Draft
Environmental Impact Statement

Panoche Valley Solar Facility
San Benito County, CA

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Transmission Line Natural Resources Assessment Report

Panoche Valley Solar Project
San Benito County, California

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1.0 Introduction

Panoche Valley Solar, LLC (PVS) proposes to construct and operate an approximate 247 megawatts (MW) solar photovoltaic energy generating facility located in San Benito County, California (Figure 1). The project would be called the Panoche Valley Solar Project (Project); the Project Footprint (Project Area) is approximately 2,506 acres in the Panoche Valley of eastern San Benito County, California, and would also include approximately 23,292 acres of Conservation Lands that are contiguous with the Project Area in San Benito and Fresno counties (Figure 1).

Due to the construction of the Project, Pacific Gas and Electric (PG&E) proposes to install optical ground wire (OPGW) on its existing Panoche-Moss Landing 230 kilovolts (kV) transmission line to establish the primary telecommunication service between the substation at the Project Footprint and Panoche Substation located 17 miles to the east of the Project. Locations of temporary study areas and permanent features needed to connect the Project's switchyard into the Panoche-Moss Landing 230 kV transmission line are shown on Figure 2.

This installation process is a routine method of providing telecommunication services between electrical substations and generating facilities or other substations and is considered maintenance to existing electrical infrastructure. The OPGW lines can be installed on existing towers with minimal or no modification to the existing towers. The purpose of the OPGW is for system protection and control of the transmission line. The OPGW line to be installed is designed to replace traditional shield wire, which protects the line by providing a path to ground, by handling electrical faults like shield wire with the added benefit of containing optical fibers which can be used for telecommunications purposes. The work along the transmission line will be of short duration at any one site (two to three weeks) and the entire installation of OPGW is planned to be completed in approximately 12 to 16 weeks.

Based on feedback expressed by the County of San Benito to support preparation of a Supplement Environmental Impact report (EIR), the Project conducted a 100 percent coverage survey of planned areas of ground disturbance associated with proposed PG&E telecommunication upgrades. Areas of planned ground disturbance were surveyed to evaluate for sensitive species known to occur in San Benito and Fresno counties, cultural resources, and state and federal jurisdictional waters. The results of the cultural resources surveys are provided in a separate report.

This survey was conducted based on planned work areas provided by PG&E as of September 15, 2014, and this subsequent report is based upon work areas provided at that time. Based on discussions with PG&E since the time of this report, modifications have been made regarding the locations of certain work areas. These changes have not been addressed in this report, but will be documented in a supplemental memorandum of this report.

2.0 Study Areas

Work activities associated with PG&E telecommunications upgrades are mostly considered temporary and will be completed during daylight hours. It is planned that existing roads and helicopters will be used to provide access to work areas wherever possible. The proposed work areas anticipated to have temporary ground disturbance include 12 temporary wire pull sites, three temporary landing zones, eight temporary guard structures, and nine wood pole temporary work areas.

Included in the survey area is a 500 foot (ft) buffer around each planned area of ground disturbance. For work areas located within proximity to one another, where the 500-ft buffers of the disturbance points overlapped, the buffers were dissolved together rather than each disturbance point having a distinct and separate 500-ft buffer. Due to this method of combining overlapping buffer areas, rather than survey 34 individual work areas along the transmission line ROW, surveys were conducted on 13 larger survey areas along the ROW. These 13 larger areas are referred to as "study areas", each with an assigned number for the purposes of this report (Figure 2). Table 1 outlines the study areas as they were grouped in the survey and as they are discussed throughout the remainder of this report.

Table 1. Study Area Descriptions

Study Area	Study Area Description	Disturbance/Work Area Acreage (approx.)	Study Area Buffer Acreage (approx.)
Work Area 1	AT&T Cable Site	0.02	20
Work Area 2	Landing Zone 1	0.34	24
Work Area 3	Wire Pull Sites 1 and 2	0.26	40
Work Area 4	Wire Pull Sites 3, 4, and 5	0.26	56
Work Area 5	Wire Pull Sites 6 and 7	0.26	39
Work Area 6	Wire Pull Sites 8 and 9, ADSS Wood Pole 1	0.29	30
Work Area 7	ADSS Wood Poles 2-9, Guard Structures 1-3, Wire Pull Site 10 and 11	1.01	116
Work Area 8	Landing Zone 2	0.34	24
Work Area 9	Guard Structures 4 and 5	0.34	26
Work Area 10	Guard Structures 6 and 7	0.34	29
Work Area 11	Guard Structure 8	0.17	22
Work Area 12	Substation OPGW underground work area, Wire Pull Site 12	2.19	49
Work Area 13	Landing Zone 3	0.34	24

The purpose of surveying a 500-ft buffer (the buffer) around each area of planned disturbance is to provide flexibility for field teams to move proposed work areas if the original position is within an area with potential to disturb sensitive resources.

The habitats within the study areas and the vicinity are comprised of annual, non-native grasslands used mainly to graze livestock in the western study areas (Study Areas 1-3), while ephedra and Allscale saltbush scrub habitat dominated the central most study areas (Study Areas 4-6). The eastern portion of the transmission upgrade project area was noted to be disturbed due to the development of agricultural (e.g. almond orchard, vineyard) and transportation (Interstate 5 and public roadways) purposes (Study Areas 7-13). Additional details on the habitat at each study area is described in Section 4.0 below. The study areas experience 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 study areas range 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.

2.1. AT&T Cable Site

AT&T will install new cable underground in the shoulder of Little Panoche Road from an existing connection point located 2,000 feet south of the Project Footprint to the site. The temporary work site will include the construction of a two feet wide by three feet deep trench to allow direct burial of the cable in compliance with state and local standards. The total area to be temporarily disturbed due to the AT&T cable installation for the project is approximately 0.02 acres. This acreage does not include the buffer area surveyed for the AT&T cable installation. The installed cables will then connect to a Network Interface Unit (NIU) measuring approximately 36 inches tall by 12 inches wide by 12 inches deep, which will be placed at the end of the cable trench line near the Project Footprint.

2.2. Wire Pull Sites

The 12 temporary wire pull sites established along the 17-mile transmission line corridor will require minor ground disturbance that should not result in permanent impact to sensitive natural and cultural resources within each necessary temporary wire pull site. Each proposed temporary wire pull site will require a work area of approximately 75-ft by 75-ft (0.13 acres) located mid-span of existing tower sites within the transmission right-of-way (ROW). The total area to be temporarily disturbed due to the wire pull sites for the project is approximately 1.42 acres. This acreage does not include the buffer area surveyed for potential wire pull sites for this project. Criteria used in selecting the final wire pull sites will include vehicle accessibility, presence of flat or nearly flat terrain adjacent to the existing transmission line route for equipment set-up, and an area that will avoid or minimize impacts to sensitive species or their habitats and other resources that would restrict work.

2.3. Landing Zones

Helicopters will be used to transport electrical workers to towers, deliver materials, and assist in pulling the OPGW from tower to tower. As presently planned, three 150-ft by 100-ft landing zones (0.34 acres) will be constructed approximately every five miles. The total area to be temporarily disturbed due to the landing sites is approximately 1.02 acres. This acreage does not include the buffer area surveyed for potential landing zones for this project. The criteria used for selecting the helicopter included an area of ground with the right topography to stage materials, pick up and transport electrical personnel and equipment, and refuel the helicopters. Establishment of these landing zones will require minimal ground disturbance and will facilitate the use of helicopters to reduce the overall impacts associated with the proposed work.

2.4. Guard Structures

Eight temporary guard structures will be necessary due to the installation of the telecommunication upgrades. The guard structures are designed to prevent tools or materials from falling into the roadway or utility, are required for overhead crossings of public roadways or existing utilities. Guard structures generally consist of two to four wooden poles and cross beams attached between the poles. They are typically installed in pairs with a net strung between them. The wooden poles will be augured and set by a line truck. Poles are anticipated to be placed in or adjacent to the disturbed road shoulder in an approximately 75-ft by 75-ft area (0.17 acres). The total area to be temporarily disturbed due to the guard structure installation sites is approximately 1.36 acres. This acreage does not include the buffer area surveyed for potential guard structure sites for this project. Installation of guard structures is not anticipated to require grading or vegetation removal, and guard structure poles will be removed following OPGW installation and the holes backfilled.

2.5. Wood Poles

Due to the existing 230 kV transmission line crossing under two existing 500 kV transmission lines, a section of approximately 4,650 feet of the 230kV will require installation of approximately nine new wood poles within the existing ROW. Within this 4,650 foot section, an All-Dielectric Self-Supporting (ADSS) fiber optic cable would be spliced from the 230 kV towers to the east and west sides of the 500 kV transmission line corridor and attached to the nine new wood poles. The poles will be located at a 30-ft to 40-ft offset to the existing 230 kV centerline and within the ROW. Installation of these poles will require a work area of 30-ft by 40-ft each (0.03 acres per pole installation site) to accommodate one crew truck and a trailer truck to transport each pole to the site, and a line truck to auger a hole about eight-feet deep and two-feet wide. The total area to be temporarily disturbed due to the wooden pole installation sites is approximately 0.27 acres. This acreage does not include the buffer area surveyed for potential wood pole sites for this project. Installation of the wooden poles is not anticipated to require grading or vegetation removal. However, the wooden poles themselves will remain in place as permanent structures but have a minimal overall impact footprint.

2.6. Optical Ground Wire Underground Installation

A section of approximately 75-ft by 1,200-ft (2.06 acres) will require for the installation of a section of OPGW underground within the existing ROW paralleling West Panoche Road, entering the eastern existing substation. This acreage does not include the buffer area surveyed for the potential OPGW underground installation site for this project. Installation of this underground section will require the above stated work area to accommodate the necessary equipment to either bore or trench the OPGW to the existing substation connection point. The total area to be temporarily disturbed due to the installation, however, the site will be restored to its original contours and elevations upon completion of the installation.

3.0 Transmission Line Assessment Methods

The following general methods for state and federal protected species surveys were used to inventory the study areas within the transmission line upgrade project area.

3.1. Sampling Location Selection

Locations for the necessary work areas were selected by PG&E based on topography, access and the constraints of splicing and pulling OPGW with a helicopter. Study areas were then created using a 500-ft buffer around each chosen work area.

3.2. Compile Existing Information

Prior to conducting the field assessments, existing information concerning sensitive species with potential to occur in the San Joaquin Valley was reviewed. Special status species with potential to occur are provided in Appendix A. Based on preliminary desktop review of potential sensitive species, surveyors evaluated each study area for indications/signs of the absence or presence of the following federally endangered, federally threatened, and/or California fully protected species or their habitats: longhorn fairy shrimp (*Branchinecta longiantenna*; LHFS), conservancy fairy shrimp (*Branchinecta conservation*; CFS), vernal pool fairy shrimp (*Branchinecta lynchi*; VPFS), vernal pool tadpole shrimp (*Lepidurus packardi*; VPTS), blunt-nosed leopard lizard (*Gambelia sila*; BNLL), California red-legged frog (*Rana draytonii*; CRF), California tiger salamander (*Ambystoma californiense*; CTS), golden eagle (*Aquila chrysaetos*; GOEA), white-tailed kite (*Elanus leucurus*; WTKI), California condor (*Gymnogyps californianus*; CACO), giant kangaroo rat (*Dipodomys ingens*; GKR), San Joaquin kit fox (*Vulpes macrotis mutica,* SJKF), San Benito evening-primrose (*Camissonia benetensis*), California jewel-flower (*Caulanthus californicus*), and San Joaquin woollythreads (*Monolopia congdonii*). In addition to these federally endangered, federally threatened, and/or California fully protected species, surveyors evaluated each study area for indications/signs of the absence or presence of other special status species or their habitats listed in Appendix A.

<u>Longhorn Fairy Shrimp</u>

The LHFS is currently listed as endangered under the Federal Endangered Species Act (ESA). Male LHFS are distinguished from other fairy shrimp by the second antennae, which is about twice as long, relative to its body size, as the second antennae from other species. Females are distinguished by their cylindrical brood pouch that extends below abdominal segments six and seven. Helm (1998) conducted a survey for fairy shrimp, during which LHFS were identified in alkaline pools and rock outcrop pools. Pools containing LHFS ranged from 4.6 to 2,788 m^2 with an average of 678 m^2. Pool depths ranged from 10 to 40 cm and averaged 23.1cm. Additionally, pools inhabiting LHFS generally had a near neutral pH, and temperatures ranging from 10 to 28°C. All pools with extant populations dry out during the summer and fall, which is required for the inundation cycle of LHFS to trigger hatching. The LHFS is very rare and only known from eight distinct populations in San Luis Opisbo, Merced, Contra Costa, and Alameda Counties (USFWS 2005).

Conservancy Fairy Shrimp

The CFS is currently listed as endangered under the ESA. The CFS is distinguished from other fairy shrimp by variations on the male's second antennae, which has a shorter distal segment than basal segment and is bent approximately 90°, and the female's brood pouch, which is tapered on each end and extends to the eighth abdominal segment (Eng et al. 1990). The CFS is generally off-white to gray with potential for green or yellow on the brood pouch. Suitable habitat for CFS includes vernal pools, alkaline pools, and vernal lakes (Helm 1998). The average pool size for CFS is 27,865 m^2, which is larger than all other endemic California brachiopods. Pools occupied by CFS commonly have low alkalinity, low total dissolved solids, a near neutral pH, and are dominated by native vernal pool plants (USFWS 2005). Similarly to the LHFS, CFS requires a dry period in the summer and fall for inundation to trigger hatching.

Vernal Pool Fairy Shrimp

The VPFS is currently listed as threatened under the ESA. The VPFS are distinguished from other fairy shrimp by the presence and size of several mounds on the male's second antennae and by the female's short, pyriform brood pouch. VPFS are typically a translucent off-white to grey and vary in size from 11 to 25 mm in length (Eng et al. 1990). Helm (1998) found VPFS in 21 different types of habitat, including vernal pools, vernal swales, alkaline pools, and road-side ditches. Optimal pools tend to be a neutral to slightly alkaline pH, have low dissolved salts, and are dominated by native vernal pool plants. Additionally, all pools must have a dry period in the summer and fall to enable the inundation cycle to trigger hatching.

Vernal Pool Tadpole Shrimp

The VPTS is currently listed as an endangered species under the ESA. The VPTS is identified by a large, shield-like carapace that covers the anterior half of the body. They have 30 to 35 pairs of phyllopods, a segmented abdomen, and paired cercopods or tail-like appendages. Mature VPTS range from 15 to 86 mm (USFWS 2005). VPTS are typically green, but coloration may vary from clear to tan, depending on water clarity (Yolo Natural Heritage Preserve 2009). Helm (1998) found VPTS in 17 different types of habitat, including alkaline pools, vernal pools, vernal swales, ditches, road ruts, and stock ponds. Average occupied pool size was 1,828 m^2, and occupied pool depth ranged from two to 151 cm, with an average of 15.2 cm. Optimal pools are neutral to slightly alkaline, clear, low in dissolved solids, and dominated by native vernal pool plants. Unlike other vernal pool crustaceans, VPTS eggs do not require a dry period before hatching, although they do require inundation.

Blunt-nosed Leopard Lizard

The BNLL are already known to occur in the Project's conservation lands and are currently listed as endangered under the ESA and by the California Endangered Species Act (CESA). BNLL are quite often the largest lizard throughout its range, and coloration can vary greatly. Background colors on the dorsal surface can range from yellowish, light gray or dark brown depending on the surrounding soil and vegetation. The ventral surface is uniformly white. The color pattern on the back consists of longitudinal rows of dark spots interrupted by white, cream, or yellow bands. These cross bands can aid in distinguishing the BNLL from other leopard lizards; the cross bands of the BNLL are much broader, more distinct, and extend from the lateral folds on each side of the body.

One common characteristic of most BNLL habitat is sparse vegetation, though vegetation does not preclude this species. BNLL rely mainly on speed to avoid predators and catch prey. A thick cover of herbaceous vegetation impedes BNLL movement, making them more vulnerable to predators and less likely to capture prey. In areas with thick herbaceous vegetation, BNLL will utilize barren washes and roads (Warrick et al. 1998). Adult BNLL emerge from below ground dormancy in early- to mid-April and remain active into July and August (Germano and Williams 2005, CDFG 2004). The BNLL is generally absent from areas of steep slopes and dense vegetation, and areas subject to seasonal flooding (USFWS 2010).

California Red-legged Frog

The CRF is currently listed as a threatened species under ESA. The CRF is a medium-sized frog with smooth skin, webbing on the hind feet, and ridges on the sides of the frog. The CRF is reddish-brown or brown, gray, or olive with small lack spots on the back and sides and dark banding on the legs. The hind legs and lower belly are red underneath, and the chest and throat are creamy and marbled with dark gray. Tadpoles are brown and marked with small dark spots, creamy white coloring with small specks on the lower body, and often rows of dorsolateral lights spots running back from behind the eyes (Nafis 2014).

The CRF is typically found in or near water in humid forests, woodlands, grasslands, coastal scrub, and streamside habitats, but do move overland at times and can be found in damp places far from water, including cool and moist bushes. Breeding habitat is in ephemeral water sources including lakes, ponds, reservoirs, slow streams, marshes, bogs, and swamps. The CRF is typically found active all year except in wetlands that dry out in summer, where frogs will estivate in moist refuges until the late fall rains. Breeding occurs from late November to April, depending on the location (Nafis 2014).

California Tiger Salamander

The CTS is currently considered a threatened species under ESA and is a state threatened candidate under CESA. The CTS is characterized by a broad head, small eyes, and tubercles on the side of the feet. Coloration is a black back with yellow, cream, or white oval spots or bars. Some individuals may have a prominent cream band on the undersides. Snout-vent length ranges from 7.6 – 12.7 cm, and total length ranges from 15 – 22 cm (Stebbins 1966; 2003).

Ephemeral vernal pools, which refill with water on a yearly basis, that are 40 – 80 cm in depth and have a surface area of 0.2 hectares or more are optimal for breeding CTS; although small, shallower pools will also house breeding CTS (Stokes et al. 2008). Stokes et al. (2008) found no CTS larvae in pools with an average depth of less than 22 cm. There is a narrow range of pool depths where the pool will not completely dry out before CTS have metamorphosed, but also not contain water year round and house predators. Metamorphosed CTS move out of the vernal pools and into upland habitats. Small mammal burrows are important features of upland habitat. Adult CTS occupy small mammal burrows in grassland, savanna, or open woodland habitats (Trenham and Shaffer 2005). Adults can generally be found at breeding pools from October through May, although breeding is highly dependent on the amount of precipitation (Trenham et al. 2001; Trenham and Shaffer 2005). Adult CTS leave the breeding pools in late spring and return to upland habitats. CTS larvae were observed in two off-site ponds during CTS Protocol Larval Surveys during the 2009-2010 rainy seasons.

Golden Eagle

The GOEA is currently listed as a state fully protected species. The GOEA is one of the largest birds in North America with a wingspan of up to 220 cm. The GOEA has broad wings with a relatively small head and long tail. Adults are dark brown with a golden sheen on the back of the head and neck. For the first several years, juveniles have a defined white patch at the base of the tail and wings. The GOEA are generally found alone or in pairs, soaring with wings slightly lifted and wingtip feathers spread apart (Cornell Lab of Ornithology 2014).

The GOEA are known to inhabit partial or complete open country, particularly near mountains, hills, and cliffs. GOEA are known to use a variety of habitats including tundra, shrublands, grassland, coniferous forests, farmland, and along rivers and streams. The GOEA nest in trees and on cliffs and steep escarpments in grassland, chaparral, shrubland, forest, and other vegetated areas (Cornell Lab of Ornithology 2014).

White-tailed Kite

The WTKI is currently listed as a state fully protected species. The WTKI is a medium-sized raptor with a wingspan of up to 38 cm. The WTKI has long, narrow, pointed wings and a long white tail. The back and wings of the WTKI is gray, while the face and underside are white. A black spot can be seen on inner portion of wings. WTKI have red eyes as adults and yellow eyes as juveniles. Juveniles look similar otherwise but have buffy streaks on the breast and head, and gray with white-tipped feathers on the back (Cornell Lab of Ornithology 2014).

The WTKI is often found in savanna, open woodlands, marshes, desert grassland, partially cleared lands, and cultivated fields. Areas with extensive winter freezes are avoided, but rainfall and humidity vary greatly throughout the bird's range. Hunting is done over lightly grazed or ungrazed fields. The WTKI typically nests in the upper third of trees that may be 3-49 m tall. Nesting trees may be open-country trees in isolation or within a forest. Characteristic hunting behavior consists of the WTKI hovering in a stationary position up to 24 m off the ground before dropping straight down onto prey (Cornell Lab of Ornithology 2014).

California Condor

The CACO is currently considered a fully protected species, as well as a state and federally endangered species. With a wingspan of 2.8 meters and a broad, wedge-shaped tail, the CACO is the largest soaring bird in North America and one of the largest flying birds in the world. Adult birds are generally black, with mostly bald heads and necks. The bill is long, hooked at the end, and enveloped with flesh along the majority of its length. A feathered ruff is located at the base of the neck into which the neck and lower head can be withdrawn in order to warm the bird. White feathers of the underwing coverts and white tips on the upperwing coverts produce an elongated triangle on the leading half of the wing undersides and a white bar on the upperwing, respectively (Cornell Lab of Ornithology 2014).

The CACO is a habitat generalist, nesting in areas as diverse as chaparral and snow-covered montane forests. Nesting sites typically occur in cliff cavities, large rock outcrops, and large trees. Roosting sites are usually nearby (Snyder and Schmitt 2002, USFWS 1996). Both types of sites require isolation from human disturbance. The CACO locates its food by sight, not olfactory receptors, so open areas with little brush to conceal carrion are required. Cliffs and tall conifers, including dead snags, are generally utilized as roost sites. The closest known nests are located in the Pinnacles to the southwest of the project.

Giant Kangaroo Rat

GKR are already known to occur in the Project Footprint and Project's conservation lands and are currently listed as endangered under the ESA and by the CESA. The GKR is large relative to other rodents in the area, and has a brownish coloration with a light brown tail tip. The Panoche Region in western Fresno and eastern San Benito Counties is currently identified as one of the six major geographical units for remaining GKR populations (USFWS 1998).

GKR live in burrow systems referred to as precincts; a typical precinct has three burrows that are independent of one another and not interconnected (Williams and Kilburn 1991). The GKR is primarily a seed-eater, but occasionally consumes green plants and insects. Foraging takes place year round in all types of weather from around sunset to near sunrise, and most activity takes place within two hours of sunset. The ability to transport large quantities of seeds in cheek pouches, coupled with the highly developed seed curing and caching behaviors, probably allows GKR to endure prolonged droughts of one or two years without major regional population effects (Williams et al. 1993).

San Joaquin Kit Fox

SJKF are already known to occur in the Project Footprint and Project's conservation lands and are currently listed as endangered under the ESA and threatened by the CESA. The kit fox is the smallest canid species in North America, and the SJKF is the larger of the two subspecies. Kit foxes have a relatively small, slim body, large ears set close together, and a long, bushy tail tapering toward the tip. The tail is usually carried low and straight. The most common colorations are described as buff, tan, or yellowish-gray on the body. Two distinctive coats develop each year: a tan summer coat, and a silver-gray winter coat. The tail is distinctly black tipped.

Preferred habitat is often dependent on the density of kangaroo rats and lagomorphs, the two favored prey items of SJKF. SJKF occupy several dens throughout their home range during the year. Dens are usually modified ground squirrel, badger, or coyote dens and can be up to 2.3 m deep (Tannerfeldt et al. 2003).

San Benito Evening-primrose

The San Benito evening-primrose is currently considered threatened by the ESA and is included in the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants on list 1B.1. The San Benito evening-primrose is an annual herb with peeling stems ranging from 3 to 20 cm long and wiry branches. Leaves are narrow and 7 to 20 mm long with small, sharp-toothed edges. Flowers contain four sepals that are approximately 3.3 mm long and four petals that are approximately 3.7 mm long. Petals are yellow and fade to reddish, and have two red dots at the base. Bloom period for the species is April to June. The San Benito evening-primrose is typically located in areas with soils that are slightly saline with a pH of 6 to 8.6 on serpentine alluvial terraces within the Clear Creek and San Carlos Creek drainages. It has been observed at elevations ranging from 630 to 1,410 meters above sea level, in areas with precipitation ranging from 43 to 63.5 cm (BLM 2010, Calflora 2014).

California Jewel-flower

The California jewel-flower is currently considered endangered by the ESA and CESA, and is included in the CNPS Inventory of Rare and Endangered Plants on list 1B.1. The California jewel-flower is an annual herb with basal and non-basal leaves. Basal leaves are wavy with a winged stem and are generally less than 11 cm long. Non-basal leaves are pear-shaped to round, with toothed edges. Flowers have 4 to 8 sepals ranging from 4 to 10 mm in length, and whitish petals with purple veins that are 6 to 11 mm long. Bloom period for the species is February to March. The California jewel-flower is generally located in flat, gently sloping areas in shadscale scrub, valley grassland, and pinyon-juniper woodland communities. It has been observed at elevations ranging from 68 to 975 meters above sea level (BLM 2010, Calflora 2014).

San Joaquin Woollythreads

The San Joaquin woollythreads is currently considered endangered by the ESA, and is included in the CNPS Inventory of Rare and Endangered Plants on list 1B.2. The San Joaquin woollythreads is a woolly annual herb. The San Joaquin woollythreads are generally 5 to 30 cm long with smooth, narrow leaves approximately 1 to 4.5 cm long with wavy edges. The ray flowers have 3-lobed yellow petals, and the disks of the flowers are 4-lobed, yellow, and bell-shaped. Blooming period for this species is February to May. The San Joaquin woollythreads are generally found in sandy or clayey grasslands. San Joaquin woollythreads have been observed at elevations ranging from 60 to 750 meters above sea level (BLM 2010, Calflora 2014).

3.3. Sensitive Species Assessment Methods

Field assessments used a transect sampling system whereby parallel transects spaced 30-meters (m) apart were evaluated by four biologists for the presence of sensitive species known to occur in the habitats found in the study areas in San Benito and Fresno counties. In addition to sensitive species, potentially jurisdictional state or federal waters were also evaluated within the study areas. Within each Study Area, surveyors visually inspected an area extending 15-m either side of each transect line. A fifth survey crew member surveyed each area for potential cultural resources.

<u>Longhorn Fairy Shrimp, Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, and Vernal Pool Tadpole Shrimp</u>

Surveys for these vernal pool brachiopods are typically required to be conducted by surveyors permitted by the USFWS, and must be completed during the full wet season survey and full dry season survey (USFWS 1996). Though the transmission line survey was conducted outside the general vernal pool brachiopod survey protocol, the overall purpose of this survey for LHFS, CFS, VPFS, and VPTS was to assess potential habitat within each study area. Potential vernal pool brachiopod habitat was assessed based on topography, local hydrology, and geology. Transects were spaced 30-m apart and surveyors walked on adjacent transect lines, surveying 15-m on either side of their line and stopping occasionally to scan for activity

<u>Blunt-nosed leopard lizard</u>

In order to survey for BNLL consistent with CDFW guidelines, a minimum of two surveyors are required to slowly walk on parallel transects spaced no further than 30m apart, occasionally stopping to scan for BNLL using binoculars over 17 days between adult and hatchling periods from April to September. All biologists conducting this survey were Level II BNLL surveyors with greater than 100 survey days completed. Though this transmission line survey was conducted outside of the time period set forth in the BNLL survey protocol (CDFG 2004) and, at some points, outside of the weather constraints, the overall goal of this survey for BNLL was to assess potential habitat within each study area. Potential BNLL habitat was assessed based on topography/terrain, vegetation, and presence of suitable burrows. Transects were spaced 30-m apart and surveyors walked on adjacent transects lines, surveying 15-m on either side of their line and stopping occasionally to scan for activity.

<u>California Red-legged Frog</u>

The CRF survey methodology involves surveying for possible breeding pools and other potential habitat. Surveyors are required to be familiar with the vocalizations of the CRF. Protocol surveys must be completed between January and the end of September and generally consists of eight surveys, two day surveys and four night surveys during breeding season, and one day and one night survey during non-breeding season. The survey is conducted over a minimum period of six weeks (USFWS 2005). Although the transmission line survey was conducted outside the general CRF survey protocol, the overall purpose of this survey for CRF was to assess potential habitat within each study area. Potential CRF habitat was assessed based on local hydrology with particular attention paid to areas with potential to serve as breeding pools. Transects were spaced 30-m apart and surveyors walked on adjacent transect lines, surveying 15-m on either side of their line and stopping occasionally to scan for activity.

California Tiger Salamander

Surveying for CTS consists of inspecting transect lines for evidence of the small mammal burrows that could contain CTS and potential breeding pond habitat. Drift fence studies during the fall and winter are the primary method used to study CTS in upland habitats (USFWS 2003). Although the transmission line survey was conducted outside the general CTS survey protocol, the overall purpose of this survey for CTS was to assess potential habitat within each study area. Potential CTS habitat was assessed based on presence of small mammal burrows and local hydrology, with particular attention paid to areas with potential to serve as breeding pools. Surveying for CTS was conducted concurrently with other sensitive species discussed. Surveyors walked on parallel 30-m spaced transects inspecting the line and 15-m on both sides of the line, stopping occasionally to scan the area with binoculars. CTS are known to travel up to 1.2 miles from their breeding ponds to estivate; however, no survey for potential CTS breeding ponds was completed as part of this study.

Golden Eagle, White-tailed Kite, and California Condor

Surveying for the GOEA, WTKI, and CACO was conducted concurrently with the aforementioned sensitive species. Surveyors walked along 30-m spaced transects, occasionally stopping to scan the sky for the presence of the GOEA, WTKI, CACO, or other avian species. Evidence of nests or previous nesting was noted in study areas with cliffs, trees, or other substrate suitable for nests.

Giant Kangaroo Rat

Surveying methods for GKR consist of surveyors walking on parallel 30-m spaced transects inspecting each transect, including 15-m on either side, for evidence of GKR precincts. Burrow precincts were considered active based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and cropped vegetation around a series of suitably sized horizontal and vertical burrow openings. Precincts that did not appear to be occupied were also identified and mapped as inactive. Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings and the surrounding area are devoid of all sign (fresh scat, tracks, fresh digging, and cropped vegetation).

San Joaquin Kit Fox

The San Joaquin kit fox survey methodology involves looking for dens and additional sign. The survey methodology used consisted of surveyors walking neighboring transects spaced 30-m apart to detect the dens that could be utilized by the species. Surveyors noted any known, natal, and potential kit fox dens, as well as latrines and tracks on loose earth observed within the work areas.

San Benito Evening-primrose , California Jewel-flower, and San Joaquin Woollythreads

Surveying for the San Benito Evening-primrose, California Jewel-flower, and San Joaquin Woollythreads was conducted concurrently with the aforementioned special status species. The survey methodology used consisted of surveyors walking neighboring parallel transects spaced 30-m apart, inspecting 15-m on either side of each transect for evidence of these plant species.

3.4. State and Federal Jurisdictional Waters Survey Methods

The following general methods for state and federal jurisdictional water surveys were used to inventory the study areas within the transmission line upgrade project area.

Clean Water Act

Potentially federal jurisdictional waters of the U.S., including wetlands, were assessed in the field for the transmission line and associated ground disturbance areas. Surveyors walked transects spaced 30-m apart, noting any topographic low with a defined bed and bank. During the on-site assessment, the sites were evaluated for drainage areas and potentially jurisdictional waters of the U.S. located within the proposed work areas and associated the larger study areas. The determination for jurisdictional waters of the U.S., including wetlands, was performed utilizing the Routine On-Site Determination Method as defined in the USACE Wetlands Delineation Manual (1987). This technique uses a three parameter approach, which requires positive evidence of:

- Hydrophytic vegetation
- Hydric soils
- Wetland hydrology

Areas exhibiting the above three wetland characteristics, as well as surface waters, are considered jurisdictional. Drainage features were also evaluated for the presence of continuous bed and bank and evidence of an ordinary high water mark (OHWM), in accordance with USACE Regulatory Guidance Letter No. 05-05, Ordinary High Water Mark Identification, and the Environmental Protection Agency (EPA) Draft Guidance on Identifying Waters Protected by the Clean Water Act (2011). Drainages with continuous evidence of bed and bank and an OHWM are typically considered jurisdictional.

The Project Area, including the transmission line and associated ground disturbance areas, is located within the Arid West Region. Soil samples were taken and Wetland Determination Data Forms (Arid West Region) were completed at any point with defined bed and bank and hydrophytic vegetation or an OHWM.

Other State Regulated Waters

Additional state regulated drainages were also assessed in the field. Notification is required for any alteration of a river, stream, or lake that flows at least intermittently through a bed or channel. Within each study area, for any drainage feature observed a Lake and Streambed Alteration Agreement (LSAA) Notification Drainage Survey Form was completed, including the presence of water, a defined bank, flow characteristics (ephemeral, intermittent, river, etc.), the presence of riparian habitat, and any additional notes. All forms were completed in accordance with the State of California Department of Fish and Game Code (Section 1602) requirements for notification. The Notification will be submitted only if alteration of a drainage feature is necessary.

4.0 Study Area Surveys Results

The survey was conducted from September 15 through September 18, 2014. Weather conditions were conducive to the survey and generally ranged from 75-100°F with winds of 5-15 mph. Based on field assessments, the majority of the planned sites for ground disturbance are areas in which there will be little to no disturbance of sensitive species, jurisdictional waters, or cultural resources. Photographs for each work area are presented in Appendix B.

4.1. Survey Results Study Area 1

Study Area 1, is a 2,000 linear foot disturbance planned along the shoulder of Little Panoche Road, consisting of the AT&T Cable Site that will be trenched for the installation of copper (Figure 3 and Table 1). Study Area 1 is located adjacent to the Project Area to the south within the Valley Floor Conservation Lands and is intersected by Little Panoche Road running north-south through the area (Appendix B and Figure 3). Trenching is planned along the Little Panoche Road shoulder; however, the habitat of the greater Study Area 1 (including the buffer) is considered disturbed (e.g. grazing) and is dominated by non-native and native species such as Russian thistle (*Salsola tragus*), red brome, procumbent pigweed (*Amaranthus blitoides*), bindweed (*Convolvulus arvensis*), Lamb's quarters (*Chenopodium album*), doveweed (*Croton setigerus*), Jimson weed (*Datura wrightii*), and redstem filaree. For a complete vegetation list please see Appendix B of this report.

No sensitive resources were observed within the disturbance area planned for trenching and communications wire/fiber installation, although evidence of use by sensitive species was observed within other portions of the associated buffer. An active GKR precinct was observed near the western edge of Study Area 1 and a fresh badger dig was observed near the southern edge of the study area, though no badger scat was noted near the dig (Figure 3). No federal or state regulated waters were observed in Study Area 1. As depicted in Figure 3, Study Area 1 overlaps with an existing proposed Project BNLL buffer zone. Work on the AT&T Cable Site will be conducted strictly along the shoulder of Little Panoche Road to avoid burrows potentially inhabited by BNLL or other sensitive species known to occur in the project area.

Despite no sensitive species being observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.2. Survey Results Study Area 2

Study Area 2 is an approximate 24 acre area within the Valley Floor Conservation Lands that includes Landing Zone 1 (Figure 4 and Table 1). Study Area 2 will be used for staging materials, picking up and transporting electrical personnel and equipment, and refueling helicopters. The habitat of Study Area 2 is considered disturbed due to heavy livestock grazing and is dominated by non-native grasses with some spares saltbush scrub habitat present (Appendix B). Some of the primary vegetative species observed in this area include soft chess (*Bromus hordeaceus*), Allscale saltbush (*Atriplex polycarpa*), vinegar weed (*Trichostema lanceolatum*), tumbling orach (*Atriplex rosea*), Russian thistle, prostrate spurge (*Chamaesyce ocellata ssp. ocellata*), common fiddleneck (*Amsinckia intermedia*), and shiny peppergrass (*Lepidium nitidum*). A complete list of observed vegetative species is provided in Appendix B.

Sensitive resources were minimal within Study Area 2 (Figure 4). No sensitive resources were observed within the 0.34 acre disturbance area, and only one recent badger dig was observed on the northern edge of the buffered study area. No federal or state regulated waters were observed in Study Area 2.

Based on discussions with PG&E since the completion of this survey, Landing Zone 1 located within Study Area 2 will be relocated due to its overlap with an existing proposed Project BNLL buffer zone (Figure 4). The new location of Landing Zone 1 will be determined later by PG&E.

Although no sensitive species were observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.3. Survey Results Study Area 3

Study Area 3 (including the associated buffer) is approximately 40 acres and is located partially within the Valley Floor Conservation Lands and includes Wire Pull Sites 1 and 2 (Figure 4 and Table 1). Study Area 3 will be used for two temporary wire pull/splice sites, one staged on either side of the existing transmission tower. The habitat of Study Area 3 is similar to Study Area 2, as the areas are within 0.4 miles of each other. The study area is characterized by livestock grazed, non-native grasses with some sparse saltbush scrub habitat in the outer limits of the study area (Appendix B). Some of the most common species observed include red brome, redstem filaree, vinegar weed, angle-stem wild buckwheat (*Eriogonum angulosum*), tumbling orach, prostrate spurge, shiny peppergrass and Allscale saltbush. A complete list of vegetative species observed is located in Appendix B.

Study Area 3 had evidence of BUOW, GKR, SJKF, and SJAS (Figure 4). BUOW white wash was observed at several fence posts and pellets were noted at one post in the eastern portion of the study area. Inactive and active GKR precincts were observed throughout the southern portion of the study area. A SJKF latrine with old scat was observed in the eastern portion of the work area, and a SJAS was observed in the northern portion of the work area. Though evidence of several species was noted at Study Area 3, none of the observations were within the planned 75-ft by 75-ft area of temporary disturbance (Figure 4). Additionally, a small drainage was noted near the southeastern boundary of Study Area 3 which is potentially Other State Waters and may require permitting if planned locations for disturbance areas are modified.

Although no sensitive species were observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.4. Survey Results Study Area 4

Study Area 4 is located in the hills 5.5 miles east of the Project Footprint within the Bureau of Land Management (BLM) Lands and consists of approximate 56 acres which includes the associated buffer (Figure 5). Study Area 4 includes Wire Pull Sites 3, 4, and 5 (Table 1), though final design of Wire Pull sites will only utilize two of the three locations. After the initial survey of Study Area 4 found the area to have highly variable topography and potential rare plant species, the survey was extended westward to determine if working around an alternative existing transmission tower would serve as a viable option for a wire pull/splice site. Study Area 4 will be used for two temporary wire pull/splice sites, one staged on either side of an existing transmission tower. Study Area 4 is located in rolling hills, dominated by non-native grasses and a natural scrub community (Appendix B). Some of the most common vegetative species observed in this area include Mediterranean grass (*Schismus arabicus*), vinegar weed, red brome, interior goldenbush (*Ericameria linearifolia*), California ephedra (*Ephedra californicus*), California matchweed (*Guitierrezia californica*), shiny peppergrass, and common fiddleneck. A complete list of vegetation observed is found in Appendix B.

Sensitive resource observations at Study Area 4 included inactive GKR precincts, a badger burrow, an SJKF latrine, and potential rare plant occurrences (Figure 5). All observations were made within the study area buffer but outside the 0.13 acre disturbance areas planned for potential wire pull sites. The sensitive species observations were generally located along the southern portion of the study area (Figure 5). GKR precincts observed were considered inactive due to the presence of bleached scat and hardened backfilled vertical burrows and lack of fresh sign. The badger burrow noted in this study area was in good condition but no recent sign was observed in the vicinity of the burrow. Sensitive vegetative species were particularly difficult to identify to the species level during the survey, due to the time of year and lack of flowers present; however, the potential rare plant observed is from the genus *Navarretia*, which includes 56 different species, 22 of which are considered rare in the State of California. All observations made at Study Area 4 were within the southern portion of the study area buffer, outside of the planned 75-ft by 75-ft ground disturbance areas. While sensitive resources do not inhibit this location as a wire pull site, the topography may serve as a limiting factor. No federal or state regulated waters were observed in Study Area 4.

While sensitive species were not observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.5. Survey Results Study Area 5

Study Area 5 is an approximate 39-acre portion of land (including the buffer) located within BLM lands approximately 10 miles east of the Project Footprint (Figure 6) which includes Wire Pull Sites 6 and 7 (Table 1). Study Area 5 will be used for two temporary wire pull/splice sites, one staged on either side of the existing transmission tower. Study Area 5 is located within the Allscale scrub alliance and appears to be occasionally used recreationally by all-terrain vehicles (ATV) (Appendix B). Some of the primary vegetative species observed in Study Area 5 include Allscale saltbush, tumbling orach, tocalote (*Centaurea melitensis*), common fiddleneck, prostrate spurge, angle-stem buckwheat, California buckwheat (*Eriogonum fasciculatum*), and redstem filaree. A complete list of observed vegetative species is found in Appendix B.

No evidence of sensitive resources were observed within the 0.13 acre planned disturbance area of Study Area 5, though evidence of use by the SJKF was observed in larger study area (Figure 6). A known SJKF den was observed in the southwestern portion of the study area where bones and prey remains were noted, in addition to somewhat fresh scat observed in the northeastern portion of the study area. Additionally, three drainages were noted along the northern boundary of Study Area 5 which are potential Other State Waters and may require permitting if planned locations for disturbance areas are modified.

Although no sensitive species were observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.6. Survey Results Study Area 6

Study Area 6 is comprised of Wire Pull Sites 8 and 9 and ADSS Wood Pole Site 1 (Figure _ and Table 1). Study Area 6 is an approximately 30 acre area (including the 500-ft buffer) located approximately 12 miles east of the Project Area (Figure 7). The separation of Study Area 6 from Study Area 7 was a decision made in the field based on access and overall habitat differentiation between the two study areas. Study Area 6 is located within a more diverse habitat that includes steep slopes with loose sediment, Allscale scrub alliance, and a large wash with high ATV use (Appendix B). Some of the primary vegetative species observed at Study Area 6 include alkali goldenbush (*Isocoma acradenia* var. *bracteosa*), California matchweed, Russian thistle, wirelettuce (*Stephanomeria pauciflora*), allscale saltbush, saltcedar (*Tamarix ramosissima*), alkali heliotrope (*Heliotropium curassavicum* var. *osculatum*), and California buckwheat. A complete list of vegetative species observed is located in Appendix B.

Sensitive biological resources were not noted within Study Area 6 during the surveys; however, the northwestern portion of the buffered study area extends into Panoche Creek, a federally jurisdictional water feature (Figure 7). The creek was dry at the time of the site visit, but exhibited evidence of wetland hydrology and hydrophytic vegetation. Wetland hydrology primary indicators observed include drift deposits, surface soil cracks, and salt crust. Hydrophytic vegetation included saltgrass (*Distichlis spicata*), annual beard grass (*Polypogon monspeliensis*), and saltcedar. Wetland Determination Data Forms for this area are found in Appendix C.

Although no sensitive species were observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.7. Survey Results Study Area 7

Study Area 7 consists of ADSS Wood Pole Sites 2-9, Guard Structures 1-3, and Wire Pull Sites 10 and 11 (Figure 7 and Table 1). Study Area 7, including the buffer, extends southeast-northwest for approximately 1 mile, comprising approximately 116 acres located 1.25 miles west of Interstate 5 (Figure 7). Study Area 7 will be used for several tasks necessary for the transmission line upgrade. Uses within this study area include: two temporary wire pull/splice sites, one staged on either side of the existing transmission tower; three guard structure sites where wood poles will be augered with net strung between them to catch any falling tools or other materials that could fall into the intersected public roadway; and eight ADSS wood pole sites where line trucks will auger holes eight feet deep and two feet wide for the wood poles. This study area is located almost entirely within a mixture of well-maintained pomegranate orchards and vineyards that had no herbaceous layer (Appendix B). Surveying methodology varied due to the high farming activity occurring throughout the week of surveys. Rather than survey 30-m transects within the vineyard and orchard that comprise Study Area 7, surveyors drove the primary roads of the vineyard and orchard at approximately 2 mph and inspected for burrow complexes and plant species between crop rows. When potential evidence of activity was observed surveyors walked the row to inspect the observation. No sensitive resources were noted within this study area (Figure 7). Panoche Creek, a federally jurisdictional water feature, intersects the northwestern boundary of the study area. The presence of Panoche Creek along the study area boundary may limit the movement of these various work areas.

Despite no sensitive species being observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.8. Survey Results Work Area 8

Study Area 8 is an approximate 24 acre area approximately one mile west of Interstate 5 (Figure 8) that includes Landing Zone 2 (Table 1). Study Area 8 will be used for staging materials, picking up and transporting electrical personnel and equipment, and refueling helicopters. Study Area 8 is located directly adjacent to Study Area 7 to the north. The southern portion of the study area is located within disturbed land developed with vineyards, while the northern portion is situated partially within the federally jurisdictional Panoche Creek and partially within a disturbed cleared work area used by the farmers to store equipment (Appendix B). Vegetative species at this work area were observed within Panoche Creek, due to the complete clearing of the northeastern portion of the area and the strict maintenance of the vineyards in the south. Some of the species observed within Panoche Creek include tree tobacco (*Nicotiana glauca*), saltcedar, big saltbush (*Atriplex lentiformis*), common sow thistle (*Sonchus oleraceus*), prostrate spurge, Jimson weed, procumbent pigweed, and alkali goldenbush. A full list of vegetation observed is located in Appendix B.

No evidence of sensitive species was observed within the 0.34 acre planned disturbance areas of Study Area 8, though evidence of use by the American badger was observed in the larger study area (Figure 8). American badger burrows were observed in the west-northwestern portion of

Study Area 8 within Panoche Creek. The presence of the federally jurisdictional Panoche Creek directly west/northwest of the planned disturbance area limits movement of this landing zone.

Although no sensitive species were observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.9. Survey Results Study Area 9

Study Area 9 is an approximate 26-acre area located approximately 0.5 miles west of Interstate 5 (Figure 8) that includes Guard Structures 4 and 5 (Table 1). Study Area 9 will be used for guard structure sites where wood poles will be augered with net strung between them to catch any falling tools or other materials. Study Area 9 is located entirely within an almond orchard, with West Panoche Road intersecting the northern portion of the study area running roughly southwest-northeast (Appendix B). Some of the vegetative species observed at this study area include procumbent pigweed, prostrate spurge, redstem filaree, cheeseweed (*Malva parviflora*), bindweed, common fiddleneck, Lamb's quarter, and red brome.

No sensitive resources were observed within the planned 0.17 acre areas of disturbance for guard structures. The only noteworthy observation made in Study Area 9 is the sighting of a great horned owl (*Bubo virginianus*) which was flushed during the survey of the southeastern portion of the study area (Figure 8). No nest was observed in the area. No federal or state regulated waters were observed in Study Area 9.

Although no sensitive species were observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.10. Survey Results Study Area 10

Study Area 10 is comprised of Guard Structures 6 and 7 (Table 1), an area comprised of approximately 29 acres that spans Interstate 5 (Figure 9). Study Area 10 will be used for guard structure sites where wood poles will be augered with net strung between them to catch any falling tools or other materials. Study Area 10 is within a disturbed habitat (e.g. plowing), bisected by I-5 running roughly north-south and intersected by West Panoche Road running roughly southwest-northeast (Appendix B). Due to the location of this study area relative to these two roads, Study Area 10 was essentially split into quarters for the survey (SE, NE, SW, NW). Some of the primary ruderal vegetative species observed include red gum (*Eucalyptus camaldulensis*), tree tobacco, puncture vine (*Tribulus terrestris*), procumbent pigweed, alkali goldenbush, Russian thistle, common fiddleneck, redstem filaree, bindweed, and saltgrass. A complete list of vegetation observed is located in Appendix B.

No sensitive resources were observed within the 0.17 acre areas of planned disturbance. The only sensitive species noted within Study Area 10 were two dead juvenile Swainson's hawks, a state-threatened species, that were observed adjacent to the highway in the northwest quarter of the study area (Figure 9). The hawks are assumed to have been killed by traffic along I-5 based on the proximity of both to the highway and apparent results of impact, which included the detachment of one of the hawk's wings from the remainder of the carcass. The northwest quarter of Study Area 10 has substantial cover of red gum, particularly when compared to the rest of Study Area 10, but no nests were observed in the study area. No federal or state regulated waters were observed in Study Area 10.

In addition to observations of Swainson's Hawks in the study area, habitat for several other potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.11. Survey Results Study Area 11

Study Area 11 is an approximate 22 acre area located approximately 1 mile east of Interstate 5 (Figure 10) that includes Guard Structure 8 (Table 1). Study Area 11 will be used for guard structure sites where wood poles will be augered with net strung between them to catch any falling tools or other materials. Study Area 11 is intersected by West Panoche Road running roughly southwest-northeast and by Brannan Avenue running north-south through the center of the study area. The southern portion of Study Area 11 is situated within a vineyard, while the northern portion is split between an almond orchard in the northwest and a cleared dirt field used for recreational purposes in the northeast (Appendix B). Vegetative species observed at Study Area 11 include procumbent pigweed, Lamb's quarter, prostrate spurge, redstem filaree, alkali weed, Jimson weed, Russian thistle, and unicorn plant (*Proboscideae lutea*). No sensitive resources including protected species and federal and state waters were observed within Study Area 11. No federal or state regulated waters were observed in Study Area 11.

Although no sensitive species were observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.12. Survey Results Work Area 12

Study Area 12 is approximately 49 acres located approximately two miles east of Interstate 5 (Figure 11) and includes Substation OPGW Underground Work Area and Wire Pull Site 12 (Table 1). Study Area 12, including the buffer, stretches roughly east-west for approximately 0.4 miles and is intersected by West Panoche Road running roughly southwest-northeast through the central portion of the study area. This study area is considered disturbed due to the southern half of this study area being comprised of vineyards in the west and the Panoche Substation in the east, while the northern half of this study area is situated within an almond orchard (Appendix B). Additionally, in the central portion of the northern half of the study area directly adjacent to West Panoche Road, are three historic households and a newer farming structure (see Appendix D for cultural resources details). Primary vegetative species observed at Study Area 12 include prostrate spurge, prickly lettuce (*Lactuca serriola*), redstem filaree, bindweed, nightshade (*Solanum xanti*), doveweed, common fiddleneck, and cheeseweed. A full list of vegetative species observed is found in Appendix B.

No sensitive resources were observed within the 2.19 acre area of planned disturbance within Study Area 12. Potential SJKF tracks were noted within the northeastern portion of the work area buffer. Additionally, a great horned owl was flushed from the almond orchard while conducting the survey on Study Area 12 (Figure 11). No nest was observed. No federal or state regulated waters were observed in Study Area 12.

Although no sensitive species were observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

4.13. Survey Results Study Area 13

Study Area 13 is an approximately 24 acre area located directly adjacent to the Panoche Substation approximately 2.5 miles east of Interstate 5 (Figure 11) that includes Landing Zone 3 (Table 1). Study Area 13 will be used for staging materials, picking up and transporting electrical personnel and equipment, and refueling helicopters. Study Area 13 is within a disturbed habitat with the northern portion intersected by West Panoche Road, the southwest within the Panoche Substation, and the east within a vineyard (Appendix B). Some of the primary vegetative species observed in Study Area 13 include California brome (*Bromus carinatus*), Russian thistle, procumbent pigweed, bindweed, tumbling orach, prostrate spurge, prickly lettuce, redstem filaree, vinegar weed, and cheeseweed. A full list of vegetation observed is located in Appendix B. No sensitive resources including protected species and federal and state waters were observed within Study Area 13.

Although no sensitive species were observed during the survey, habitat for several potential species was noted within the study area. Special status species with habitat within the study area can be found in Appendix A.

5.0 Summary and Recommendations

The most biologically diverse of the areas surveyed is Study Area 3 (Wire Pull Sites 1 and 2). Within Study Area 3, evidence of BUOW, GKR, SJAS, and SJKF was observed; however, none of these observations were made within the planned areas of disturbance for the wire pull sites. Access issues may restrict use of Study Area 5 (Wire Pull Sites 6 and 7), as the only access road is controlled by the BLM. Coordination with BLM may enable use of the two-track road that leads directly to Study Area 5. Variable topography may restrict use of Study Area 4 (Wire Pull Sites 3, 4, and 5).

Though observations for sensitive resources were relatively low at each study area surveyed, the majority of the study areas (excluding those within vineyards and orchards) contained substantial burrows for other rodents and small mammals, the primary source of food for the SJKF. Additionally, minimal amounts of old SJKF scat were observed at several study areas, specifically those to the west of Interstate 5. Even though no individual BNLL were observed, due to the terrain, evidence of sufficient small mammal burrows, the studies being performed outside the protocol season window, and the overall habitat within certain study areas, BNLL could potentially be found within work areas. With the noted evidence of the small mammal burrows the study areas could contain other special status small mammal species (e.g. Tulare grasshopper mouse). The study area was not trapped for these burrowing mammal species, therefore, without additional surveys, it has to be assumed that these special status species could utilize the small mammal burrows within the study areas.

Furthermore, with the evidence of the small mammal burrows the study areas could contain CTS. The study area was limited to a 500 foot buffer in which no vernal pools/ponds were located. However, with CTS known to travel up to 1.2 miles from their breeding ponds to estivate, no survey for potential CTS breeding ponds was completed as part of this study. Therefore, without a larger radius breeding pond survey, it has to be assumed that CTS could estivate within the appropriate sized small mammal burrows within the study areas.

No evidence of nesting special status raptor species were located within the study areas with exception of Study Area 3 as noted above. However, during the worked being performed during the upgrade that is within a quarter mile of an active nest during breeding season could cause a disturbance.

There are several special-status plants known to occur in the vicinity of the study areas. However, due to the timing of the surveys within the study areas certain special status species may not be evident. The potential presence of those special status species within the study areas due to habitat is noted in Appendix A. Use of any of the planned disturbance areas should take proper steps to ensure no sensitive species are impacted by the planned activities.

The potential habitats for some special status species were observed within certain study areas during the field assessment as noted in Appendix A. This does not provide evidence of presence or absence of the species but does give an indication of the potential for the species that could occur or be observed within the study areas during the appropriate seasonal survey window. This data will provide crucial information when developing the avoidance and minimization measures for the construction of the telecommunication upgrades.

Potentially federal and state jurisdictional waters were assessed in the field for the study areas and associated ground disturbance areas. The only study areas that were found to have jurisdictional waters issues was Study Area 6 and Study Area 8, both of which have disturbance area buffers extending into Panoche Creek. However, these potential jurisdictional areas are not located within the smaller associated disturbance area planned within the noted study area.

The results from the Panoche Valley Solar Transmission Line Natural Resources Assessment indicate the sites chosen as temporary work areas for transmission line upgrades are situated such that temporary disturbances will have potentially minimal or no impact on special status species and regulated natural resources described in this report with appropriate avoidance and minimization measures. Additionally, surveys of study areas, which included the planned disturbance areas and a 500-ft buffer, revealed the flexibility of moving the disturbance areas if necessary at the time of upgrade construction field work.

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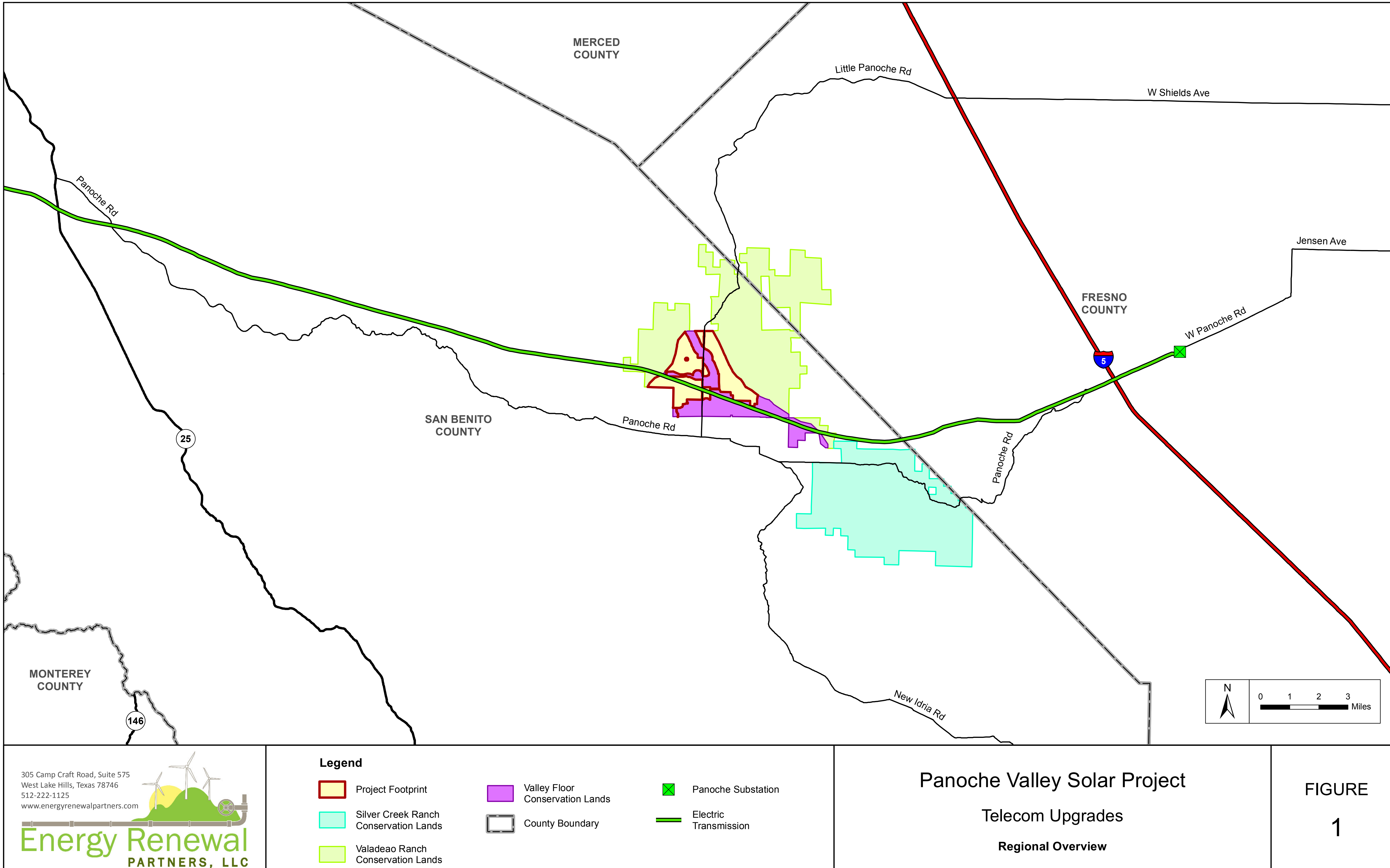
FIGURES



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Panoche Valley Solar Project

Telecom Upgrades

Regional Overview

FIGURE

1

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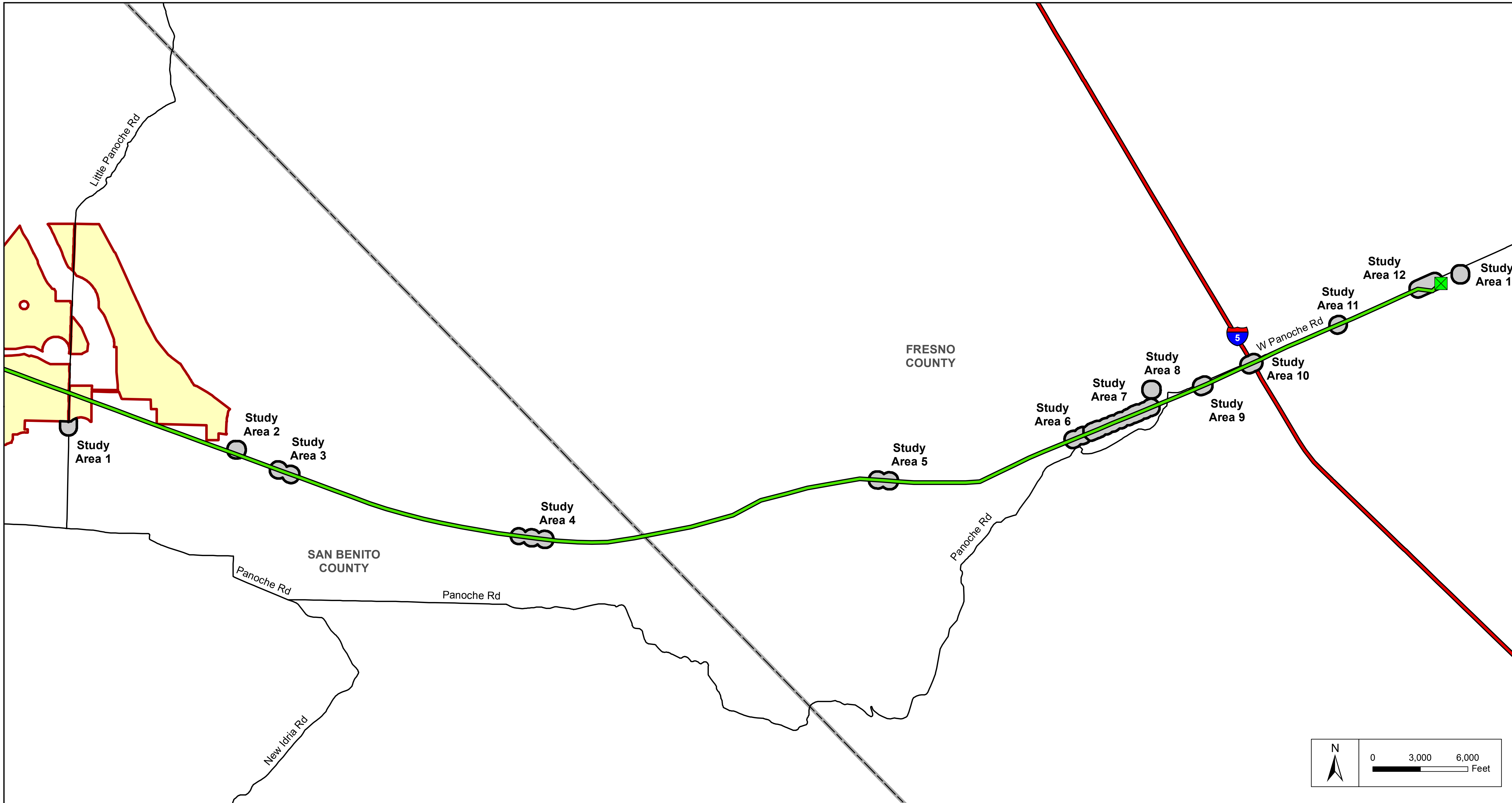

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Legend

- Project Footprint
- County Boundary
- Panoche Substation
- Electric Transmission
- Study Area

Panoche Valley Solar Project

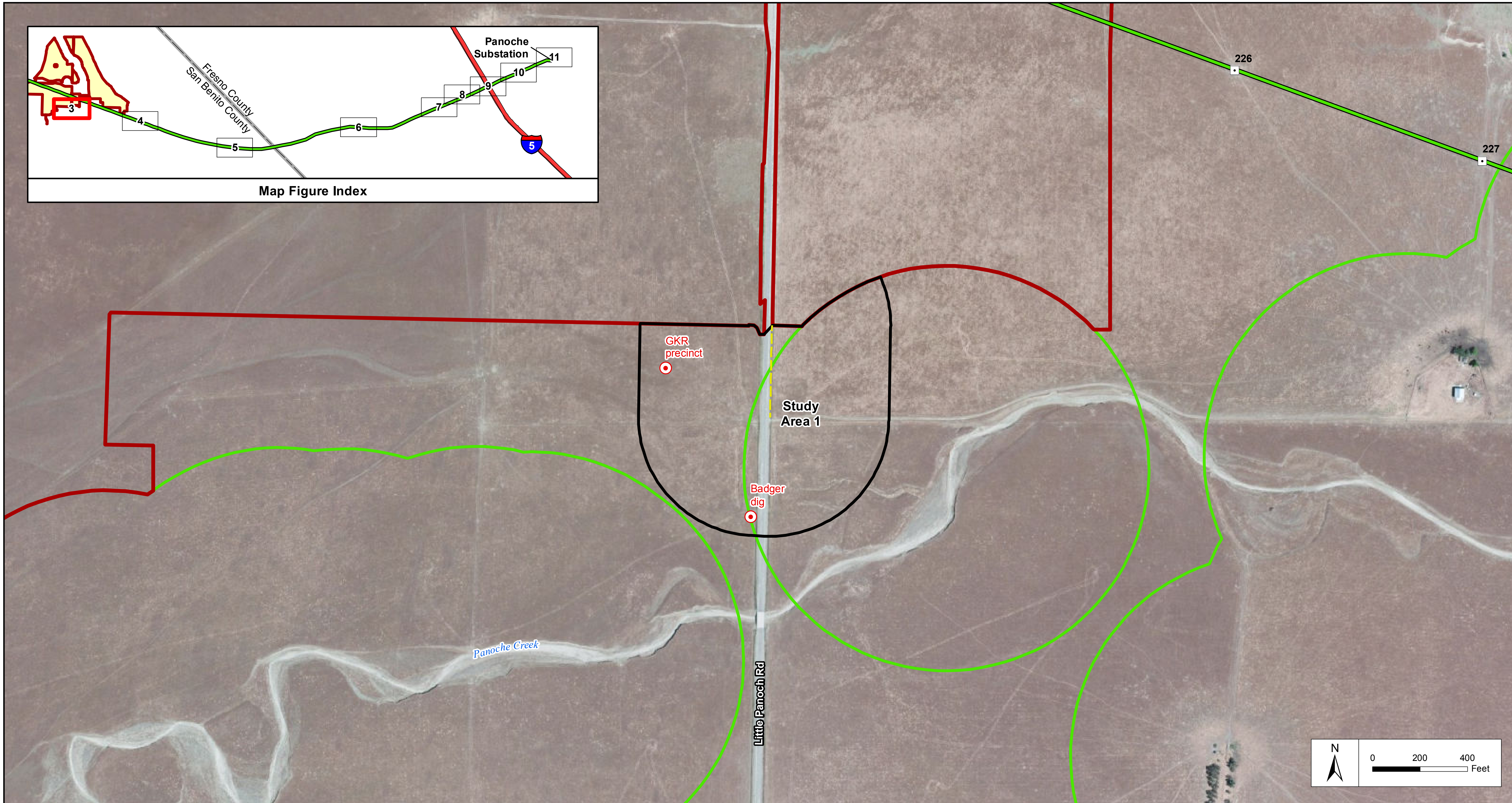
Telecom Upgrades

Project Overview

FIGURE

2

JH 2014-09-29



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Legend

- Survey Observation
- Study Area
- Solar Project
- Existing Transmission Structure
- Existing Electric Transmission
- AT&T Cable Below Ground Option
- Blunt-Nose Leopard Lizard Buffer Area

Panoche Valley Solar Project

Telecom Upgrades

Study Area 1

FIGURE

3

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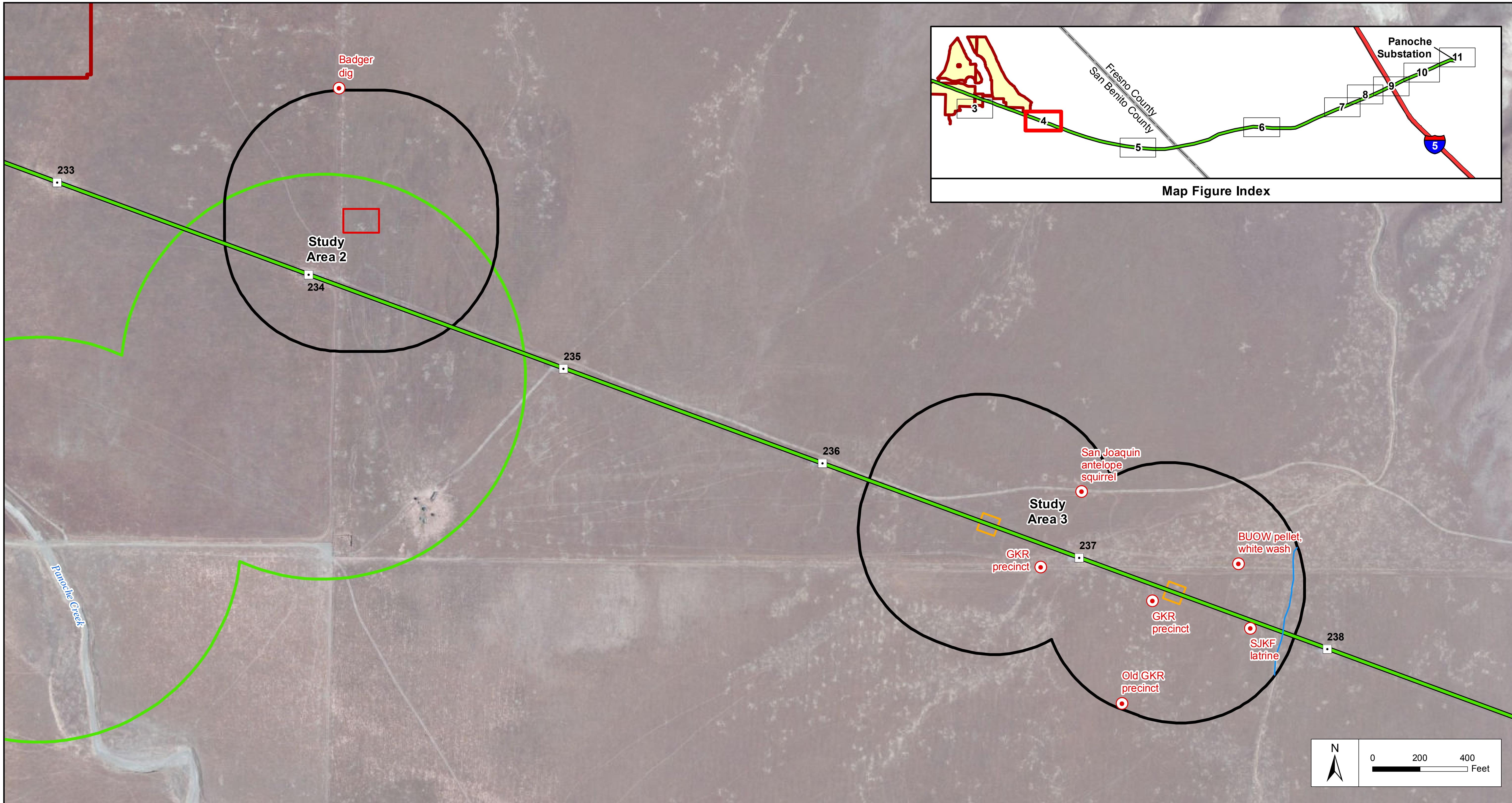

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Legend

- Survey Observation
- Study Area
- Solar Project
- Existing Transmission Structure
- Existing Electric Transmission
- Drainage
- Landing Zone Work Area
- Wire Pull Site Work Area
- Blunt-Nose Leopard Lizard Buffer Area

Panoche Valley Solar Project

Telecom Upgrades

Study Areas 2 and 3

FIGURE

4

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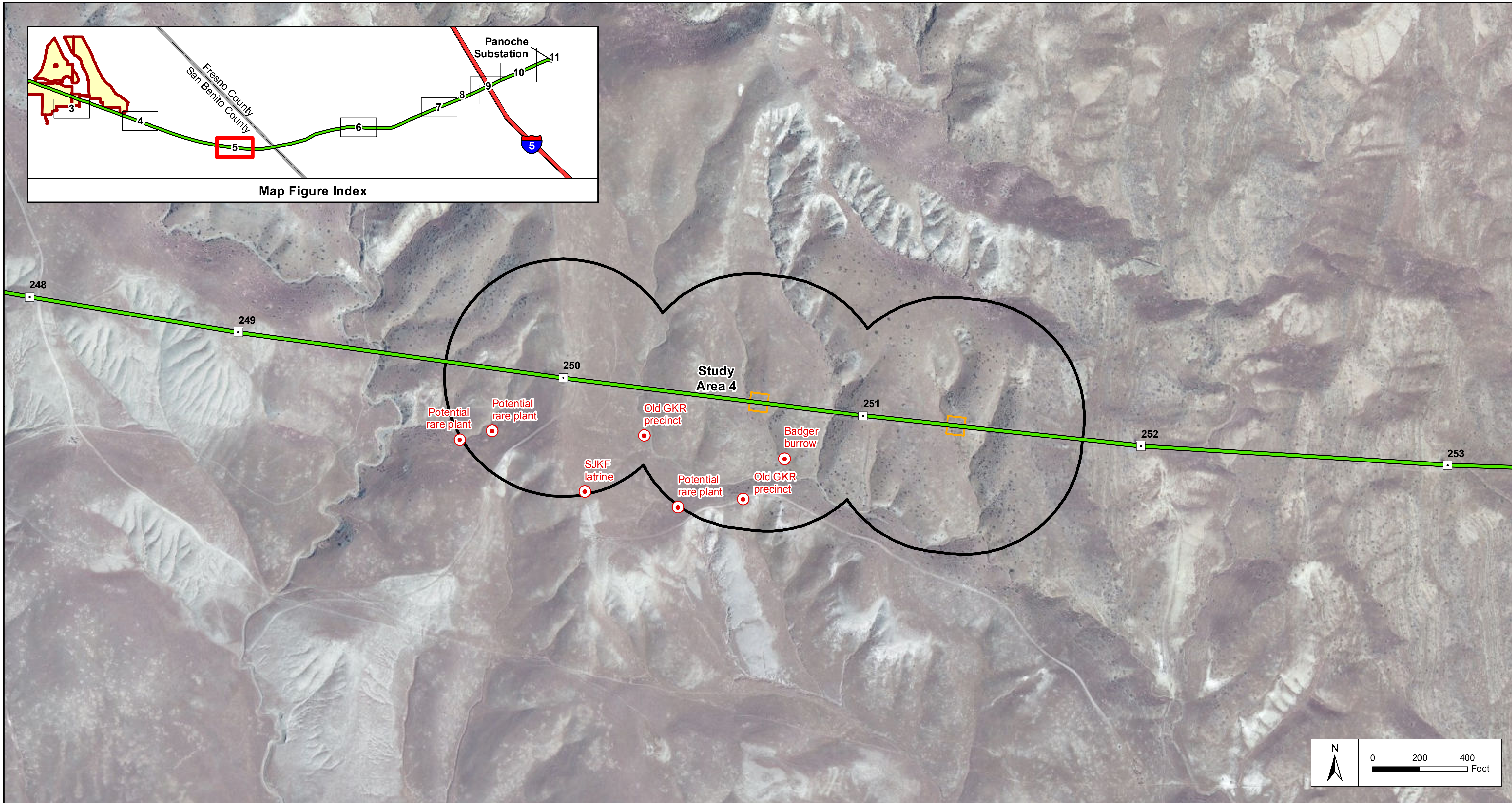

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Legend

Survey Observation
Study Area
Existing Transmission Structure
Existing Electric Transmission
Wire Pull Site Work Area

Panoche Valley Solar Project

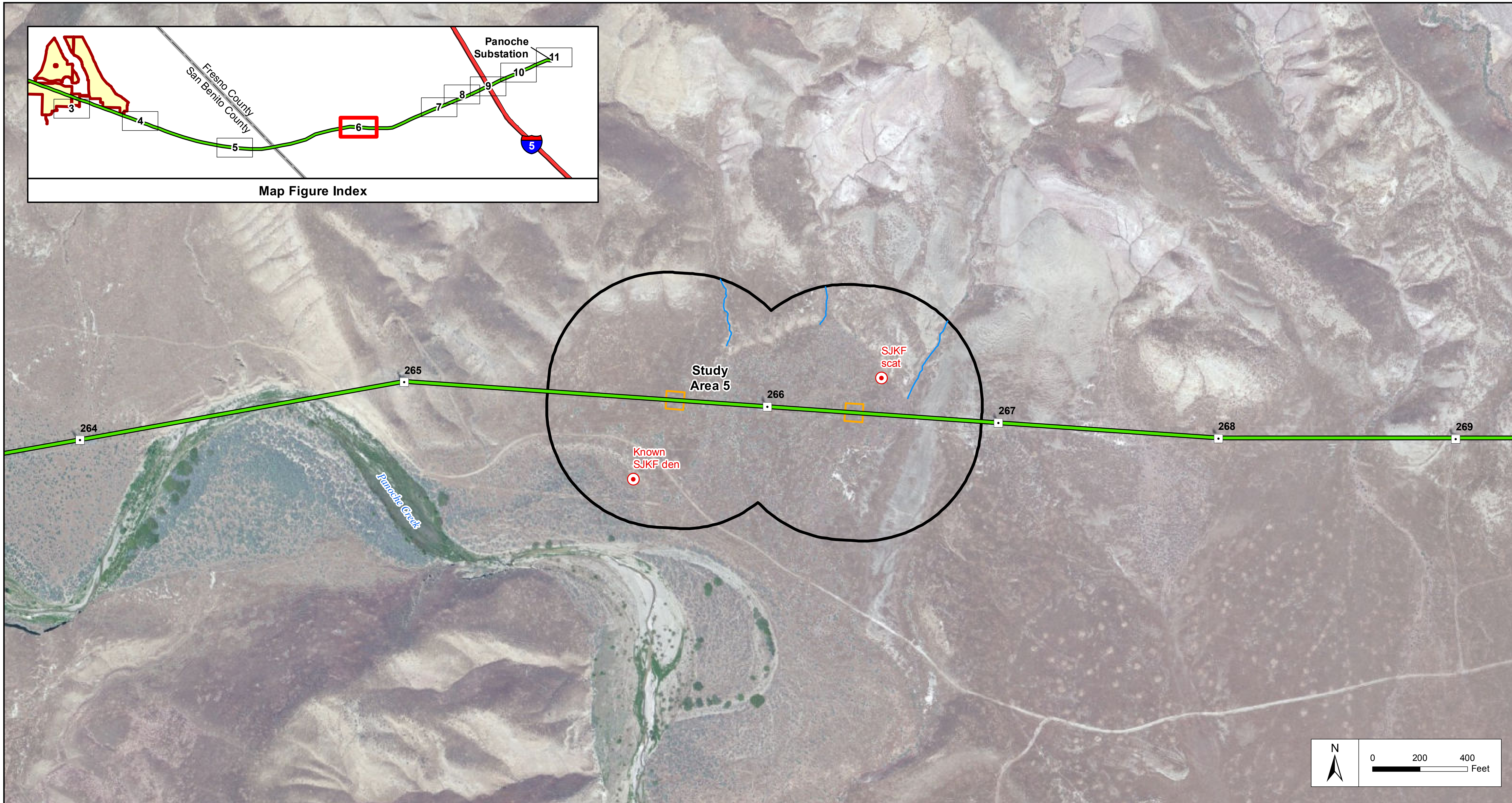
Telecom Upgrades

Study Area 4

FIGURE

5

JH 10/15/2014



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Legend

- Survey Observation
- Study Area
- Existing Transmission Structure
- Existing Electric Transmission
- Drainage
- Wire Pull Site Work Area

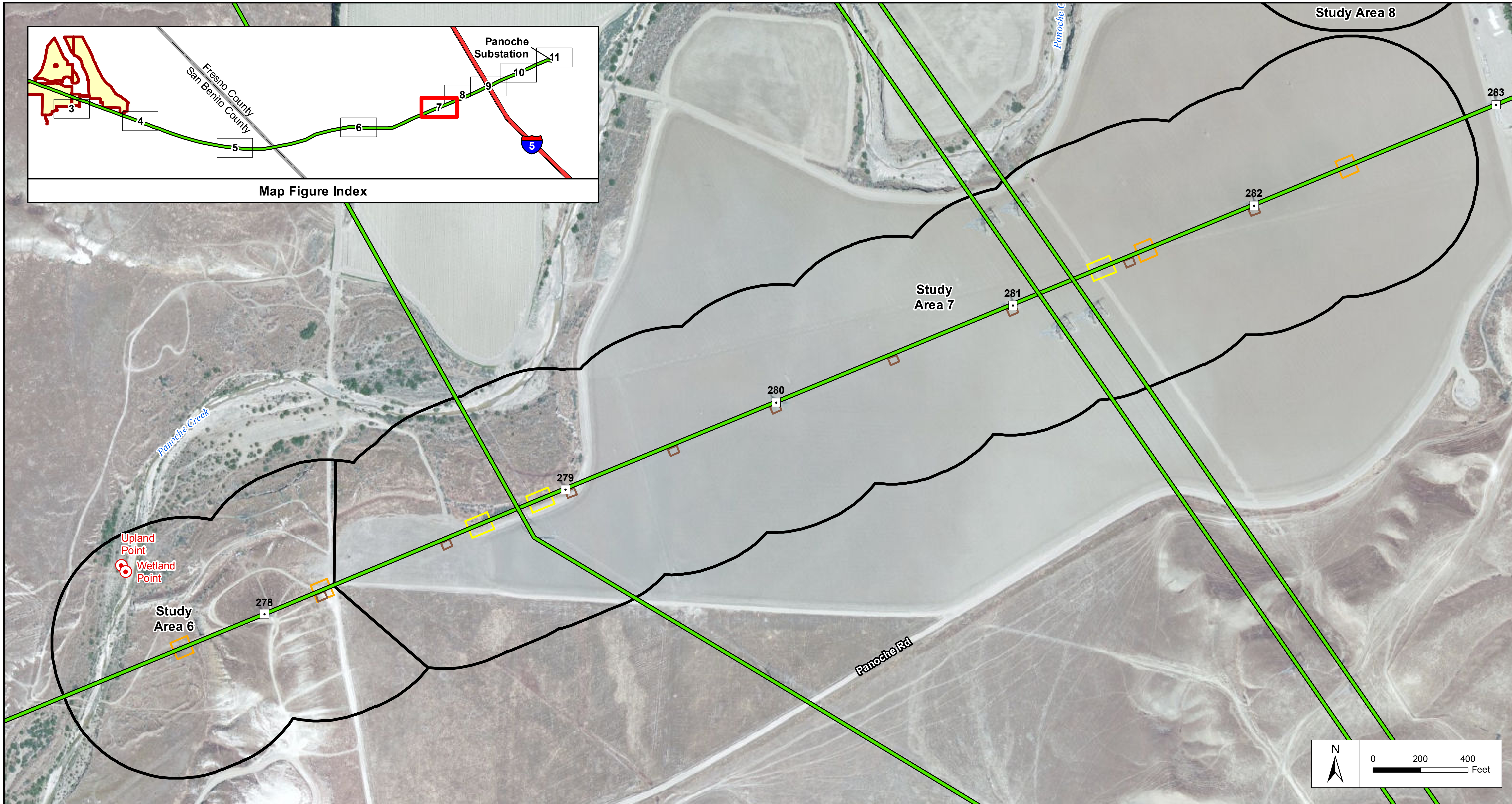
Panoche Valley Solar Project

Telecom Upgrades

Study Area 5

FIGURE 6

JH 10/15/2014



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Legend

- Survey Observation
- Study Area
- Existing Transmission Structure
- Existing Electric Transmission
- ADSS Pole Work Area
- Guard Structure Work Area
- Wire Pull Site Work Area

Panoche Valley Solar Project

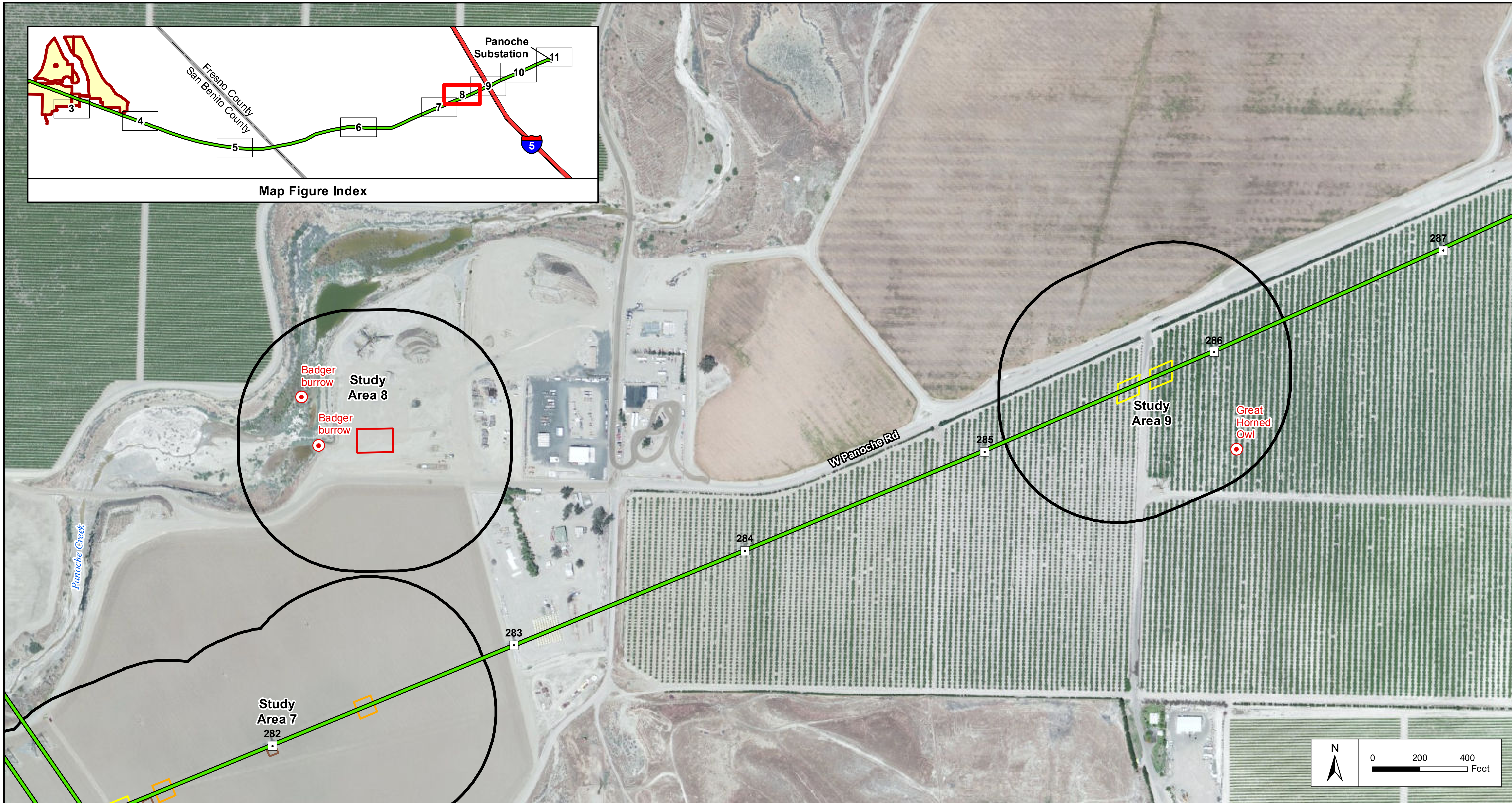
Telecom Upgrades

Study Areas 6 and 7

FIGURE

7

JH 10/15/2014



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Legend

- Survey Observation
- Study Area
- Existing Transmission Structure
- Existing Electric Transmission
- ADSS Pole Work Area
- Guard Structure Work Area
- Landing Zone Work Area
- Wire Pull Site Work Area

Panoche Valley Solar Project

Telecom Upgrades

Study Areas 8 and 9

FIGURE

8

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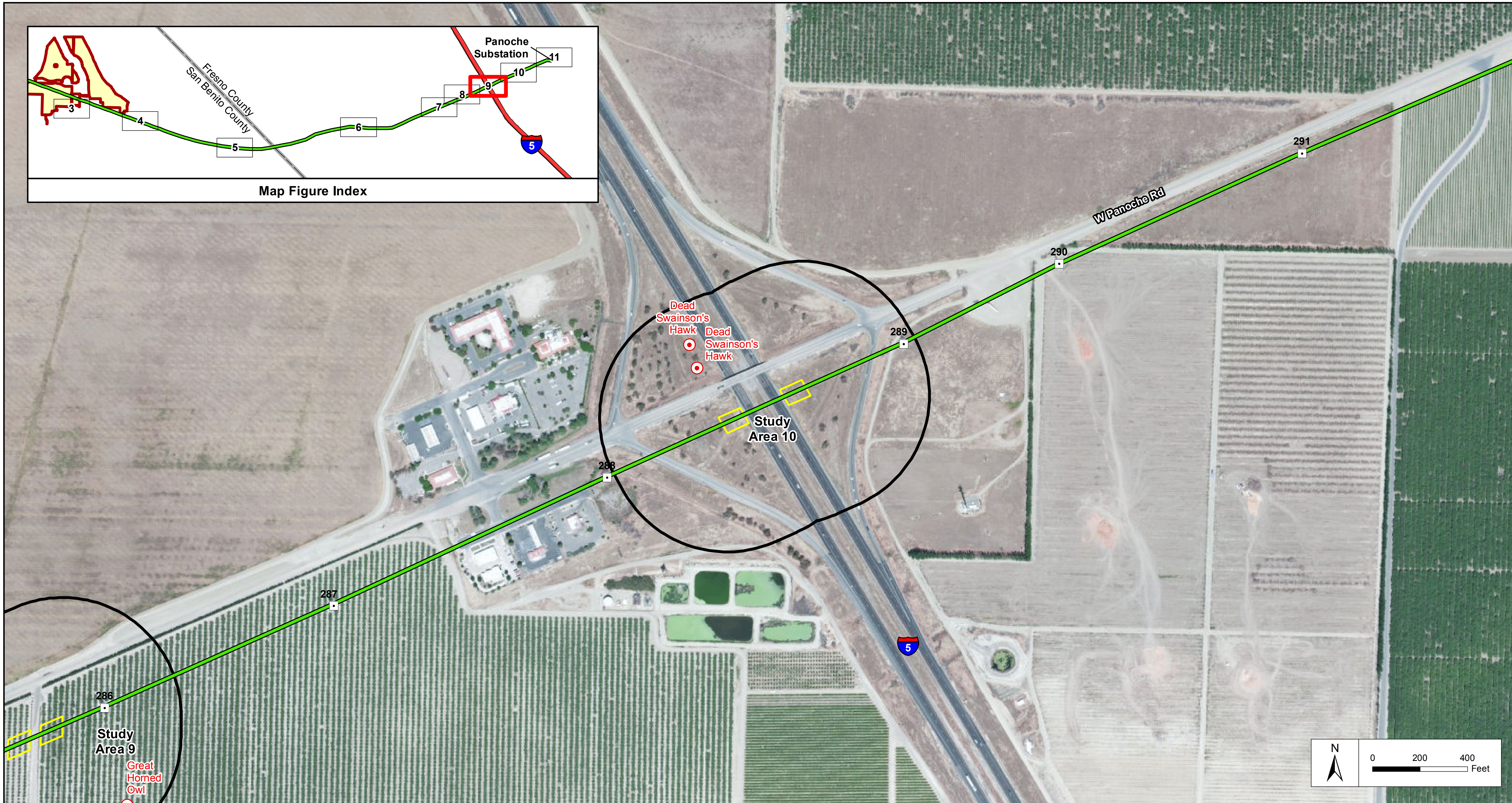

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Legend

- Survey Observation
- Study Area
- Existing Transmission Structure
- Existing Electric Transmission
- Guard Structure Work Area

Panoche Valley Solar Project

Telecom Upgrades

Study Area 10

FIGURE 9

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Legend

- Study Area
- Existing Transmission Structure
- Guard Structure Work Area
- Existing Electric Transmission

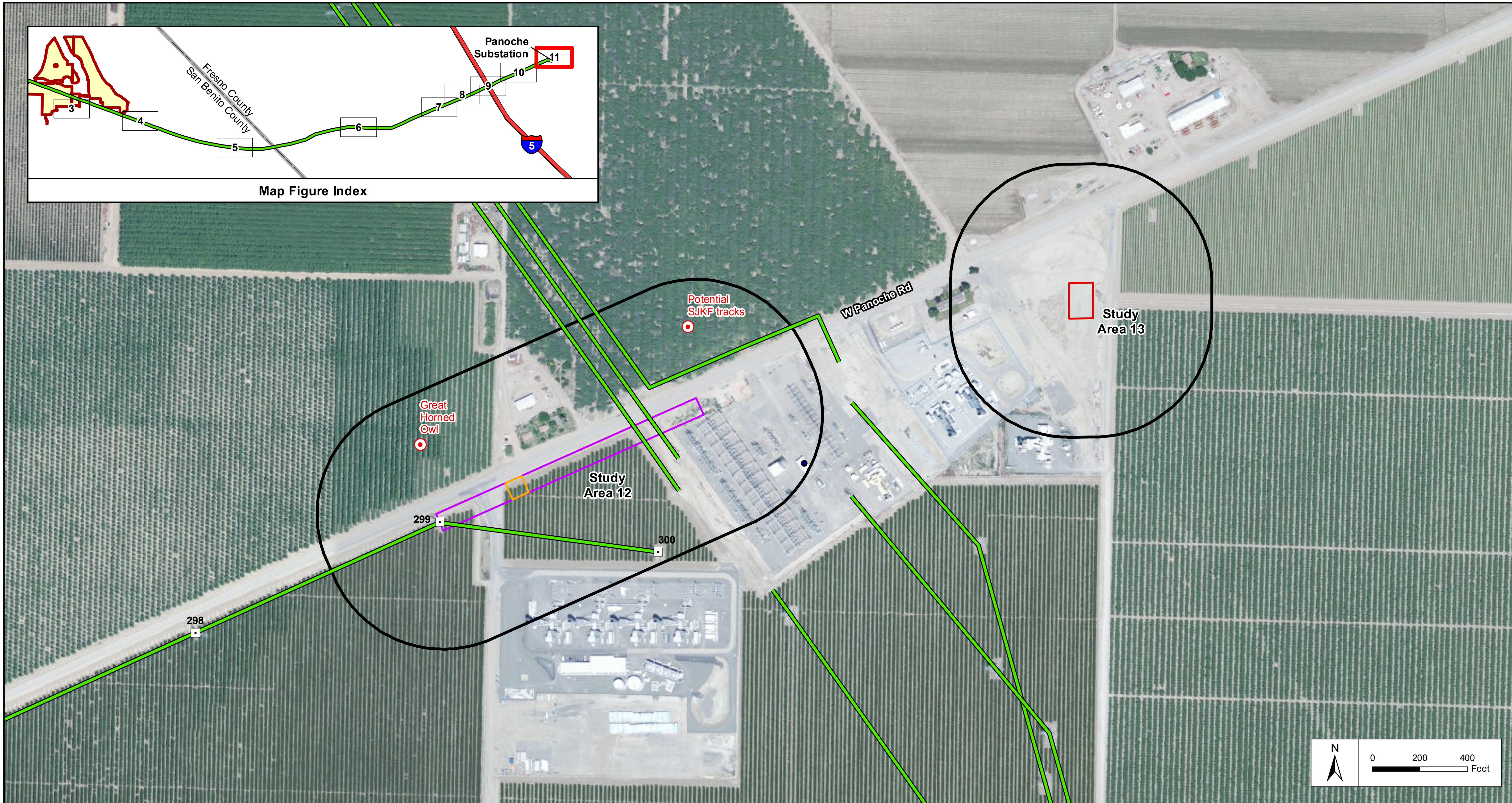
Panoche Valley Solar Project

Telecom Upgrades

Study Area 11

FIGURE 10

JH 10/15/2014



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Legend

- Survey Observation
- Study Area
- Existing Transmission Structure
- Existing Electric Transmission
- Landing Zone Work Area
- Panoche Substation OPGW UG Work Area
- Wire Pull Site Work Area

Panoche Valley Solar Project

Telecom Upgrades

Study Areas 12 and 13

FIGURE

11

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APPENDICES

Appendix A

Special Status Species with Potential to Occur

Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status	Potential to Occur	Habitat	Potential Study Areas
Invertebrates					
Branchinecta longiantenna	longhorn Fairy Shrimp	FE	Not Likely To Occur	Clear to turbid grassland pools within San Joaquin Vernal Pool Region	NA
Branchinecta conservation	conservancy fairy shrimp	FE	Not Likely To Occur	Turbid water in vernal pools	NA
Branchinecta lynchi	vernal Pool Fairy Shrimp	FT	Not Likely to Occur	Vernal pools, vernal swales, alkaline pools, and road-side ditches	NA
Lepidurus packardi	vernal pool tadpole shrimp	FE	Not Likely To Occur	Clear, well vegetated vernal pools to turbid, alkali scald pools; generally in water deeper than 12 cm	NA
Reptiles					
Actinemys marmorata pallida	Southwestern pond turtle	CSC	Low	Slow-moving waterways with upland habitat accessible for basking.	6-8
Anniella pulchra pulchra	silvery legless lizard	CSC	Moderate	Sandy or loose loamy soils with adequate soil moisture	1-8
Gambelia sila	blunt-nosed leopard lizard	FE, SE, SFP	Present (Observed in Valley Floor Conservation Lands 2013)	Arid grasslands, alkali flats, low elevation foothills, large washes; burrows of other species typically used for cover and sparse vegetation preferred	1-7
Masticophis flagellum ruddocki	San Joaquin coachwhip	CSC	High	Desert, prairie, scrublands, juniper-grassland, and other habitats in dry, open terrain	1-13
Phrynosoma blainvillii	coast horned lizard	CSC	High	Open areas with sandy soil and low vegetation, lowlands along sandy washes with scattered shrubs	1-7
Rana draytonii	California red-legged frog	FT	Not Likely To Occur	Standing deep ponds, pools, and streams; tall vegetation	NA

Scientific Name	Common Name	Status	Potential to Occur	Habitat	Potential Study Areas
Thamnophis hammondii	two-striped garter snake	CSC	Not Likely To Occur	In or near permanent fresh water, along streams with rocky beds bordered by riparian vegetation	NA
Amphibians					
Ambystoma californiense	California tiger salamander	FT, STC	High	Burrows of small mammals within grassland or oak savannah with wetland breeding ponds up to one mile away	1-6
Spea hammondii	western spadefoot toad	CSC	Moderate	Open areas with sandy or gravelly soils within woodlands, grasslands, sandy washes, lowlands, and other habitats.	1-8
Birds					
Agelaius tricolor	tricolored blackbird	CSC	High	Nest in marshy areas and settle in areas with access to open water; forage in valley and foothill grassland and agricultural fields	4-7
Ammodramus savannarum	grasshopper sparrow	CSC	High	Open grasslands and prairies with patches of bare ground.	1-7
Aquila chrysaetos	golden eagle	SFP	Present	Partially or completely open country around mountains or hills within habitats ranging from desert to arctic	1-7
Asio flammeus	short-eared owl	CSC	Low (nesting)	Open country including tundra, prairie, grassland, sand dunes and other habitats; sufficient vegetation required for nesting	1-7
Asio otus	long-eared owl	CSC	Moderate	Combination of grassland for foraging and dense tall shrubs for nesting and roosting.	1-7, 9-13
Athene cunicularia	Burrowing owl	CSC	Present	Open grasslands with sparse vegetation and few shrubs, gentle topography and well-drained soils	1-8

Scientific Name	Common Name	Status	Potential to Occur	Habitat	Potential Study Areas
Buteo swainsonii	Swainson's hawk	ST	Present	Grasslands, sage flats, or swaths for nesting; nest within trees, often the only tree in the area	6-13
Charadrius montanus	mountain plover	CSC, FTC	Present (winter only)	Breeds onen plains at moderate elevations; winters in short-grass plains and fields, plowed fields, and sandy deserts.	1-10
Circus cyaneus	northern harrier	CSC	Present	Breeds in wide open habitats from tundra to prairie grasslands; nests on ground in grasses or wetland vegetation	1-7
Elanus leucurus	white-tailed kite	SFP	Moderate	Commonly found in savanna, woodlands, marshes, desert grassland, partially cleared lands and cultivated fields; avoids areas with excessive winter freeze	1-13
Gymnogyps californianus	California condor	FE, SE	Not Likely to Occur	Nest in caves on cliff faces in mountains; scavenge in habitats ranging from Pacific beaches to mountain forests and meadows	NA
Haliaeetus leucocephalus	bald eagle	SE, FP	Not Likely To Occur	Nest in areas adjacent to large bodies of water; in winter can be seen in dry, open uplands near open water	NA
Lanius ludovicianus	Loggerhead shrike	CSC	Present	Open country with scattered shrubs and trees	1-9
Pooecetes gramineus affinis	Oregon vesper sparrow	CSC	High (winter only)	Breeds in Oregon; most often found in hilly margins of Willamette Valley; dry, upland prairies and pastures; winters over much of California	1-6
Xanthocephalus xanthocephalus	yellow-headed Blackbird	CSC	Low	Breed and roost in freshwater wetlands with dense, emergent vegetation; forage in fields	4-7
Mammals					

Scientific Name	Common Name	Status	Potential to Occur	Habitat	Potential Study Areas
Ammospermophilus nelsoni	San Joaquin antelope squirrel	ST	Present	Dry flat or rolling terrain on alluvial and loamy soils; grassy, sparsely shrubby ground	1-7
Antrozous pallidus	pallid bat	CSC	High (foraging)	Desert habitats with rocky outcrops for roosting	1-13
Corynorhinus townsendii	Townsend's big-eared bat	CSC	Low (foraging)	Pine forests and arid desert scrub habitats with caves nearby for roosting; may roost in abandoned buildings	1-13
Dipodomys ingens	giant kangaroo rat	FE, SE	Present	Arid gentle slopes and plains with variable vegetative cover and well-drained soils	1-6
Dipodomys nitratoides brevinasus	short-nosed kangaroo rat	CSC	High	Grasslands with scattered shrubs and desert shrub associations on loose soils	1-6
Dipodomys elephantinus	big-eared kangroo rat	CSC	Not Likely to Occur	Chaparral areas; most often under dense vegetation	5
Eumops perotis	western mastiff bat	CSC	Moderate (foraging)	Broad, open areas within dry desert washes, floodplains, grasslands, agricultural areas, and other habitats. Crevices in cliff faces, high buildings, trees or tunnels required for roosting	1-13
Onychomys torridus tularensis	Tulare grasshopper mouse	CSC	High	Arid shrubland communities in hot, arid grassland and shrubland associations.	1-7
Taxidea taxus	American badger	CSC	Present	Dry, open grasslands and brushlands with little groundcover.	1-10
Vulpes macrotis mutica	San Joaquin kit fox	FE/ST	Present	Loose-textured soils within grasslands; habitat converted for urban uses are still utilized if remnants of native habitat are present.	1-10

FE = Federally Endangered. FT = Federally Threatened SE = State Endangered FTC = Federally Threatened Candidate

SFP = State Fully Protected CSC = California Species of Special Concern STC = State Threatened Candidate ST = State Threatened

Special-Status Plant Species with Potential to Occur

Scientific Name	Common Name	Status	Potential to Occur	Habitat	Potential Study Areas
Amsinckia vernicosa var *furcata*	forked fiddleneck	CNPS 4.2	High	Valley grassland and foothill woodlands	1-6
Androsace elongata ssp. *acuta*	California androsace	CNPS 4.2	Moderate	Slopes of chaparral, foothill woodlands, northern coastal scrub, and coastal sage scrub	4-6
Astragalus macrodon	Salinas milkvetch	CNPS 4.3	Low	Openings in chaparral, valley grasslands, and foothill woodlands; weak affinity to serpentine soil	1-6
Astragalus rattanii var. *jepsonianus*	Jepson's milkvetch	CNPS 1B.2	Low	Valley grasslands and foothill woodlands; strong affinity to serpentine soil	1-6
Atriplex cordulata	Heartscale	CNPS 1B.2	Low	Occurs in wetlands and non wetlands in shadscale scrub, valley grassland, and wetland-riparian communities; saline or alkaline soil	1-8
Atriplex coronata var. *coronata*	Crownscale	CNPS 4.2	Moderate	Vernal pools in shadscale scrub, valley grassland, freshwater wetlands, and wetland-riparian communities; usually occurs in wetlands	1-7
Atriplex depressa	Brittlescale	CNPS 1B.2	Low	Occurs in playas of shadscale scrub, valley grassland, alkali sink, and wetland-riparian communities; equally likely to occur in wetland and non wetlands; alkali soil	1-8
Atriplex joaquiniana	San Joaquin spearscale	CNPS 1B.2	Moderate	Meadows of shadscale scrub and valley grassland communities	1-6
Atriplex minuscula	Lesser saltscale	CNPS 1B.1	Low	Occurs in playas of shadscale scrub, valley grassland, and alkali sink communities; usually occurs in non wetlands	1-6
Atriplex subtilis	Subtle orache	CNPS 1B.2	Low	Valley and foothill grassland; often in vicinity of vernal pools; alkaline soils	1-6
Atriplex coronata var. *vallicola*	Lost Hills crownscale	CNPS 1B.2	High	Vernal pools in shadscale scrub, valley grassland, freshwater wetlands, and wetland-riparian communities; usually occurs in wetlands on alkaline substrates	1-6

Scientific Name	Common Name	Status	Potential to Occur	Habitat	Potential Study Areas
Blepharizonia plumosa	Big tarplant	CNPS 1B.1	Low	Often on slopes of valley grassland, foothill woodland, and chaparral; clay to clay-loam soils	1-6
California macrophylla	round-leaved filaree	CNPS 1B.1	High	Valley and foothill grassland, cismontane woodland; friable clay soils	1-6
Calyptridium parryi var. *hesseae*	Santa Cruz Mountains pussypays	CNPS 1B.1	Low	Sandy or gravelly openings of chaparral and foothill woodlands	1-6
Camissonia benetensis	San Benito evening-primrose	FT, CNPS 1B.1	Low	Serpentine-derived alluvial deposits in the vicinity of the Clear Creek Management Area in San Benito County	NA
Campanula exigua	chaparral harebell	CNPS 1B.2	Low	Talus slopes, occasionally other open places within chaparral communities; serpentine substrates	NA
Caulanthus californicus	California jewel-flower	FE, SE, CNPS 1B.1	Not Likely to Occur	Valley and foothill grassland, pinyon and juniper woodland, and chenopod scrub communities; subalkaline, sandy loam soils	1-6
Caulanthus coulteri var. *lemmonii*	Lemmon's jewel-flower	CNPS 1B.2	Moderate	Valley and foothill grassland, and pinyon and juniper woodland communities	1-6
Chorizanthe ventricosa	Potbellied spineflower	CNPS 4.3	Low	Mixed grassland communities, oak-pine woodlands; serpentine outcrops	1-6
Cordylanthus mollis ssp. *hispidus*	Hispid bird's-beak	CNPS 1B.1	Low	Meadows and playas of alkali sink, valley grassland, and wetland-riparian communities; generally occurs in wetlands; alkaline soils	1-6
Deinandra halliana	Hall's tarplant	CNPS 1B.1	High	Grassland, edges of alkali sinks, open muddy slopes; clayey soils	1-6
Delphinium californicum ssp. *interius*	California larkspur	CNPS 1B.2	Low	Foothill woodlands; usually occurs in non wetlands	1-6
Delphinium gypsophilum ssp. *gypsophilum*	gypsum-loving larkspur	CNPS 4.2	High	Slopes in valley grassland, alkali sink, foothill woodland communities	1-6
Delphinium recurvatum	recurved larkspur	CNPS 1B.2	Low	Annual grasslands or in association with saltbush scrub or valley sink scrub habitats; sandy or clay alkaline soils	1-6
Eriogonum gossypinum	cottony buckwheat	CNPS 4.2	Low	Shadscale scrub and valley grassland commmunities; clay soils	1-6

Scientific Name	Common Name	Status	Potential to Occur	Habitat	Potential Study Areas
Eriogonum temblorense	Temblor buckwheat	CNPS 1B.2	Moderate	Valley and foothills grassland, sandstone outcrops	1-6
Eriogonum vestitum	Idria buckwheat	CNPS 4.3	High	Saltbush scrub communities, steep shale slopes, occasionally on sandstone	1-8
Fritillaria falcata	talus fritillary	CNPS 1B.2	Low	Talus slopes in chaparral communities; endemic to serpentine soils	NA
Fritillaria viridea	San Benito fritillary	CNPS 1B.2	Low	Chaparral communities; endemic to serpentine soils	NA
Lagophylla diabolensis	Diablo Range hare-leaf	CNPS 1B.2	Moderate	Valley grasslands and foothill woodland communities	1-6
Layia discoidea	rayless layia	CNPS 1B.1	Low	Talus slopes and alluvial terraces within chaparral communities; serpentine soils	NA
Layia heterotricha	pale-yellow layia	CNPS 1B.1	High	Cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland communities; alkaline and clay soils	1-6
Layia munzii	Munz's tidytips	CNPS 1B.2	High	Shadscale scrub, valley grassland, and wetland-riparian communities; usually occurs in wetlands; alkaline or clay soils	1-8
Lepidium jaredii ssp. *Album*	Panoche pepper-grass	CNPS 1B.2	Moderate	Washes and alluvial fans of valley grassland communities	1-8
Leptosiphon ambiguus	Serpentine Linanthus	CNPS 4.2	High	Valley grassland, foothill woodland, and northern coast scrub communities; serpentine soils	1-6
Madia radiata	showy golden madia	CNPS 1B.1	High	Slopes of valley and foothill grasslands and foothill woodland communities; friable clay and calcium-rich soils	1-8
Malacothamnus aboriginum	Indian Valley bush malllow	CNPS 1B.2	Low	Open, rocky slopes and dry hills of chaparral and cismontane woodland communities	5-6
Monolopia congdonii	San Joaquin woollythreads	FE, CNPS 1B.2	High	Nonnative grassland, valley saltbush scrub, saltbush scrub, interior coast range saltbush scrub communities; neutral to subalkaline sandy or sandy-loam soils in San Joaquin Vallley.	1-6
Navarretia nigelliformis	adobe navarretia	CNPS 4.2	Moderate	Valley and foothill grasslands and wetland-riparian communities, generally found in wetlands; clay, sometimes serpentine soil	1-8

Scientific Name	Common Name	Status	Potential to Occur	Habitat	Potential Study Areas
Navarretia prostrata	prostrate vernal pool navarretia	CNPS 1B.1	Low	Vernal pools and alkaline floodplains of coastal sage scrub and wetland-riparian communities, occasionally in alkaline vallley and foothill grassland communities; usuallly occur in wetlands	1-8
Phacelia phacelioides	Mt. Diablo phacelia	CNPS 1B.2	Low	Chaparral and foothill woodland communities; strong affinity for serpentine soils	1-6
Senecio aphanactis	Chaparral ragwort	CNPS 2.B2	Low	Foothill woodlands, northern coastal scrub, and coastal sage scrub communities; often in serpentine soils	1-6

FE = Federally Endangered.

SE = State Endangered.

CNPS = California Native Plant Society.

1B = Plants that are rare, threatened, or endangered in California and elsewhere.

4 = A watch list of plants of limited distribution.

0.1: Seriously endangered in California.

0.2: Fairly endangered in California.

0.3: Not very endangered in California.

Appendix B

Photographic Log

Photographic Log

Photo 1: Study Area 1 from the southern study area boundary looking northwest.

Photo 2: Study Area 2 looking west from southeast study area boundary.


Photo 3: View of Study Area 2 facing northwest.


Photo 4: View of Study Area 3 facing northeast.


Photo 5: Small drainage along eastern boundary of Study Area 3.


Photo 6: View of southern portion of Study Area 3 facing west.

Photo 7: View of Study Area 4 facing north.

Photo 8: Study Area 4 facing east/northeast from southern portion of study area.

Photo 9: Study Area 4 facing west from access road.

Photo 10: View of Study Area 4 facing west.

Photo 11: View of Study Area 5 facing west from eastern portion of study area.

Photo 12: Study Area 5 facing west/northwest.


Photo 13: View of Study Area 5 facing east.


Photo 14: Study Area 6 facing southeast.

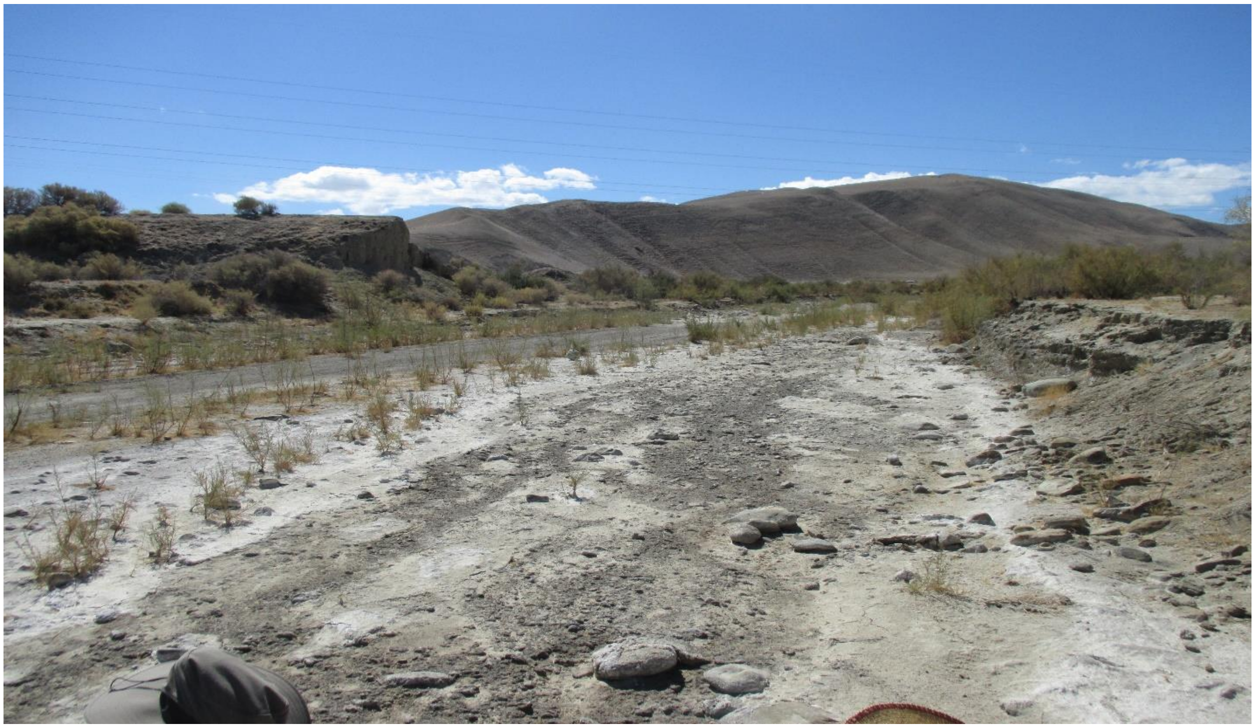
Photo 15: Northwestern portion of Study Area 6 within Panoche Creek bed.


Photo 16: View facing east from wetland soil data point within Panoche Creek in Study Area 6.

Photo 17: View facing south from upland soil data point in Study Area 6.

Photo 18: View of central portion of Study Area 6 facing east.

Photo 19: View of Study Area 6 facing north.

Photo 20: View of well-maintained crop rows within Study Area 7.

Photo 21: View of Study Area 7 taken from Study Area 6 facing east.

Photo 22: Southern portion of Study Area 8 taken from central cleared portion of study area.

Photo 23: View of Panoche Creek located in northern portion of Study Area 8.

Photo 24: View of well-maintained almond orchards of Study Area 9.

Photo 25: View of Study Area 9 facing east.

Photo 26: View of southeast quarter of Study Area 10 facing north.

Photo 27: View of southwest quarter of Study Area 10 facing south.

Photo 28: View of southeast quarter of Study Area 10, facing south.

Photo 29: View of northeast quarter of Study Area 10 facing north.

Photo 30: View of northwest quarter of Study Area 10 facing north.


Photo 31: Northern portion of Study Area 11 facing west showing recreational area and orchards.


Photo 32: View of vineyards within southern portion of Study Area 11.


Photo 33: View of Study Area 12 facing east/southeast.


Photo 34: View of northern portion of Study Area 12 within almond orchards.

Photo 35: View of Study Area 12 facing west along West Panoche Road.

Photo 36: View of Study Area 13 facing west towards Panoche Substation.

Photo 37: Cleared area within central portion of Study Area 13.

Appendix C
Vegetation List by Work Area

Vegetation by Study Area

Study Area	FAMILY	GENUS	SPECIES	COMMON NAME
Study Area 1	Amaranthaceae	*Amaranthus*	*blitoides*	procumbent pigweed
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Brassicaceae	*Lepidium*	*nitidum*	shiny peppergrass
	Brassicaceae	*Caulanthus*	*californicua*	California jewel flower
	Chenopodiaceae	*Chenopodium*	*album*	lamb's quarter
	Chenopodiaceae	*Salsola*	*tragus*	Russian thistle
	Convolvulaceae	*Convolvulus*	*arvensis*	bindweed
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Malvaceae	*Malva*	*parviflora*	cheeseweed
	Poaceae	*Bromus*	*madritensis* ssp. *rubens*	red brome
	Poaceae	*Hordeum*	*murinum*	barley
	Solanaceae	*Datura*	*wrightii*	Jimson weed
	Solanaceae	*Solanum*	*xanti*	nightshade
	Zygophyllaceae	*Tribulus*	*terrestris*	puncture vine
Study Area 2	Asteraceae	*Holocarpha*	*virgata* ssp. *virgata*	tarplant
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Brassicaceae	*Lepidium*	*nitidum*	shiny peppergrass
	Chenopodiaceae	*Atriplex*	*rosea*	tumbling orach
	Chenopodiaceae	*Atriplex*	*polycarpa*	allscale saltbush
	Chenopodiaceae	*Salsola*	*tragus*	Russian thistle
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Lamiaceae	*Trichostema*	*lanceolatum*	vinegar weed
	Poaceae	*Avena*	*fatua*	wild oat
	Poaceae	*Bromus*	*madritensis*	red brome
	Poaceae	*Bromus*	*hordeaceus*	soft chess
	Poaceae	*Distichlis*	*spicata*	salt grass
	Poaceae	*Hordeum*	*murinum*	barley
Study Area 3	Asteraceae	*Holocarpha*	*virgata* ssp. *virgata*	tarplant
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Brassicaceae	*Lepidium*	*nitidum*	shiny peppergrass
	Chenopodiaceae	*Atriplex*	*rosea*	tumbling orach
	Chenopodiaceae	*Atriplex*	*polycarpa*	allscale saltbush
	Chenopodiaceae	*Salsola*	*tragus*	Russian thistle
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree

Study Area	FAMILY	GENUS	SPECIES	COMMON NAME
Study Area 3	Lamiaceae	*Trichostema*	*lanceolatum*	vinegar weed
	Polygonaceae	*Eriogonum*	*angulosum*	angle-stem wild buckwheat
	Poaceae	*Avena*	*fatua*	wild oat
	Poaceae	*Bromus*	*madritensis* ssp. *rubens*	red brome
	Poaceae	*Bromus*	*hordeaceus*	soft chess
	Poaceae	*Distichlis*	*spicata*	salt grass
	Poaceae	*Hordeum*	*murinum*	barley
Study Area 4	Asteraceae	*Ericameria*	*linearifolia*	interior goldenbush
	Asteraceae	*Deinandra*	sp.	Potential rarity*
	Asteraceae	*Gutierrezia*	*californica*	California matchweed
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Boraginaceae	*Phacelia*	*tanacetifolia*	tansy phacelia
	Brassicaceae	*Lepidium*	*nitidum*	shiny peppergrass
	Ephedraceae	*Ephedra*	*californica*	California ephedra
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Lamiaceae	*Salvia*	*columbariae*	chia
	Lamiaceae	*Trichostema*	*lanceolatum*	vinegar weed
	Polemoniaceae	*Navarretia*	sp.	Potential rarity*
	Polygonaceae	*Eriogonum*	*fasciculatum*	California buckwheat
	Poaceae	*Bromus*	*madritensis* ssp. *rubens*	red brome
	Poaceae	*Schismus*	*arabicus*	Mediterranean grass
	Poaceae	*Poa*	*secunda* ssp. *secunda*	one-sided blue grass
Study Area 5	Asteraceae	*Centaurea*	*melitensis*	tocalote
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Brassicaceae	*Lepidium*	*nitidum*	shiny peppergrass
	Chenopodiaceae	*Atriplex*	*rosea*	tumbling orach
	Chenopodiaceae	*Atriplex*	*polycarpa*	allscale saltbush
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Plantaginaceae	*Plantago*	*ovata*	plantain
	Polygonaceae	*Eriogonum*	*angulosum*	angle-stem buckwheat
	Polygonaceae	*Eriogonum*	*fasciculatum*	California buckwheat
	Poaceae	*Bromus*	*diandrus*	ripgut brome
	Poaceae	*Bromus*	*madritensis* ssp. *rubens*	red brome
	Poaceae	*Schismus*	*arabicus*	Mediterranean grass
	Poaceae	*Poa*	*secunda* ssp. *secunda*	one-sided blue grass
Study Area 6	Asteraceae	*Gutierrezia*	*californica*	california matchweed
	Asteraceae	*Isocoma*	*acradenia* var. *bracteosa*	alkali goldenbush
	Asteraceae	*Stephanomeria*	*pauciflora*	wirelettuce
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Boraginaceae	*Heliotropium*	*curassavicum* var. *osculatum*	alkali heliotrope
	Chenopodiaceae	*Atriplex*	*rosea*	tumbling orach

Study Area	FAMILY	GENUS	SPECIES	COMMON NAME
Study Area 6	Chenopodiaceae	*Atriplex*	*polycarpa*	allscale saltbush
	Chenopodiaceae	*Salsola*	*tragus*	Russian thistle
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Plantaginaceae	*Plantago*	*ovata*	plantain
	Polygonaceae	*Eriogonum*	*angulosum*	angle-stem buckwheat
	Polygonaceae	*Eriogonum*	*fasciculatum*	California buckwheat
	Poaceae	*Bromus*	*diandrus*	ripgut brome
	Poaceae	*Bromus*	*madritensis* ssp. *rubens*	red brome
	Poaceae	*Distichlis*	*spicata*	saltgrass
	Poaceae	*Hordeum*	*murinum*	barley
	Poaceae	*Polypogon*	*monspeliensis*	annual beard grass
	Poaceae	*Poa*	*secunda* ssp. *secunda*	one-sided blue grass
	Tamaricaceae	*Tamarix*	*ramosissima*	saltcedar
Study Area 7	Punicaceae	*Punica*	*granatum*	pomegranate
	Vitaceae	*Vitis*	*vinifera*	wine grape
Study Area 8	Amaranthaceae	*Amaranthus*	*blitoides*	procumbent pigweed
	Asteraceae	*Baccharis*	*salicifolia* ssp. *salicifolia*	mule fat
	Asteraceae	*Isocoma*	*acradenia* var. *bracteosa*	alkali goldenbush
	Asteraceae	*Sonchus*	*oleraceus*	common sow thistle
	Asteraceae	*Xanthium*	*strumarium*	cocklebur
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Boraginaceae	*Heliotropium*	*curassavicum* var. *osculatum*	alkali heliotrope
	Chenopodiaceae	*Atriplex*	*lentiformis*	big saltbush
	Chenopodiaceae	*Salsola*	*tragus*	Russian thistle
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Poaceae	*Bromus*	*diandrus*	ripgut brome
	Poaceae	*Bromus*	*madritensis* ssp. *rubens*	red brome
	Solanaceae	*Datura*	*wrightii*	Jimson weed
	Solanaceae	*Nicotiana*	*glauca*	tree tobacco
	Tamaricaceae	*Tamarix*	*ramosissima*	saltcedar
Study Area 9	Amaranthaceae	*Amaranthus*	*blitoides*	procumbent pigweed
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Chenopodiaceae	*Chenopodium*	*album*	lamb's quarter
	Convolvulaceae	*Convolvulus*	*arvensis*	bindweed
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Malvaceae	*Malva*	*parviflora*	cheeseweed
	Poaceae	*Poa*	*annua*	annual blue grass
	Poaceae	*Bromus*	*madritensis* ssp. *rubens*	red brome
	Poaceae	*Sporobolus*	*airoides*	alkali sacaton
	Solanaceae	*Solanum*	*xanti*	nightshade

Study Area	FAMILY	GENUS	SPECIES	COMMON NAME
Study Area 10	Amaranthaceae	*Amaranthus*	*blitoides*	procumbent pigweed
	Asteraceae	*Ambrosia*	*acanthicarpa*	annual bur-sage
	Asteraceae	*Helianthus*	*californicus*	California sunflower
	Asteraceae	*Isocoma*	*acradenia* var. *bracteosa*	alkali goldenbush
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Brassicaceae	*Hirschfeldia*	*incana*	summer mustard
	Brassicaceae	*Lepidium*	*nitidum*	shiny peppergrass
	Chenopodiaceae	*Chenopodium*	*album*	lamb's quarter
	Chenopodiaceae	*Chenopodium*	*sp.*	
	Chenopodiaceae	*Salsola*	*tragus*	Russian thistle
	Convolvulaceae	*Convolvulus*	*arvensis*	bindweed
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Malvaceae	*Malva*	*parviflora*	cheeseweed
	Myrtaceae	*Eucalyptus*	*camaldulensis*	red gum
	Palmae			Introduced Palm
	Poaceae	*Avena*	*fatua*	wild oats
	Poaceae	*Bromus*	*diandrus*	ripgut brome
	Poaceae	*Bromus*	*madritensis* ssp. *rubens*	red brome
	Poaceae	*Distichilis*	*spicata*	saltgrass
	Poaceae	*Hordeum*	*murinum*	barley
	Solanaceae	*Datura*	*wrightii*	Jimson weed
	Solanaceae	*Nicotiana*	*glauca*	tree tobacco
	Solanaceae	*Solanum*	*xanti*	nightshade
	Zygophyllaceae	*Tribulus*	*terrestris*	puncture vine
Study Area 11	Amaranthaceae	*Amaranthus*	*blitoides*	procumbent pigweed
	Chenopodiaceae	*Chenopodium*	*album*	lamb's quarter
	Chenopodiaceae	*Salsola*	*tragus*	Russian thistle
	Convolvulaceae	*Cressa*	*truxilliensis*	alkali weed
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Martyniaceae	*Proboscidea*	*lutea*	unicorn plant
	Poaceae	*Bromus*	*carinatus*	California brome
	Salicaceae	*Salix*	*gooddingii*	Goodding's black willow
	Solanaceae	*Datura*	*wrightii*	Jimson weed
	Tamaricaceae	*Tamarix*	*ramosissima*	saltcedar
Study Area 12	Asteraceae	*Erigeron*	*canadensis*	horseweed
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Chenopodiaceae	*Chenopodium*	*album*	lamb's quarter
	Chenopodiaceae	*Salsola*	*tragus*	Russian thistle
	Convolvulaceae	*Convolvulus*	*arvensis*	bindweed
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed

Study Area	FAMILY	GENUS	SPECIES	COMMON NAME
Study Area 12	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Malvaceae	*Malva*	*parviflora*	cheeseweed
	Poaceae	*Avena*	*fatua*	wild oat
	Poaceae	*Cynodon*	*dactylon*	Bermuda grass
	Poaceae	*Hordeum*	*murinum*	barley
	Salicaceae	*Populus*	*fremontii*	Fremont's cottonwood
	Solanaceae	*Datura*	*wrightii*	Jimson weed
	Solanaceae	*Solanum*	*xanti*	nightshade
	Zygophyllaceae	*Tribulus*	*terrestris*	puncture vine
Study Area 13	Amaranthaceae	*Amaranthus*	*blitoides*	procumbent pigweed
	Asteraceae	*Erigeron*	*canadensis*	horseweed
	Asteraceae	*Lactuca*	*serriola*	prickly lettuce
	Boraginaceae	*Amsinckia*	*intermedia*	common fiddleneck
	Brassicaceae	*Lepidium*	*nitidum*	shiny peppergrass
	Cactaceae	*Opuntia*	*ficus-indica*	Mission prickly pear
	Chenopodiaceae	*Atriplex*	*roseum*	tumbling orach
	Chenopodiaceae	*Chenopodium*	*album*	lamb's quarter
	Chenopodiaceae	*Salsola*	*tragus*	Russian thistle
	Convolvulaceae	*Convolvulus*	*arvensis*	bindweed
	Convolvulaceae	*Cressa*	*truxilliensis*	alkali weed
	Euphorbiaceae	*Chamaesyce*	*ocellata* ssp. *ocellata*	prostrate spurge
	Euphorbiaceae	*Croton*	*setigerus*	dove weed
	Geraniaceae	*Erodium*	*cicutarium*	redstem filaree
	Lamiaceae	*Trichostema*	*lanceolatum*	vinegar weed
	Malvaceae	*Malva*	*parviflora*	cheeseweed
	Onagraceae	*Epilobium*	*sp.*	
	Poaceae	*Avena*	*fatua*	wild oat
	Poaceae	*Bromus*	*carinatus*	California brome
	Poaceae	*Bromus*	*madritensis* ssp. *rubens*	red brome
	Poaceae	*Cynodon*	*dactylon*	Bermuda grass
	Poaceae	*Hordeum*	*murinum* ssp.	barley
	Salicaceae	*Populus*	*fremontii*	Fremont's cottonwood
	Solanaceae	*Datura*	*wrightii*	Jimson weed
	Solanaceae	*Solanum*	*xanti*	nightshade
	Zygophyllaceae	*Tribulus*	*terrestris*	puncture vine

* Could not be identified to species due to poor condition of specimens and season

Appendix D

Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: PVS Study Area 6 City/County: NA/Fresno Sampling Date: 9/18/2014

Applicant/Owner: PV2 State: CA Sampling Point: Wetland 1

Investigator(s): Russell Kokx, Morgan Edel, Julianne Wooten Section, Township, Range: S16, T15S, R12E

Landform (hillslope, terrace, etc.): dry creek bed Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): _____ Lat: 36.626284° Long: -120.661358° Datum: NAD83

Soil Map Unit Name: Cerini-Anela-Fluvaquents, saline-Sodic association NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?** **Yes** ☐ **No** ☒
Hydric Soil Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks: Panoche Creek

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
50% = _____, 20% = _____	_____	= Total Cover	
Sapling/Shrub Stratum (Plot size:_____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
50% = _____, 20% = _____	_____	= Total Cover	
Herb Stratum (Plot size:i m)			
1. *Distichlis spicata*	25	yes	FAC
2. *Polypogon monspeliensis*	20	no	FACW
3. *Tamarix ramosissima*	5	no	FAC
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
50% = _____, 20% = _____	_____	= Total Cover	
Woody Vine Stratum (Plot size:_____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
50% = _____, 20% = _____	_____	= Total Cover	
% Bare Ground in Herb Stratum 50	% Cover of Biotic Crust _____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	_____	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

	Total % Cover of :	Multiply by:	
OBL species	_____	x1 =	_____
FACW species	20	x2 =	40
FAC species	30	x3 =	90
FACU species	_____	x4 =	_____
UPL species	_____	x5 =	_____
Column Totals:	50 (A)		130 (B)

Prevalence Index = B/A = 2.6

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☒ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

Project Site: PVS Study Area 6

SOIL

Sampling Point: Wetland 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
4	2.5Y 5/4	100					loamy sand	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☒ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks: Point within Panoche Creek inundated only after storm event.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☒ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☒ Water Marks (B1) **(Riverine)**
- ☒ Sediment Deposits (B2) **(Riverine)**
- ☒ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):	_____	
Water Table Present?	Yes ☐	No ☒	Depth (inches):	_____	
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):	_____	**Wetland Hydrology Present?** **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: PVS Study Area 6 City/County: NA/Fresno Sampling Date: 9/18/2014

Applicant/Owner: PV2 State: CA Sampling Point: Upland 1

Investigator(s): Russell Kokx, Morgan Edel, Julianne Wooten Section, Township, Range: S16, T15S, R12E

Landform (hillslope, terrace, etc.): dry creek bed Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): _____ Lat: 36.626357° Long: -120.661423° Datum: NAD83

Soil Map Unit Name: Cerini-Anela-Fluvaquents, saline-Sodic association NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐ No ☒	Is the Sampled Area within a Wetland?	Yes ☐ No ☒
Hydric Soil Present?	Yes ☐ No ☒		
Wetland Hydrology Present?	Yes ☐ No ☒		
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Tamarix ramosissima*	30	yes	FAC
2. _____			
3. _____			
4. _____			
50% = _____, 20% = _____	30	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
50% = _____, 20% = _____	_____	= Total Cover	
Herb Stratum (Plot size: i m)			
1. *Bromus madritensis*	20	no	FACU
2. *Erodium cicutarium*	10	no	FACU
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
50% = _____, 20% = _____	_____	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1. _____			
2. _____			
50% = _____, 20% = _____	_____	= Total Cover	
% Bare Ground in Herb Stratum 40	% Cover of Biotic Crust _____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	33	(A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	_____	x1 =	_____
FACW species	_____	x2 =	_____
FAC species	30	x3 =	90
FACU species	30	x4 =	120
UPL species	_____	x5 =	_____
Column Totals:	60 (A)		210 (B)

Prevalence Index = B/A = 3.5

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☐ **No** ☒

Remarks:

Project Site: PVS Study Area 6

SOIL

Sampling Point: Upland 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (Moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
8	10YR 4/4	100					sandy loam	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☒ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (inches):	
Water Table Present?	Yes ☐	No ☒	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ☐	No ☒	Depth (inches):	

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix F
Biological Resources

APPENDIX F
TABLE OF CONTENTS

F.1 Bloom Biological, Inc. 2010. Results of protocol surveys for nesting golden eagles (*Aquila chrysaetos*) conducted in association with the proposed Panoche Valley Solar Farm Project Located in the Panoche Valley, Unincorporated San Benito County, California. November 14, 2010.

F.2 Bloom Biological, Inc. 2014. Golden Eagle Survey. Panoche Valley Solar Farm Project.

F.3 Live Oak Associates. 2009a. Summary of Biotic Resources, Solargen Energy's Panoche Ranch Solar Farm. April 20, 2009.

F.4 ______. 2009b. Late Summer/Early Fall Rare Plant Surveys for the Panoche Valley Solar Farm Project in San Benito County, California (PN 1297-04). November 24, 2009.

F.5 ______. 2010a. Protocol-Level Dry Season Branchiopod Survey Results, 90-Day Report. Panoche Valley Solar Farm, San Benito County, California. January 14, 2010.

F.6 ______. 2010c. Protocol-Level Wet Season Branchiopod Survey Results 90-Day Report Panoche Valley Solar Farm. San Jose, California. August 13, 2010.

F.7 ______. 2010d. Non-Protocol Branchiopod Survey Results, Solargen Energy, Panoche Valley Mitigation Parcels. San Jose, California. August 2010.

F.8 ______. 2010e. Early Spring Rare Plant Surveys for the Panoche Valley Solar Farm Project in San Benito County, California (PN 1297-04b). June 17, 2010.

F.9 _____. 2010f. Late Spring Rare Plant Surveys for the Panoche Valley Solar Farm Project in San Benito County, California (PN 1297-04c). September 17, 2010.

F.10 ______. 2010g. Results of 2010 Adult and Juvenile BNLL Surveys Conducted on Section 16 of Township 15S, Range 10E for Solargen Energy's Panoche Valley Solar Farm. Prepared for Solargen Energy, Inc. September 22, 2010.

F.11 ______. 2010h. Data Request #8. Silver Creek Ranch Reconnaissance-Level Surveys. September 10, 2010.

F.12 ______. 2010i. Preliminary Write-Up of Golden Eagle Non-Breeding Season Surveys and Raptor Survey. Prepared for Solargen Energy, Inc. September 22, 2010.

F.13 ______. 2010j. Summary of the Conservation Strategy for Federally and State Listed Species for the Panoche Valley Solar Farm. April 27, 2010.

F.14 McCormick Biological, Inc. 2015a. Early season rare plant surveys of Panoche Solar Project Footprint. Memorandum. March 13, 2015.

F.15 Panoche Valley Solar. 2014. Biological Assessment for the Panoche Valley Solar Facility. April 2014.

F.16 Power Engineers. 2009a. Panoche Valley Solar Farm Wetland Delineation Report. Project Number 117257. November 12, 2009.

Bloom Biological, Inc.
Research | Consulting | Conservation

RESULTS OF PROTOCOL SURVEYS FOR NESTING GOLDEN EAGLES (*AQUILA CHRYSAETOS*) CONDUCTED IN ASSOCIATION WITH THE PROPOSED PANOCHE VALLEY SOLAR FARM PROJECT LOCATED IN THE PANOCHE VALLEY, UNINCORPORATED SAN BENITO COUNTY, CALIFORNIA.

Bloom Biological, Incorporated
November 14, 2010

Bloom Biological, Incorporated (BBI) was retained by Solargen Energy, Incorporated (Solargen) in cooperation with Live Oak Associates, Inc. to conduct surveys for Golden Eagle (*Aquila chrysaetos*) nests in the vicinity of the proposed Panoche Valley Solar Farm Project (PVSF), located in the Panoche Valley in unincorporated San Benito County, California. This report discusses the BBI's survey methods, results and recommendations.

PROPOSED PROJECT DESCRIPTION

The 4,885-acre project site is located in eastern San Benito County in the Panoche Valley, approximately 15 miles west of Highway 5 and along Little Panoche Road (also known as West Shields Road). Specifically, the project is located in Township 15S, Range 10E, Sections 3-4, 8-11, and 13-16 and Township 15S, Range 11E, Section 19 of the USGS *Cerro Colorado*, *Llanada*, *Mercy Hot Springs*, and *Panoche* 7.5-minute topographic quadrangle maps.

The topography of the site descends gradually to the east-southeast with sloping gradients up to approximately 11 percent. The site elevation ranges from approximately 1,250 feet above mean sea level near the southeast end of the site to approximately 1,400 feet above mean sea level near the west end. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. Both Panoche Creek and Las Aguilas Creek traverse the project site. In addition, there are several unnamed washes located throughout the site.

There is no urban development within the project site or surrounding area. The nearest rural community is approximately 15 miles from the perimeter of the project site. Previously, much of the project site was used for crop production; however, for approximately the past forty years, the project site and the surrounding area have been used for grazing. Vegetation is low-lying and sparse and primarily consists of annual nonnative grass species.

Like much of California, the site and surroundings experience a Mediterranean climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall, and is characterized as high desert. Annual precipitation in the general vicinity of the site ranges between 9 and 13 inches, almost 85 percent of which falls between October and March. Nearly all precipitation falls in the form of rain. Stormwater runoff readily infiltrates the sites' soils; when field capacity has been reached, gravita-tional water flows into the creeks and drainages.

REASON FOR SURVEYS

The Golden Eagle is an uncommon permanent resident and migrant throughout most of California's foothills, mountains, sage-juniper flats and deserts (CDFG 2008), and is protected under the federal Bald and Golden Eagle Protection Act and by the California Department of Fish & Game as a Fully Protected Species. Golden Eagle status studies completed as recently as 1989 suggested a stable population for much of the western United States (Harlow and Bloom 1989), however, recent evidence suggest that eagle numbers in the western United States are now declining. As a result, the U.S. Fish and Wildlife Service (Service) is recommending focused surveys in nesting habitat within ten miles of proposed projects that might cause anthropogenic disturbances to eagles. Future recommendations regarding Golden Eagle wintering and migratory habitat use are being developed.

METHODS

The Service has recently recommended (Pagel et al. 2010) the following four tasks to determine the likely effects of a project or activity on eagles:

A. Collection and synthesis of biological data.
B. Identifying activities that are likely to result in take.
C. Avoidance and minimization measures.
D. Quantifying the anticipated take.

BBI's typical survey approach follows recommendations made in the U.S. Fish and Wildlife Service's (Service) Interim Golden Eagle inventory and monitoring protocols (Pagel et al. 2010), which recommend two surveys for eagle nests by helicopter. The first (Phase 1) is normally conducted in March and the second (Phase 2) in late April/early May. The Service notes that helicopter surveys are an accepted and efficient means to monitor large areas of habitat, to inventory potential habitat, and monitor known territories (Pagel et al. 2010), as eagles nest on cliffs or large trees in open areas and build a large platform nest often initially 10 feet across and 3 feet high of sticks, twigs and greenery (CDFG 2008). Because of their large size, these nests, particularly when active, are easy to spot at a great distance from the air and in California can be distinguished from Red-tailed Hawk (*Buteo jamaicensis*), Common Raven (*Corvus corax*) and Bald Eagle (*Haliaeetus leucocephalus*) by biologists experienced with the nests of those species. The Phase 2 survey can be conducted on foot if feasible. The purpose of the surveys is to record and report occupancy (Phase 1) and productivity (Phase 2) of resident golden eagles including, but not limited to, the following:

- individual activities,
- nests and territories on and surrounding the subject solar farm project, and within an approximate 4- to 10-mile radius of the proposed project (assumed Service requirement).

The Golden Eagle surveys conducted in 2010 for the PVSF were conducted outside of the survey window recommended in the Service's guidelines, however, the specific surveys conducted by BBI were approved by the Service with the caveat that spring surveys would likely still be recommended and that any Golden Eagle nest trees or nest cliffs found may need to be climbed to verify species and nest success. The potential survey area included the project site and all lands within a ten mile radius surrounding the project site, with a particular emphasis on topographic features and large power line rights-of-way where Golden Eagles are likely to be located.

Because of the late date that surveys were being conducted, BBI gathered as much data as possible about Golden Eagle locations and use of the area over the course of two days of helicopter surveys conducted on August 6 and 7, 2010. Flight times were nine and five hours, respectively. Both surveys followed the helicopter survey methodology described in Section VII.b Aerial Surveys of Pagel et al. (2010). Surveys were conducted by BBI biologists Peter H. Bloom (seated in the front of the helicopter) and Scott Thomas (seated in the rear). Two GPS units, 1 primary and 1 backup, were used to document geographic locations of importance and the routes taken. The survey duration was adequate to cover the entire area and examine detectable large stick nests for the presence of inactive and active Golden Eagle nests. Nests of all raptor species and corvids that could be detected were documented.

SURVEY LIMITATIONS

The western 50% of the survey area contained highly variable hilly topography and was cloaked in oak woodlands and oak savannah that include at least Blue Oaks (*Quercus douglassiana*) and Valley Oaks (*Q. lobata*), both common nesting substrates for Golden Eagles and Red-tailed Hawks (*Buteo jamaicensis*) in this region (Bloom unpub. & Tietje et al. 1998). Both tree species are deciduous. But because nesting surveys were performed in August, essentially all live trees were fully leafed out and only a moderate percentage could be accurately surveyed.

The survey accuracy was also weakened because all nesting pairs of Golden Eagles and Red-tailed Hawks in this region had fledged their young by August 1. As a result, the identity of nest ownership could not be precisely known in the case of some nests because no chicks, incubating or brooding adults or other important nest identifiers could be used. However, the summer 2010 preliminary results are unequivocal; there is a high density of nesting Golden Eagles and other raptors and ravens surrounding Panoche Valley but relatively few actually on the valley floor.

RESULTS

A total of 169 large bird (raptor or corvid) nests were detected during the survey, including 15 Golden Eagle nests (see Table II, end of document). Of the 15 Golden Eagle nests, nine were determined to have been active in 2010. Based on the location and distribution of these nests, BBI estimates that these 15 nests represent at least nine active Golden Eagle territories within ten miles of the PVSF. Based upon the quantity and quality of oak woodland and oak savannah habitat in the western half of the study area, it is likely that several more Golden Eagle nesting territories and their nests have yet to be discovered.

Also detected during the survey were 111 Common Raven nests, 1 Turkey Vulture nest, 1 Barn Owl nest, 1 Great Horned Owl nest, 16 Prairie Falcon nests and 24 Red-tailed Hawk nests. A complete list of wildlife observed in the survey area is shown below in Table I.

Table I. Wildlife Species Observed During the Survey

Species	Scientific Name	Notes
Birds		
Golden Eagle	*Aquila chrysaetos*	(2) Panoche Valley (3) Valley de Aquila
Red-tailed Hawk	*Buteo jamaicensis*	
Prairie Falcon	*Falco mexicanus*	
Barn Owl	*Tyto alba*	
Great Horned Owl	*Bubo virginiaus*	
American Kestrel	*Falco sparverius*	Abundant in cliffs
Road Runner	*Geococcyx californicus*	
Common Raven	*Corvus corax*	
Chukar	*Alectoris chukar*	
Mourning Dove	*Zenaida macroura*	
Rock Dove	*Columbia livia*	
Mammals		
Bobcat	*Lynx rufus*	
Mule Deer	*Odocoileus hemionus*	

Coyote	*Canus larans*
Gray Fox	*Urocyon cinereorgenteus*
Black-tailed Jack Rabbit	*Lepus californicus*
Audubon's Cottontail	*Sylvilagus audubonii*
California Ground Squirrel	*Spermophilus beecheyi*

DISCUSSION

Natural History

Kochert *et al.* (2002) provided a thorough description of the natural history of the Golden Eagle, noting that the species is found in numerous 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 hunting habitat, 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 typically reach sexual maturity, form territories and begin nesting at about five years of age. Pairs generally stay within the limits of their territory, which can measure 10–30 square kilometers, and within that territory can be as many as 14 nests (Bloom pers. obs.) which a pair maintains and repairs as part of their courtship. Over the course of a decade several of these nests will be used and will produce young, others may only be added to with 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. The black-tailed jackrabbit is a key prey species throughout much of the range, and eagle reproductive rates fluctuate with jackrabbit population cycles.

Adverse Effects of Energy Projects

While there is currently an effort to build a larger "sustainable" energy infrastructure in the United States and abroad with expected fewer overall environmental effects than the existing hydrocarbon-based infrastructure, conservation biologists are still in the process of establishing what effects alternative energy plants might have on the environment at the local level. It is well-established that Golden Eagles and other raptors are vulnerable to mortality through collision with wind turbines (Orloff and Flannery 1992, PBRG 1997, Madders and Walker 2002). For solar facilities, potential effects on wildlife are in the early stages of investigation, but it is expected that raptors and other species could suffer adverse effects due to reduced foraging habitat, electrocution from distribution lines and potentially, a reduction in the prey base also caused by habitat loss for prey species. In the case of the proposed PVSF, the project has the potential to have the following effects on Golden Eagles:

- **Direct Mortality -** Long-term surveys of Golden Eagle populations have shown declines in nesting populations throughout the western United States (Kochert and Steenhof 2002). Franson et al. (1995) found that humans cause >70% of recorded deaths, with the leading causes being accidental trauma (collisions with vehicles, power lines, or other structures, 27%), electrocution

(25%), gunshot (15%), and poisoning (6%). Lead poisoning in California has also been identified as an important mortality factor with > 30% of a population having elevated levels (Bloom et al. 1989, Pattee et al. 1990).

Electrocution is a particular risk potentially posed by the PVSF. Golden Eagles are vulnerable to electrocution when landing or taking off from power poles, when defecating from power poles, or when two eagles perch on the same pole, with the risk increasing when inclement weather hampers flight or when wet feathers increase conductivity (Avian Power Line Interaction Committee 1996). Harness and Wilson (2001) reported that ≥272 Golden Eagle electrocution deaths occurred in western North America From 1986 to 1996. In areas lacking natural perches such as the area surrounding the PVSF; poles with cross arms diagonal or parallel to prevailing winds are most lethal (Benson 1981, Harness and Wilson 2001).

- **Nest Failures -** Golden Eagles may desert nests in early incubation if disturbed by humans (Bloom 1974, Thelander 1974), and potential desertion may not be noticed early through behavioral cues as Golden Eagles are not aggressive toward humans in the nest vicinity and will simply leave and not return to the area for hours (Camenzind 1969), if ever. While it is unlikely that project development would cause such an effect directly given the location of most nests relative to the proposed project site, project implementation could contribute to cumulative or growth-inducing impacts, ultimately causing additional anthropogenic disturbance in the area over time. Fifteen Golden Eagle nests were detected during the survey at distances of 3.1 to 10 miles from the proposed project's boundary (see Table II). Increased recreation including the use of dirt roads, off-road vehicle use, rock climbing, and target shooting are all linked to nest failures and over the long-term, complete nest territory abandonment.

- **Indirect Mortality –** Management of healthy eagle populations requires maintaining prey habitat in foraging areas (Kochert et al. 2002) as the availability of food and nesting sites is the primary factor determining nesting density of Golden Eagles (Hunt et al. 1995) and reproductive rates of Golden Eagles often fluctuate with prey densities (Smith and Murphy 1979, Tjernberg 1983, Bates and Moretti 1994, Steenhof et al. 1997, McIntyre and Adams 1999). In southwestern Idaho, Marzluff et al. (1997) have found that behavior and demography of Golden Eagles are closely associated with the abundance of black-tailed jackrabbits (*Lepus californicus*), which are themselves dependent on stands of sagebrush/rabbitbrush interspersed with grassland (Knick and Dyer 1997). Bloom and Hawks (1982), working in the Great Basin Desert of northeast California and northwest Nevada found that 91% of the biomass and 85% of the frequency of prey found in nests were attributed to lagomorphs. Patch sizes of this habitat were found to be an essential feature of Golden Eagle home ranges (Marzluff et al. 1997). Both rabbitbrush and black-tailed jackrabbits are present in the study area, and could potentially be adversely affected by construction of the PVSF within the project's footprint, and perhaps further from the site due to increased anthropogenic disturbance to the surrounding area.

Mitigating Potential Adverse Project Effects

It is BBI's opinion that as several Golden Eagle nests exist within 2.0 miles of the Panoche Valley floor that the habitat quality is relatively high. The project's impacts on nesting Golden Eagles may be moderately high. However, given the potential for impacts caused by the project to this or other future Golden Eagle pairs, it is highly recommended that mitigation be incorporated into the project to reduce the potential for project-initiated direct and indirect mortality or nest failure. BBI recommends the following measures be taken into consideration:

- Permanent conservation of land surrounding certain nest sites to ensure future development or other land uses directly or indirectly caused by the project do not impact vulnerable eagle nest locations.

- Lead bullets, lead bullet fragments, and lead pellets from hunting cause unnecessary deaths of Golden Eagles, Bald Eagles, California Condors and other raptors. Support regional as well as the State-wide ban of the use of lead bullets for hunting in California.

- Permanent conservation of on-site and/or off-site natural foraging habitat.

- Many hundreds of acres of lowland non-native grasslands cover the valley floors with little or no native shrub species used for foraging and cover by lagomorphs. Investigate the potential for habitat improvement (native shrub restoration) of keystone prey species preyed upon by Golden Eagles.

- Large numbers of raptorial birds, including Golden Eagles are electrocuted annually. Replace existing dangerous utility lines with raptor-safe designs within the 10 mile radius survey area and ensure that all new lines be raptor-safe or underground (Avian Power Line Interaction Committee 1996).

- The lack of knowledge of nesting Golden Eagle populations is hampering efforts to strategically locate energy projects; hence more data is needed on productivity, natal dispersal, home-range size, and habitat use of Golden Eagles in coastal California. BBI proposes annual productivity monitoring for the nests of the approximately nine known Golden Eagle pairs and banding of all young produced. This work should occur during the remaining pre-construction period and 10 years post-construction.

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Table II. Survey Results

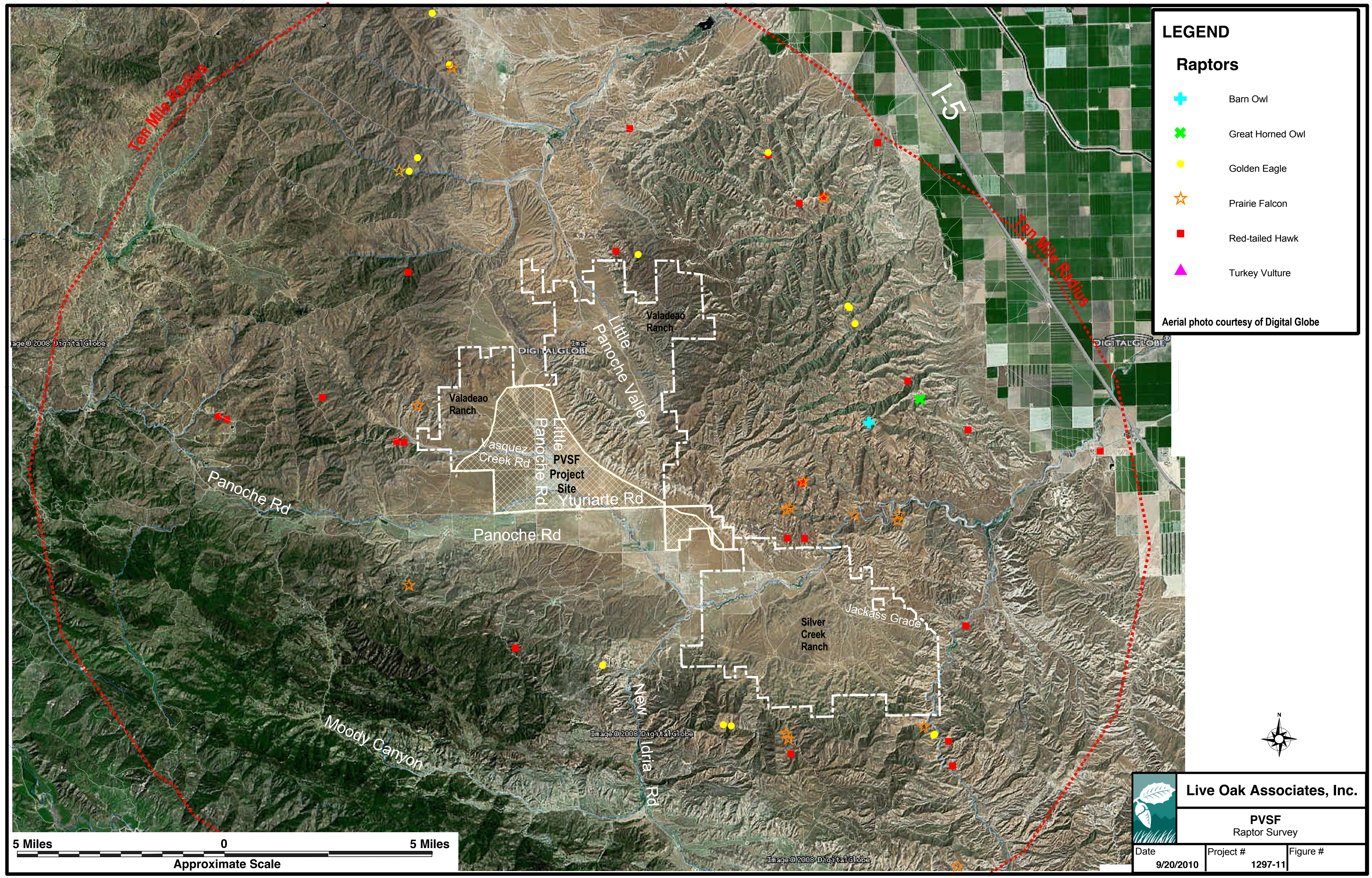
The following table shows the full results of BBI's survey. Nests are listed in order by distance from the site boundary. Distance was calculated using the ST_Distance spatial query function in PostGIS and converted to miles.

Species	Point	Easting	Northing	Substrate	Status	Notes	Distance From Site
Common Raven	39	688871	4056213	Power Tower	Active		0
Common Raven	35	693728	4054673	Power Tower	Active		0
Common Raven	36	693064	4054891	Power Tower	Active		0
Common Raven	37	692631	4055012	Power Tower	Active		0
Common Raven	38	689203	4056102	Power Tower	Inactive		0
Common Raven	41	687559	4056651	Power Tower	Active		0
Common Raven	40	687907	4056543	Power Tower	Active		0
Common Raven	34	695043	4054255	Power Tower	Active		0
Common Raven	33	696774	4053788	Power Tower	Inactive		0.13
Common Raven	42	687200	4056752	Power Tower	Active		0.14
Common Raven	183	696418	4054891	Cliff	Active		0.47
Common Raven	43	686473	4056931	Power Tower	Active		0.51
Common Raven	169	697367	4052220	Tamarisk	Active		0.58
Common Raven	44	686106	4056965	Power Tower	Active		0.69
Common Raven	32	698204	4053569	Power Tower	Inactive		0.81
Common Raven	45	685832	4056998	Power Tower	Inactive		0.84
Common Raven	184	696971	4055418	Cliff	Inactive		0.94
Common Raven	168	692322	4052926	Power Pole	Active		1.03
Common Raven	31	698623	4053519	Power Tower	Active		1.06
Red-tailed Hawk	46	684890	4057086	Power Tower	Active		1.38
Red-tailed Hawk	30	699365	4053469	Power Tower	Active		1.51
Red-tailed Hawk	47	684609	4057118	Power Tower	Active		1.55
Prairie Falcon	181	685412	4058501	Cliff	Active	Built on an old eagle nest	1.67
Prairie Falcon	185	699331	4054545	Cliff	Active	May be a duplicate	1.69
Prairie Falcon	106	699470	4054645	Cliff	Active	Barn Owl active on same cliff	1.8
Red-tailed Hawk	29	700027	4053450	Power Tower	Active		1.92
Common Raven	105	699652	4054959	Cliff	Inactive		1.99
Red-tailed Hawk	107	699894	4055536	Cliff	Inactive		2.32
Prairie Falcon	108	699974	4055640	Cliff	Active	On top of old Common Raven nest	2.4
Prairie Falcon	188	685074	4051709	Cliff	Active		2.63
Common Raven	191	688859	4049498	Cliff	Inactive		3.07
Golden Eagle	198	692387	4048663	Cliff	Active	Fledged young in 2010	3.09
Prairie Falcon	117	701901	4054384	Cliff	Active		3.16
Red-tailed Hawk	190	689089	4049317	Cliff	Active		3.19
Common Raven	196	694130	4047790	Cliff	Inactive		3.27
Common Raven	52	692975	4063678	Cliff	Active	Built on an old eagle nest	3.29
Common Raven	200	692333	4048249	Cliff	Active		3.33
Common Raven	54	693135	4063689	Cliff	Inactive		3.35
Common Raven	55	692757	4063984	Cliff	Inactive		3.4
Common Raven	197	693563	4047553	Cliff	Active		3.48

Species	Point	Easting	Northing	Substrate	Status	Notes	Distance From Site
Red-tailed Hawk	182	681810	4058771	Blue Oak	Active	Large enough that it could be a Golden Eagle nest	3.56
Red-tailed Hawk	180	685046	4063501	Cliff	Active	Fledged young in 2010 – Large enough to be a Golden Eagle nest	3.57
Red-tailed Hawk	56	692890	4064296	Cliff	Active	May be a Red-tailed Hawk or Golden Eagle	3.61
Golden Eagle	53	693736	4064176	Cliff	Old	May be a Red-tailed Hawk or Golden Eagle	3.8
Common Raven	189	689836	4048170	Cliff	Inactive		3.94
Golden Eagle	120	696951	4046424	Cliff	Inactive		4.12
Prairie Falcon	109	703509	4054159	Cliff	N/A	Roost location only	4.12
Common Raven	114	703260	4055283	Cliff	Inactive		4.13
Golden Eagle	121	697251	4046384	Cliff	Active	Fledged young in 2010	4.15
Prairie Falcon	110	703593	4054396	Cliff	Active		4.19
Common Raven	122	697518	4046337	Cliff	Inactive		4.19
Common Raven	125	699082	4046628	Cliff	Active		4.21
Common Raven	124	697580	4046261	Cliff	Inactive		4.24
Common Raven	113	703713	4054666	Cliff	Inactive		4.3
Common Raven	115	702487	4057702	Cliff	Inactive		4.42
Barn Owl	116	702461	4057828	Cliff	Active		4.46
Prairie Falcon	126	699328	4046136	Cliff	Inactive		4.55
Prairie Falcon	127	699403	4045918	Cliff	Active		4.69
Common Raven	128	699467	4045893	Cliff	Active		4.72
Common Raven	192	688324	4046715	Cliff	Inactive		4.78
Common Raven	111	703939	4056476	Cliff	Active		4.79
Common Raven	112	703899	4056958	Cliff	Inactive		4.9
Common Raven	129	699772	4045643	Cliff	Active		4.93
Red-tailed Hawk	130	699510	4045316	Cliff	Active		5.07
Red-tailed Hawk	48	678196	4057954	Power Tower	Active		5.51
Golden Eagle	177	685080	4067308	Cliff	Inactive		5.58
Common Raven	178	684870	4067237	Cliff	Inactive		5.59
Common Raven	101	697224	4065076	Cliff	Inactive		5.66
Prairie Falcon	179	684706	4067346	Cliff	Active		5.7
Red-tailed Hawk	49	677862	4058063	Power Tower	Active	Inactive Common Raven on same tower	5.72
Great Horned Owl	93	704389	4058705	Cliff	Active		5.74
Red-tailed Hawk	96	703911	4059398	Cliff	Active		5.78
Golden Eagle	176	685397	4067819	Cliff	Active	3 Golden Eagle nests on same face - 1 Active	5.8
Golden Eagle	98	701925	4061559	Cliff	Inactive	2 Inactive Golden Eagle nests 50 feet apart	5.84
Red-tailed Hawk	167	706109	4050149	Cliff	Active		5.98
Common Raven	28	706489	4054862	Power Tower	Active		6.02
Golden Eagle	99	701721	4062161	Cliff	Active		6.06
Golden Eagle	100	701658	4062219	Cliff	Active	Probably same pair as 099	6.07
Common Raven	148	703193	4045429	Cliff	Active		6.13
Common Raven	149	703446	4045525	Cliff	Inactive		6.18
Prairie Falcon	150	704534	4046371	Cliff	Active		6.29
Red-tailed Hawk	95	706197	4057552	Cliff	Inactive		6.35
Common Raven	94	706251	4057529	Cliff	Inactive		6.37

Species	Point	Easting	Northing	Substrate	Status	Notes	Distance From Site
Common Raven	165	704817	4046505	Cliff	Inactive		6.37
Common Raven	187	678902	4049482	Cliff	Inactive		6.39
Red-tailed Hawk	103	693419	4068923	Eucalyptus	Active		6.42
Common Raven	166	705217	4046831	Cliff	Active		6.43
Common Raven	164	705000	4046372	Cliff	Inactive		6.51
Golden Eagle	152	704906	4046035	Cliff	Active		6.6
Golden Eagle	151	704940	4046075	Cliff	Inactive		6.6
Common Raven	102	694520	4069158	Eucalyptus	Inactive		6.79
Common Raven	153	705126	4045728	Cliff	Active	Barn Owl active on same cliff	6.83
Common Raven	163	705268	4045775	Cliff	Active		6.87
Common Raven	162	705497	4045981	Cliff	Active		6.9
Common Raven	161	705539	4045909	Cliff	Active		6.95
Red-tailed Hawk	160	705463	4045797	Cliff	Inactive		6.96
Common Raven	104	693691	4069783	Cliff	Inactive		6.98
Common Raven	50	675894	4058585	Power Tower	Inactive		6.99
Common Raven	159	705294	4045169	Cliff	Active		7.14
Common Raven	50	675526	4058678	Power Tower	Inactive		7.23
Common Raven	87	699929	4065879	Cliff	Active		7.28
Red-tailed Hawk	88	699829	4066095	Cliff	Active		7.31
Common Raven	89	699569	4066533	Cliff	Inactive		7.35
Common Raven	173	687269	4070933	Cliff	Active		7.39
Red-tailed Hawk	158	705621	4044871	Cliff	Active		7.41
Red-tailed Hawk	85	698653	4067936	Cliff	Active		7.54
Common Raven	154	705645	4044580	Cliff	Active		7.55
Golden Eagle	86	698641	4068022	Cliff	Active		7.57
Prairie Falcon	171	686705	4071232	Cliff	Active		7.63
Common Raven	172	686705	4071239	Eucalyptus	Active		7.64
Common Raven	64	708344	4057912	Power Tower	Inactive		7.66
Golden Eagle	170	686600	4071318	Cliff	Active		7.7
Common Raven	65	707206	4060337	Power Tower	Inactive		7.76
Common Raven	66	706855	4061014	Power Tower	Inactive		7.83
Common Raven	90	700796	4066261	Cliff	Inactive		7.86
Prairie Falcon	91	700750	4066331	Cliff	Inactive		7.86
Red-tailed Hawk	92	700723	4066361	Cliff	Active		7.86
Common Raven	146	709599	4054229	Cliff	Inactive		7.89
Common Raven	67	706624	4061486	Power Tower	Inactive		7.9
Common Raven	68	706182	4062259	Power Tower	Inactive		7.99
Common Raven	145	709785	4053854	Cliff	Inactive		7.99
Common Raven	147	709752	4054497	Cliff	Inactive		8
Common Raven	69	705960	4062667	Power Tower	Inactive		8.06
Common Raven	70	705759	4063048	Power Tower	Active		8.13
Common Raven	71	705552	4063404	Power Tower	Active		8.2
Common Raven	72	705321	4063807	Power Tower	Inactive		8.29
Common Raven	73	705199	4064163	Power Tower	Inactive		8.4
Common Raven	74	705013	4064639	Power Tower	Inactive		8.55
Common Raven	155	706504	4042952	Cliff	Active		8.65
Common Raven	135	710786	4055198	Power Tower	Inactive		8.69
Common Raven	75	704848	4065093	Power Tower	Active		8.7

Species	Point	Easting	Northing	Substrate	Status	Notes	Distance From Site
Common Raven	174	685981	4072937	Cliff	Active		8.76
Common Raven	136	711213	4054523	Power Tower	Inactive		8.91
Golden Eagle	175	685953	4073276	Cliff	Active	Fledged young in 2010	8.97
Common Raven	137	711378	4054258	Power Tower	Active		9
Red-tailed Hawk	27	711189	4056753	Power Tower	Active		9.12
Common Raven	76	703932	4066820	Power Tower	Inactive		9.23
Common Raven	84	700505	4070153	Power Tower	Active		9.33
Common Raven	62	699788	4070833	Power Tower	Inactive		9.36
Common Raven	63	700231	4070475	Power Tower	Active		9.37
Common Raven	138	712028	4053286	Power Tower	Inactive		9.38
Common Raven	83	701045	4069744	Power Tower	Active		9.38
Common Raven	60	698885	4071592	Power Tower	Inactive		9.41
Common Raven	61	699232	4071335	Power Tower	Inactive		9.41
Common Raven	186	675911	4067213	Cliff	Inactive		9.43
Common Raven	82	701698	4069225	Power Tower	Active		9.45
Common Raven	77	703429	4067556	Power Tower	Inactive		9.46
Common Raven	81	702065	4068941	Power Tower	Inactive		9.5
Common Raven	59	697778	4072457	Power Tower	Inactive		9.51
Common Raven	139	712236	4052980	Power Tower	Active		9.51
Common Raven	58	697525	4072656	Power Tower	Inactive		9.55
Common Raven	78	703253	4067841	Power Tower	Inactive		9.56
Common Raven	156	706127	4040723	Cliff	Inactive	Built on an old eagle nest	9.56
Prairie Falcon	157	706102	4040702	Cliff	Active		9.56
Common Raven	80	702439	4068647	Power Tower	Inactive		9.57
Common Raven	140	712384	4052740	Power Tower	Inactive		9.6
Common Raven	57	697223	4072914	Cliff	Active		9.61
Red-tailed Hawk	79	702787	4068386	Power Tower	Active		9.64
Common Raven	195	686725	4038865	Cliff	Inactive		9.72
Common Raven	141	712936	4052059	Power Tower	Active		9.96
Golden Eagle	194	686565	4038457	Cliff	Inactive	Historic nest site	9.98
Common Raven	193	686649	4038178	Cliff	Inactive		10.15
Common Raven	142	713867	4051092	Power Tower	Inactive		10.59
Common Raven	143	714018	4050918	Power Tower	Active		10.7
Common Raven	144	714404	4050508	Power Tower	Active		10.97
Red-tailed Hawk	134	710636	4036047	Cliff	Inactive		13.58
Common Raven	133	711135	4036423	Cliff	Inactive		13.59
Prairie Falcon	132	711910	4033670	Cliff	Active		15.23
Turkey Vulture	131	713083	4033127	Cliff	Active		15.94



LEGEND
Raptors
Barn Owl
Great Horned Owl
Golden Eagle
Prairie Falcon
Red-tailed Hawk
Turkey Vulture
Aerial photo courtesy of Digital Globe
Ten Mile Radius
Ten Mile Radius
I-5
Valadeao Ranch
Valadeao Ranch
Little Panoche Valley
Vasquez Creek Rd
Little Panoche Rd
PVSF Project Site
Yturiarte Rd
Panoche Rd
Panoche Rd
Silver Creek Ranch
Jackass Grade
New Idria Rd
Moody Canyon
5 Miles
0
5 Miles
Approximate Scale
Live Oak Associates, Inc.
PVSF
Raptor Survey
Date
9/20/2010
Project #
1297-11
Figure #

Panoche Valley Solar Facility
2014 Final Golden Eagle Nesting Survey Report

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

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

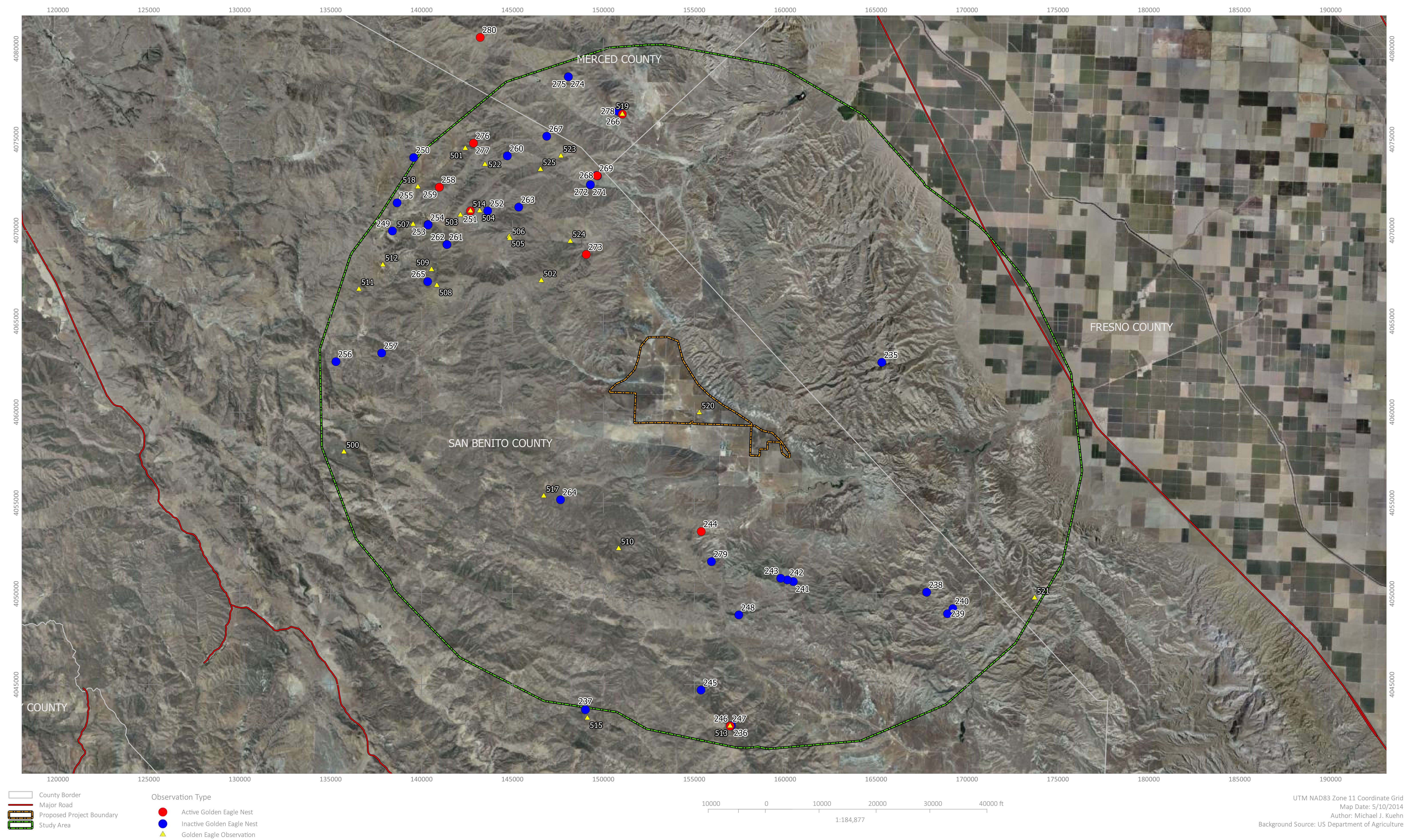

EXHIBIT 1. 2014 Golden Eagle Nesting Survey Results

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	

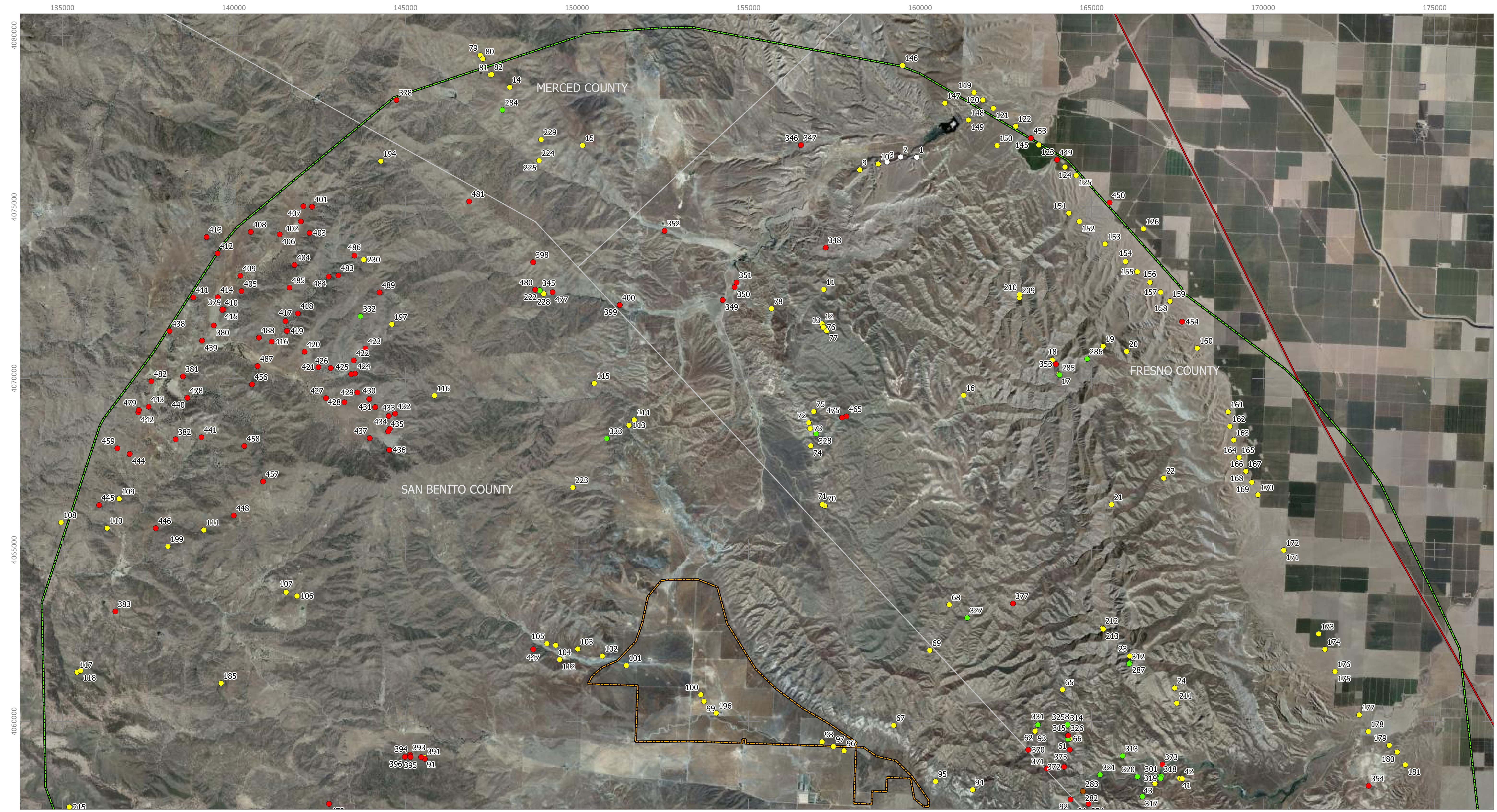
ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
366	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.07	
367	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	6.42	
368	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	1.26	
369	Red-tailed Hawk	Cliff	Empty	0	Inactive	1.85	
370	Red-tailed Hawk	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

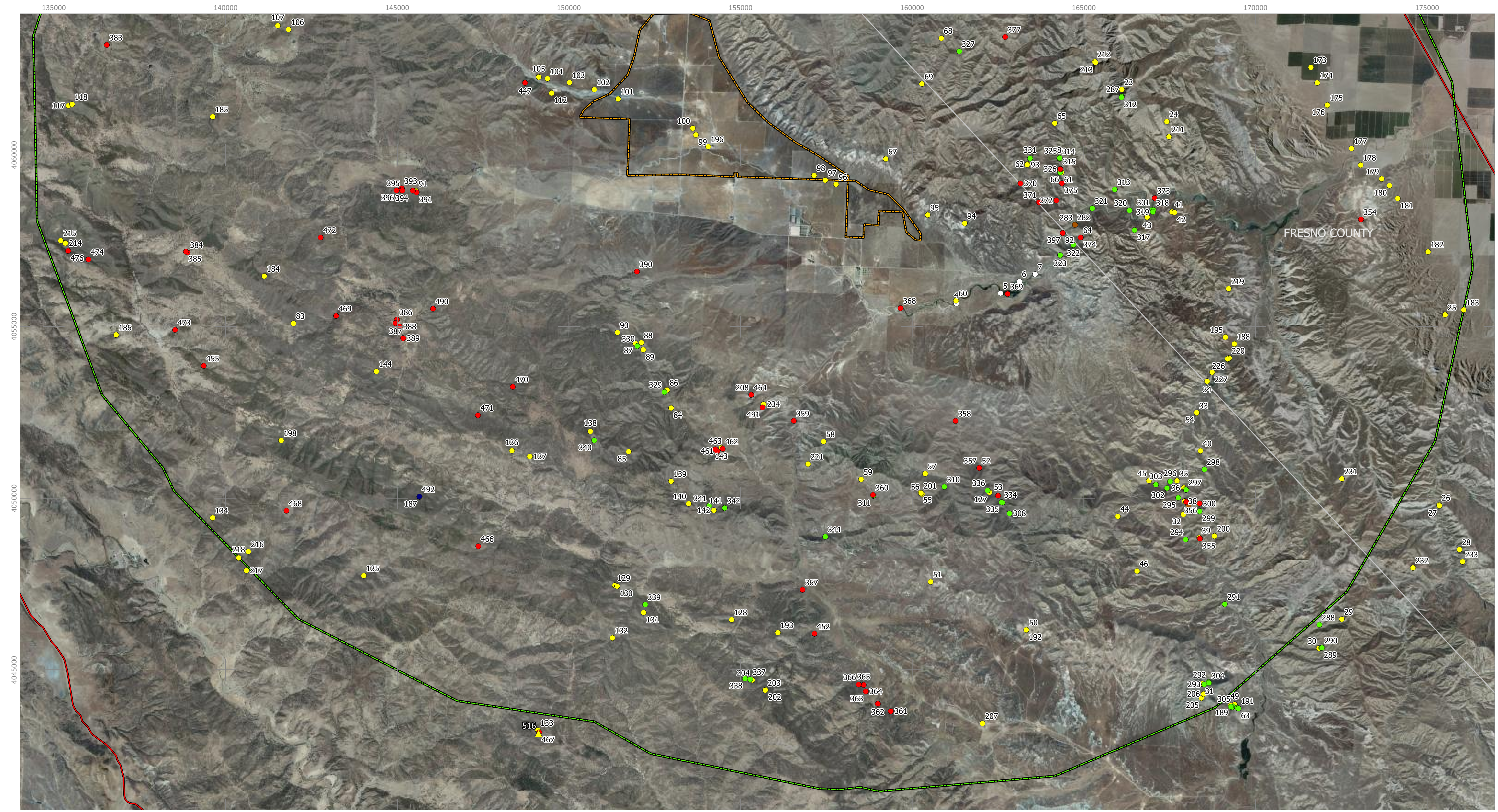
5000 0 5000 10000 15000 20000 ft
1:105,791

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.

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LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

SUMMARY OF BIOTIC RESOURCES
SOLARGEN ENERGY'S
PANOCHE RANCH SOLAR FARM

Prepared by:
Live Oak Associates, Inc.

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Wes Rhodehamel, Regional Director Bakersfield and Senior Wildlife Biologist
Neal Kramer, Botanist

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20400 Stevens Creek Boulevard, Suite 700
Cupertino, CA 95014

20 April 2009 PN: 1297-01

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1 INTRODUCTION

The following is a summary of a reconnaissance survey conducted by Live Oak Associates, Inc. (LOA) between 1 and 3 April 2009 on the proposed Panoche Ranch Solar Farm located in the Panoche Valley, San Benito and Fresno Counties, California. This summary offers an overview of the proposed project and discusses the biotic resources directly observed during the reconnaissance survey and also those that are historically know to occur in the site's vicinity.

1.1 PROJECT DESCRIPTION

Solargen Energy Inc. proposes to construct and operate a 1.5 Gigawatt solar photovoltaic (PV) energy generating facility that would be named the Panoche Ranch Solar Farm (Farm). The proposed location of the Farm is on private lands in the Panoche Valley, the majority of which (approximately 10,000 acres) are located in the eastern portion of San Benito County. A smaller area of approximately 900 acres is located north of Mercey Hot Springs in western Fresno County.

The Farm is proposed, in part, to support California in meeting the Renewable Portfolio Standard mandate, requiring investor-owned utilities to supply 20% of their total electricity through renewable energy by the year 2010. Benefits of the proposed Farm include the following:

- Direct conversion of sunlight to electricity through the PV effect does not require water to generate electricity
- Solargen's PV panels consist of non-toxic materials such as glass, silicon, concrete and steel
- The Farm would offset potential emissions of greenhouse gases that contribute to climate change and other pollutants such as nitrogen dioxide from fossil fuel fired power plants

The Farm would be constructed on contiguous parcels of land historically used for grazing. A buffer zone with a minimum width of 35-feet would be maintained between the PV panels and surrounding land and the operation of the Farm would not interfere with adjacent land uses currently in place.

The selection of the site in Panoche Valley is based mainly on sun light, topography and proximity to the Moss to Panoche transmission line owned by PG&E. This line provides a unique opportunity to connect energy produced at the Farm to an existing point on the system with available electric transmission capacity. The Panoche Valley offers a relatively level valley floor, occurring between approximately 1240 and 1400 feet above sea level. The Panoche Valley area supports a strong solar resource according to the National Renewable Energy Laboratory Solar Radiation Database (http://www.nrel.gov/gis/data_analysis.html), which has collected data for the last decade on various locations around the United States. The Farm would be expected to remain in operation for at least 30 years, with the possibility of a subsequent re-powering for additional years of operation. The energy produced here would mainly benefit users in San Benito and Fresno Counties, though outlying customers would also receive a portion of their energy from the Farm.

The Farm would consist primarily of PV panels on steel support structures, which would be dark in color. These panels would be arranged in rows, with panels tilting upward and facing south or southwest. Each panel would be 7- by 8-feet and they would stand no more than 15-feet above the ground. The panels would be arranged in blocks, and each block would be supported by an inverter and transformer. These units would stand no more than 25-feet above the ground. Medium-voltage collection system lines would be buried underground. It is believed that this system, with no moving parts, no thermal cycle, no water needs, a low visual profile and underground collection system would help minimize the Farm's potential impacts to the environment.

Due to the topography of the Panoche Valley, the installation of the Farm would not require large-scale grading. The main areas of grading would occur for all-weather access roads, the Farm substation, and an operations and maintenance (OM) facility. The roads would be heavily used during the construction phase, and then rarely used for maintenance in subsequent years.

As stated previously, the Farm would not require water to generate electricity. However, some water would be required for sanitary facilities and for periodic panel cleaning. It is estimated that these uses would require approximately 10.5 acre-feet of water per year, based on a one time per year cleaning schedule. This annual water demand represents approximately 6% of that used for a similar-sized solar thermal facility, based on recent California Energy Commission information. It is estimated that the construction of the Farm would take approximately 6 years to complete, and during this time, additional water would be necessary for sanitary facilities, dust control, initial panel washing and manufacturing concrete. Solargen is exploring opportunities to clean and recycle gray water for reuse onsite. Existing onsite wells should be sufficient to serve the Farm's water needs, however thorough studies of the water resources both onsite and in the greater Panoche Valley area are planned.

An approximately 5-acre substation is proposed as part of the project, and includes an adjacent area of up to 2 acres to be occupied by an OM facility, including a small parking area. One or more cement pads would be constructed as foundations for substation equipment, and other areas would utilize a gravel substrate. An 8-foot chain link fence would be constructed around the substation. These facilities would be strategically placed adjacent to the existing PG&E Moss to Panoche 230 kV transmission line. In addition to the substation and OM facility, there would be approximately one gear switch house for every 40 inverter and transformer combinations, each of which would have similar dimensions to the inverters and transformers.

2 EXISTING CONDITIONS

The outline of the proposed project is irregularly-shaped consisting of two blocks of land. The main area being considered is approximately 10,000 acres consisting of all or part of Township 15S, Range 10E, Sections: 3, 4, 5, 8, 9, 10, 11, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25; and Township 15S, Range 11E, Sections: 18, 19, 20, 29, and 30 all located in the eastern region of San Benito County, California, in an area known as the Panoche Valley. The majority of parcels within the site are used for cattle grazing. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1240 feet National Geodetic Vertical Datum (NGVD) to approximately 1400 NGVD.

The second area being considered by the applicant is a smaller parcel of approximately 900 acres located just east of the Little Panoche Reservoir and northeast of Mercey Hot Springs, in an area known as Little Panoche Valley in western Fresno County. The outline of this parcel is also irregularly-shaped, and encompasses portions of Township 13S, Range 11E, Sections: 20, 21, 28, 29 and 30. This area is basically a plateau with an elevation range of approximately 700 feet NGVD to 1,000 feet NGVD, featuring several ravines. Land uses in this area are the reservoir, the Little Panoche Wildlife Area, an old tire dump, and almond orchards; the Little Panoche Creek is in close proximity. The site itself is currently used for grazing cattle.

Like much of California, the sites and their surroundings experience 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 between 8- and 10-inches, almost 85% of which falls between October and March. Nearly all precipitation falls in the form of rain. Stormwater runoff readily infiltrates the sites' soils; when field capacity has been reached, gravitational water flows into the creeks and drainages.

2.1 BIOTIC HABITATS

Although the biotic habitats vary within Panoche Valley, the areas suitable for developing a solar farm are comprised of annual, non-native grasslands used mainly to graze cattle. It was in these areas that LOA focused reconnaissance surveys. Stock ponds were observed in Section 4 and, as mentioned above, Panoche and Las Aguilas Creeks and a number of unnamed drainages and washes traverse the grasslands. Most of the waterways were dry during the April 2009 surveys, and consisted mainly of gravely bottoms.

At the time of the April 2009 reconnaissance survey, much of Panoche Valley was heavily grazed by livestock. Prominent grass species observed during the April visit included 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

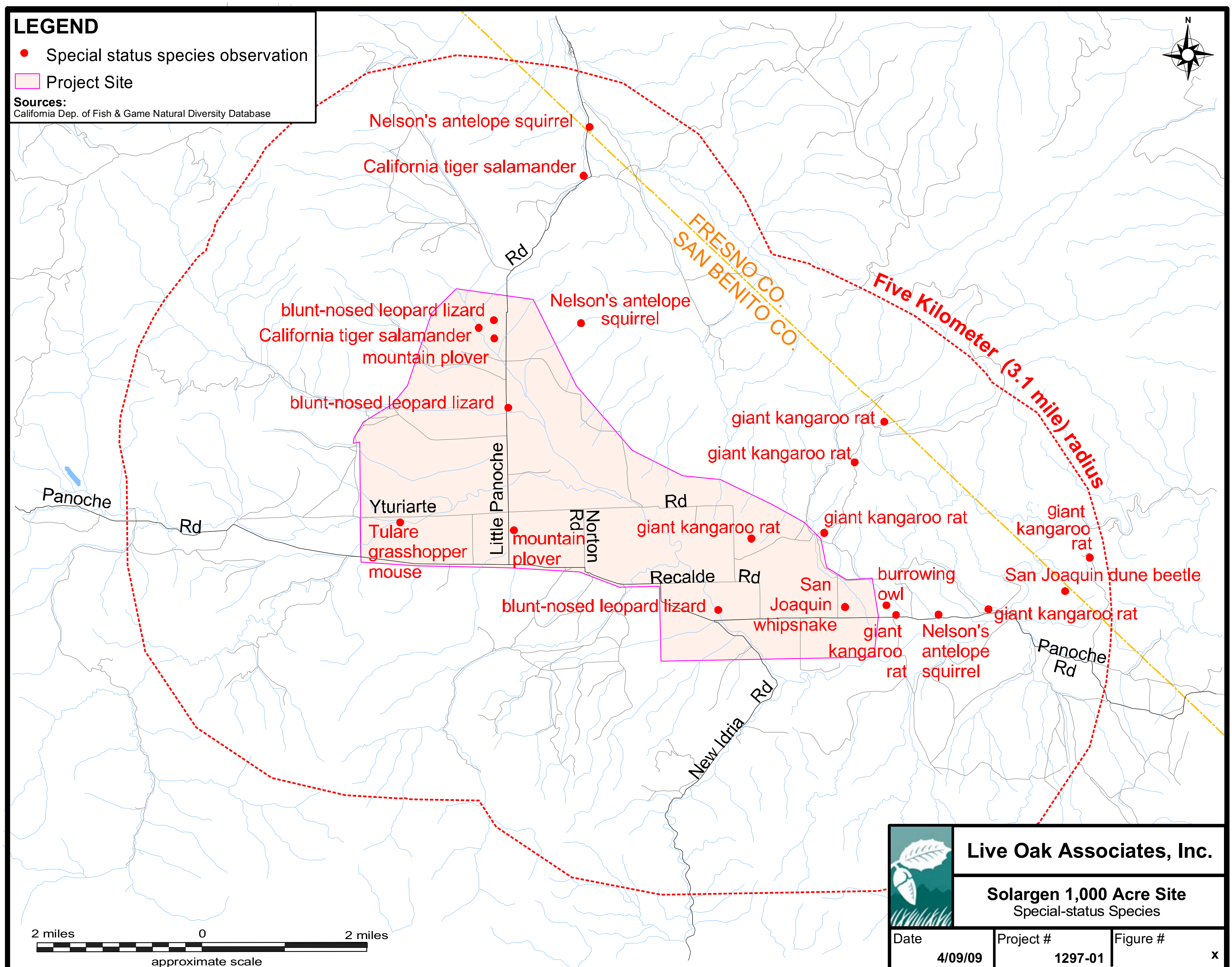
(*Medicago polymorpha*) were also common, especially along ranch roads. Species diversity increased in areas less disrupted by livestock or historic cultivation and included a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitaum*), California gold fields (*Lasthenia californica*), tidy-tips (*Layia platyglossa*) and California creamcups (*Platystemon californicus*).

Rangelands of the site, like grasslands throughout the region, serve as productive biotic habitats supporting a large diversity of native terrestrial vertebrates. Open habitats of the region provide significant foraging habitat for a variety of resident and wintering raptors, as well as granivorous (seed-eating) birds. The cover of native and non-native grasses and forbs provide cover for large populations of small mammals that, in turn, attract a diversity of predatory species. A number of these species are expected to utilize grasslands occurring on the site throughout all or part of the year as breeding and/or foraging habitat and many species remain during their entire life cycle. Some of these species are given special status listing (Figures 1 and 2).

Amphibians would be limited onsite due to the dominance of upland habitat; however, amphibians likely use the stock ponds found in Range 10E, Section 4 and utilize the waters of the creeks and drainages when they are flowing. Due to the large amount of acreage and a limited amount of time to conduct reconnaissance surveys, these ponds and drainages were not surveyed in detail. Access to section 4 was not obtained at the time of the reconnaissance level survey therefore examination of the stock ponds was not possible. Amphibian species that could occur here include the California tiger salamander (*Ambystoma californiense*)(CTS) which was observed in the area in 1992, western toad (*Bufo boreas*), Pacific chorus frog (*Hyla regilla*) and bullfrog (*Rana catesbeiana*). The presence of bull frogs or predacious fish in these water bodies would limit the suitability for CTS breeding habitat.

The rangelands of the site offer suitable habitat for a number of locally occurring reptilian species. The Pacific gopher snake (*Pituophis catenifer catenifer*) and western rattlesnake (*Crotalus viridis*) were all observed during the April 2009 surveys. These same rangelands could potentially support the western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), California horned lizard (*Phrynosoma coronatum frontale*), blunt-nosed leopard lizard (*Gambelia silus*) which has been documented in Range 10E, Sections 4, 9, and 25 between 1979 and 2004, southern alligator lizard (*Elgaria multicarinatus*), San Joaquin coachwhip (*Masticophis flagellum ruddocki*) observed in Range 11E, Section 29 in 1984, common king snake (*Lampropeltis getula*), and common garter snake (*Thamnophis sirtalis*).

Both resident and migratory birds, particularly raptors and granivorous birds, are expected to utilize the field as foraging habitat. Raptors observed on the site included red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), prairie falcon (*Falco mexicanus*) American kestrel (*Falco sparverius*), and turkey vulture (Cathartes aura) Other raptors that may forage onsite include the white-tailed kite (*Elanus leucurus*), Swainson's hawk (*Buteo swainsoni*), and golden eagle (*Aquila chrysaetos*). Additional bird species observed on the site or in the vicinity included the greater roadrunner (*Geococcyx californianus*), burrowing owl (*Athene cunicularia*), Anna's hummingbird (*Calypte anna*), loggerhead shrike (*Lanius ludovicianus*), yellow-billed magpie (*Pica nuttalli*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*) including a nest on a transformer tower on the 900-acre parcel, California horned lark


LEGEND
Special status species observation
Project Site
Sources:
California Dep. of Fish & Game Natural Diversity Database
Nelson's antelope squirrel
California tiger salamander
Rd
FRESNO CO.
SAN BENITO CO.
Five Kilometer (3.1 mile) radius
blunt-nosed leopard lizard
California tiger salamander
mountain plover
Nelson's antelope squirrel
blunt-nosed leopard lizard
giant kangaroo rat
giant kangaroo rat
Panoche
Rd
Yturiarte
Little Panoche
Rd
Norton Rd
Tulare grasshopper mouse
mountain plover
giant kangaroo rat
giant kangaroo rat
giant kangaroo rat
Recalde
Rd
blunt-nosed leopard lizard
San Joaquin whipsnake
burrowing owl
giant kangaroo rat
Nelson's antelope squirrel
San Joaquin dune beetle
giant kangaroo rat
Panoche Rd
New Idria Rd
2 miles
0
2 miles
approximate scale
Live Oak Associates, Inc.
Solargen 1,000 Acre Site
Special-status Species
Date
4/09/09
Project #
1297-01
Figure #
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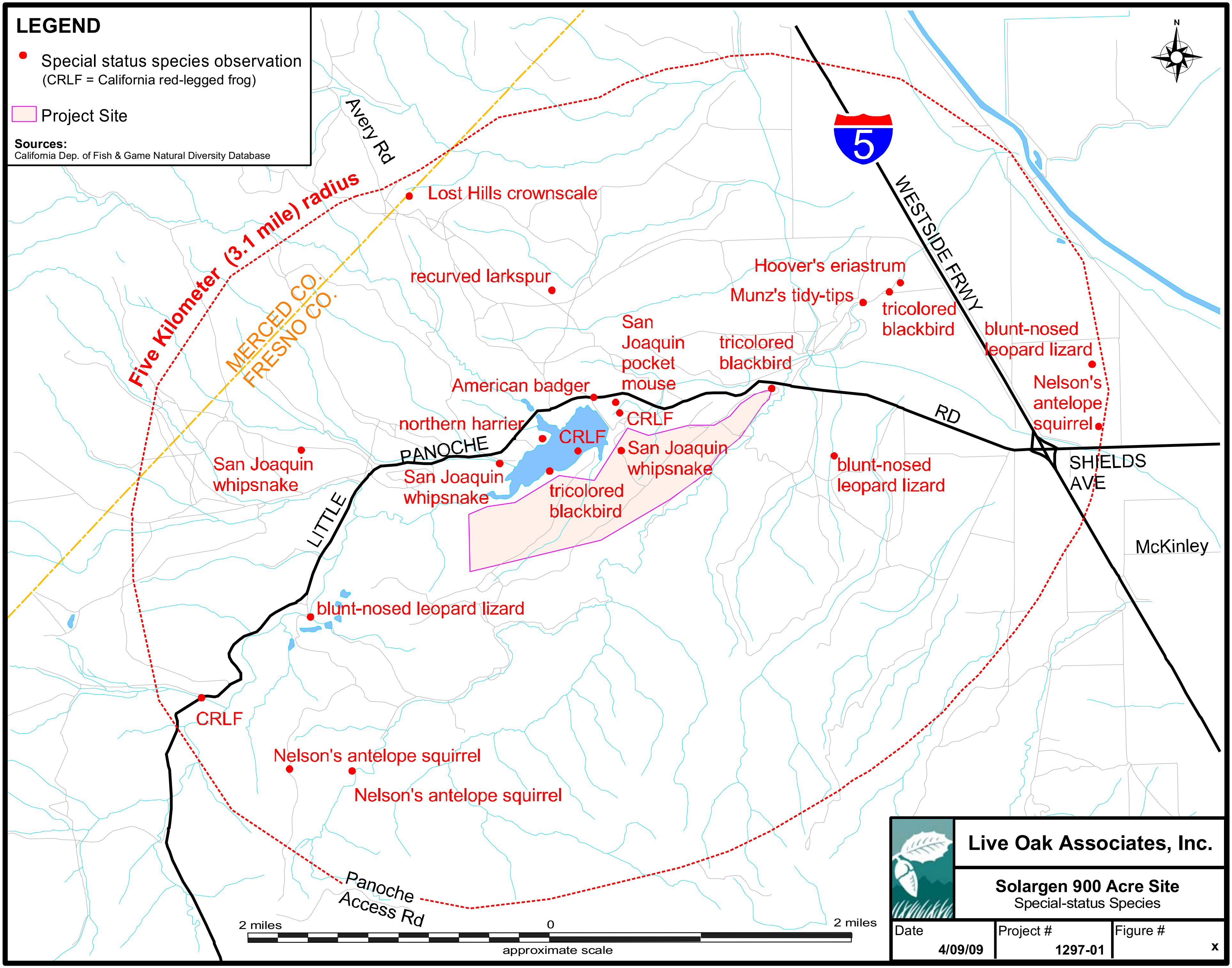
LEGEND
Special status species observation
(CRLF = California red-legged frog)
Project Site
Sources:
California Dep. of Fish & Game Natural Diversity Database
Avery Rd
Five Kilometer (3.1 mile) radius
MERCED CO.
FRESNO CO.
Lost Hills crownscale
recurved larkspur
Hoover's eriastrum
Munz's tidy-tips
tricolored blackbird
blunt-nosed leopard lizard
Nelson's antelope squirrel
San Joaquin pocket mouse
tricolored blackbird
American badger
CRLF
northern harrier
CRLF
San Joaquin whipsnake
San Joaquin whipsnake
San Joaquin whipsnake
tricolored blackbird
blunt-nosed leopard lizard
5
WESTSIDE FRWY
PANOCHE
RD
SHIELDS AVE
McKinley
LITTLE
blunt-nosed leopard lizard
CRLF
Nelson's antelope squirrel
Nelson's antelope squirrel
Panoche Access Rd
2 miles
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Live Oak Associates, Inc.
Solargen 900 Acre Site
Special-status Species
Date
4/09/09
Project #
1297-01
Figure #
x

(*Eremophila alpestris actia*), European starling (*Sturnus vulgaris*), red-winged blackbird (*Agelaius phoeniceus*), tricolored blackbird (*A. tricolor*) and western meadowlark (*Sturnella neglecta*). California condors (*Gymnogyps californianus*) would also be expected to forage over the site given its proximity to the Pinnacles National Monument. A variety of owls could occur regionally including the common barn owl (*Tyto alba*) and great gray owl (*Strix nebulosa*) Shorteared owl (*Asio flammeus*)

Small mammals likely to occur on the site include the Botta's pocket gopher (*Thomonys bottae*), and western harvest mouse (*Reithrodontomys megalotis*). The San Joaquin pocket mouse (*Perognathus inornatus*), grasshopper mouse (*Onychomys torridus*), Tulare grasshopper mouse (*O. t. tularensis*) observe within Range 10S Section 20 in 1938, and deer mouse (*Peromyscus maniculatus*) would be rare additions to the site, as the site lacks thick grass and herbaceous cover. A number of California ground squirrels (*Spermophilus beecheyi*) and their burrows were observed at various areas of the site. The region supports various kangaroo rat species, and a number of precincts were observed in Range 10S, Sections: 11, 13, 14, 15, and 24, and Range 11S, Sections 18, 19 and 30, indicating the potential presence of the giant kangaroo rat (*Dipdomys ingens*). The San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) has been documented in the area, and this species was observed from the roadway approximately 3.5 miles east of the site in April 2009.

Small mammals often attract predators, including reptiles and birds previously discussed. The abundance of small mammals also attracts larger mammals known to occur in the region, including the San Joaquin kit fox (*Vulpes macrotis mutica*) multiple occurrences have been made in the region and the Panoche Valley is considered one of three core habitats for the species (Figures 3 and 4), cougar (*Puma concolor*) known to occur in the region, and bobcat (*Lynx rufus*) a jaw of which was found during the April 2009 site visit. Black-tailed deer (*Odocoileus hemionus columbianus*), also occur in the region and likely graze the areas of the site from time to time.

2.2 SPECIAL STATUS PLANTS AND ANIMALS

A number of special status plants and animals occur in the vicinity of the study area. The 10,000-acre project site is located within the SE corner of Cerro Colorado, SW corner of Mercey Hot Springs, NE corner of Llanda and northern portion of Panoche U.S.G.S. 7.5 minute quadrangles, and the 900-acre project site is located within the Laguna Seca U.S.G.S. 7.5 minute quadrangle. These quadrangles and surrounding quadrangles (Chounet, Tumey Hills, Rock Springs Peak, Hernandez Reservoir, Idria, Ortigalita Peak, Ortigalita Peak NW, Hammonds Ranch, Charleston School and Dos Palos) were used in the search for special status plants and animals in the vicinity of the study area.

There are two federally listed plant species that occur in the region, the San Benito evening primrose (*Camissonia benitensis*) only known from the Idria area and San Joaquin woolythreads (*Monolopia congdonni*). In addition, there are a number of CNPS listed plants that occur regionally, several of which occur in grasslands such as those found in the Panoche Valley.

A number of special status animal species occur in the region of the proposed Farm site. Table 1 below addresses a select group of the animal species that could or do occur onsite or in the nearby vicinity. The locations of nearby sightings of special status species have been shown in Figures 1 and 2; and figures 3 and 4 show observations of the San Joaquin kit fox within a 10-mile radius of the two study areas. Sources of information for this table included *California's Wildlife, Volumes I, II, and III* (Zeiner et al. 1988), *California Natural Diversity Data Base* (CDFG 2009), *Endangered and Threatened Wildlife and Plants* (USFWS 2009), *Annual Report on the Status of California State Listed Threatened and Endangered Animals and Plants* (CDFG 2009), and *The California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2001 and online inventory).

TABLE 1. SECLECT LIST OF SPECIAL STATUS ANIMAL SPECIES THAT OCCUR OR HAVE THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE STUDY AREA

ANIMALS (adapted from CDFG 2009 and USFWS 2009)

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	Occurrence in the Study Area
California Tiger Salamander (*Ambystoma californiense*)	FT, SCE	Requires vernal pools for breeding and rodent burrows in annual grasslands for refuge.	**Possible.** Stock ponds were observed in Section 4, and CTS were observed in this area in 1992. It is possible the species remains present; however, the presence of bull frogs and/or predacious fish would reduce successful breeding for the species.
Blunt-Nosed Leopard Lizard (*Gambelia silus*)	FE, CE, CP	Frequents grasslands, alkali meadows and chenopod scrub of the San Joaquin Valley from Merced south to Kern Co.	**Likely.** BNLL have been documented by the CNDDB in Sections 4, 9, and 25 between 1979 and 2004. Potentially suitable habitat occurs onsite for BNLL.
San Joaquin Antelope Ground Squirrel (*Ammospermophilus nelsoni*)	CT	Occurs in the southwest portion of the valley on dry, sparsely vegetated loamy soils.	**Possible.** SJAS were recorded by the CNDDB in Section 3, and antelope squirrels were observed approximately 3.5 miles east of the subject properties during reconnaissance surveys conducted in April 2009.
Giant Kangaroo Rat (Di*pdomys ingens*)	FE, CE	Occurs in grasslands and shrub communities on gentle slopes (less than 11%). Primarily feeds on seeds, and occasionally on green plants and insects.	**Present.** GKR create burrow systems known as "precincts" with well worn paths between burrows. They also have a propensity to store their seeds outside their burrows. Evidence of this behavior and scats of appropriate size for GKR were observed in Sections 11, 13, 14, 15, 18, 19, 24 and 30 during recon surveys in April 2006. The CNDDB lists occurrences for this species in Sections 19 and 29 in 1992 and 2004, respectively. Therefore, GKR are presumed present onsite.
San Joaquin Kit Fox (*Vulpes macrotis mutica*)	FE, CT	Frequents desert alkali scrub and annual grasslands and may forage in adjacent agricultural habitats. Utilizes enlarged (4 to 10 inches in diameter) ground squirrel burrows as denning habitat.	**Present.** Panoche Valley is known to be one of 3 core habitat areas for SJKF. Burrows of suitable size for SJKF denning and scats of appropriate size for SJKF were observed in Sections 11, 13, 14, 15, 18, 19, 24 and 30 during recon surveys in April 2006. The CNDDB lists occurrences of the species in Sections 20, 22, 23, 25, 29 and 30 between 1975 and 2006. Conversations with local residents indicate frequent sightings. Therefore, SJKF are presumed present onsite.

State Sepcies of Special Concern

Species	Status	Habitat	Occurrence in the Study Area
Burrowing Owl (*Athene cunicularia*)	CSC	Frequents open, dry annual or perennial grasslands, deserts, and scrublands characterized by low growing vegetation. This species is dependent upon burrowing mammals, most notably the California ground squirrel, for nest burrows.	**Likely.** Burrowing owls were observed along Little Panoche Road between Mercey Hot Springs and the 10,000-acre site during April 2009 recon surveys. Furthermore, BUOW were observed in 2004 in Range 11S Section 29.

Explanation of Occurrence Designations and Status Codes

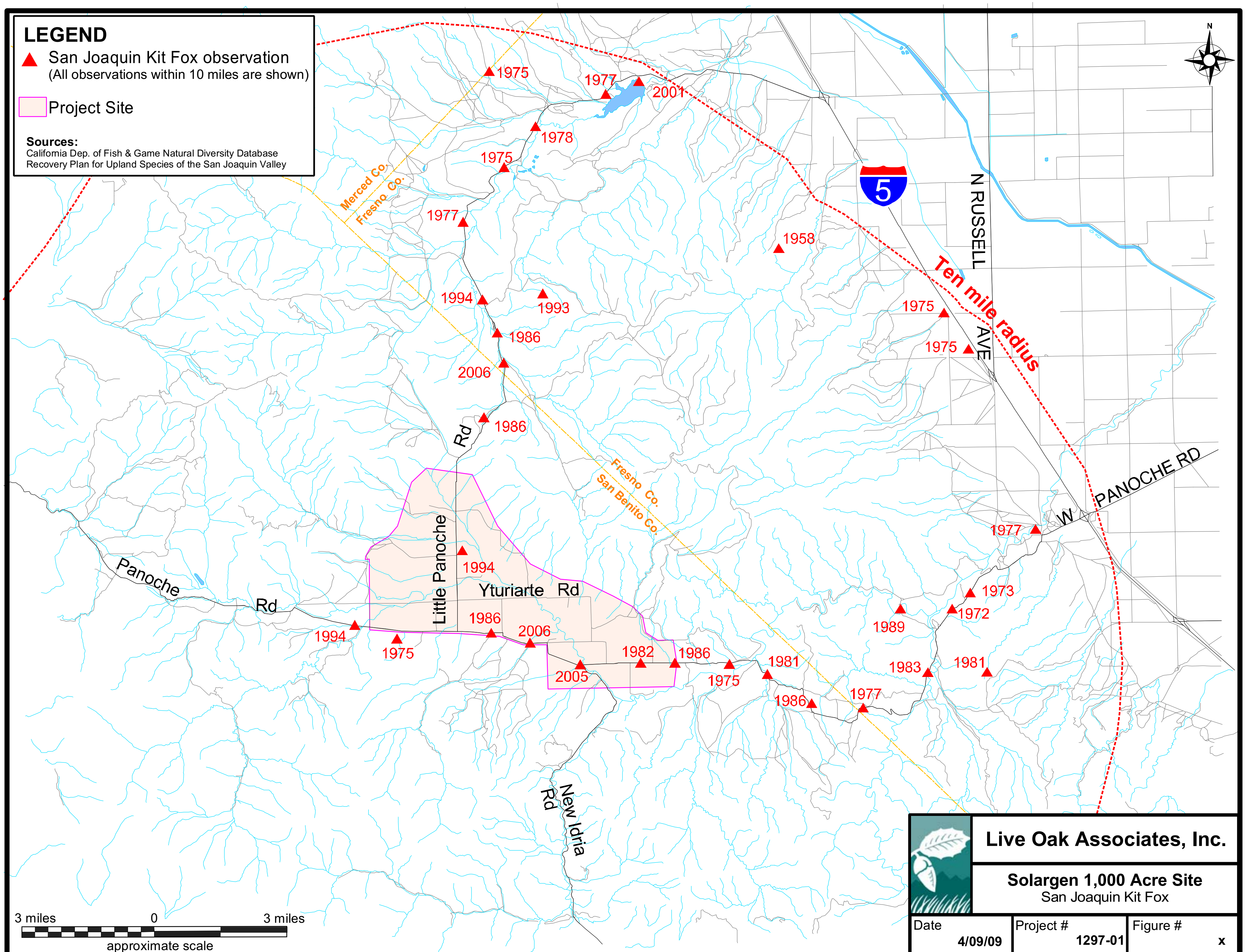
Present: Species observed on the sites at time of field surveys or during recent past.
Likely: Species known to occur in the vicinity and would likely occur onsite due to presence of like habitat.
Possible: Species not observed on the sites, but it could occur there from time to time.
Unlikely: Species not observed on the sites, and would not be expected to occur there except, perhaps, as a transient
Absent: Species not observed on the sites, and precluded from occurring there because habitat requirements not met.

STATUS CODES

FE	Federally Endangered	CE	California Endangered
FT	Federally Threatened	CT	California Threatened
FPE	Federally Endangered (Proposed)	CR	California Rare
FC	Federal Candidate	CP	California Protected
		CSC	California Species of Special Concern
		SCE	California Candidate (Endangered)

CNPS California Native Plant Society Listings:

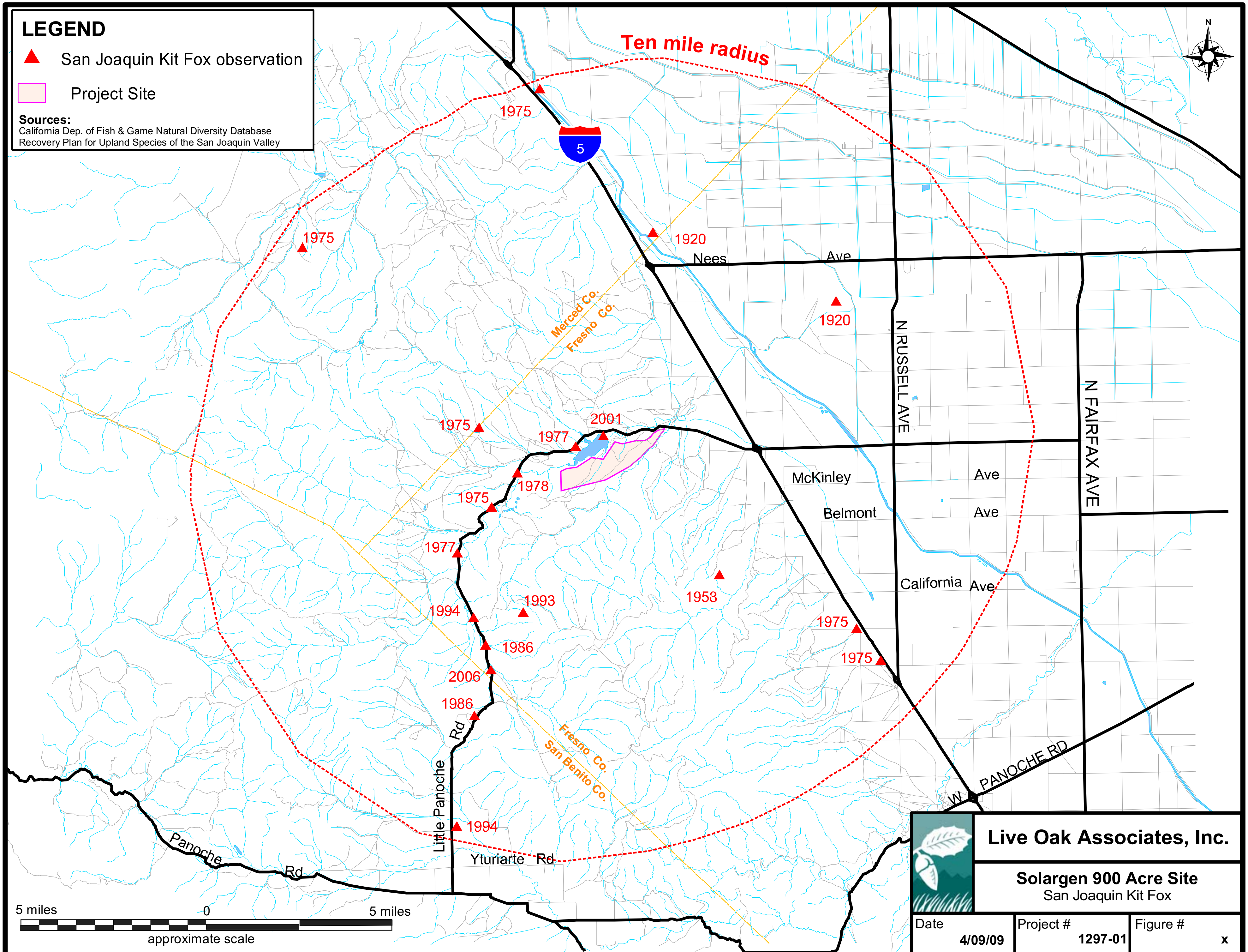
1A	Plants Presumed Extinct in California	3	Plants about which we need more information – a review list
1B	Plants Rare, Threatened, or Endangered in California and elsewhere	4	Plants of limited distribution – a watch list
2	Plants Rare, Threatened, or Endangered in California, but more common elsewhere		



Live Oak Associates, Inc.

Solargen 1,000 Acre Site
San Joaquin Kit Fox

Date	Project #	Figure #
4/09/09	1297-01	x


LEGEND
San Joaquin Kit Fox observation
Project Site
Sources:
California Dep. of Fish & Game Natural Diversity Database
Recovery Plan for Upland Species of the San Joaquin Valley
Ten mile radius
N
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1920
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Ave
1920
Merced Co.
Fresno Co.
N RUSSELL AVE
N FAIRFAX AVE
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Fresno Co.
San Benito Co.
Rd
Little Panoche
W PANOCHE RD
1994
Panoche
Rd
Yturiarte Rd
5 miles
0
5 miles
approximate scale
Live Oak Associates, Inc.
Solargen 900 Acre Site
San Joaquin Kit Fox
Date
4/09/09
Project #
1297-01
Figure #
x

November 24, 2009

Eric Cherniss
Vice President of Project Development
Solargen Energy, Inc.
20400 Stevens Creek Blvd., Suite 700
Cupertino, CA 95014

Subject: Late summer/early fall rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN 1297-04)

Dear Eric:

At your request, Live Oak Associates, Inc. (LOA), completed focused surveys for special status plants (i.e., plants designated as endangered, threatened, or rare) on 6,200 acres of the approximately 10,000-acre Panoche Valley Solar Farm site located along Panoche Road and Little Panoche Road in San Benito County. Specifically, this survey was conducted to determine whether or not late-season-blooming rare plant species are present on the site.

Site Location and Existing Conditions

The project site occurs on the floor of Panoche Valley between the Gabilan Range to the west and the Panoche Hills to the east. The survey area is generally bounded to the west, north, and east by open space and rangelands and to the south by Yturiarte Road (Figure 1). Surrounding lands consist of rangelands used for cattle grazing.

The survey area consists of all or portions of the following: sections 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 16, and 17 of township 15 south, range 10 east; and sections 18 and 19 of township 15 south, range 11 east (Figure 2). Panoche Creek, Las Aguilas Creek, and several other unnamed drainages run through the site. Soils on the site range from slightly acid to moderately alkaline. Topographically, the site is relatively flat, ranging in elevation from approximately 1300 ft. National Geodetic Vertical Datum (NGVD) along Yturiarte Road to approximately 1400 ft. NGVD along the east and west edges of the valley floor.

Target Special Status Species

The late summer/early fall rare plant surveys focused on six target species that are known to occur in the region and have habitat requirements that the site may potentially support (Table 1). These species also have late-season flowering periods (i.e., late summer to early fall), making them easiest to identify at this time of year. None of the six target species are listed on the federal or state endangered species lists.

Table 1. Target species for the late-season rare plant surveys.

Species	CNPS Listing*	Family	Description
Crownscale (*Atriplex coronata* var. *coronata*)	CNPS 4	Chenopodiaceae	Life form: Annual herb. Habitat: Chenopod scrub, valley and foothill grasslands, and vernal pools. Occurs on alkaline soils. Blooms: March–October.
Lost Hills crownscale (*Atriplex vallicola*)	CNPS 1B	Chenopodiaceae	Life form: Annual herb. Habitat: Chenopod scrub, valley and foothill grasslands, and vernal pools. Often occurs on powdery, alkaline soils that are vernally moist. Blooms: April–August.
Big tarplant (*Blepharizonia plumosa*)	CNPS 1B	Asteraceae	Life form: Annual herb. Habitat: Valley and foothill grasslands, often in dry areas. Blooms: July–October.
Hispid bird's-beak (*Cordylanthus mollis* ssp. *hispidus*)	CNPS 1B	Scrophulariaceae	Life form: Annual herb. Habitat: Meadows and seeps, playas, and valley and foothill grasslands. Often occurs on damp, alkaline soils. Blooms: June–September.
Idria buckwheat (*Eriogonum vestitum*)	CNPS 4	Polygonaceae	Life form: Annual herb. Habitat: Valley and foothill grasslands. Blooms: April–August.
San Joaquin bluecurls (*Trichostema ovatum*)	CNPS 4	Lamiaceae	Life form: Annual herb. Habitat: Chenopod scrub and valley and foothill grasslands. Blooms: July–October.

***California Native Plant Society (CNPS) list designations**
1B: Plants Rare, Threatened, or Endangered in California and elsewhere
4: Plants of limited distribution – a watch list

Survey Methods

Prior to conducting the surveys, LOA searched the California Natural Diversity Database (CDFG 2009) and the *Inventory of Rare and Endangered Plants* (CNPS 2009) to identify the nearest known populations of the target species to the project site and to review photographs and habitat requirements of the species.

Focused special status plant species surveys were conducted by LOA botanist Neal Kramer and LOA ecologists Davinna Ohlson, Melissa Denena, Nathan Hale, Jeff Gurule, Dave Hartesveldt, Pamela Peterson, and Molly Goble. Sections 10 and 15 were surveyed for rare plants concurrent with the blunt-nosed leopard lizard surveys; these surveys were conducted August 17-19 and

August 24-26, 2009. Surveys over the remaining sections were conducted on September 14-18, September 21-25, and September 30–October 2, 2009.

In summary, the survey team walked the entire site in evenly-spaced transects, ensuring 100% visual coverage, during the species' blooming period when they would be evident and most identifiable. Emphasis was placed on areas more likely to support suitable habitat for the target species. All vascular plant species observed were recorded in a field notebook and, to the maximum extent practicable, identified to the lowest taxonomic order (Appendices A and B). This survey methodology is consistent with survey protocols outlined in the *CNPS Botanical Survey Guidelines* and the California Department of Fish and Game Resource Agency's *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities* (Appendix C).

Results

None of the target late-blooming special status species were found on any sections of the site during the August, September, and October 2009 surveys (Appendix B). Based on our findings, we conclude that these species are absent from the project site. Ground disturbance activities (e.g., grading, trenching, or drilling) occurring on the site within the next three to five years would not adversely impact these species, as they are not expected to recruit on the site within this timeframe.

Should ground disturbance activities begin more than three to five years past the date of these surveys, then the site should be resurveyed to evaluate any changes in site conditions and determine if the target species remain absent from the site.

If you have any questions regarding our findings, please contact Michele Korpos at mkorpos@loainc.com or (408) 281-5881 at your earliest convenience.

Sincerely,

Davinna Ohlson

Davinna Ohlson, M.S.
Senior Project Manager
Plant/Wildlife Ecologist

Enclosures

References

California Department of Fish and Game. 2009. California fish and game code. Gould Publications. Binghamton, NY.

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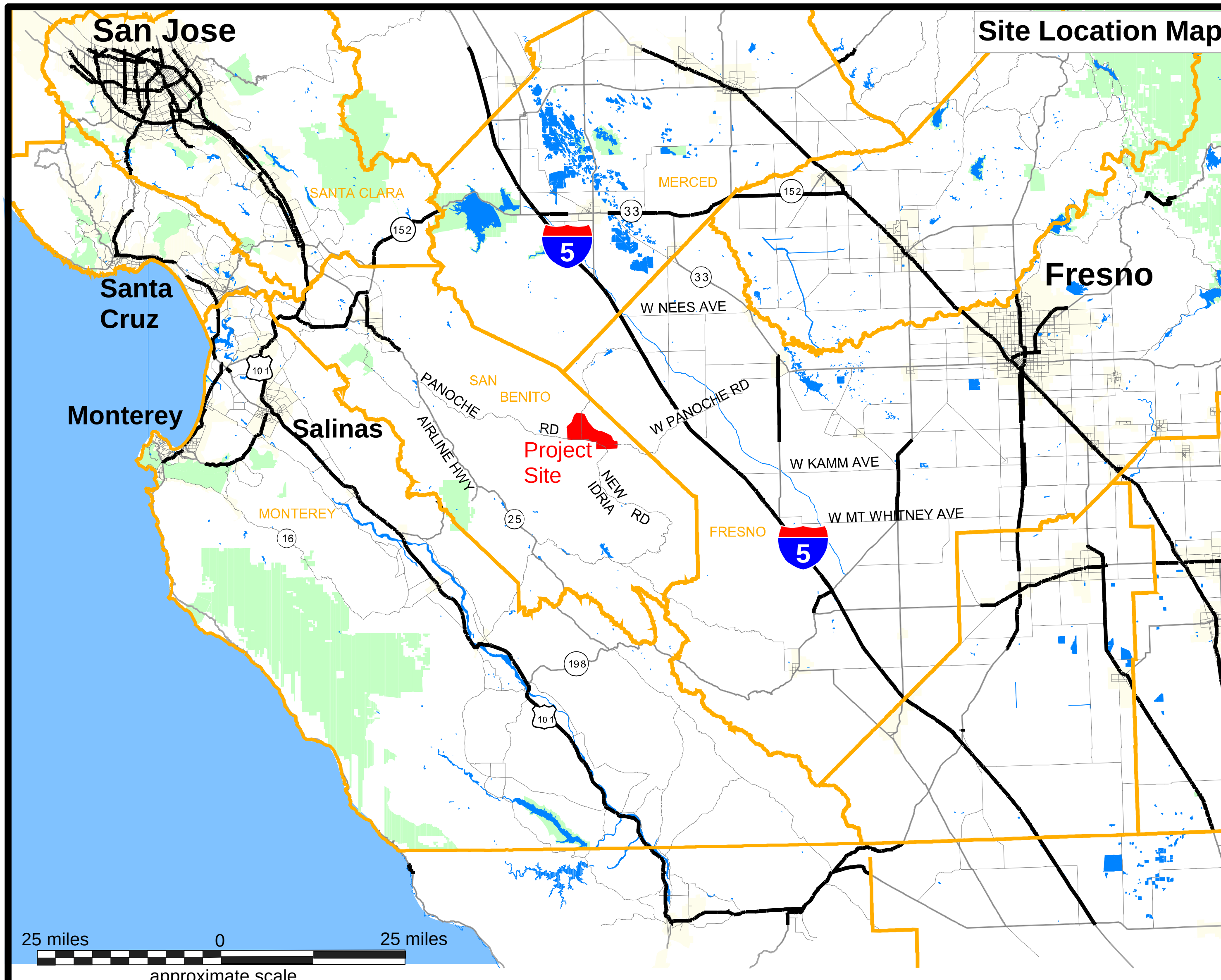
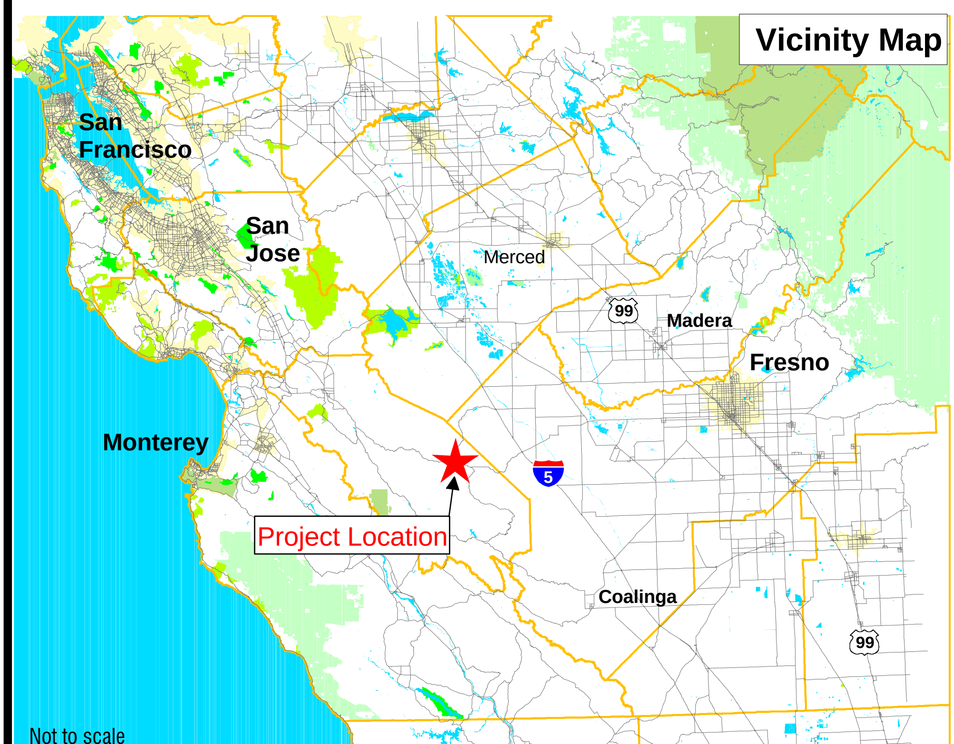
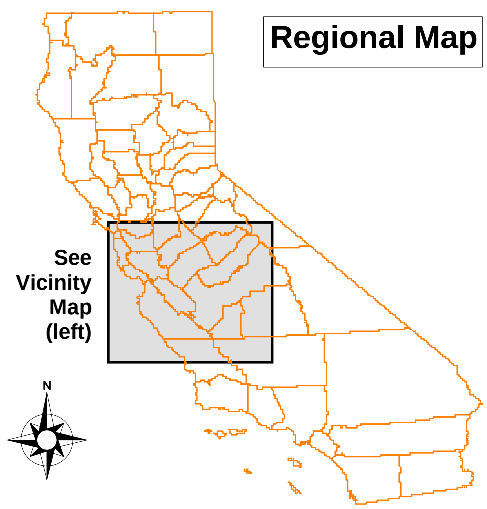


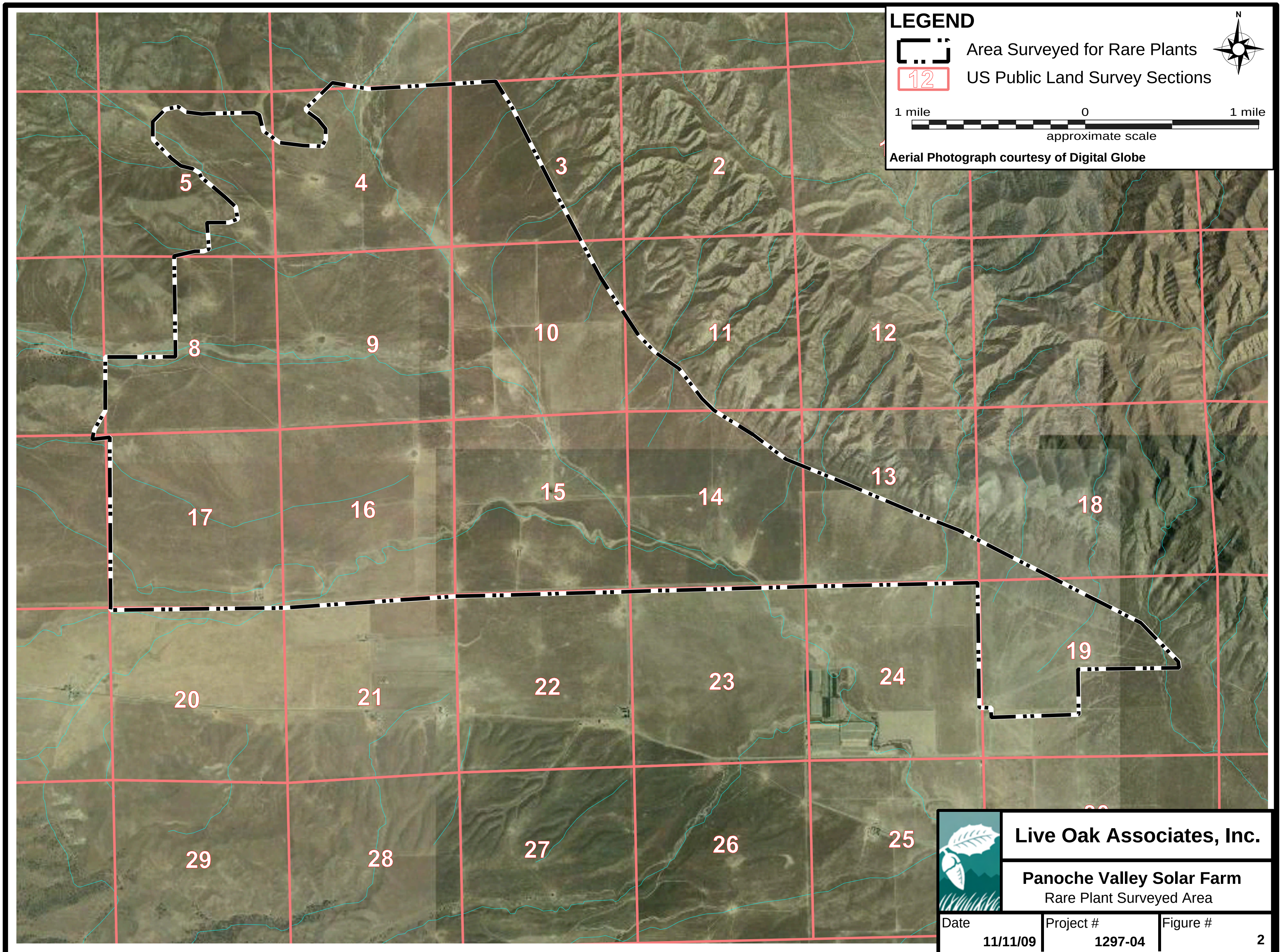




Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1


LEGEND
Area Surveyed for Rare Plants
US Public Land Survey Sections
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approximate scale
Aerial Photograph courtesy of Digital Globe
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Live Oak Associates, Inc.
Panoche Valley Solar Farm
Rare Plant Surveyed Area
Date
11/11/09
Project #
1297-04
Figure #
2

APPENDIX A: VASCULAR PLANTS OF THE STUDY AREA

The plants species listed below were observed on the Panoche Valley solar farm site during the field survey conducted by Live Oak Associates from August through October 2009. The U.S. Fish and Wildlife Service wetland indicator status of each plant has been shown following its common name.

OBL - Obligate
FACW - Facultative Wetland
FAC - Facultative
FACU - Facultative Upland
UPL - Upland
+/- - Higher/lower end of category
NI - No investigation

Scientific Name	Common Name	Wetland Status
AMARANTHACEAE - Amaranth Family		
*Amaranthus albus**	tumbleweed, white amaranth	FACU
Atriplex fruiticulosa	ball saltbush	
Atriplex polycarpa	cattle/allscale/desert saltbush	UPL
*Salsola tragus**	Russian thistle, tumbleweed	FACU
ANACARDIACEAE - Sumac or Cashew Family		
*Schinus molle**	California/Peruvian pepper tree	UPL
APIACEAE - Carrot Family		
Lomatium sp.	common lomatium	UPL
Sanicula crassicaulis	Pacific sanicle, gamble weed	UPL
APOCYNACEAE - Dogbane Family		
Asclepias fasicularis	narrow-leaf milkweed	FAC
ARALIACEAE - Ginseng Family		
*Hedera helix**	english ivy	UPL
ASTERACEAE - Sunflower Family		
Achyrachaena mollis	blow wives	UPL
Ambrosia acanthicarpa	annual bursage	
Blepharizonia laxa	big tarweed	UPL
*Centaurea melitensis**	tocalote	UPL
Conyza canadensis	horseweed	FAC
Hemizonia kelloggii	Kellogg's tarweed	UPL
Heterotheca oregona var. rudis	inland Oregon golden aster	UPL
Holocarpha obconica	San Joaquin Tarweed	UPL
Holocarpha virgata var. virgata	virgate/pitgland tarweed	UPL
*Hypochaeris glabra**	smooth cat's ear	UPL
Isocoma menziesii var. vernonioides	coastal isocoma, coast goldenbush	FACW
*Lactuca serriola**	prickly lettuce	FAC
Lagophylla ramosissima	common hareleaf	UPL
Lasthenia californica	coast/California/common goldfields	UPL
Layia platyglossa	tidy-tips	UPL
Lessingia nemaclada	slenderstem/thread-stem lessingia	UPL
*Matricaria matricarioides**	pineapple weed	FACU

Scientific Name	Common Name	Wetland Status
Monolopia major	cupped monolopia	UPL
Psilocarphus brevissimus var. brevissimus	dwarf woolly-heads	OBL
Rafinesquia californica	California chicory	UPL
Senecio flaccidus var. douglasii	Douglas' groundsel/shrubby butterweed	UPL
*Senecio vulgaris**	common groundsel	NI*
BORAGINACEAE - Borage Family		
Amsinckia menziesii var. intermedia	common fiddleneck	UPL
Amsinckia menziesii var. menziesii	Menzies' /small-flowered fiddleneck	UPL
Amsinckia tessellata	devil's lettuce, checker fiddleneck	
Heliotropium curassavicum	seaside/salt heliotrope	OBL
Plagiobothrys acanthocarpus	adobe popcornflower	OBL
Plagiobothrys stipitatus var. ?	slender popcorn flower	OBL
BRASSICACEAE - Mustard Family		
*Capsella bursa-pastoris**	shepherd's purse	FAC-
*Cardaria draba**	heart-podded hoary cress	UPL
*Descurainia sophia**	flixweed, tansymustard	UPL
*Hirschfeldia incana**	summer mustard	UPL
Lepidium dictyotum var. dictyotum	alkali peppergrass	OBL
Lepidium nitidum var. nitidum	shining peppergrass	UPL
*Sisymbrium irio**	London rocket	UPL
*Sisymbrium orientale**	oriental mustard	UPL
Thysanocarpus curvipes	lacepod/fringe pod, ribbed fringepod	UPL
CHARACEAE - Green Algae		
Chara sp.	green algae	OBL
CONVOLVULACEAE - Morning-Glory or Bindweed Family		
*Convolvulus arvensis**	bindweed, orchard morningglory	UPL
CUCURBITACEAE - Gourod Family		
Marah fabaceus	California man-root	UPL
EPHEDRACEAE - Ephedra Family		
Ephedra californica	California ephedra, Mormon tea	UPL
EUPHORBIACEAE - Spurge Family		
Chamaesyce ocellata ssp. ocellata	Contura Creek sandmat, valley spurge	UPL
Eremocarpus setigerus	turkey mullein, dove weed	UPL
FABACEAE - Legume Family		
Astragalus gambelianus	Gambell's dwarf milkvetch	UPL
Astragalus oxyphysus	Mt. Diablo milkvetch, Diablo locoweed	UPL
Lotus wrangelianus	California lotus	UPL
Lupinus bicolor	miniature lupine, Lindley's annual lupine	UPL
Lupinus microcarpus	gully/chick lupine	UPL
Lupinus succulentus	arroyo lupine	UPL
*Medicago polymorpha**	burclover	UPL
*Melilotus indicus**	sour clover, Indian melilot	FAC
*Robinia pseudoacacia**	black locust	FAC
FAGACEAE - Oak Family		
Quercus agrifolia	coast live oak	UPL
FRANKENIACEAE - Frankenia Family		
Frankenia salina	alkali heath	FACW+
GERANIACEAE - Geranium Family		

Scientific Name	Common Name	Wetland Status
*Erodium botrys**	broad-leaved filaree	UPL
*Erodium cicutarium**	red-stemmed filaree	UPL
*Erodium moschatum**	white-stemmed filaree	UPL
JUGLANDACEAE - Walnut Family		
*Juglans hindsii**	Northern California blacck walnut	
LAMIACEAE - Mint Family		
*Marrubium vulgare**	horehound	FAC
*Marrubium vulgare**	horehound	FAC
Trichostema lanceolatum	vinegarweed	UPL
LOASACEAE - Loasa Family		
Mentzelia sp.	blazingstar	UPL
MALVACEAE - Mallow Family		
*Malva parviflora**	cheeseweed	UPL
Malvella leprosa	alkali mallow	FAC*
MORACEAE - Mulberry Family		
*Maclura pomifera**	osage orange	UPL
*Morus alba**	white/silkworm mulberry	NI
MYRTACEAE - Myrtle Family		
*Eucalyptus sp.**		UPL
NYCTAGINACEAE - Four O'Clock Family		
Mirabilis californica	wishbone bush	UPL
OLEACEAE - Olive Family		
*Olea europaea**	olive	UPL
ONAGRACEAE - Evening primrose Family		
Clarkia sp.		UPL
PAPAVERACEAE - Poppy Family		
Platystemon californicus	California cream cups	UPL
PINACEAE - Pine Family		
*Pinus sp.**	pine	
PLANTAGINACEAE - Plantain Family		
Plantago erecta	California plantain	UPL
POACEAE - Grass Family		
*Avena sp.**	wild oat	UPL
*Bromus diandrus**	ripgut brome	UPL
*Bromus hordeaceus**	soft chess	FACW-
*Bromus madritensis**	foxtail chess, red brome	UPL
*Cynodon dactylon**	bermuda grass	FAC
Distichlis spicata	saltgrass	FACW*
*Hordeum marinum ssp. gussoneanum**	Mediterranean barley	FAC
*Hordeum murinum ssp. leporinum**	barnyard/farmer's foxtail, foxtail barley	NI
Leymus triticoides	beardless/ alkali ryegrass	FAC+
Vulpia microstachys	annual fescue	UPL
*Vulpia myuros var. myuros**	rat-tail fescue	FACU*
POLYGONACEAE - Buckwheat Family		
Eriogonum angulosum	anglestem buckwheat	UPL
Eriogonum fasciculatum	California buckwheat	UPL
Eriogonum gracile var. gracile	slender woolly buckwheat	UPL
Eriogonum gracillimum	rose & white buckwheat	UPL

Scientific Name	Common Name	Wetland Status
Pterostegia drymarioides	pterostigia	UPL
*Rumex crispus**	curly dock	FACW-
PRIMULACEAE - Primrose Family		
Dodecatheon sp.	shooting star	UPL
PUNICACEAE - Pomegranate Family		
*Punica granatum**	pomegranate	NI
ROSACEAE - Rose Family		
*Malus sp.**	apple	
*Prunus dulcis**	almomd	UPL
*Rosa sp.**	rose	
RUTACEAE - Rue Family		
*Citrus sinensis**	orange	
SALICACEAE - Willow Family		
Populus fremontii ssp. fremontii	Fremont cottonwood	FACW
Salix laevigata	red willow	~NI
SOLANACEAE - Nightshade Family		
Datura stramonium?*	jimson weed	UPL
Datura wrightii	tolguacha, toluaca, sacred thorn-apple	UPL
*Nicotiana glauca**	tree tobacco	FAC
Solanum americanum	common/small flowered nightshade	FAC
Solanum umbelliferum	blue witch	UPL
TAMARICACEAE - Tamarisk Family		
*Tamarix aphylla**	athel	FACW-
THEMIDACEAE -		
Dichelostemma capitatum ssp. capitatum	blue dicks	UPL
VERBENACEAE - Vervain Family		
Verbena lasiostachys var.?	western verbena	FAC-
ZYGOPHYLLACEAE - Caltrop Family		
*Tribulus terrestris**	puncture vine	UPL

APPENDIX B: PLANTS OBSERVED ON THE SITE BY SECTION

The table below details the plant species observed on the Panoche Valley solar farm site by section during the rare plant surveys conducted by LOA from August through October 2009.

Scientific Name	Section														
	3	4	5	7	8	9	10	11	13	14	15	16	17	18E	19E
Achyrachaena mollis													X		
*Amaranthus albus**							X								X
Ambrosia acanthicarpa										X					X
Amsinckia menziesii				X					X	X			X		X
Amsinckia menziesii var. intermedia								X				X			
Amsinckia menziesii var. menziesii		X													
Amsinckia tessellata	X			X											
Asclepias fasicularis						X	X			X	X	X			
Astragalus sp.										X		X			
Astragalus gambelianus															
Astragalus oxyphysus															
Atriplex fruiticulosa		X													
Atriplex polycarpa									X						X
*Avena sp.**			X	X	X			X	X	X		X			
Blepharizonia laxa															X
*Bromus diandrus**	X			X				X				X	X		
*Bromus hordeaceus**	X	X	X	X	X	X	X	X	X	X		X	X	X	
*Bromus madritensis**	X	X	X	X	X	X	X	X	X	X		X	X		X
*Capsella bursa-pastoris**		X													
*Cardaria draba**															
*Centaurea melitensis**	X				X					X					
Chamaesyce ocellata ssp. ocellata	X	X	X		X	X	X	X	X	X	X	X	X	X	X
Chara sp.											X		X		
*Citrus sinensis**													X		
Clarkia sp.					X										
*Convolvulus arvensis**		X				X	X	X		X	X	X	X		
Conyza canadensis													X		

Scientific Name	Section														
	3	4	5	7	8	9	10	11	13	14	15	16	17	18E	19E
*Cynodon dactylon**					X	X	X				X		X		
Datura stramonium?*															
Datura wrightii							X			X	X	X	X		
*Descurainia sophia**															
Dichelostemma capitatum ssp. capitatum															
Distichlis spicata									X	X		X			
Dodecatheon sp.					X								X		
Ephedra californica															
Eremocarpus setigerus	X		X		X	X	X		X	X	X	X		X	X
Eriogonum angulosum	X								X						X
Eriogonum fasciculatum															
Eriogonum gracile var. gracile						X									
Eriogonum gracillimum										X		X			
Erodium sp.			X		X								X		
*Erodium botrys**								X				X			
*Erodium cicutarium**									X				X		
*Erodium moschatum**									X						
*Eucalyptus sp.**		X					X				X	X			
Frankenia salina									X						
*Hedera helix**													X		
Heliotropium curassavicum										X	X	X	X		
Hemizonia kelloggii															
Heterotheca oregona var. rudis					X					X	X	X			
*Hirschfeldia incana**										X			X		
Holocarpha obconica															X
Holocarpha virgata var. virgata		X	X	X	X					X		X	X		
*Hordeum marinum ssp. gussoneanum**		X		X											
*Hordeum murinum ssp. leporinum**	X	X	X	X	X			X	X	X	X	X	X	X	X
*Hypochaeris glabra**												X			
Isocoma menziesii var. vernonioides									X	X	X				
*Juglans hindsii.**											X		X		
*Lactuca serriola**						X				X			X		
Lagophylla ramosissima					X	X				X		X			

Scientific Name	Section														
	3	4	5	7	8	9	10	11	13	14	15	16	17	18E	19E
Lasthenia californica										X					
Layia platyglossa															
Lepidium dictyotum var. dictyotum		X				X									
Lepidium nitidum var. nitidum	X	X		X	X	X	X	X	X	X		X		X	X
Lessingia nemaclada					X										
Leymus triticoides										X					
Lomatium sp.															
Lotus sp.															X
Lotus wrangelianus															
Lupinus sp.				X											
Lupinus bicolor					X	X							X		
Lupinus microcarpus					X					X					
Lupinus succulentus										X					
*Maclura pomifera**													X		
*Malus sp.**													X		
*Malva sp.**									X				X		
*Malva parviflora**															
Malvella leprosa											X				
Marah fabaceus															
*Marrubium vulgare**										X			X		
*Marrubium vulgare**															
*Matricaria matricarioides**													X		
*Medicago polymorpha**		X													
*Melilotus indicus**										X					
Mentzelia sp.															
Mirabilis californica															
Monolopia major															
*Morus alba**												X	X		
*Nicotiana glauca**												X	X		
*Olea europaea**										X					
*Pinus sp.**										X					
Plagiobothrys acanthocarpus		X													
Plagiobothrys stipitatus var. ?		X				X					X				

Scientific Name	Section														
	3	**4**	**5**	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**15**	**16**	**17**	**18E**	**19E**
Plantago erecta		X			X				X	X			X		X
Platystemon californicus															
Populus fremontii ssp. fremontii															
*Prunus dulcis**										X					
Psilocarphus brevissimus var. brevissimus		X				X									
Pterostegia drymarioides															
*Punica granatum**										X					
Quercus agrifolia													X		
Rafinesquia californica															
*Robinia pseudoacacia**										X					
*Rosa sp.**													X		
*Rumex crispus**															
Salix laevigata											X				
*Salsola tragus**	X								X	X				X	X
Sanicula crassicaulis					X										
*Schinus molle**										X			X		
Senecio flaccidus var. douglasii					X	X						X			
*Senecio vulgaris**															
*Sisymbrium sp**								X							
*Sisymbrium irio**		X								X		X			
*Sisymbrium orientale**										X					
Solanum americanum									X						
Solanum umbelliferum			X			X									
*Tamarix aphylla**										X	X				
Thysanocarpus curvipes															
*Tribulus terrestris**							X								
Trichostema lanceolatum	X	X	X		X	X	X								
Verbena lasiostachys var.													X		
Vulpia microstachys	X	X	X	X	X	X						X	X	X	X
*Vulpia myuros var. myuros**	x	x		X	X		X	X		X		X			

APPENDIX B

CALIFORNIA NATIVE PLANT SOCIETY BOTANICAL SURVEY GUIDELINES
&
GUIDELINES FOR ASSESSING THE EFFECTS OF PROPOSED PROJECT ON RARE, THREATENED AND ENDANGERED PLANTS AND NATURAL COMMUNITIES BY THE RESOURCE AGENCY OF THE CALIFORNIA DEPARTMENT OF FISH AND GAME

CNPS Botanical Survey Guidelines

(from CNPS *Inventory*, 6th Edition, 2001)

The following recommendations are intended to help those who prepare and review environmental documents determine when a botanical survey is needed, who should be considered qualified to conduct such surveys, how surveys should be conducted, and what information should be contained in the survey report. The California Native Plant Society recommends that lead agencies not accept the results of surveys unless they are conducted and reported according to these guidelines.

1. Botanical surveys are conducted in order to determine the environmental effects of proposed projects on all botanical resources, including special status plants (rare, threatened, and endangered plants) and plant (vegetation) communities. Special status plants are not limited to those that have been listed by state and federal agencies but include any plants that, based on all available data, can be shown to be rare, threatened, or endangered under the following definitions:

A species, subspecies, or variety of plant is "endangered" when the prospects of its survival and reproduction are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, or disease. A plant is "threatened" when it is likely to become endangered in the foreseeable future in the absence of protection measures. A plant is "rare" when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.[1]

Rare plant (vegetation) communities are those communities that are of highly limited distribution. These communities may or may not contain special status plants. The most current version of the California Natural Diversity Database's *List of California Terrestrial Natural Communities*[2] should be used as a guide to the names and status of communities.

Consistent with the California Native Plant Society's goal of preserving plant biodiversity on a regional and local scale, and with California Environmental Quality Act environmental impact assessment criteria[3], surveys should also assess impacts to locally significant plants. Both plants and plant communities can be considered significant if their local occurrence is on the outer limits of known distribution, a range extension, a rediscovery, or rare or uncommon in a local context (such as within a county or region). Lead agencies should address impacts to these locally unique botanical resources regardless of their status elsewhere in the state.

2. Botanical surveys must be conducted to determine if, or to the extent that, special status or locally significant plants and plant communities will be affected by a proposed project when any natural vegetation occurs on the site and the project has the potential for direct or indirect effects on vegetation.

3. Those conducting botanical surveys must possess the following qualifications:

a. Experience conducting floristic field surveys;
b. Knowledge of plant taxonomy and plant community ecology and classification;
c. Familiarity with the plants of the area, including special status and locally significant plants;
d. Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
e. Experience with analyzing impacts of a project on native plants and communities.

4. Botanical surveys should be conducted in a manner that will locate any special status or locally significant plants or plant communities that may be present. Specifically, botanical surveys should be:

a. Conducted in the field at the proper times of year when special status and locally significant plants are both evident and identifiable. When special status plants are known to occur in the type(s) of habitat present in the project area, nearby accessible occurrences of the plants (reference sites) should be observed to determine that the plants are identifiable at the time of survey.
b. Floristic in nature. A floristic survey requires that every plant observed be identified to species, subspecies, or variety as applicable. In order to properly characterize the site, a complete list of plants observed on the site shall be included in every botanical survey report. In addition, a sufficient number of visits spaced

throughout the growing season is necessary to prepare an accurate inventory of all plants that exist on the site. The number of visits and the timing between visits must be determined by geographic location, the plant communities present, and the weather patterns of the year(s) in which the surveys are conducted.

c. Conducted in a manner that is consistent with conservation ethics and accepted plant collection and documentation techniques[4,5]. Collections (voucher specimens) of special status and locally significant plants should be made, unless such actions would jeopardize the continued existence of the population. A single sheet should be collected and deposited at a recognized public herbarium for future reference. All collections shall be made in accordance with applicable state and federal permit requirements. Photography may be used to document plant identification only when the population cannot withstand collection of voucher specimens.
d. Conducted using systematic field techniques in all habitats of the site to ensure a thorough coverage of potential impact areas. All habitats within the project site must be surveyed thoroughly in order to properly inventory and document the plants present. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity.
e. Well documented. When a special status plant (or rare plant community) is located, a California Native Species (or Community) Field Survey Form or equivalent written form, accompanied by a copy of the appropriate portion of a 7.5-minute topographic map with the occurrence mapped, shall be completed, included within the survey report, and separately submitted to the California Natural Diversity Database. Population boundaries should be mapped as accurately as possible. The number of individuals in each population should be counted or estimated, as appropriate.

5. Complete reports of botanical surveys shall be included with all environmental assessment documents, including Negative Declarations and Mitigated Negative Declarations, Timber Harvesting Plans, Environmental Impact Reports, and Environmental Impact Statements. Survey reports shall contain the following information:

a. Project location and description, including:
    1. A detailed map of the location and footprint of the proposed project.
    2. A detailed description of the proposed project, including one-time activities and ongoing activities that may affect botanical resources.
    3. A description of the general biological setting of the project area.
b. Methods, including:
    1. Survey methods for each of the habitats present, and rationale for the methods used.
    2. Description of reference site(s) visited and phenological development of the target special status plants, with an assessment of any conditions differing from the project site that may affect their identification.
    3. Dates of surveys and rationale for timing and intervals; names of personnel conducting the surveys; and total hours spent in the field for each surveyor on each date.
    4. Location of deposited voucher specimens and herbaria visited.
c. Results, including:
    1. A description and map of the vegetation communities on the project site. The current standard for vegetation classification, *A Manual of California Vegetation*[6], should be used as a basis for the habitat descriptions and the vegetation map. If another vegetation classification system is used, the report must reference the system and provide the reason for its use.
    2. A description of the phenology of each of the plant communities at the time of each survey date.
    3. A list of all plants observed on the project site using accepted scientific nomenclature, along with any special status designation. The reference(s) used for scientific nomenclature shall be cited.
    4. Written description and detailed map(s) showing the location of each special status or locally significant plant found, the size of each population, and method used to estimate or census the population.
    5. Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms and accompanying maps.
d. Discussion, including:
    1. Any factors that may have affected the results of the surveys (e.g., drought, human disturbance, recent fire).
    2. Discussion of any special local or range-wide significance of any plant population or community on the site.
    3. An assessment of potential impacts. This shall include a map showing the distribution of special status and locally significant plants and communities on the site in relation to the proposed activities. Direct, indirect, and cumulative impacts to the plants and communities shall be discussed.
    4. Recommended measures to avoid and/or minimize direct, indirect, and cumulative impacts.

e. References cited and persons contacted.
f. Qualifications of field personnel including any special experience with the habitats and special status plants present on the site.

3.3.2 References Cited

[1] California Environmental Quality Act Guidelines, §15065 and §15380.

[2] List of California Terrestrial Natural Communities. California Department of Fish and Game Natural Diversity Database. Sacramento, CA.

[3] California Environmental Quality Act Guidelines, Appendix G (Initial Study Environmental Checklist).

[4] Collecting Guidelines and Documentation Techniques. California Native Plant Society Policy (adopted March 4, 1995).

[5] Ferren, W.R., Jr., D.L. Magney, and T.A. Sholars. 1995. The Future of California Floristics and Systematics: Collecting Guidelines and Documentation Techniques. *Madroño* 42(2):197-210.

[6] Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society. Sacramento, CA. 471 pp.

GUIDELINES FOR CONDUCTING RESEARCH ON RARE, THREATENED AND ENDANGERED PLANTS AND PLANT COMMUNITIES

August 1997

The Department of Fish and Game recognizes the importance of research in promoting the conservation, appreciation, and understanding of California's rare, threatened, and endangered plants and plant communities. Under Section 1907(a) and Section 2081(a) of the Fish and Game Code, the Department may authorize, through permits and Memoranda of Understanding, the take and possession of State-listed species for scientific, educational, and management purposes. The Department's Species Conservation and Recovery Program (SCARP) handles this permitting process for State-listed plant species. The Research Permit is typically the vehicle by which SCARP will authorize research on these species. To apply for a permit, use the **Proposal Format for Research Projects involving State-Listed Plants**, below.

The following information is intended to guide you in planning research on State-listed plant species.

1. The Department generally will not authorize collection of more than 5% of the seed or vegetative growth produced by any population of a listed species during any given year. In your proposal, please justify the amount you would like to collect.

2. Moving plants, seeds, or pollen from one location or population of the plant to another is generally discouraged, unless it is part of an overall recovery program, because of the possibility of genetic contamination of local natural populations. Proposals involving such movement must include justification of why this design is necessary and must address the possibility or likelihood of contamination. Methods to prevent any possible genetic contamination should be discussed.

3. If your research will include any reintroduction activities, the following criteria must be met: (a) sites chosen for reintroduction must have permanent protection in the event the reintroduction succeeds, and (b) the Investigator(s) must agree to monitor for a period that is long enough to assess the success of the reintroduction (we generally recommend seven years). Before planning a reintroduction, you should consider and include in your proposal the following factors: habitat suitability, probability of success, potential genetic contamination, and long-term protection and management needs (including funding sources).

4. Research should be conducted in a manner that is consistent with conservation ethics. Collections of voucher specimens of rare or suspected rare species should be made only when such actions will not jeopardize the continued existence of the population and in accordance with applicable State and Federal permit regulations, and generally are not needed from sites which have already been vouchered. Voucher specimens should be deposited at recognized public herbaria for future reference. Photography should be used to document plant identification and habitat whenever possible, but especially when the population cannot withstand collection of voucher specimens. The Investigators should take all precautions to minimize damage to rare species, the associated soil, and vegetation during field work.

5. Principal Investigators should possess the following qualifications:

    a. Experience as a botanical field investigator with plant identification skills and experience in experimental design, field methods, plant ecology, and at least a rudimentary knowledge of population genetics;

    b. Familiarity with the flora and fauna of the area, including rare species; and

    c. Familiarity with the appropriate State and Federal statutes related to rare plants and plant collecting.

6. Any unused seed collected from a State-listed species should be deposited at Rancho Santa Ana Botanic Garden or another facility which has the expertise and equipment necessary for seed storage, under direct arrangement with that facility and with Department approval. Research permits are issued only for scientific research projects. If your project is related to a mitigation effort, contact the Department regarding a 2081(b) incidental take permit.

LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

PROTOCOL-LEVEL DRY SEASON BRANCHIOPOD SURVEY RESULTS
90-DAY REPORT
PANOCHE VALLEY SOLAR FARM
SAN BENITO COUNTY, CALIFORNIA
(Tracking Number 81440-2010-CPA-0023)

Prepared by:

LIVE OAK ASSOCIATES, INC.

Rick Hopkins, PhD, Principal/Senior Conservation Biologist
Michele Korpos, Senior Project Manager/Wildlife Ecologist
Jeff Gurule, B.A., Senior Project Manager/Staff Ecologist
Geoffrey Cline, M.S., Staff Ecologist

Prepared for:

SOLARGEN ENERGY
Solargen Energy, Inc.
Eric Cherniss
VP Project Development
20400 Stevens Creek Boulevard, Suite 700
Cupertino, CA 95014

January 14, 2010 PN 1297-06b

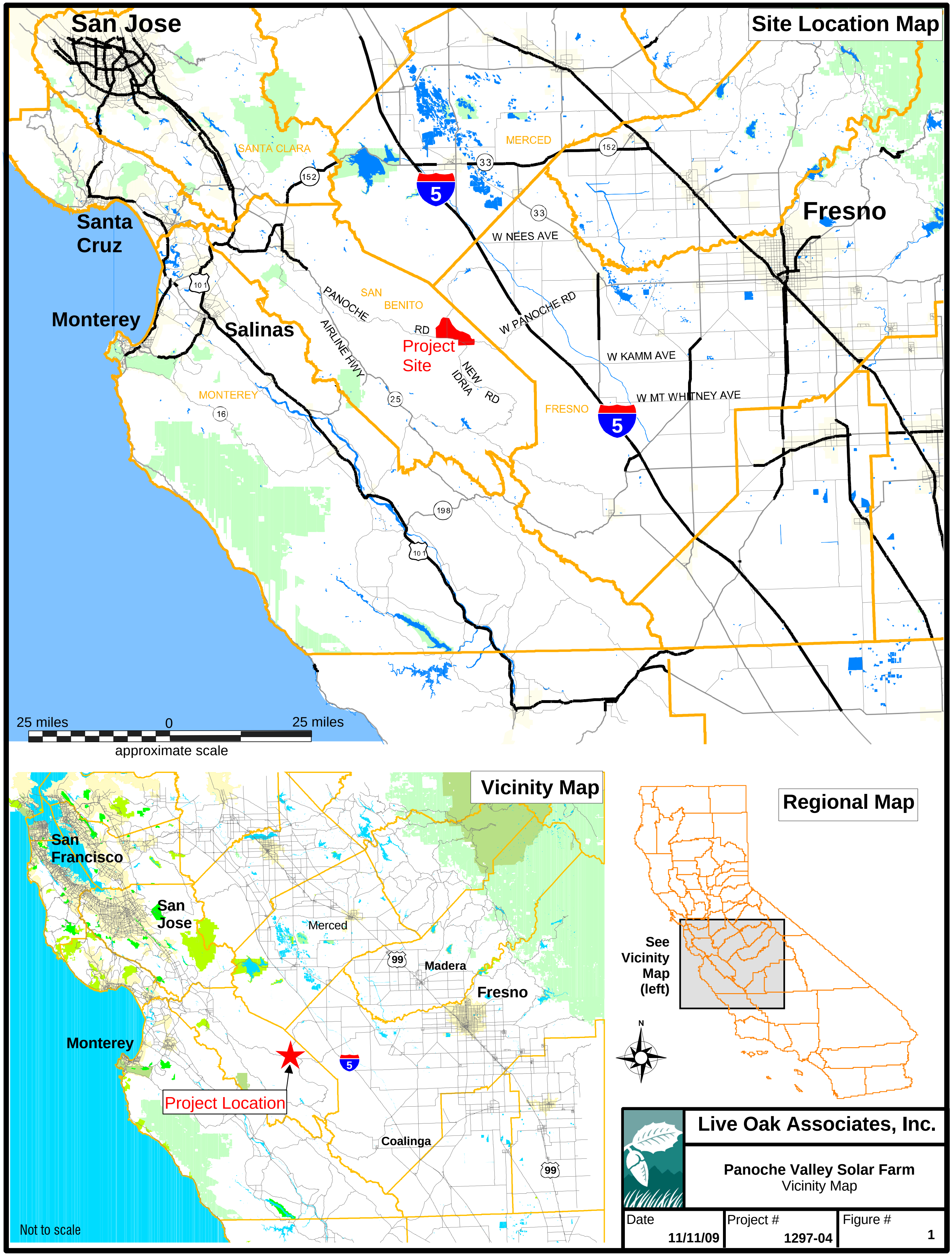
TABLE OF CONTENTS

1.0 INTRODUCTION AND SITE DESCRIPTION

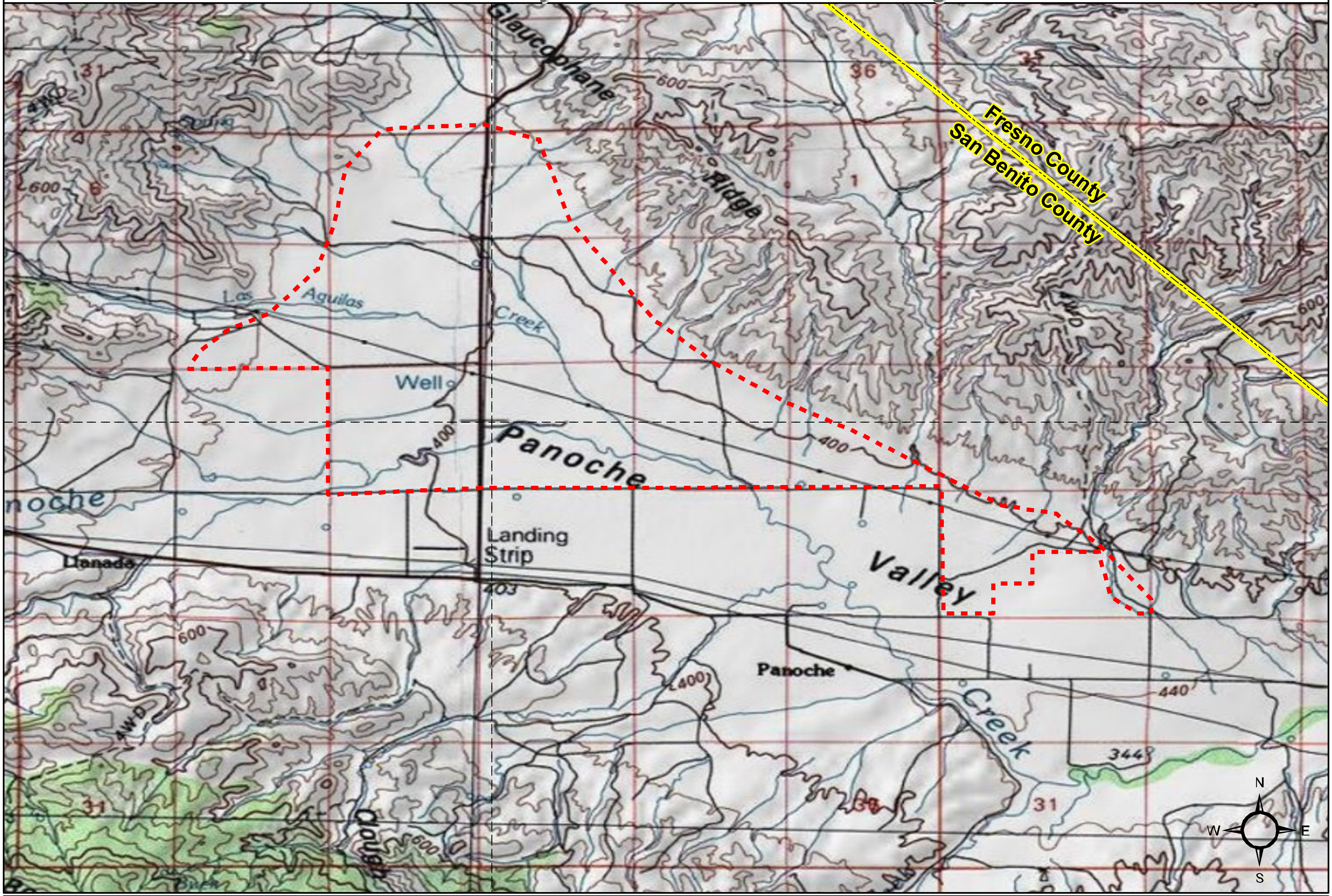
Protocol-level wet-season and dry season branchiopod surveys were conducted by Live Oak Associates, Inc. (LOA) on the Panoche Valley Solar Farm (PVSF) project site in San Benito County, California. Surveys consisted of protocol level wet season sampling in 2009/2010, the results of which were reported to the U.S. Fish and Wildlife Service (USFWS) Ventura office in a report titled *Protocol-Level Dry Season Branchiopod Survey Results 90-Day Report, Panoche Valley Solar Farm, San Benito County, California* (LOA 2010) and protocol level dry season sampling in 2010. The following report serves as the 90-day Report of the dry season surveys.

The site or study area consists of approximately 4,885-acres, located in Panoche Valley approximately 15 miles west of Interstate 5 and six miles south of Mercey Hot Springs near the intersection of Panoche Road and Little Panoche Road (Figure 1). The site can be found on the Cerro Colorado, Mercey Hot Springs, Llanada, and Panoche, California U.S.G.S quadrangles, in Sections 3-4, 8-11, and 13-16, Township 15 South, Range 10 East and Section 19, Township 15 South, Range 11 East (Figure 2). All the parcels within the study area are used for cattle grazing. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1200 feet National Geodetic Vertical Datum (NGVD) to approximately 1490 feet NGVD.

Thirteen soil types from nine soil series were identified on the project site. The Riverwash soil type is the only soil considered hydric. This soil type is considered hydric due to frequent flooding for long durations or very long durations during the growing season. Riverwash consists of mixed water-washed sand and gravel, occurs along streams or rivers and is often flooded during storm events. Within the study area, Riverwash soils are associated with Panoche Creek and portions of Las Aguilas Creek. The Panoche Creek channel was not considered potential habitat for fairy shrimp or tadpole shrimp due to high flows that periodically scour the creek channel. Ponded areas that were sampled consisted primarily of two types; 1) Hard-packed depressions associated with ranch roads and cattle troughs which were extremely ruderal in nature and were repeatedly disturbed by vehicle traffic and/or cattle, and 2) Natural and artificial


Site Location Map
San Jose
Santa Cruz
Monterey
Salinas
Fresno
SANTA CLARA
MERCED
SAN BENITO
MONTEREY
FRESNO
Project Site
PANOCHE RD
AIRLINE HWY
NEW IDRIA RD
W NEES AVE
W PANOCHE RD
W KAMM AVE
W MT WHITNEY AVE
5
152
33
101
25
16
198
25 miles
0
25 miles
approximate scale
Vicinity Map
San Francisco
San Jose
Merced
Madera
Fresno
Monterey
Coalinga
99
5
Project Location
Not to scale
Regional Map
See Vicinity Map (left)
N
Live Oak Associates, Inc.
Panoche Valley Solar Farm
Vicinity Map
Date
11/11/09
Project #
1297-04
Figure #
1

Panoche Valley Solar Farm Figure 2



County Boundary
Study Area Boundary
USGS Quads: Cerro Colorado, Mercey Hot Springs, Panoche, Llanada

POWER ENGINEERS

R:\117257_Ponoche\DD\GIS\Applications\QuadMap Print Date: 11/11/2009

1:63,360 1 inch=1 mile

0 1 2 Miles

Solargen Energy

depressions within natural swales. Annual precipitation in the general vicinity of the site is highly variable from year to year. Annual rainfall ranges between 9 and 13 inches, almost 85% of which falls between October and March. During drought years, precipitation totals may only reach 5 inches per year. Storm-water infiltrates the soils of the site, but when field capacity has been reached, gravitational water flows into the creeks and drainages.

2.0 METHODS

In order to determine the presence or absence of shrimp species on the PVSF project site, LOA conducted protocol level wet season branchiopod surveys in the winter and spring of 2009/2010 and dry season surveys on September 27 – 30, 2010. All surveys were conducted in accordance with the *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Brachiopods* (USFWS 1996). LOA was authorized to initiate dry season branchiopod surveys by David Pereksta with the USFWS on September 14, 2010 (Appendix A).

2.1 Soil Collection

On September 27 – 30, 2010, Jeff Gurule (TE-168924-0) with the assistance of Geoffrey Cline (an un-permitted LOA biologist) conducted the dry season soil collection. Soil samples were collected by Mr. Gurule and data was recorded in the field by Mr. Cline on USFWS approved dry season data sheets. The completed dry season data sheets are presented in Appendix D.

Prior to the onset of the 2010/2011 rainy season, soils from 117 seasonal pools, stock ponds, and puddles were collected. Approximately one liter volume of the top one to three centimeters of sediment was collected from ten sampling locations within each pond. Upon completion of the soil collection, soil was properly stored and transferred to Christopher Rogers of Kansas Biological Survey for cyst analysis.

2.2 Soil Analysis

The soil analysis methods and results were prepared in a separate report authored by Mr. Rogers. This report is presented in Appendix B.

2.3 USFWS Reporting and Voucher Specimen

The USFWS requires that a 90-day report be submitted to the appropriate field office (Sacramento USFWS in this case) following the completion of protocol-level branchiopod surveys. Additionally, the USFWS requires that a “Notice of Presence” be submitted upon identifying a federally listed branchiopod species from the project site authorized for sampling within ten working days of the finding. It is also required that a California Natural Diversity Data Base (CNDDB) field survey form be submitted to CDFG for listed species observed on site.

Any federally listed branchiopods collected during the protocol-level surveys must be submitted as voucher specimens to the California Academy of Sciences (CAS) or the Natural Museum of Los Angeles County (LACM). All specimens have to be preserved and submitted according to the CAS or LACM strict standards.

3.0 RESULTS

3.1 Dry Season Sampling

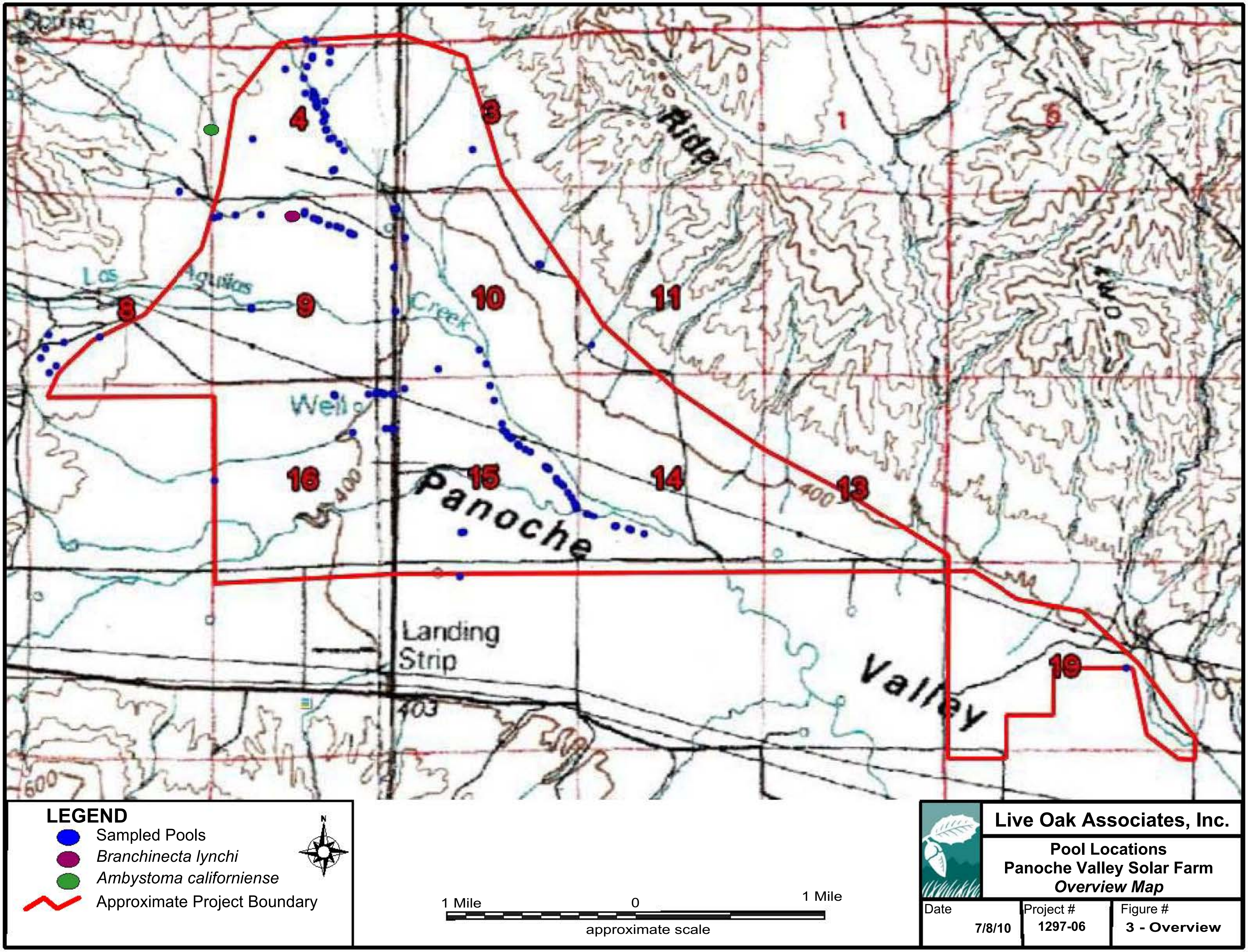
A total of 128 pools met the criteria for inundation in 2009/2010 and were sampled during the wet season for branchiopod species (Figure 3). Of the 128 pools sampled during the wet season 117 pools were sampled during the dry season survey. The discrepancy in the sampling numbers is due to separate pools becoming hydrologically connected as the wet season advanced, pools associated with cattle water troughs remaining wet throughout the year due to perennial runoff, and one pool associated with a cattle trough buried by ranchers in order to berm up the deepening depression around the cattle trough to allow cattle easy access to the water. As previously reported, the wet season survey found only one pool (Pool 12) experiencing an Anostracan hatch; with only one Anostracan species, the Federally Threatened vernal pool fairy shrimp (*Branchinecta lynchi*), detected. The dry season sampling effort found *Branchinecta* cysts in Pool 12 and Pool 13, which lies immediately down gradient from Pool 12. Therefore, it is assumed that the *Branchinecta* cysts were of the species *Branchinecta lynchi* since this species was the only Anostrocan species identified during the wet season surveys and the proximity of Pool 13 and Pool 12.

Tadpole shrimp (*lepiduris packerdi*) cysts were not detected in any of the soil samples. Pool coordinates are presented in Appendix C and photographs of the site, with photo specific information, are located in Appendix D.

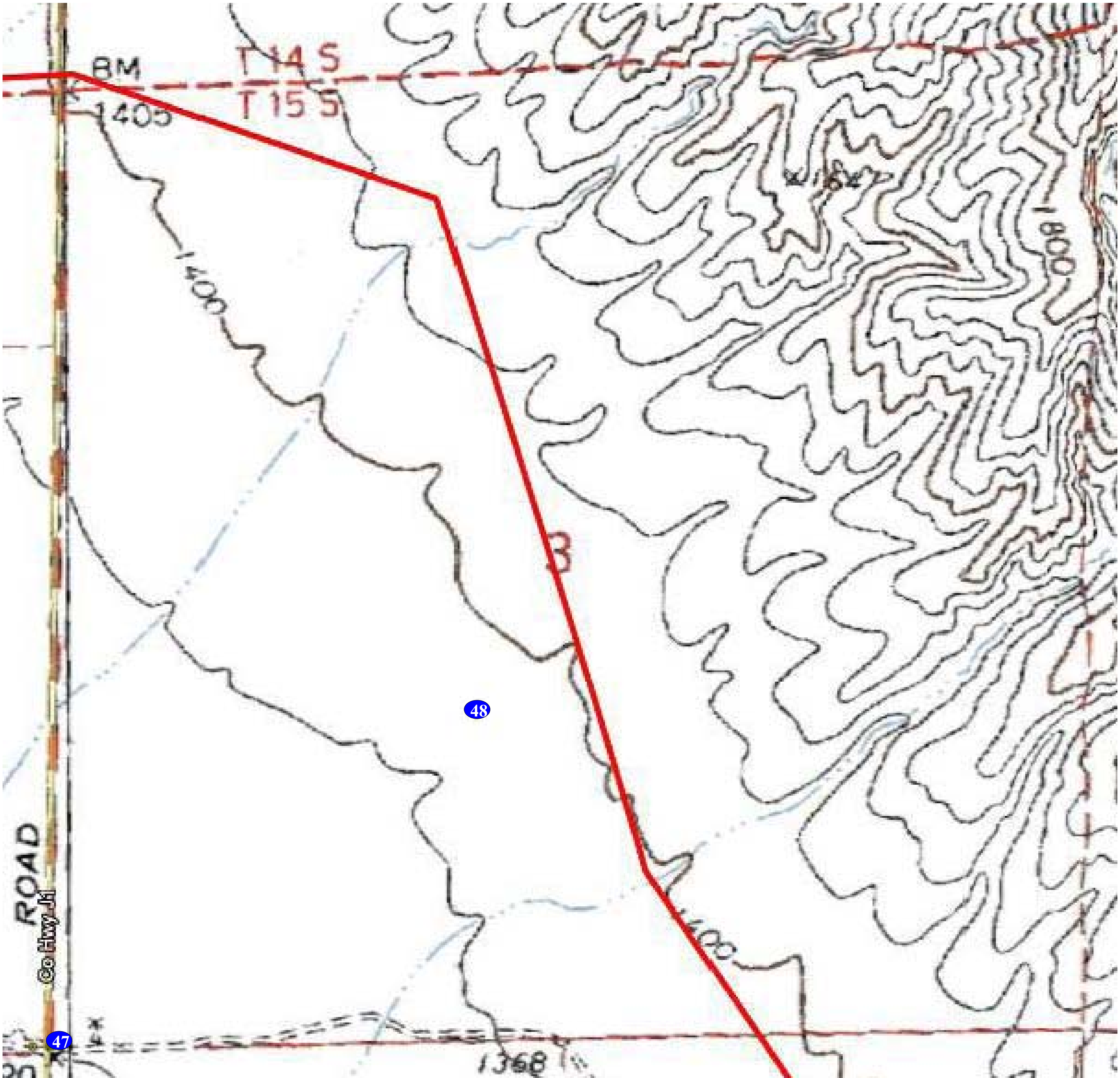
3.2 USFWS Reporting and Voucher Specimen

This report serves as the dry season branchiopod 90-day report for the PVSF project site. Notification of the presence of the Federally Threatened *Branchinecta lynchi* was sent to Christopher Diel at the Ventura, CA Branch of the USFWS via an email on March 24, 2010 during the wet season survey.

As required by the USFWS, a CNDDB form was submitted to CDFG in order to document the presence of *Branchinecta lynchi* found during the 2009/2010 wet season surveys.



Los Aguilas Creek
Ridge
Well
Panoche
Valley
Landing Strip
4
3
1
6
8
9
10
11
13
14
15
16
19
400
403
600
LEGEND
Sampled Pools
Branchinecta lynchi
Ambystoma californiense
Approximate Project Boundary
N
1 Mile
0
1 Mile
approximate scale
Live Oak Associates, Inc.
Pool Locations
Panoche Valley Solar Farm
Overview Map
Date 7/8/10
Project # 1297-06
Figure # 3 - Overview



LEGEND

- 68 Sampled Pool
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

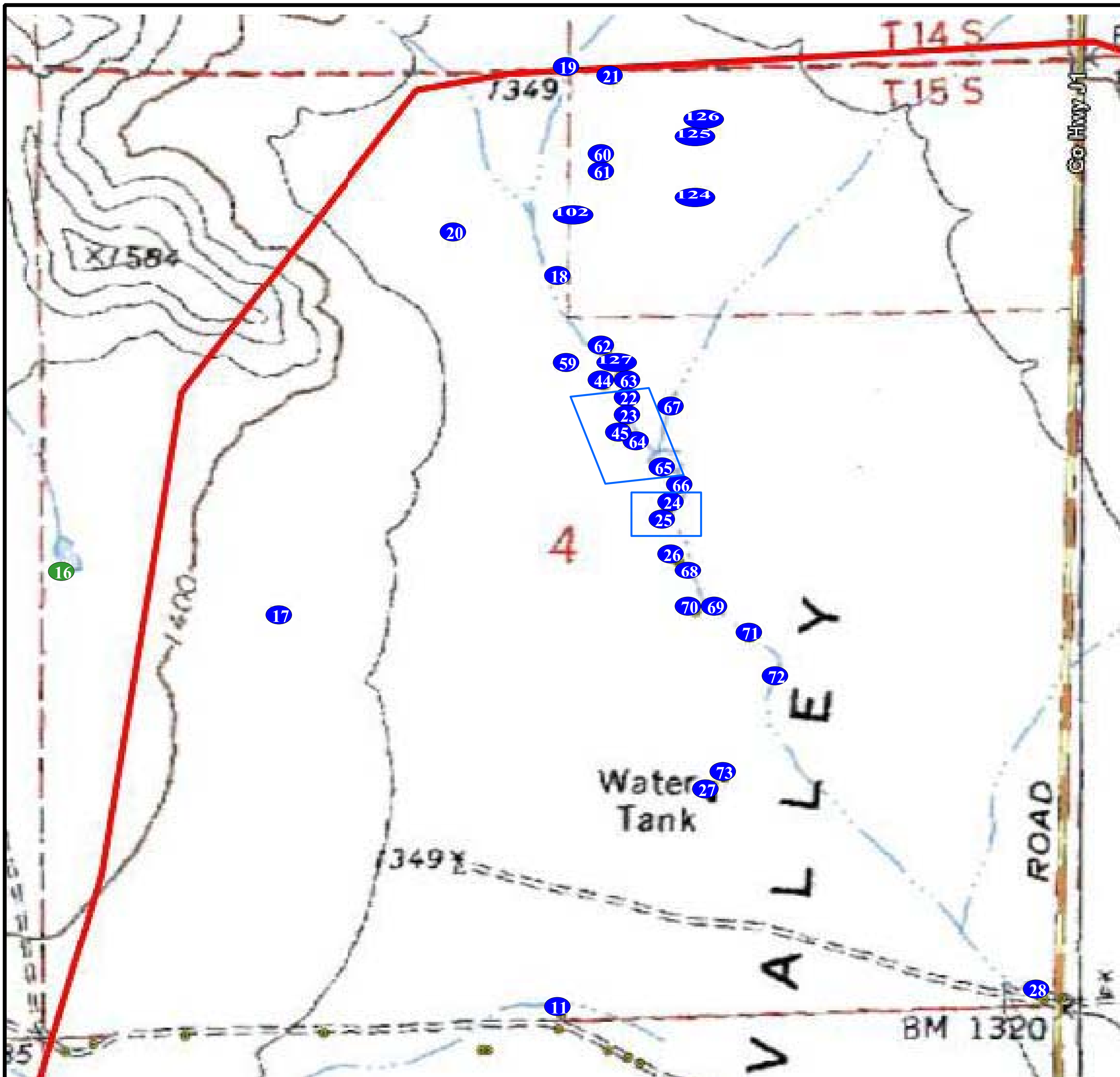
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 3

Date	Project #	Figure #
7/8/10	**1297-06**	**3 - Section 3**



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

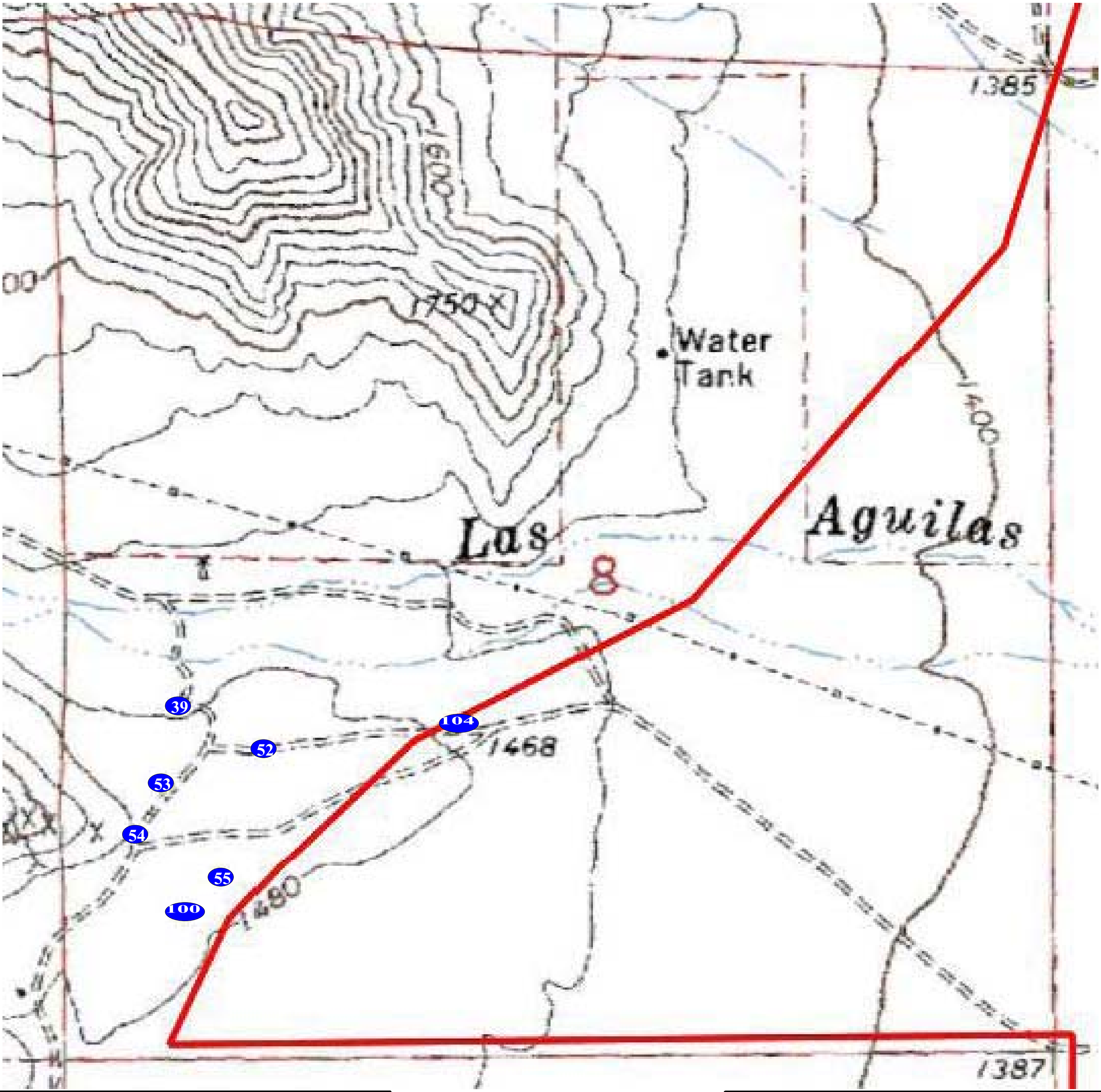
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 4

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 4



LEGEND

N

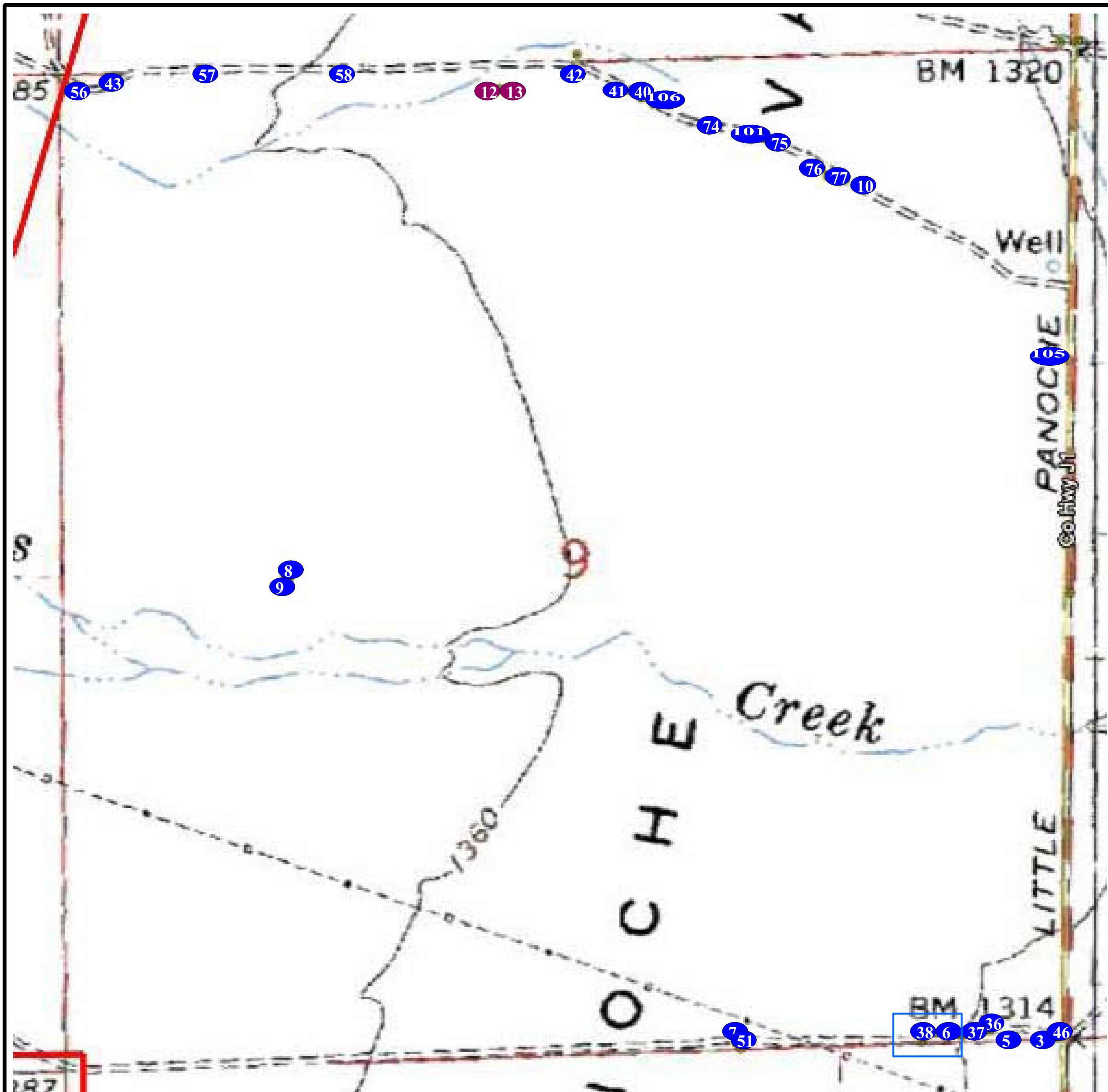
- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 8

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 8



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

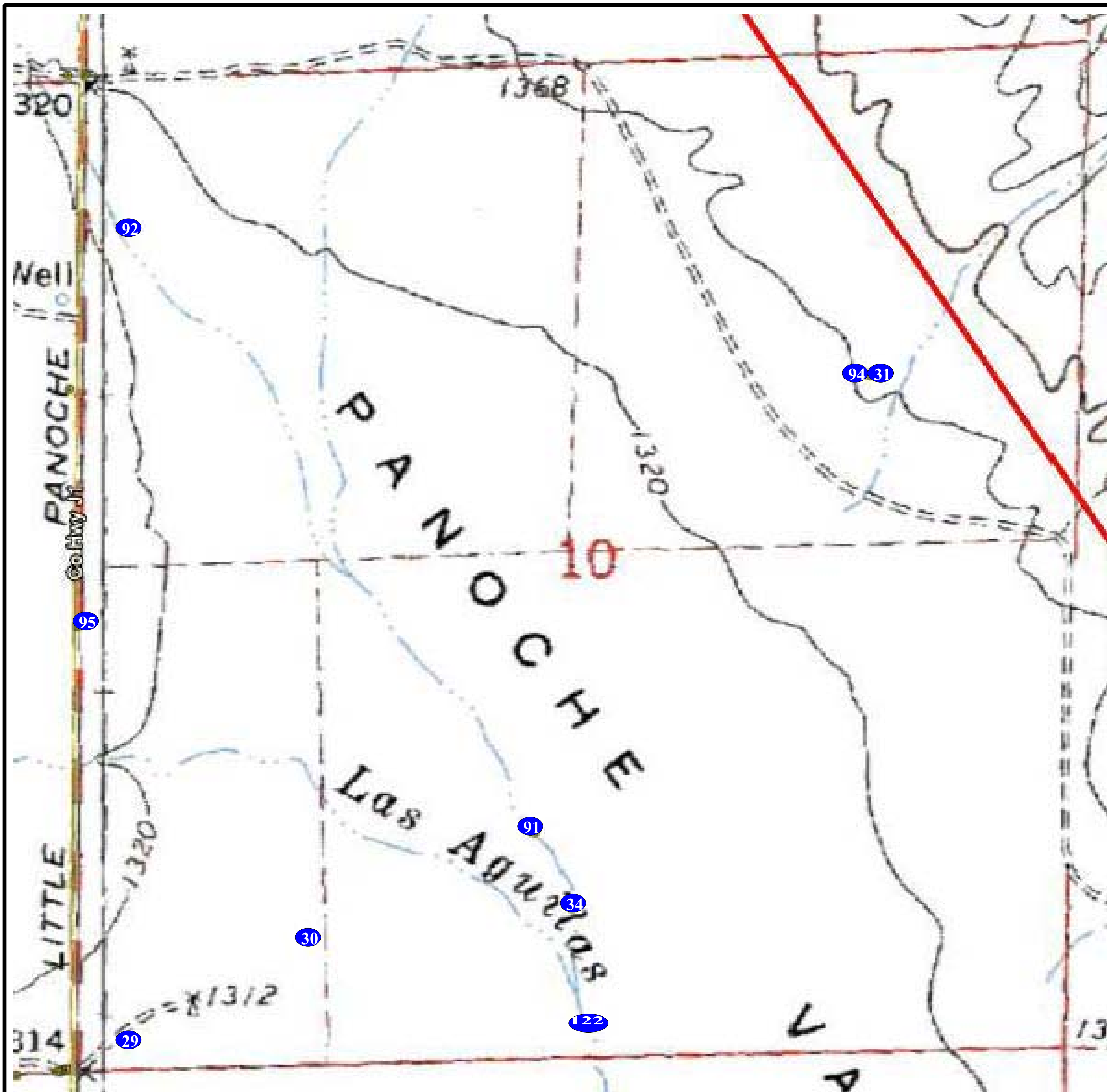
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 9

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 9



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

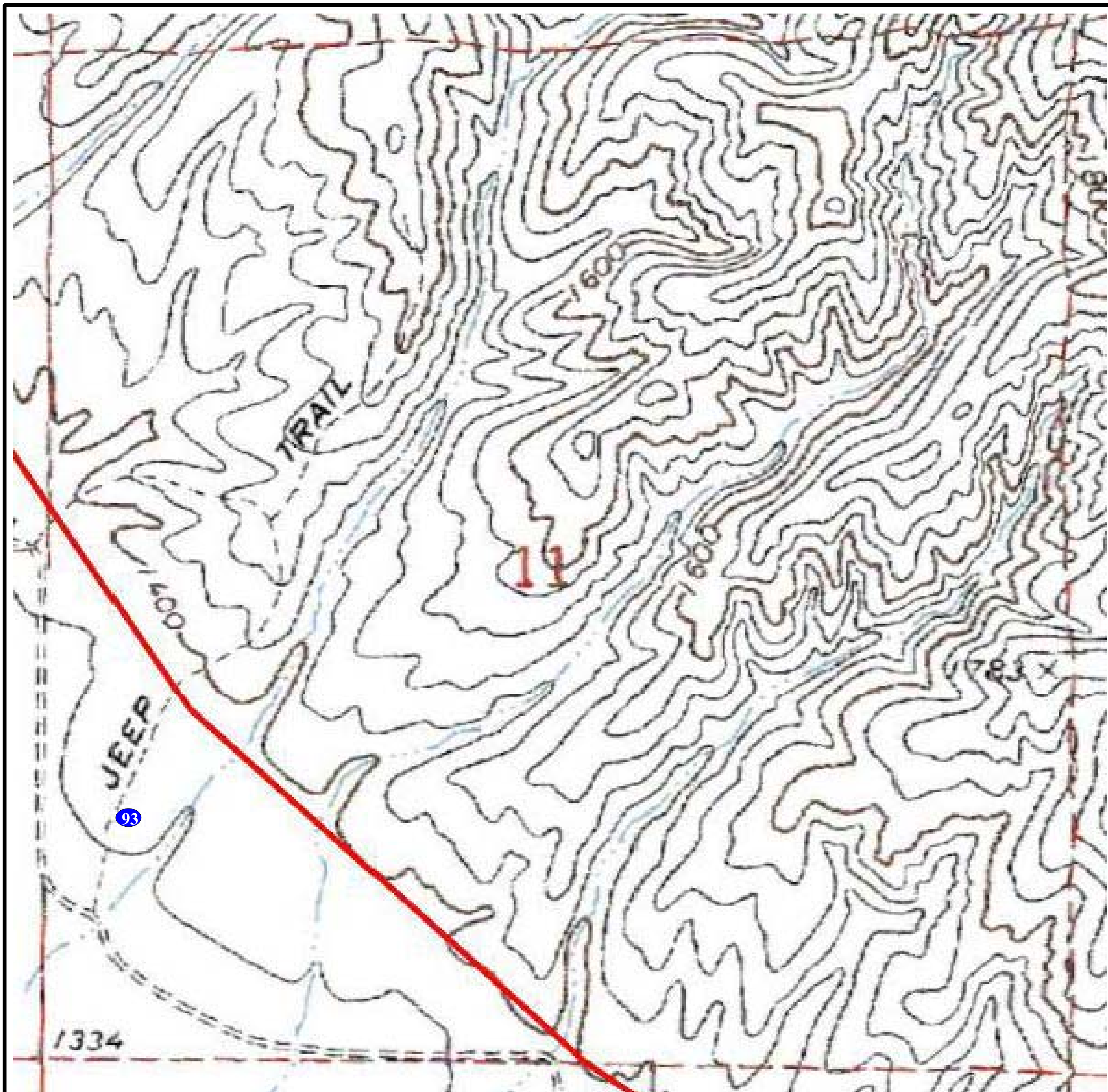
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 10

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 10



LEGEND

- 68 Sampled Pool
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

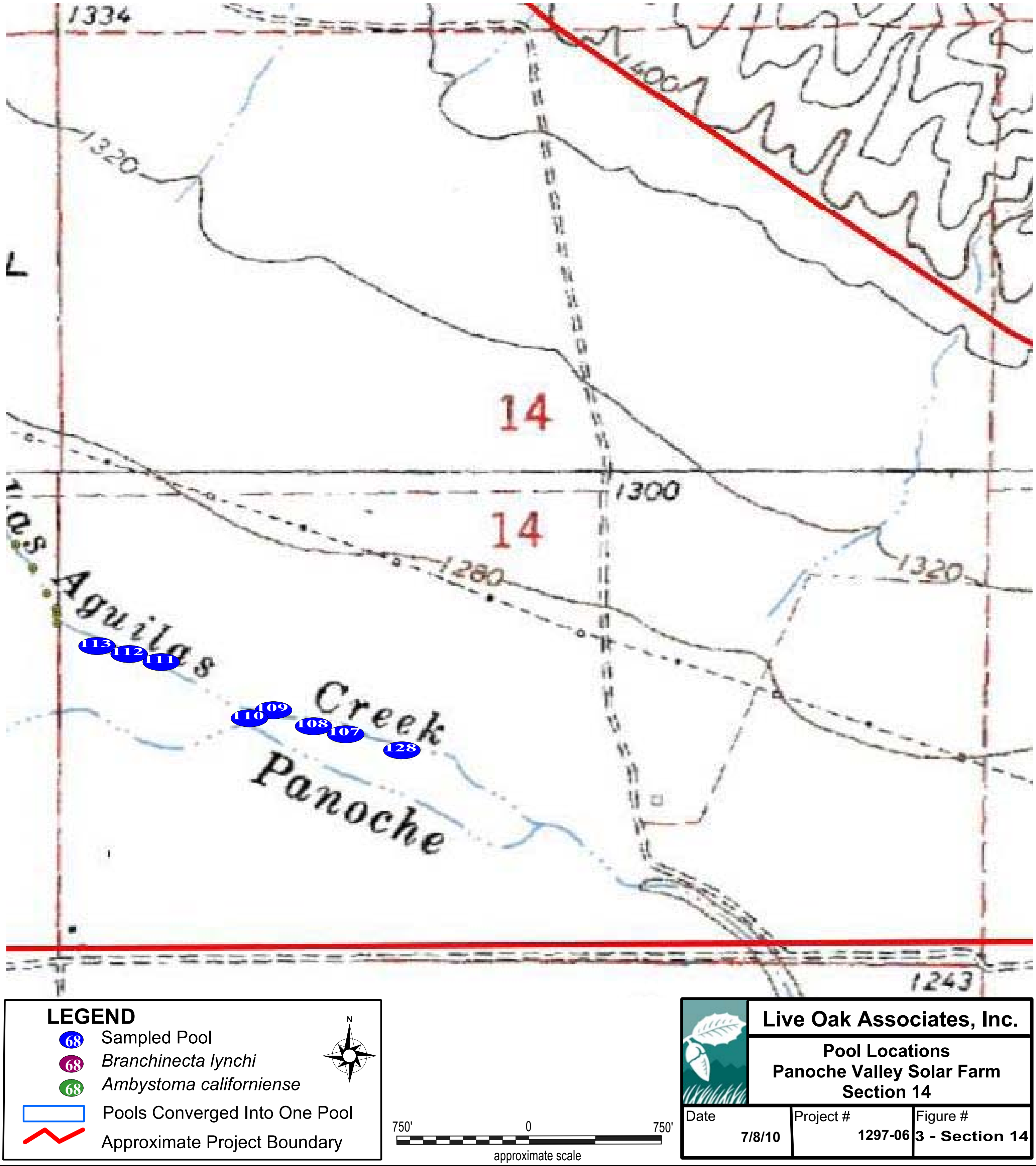
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 11

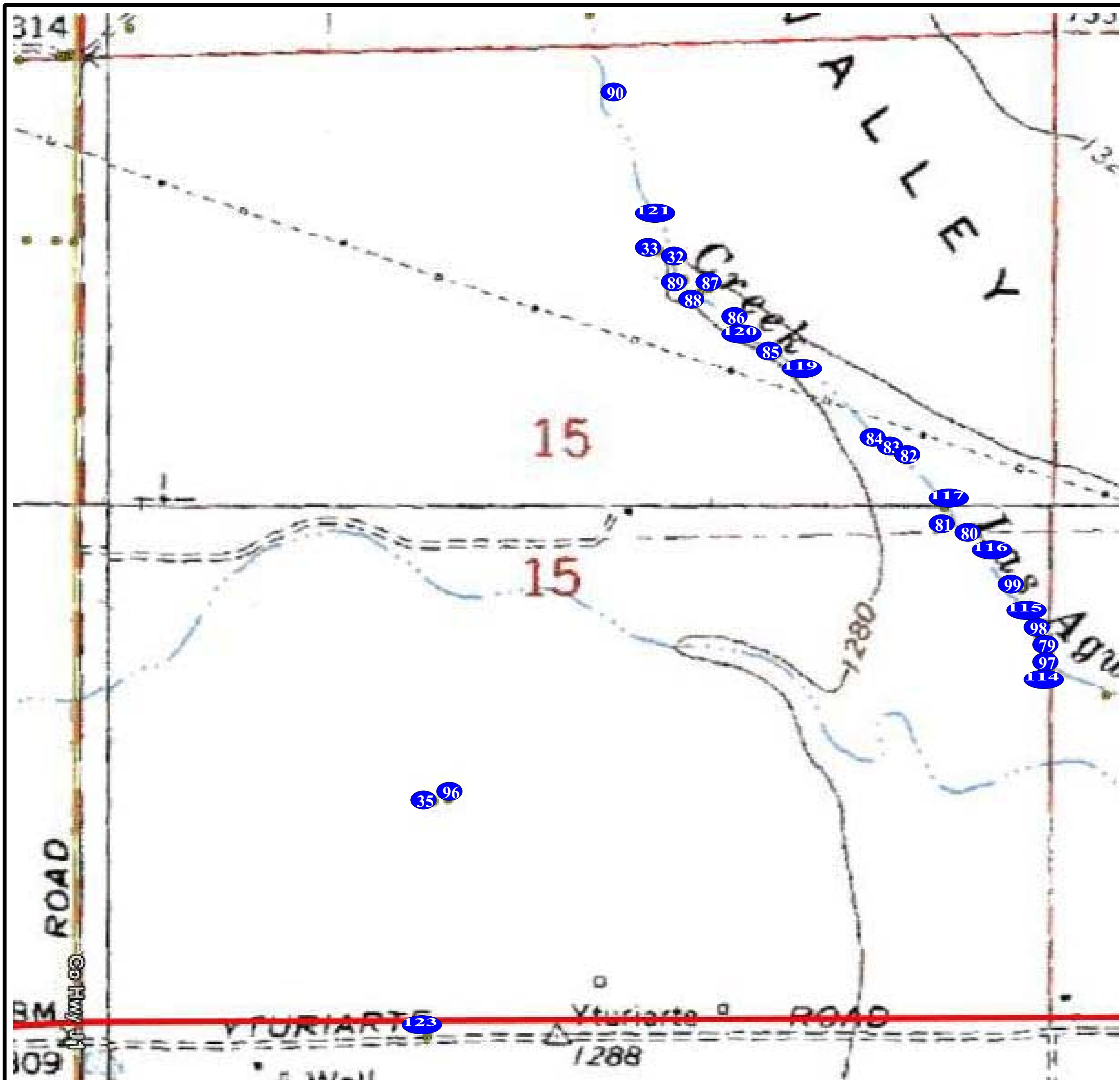
Date	Project #	Figure #
7/8/10	1297-06	3 - Section 11



Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 14

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 14



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

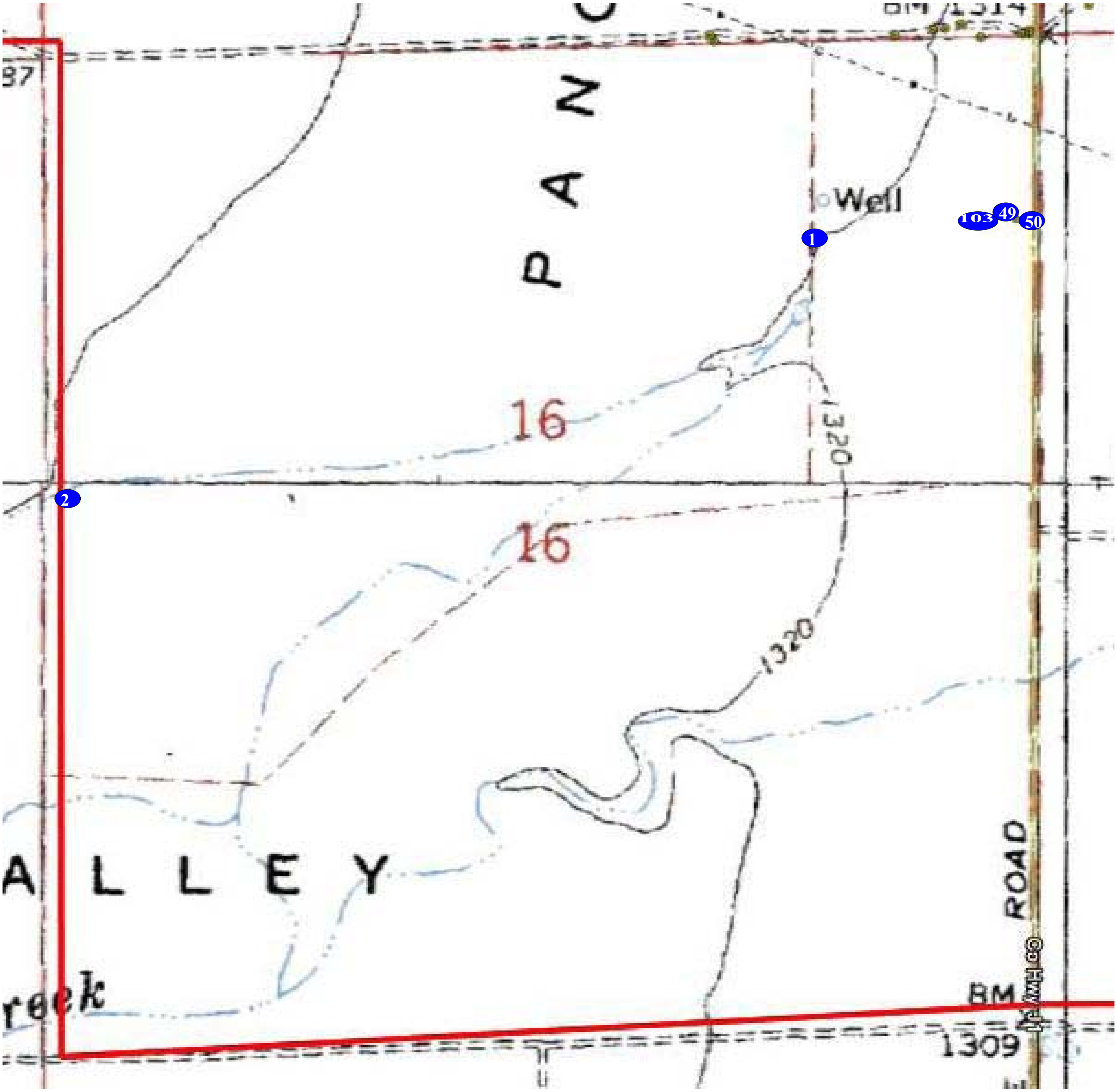
N

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 15

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 15



LEGEND

68 Sampled Pools

68 *Branchinecta lynchi*

68 *Ambystoma californiense*

Pools Converged Into One Pool

Approximate Project Boundary

N

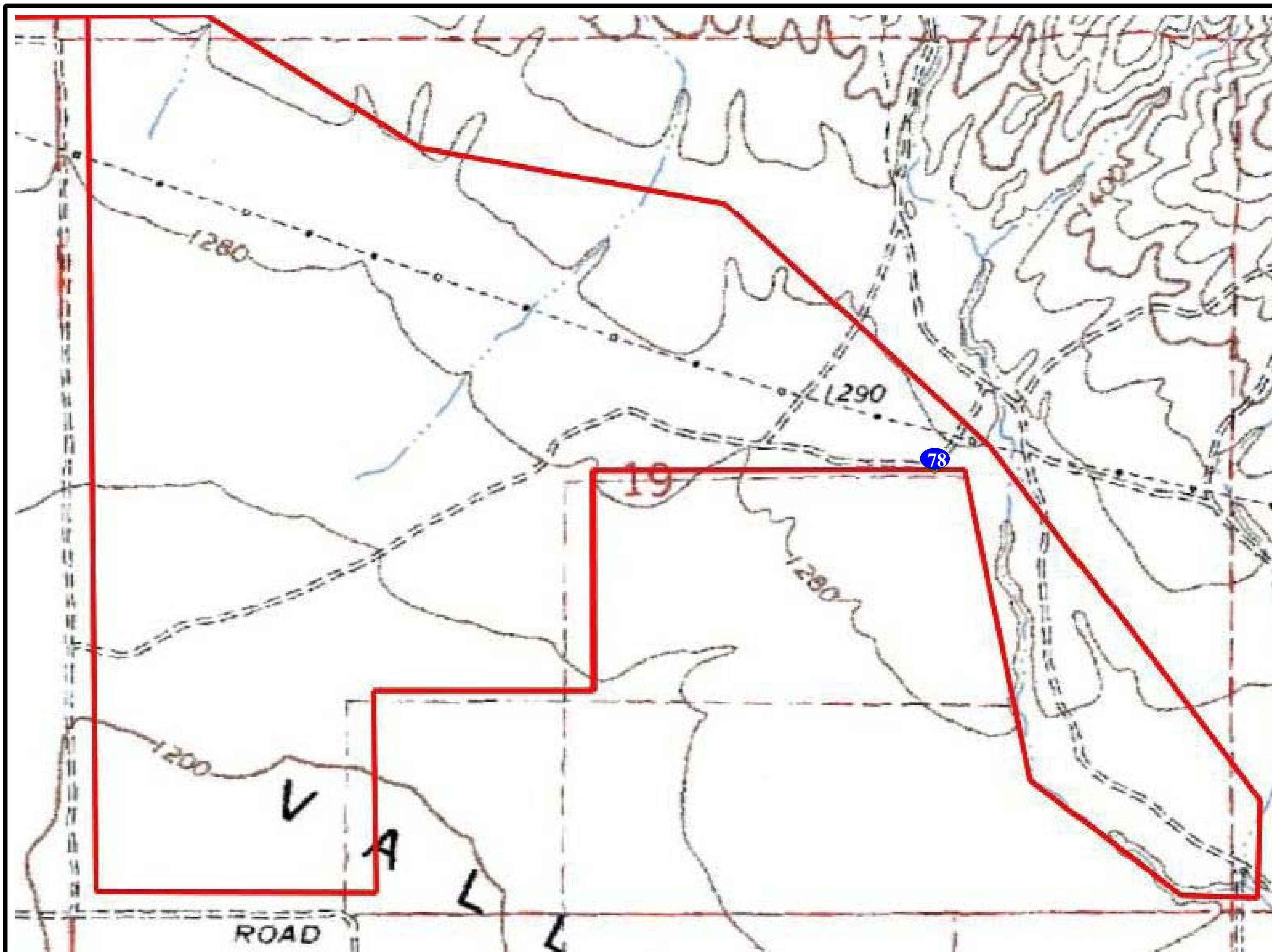
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 16

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 16



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 19

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 19

Voucher specimens collected during the wet season survey were submitted in accordance with the *Interim Survey Guidelines* (USFWS 1996) to the CAS by Geoff Cline of LOA on November 8, 2010. Live Oak Associates understands that Kansas Biological Survey will submit a representative sample of each cyst type recovered from the soil samples to either the CAS or LACM, as required by the USFWS guidelines for a protocol level survey.

3.3 Conclusion

Based on the results of the 2009/2010 protocol wet season surveys and 2010 dry season survey, it has been determined that the Federally Threatened vernal pool fairy shrimp (*Branchinecta lynchi*) is present in two adjacent pools, Pool 12 and Pool 13, on the PVSF project site. Pool 12 is a seasonal stock pond constructed from scraped earth bermed up across a shallow swale. Pool 13 is a depression immediately down gradient from Pool 12 presumably formed from the scraping of soil from this area to create the bermed dam of Pool 12. Other habitat sampled during the surveys contained no branchiopods and consisted primarily of ruderal pools associated with compacted depressions in dirt ranch roads or cattle troughs, as well as a few seasonal stock ponds and a number of natural pools forming in swales or drainages. Incidental findings of California tiger salamander occurred in Pool 16 (a seasonal stock pond) during the wet season surveys. Given the above average rainfall during the 2009/2010 rainy season it is doubtful any onsite branchiopod habitat was missed by the protocol survey effort.

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

Jeff Gurule

Signature: Jeff Gurule. Date: January 14, 2011.

Permit # TE-168924-0

APPENDIX A:
DRY SEASON AUTHORIZATION LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
81440-2010-CPA-0180

September 14, 2010

Michele Korpos
Senior Project Manager
Live Oak Associates, Inc.
6840 Via Del Oro, Suite 220
San Jose, California 95119

Subject: Authorization to Commence Dry-Season Surveys for Vernal Pool Branchiopods at the Proposed Panoche Valley Solar Farm, San Benito County, California

Dear Ms. Korpos:

We have reviewed your request, dated July 29, 2010, and received by our office by electronic mail on July 30, 2010, to conduct dry-season surveys for federally listed vernal pool branchiopods, including the federally threatened vernal pool fairy shrimp (*Branchinecta lynchi*), for the proposed Panoche Valley Solar Project, San Benito County, California. You are requesting permission to conduct dry-season sampling at 128 pool locations identified during the wet-season surveys performed during the 2009/2010 wet season. The 90-day report for the protocol-level wet-season branchiopod surveys dated August 13, 2010, was received by our office by electronic mail on August 19, 2010. The results of the wet-season surveys identified one pool occupied by vernal pool fairy shrimp. The methods and findings included in the 90-day report for the wet-season surveys for the subject project are currently under review.

You request that the soil collection portion of the sampling be conducted by Davianna Ohlson, Melissa Denena, Jeff Gurule, and/or Austin Pearson under the terms and conditions of their recovery permits (TE1670750-0, TE108681-0, TE168924-0, TE108683-0 respectively) and performed in accordance with the methods described in the U.S. Fish and Wildlife Service's April 1996 *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods* (Guidelines). In your request, you also request that Christopher Rogers (TE-796284-3) conduct the soil analysis and possible culture of any cysts collected.

The permits identified for Ms. Ohlson, Ms. Denena, and Mr. Pearson expired in December 2009. We do not authorize Davianna Ohlson, Melissa Denena, or Austin Pearson to conduct the proposed dry-season surveys. Christopher Roger's current recovery permit, TE-796284-5, does not authorize the culturing of cysts. We do not authorize Christopher Rogers to culture any cysts identified in the soil samples collected during the dry-season surveys.

Michele Korpos

We hereby authorize Jeff Gurule to conduct the dry-season surveys and Christopher Rogers to conduct the soil sieving and examination and cyst identification to genus. Per section V.h of the Guidelines, each fairy shrimp or tadpole shrimp cyst shall be identified to genus by a qualified biologist and the Service may require an independent review by a crustacean biologist of any vernal pool branchiopod or cyst identification. Further, section V.h states that, for each feature surveyed, if branchiopod cyst identification is made to genus, there are two options: 1) surveys may be suspended if it is agreed that one or more listed species are present or 2) a subsequent complete wet-season sampling survey shall be conducted. Surveys may continue at the remaining features on the project site; however, if all surveys are suspended, it must be assumed that all features are occupied by the listed entity.

We remind Mr. Gurule and Mr. Rogers of their responsibilities in reporting survey results to us, regardless of findings, and suggest that they review the permit for any special conditions that must be met. We request use of the dry-season data sheet available on our website (http://www.fws.gov/ventura/) during the dry-season surveys and that copies of the data sheets be included in future reports on the survey findings. If you have any questions, please contact Christopher Diel of my staff at (805) 644-1766, extension 305.

Sincerely,

Douglass M. Cooper
Deputy Assistant Field Supervisor

APPENDIX B:
DRY SEASON SOIL ANALYSIS REPORT

8 December 2010

Eric Cherniss
Solargen Energy, Inc.
20400 Stevens Creek Blvd., Suite 740
Cupertino, CA 95014

SUBJECT: Results of Analyses of Soil Samples Collected from the Proposed Panoche Valley Project Site, San Benito County, California.

Dear Mr. Cherniss,

Live Oak Associates conducted a dry season survey of potential special status shrimp habitats at the proposed Panoche Valley project site, located in San Benito County, California. Soil samples were collected from 117 previously identified habitats judged to be suitable for special status shrimp species, and these samples were shipped to Kansas Biological Survey for processing and analyses. Special status shrimp eggs were collected from the soil samples analyzed from two features.

Kansas Biological Survey understands that Live Oak Associates will submit this report and all other pertinent materials and information to the US Fish and Wildlife Service (USFWS), and the California Department of Fish and Game (DFG), as required by the USFWS guidelines for a protocol level survey.

Definitions

For the purpose of this report, special status shrimp are defined to include shrimp species listed as threatened or endangered under the federal Endangered Species Act (ESA) (50 CFR 17.11 for listed animals and various Federal Register notices for proposed species). One special status tadpole shrimp (*Lepidurus packardi*) and two special status fairy shrimp species (*Branchinecta lynchi* and *Branchinecta longiantenna*) have the potential to occur at the proposed project site. In addition, two non-listed fairy shrimp species (*Branchincta lindahli* and *Linderiella occidentalis*) is known from the proposed project vicinity.

Species Accounts

Lepidurus packardi Simon, 1886
Lepidurus packardi, the Vernal Pool Tadpole Shrimp, is federally listed as an endangered species. This tadpole shrimp species is found in vernal pools throughout the Sacramento Valley, to the east side of San Francisco Bay (Rogers, 2001). Typically *Lepidurus packardi* is green in color, but may be mottled with brown in highly turbid water. *Lepidurus packardi* is omnivorous and generally forages on the bottoms of pools in dense vegetation. Tadpole shrimp tend to be

slow growing and are usually collected after the vernal pool has been ponded for 30 days (Rogers, 2001).

Branchinecta lynchi Eng, Belk & Eriksen, 1990
Branchinecta lynchi, the Vernal Pool Fairy Shrimp, is federally listed as a threatened species. This shrimp species is found in vernal pools throughout the Central Valley and western Riverside County in California, and near Medford, Oregon (Eriksen & Belk, 1999). This fairy shrimp species occurs in neutral to slightly alkaline vernal pools throughout the California Central Valley, and in rock outcrop pools along the Interior Coast Ranges, south of the Sacramento River Delta.

Branchinecta longiantenna Eng, Belk, & Eriksen, 1990
Branchinecta longiantenna, or the Longhorn Fairy Shrimp, is federally listed as an endangered species. This species is reported from small, shallow rock outcrop vernal pools, and grassy-bottomed vernal pools. This species of fairy shrimp has an extremely disjunct distribution, and is known only from three locations: a sandstone outcrop vernal pools along the Contra Costa/Alameda County line, a couple of grassy bottomed vernal pools at the Pixley National Wildlife Refuge in Merced County in the San Joaquin Valley, and from a couple of grassy bottomed vernal pools and roadside scrapes on the Carrizo Plain in San Luis Obispo County (Eriksen & Belk, 1999; Rogers, in prep).

Branchinecta lindahli Packard, 1883
This taxon is a common fairy shrimp with no legal status. This fairy shrimp is common in alkaline habitats throughout the western United States and northern Mexico. It typically occurs in pools that are turbid, alkaline or slightly saline, and often ringed with salt grass (*Distichilis* sp.). *Branchinecta lindahli* may be opportunistic, as it is common in a wide variety of artificial habitats, such as bulldozer scrapes, roadside ditches and railroad toe-drains (Eriksen & Belk, 1999; Rogers & Lang, in prep).

Linderiella occidentalis (Dodds, 1923)
The first species recorded from California, the California Linderiella is a common fairy shrimp from vernal pools throughout the California Central Valley and Coast Ranges of California. *Linderiella occidentalis* is typically white and green with red markings. *Linderiella occidentalis* tends to mature later than the *Branchinecta* species and is typical of vernal pools that are inundated for at least 20 days. *Linderiella occidentalis* was originally proposed for listing under the Endangered Species Act and was withdrawn from the proposal in 1995.

Methods

Live Oak Associates collected soil samples from 117 potential special status shrimp habitats at the proposed project site. Each soil sample was placed in a bag, labeled with the locality number, and shipped to the Kansas Biological Survey laboratory for analysis. All potential habitats were identified according to the numbers assigned to them in the field.

Laboratory Analysis

Soil samples were prepared for examination in the laboratory by dissolving the clumps of soil in water and sieving the material through 300- and 150- µm pore size screens. The small size of these screens ensures that the eggs from the shrimp species will be retained. The portion of each sample retained in the screens was dissolved in a brine solution to separate the organic material from the inorganic material. The organic fraction was then examined under a microscope.

Results

Potential special status shrimp eggs were recovered from the soil samples taken from features 12 and 13. The eggs present belong to the genus *Branchinecta* and are most likely *Branchinecta lynchi* as this species was previously identified from feature 12 and we are given to understand that feature 13 is adjacent to this habitat. These analyses are insufficient by themselves to determine that special status shrimp are absent from the other habitat on this site. The results of this survey must be combined with a protocol wet season survey, and concurrence must be sought from the USFWS before any additional determinations can be made.

If you have any questions please call me.

Sincerely,

D. Christopher Rogers
785.864.1714
Crustacean Taxonomist and Ecologist
Kansas Biological Survey
Central Plains Center for Bioassessment
Kansas University, Higuchi Hall
2101 Constant Avenue, Lawrence, KS 66047-3759 USA

References

Eriksen, C. H. & D. Belk. 1999. The fairy shrimps of California's pools, puddles, and playas. Mad River Press, Eureka, CA, USA. 196 pp.

Rogers, D.C. 2001. Revision of the Nearctic *Lepidurus* (Notostraca). Journal of Crustacean Biology 21: 991 – 1006.

United States Fish and Wildlife Service. September 19, 1994. Federal Register Final Rule; determination of endangered status for the conservancy fairy shrimp, longhorn fairy shrimp, and the vernal pool tadpole shrimp; and threatened status for the vernal pool fairy shrimp.

APPENDIX C:
POOL COORDINATES

Panoche Solar Farm Pool Locations **Grid: UTM** **Datum: NAD83** **Zone: 10S**

Pool #	Easting	Northing	Altitude
1	689496	4055757	1305 ft
2	688302	4055313	1342 ft
3	689829	4056101	1324 ft
4	689834	4056100	1319 ft
5	689763	4056093	1314 ft
6	689688	4056103	1316 ft
7	689326	4056083	1320 ft
8	688589	4056816	1372 ft
9	688595	4056815	1374 ft
10	689470	4057479	1342 ft
11	689036	4057670	1333 ft
12	688911	4057611	1335 ft
13	688921	4057611	1338 ft
14	687939	4057814	1379 ft
15	687945	4057818	1382 ft
16	688234	4058362	1380 ft
17	688572	4058300	1402 ft
18	689004	4058842	1332 ft
19	689014	4059176	1357 ft
20	688840	4058916	1356 ft
21	689086	4059160	1354 ft
22	689119	4058641	1330 ft
23	689120	4058634	1320 ft
24	689187	4058476	1331 ft
25	689181	4058467	1316 ft
26	689204	4058399	1318 ft
27	689270	4058041	1318 ft
28	689811	4057710	1306 ft
29	689938	4056148	1308 ft
30	690230	4056326	1294 ft
31	691090	4057257	1358 ft
32	690834	4055790	1271 ft
33	690806	4055805	1279 ft
34	690648	4056380	1286 ft
35	690460	4054895	1314 ft
36	689732	4056112	1308 ft
37	689708	4056105	1337 ft
38	689626	4056092	1327 ft
39	686835	4056546	1454 ft
40	689145	4057604	1309 ft
41	689113	4057614	1327 ft
42	689033	4057647	1329 ft
43	688292	4057609	1362 ft
44	689083	4058673	1320 ft
45	689115	4058610	1320 ft
46	689842	4056105	1301 ft
47	689839	4057712	1311 ft
48	690492	4058250	1374 ft
49	689828	4055797	1296 ft
50	689855	4055796	1294 ft
51	689333	4056074	1312 ft
52	686969	4056483	1469 ft
53	686814	4056424	1484 ft
54	686776	4056341	1486 ft
55	686907	4056277	1476 ft
56	688248	4057597	1378 ft
57	688437	4057625	1361 ft
58	688657	4057633	1351 ft
59	689019	4058710	1344 ft
60	689075	4059037	1331 ft
61	689072	4059015	1337 ft
62	689086	4058729	1325 ft
63	689107	4058687	1338 ft
64	689125	4058590	1320 ft
65	689181	4058543	1312 ft
66	689199	4058519	1310 ft
67	689190	4058645	1305 ft
68	689208	4058395	1332 ft
69	689269	4058326	1309 ft
70	689236	4058317	1301 ft
71	689323	4058278	1305 ft
72	689366	4058222	1305 ft
73	689288	4058054	1312 ft
74	689248	4057557	1329 ft
75	689355	4057533	1338 ft
76	689431	4057496	1320 ft
77	689443	4057485	1316 ft
78	696325	4053843	1330 ft
79	691459	4055163	1264 ft
80	691320	4055354	1257 ft
81	691291	4055371	1245 ft
82	691217	4055474	1270 ft
83	691196	4055487	1260 ft
84	691183	4055498	1279 ft
85	691004	4055643	1256 ft
86	690938	4055687	1267 ft
87	690890	4055745	1274 ft
88	690875	4055737	1275 ft
89	690848	4055758	1285 ft
90	690724	4056063	1285 ft
91	690585	4056501	1294 ft
92	689917	4057463	1316 ft
93	691576	4056566	1361 ft
94	691108	4057252	1362 ft
95	689847	4056821	1301 ft
96	690484	4054899	1289 ft
97	691460	4055152	1241 ft
98	691441	4055189	1236 ft
99	691385	4055274	1236 ft
100	686848	4056217	1490 ft
101	689315	4057548	1331 ft
102	689029	4058943	1312 ft
103	689781	4055798	1307 ft
104	687276	4056536	1469 ft
105	689824	4057202	1308 ft
106	689163	4057595	1323 ft
107	691959	4054950	1247 ft
108	691936	4054959	1252 ft
109	691827	4054980	1234 ft
110	691813	4054979	1246 ft
111	691629	4055068	1256 ft
112	691593	4055078	1253 ft
113	691552	4055092	1249 ft
114	691461	4055137	1258 ft
115	691417	4055233	1251 ft
116	691346	4055332	1252 ft
117	691281	4055396	1256 ft
118	691206	4055485	1269 ft
119	691049	4055621	1263 ft
120	690950	4055672	1264 ft
121	690796	4055862	1268 ft
122	690685	4056192	1292 ft
123	690458	4054510	1277 ft
124	689225	4058981	1329 ft
125	689226	4059076	1346 ft
126	689230	4059090	1336 ft
127	689092	4058711	1338 ft
128	692072	4054918	1258 ft

APPENDIX D:
PHOTOS

Photo 1: Looking SW at Pool #12 - a stock pond. Vernal pool fairy shrimp (*Branchinecta lynchi*) were observed in this pool on 3/16/10. The pool to the left, Pool #13, as well as Pool #12 were found to contain *Branchinecta* cysts during dry season surveys. It is assumed the *Branchinecta* cysts are *Branchinecta lynchi*.

Photo 2: Looking SE at Pool #5, a natural vernal pool at the toe of a swale. No shrimp were found in this pool during the 2009/2010 wet season survey or 2010 dry season survey.

Photo 3: LOA Biologist Mr. Jeff Gurule (TE-168924) sampling Pool #50 at the intersection of a ranch road and Little Panoche Road looking east. This pool is an example of the many ruderal pools associated with the ranch roads on the site. No shrimp were found in this pool during the 2009/2010 wet season survey and 2010 dry season survey.

Photo 4: Incidental California tiger salamander observation from Pool #16 on May 11th, 2010.

Photo 5: Looking south across the study area.

Photo 6: Looking north across the study area.

LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

PROTOCOL-LEVEL WET SEASON BRANCHIOPOD SURVEY RESULTS
90-DAY REPORT
PANOCHE VALLEY SOLAR FARM
SAN BENITO COUNTY, CALIFORNIA
(Tracking Number 81440-2010-CPA-0023)

Prepared by:

LIVE OAK ASSOCIATES, INC.

Austin Pearson, B.S., Director of Ecological Services
Jeff Gurule, B.A., Staff Ecologist
Geoffrey Cline, M.S., Staff Ecologist

Prepared for:

SOLARGEN ENERGY
Solargen Energy, Inc.
Eric Cherniss
VP Project Development
20400 Stevens Creek Boulevard, Suite 700
Cupertino, CA 95014

August 13, 2010 PN 1297-06

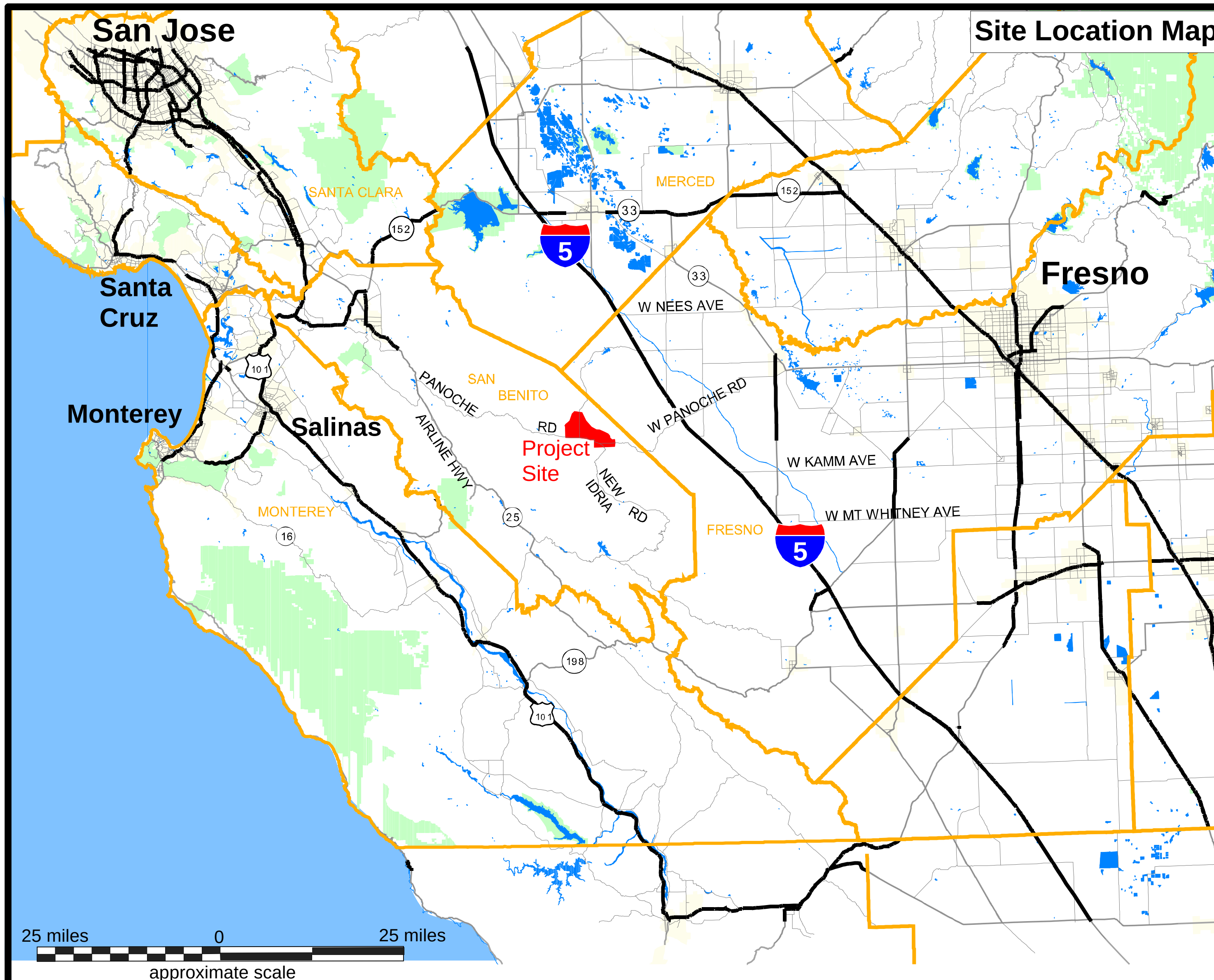
TABLE OF CONTENTS

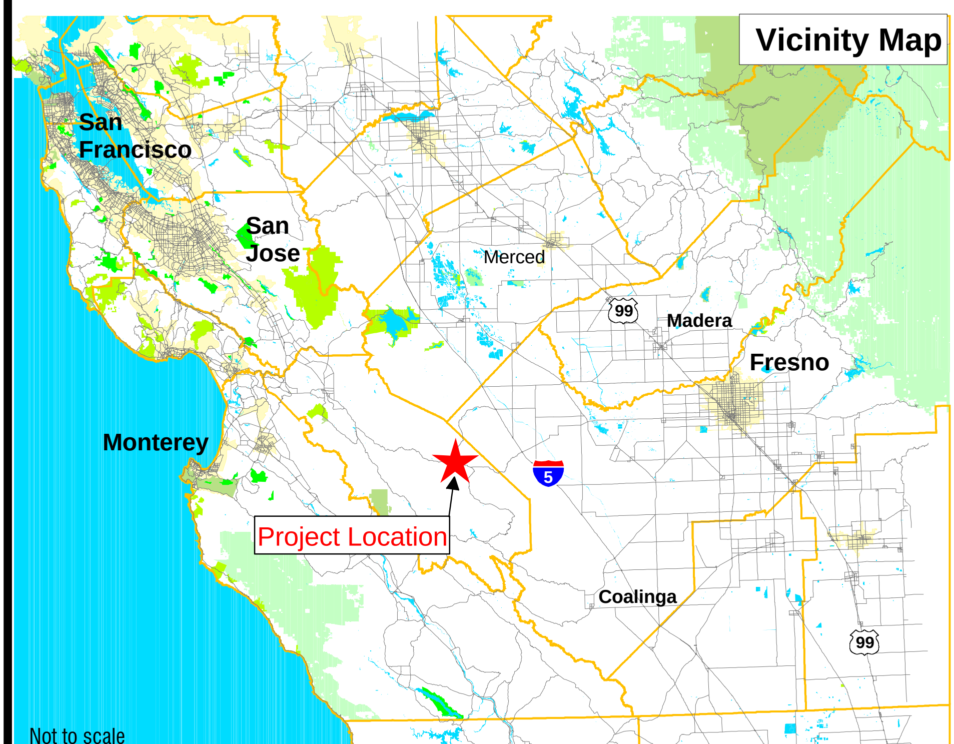
1.0 INTRODUCTION AND SITE DESCRIPTION

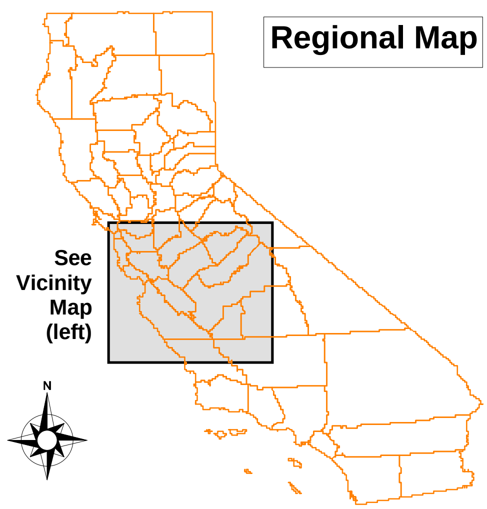
Protocol-level wet-season branchiopod surveys were conducted by Live Oak Associates, Inc. (LOA) on the Panoche Valley Solar Farm (PVSF) project site in San Benito County, California. Surveys consisted of protocol level wet season sampling in 2009/2010. The site or study area consists of approximately 4,885-acres, located in Panoche Valley approximately 15 miles west of Interstate 5 and six miles south of Mercey Hot Springs near the intersection of Panoche Road and Little Panoche Road (Figure 1). The site can be found on the Cerro Colorado, Mercey Hot Springs, Llanada, and Panoche, California U.S.G.S quadrangles, in Sections 3-4, 8-11, and 13-16, Township 15 South, Range 10 East and Section 19, Township 15 South, Range 11 East (Figure 2).

All the parcels within the study area are used for cattle grazing. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1200 feet National Geodetic Vertical Datum (NGVD) to approximately 1490 feet NGVD.

Thirteen soil types from nine soil series were identified on the project site. The Riverwash soil type is the only soil considered hydric. This soil type is considered hydric due to frequent flooding for long durations or very long durations during the growing season. Riverwash consists of mixed water-washed sand and gravel, occurs along streams or rivers and is often flooded during storm events. Within the study area, Riverwash soils are associated with Panoche Creek and portions of Las Aguilas Creek. The Panoche Creek channel was not considered potential habitat for fairy shrimp or tadpole shrimp due to high flows that periodically scour the creek channel. Ponded areas that were sampled consisted primarily of two types; 1) Hard-packed depressions associated with ranch roads and cattle troughs which were extremely ruderal in nature and were repeatedly disturbed by vehicle traffic and/or cattle, and 2) Natural and artificial depressions within natural swales. Annual precipitation in the general vicinity of the site is highly variable from year to year. Annual rainfall ranges between 9 and 13





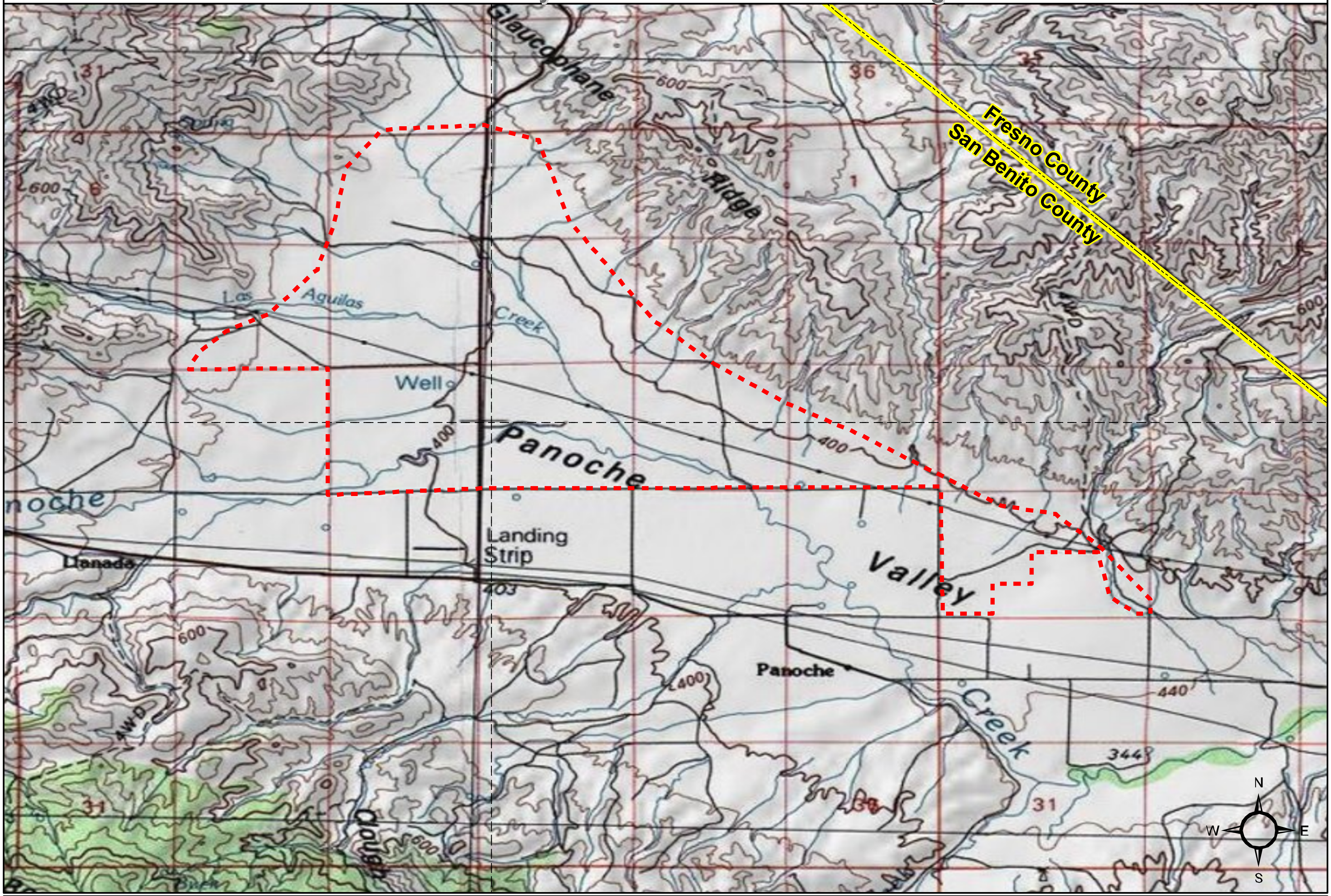


Live Oak Associates, Inc.

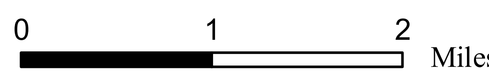
Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1

Panoche Valley Solar Farm — Figure 2



County Boundary — Study Area Boundary — USGS Quads: Cerro Colorado, Mercey Hot Springs, Panoche, Llanada



1:63,360 1 inch=1 mile

POWER ENGINEERS

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Solargen Energy

inches, almost 85% of which falls between October and March. During drought years, precipitation totals may only reach 5 inches per year. Storm-water infiltrates the soils of the site, but when field capacity has been reached, gravitational water flows into the creeks and drainages.

2.0 METHODS

In order to determine the presence or absence of shrimp species on the PVSF project site, LOA conducted protocol-level wet-season branchiopod surveys in the winter and spring of 2009/2010. All surveys were conducted in accordance with the *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Brachiopods* (USFWS 1996).

LOA was authorized to initiate branchiopod surveys by David Pereksta with the U.S. Fish and Wildlife Service (USFWS) on November 24, 2009 (Appendix A). Wet season surveys were conducted throughout winter and spring of 2009/2010.

Jeff Gurule (TE-168924) conducted most of the wet-season pool sampling. Data was recorded in the field by Jeff Gurule and Austin Pearson (TE-108683-0) with the assistance of Geoffrey Cline (an un-permitted LOA biologist) when necessary. Data was recorded on a previously approved data sheet, authorized via email by David Kelly with the USFWS on November 12, 2008 (See Appendix A). The data sheet is an Excel spreadsheet, with data entered in the field directly into the spreadsheet via a PDA. The 2009/2010 wet season data is presented in Appendix B.

2.1 Wet Season Sampling

The *Interim Survey Guidelines* (USFWS 1996) require that protocol-level wet season surveys begin once ponds are inundated with greater than three centimeters after 24 hours of a storm event. Following the initial inundation, ponds must be sampled at least every two weeks for as long as they are inundated or until they have experienced 120 days of continuous inundation, whichever is shorter. However, if ponds dry, then refill, the 120 day period starts anew.

After each substantial rain event the site was monitored to determine if the pools and puddles were inundated. Pools on the site began filling in December 2009 with pools receiving runoff from hard-packed surfaces generally filling first. As such, the sampling of onsite pools and puddles began on December 21, 2009 and continued on January 4, 5, 18, and 19, February 1, 2, 16, and 17, March 2, 3, 16, 17, and 30, April 13, 14, 27, and 28, May 11 and 25, and June 7, 2010.

After significant rain events increased in January and the soils became more saturated, a few pools previously sampled separately combined to form larger pools that were then sampled as one pool. Sampling continued in these now larger combined pools, with data only collected from the aggregate pools. In order to continue to identify the donor pools, the aggregate pools were numbered using the pool numbers of the donor pools (ex. Aggregate Pool Number 24, 25 consisted of donor pools 24 and 25). Each area once occupied by an individual donor pool, now within the boundaries of the aggregate pool, was dip-netted to assure a thorough sampling of the aggregate pools.

2.2 USFWS Reporting and Voucher Specimen

The USFWS requires that a 90-day report be submitted to the appropriate field office (Sacramento USFWS in this case) following the completion of protocol-level branchiopod surveys. Additionally, the USFWS requires that a “Notice of Presence” be submitted upon identifying a federally listed branchiopod species from the project site authorized for sampling within ten working days of the finding. It is also required that a California Natural Diversity Data Base (CNDDB) field survey form be submitted to CDFG for listed species observed on site.

Any federally listed branchiopods collected during the protocol-level surveys must be submitted as voucher specimens to the California Academy of Sciences (CAS) or the Natural Museum of Los Angeles County (LACM). All specimens have to be preserved and submitted according to the CAS or LACM strict standards.

3.0 RESULTS

A total of 128 pools met the criteria for inundation in 2009/2010 and were sampled for branchiopod species (Figure 3). As previously mentioned some of these 128 pools combined after initial sampling events to form larger pools, temporarily reducing the number of actual pools in the sample set. Once the pools were disconnected from each other they were no longer considered a group. The 2009/2010 rainy season totals for the Panoche Weather Station is 14.57 inches, 137% of the yearly average for Panoche, California (California Department of Water Resources, Station PNH, accessed online June 17th, 2010). Even though total precipitation was above average, only one pool experienced an Anostracan hatch.

3.1 Wet Season Sampling

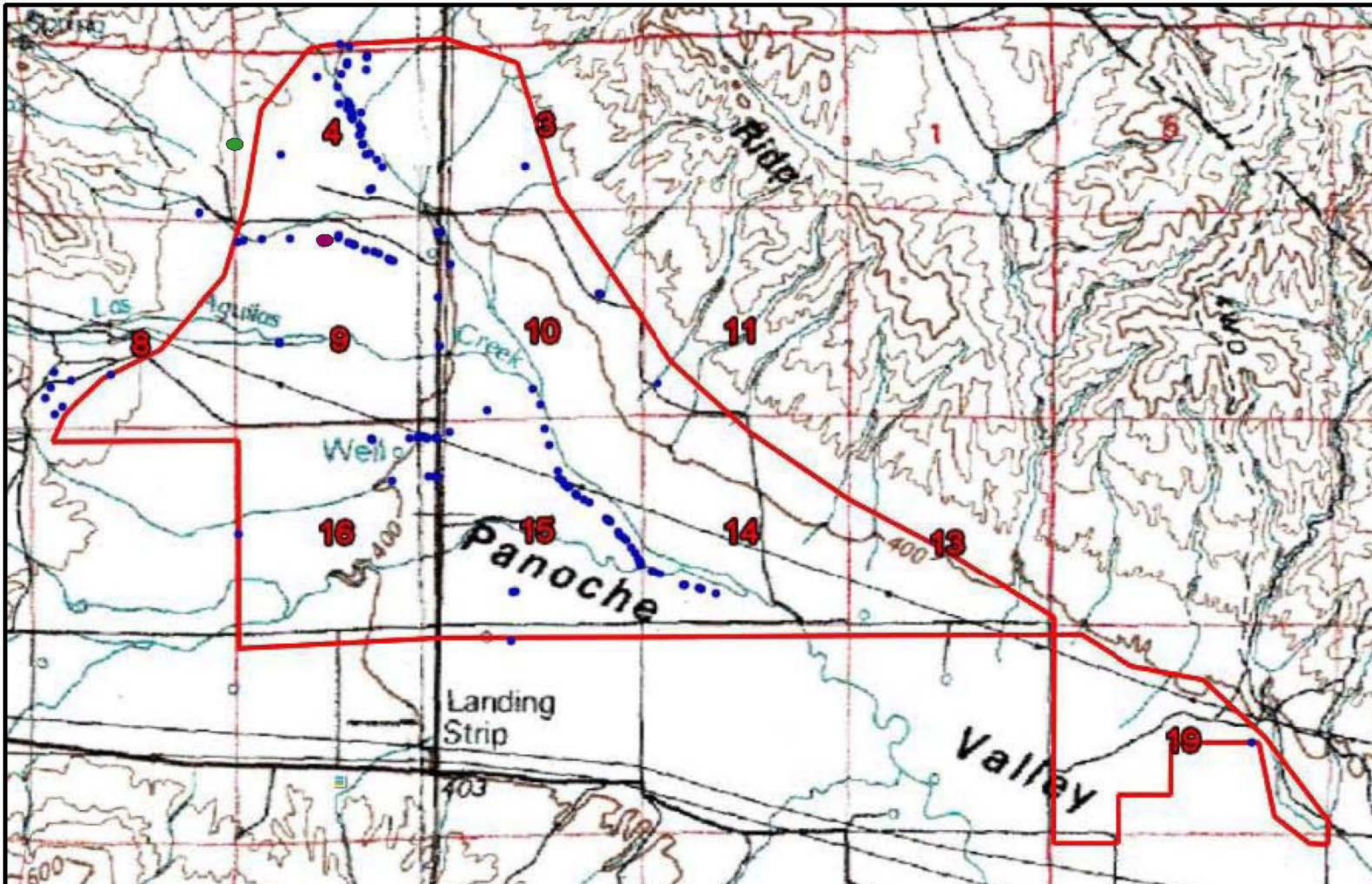
Only one anostracan species, The Federally Threatened vernal pool fairy shrimp (*Branchinecta lynchi*), was detected during 2009/2010 wet season sampling on the PVSF project site. *Branchinecta lynchi* were detected in a single pool (Pool #12) on March 16, 2010. Results of the 2009/2010 wet season Branchiopod surveys are presented in Figures 3 below. Pool #16 was found to contain California tiger salamander larvae (*Ambystoma californiense*), which were observed incidentally. Tadpole shrimp (*lepiduris packerdi*) were not detected on the site. Datasheets are presented in Appendix B. Pool coordinates are presented in Appendix C and photographs of the site, with photo specific information, are located in Appendix D.

3.2 USFWS Reporting and Voucher Specimen

This report serves as the 2009/2010 wet season branchiopod 90-day report for the PVSF project site. Notification of the presence of the Federally Threatened *Branchinecta lynchi* was sent to Christopher Diel at the Ventura, CA Branch of the USFWS via an email on March 24, 2010.

As required by the USFWS, a CNDDB form will be submitted to CDFG in order to document the presence of *Branchinecta lynchi* found during the 2009/2010 wet season surveys.

Voucher specimens will be submitted in accordance with the *Interim Survey Guidelines* (USFWS 1996).



LEGEND
- Sampled Pools
- *Branchinecta lynchi*
- *Ambystoma californiense*
- Approximate Project Boundary

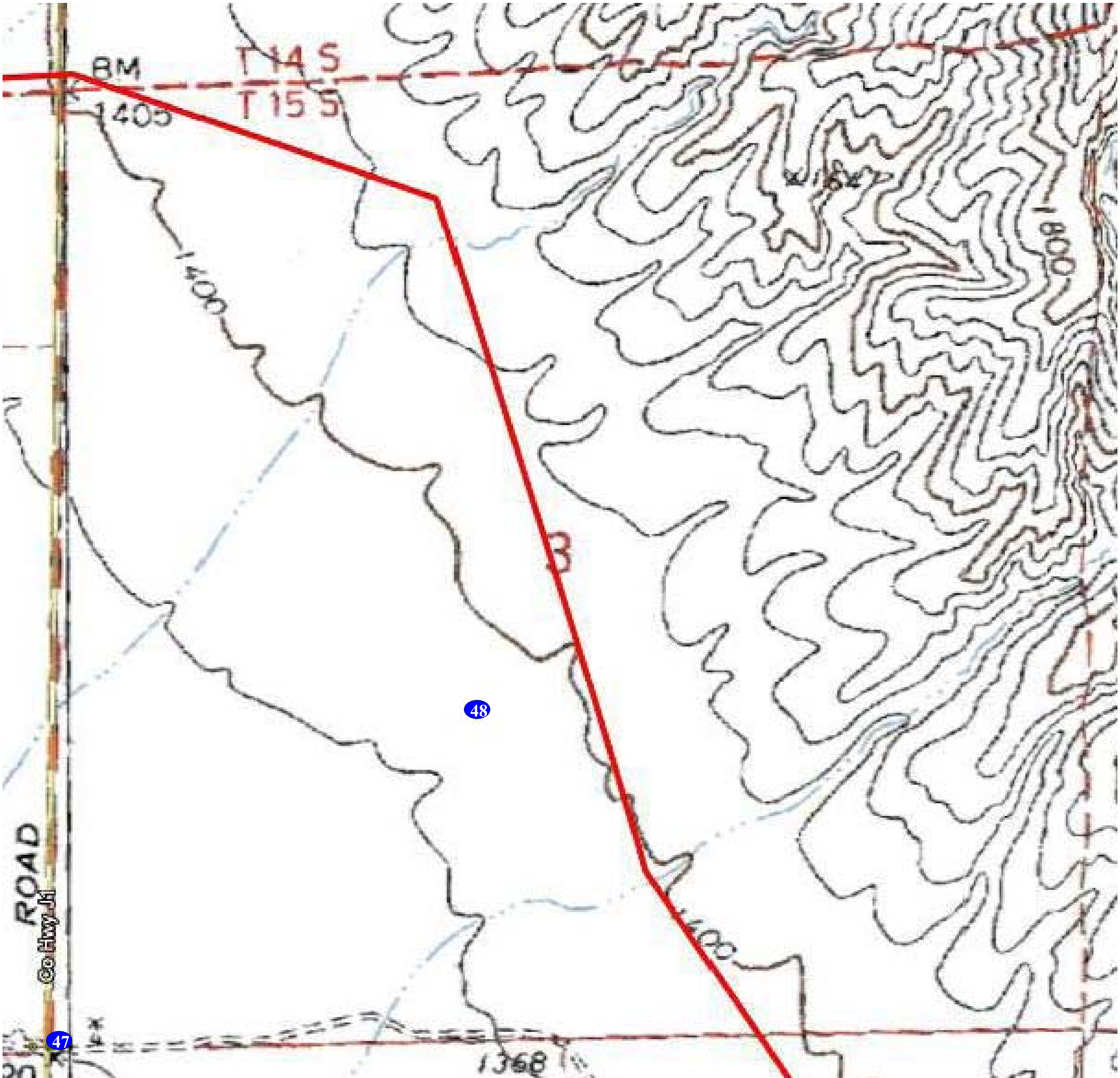
N

1 Mile 0 1 Mile
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Overview Map

Date	Project #	Figure #
7/8/10	1297-06	3 - Overview



LEGEND

- 68 Sampled Pool
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

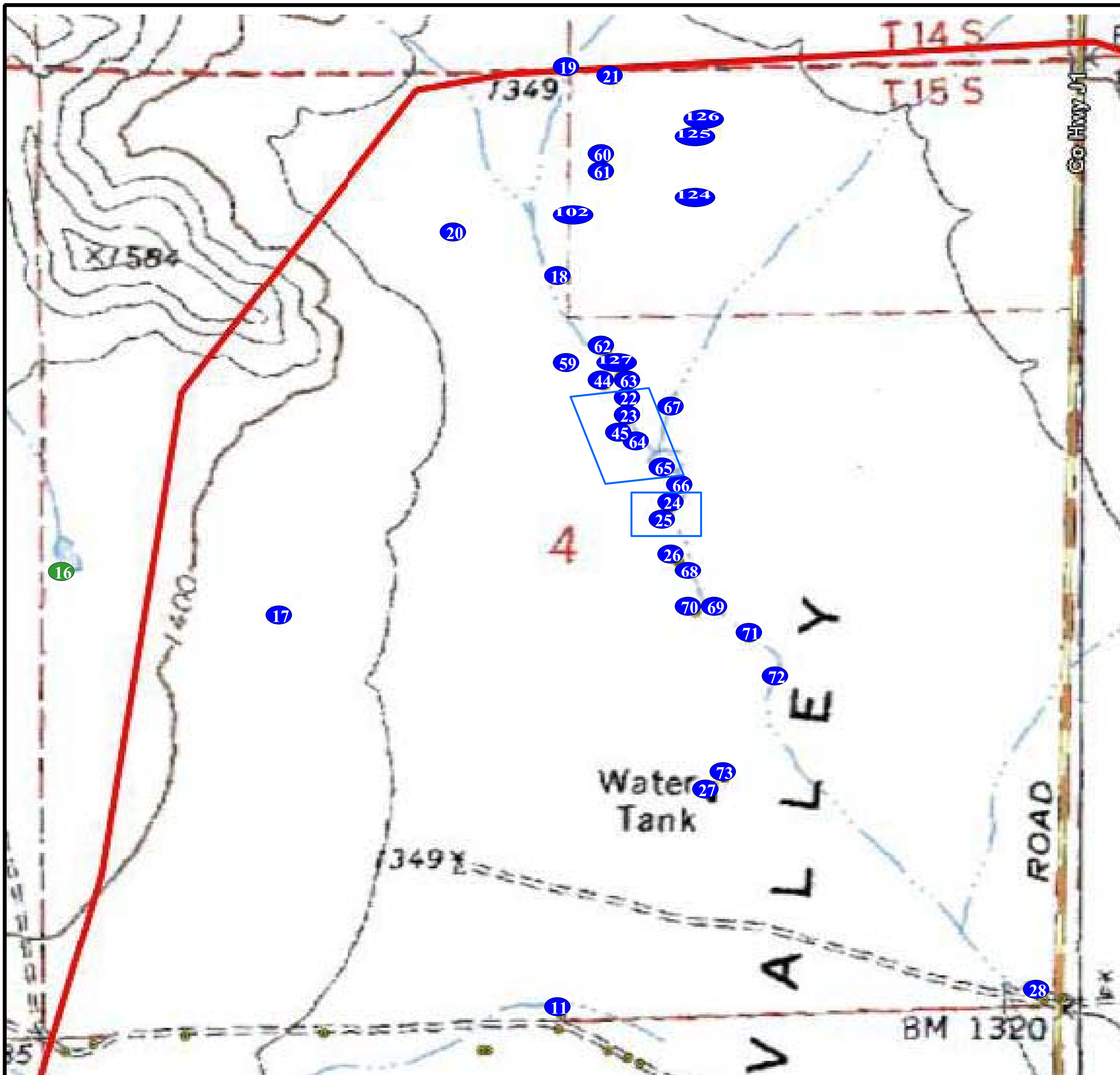
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 3

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 3



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

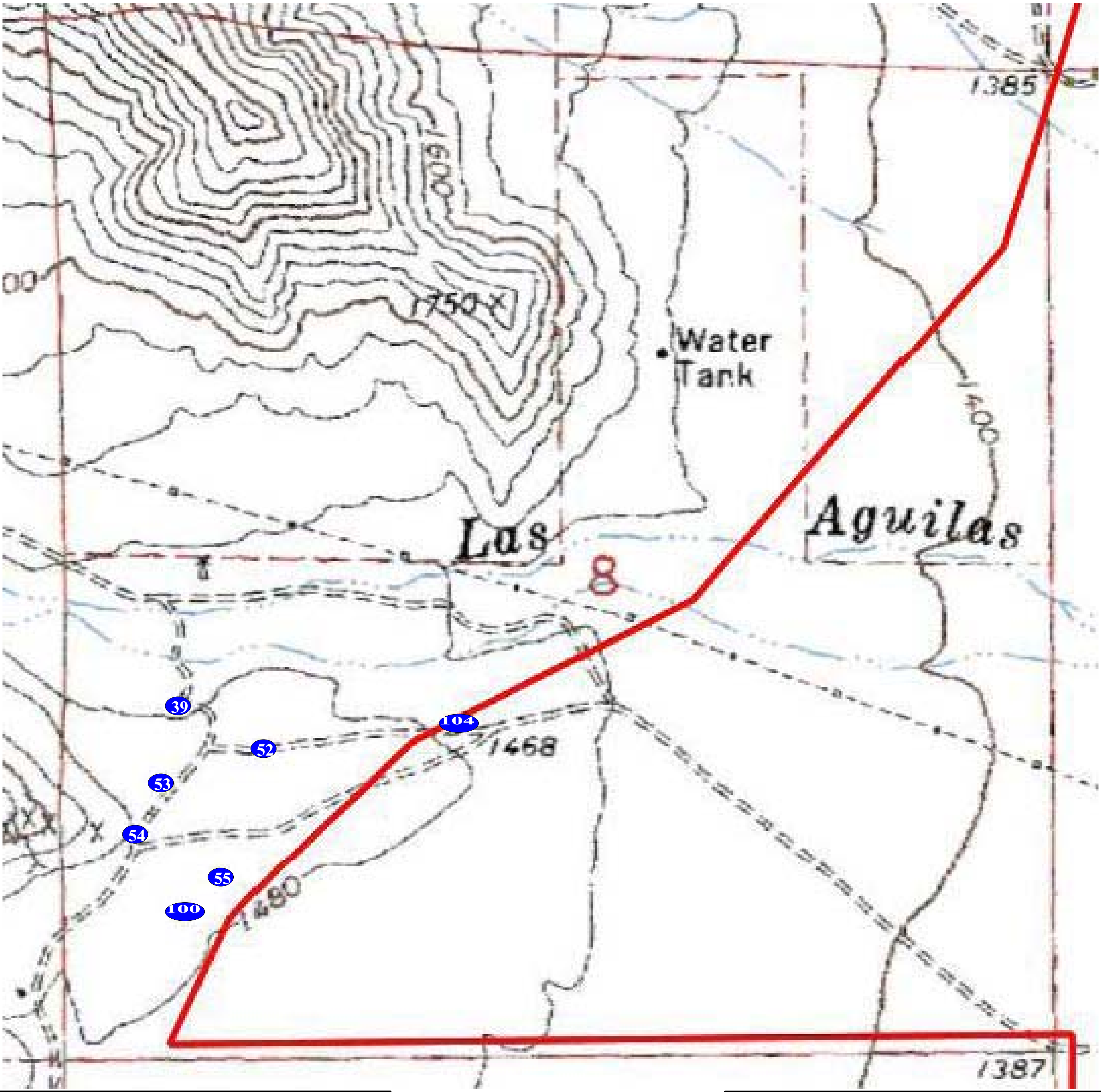
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 4

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 4



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

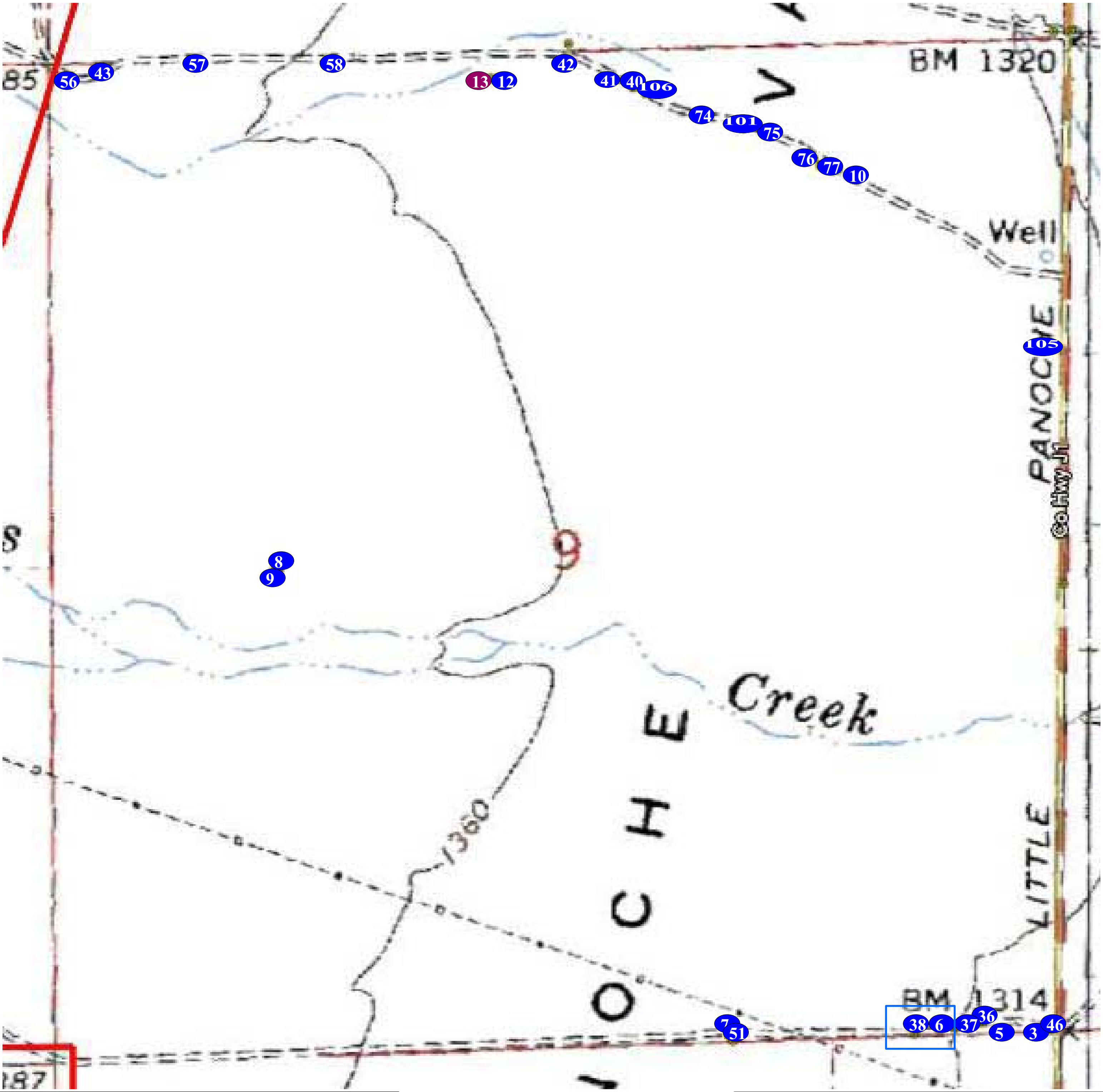
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 8

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 8



LEGEND

68 Sampled Pools

68 *Branchinecta lynchi*

68 *Ambystoma californiense*

Pools Converged Into One Pool

Approximate Project Boundary

N

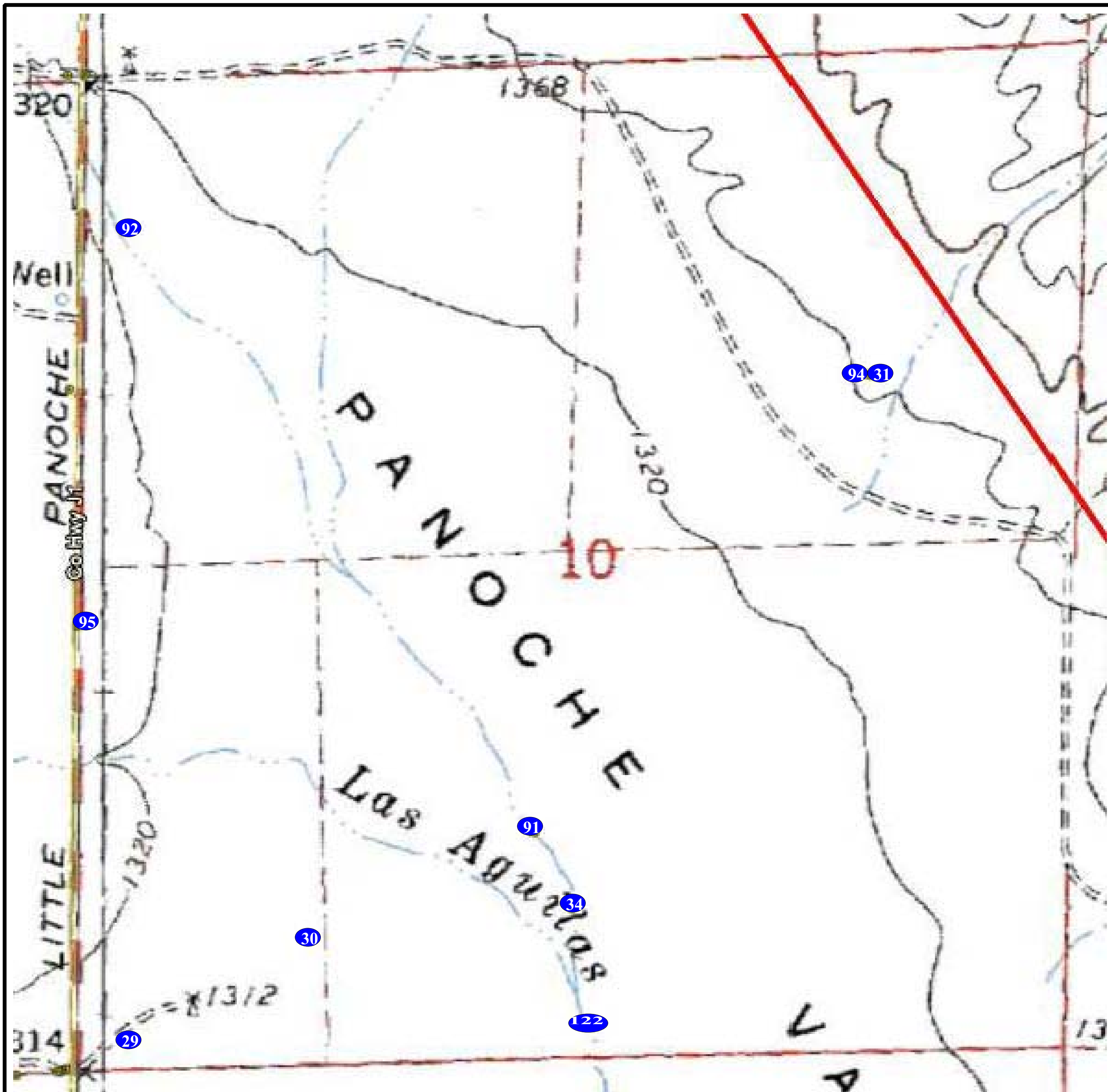
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 9

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 9



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

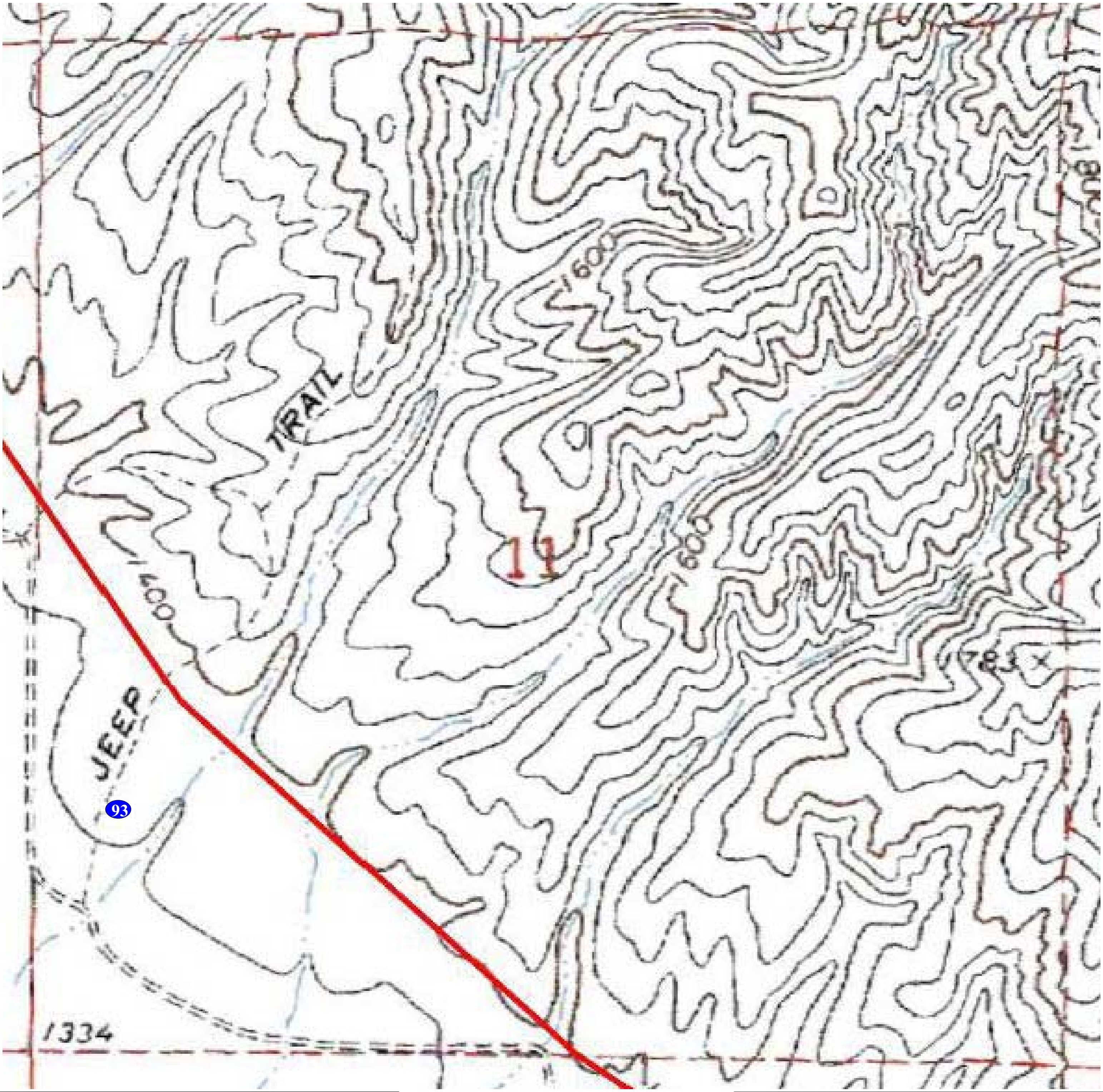
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 10

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 10



LEGEND

- 68 Sampled Pool
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

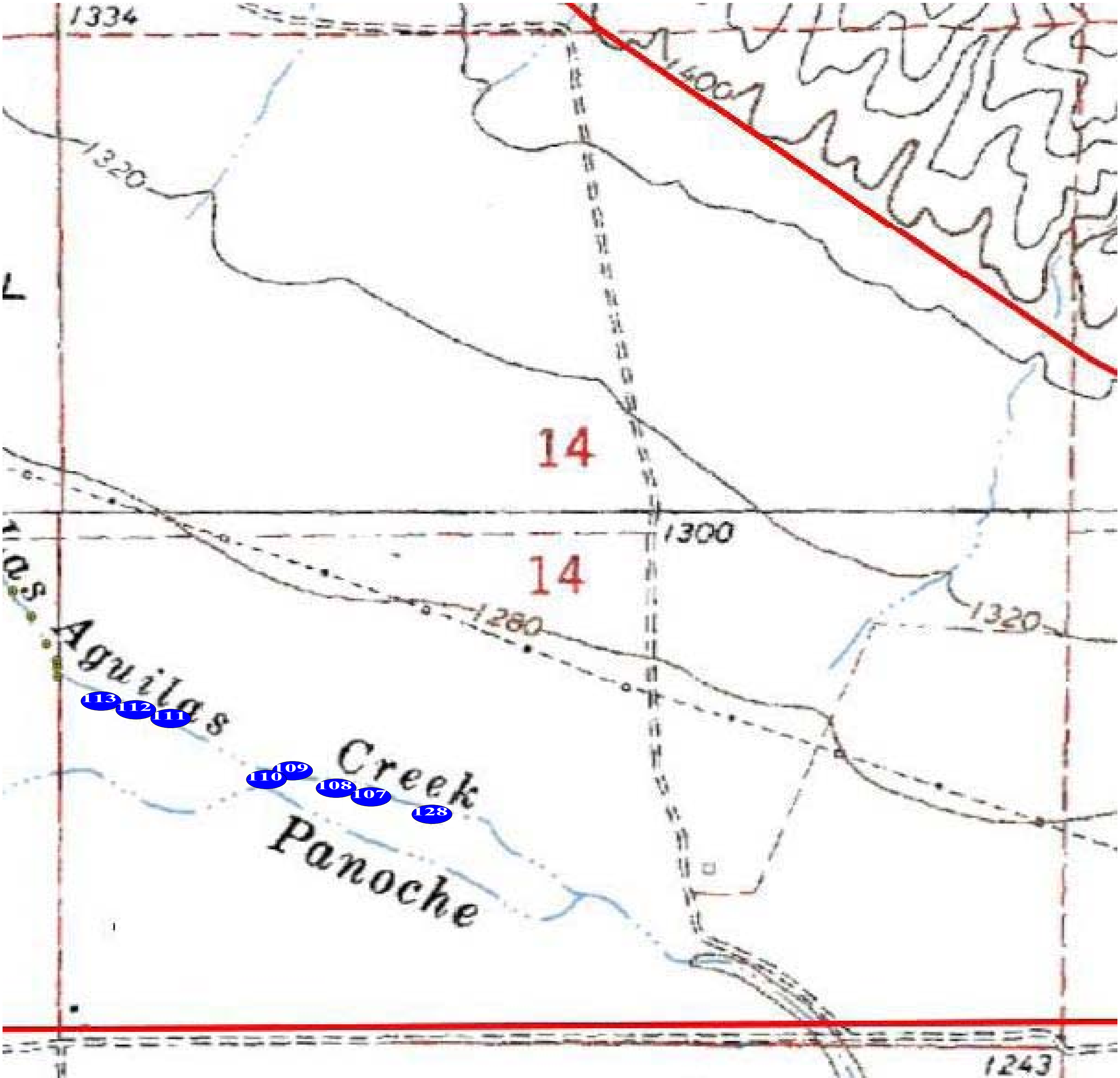
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 11

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 11



LEGEND

68 Sampled Pool

68 *Branchinecta lynchi*

68 *Ambystoma californiense*

Pools Converged Into One Pool

Approximate Project Boundary

N

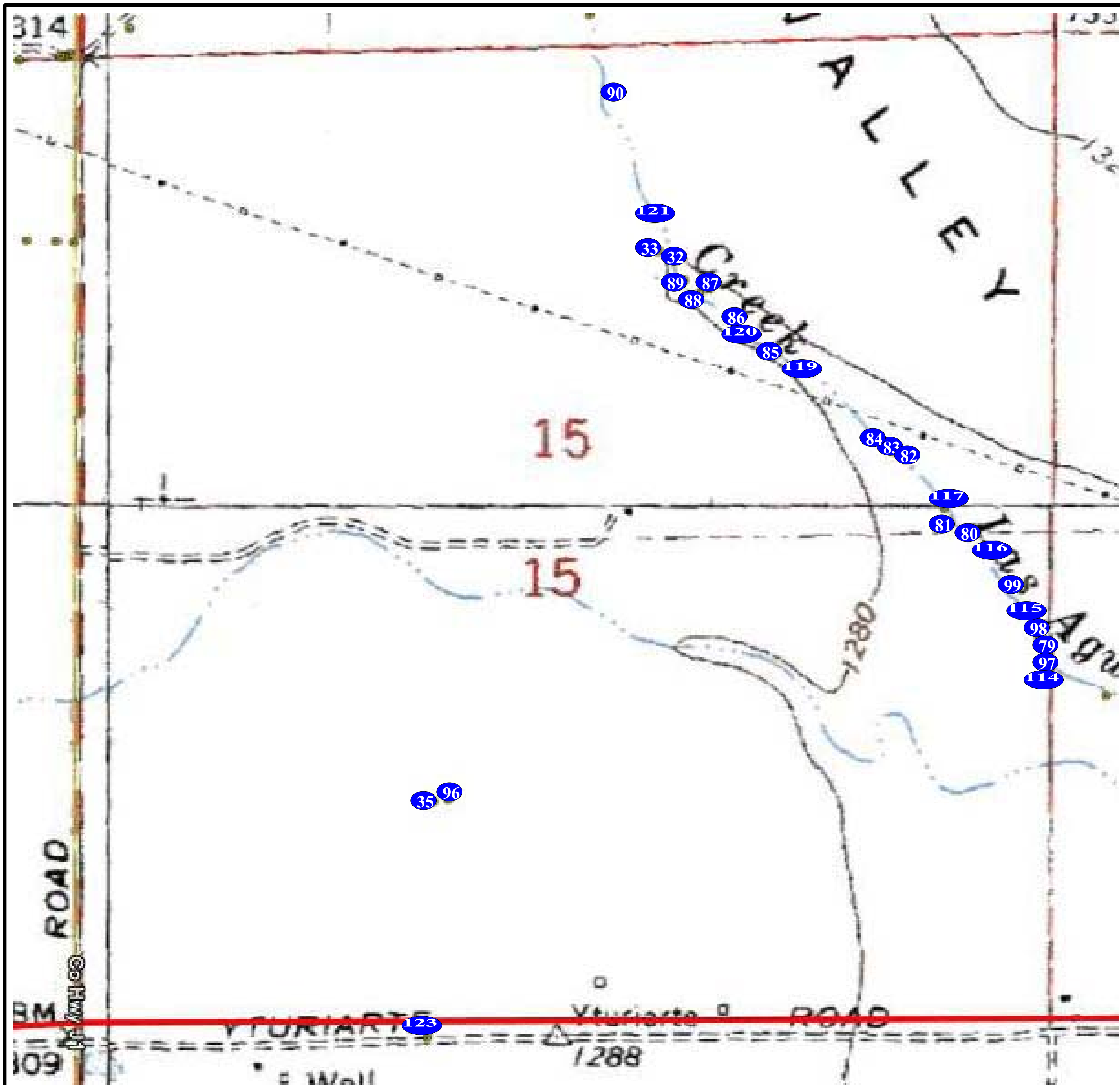
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 14

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 14



LEGEND

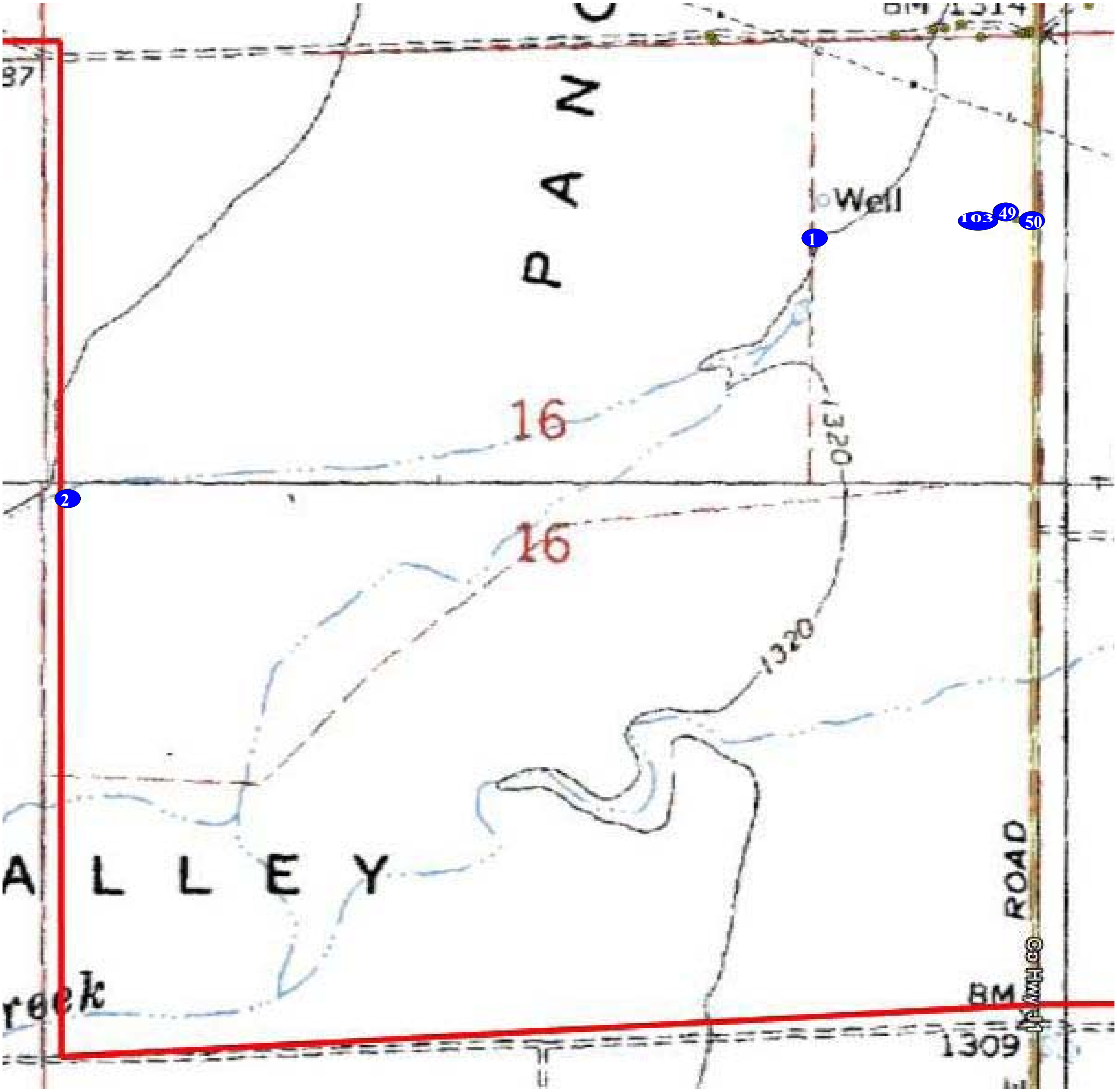
- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 15

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 15



LEGEND

68 Sampled Pools

68 *Branchinecta lynchi*

68 *Ambystoma californiense*

Pools Converged Into One Pool

Approximate Project Boundary

N

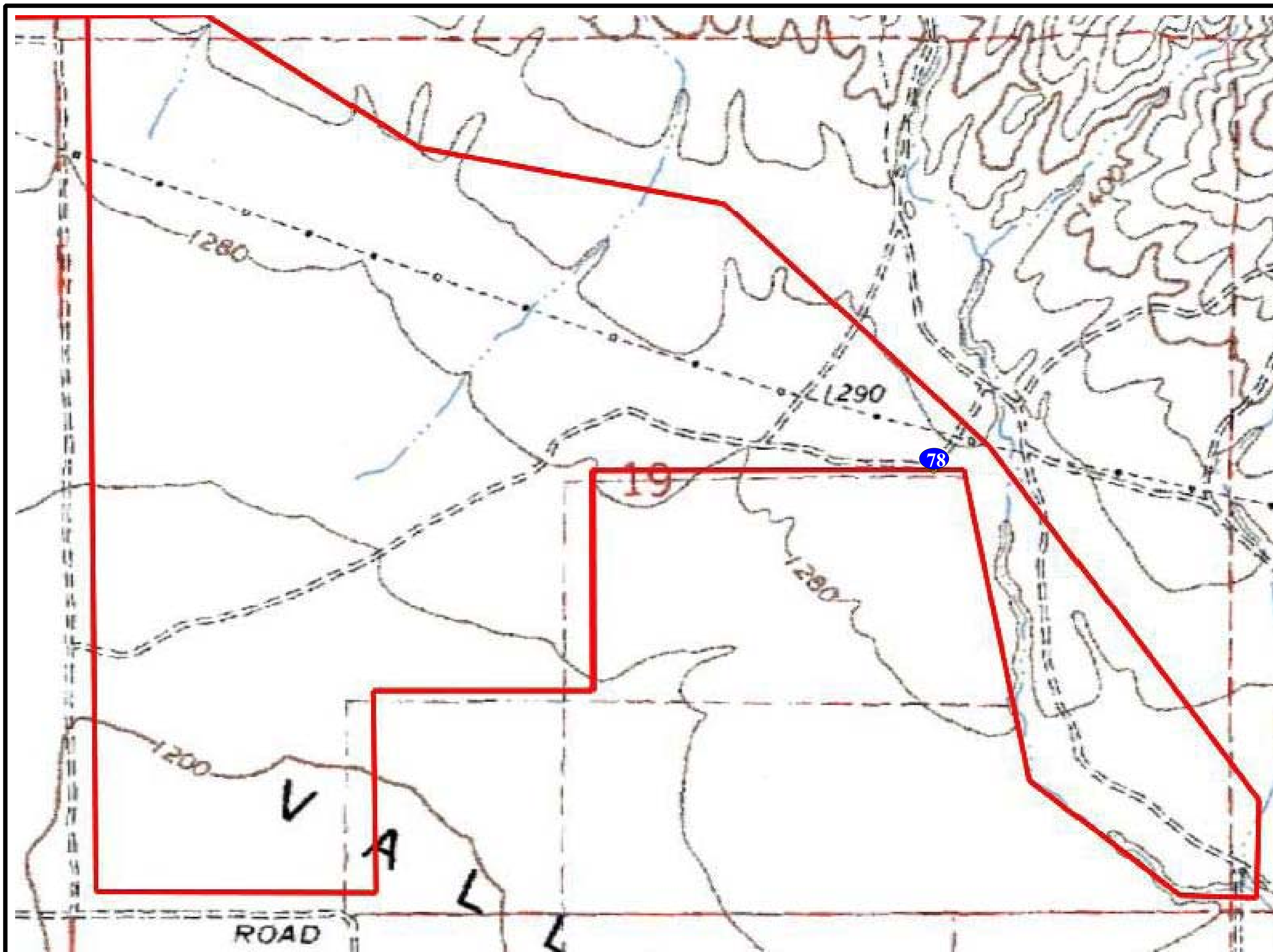
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 16

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 16



LEGEND

68 Sampled Pools

68 *Branchinecta lynchi*

68 *Ambystoma californiense*

Pools Converged Into One Pool

Approximate Project Boundary

N

750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 19

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 19

3.3 Conclusion

Based on the results of the 2009/2010 wet season surveys, it has been determined that the Federally Threatened vernal pool fairy shrimp (*Branchinecta lynchi*) is present in one pool (Pool #12) on the PVSF project site. Incidental findings of California tiger salamander occurred in Pool #16 during the Branchiopod surveys.

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

Jeff Gurule

Signature: Jeff Gurule. Date: August 13, 2010.

Permit # TE-168924

APPENDIX A:
AUTHORIZATION LETTERS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
81440-2010-CPA-0023

November 24, 2009

Michele Korpos
Senior Project Manager
Live Oak Associates, Inc.
6840 Via Del Oro, Suite 220
San Jose, California 95119

Subject: Authorization to Commence Aquatic Surveys for Vernal Pool Branchiopods at the Proposed Panoche Valley Solar Farm, San Benito County, California

Dear Ms. Korpos:

We have reviewed your request, dated November 11, 2009, and received by our office by electronic mail, to conduct aquatic larval surveys for federally listed vernal pool branchiopods, including the federally threatened vernal pool fairy shrimp (*Branchinecta lynchi*). You are requesting permission to conduct wet-season sampling at the proposed Panoche Valley Solar Project, San Benito County, California. The surveys will be conducted by Davianna Ohlson, Melissa Denena, Jeff Gurule, and/or Austin Pearson under the terms and conditions of their recovery permit (TE1670750-0, TE108681-0, TE168924-0, TE108683-0 respectively) and performed in accordance with the methods described in the U.S. Fish and Wildlife Service's Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods, April 1996.

We hereby authorize Davianna Ohlson, Melissa Denena, Jeff Gurule, and Austin Pearson to conduct the wet-season surveys. We remind them of their responsibilities in reporting survey results to us, regardless of findings, and suggest that they review the permit for any special conditions that must be met. If you have any questions, please contact Christopher Diel of my staff at (805) 644-1766, extension 305.

Sincerely,

for David M. Pereksta
Assistant Field Supervisor

Jeff Gurule

From: David_Kelly@fws.gov
Sent: Wednesday, November 12, 2008 7:59 AM
To: Jeff Gurule
Cc: Elizabeth_Warne@fws.gov; Josh_Hull@fws.gov
Subject: Re: Branchiopod Survey Data Sheet
Attachments: Data Sheet Template.xls

Jeff, the data sheet that you presented contains the information that we required in the protocol for the VPb surveys. You are authorized to use this survey form until otherwise notified. Thank you.

David Lee Kelly
Fish and Wildlife Biologist
Recovery Branch
US Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825
Ph. (916) 414-6492

Jeff Gurule <jgurule@loainc.com>

11/11/2008 04:38 PM

To <David_Kelly@fws.gov>
cc
Subject Branchiopod Survey Data Sheet

Hi David,

Last rainy season Live Oak Associates, Inc. conducted branchiopod surveys on three properties in Fresno County with numerous vernal pools on each (the largest containing 92 pools); this resulted in numerous data sheets (over a 1,000 pages of data sheets) submitted with our 90-day reports. Not only were these data sheets difficult to organize and proof, PDF's of the final reports were so huge it was difficult to email them with the data sheets attached. I believe that you expressed interest, yourself, in having us utilize an abbreviated data sheet for ease of handling and reviewing after seeing how many data sheets we had amassed in those surveys.

So, as Live Oak has authorization to conduct 2nd year surveys on properties we surveyed last year, plus additional properties not surveyed last year, I have created an EXCEL template to serve as our data sheet for all surveys conducted this year. I am submitting this template for your approval. I believe using this data sheet will greatly increase efficiency, present the data in a more useful format, and greatly reduce the potential for error.

I have included an explanation of codes that would be used in the Surveyors and Habitat Condition/Land Use columns. This explanation of codes would ultimately be located at the bottom of the EXCEL sheet.

I hope this is acceptable to you or that you have some suggestions on how to further simplify it. I hope to here back from you soon, as weather conditions may necessitate initiation of surveys soon.

Thanks,

Jeff Gurule
Project Manager
Wildlife/Wetland/Plant Ecologist

APPENDIX B:
2009/2010 WET SEASON SURVEY DATA

U.S. Fish and Wildlife Service Vernal Pool Data Sheet Wet Season Protocol Survey 2009/2010
Panoche Valley Solar Farm (1297-06), San Benito County, Cerro Colorado, Mercey Hot Springs, Llanada, & Panoche Quads, Township: 15S, Range: 10E & 11E

Fairy Shrimp ID Sheet 2009/2010
Panoche Valley Solar Farm (1297-06)

Pool #	Surveyers*	Date	Time (24hr)	Water Temp	Air Temp	Depth (cm)	Length (m)	Width (m)	Habitat Conditions/ Land Use*	Number of Shrimp in Pool	Number, Sex, Genus Collected	Notes	Number, Sex, Species IDed	Listed Species (x)	Date Identified	Identified By
1	JG, AP	12/21/09	854	9.0	11.0	7	2.0	1.0	CGH		0	trough pud.				
2	JG, AP	12/21/09	915	9.5	11.0	7	3.0	2.0	CGH		0					
3	JG, AP	12/21/09	931	9.0	11.0	7	3.0	2.0	CGH		0	road				
4	JG, AP	12/21/09	933	9.0	11.0	4	1.5	1.0	CGH		0	road				
5	JG, AP	12/21/09	935	8.5	11.0	11	8.0	2.0	CGH		0	vp				
6	JG, AP	12/21/09	942	9.5	11.0	3	2.0	0.5	CGH		0	rd				
7	JG, AP	12/21/09	947	10.0	11.0	3	2.0	1.0	CGH		0	rd				
8	JG, AP	12/21/09	1017	10.0	11.0	12	25.0	2.0	CGH		0	water tank pot. peren. pool				
9	JG, AP	12/21/09	1020	10.0	11.0	15	4.0	4.0	CGH		0	trough pud.				
10	JG, AP	12/21/09	1031	9.5	11.0	15	4.0	2.0	CGH		0	rd				
11	JG, AP	12/21/09	1037	10.0	11.0	7	2.0	1.0	CGH		0					
12	JG, AP	12/21/09	1040	11.0	11.0	4	0.5	0.5	CGH		0	burm pond				
13	JG, AP	12/21/09	1042	11.0	11.0	5	6.0	3.0	CGH		0					
14	JG, AP	12/21/09	1058	11.5	11.0	10	3.0	2.0	CGH		0	trough pud				
15	JG, AP	12/21/09	1100	12.5	11.0	6	3.0	2.0	CGH		0					
16	JG, AP	12/21/09	1115	11.0	11.0	20	9.0	3.0	CGH		0	burm pond				
17	JG, AP	12/21/09	1122	12.5	11.0	7	4.0	2.0	CGH		0	trough pond				
18	JG, AP	12/21/09	1132	11.5	11.0	10	40.0	2.0	CGH		0					
19	JG, AP	12/21/09	1138	11.0	11.0	7	2.0	1.0	CGH		0					
20	JG, AP	12/21/09	1143	12.5	11.0	6	1.0	0.5	CGH		0					
21	JG, AP	12/21/09	1148	10.0	11.0	20	3.0	1.0	CGH		0					
22	JG, AP	12/21/09	1232	12.5	11.0	10	1.0	0.5	CGH		0					
23	JG, AP	12/21/09	1234	12.5	11.0	15	8.0	1.0	CGH		0					
24	JG, AP	12/21/09	1244	12.0	11.0	21	3.0	2.0	CGH		0					
25	JG, AP	12/21/09	1246	13.0	11.0	10	2.0	1.0	CGH		0					
26	JG, AP	12/21/09	1249	13.0	11.0	14	1.0	0.5	CGH		0					
27	JG, AP	12/21/09	1257	12.5	11.0	12	7.0	2.0	CGH		0	trough pud.				
28	JG, AP	12/21/09	1306	13.5	11.0	8	1.0	0.5	CGH		0	rd				
29	JG, AP	12/21/09	1332	13.0	11.0	10	5.0	2.0	CGH		0	trough pond				
30	JG, AP	12/21/09	1339	13.0	11.0	11	1.5	1,5	CGH		0					
31	JG, AP	12/21/09	1430	13.5	11.0	6	2.0	1.0	CGH		0	trough pud				
32	JG, AP	12/21/09	1451	14.0	11.0	7	4.0	2.0	CGH		0					
33	JG, AP	12/21/09	1453	13.0	11.0	14	13.0	4.0	CGH		0					
34	JG, AP	12/21/09	1502	13.5	11.0	13	6.0	5.0	CGH		0					
35	JG, AP	12/21/09	1550	13.0	11.0	11	3.0	2.0	CGH		0	trough pud				
1	JG, GC	1/4/10	1124	14.0	11.0	7	5.0	2.0	CGH		0	trough pud				
2	JG, GC	1/4/10	1137	14.0	11.0	3	1.0	1.0	CGH		0					
3	JG, GC	1/4/10	1149	14.0	11.0	8	4.0	2.0	CGH		0	rd				
4	JG, GC	1/4/10	1150	15.0	11.0	4	2.0	1.5	CGH		0	rd				
5	JG, GC	1/4/10	1157	15.0	11.0	10	7.5	2.0	CGH		0	vp				
6	JG, GC	1/4/10	1205	15.5	11.0	6	5.5	1.0	CGH		0	rd				
7	JG, GC	1/4/10	1219	17.0	11.0	3	4.0	2.0	CGH		0	rd side				
8	JG, GC	1/4/10	1430	16.5	11.0	12	45.0	5.0	CGH		0	water tank pot. peren. pool				
9	JG, GC	1/4/10	1426	16.5	11.0	15	6.0	5.0	CGH		0	trough pud				
10	JG, GC	1/4/10	1346	15.0	11.0	12	4.0	2.0	CGH		0	rd				
11	JG, GC	1/4/10	1403	15.5	11.0	6	1.0	0.5	CGH		0					
12	JG, GC	1/4/10	1412			0			CGH		0					
13	JG, GC	1/4/10	1412	13.0	11.0	4	7.0	3.0	CGH		0	Hoof pocks				
14	JG, GC	1/4/10	1444	17.5	11.0	9	4.5	2.0	CGH		0	trough pud				
15	JG, GC	1/4/10	1447	16.0	11.0	7	4.0	2.0	CGH		0					
16	JG, GC	1/4/10	1454	16.5	11.0	19	9.5	4.0	CGH		0	burm pond				
17	JG, GC	1/4/10	1500	13.5	11.0	9	5.5	2.0	CGH		0	trough pond				
18	JG, GC	1/4/10	1510	16.0	11.0	13	42.5	2.0	CGH		0					
19	JG, GC	1/4/10	1524	13.0	11.0	7	1.5	1.5	CGH		0					

20	JG, GC	1/4/10	1520	15.0	11.0	5	4.0	2.0	CGH		0	rd side				
21	JG, GC	1/4/10	1528	14.5	9.0	18	4.0	1.0	CGH		0	rd side				
22	JG, GC	1/4/10	1540	13.5	9.0	5	1.0	0.5	CGH		0					
23	JG, GC	1/4/10	1541	15.0	9.0	7	8.0	1.0	CGH		0					
24	JG, GC	1/4/10	1557	14.5	9.0	15	5.0	2.0	CGH		0					
25	JG, GC	1/4/10	1557	11.5	9.0	7	3.0	1.5	CGH		0					
26	JG, GC	1/4/10	1601	11.5	9.0	5	4.5	1.0	CGH		0					
27	JG, GC	1/4/10	1607	13.0	9.0	14	8.0	7.0	CGH		0	trough pud				
28	JG, GC	1/4/10	1607			0			CGH		0	Dry				
36	JG, GC	1/4/10	1202	16.0	11.0	6	7.0	2.0	CGH		0	rd				
37	JG, GC	1/4/10	1207	15.0	11.0	5	6.0	2.0	CGH		0	rd				
38	JG, GC	1/4/10	1211	16.0	11.0	5	3.0	1.3	CGH		0	rd side				
39	JG, GC	1/4/10	1330	17.0	11.0	7	15.0	1.5	CGH		0	rd side				
40	JG, GC	1/4/10	1358	16.0	11.0	5	2.0	1.0	CGH		0	rd				
41	JG, GC	1/4/10	1400	17.0	11.0	4	4.0	2.0	CGH		0	rd				
42	JG, GC	1/4/10	1406	16.5	11.0	7	7.0	1.0	CGH		0	rd				
44	JG, GC	1/4/10	1538	14.0	9.0	5	2.0	0.5	CGH		0	rd				
45	JG, GC	1/4/10	1520	15.0	9.0	13	15.0	2.0	CGH		0					
28	JG, GC	1/5/10	1144	12.5	10.0	5	1.0	0.5	CGH		0	rd				
29	JG, GC	1/5/10	1121	8.0	10.0	10	5.5	3.0	CGH		0	trough pud				
30	JG, GC	1/5/10	1130	12.0	10.0	10	2.0	2.0	CGH		0					
31	JG, GC	1/5/10	1210	12.5	10.0	6	2.0	1.5	CGH		0	trough pud				
32	JG, GC	1/5/10	1254	14.0	14.0	4	2.0	0.5	CGH		0					
33	JG, GC	1/5/10	1259	16.0	14.0	14	16.0	3.0	CGH		0					
34	JG, GC	1/5/10	1315	15.0	14.0	15	8.0	5.0	CGH		0					
35	JG, GC	1/5/10	1403	16.0	14.0	13	4.5	4.0	CGH		0	trough pud				
46	JG, GC	1/5/10	1109	11.0	10.0	6	6.0	1.5	TT		0	rd				
47	JG, GC	1/5/10	1139	10.5	10.0	13	2.5	2.0	TT		0	rd				
48	JG, GC	1/5/10	1154	13.5	10.0	7	18.0	4.0	CGH		0	trough pud				
1	JG, GC	1/18/10	1214	9.5	9	8	18	13	CGH		0	trough pud				
2	JG, GC	1/18/10	1224	9.5	9	20	10	5	CGH		0					
3	JG, GC	1/18/10	1251	9.5	9	12	5	3	CGH		0	3,4.46 1 way flow connection				
4	JG, GC	1/18/10	1253	9.5	9	5	2.5	2.5	CGH		0	3,4.46 1 way flow connection				
5	JG, GC	1/18/10	1256	9.5	9	20	28	5	CGH		0	5,36,37 1 way flow connection				
7	JG, GC	1/18/10	1312	9.5	9	10	20	3.5	CGH		0					
8	JG, GC	1/18/10	1416	9.5	9	10	32	4	CGH		0					
9	JG, GC	1/18/10	1418	9.5	9	20	6.5	5.5	CGH		0					
10	JG, GC	1/18/10	1349	9.5	9	20	15	3	CGH		0					
11	JG, GC	1/18/10	1359	9.5	9	14	13	11	CGH		0					
12	JG, GC	1/18/10	1403	9.5	9	14	10	8	CGH		0					
13	JG, GC	1/18/10	1405	9.5	9	18	35	13	CGH		0					
14	JG, GC	1/18/10	1429	9.5	9	18	9	6	CGH		0					
15	JG, GC	1/18/10	1431	9.5	9	10	12	11	CGH		0					
16	JG, GC	1/18/10	1440	9.5	9	40	20	14	CGH		0					
17	JG, GC	1/18/10	1447	9.5	9	8	5	3	CGH		0					
18	JG, GC	1/18/10	1515	9.5	9	17	180	5	CGH		0					
19	JG, GC	1/18/10	1458	9.5	9	15	23	7	CGH		0					
20	JG, GC	1/18/10	1508	9.5	9	10	32	7	CGH		0					
21	JG, GC	1/18/10	1500	9.5	9	25	125	3	CGH		0					
37	JG, GC	1/18/10	1259	9.5	9	12	29	3	CGH		0	5,36,37 1 way flow connection				
38	JG, GC	1/18/10	1308	9.5	9	8	12	2	CGH		0					
39	JG, GC	1/18/10	1333	9.5	9	20	23	9	CGH		0					
40	JG, GC	1/18/10	1354	9.5	9	17	7.5	3	CGH		0					
41	JG, GC	1/18/10	1355	9.5	9	9	11	5	CGH		0					
42	JG, GC	1/18/10	1358	9.5	9	14	10	1	CGH		0					
46	JG, GC	1/18/10	1255	9.5	9	20	11	4	CGH		0	3,4.46 1 way flow connection				
36,6	JG, GC	1/18/10	1257	9.5	9	14	33	5	CGH		0	pools connected				
22	JG, GC	1/19/10	932	7	7	10	3	1	CGH		0					
23	JG, GC	1/19/10	933	7	7	15	11	2	CGH		0					

26	JG, GC	1/19/10	945	7	7	14	17	3	CGH		0					
27	JG, GC	1/19/10	953	7	7	27	15	15	CGH		0					
28	JG, GC	1/19/10	1030	7	7	15	9	4	CGH		0					
29	JG, GC	1/19/10	1142	7	7	14	7	4	CGH		0					
30	JG, GC	1/19/10	1129	7	7	25	3	3	CGH		0					
31	JG, GC	1/19/10	1050	7	7	15	4	4	CGH		0					
32	JG, GC	1/19/10	1113	7	7	34	9	4.5	CGH		0					
33	JG, GC	1/19/10	1115	7	7	35	29	8	CGH		0					
34	JG, GC	1/19/10	1105	7	7	39	13	9	CGH		0					
35	JG, GC	1/19/10	1225	7	7	17	5.5	4.5	CGH		0					
44	JG, GC	1/19/10	929	7	7	10	3	1	CGH		0					
45	JG, GC	1/19/10	936	7	7	19	20	2.5	CGH		0					
47	JG, GC	1/19/10	1029	7	7	19	4.5	4	CGH		0					
48	JG, GC	1/19/10	1037	7	7	10	4	4	CGH		0					
24,25	JG, GC	1/19/10	940	7	7	27	33	2.5	CGH		0	two pools connected				
1	JG, GC	2/1/10	1232	17	17	6	1.5	1.5	CGH		0					
2	JG, GC	2/1/10	1242	12	17	25	7	4	CGH		0					
3	JG, GC	2/1/10	1259	17	17	10	5	3	CGH		0					
4	JG, GC	2/1/10	1258	17	17	5	2.5	2	CGH		0					
5	JG, GC	2/1/10	1304	15	17	20	9	4.5	CGH		0					
6	JG, GC	2/1/10	1310	16.5	17	8	9	1.5	CGH		0					
7	JG, GC	2/1/10	1314	17	17	8	13	3	CGH		0					
8	JG, GC	2/1/10	1417	14	15	12	45	3	CGH		0					
9	JG, GC	2/1/10	1418	13	15	19	7.5	6	CGH		0					
10	JG, GC	2/1/10	1711	12.5	14	16	8	3	CGH		0					
11	JG, GC	2/1/10	1441	14.5	14	13	8	6	CGH		0					
12	JG, GC	2/1/10	1434	11.5	15	30	16	10	CGH		0					
13	JG, GC	2/1/10	1435	16	15	14	35	16	CGH		0					
14	JG, GC	2/1/10	1357	17.5	17	9	10	5.5	CGH		0					
15	JG, GC	2/1/10	1356	13	17	15	6	4.5	CGH		0					
16	JG, GC	2/1/10	1450	14	14	40	23	16	CGH		0					
17	JG, GC	2/1/10	1454	15	14	8	4	2	CGH		0					
18	JG, GC	2/1/10	1501	15.5	14	19	60	3	CGH		0					
19	JG, GC	2/1/10	1510	15	14	9	3	3	CGH		0					
20	JG, GC	2/1/10	1505	16	14	9	5	3	CGH		0					
21	JG, GC	2/1/10	1516	14	14	26	15	1.5	CGH		0					
22	JG, GC	2/1/10	1604	14.5	14	6	2	1	CGH		0					
23	JG, GC	2/1/10	1606	15	14	15	8	1	CGH		0					
26	JG, GC	2/1/10	1628	11	14	33	24	3	CGH		0					
27	JG, GC	2/1/10	1651	14	14	16	9	8	CGH		0					
36	JG, GC	2/1/10	1303	16.5	17	7	13	4.5	CGH		0					
37	JG, GC	2/1/10	1308	16.5	17	8	13	2.5	CGH		0					
38	JG, GC	2/1/10	1312	17	17	10	6	2	CGH		0					
39	JG, GC	2/1/10	1346	15.5	17	15	21	2.5	CGH		0					
40	JG, GC	2/1/10	1701	13	14	13	2	2	CGH		0					
41	JG, GC	2/1/10	1700	13.5	14	9	6	4.5	CGH		0					
42	JG, GC	2/1/10	1439	16	14	7	8	2	CGH		0					
43	JG, GC	2/1/10	1407	16	15	7	2	2	CGH		0	rd				
44	JG, GC	2/1/10	1556	14	14	6	1.5	0.5	CGH		0					
45	JG, GC	2/1/10	1607	15	14	13	16	2.5	CGH		0					
46	JG, GC	2/1/10	1256	16.5	17	8	8	2	CGH		0					
49	JG, GC	2/1/10	1251	16	17	10	4	0.5	CGH		0	rd				
50	JG, GC	2/1/10	1254	16	17	6	1.5	1.5	CGH		0	rd				
51	JG, GC	2/1/10	1316	16.5	17	5	4	2.5	CGH		0	rd				
52	JG, GC	2/1/10	1327	16.5	17	5	2	1.5	CGH		0	rd				
53	JG, GC	2/1/10	1339	16.5	17	8	3	2	CGH		0	rd				
54	JG, GC	2/1/10	1340	17	17	4	4	1	CGH		0	rd				
55	JG, GC	2/1/10	1342	18	17	5	2	1.5	CGH		0					
56	JG, GC	2/1/10	1405	16.5	15	6	1.5	1	CGH		0	rd				

57	JG, GC	2/1/10	1409	16	15	6	2	2	CGH		0	rd				
58	JG, GC	2/1/10	1427	16	15	9	6	1.5	CGH		0					
59	JG, GC	2/1/10	1459	16	14	9	4	2	CGH		0					
60	JG, GC	2/1/10	1520	16	14	70	32	24	CGH		6	collected unk invert				
61	JG, GC	2/1/10	1540	16	14	9	3	1	CGH		0					
62	JG, GC	2/1/10	1554	16	14	10	3.5	1	CGH		0					
63	JG, GC	2/1/10	1558	14.5	14	22	16	2	CGH		0					
64	JG, GC	2/1/10	1609	15	14	8	17	2.5	CGH		0					
65	JG, GC	2/1/10	1612	13	14	70+	73	35	CGH		0					
66	JG, GC	2/1/10	1616	14.5	14	11	2.5	2	CGH		0					
67	JG, GC	2/1/10	1621	14.5	14	9	14	0.25	CGH		0					
68	JG, GC	2/1/10	1630	14.5	14	9	14	2.5	CGH		0					
69	JG, GC	2/1/10	1634	12.5	14	23	27	21	CGH		0					
70	JG, GC	2/1/10	1636	14.5	14	9	9	2	CGH		0					
71	JG, GC	2/1/10	1645	12	14	25	82	3	CGH		0					
72	JG, GC	2/1/10	1647	13	14	33	59	6	CGH		0					
73	JG, GC	2/1/10	1439	13	14	6	3	2	CGH		0					
74	JG, GC	2/1/10	1703	13	14	7	5	2	CGH		0	rd				
75	JG, GC	2/1/10	1705	13	14	8	4	3	CGH		0	rd				
76	JG, GC	2/1/10	1707	13.5	14	6	3	1	CGH		0	rd				
77	JG, GC	2/1/10	1709	14	14	9	2	2	CGH		0	rd				
24,25	JG, GC	2/1/10	1626	13.5	14	30	38	3	CGH		0	combo				
28	JG, GC	2/2/10	1439	18	18	9	3	3	CGH		0					
29	JG, GC	2/2/10	1448	13.5	18	13	6.5	4	CGH		0					
30	JG, GC	2/2/10	1350	11	18	31	3	3	CGH		0					
31	JG, GC	2/2/10	1420	17	18	15	3	2	CGH		0					
32	JG, GC	2/2/10	1220	14	18	17	7	4	CGH		0					
33	JG, GC	2/2/10	1222	9	18	55	31	8	CGH		0					
34	JG, GC	2/2/10	1330	14	18	30	13	7	CGH		0					
35	JG, GC	2/2/10	1520	17.5	18	11	4	4	CGH		0					
47	JG, GC	2/2/10	1438	16	18	13	2.5	2	CGH		0					
48	JG, GC	2/2/10	1429	16	18	7	3	2	CGH		0					
78	JG, GC	2/2/10	1026	11.5	18	8	2.5	2	CGH		0					
79	JG, GC	2/2/10	1129	14.5	18	10	3	1	CGH		0					
80	JG, GC	2/2/10	1134	9.5	18	55	20	5	CGH		0					
81	JG, GC	2/2/10	1137	11.5	18	8	6	2.5	CGH		0					
82	JG, GC	2/2/10	1143	18	18	5	3	1	CGH		0					
83	JG, GC	2/2/10	1145	17.5	18	6	3	1	CGH		0					
84	JG, GC	2/2/10	1147	15	18	14	1.5	2	CGH		0					
85	JG, GC	2/2/10	1156	14.5	18	20	30	2.5	CGH		0					
86	JG, GC	2/2/10	1201	15	18	17	12	2.5	CGH		0					
87	JG, GC	2/2/10	1211	17.5	18	9	1.5	1.5	CGH		0					
88	JG, GC	2/2/10	1213	12	18	47	8	5.5	CGH		0					
89	JG, GC	2/2/10	1216	13.5	18	30	13.5	4	CGH		0					
90	JG, GC	2/2/10	1302	16	18	25	30	12	CGH		0					
91	JG, GC	2/2/10	1337	19	18	10	3	1.5	CGH		0					
92	JG, GC	2/2/10	1400	17.5	18	11	10	7	CGH		0	trough pud				
93	JG, GC	2/2/10	1409	16	18	9	4	4	CGH		0	trough pud				
94	JG, GC	2/2/10	1419	19	18	9	1.5	1	CGH		0					
95	JG, GC	2/2/10	1445	18.5	18	7	16	0.5	CGH		0					
96	JG, GC	2/2/10	1026	14	18	13	4	4	CGH		0	trough pud				
2	JG, GC	2/16/10	1453	16.5	18.5	30	9.5	5	CGH		0					
3	JG, GC	2/16/10	1537	19	18.5	9	4	2.5	CGH		0					
4	JG, GC	2/16/10	1538	20	18.5	4	2	1.5	CGH		0					
5	JG, GC	2/16/10	1535	20.5	18.5	21	10	4	CGH		0					
6	JG, GC	2/16/10	1531	20	18.5	7	5	1.5	CGH		0					
7	JG, GC	2/16/10	1527	21	18.5	5	5	2.5	CGH		0					
8	JG, GC	2/16/10	1627	16	18.5	12	45	2.5	CGH		0					
9	JG, GC	2/16/10	1629	17	18.5	19	7	7	CGH		0					

10	JG, GC	2/16/10	1547	17	18.5	17	6	2.5	CGH			0				
11	JG, GC	2/16/10	1611	15	18.5	19	8	6	CGH			0				
12	JG, GC	2/16/10	1617	18	18.5	33	17	15	CGH			0				
13	JG, GC	2/16/10	1615	20	18.5	18	38	19	CGH			0				
14	JG, GC	2/16/10	1640	16	18.5	18	6	5	CGH			0				
15	JG, GC	2/16/10	1642	19	18.5	9	6.5	9	CGH			0				
16	JG, GC	2/16/10	1651	18	18.5	40	24.5	17	CGH			0				
17	JG, GC	2/16/10	1655	14.5	18.5	6	3	1	CGH			0				
36	JG, GC	2/16/10	1534	20	18.5	11	6	3	CGH			0				
37	JG, GC	2/16/10	1533	20	18.5	11	6	2	CGH			0				
38	JG, GC	2/16/10	1529	18.5	18.5	5	3	1.5	CGH			0				
39	JG, GC	2/16/10	1517	21.5	18.5	10	21	3	CGH			0				
40	JG, GC	2/16/10	1604	19	18.5	11	1.5	1	CGH			0				
41	JG, GC	2/16/10	1606	19	18.5	6	4	4	CGH			0				
42	JG, GC	2/16/10	1609	17.5	18.5	5	2	1	CGH			0				
46	JG, GC	2/16/10	1539	20	18.5	7	5	2	CGH			0				
49	JG, GC	2/16/10	1444	20.5	18.5	6	2	0.25	CGH			0				
53	JG, GC	2/16/10	1505	18.5	18.5	7	2.5	2	CGH			0				
54	JG, GC	2/16/10	1507	20	18.5	4	3	1	CGH			0				
55	JG, GC	2/16/10	1514	21	18.5	4	2	1.5	CGH			0				
58	JG, GC	2/16/10	1621	18	18.5	6	3	0.75	CGH			0				
74	JG, GC	2/16/10	1555	20	18.5	7	5	2.5	CGH			0				
75	JG, GC	2/16/10	1551	19.5	18.5	7	4	2	CGH			0				
76	JG, GC	2/16/10	1549	19	18.5	4	2.5	0.75	CGH			0				
78	JG, GC	2/16/10	1353	21	18.5	10	2.5	2	CGH			0				
79	JG, GC	2/16/10	1421	20	18.5	15	5	1.5	CGH			0				
97	JG, GC	2/16/10	1419	22	18.5	6	1.5	0.5	CGH			0				
98	JG, GC	2/16/10	1422	22.5	18.5	5	3	0.5	CGH			0				
99	JG, GC	2/16/10	1425	22.5	18.5	9	4	1	CGH			0				
100	JG, GC	2/16/10	1510	20	18.5	9	2.5	2	CGH			0				
101	JG, GC	2/16/10	1553	20	18.5	5	6.5	1	CGH			0				
18	JG, GC	2/17/10	1112	16	19	13	52	4	CGH			0				
19	JG, GC	2/17/10	1125	16	19	14	3	3	CGH			0				
20	JG, GC	2/17/10	1120	19	19	9	4	3	CGH			0				
21	JG, GC	2/17/10	1128	13.5	19	23	9.5	2	CGH			0	collected unk invert			
22	JG, GC	2/17/10	1208	20	19	11	1.5	0.75	CGH			0				
23	JG, GC	2/17/10	1210	20.5	19	11	7	1.5	CGH			0				
26	JG, GC	2/17/10	1231	12.5	19	33	25	5	CGH			0				
27	JG, GC	2/17/10	1248	21	19	7	9	6	CGH			0				
28	JG, GC	2/17/10	1500	21	19	8	3	2	CGH			0				
29	JG, GC	2/17/10	1455	17	19	11	6.5	4.5	CGH			0				
30	JG, GC	2/17/10	1635	13	19	33	3.5	3.5	CGH			0				
31	JG, GC	2/17/10	1518	22	19	5	2	1	CGH			0				
32	JG, GC	2/17/10	1618	22	19	19	7	3	CGH			0				
33	JG, GC	2/17/10	1620	13.5	19	51	31	9	CGH			0				
34	JG, GC	2/17/10	1630	16	19	31	14	9	CGH			0				
44	JG, GC	2/17/10	1205	20	19	9	2	0.33	CGH			0				
45	JG, GC	2/17/10	1212	21	19	12	17	3.5	CGH			0				
47	JG, GC	2/17/10	1501	20.5	19	12	3	3	CGH			0				
48	JG, GC	2/17/10	1510	21.5	19	8	4	2	CGH			0				
59	JG, GC	2/17/10	1103	17.5	19	9	5	2	CGH			0				
60	JG, GC	2/17/10	1145	12.5	19	70+	31	26	CGH			0				
62	JG, GC	2/17/10	1202	19.5	19	11	5	1.5	CGH			0				
63	JG, GC	2/17/10	1203	17	19	27	19	2.5	CGH			0				
64	JG, GC	2/17/10	1214	21	19	7	10	2	CGH			0				
65	JG, GC	2/17/10	1217	17.5	19	70+	75	36	CGH			0	unk invert			
66	JG, GC	2/17/10	1226	16.5	19	15	4	2	CGH			0				
68	JG, GC	2/17/10	1233	20	19	7	14	2.5	CGH			0				
69	JG, GC	2/17/10	1237	16.5	19	14	25	19	CGH			0				

70	JG, GC	2/17/10	1235	21.5	19	7	6	1.5	CGH		0					
71	JG, GC	2/17/10	1240	17	19	26	80	4	CGH		0					
72	JG, GC	2/17/10	1245	13.5	19	36	56	5	CGH		0					
73	JG, GC	2/17/10	1250	21	19	4	1	1	CGH		0					
80	JG, GC	2/17/10	1532	14.5	19	43	17	5	CGH		0					
81	JG, GC	2/17/10	1534	22	19	15	12	4	CGH		0					
82	JG, GC	2/17/10	1538	23.5	19	8	5	1.5	CGH		0					
83	JG, GC	2/17/10	1540	23.5	19	8	5.5	1.5	CGH		0					
84	JG, GC	2/17/10	1542	22.5	19	13	17	2	CGH		0					
85	JG, GC	2/17/10	1550	20	19	19	24	2.5	CGH		0					
86	JG, GC	2/17/10	1610	20	19	17	12	2	CGH		0					
88	JG, GC	2/17/10	1615	15.5	19	44	8	6	CGH		0					
89	JG, GC	2/17/10	1617	19.5	19	21	12	5	CGH		0					
90	JG, GC	2/17/10	1626	22.5	19	22	30	12	CGH		0					
92	JG, GC	2/17/10	1643	18	19	13	12	7	CGH		0					
93	JG, GC	2/17/10	1523	21	19	7	4	3	CGH		0					
96	JG, GC	2/17/10	1444	18	19	17	6	5	CGH		0					
102	JG, GC	2/17/10	1200	25	19	4	6	1	CGH		0					
24,25	JG, GC	2/17/10	1228	12	19	30	39	3	CGH		0					
1	JG, AP	3/2/10	1238	14	12	6	1	1			0					
2	JG, AP	3/2/10	1246	13	12	34	7	3			0					
3	JG, AP	3/2/10	1311	14	12	11	4	3			0					
4	JG, AP	3/2/10	1308	14	12	5	1.5	1			0					
5	JG, AP	3/2/10	1314	13.5	12	25	9	4			0					
6	JG, AP	3/2/10	1319	14	12	9	5	1			0					
7	JG, AP	3/2/10	1410	15.5	12	8	11	2			0					
8	JG, AP	3/2/10	1518	15	12	16	19	2			0					
9	JG, AP	3/2/10	1520	14	12	20	5	4			0					
10	JG, AP	3/2/10	1426	15	12	20	7	2			0					
11	JG, AP	3/2/10	1448	15	12	22	7	6			0					
12	JG, AP	3/2/10	1450	13	12	35	4	8			0					
13	JG, AP	3/2/10	1453	14	12	18	32	9			0					
14	JG, AP	3/2/10	1553	13.5	12	18	5	4			0					
15	JG, AP	3/2/10	1551	15	12	10	7	6			0					
16	JG, AP	3/2/10	1604	13	12	57	23	21			0	1 cts larva				
17	JG, AP	3/2/10	1418	13.5	12	8	3	1			0					
36	JG, AP	3/2/10	1316	14	12	9	7	2			0					
37	JG, AP	3/2/10	1318	14	12	6	9	2			0					
38	JG, AP	3/2/10	1413	15.5	12	12	3	2			0					
39	JG, AP	3/2/10	1358	15	12	16	18	4			0					
40	JG, AP	3/2/10	1442	15	12	16	2	2			0					
41	JG, AP	3/2/10	1444	15	12	12	3	2			0					
42	JG, AP	3/2/10	1446	15	12	9	7	1			0					
43	JG, AP	3/2/10	1529	14	12	7	2	1			0					
46	JG, AP	3/2/10	1304	14	12	8	6	1			0					
49	JG, AP	3/2/10	1212	13.5	12	17	18	1			0					
50	JG, AP	3/2/10	1218	13.5	12	7	4	0.5			0					
51	JG, AP	3/2/10	1412	16.5	12	3	1.5	1.1			0					
52	JG, AP	3/2/10	1344	16	12	6	2	2			0					
53	JG, AP	3/2/10	1346	17	12	10	4	3			0					
54	JG, AP	3/2/10	1348	17.5	12	8	6	1			0					
55	JG, AP	3/2/10	1354	17	12	10	5	2			0					
56	JG, AP	3/2/10	1533	14	12	6	2	0.5			0					
57	JG, AP	3/2/10	1501	15	12	7	3	2			0					
58	JG, AP	3/2/10	1458	14.5	12	9	5	1			0					
74	JG, AP	3/2/10	1438	15	12	10	5	2			0					
75	JG, AP	3/2/10	1432	15.5	12	9	4	2			0					
76	JG, AP	3/2/10	1429	15	12	6	3	1			0					
77	JG, AP	3/2/10	1430	15	12	10	1	1			0					

100	JG, AP	3/2/10	1353	16.5	12	11	2	2			0					
101	JG, AP	3/2/10	1434	15.5	12	7	7	2			0					
103	JG, AP	3/2/10	1230	14	12	10	2	1	cgh		0	rd				
104	JG, AP	3/2/10	1403	16	12	9	4	4	cgh		0					
105	JG, AP	3/2/10	1421	15	12	10	14	8	cgh		0					
106	JG, AP	3/2/10	1441	15	12	9	4	1.5			0	rd				
18	JG, AP	3/3/10	1359	11.5	10	25	44	1.5			0					
19	JG, AP	3/3/10	1410	11	10	18	5	1			0					
20	JG, AP	3/3/10	1406	12	10	10	4	3			0					
21	JG, AP	3/3/10	1414	11	10	33	15	1			0					
26	JG, AP	3/3/10	1520	11	10	41	22	2			0					
27	JG, AP	3/3/10	1552	13.5	10	17	8	4			0					
28	JG, AP	3/3/10	1211	12	10	12	3	2			0					
29	JG, AP	3/3/10	1224	12	10	12	5	2			0					
30	JG, AP	3/3/10	1134	10	10	37	3	3			0					
31	JG, AP	3/3/10	1155	10	10	8	2	1			0					
32	JG, AP	3/3/10	1056	9	10	20	6	3			0					
33	JG, AP	3/3/10	1101	9.5	10	50+	30	8			0					
34	JG, AP	3/3/10	1125	9.5	10	40	11	4			0					
35	JG, AP	3/3/10	1330	13	10	4	3	1			0					
44	JG, AP	3/3/10	1454	12	10	11	2	0.5			0					
47	JG, AP	3/3/10	1209	10	10	18	3	2			0					
59	JG, AP	3/3/10	1356	12.5	10	13	11	5			0					
60	JG, AP	3/3/10	1420	10	10	50+	29	y			0					
61	JG, AP	3/3/10	1428	11	10	14	3	1			0					
62	JG, AP	3/3/10	1448	12.5	10	20	4	1			0					
63	JG, AP	3/3/10	1452	11.5	10	31	18	2			0					
66	JG, AP	3/3/10	1511	12.5	10	18	3	1			0					
67	JG, AP	3/3/10	1506	12	10	6	7	0.5			0					
68	JG, AP	3/3/10	1523	14	10	13	12	2			0					
69	JG, AP	3/3/10	1526	11.5	10	45	37	20			0					
70	JG, AP	3/3/10	1530	14	10	11	9	1			0					
71	JG, AP	3/3/10	1534	11	10	32	72	2			0					
72	JG, AP	3/3/10	1540	11	10	43	55	4			0					
73	JG, AP	3/3/10	1554	13.5	10	14	3	2			0					
78	JG, AP	3/3/10	903	7.5	10	13	2	2			0					
79	JG, AP	3/3/10	952	9	10	20	5	1			0					
80	JG, AP	3/3/10	1013	9	10	49	16	4			0					
81	JG, AP	3/3/10	1017	9	10	22	10	3			0					
82	JG, AP	3/3/10	1022	10	10	11	6	1			0					
83	JG, AP	3/3/10	1027	10	10	14	5	1			0					
84	JG, AP	3/3/10	1028	10	10	23	16	2			0					
85	JG, AP	3/3/10	1036	9.5	10	34	34	3			0					
86	JG, AP	3/3/10	1041	9.5	10	30	23	2			0					
88	JG, AP	3/3/10	1045	8.5	10	47	7	5			0					
89	JG, AP	3/3/10	1054	9	10	33	17	4			0					
90	JG, AP	3/3/10	1115	9.5	10	30	30	7			0					
91	JG, AP	3/3/10	1129	10	10	14	3	1			0					
92	JG, AP	3/3/10	1215	12	10	5	3	2			0					
93	y	3/3/10	1150	10	10	12	3	2			0					
94	JG, AP	3/3/10	1156	10	10	9	1	1			0					
95	JG, AP	3/3/10	1220	12.5	10	12	17	1			0					
96	JG, AP	3/3/10	1333	12.5	10	16	4	4			0					
97	JG, AP	3/3/10	950	9	10	13	3	1			0					
98	JG, AP	3/3/10	954	9	10	12	16	1			0					
99	JG, AP	3/3/10	957	9	10	18	19	0.5			0					
102	JG, AP	3/3/10	1432	12	10	11	5	1			0					
107	JG, AP	3/3/10	924	8.5	10	10	4	1	cgh		0	swale				
108	JG, AP	3/3/10	926	8.5	10	13	3	0.5	cgh		0	swale				

109	JG, AP	3/3/10	929	9	10	12	3	1	cgh		0	swale				
110	JG, AP	3/3/10	931	8.5	10	19	9	1	cgh		0	swale				
111	JG, AP	3/3/10	934	9	10	15	11	1	cgh		0	swale				
112	JG, AP	3/3/10	936	9	10	16	8	1	cgh		0	swale				
113	JG, AP	3/3/10	938	9	10	17	4	1	cgh		0	swale				
114	JG, AP	3/3/10	942	9	10	12	10	1	cgh		0	swale				
115	JG, AP	3/3/10	956	9	10	8	3	0.5	cgh		0	swale				
116	JG, AP	3/3/10	1000	9	10	15	8	1	cgh		0	swale				
117	JG, AP	3/3/10	1019	9	10	7	15	1	cgh		0	swale				
118	JG, AP	3/3/10	1025	10	10	11	3	1	cgh		0	swale				
119	JG, AP	3/3/10	1034	9.5	10	17	48	3	cgh		0	swale				
120	JG, AP	3/3/10	1039	10	10	12	20	0.5	cgh		0	swale				
121	JG, AP	3/3/10	1110	9.5	10	23	26	8	cgh		0	swale				
122	JG, AP	3/3/10	1121	10	10	15	40	8	cgh		0	swale				
123	JG, AP	3/3/10	1337	13	10	9	5	4	cgh		0	swale				
124	JG, AP	3/3/10	1436	12.5	10	15	3	1	cgh		0	swale				
125	JG, AP	3/3/10	1440	12.5	10	14	5	1	cgh		0	swale				
126	JG, AP	3/3/10	1442	13	10	13	5	0.5	cgh		0	swale				
127	JG, AP	3/3/10	1450	12.5	10	15	5	1	cgh		0	swale				
2,23,45,64,65	JG, AP	3/3/10	1500	10	10	100+	140	40			0	pools combined				
24,25	JG, AP	3/3/10	1514	11.5	10	35	34	2			0					
2	JG, GC	3/16/10	1045	12.5	21	33	7	5								
3	JG, GC	3/16/10	1139	20	21	6	4	2								
5	JG, GC	3/16/10	1132	16	21	13	10	3								
8	JG, GC	3/16/10	1308	24.5	21	14	53	4								
9	JG, GC	3/16/10	1310	20	21	11	6.5	5								
10	JG, GC	3/16/10	1148	17	21	14	4.5	2								
11	JG, GC	3/16/10	1158	16	21	16	6	5								
12	JG, GC	3/16/10	1203	12.5	21	30	17	10		100s	4,Male,Branc		4, Male, *Branchinecta Lynchi*	x	3/18/2010	JG
13	JG, GC	3/16/10	1200	18	21	17	32	13								
14	JG, GC	3/16/10	1319	17	21	14	6	6								
15	JG, GC	3/16/10	1321	24.5	21	5	3.5	2								
16	JG, GC	3/16/10	1330	19	21	50	25	5				2 CTS Larva				
18	JG, GC	3/16/10	1045	24	21	13	47	2								
19	JG, GC	3/16/10	1409	19	21	12	1	0.5								
21	JG, GC	3/16/10	1411	19	21	24	7	2								
26	JG, GC	3/16/10	1530	16.5	21	21	24	3								
27	JG, GC	3/16/10	1607	23	21	7	7	5								
29	JG, GC	3/16/10	1626	21.5	21	11	7	4								
37	JG, GC	3/16/10	1130	21	21	4	7	5								
39	JG, GC	3/16/10	1109	18	21	5	14	2.5								
41	JG, GC	3/16/10	1154	22	21	3	3	2.5								
42	JG, GC	3/16/10	1156	22	21	3	2	0.5								
47	JG, GC	3/16/10	1635	20	21	13	3	2								
59	JG, GC	3/16/10	1350	24.5	21	6	2	1								
60	JG, GC	3/16/10	1416	13	21	75+	35	27								
62	JG, GC	3/16/10	1443	27	21	6	3	0.5								
63	JG, GC	3/16/10	1445	20	21	23	16	2								
66	JG, GC	3/16/10	1516	15	21	9	2.5	5								
68	JG, GC	3/16/10	1535	23.5	21	7	10	2								
69	JG, GC	3/16/10	1541	24	21	15	23	17								
70	JG, GC	3/16/10	1603	25	21	5	3	0.5								
71	JG, GC	3/16/10	1545	16	21	30	81	4								
72	JG, GC	3/16/10	1601	19	21	30	60	5								
74	JG, GC	3/16/10	1152	22	21	3	7	5								
23,45,64,65	JG, GC	3/16/10	1455	14	21	75+	103	84								
24,25	JG, GC	3/16/10	1519	20	21	21	34	2.5								
30	JG, GC	3/17/10	1144	13	21	32	3.5	3.5								
33	JG, GC	3/17/10	1122	11.5	21	75+	33	7.5								

34	JG, GC	3/17/10	1137	13	21	30	11.5	8								
80	JG, GC	3/17/10	1050	12	21	23	7	3.5								
81	JG, GC	3/17/10	1055	19	21	7	3.5	1.5								
85	JG, GC	3/17/10	1105	14	21	18	30	2.5								
85	JG, GC	3/17/10	1118	18	21	11	6	2.5								
86	JG, GC	3/17/10	1109	16	21	14	9	2								
88	JG, GC	3/17/10	1113	11	21	37	7	4.5								
89	JG, GC	3/17/10	1116	13	21	22	10	3.5								
90	JG, GC	3/17/10	1130	13	21	25	29	12								
92	JG, GC	3/17/10	1211	22	21	6	6	6								
96	JG, GC	3/17/10	1228	19	21	15	4	4								
2	JG,AP	3/30/10	1007	14	13	19	4	3		0						
8	JG,AP	3/30/10	1057	15	13	8	17	2		0						
12	JG,AP	3/30/10	1049	13	13	21	11	5		0						
13	JG,AP	3/30/10	1043	15	13	8	13	4		0						
14	JG,AP	3/30/10	1105	13.5	13	3	2	0.5		0						
16	JG,AP	3/30/10	1115	13.5	13	45	21	12		0		10 cts larva				
24	JG,AP	3/30/10	1206	16.5	13	6	2	1		0						
25	JG,AP	3/30/10	1208	13.5	13	16	14	2		0						
26	JG,AP	3/30/10	1211	14	13	20	18	2		0						
29	JG,AP	3/30/10	1252	17.5	13	10	5	2		0						
30	JG,AP	3/30/10	1310	17	13	19	3	3		0						
33	JG,AP	3/30/10	1327	13	13	65	25	10		0						
34	JG,AP	3/30/10	1315	16.5	13	20	8	7		0						
60	JG,AP	3/30/10	1128	12	13	71	25	15		0						
63	JG,AP	3/30/10	1145	15.5	13	15	8	1		0						
69	JG,AP	3/30/10	1216	15	13	15	4	3		0		all hoof prints				
71	JG,AP	3/30/10	1219	14.5	13	19	66	2		0						
72	JG,AP	3/30/10	1225	14.5	13	23	29	3		0						
80	JG,AP	3/30/10	1349	19	13	4	2	1		0						
85	JG,AP	3/30/10	1340	19	13	12	14	1		0						
88	JG,AP	3/30/10	1334	14.5	13	34	4	4		0						
89	JG,AP	3/30/10	1333	17	13	15	6	1		0						
90	JG,AP	3/30/10	1320	17.5	13	20	21	9		0						
45,64,65	JG,AP	3/30/10	1152	12.5	13	75+	88	32		0						
1	GC,JG	4/13/10	1355	27.5	16	5	3	1								
2	GC,JG	4/13/10	1405	19	16	26	10	4								
3	GC,JG	4/13/10	1456	21.5	16	10	6	3								
4	GC,JG	4/13/10	1457	21.5	16	8	4	3								
5	GC,JG	4/13/10	1454	21	16	20	22	4.5								
6	GC,JG	4/13/10	1448	27.5	16	7	10	2								
7	GC,JG	4/13/10	1445	25	16	9	15	3								
8	GC,JG	4/13/10	1602	19.5	16	13	60	3								
9	GC,JG	4/13/10	1604	19.5	16	15	5.5	5								
10	GC,JG	4/13/10	1511	24	16	21	10	3								
11	GC,JG	4/13/10	1545	22	16	9	5	4								
12	GC,JG	4/13/10	1548	27.5	16	25	16	8								
13	GC,JG	4/13/10	1546	21	16	11	22	8								
14	GC,JG	4/13/10	1612	19.5	16	15	6	4.5								
15	GC,JG	4/13/10	1617	22	16	7	9	5.5								
16	GC,JG	4/13/10	1621	18	16	40	24	15				Clam shrimp, 4 CTS				
17	GC,JG	4/13/10	1633	19.5	16	6	5	2								
18	GC,JG	4/13/10	1638	19.5	16	14	52	2								
19	GC,JG	4/13/10	1646	17.5	16	16	5	4								
20	GC,JG	4/13/10	1644	19	16	8	5	3								
21	GC,JG	4/13/10	1648	13.5	16	26	16	1.5								
29	GC,JG	4/13/10	1500	23.5	16	14	6.5	4								
36	GC,JG	4/13/10	1452	27.5	16	15	27	4								
37	GC,JG	4/13/10	1450	27.5	16	15	14	2.5								

38	GC,JG	4/13/10	1447	25	16	10	8	2.5								
39	GC,JG	4/13/10	1423	27	16	17	24	7								
40	GC,JG	4/13/10	1523	22	16	18	2.5	2.5								
41	GC,JG	4/13/10	1524	22.5	16	7	6	5								
42	GC,JG	4/13/10	1544	22.5	16	10	9	4								
43	GC,JG	4/13/10	1610	20	16	8	1.5	1								
46	GC,JG	4/13/10	1458	25.5	16	7	9.5	3								
49	GC,JG	4/13/10	1350	23.5	16	11	13	0.5								
50	GC,JG	4/13/10	1347	26	16	12	70	2								
50	GC,JG	4/13/10	1347	26	16	12	70	2								
52	GC,JG	4/13/10	1420	27	16	5	4	4								
53	GC,JG	4/13/10	1426	27.5	16	9	3	2								
54	GC,JG	4/13/10	1428	27.5	16	8	9	2								
55	GC,JG	4/13/10	1433	26	16	10	5	2.5								
56	GC,JG	4/13/10	1608	20	16	6	1.5	0.5								
57	GC,JG	4/13/10	1611	20	16	9	1	1								
60	GC,JG	4/13/10	1654	14	16	75+	28	23								
61	GC,JG	4/13/10	1700	17	16	7	2	0.5								
74	GC,JG	4/13/10	1520	25	16	10	7	3								
75	GC,JG	4/13/10	1517	26	16	9	6	3.5								
76	GC,JG	4/13/10	1515	25.5	16	9	7	1								
77	GC,JG	4/13/10	1513	25	16	12	3	3								
100	GC,JG	4/13/10	1430	26	16	10	3	2.5								
101	GC,JG	4/13/10	1518	25.5	16	9	9	2								
104	GC,JG	4/13/10	1416	27.5	16	6	5	5								
106	GC,JG	4/13/10	1522	23.5	16	13	5	2								
22	GC,JG	4/14/10	1000	14	15	7	2	0.5								
23	GC,JG	4/14/10	1001	14.5	15	12	7	1								
24	GC,JG	4/14/10	1031	13.5	15	16	15	3								
25	GC,JG	4/14/10	1033	12	15	18	12	1.5								
26	GC,JG	4/14/10	1035	14	15	20	20.5	2								
27	GC,JG	4/14/10	1113	15.5	15	18	9	8								
28	GC,JG	4/14/10	1641	19	15	7	2	1								
30	GC,JG	4/14/10	1618	16	15	23	2.5	2.5								
32	GC,JG	4/14/10	1556	18	15	20	7	5								
33	GC,JG	4/14/10	1557	13	15	63	30	8								
34	GC,JG	4/14/10	1610	16	15	30	10	7								
35	GC,JG	4/14/10	1657	16.5	15	9	4	3								
44	GC,JG	4/14/10	958	14	15	9	2	0.5								
47	GC,JG	4/14/10	1642	19.5	15	18	3	3								
62	GC,JG	4/14/10	954	16	15	6	2.5	0.5								
63	GC,JG	4/14/10	956	12.5	15	17	14.5	1.5								
68	GC,JG	4/14/10	1045	12.5	15	13	13	2								
69	GC,JG	4/14/10	1052	17.5	15	10	20	3								
70	GC,JG	4/14/10	1054	17	15	9	7.5	1								
71	GC,JG	4/14/10	1100	14	15	22	71	3								
72	GC,JG	4/14/10	1105	14.5	15	21	33	4.5								
73	GC,JG	4/14/10	1115	20.5	15	6	1.5	0.5								
78	GC,JG	4/14/10	1432	21.5	15	13	3	3								

79	GC,JG	4/14/10	1513	19	15	12	5	1.5								
85	GC,JG	4/14/10	1542	20	15	16	24	2								
86	GC,JG	4/14/10	1547	18	15	17	11	2								
88	GC,JG	4/14/10	1549	16.5	15	26	5	4								
89	GC,JG	4/14/10	1555	19.5	15	21	10	3.5								
90	GC,JG	4/14/10	1604	20	15	13	25	9								
91	GC,JG	4/14/10	1613	18	15	15	4	2								
92	GC,JG	4/14/10	1644	17.5	15	10	6	5								
95	GC,JG	4/14/10	1649	20	15	14	44	1.5								
96	GC,JG	4/14/10	1659	18.5	15	15	5	5								
97	GC,JG	4/14/10	1512	19	15	12	3.5	1.5								
98	GC,JG	4/14/10	1514	21	15	7	6.5									
99	GC,JG	4/14/10	1524	20	15	13	10	0.5								
109	GC,JG	4/14/10	1500	21.5	15	11	3	1								
111	GC,JG	4/14/10	1502	20	15	10	4	1								
112	GC,JG	4/14/10	1505	20.5	15	10	9	1								
113	GC,JG	4/14/10	1508	18	15	15	6	1.5								
114	GC,JG	4/14/10	1511	19	15	9	8	1								
115	GC,JG	4/14/10	1522	19	15	10	4	0.5								
116	GC,JG	4/14/10	1526	20	15	7	2.5	0.5								
123	GC,JG	4/14/10	1703	19	15	9	4	2.5								
128	GC,JG	4/14/10	1454	22	15	10	5	1								
45,64,65	GC,JG	4/14/10	1002	12	15	75+	86	83								
2	GC, JG	4/27/10	1418	20	24	16	4	3								
5	GC, JG	4/27/10	1450	21	24	14	8	3								
7	GC, JG	4/27/10	1445	23	24	4	1	0.5								
8	GC, JG	4/27/10	1517	23	24	7	59	4								
10	GC, JG	4/27/10	1456	26	24	9	3.5	2								
12	GC, JG	4/27/10	1504	22	24	21	12	8.5								
16	GC, JG	4/27/10	1539	18.5	24	39	21	14			Clam Shrimp	5 CTS				
18	GC, JG	4/27/10	1600	21.5	24	9	12	0.5								
21	GC, JG	4/27/10	1605	21	24	15	3	1								
24	GC, JG	4/27/10	1636	21	24	11	4	1.5								
26	GC, JG	4/27/10	1638	21	24	10	15	1.5								
42	GC, JG	4/27/10	1501	23	24	6	2	1								
60	GC, JG	4/27/10	1608	18	24	75+	26	23								
65	GC, JG	4/27/10	1620	17	24	75+	72	30								
71	GC, JG	4/27/10	1640	21	24	16	55	2								
72	GC, JG	4/27/10	1645	21	24	12	25.5	3								
29	GC, JG	4/28/10	1036	13.5	11	11	6.5	3.5								
30	GC, JG	4/28/10	1019	12	11	15	2	2								
32	GC, JG	4/28/10	1003	12	11	55	24	7								
34	GC, JG	4/28/10	1017	12	11	21	8	5.5								
35	GC, JG	4/28/10	1045	13.5	11	11	5.5	5								
88	GC, JG	4/28/10	957	12.5	11	14	3	2.5								
90	GC, JG	4/28/10	1011	12.5	11	11	10	4								
16	AP	5/11/10	815	8	9	23	14	7				17 cts larva, 3"-4"				
33	AP	5/11/10	936	10	12	30	20	4								
60	AP	5/11/10	833	10	9	40+	25	14								
65	AP	5/11/10	850	11	9	50+	63	27								
108	AP	5/11/10	758	9.5	9	7	18	3								
112	AP	5/11/10	745	8	9	9	7	4								
60	AP	5/25/10	825	13	14	40+	20	14								
65	AP	5/25/10	850	13	14	50+	54	22								
60	AP	6/7/10	810	19.5	23	35	19	10								
65	AP	6/7/10	832	20	23	50	51	20								

***** JG=Jeff Gurule; GC=Geoff Cline; AP=Austin Pearson
CGH=Cattle Grazing Heavy

APPENDIX C:
POOL COORDINATES

Panoche Solar Farm Pool Locations **Grid: UTM** **Datum: NAD83** **Zone: 10S**

Pool #	Easting	Northing	Altitude
1	689496	4055757	1305 ft
2	688302	4055313	1342 ft
3	689829	4056101	1324 ft
4	689834	4056100	1319 ft
5	689763	4056093	1314 ft
6	689688	4056103	1316 ft
7	689326	4056083	1320 ft
8	688589	4056816	1372 ft
9	688595	4056815	1374 ft
10	689470	4057479	1342 ft
11	689036	4057670	1333 ft
12	688911	4057611	1335 ft
13	688921	4057611	1338 ft
14	687939	4057814	1379 ft
15	687945	4057818	1382 ft
16	688234	4058362	1380 ft
17	688572	4058300	1402 ft
18	689004	4058842	1332 ft
19	689014	4059176	1357 ft
20	688840	4058916	1356 ft
21	689086	4059160	1354 ft
22	689119	4058641	1330 ft
23	689120	4058634	1320 ft
24	689187	4058476	1331 ft
25	689181	4058467	1316 ft
26	689204	4058399	1318 ft
27	689270	4058041	1318 ft
28	689811	4057710	1306 ft
29	689938	4056148	1308 ft
30	690230	4056326	1294 ft
31	691090	4057257	1358 ft
32	690834	4055790	1271 ft
33	690806	4055805	1279 ft
34	690648	4056380	1286 ft
35	690460	4054895	1314 ft
36	689732	4056112	1308 ft
37	689708	4056105	1337 ft
38	689626	4056092	1327 ft
39	686835	4056546	1454 ft
40	689145	4057604	1309 ft
41	689113	4057614	1327 ft
42	689033	4057647	1329 ft
43	688292	4057609	1362 ft
44	689083	4058673	1320 ft

Pool #	Easting	Northing	Altitude
45	689115	4058610	1320 ft
46	689842	4056105	1301 ft
47	689839	4057712	1311 ft
48	690492	4058250	1374 ft
49	689828	4055797	1296 ft
50	689855	4055796	1294 ft
51	689333	4056074	1312 ft
52	686969	4056483	1469 ft
53	686814	4056424	1484 ft
54	686776	4056341	1486 ft
55	686907	4056277	1476 ft
56	688248	4057597	1378 ft
57	688437	4057625	1361 ft
58	688657	4057633	1351 ft
59	689019	4058710	1344 ft
60	689075	4059037	1331 ft
61	689072	4059015	1337 ft
62	689086	4058729	1325 ft
63	689107	4058687	1338 ft
64	689125	4058590	1320 ft
65	689181	4058543	1312 ft
66	689199	4058519	1310 ft
67	689190	4058645	1305 ft
68	689208	4058395	1332 ft
69	689269	4058326	1309 ft
70	689236	4058317	1301 ft
71	689323	4058278	1305 ft
72	689366	4058222	1305 ft
73	689288	4058054	1312 ft
74	689248	4057557	1329 ft
75	689355	4057533	1338 ft
76	689431	4057496	1320 ft
77	689443	4057485	1316 ft
78	696325	4053843	1330 ft
79	691459	4055163	1264 ft
80	691320	4055354	1257 ft
81	691291	4055371	1245 ft
82	691217	4055474	1270 ft
83	691196	4055487	1260 ft
84	691183	4055498	1279 ft
85	691004	4055643	1256 ft
86	690938	4055687	1267 ft
87	690890	4055745	1274 ft
88	690875	4055737	1275 ft

Pool #	Easting	Northing	Altitude
89	690848	4055758	1285 ft
90	690724	4056063	1285 ft
91	690585	4056501	1294 ft
92	689917	4057463	1316 ft
93	691576	4056566	1361 ft
94	691108	4057252	1362 ft
95	689847	4056821	1301 ft
96	690484	4054899	1289 ft
97	691460	4055152	1241 ft
98	691441	4055189	1236 ft
99	691385	4055274	1236 ft
100	686848	4056217	1490 ft
101	689315	4057548	1331 ft
102	689029	4058943	1312 ft
103	689781	4055798	1307 ft
104	687276	4056536	1469 ft
105	689824	4057202	1308 ft
106	689163	4057595	1323 ft
107	691959	4054950	1247 ft
108	691936	4054959	1252 ft
109	691827	4054980	1234 ft
110	691813	4054979	1246 ft
111	691629	4055068	1256 ft
112	691593	4055078	1253 ft
113	691552	4055092	1249 ft
114	691461	4055137	1258 ft
115	691417	4055233	1251 ft
116	691346	4055332	1252 ft
117	691281	4055396	1256 ft
118	691206	4055485	1269 ft
119	691049	4055621	1263 ft
120	690950	4055672	1264 ft
121	690796	4055862	1268 ft
122	690685	4056192	1292 ft
123	690458	4054510	1277 ft
124	689225	4058981	1329 ft
125	689226	4059076	1346 ft
126	689230	4059090	1336 ft
127	689092	4058711	1338 ft
128	692072	4054918	1258 ft

APPENDIX D:
PHOTOS

Photo 1: Looking SW at Pool #12 - a stock pond. Vernal pool fairy shrimp (*Branchinecta lynchi*) were observed in this pool on 3/16/10.

Photo 2: Looking SE at Pool #5, a natural vernal pool at the toe of a swale. No shrimp were observed in this pool during the 09/10 wet season survey.

Photo 3: LOA Biologist Mr. Jeff Gurule (TE-168924) sampling Pool #50 at the intersection of a ranch road and Little Paonoche Road looking east. This pool is an example of the many ruderal pools associated with the ranch roads on the site. No shrimp were observed in this pool during the 09/10 wet season survey.

Photo 4: Incidental California tiger salamander observation from Pool #16 on May 11^{th}, 2010.

Photo 5: Looking south across the study area.

Photo 6: Looking north across the study area.

August 13, 2010

Douglass Cooper
Fish and Wildlife Service
2493 Portola Road, Suite B
Ventura, California 93003

RE: Non-Protocol Branchiopod Survey Results, Solargen Energy, Panoche Valley Mitigation Parcels.

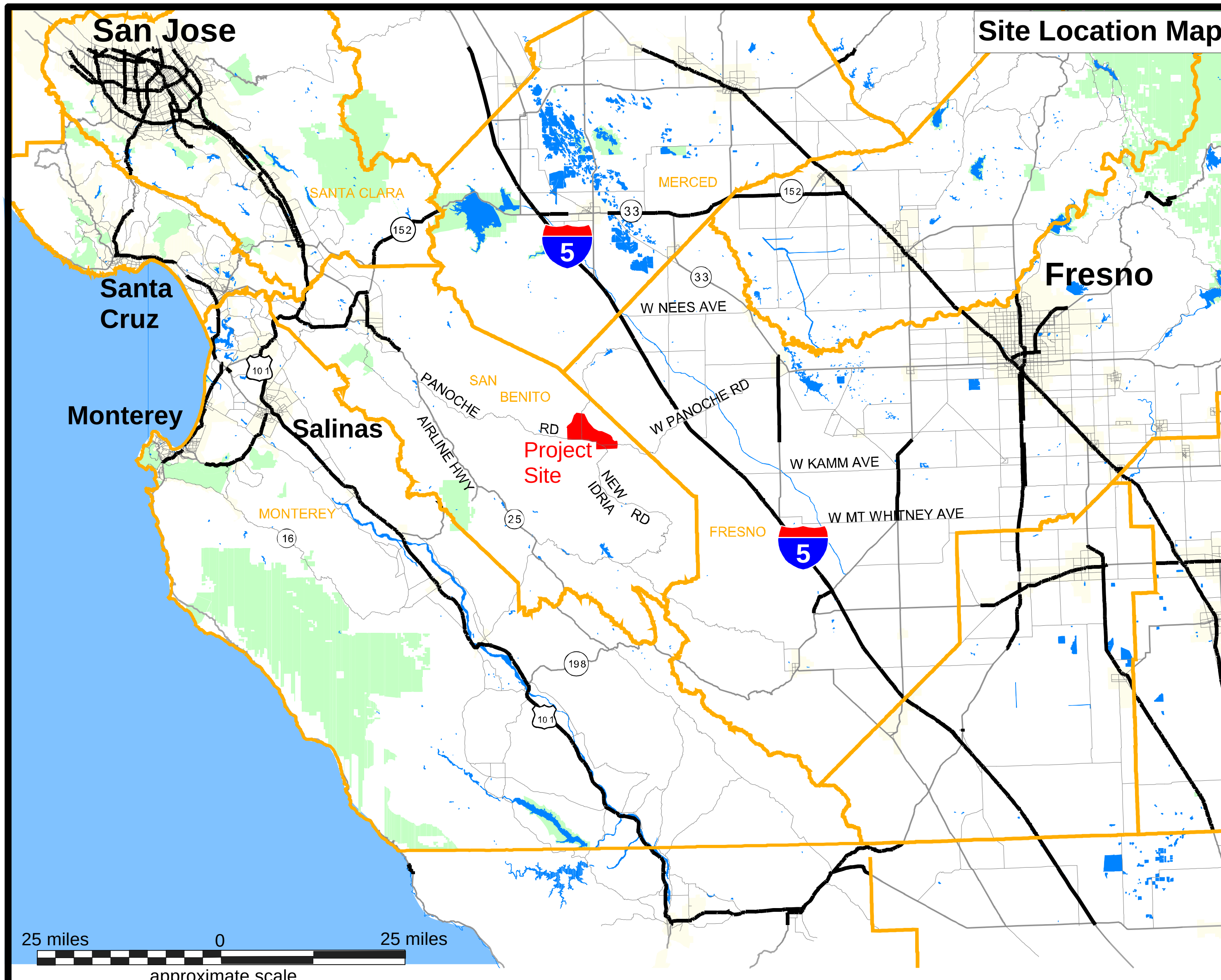
Douglass:

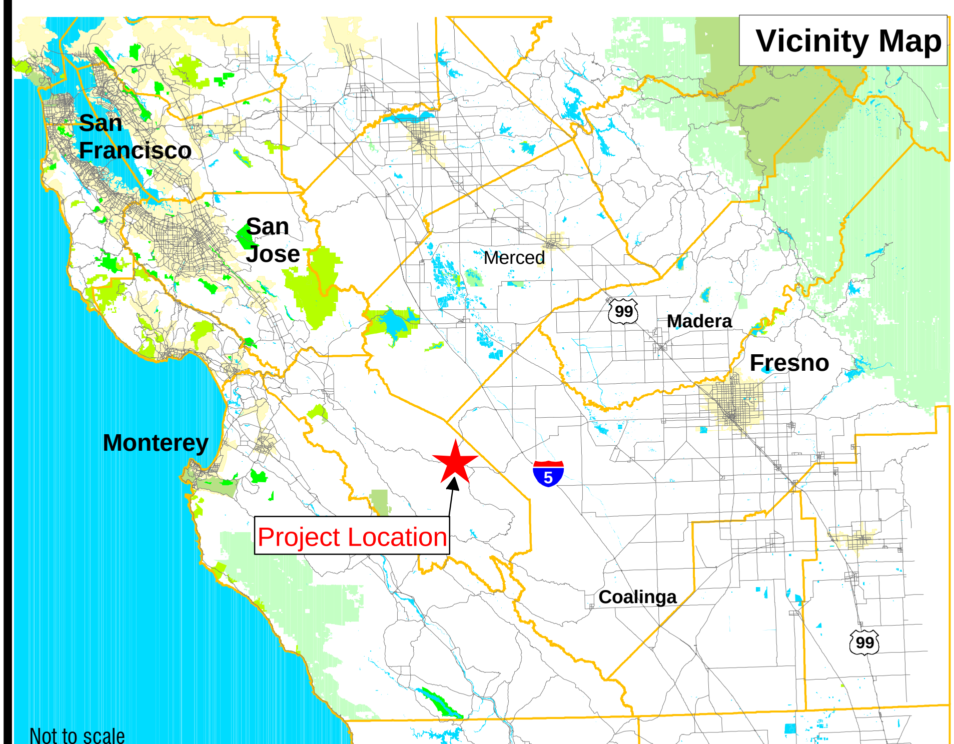
This letter serves the purpose of the 90-day survey report, as required by the U.S. Fish and Wildlife Service (USFWS), for the results of a non-protocol reconnaissance Brachiopod survey conducted on approximately 10,300 acres of property for the Solargen Energy solar project in Panoche Valley, CA. The survey site is located in east-central San Benito County and southwest Fresno County, approximately 8 miles west of Interstate 5, less than 1 mile south of Mercey Hot Springs, east of Pinnacles National Monument, and north of Panoche Road, along Little Panoche Road (Figure 1). The site can be found on the Cerro Colorado, Mercey Hot Springs, Llanada, and Panoche, California U.S.G.S quadrangles, in Sections 19, 30, and 31 of Township 14 south, Range 11 east; Section 21-27 and 32-36 of Township 14 south, Range 10 east; Sections 1-8 and 11-14 of Township 15 south, Range 10 east; Sections 6, 7, 19, and 20 of Township 15 south, Range 11 east (Figure 2).

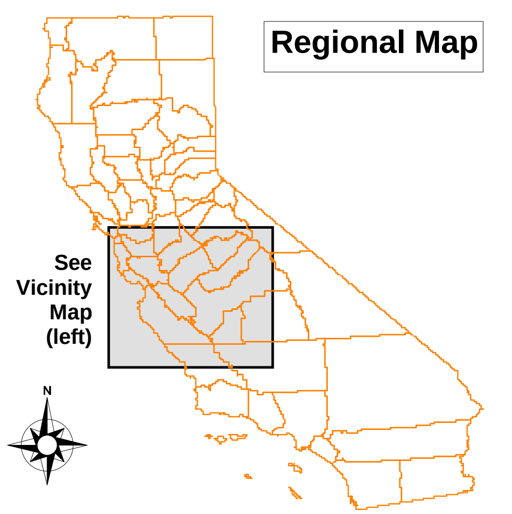
On April 14th, 2010, Live Oak Associates, Inc. (LOA) biologist Mr. Jeff Gurule (TE-168924-0), assisted by Mr. Geoff Cline (an un-permitted LOA biologist), surveyed the site for federally listed vernal pool crustaceans. The proposed survey was deemed acceptable via a phone conversation between Michele Korpos, LOA Panoche Project Manager, and Chris Diel of the Ventura USFWS office on April 9, 2010 with the understanding that maps delineating the survey area would be sent by Ms. Korpos and a written authorization would be issued by the USFWS after review of the proposed survey area. However, apparently the maps were never received by Mr. Diel and no written authorization was issued. In discussing this issue with Mr. Diel on August 2, 2010, the consensus was that since the surveys were non-protocol surveys conducted on a single day late in the season, the lack of a formal authorization was not concerning.

Methods

Mr. Gurule and Mr. Cline selected pools to sample as directed by LOA biologist Michele Korpos, who mapped pools potentially suitable for vernal pool crustaceans during the course of other biological surveys of the study area. The sampling method was consistent with USFWS



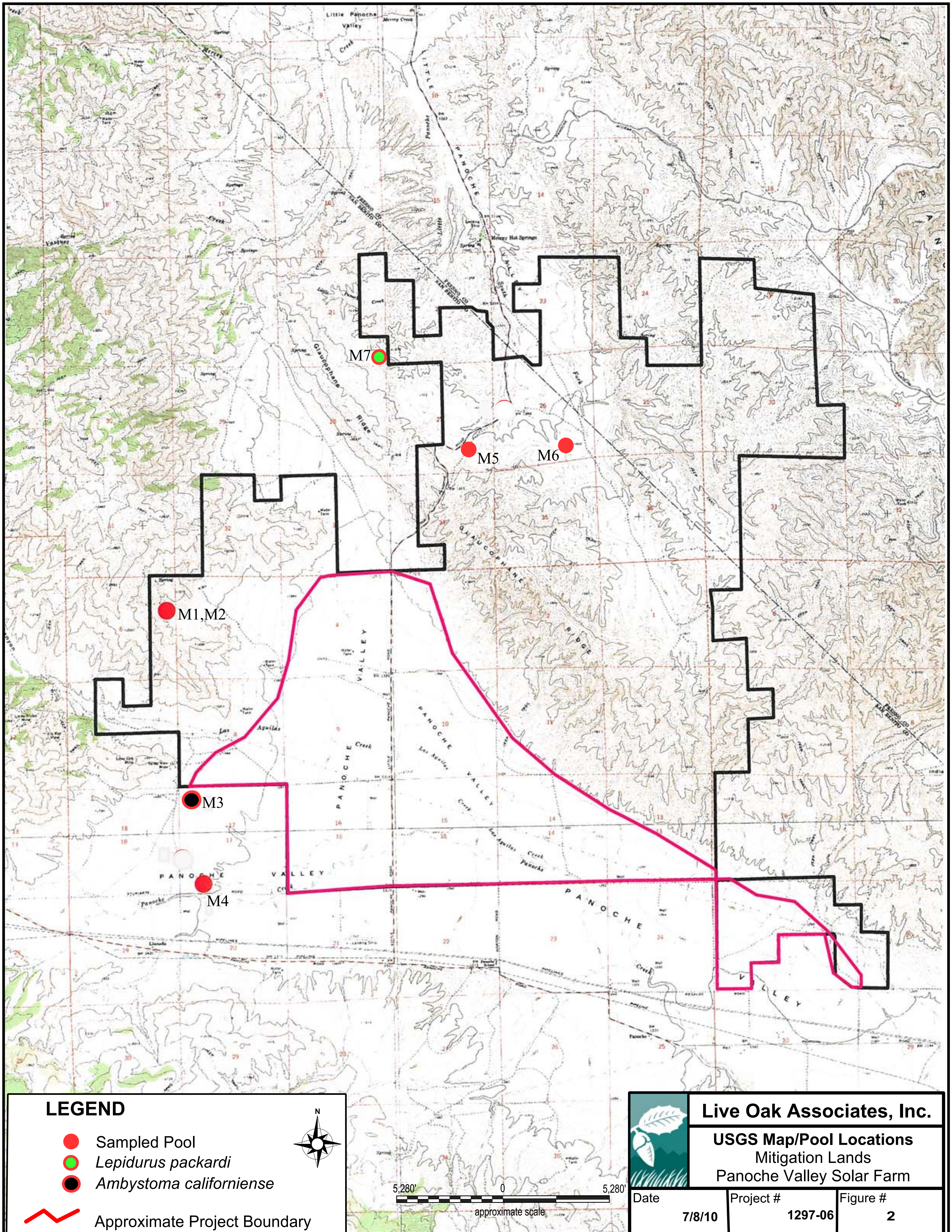




Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1


M1,M2
M3
M4
M5
M6
M7
LEGEND
Sampled Pool
Lepidurus packardi
Ambystoma californiense
Approximate Project Boundary
N
5,280'
0
5,280'
approximate scale
Live Oak Associates, Inc.
USGS Map/Pool Locations
Mitigation Lands
Panoche Valley Solar Farm
Date
7/8/10
Project #
1297-06
Figure #
2

Recovery Permit requirements. Each pool was thoroughly sampled with a dip net. Pool characteristics and aquatic species observed were recorded on a previously approved data sheet, authorized via email by David Kelly with the USFWS on November 12, 2008 (See Attachment A). The data sheet is formatted to an Excel spreadsheet, with data entered in the field directly into the spreadsheet via a PDA. Pool location coordinates were collected using a Garmin Rino 120 handheld GPS unit.

Results

Mr. Gurule and Mr. Cline sampled seven pools. Pool locations are presented in Figure 2, survey results are presented in Attachment B, and Lat. Long. coordinates of each sampled pool are presented in Attachment C. Branchiopods were found in one of the seven pools surveyed (Pool M7). Individuals were netted, observed, identified as vernal pool tadpole shrimp (*Lepidurus packardi*), photographed, and released. Additionally, California tiger salamander larvae (*Ambystoma californiense*) were netted in Pool M3. Photos are presented in Attachment D.

Discussion

The discovery of the Federally Endangered *L. packardi* is significant. This represents a fairly substantial range extension of the species. Prior to this discovery, no populations of *L. packardi* were known in San Benito County or western Fresno County (CNDDB 2010 and Draft Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon 2004).

Although the April 14th, 2010 survey found *L. packardi* in one pool (Pool M7), this single day of surveying does not provide sufficient evidence of the absence of other branchiopods, including listed branchiopods such as the *Branchiata lynchi*, from the site. There remains the possibility that had protocol level surveys been conducted, federally listed anostracans such as *B. lynchi* may have been found in some pools of the site.

Please feel free to contact me with any further questions or comments.

Sincerely,

Jeff Gurule
Senior Project Manager
Staff Ecologist

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

Jeff Gurule, Permit # TE-168924-0

Signature:__________________________. Date: August 13, 2010.

ATTACHMENT A:
DATA SHEET AUTHORIZATION

Jeff Gurule

From:	David_Kelly@fws.gov
Sent:	Wednesday, November 12, 2008 7:59 AM
To:	Jeff Gurule
Cc:	Elizabeth_Warne@fws.gov; Josh_Hull@fws.gov
Subject:	Re: Branchiopod Survey Data Sheet
Attachments:	Data Sheet Template.xls

Jeff, the data sheet that you presented contains the information that we required in the protocol for the VPb surveys. You are authorized to use this survey form until otherwise notified. Thank you.

David Lee Kelly
Fish and Wildlife Biologist
Recovery Branch
US Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825
Ph. (916) 414-6492

Jeff Gurule <jgurule@loainc.com>

11/11/2008 04:38 PM

To <David_Kelly@fws.gov>
cc
Subject Branchiopod Survey Data Sheet

Hi David,

Last rainy season Live Oak Associates, Inc. conducted branchiopod surveys on three properties in Fresno County with numerous vernal pools on each (the largest containing 92 pools); this resulted in numerous data sheets (over a 1,000 pages of data sheets) submitted with our 90-day reports. Not only were these data sheets difficult to organize and proof, PDF's of the final reports were so huge it was difficult to email them with the data sheets attached. I believe that you expressed interest, yourself, in having us utilize an abbreviated data sheet for ease of handling and reviewing after seeing how many data sheets we had amassed in those surveys.

So, as Live Oak has authorization to conduct 2nd year surveys on properties we surveyed last year, plus additional properties not surveyed last year, I have created an EXCEL template to serve as our data sheet for all surveys conducted this year. I am submitting this template for your approval. I believe using this data sheet will greatly increase efficiency, present the data in a more useful format, and greatly reduce the potential for error.

I have included an explanation of codes that would be used in the Surveyors and Habitat Condition/Land Use columns. This explanation of codes would ultimately be located at the bottom of the EXCEL sheet.

I hope this is acceptable to you or that you have some suggestions on how to further simplify it. I hope to here back from you soon, as weather conditions may necessitate initiation of surveys soon.

Thanks,

Jeff Gurule
Project Manager
Wildlife/Wetland/Plant Ecologist

ATTACHMENT B:
DATA SHEET

U.S. Fish and Wildlife Service Vernal Pool Data Sheet Wet Season Non-Protocol Survey 2010 Panoche Valley Mitigation Land (1297-06), San Benito County, Cerro Colorado, Mercey Hot Springs, Llanada, & Panoche Quads, Township: 15S, Range: 10E & 11E													**Fairy Shrimp ID Sheet 2010 Panoche Valley Mitigation Land (1297-06)**				
Pool #	Surveyers*	Date	Time (24hr)	Water Temp	Air Temp	Depth (cm)	Length (m)	Width (m)	Habitat Conditions/ Land Use*	Number of Shrimp in Pool	Number, Sex, Genus Collected	Notes	Number, Sex, Species IDed	Listed Species (x)	Date Identified	Identified By	Comments
M1	JG,GC	4/14/10	1147	14	15	29	5	5	CGM			mitigation pond					
M2	JG,GC	4/14/10	1150	12.5	15	53	9	5	CGM			mitigation pond					
M3	JG,GC	4/14/10	1223	13	15	75+	69	34	CGM			mitigation pond, clam shrimp,5 CTS					
M4	JG,GC	4/14/10	1251	11	15	75+	57	24	CGM			mitigation pond, clam shrimp					
M5	JG,GC	4/14/10	1717	19	15	25	12.5	10	CGM			mitigation pool					
M6	JG,GC	4/14/10	1735	19	15	10	11	5.5	CGM			mitigation pool					
M7	JG,GC	4/14/10	1818	19	15	13	60	29	CGM	100s	100s of *Lepidurus packardi*	mitigation pool, 100's tadpole shrimp	No tadpole shrimp collected. See Appendix C for photos	x	4/14/2010	JG	

* JG=Jeff Gurule; GC=Geoff Cline
CGM=Cattle Grazing Moderate

ATTACHMENT C:
POOL UTM COORDINATES

Panoche Solar Farm Pool Locations Grid: UTM Datum: NAD83 Zone: 10S

Pool #	Easting	Northing	Altitude
M1	686801	4058372	1663 ft
M2	686757	4058366	1656 ft
M3	686887	4055826	1433 ft
M4	687076	4054586	1376 ft
M5	690899	4061045	1443 ft
M6	692421	4061098	1419 ft
M7	689604	4062415	1438 ft

ATTACHMENT D:
PHOTOS

View Looking North of Pool 135 (Tadpole Shrimp Pool)

Tadpole Shrimp

View Looking West Over Survey Area, No Pools in Vicinity.

View Looking East Over Survey Area, No Pools in Vicinity.


View Looking South Over Survey Area, Pool M4 in background out of site.

June 17, 2010

Eric Cherniss
Vice President of Project Development
Solargen Energy, Inc.
20400 Stevens Creek Blvd., Suite 700
Cupertino, CA 95014

Subject: Early spring rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN 1297-04b)

Dear Eric:

Live Oak Associates, Inc. (LOA), has completed a focused early spring survey for special status plants (i.e., plants designated as endangered, threatened, or rare (CDFG 2010) and plants listed by the California Native Plant Society (2009)) on 4,717 acres of the Panoche Valley Solar Farm site (hereafter referred to as “study area”) located along Little Panoche Road in San Benito County, California. Specifically, this survey was conducted to determine whether or not special status plants that would bloom in March or April were present within the study area in 2010.

Site Location and Existing Conditions

The project site occurs on the floor of Panoche Valley between the Gabilan Range to the west and the Panoche Hills to the east. The survey area is generally bounded to the west, north, and east by open space and rangelands and to the south by Yturiarte Road (Figure 1). Surrounding lands consist of rangelands used for cattle grazing.

The early spring 2010 study area included valley floor topography (i.e., areas generally of less than 5% slope) within all or portions of Sections 3, 4, 5, 8, 9, 10, 11, 13, 14, 15, and 16, of Township 15 south, Range 10 east, and Section 19 of Township 15 south, Range 11 east (Figure 2). Habitats present within this area include relatively flat rangelands and gentle slopes dominated by moderately saline clay soils, the beds and banks of seasonally flowing arroyo-like creeks (Panoche Creek, for example, which flowed throughout most of the survey period), and many ephemeral drainages and low swales that were repeatedly charged by runoff events. Various disturbance intensities associated with cattle grazing provide further microhabitat variation for plants. Rainfall amounts in 2010 were estimated by local measurement to be nearly 200% of the long-term average, providing an excellent environment for plant growth and flowering, and thus allowing the opportunity to compile a reasonably complete inventory of the study area's plant assemblage.

Literature Search and Botanical Survey

A literature search was conducted in order to identify special status plant species that may potentially occur within the study area's available habitats. A search of the California Natural Diversity Database and review of environmental documentation for area projects uncovered 22 potentially occurring special status plants. Consultation with local California Department of Fish and Game botanists, Mr. Dave Hacker and Ms. Ellen Cypher, and with a local Bureau of Land Management botanist, Mr. Ryan O'Dell, yielded one additional potentially occurring special status species (*Caulanthus californicus*) that was included in the search list (Table 1). Of these 23 species, 19 have flowering periods (i.e., optimal survey times) that fall within the March-April period chosen for the early spring botanical survey. This includes San Joaquin woollythreads (*Monolopia congdonii*) and California jewelflower (*Caulanthus californicus*), species that are federally listed as endangered. Based upon the expected phenologies suggested within the published literature, it was decided that the presence or absence of eight potentially occurring special status species (*Astragalus macrodon*, *Atriplex vallicola*, *Blepharizonia plumosa*, *Cordylanthus mollis* ssp. *hispidus*, *Deinandra halliana*, *Eriogonum vestitum*, *Navarretia nigelliformis* ssp. *radians*, and *Trichostema ovatum*) would be determined by additional surveys conducted during their blooming period in May-July 2010. None of the search species listed in Table 1 were detected within the study area during an August-October 2009 botanical survey (LOA, 2009).

Table 1. Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2010).

Species	Status*	Habitat	Blooming Period
Santa Clara thorn-mint *Acanthomintha lanceolata* Annual herb	CNPS 4	Chaparral, woodland, rocky, often serpentine	March-June
Forked fiddleneck *Amsinckia vernicosa* var. *furcata* Annual herb	CNPS 4	Woodland, grassland	February-May
California androsace *Androsace elongata* ssp. *acuta* Annual herb	CNPS 4	Chaparral, woodland, meadows and seeps, grassland	March-June
Salinas milk-vetch *Astragalus macrodon* Perennial herb	CNPS 4	Chaparral, woodland, grassland	April-July
Crownscale *Atriplex coronata* var. *coronata* Annual herb	CNPS 4	Chenopod scrub, grasslands, and vernal pools, alkaline soils	March–October

Table 2 (cont'd). Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2010).

Species	Status*	Habitat	Blooming Period
Lost Hills crownscale *Atriplex vallicola* Annual herb	CNPS 1B	Chenopod scrub, grasslands, and vernal pools, alkaline soils.	April–August
Big tarplant *Blepharizonia plumosa* Annual herb	CNPS 1B	Dry areas in grasslands	July–October
Round-leaved filaree *California macrophylla* Annual herb	CNPS 1B	Woodland, grassland	March-May
California jewelflower *Caulanthus californicus* Perennial herb	FE, CNPS 1B	grasslands (non-alkaline), flats	March-May
Lemmon's jewelflower *Caulanthus coulteri* var. *lemmonii* Perennial herb	CNPS 1B	Pinyon-juniper woodland, grassland	March-May
Hispid bird's-beak *Cordylanthus mollis* ssp. *hispidus* Annual herb	CNPS 1B	Meadows and seeps, playas, grasslands, often damp, alkaline	June–September
Hall's tarplant *Deinandra halliana* Annual herb	CNPS 1B	Chenopod scrub, grassland, clay soils	April-May
Gypsum-loving larkspur *Delphinium gypsophilum* ssp. *gypsophilum* Perennial herb	CNPS 4	Chenopod scrub, grassland, clay soils	February-May
Recurved larkspur *Delphinium recurvatum* Perennial herb	CNPS 1B	Chenopod scrub, grassland, alkaline	March-June
Idria buckwheat *Eriogonum vestitum* Annual herb	CNPS 4	Grasslands, open slopes	April–August
Pale yellow layia *Layia heterotricha* Annual herb	CNPS 1B	Pinyon-juniper woodland, alkaline grassland, clay	March-June

Table 3 (cont'd). Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2010).

Species	Status*	Habitat	Blooming Period
Panoche peppergrass *Lepidium jaredii* ssp. *album* Annual herb	CNPS 1B	Grassland, washes and alluvial fans	February-June
Serpentine leptosiphon *Leptosiphon ambiguus* Annual herb	CNPS 4	Grassland, often on serpentine soil	March-June
Showy golden madia *Madia radiata* Annual herb	CNPS 1B	Woodland, grassland	March-May
San Joaquin woollythreads *Monolopia congdonii* Annual herb	FE, CNPS 1B	Chenopod scrub, grassland, sandy	February-May
Shining navarretia *Navarretia nigelliformis* ssp. *radians* Annual herb	CNPS 1B	Woodland, grassland, vernal pools	May-July
Chaparral ragwort *Senecio aphanactis* Annual herb	CNPS 2	Woodland, chaparral	January-April
San Joaquin bluecurls *Trichostema ovatum* Annual herb	CNPS 4	Chenopod scrub, grasslands	July–October

***Status Codes**

California Native Plant Society (CNPS) list designations

1B: Plants Rare, Threatened, or Endangered in California and elsewhere
2: Plants Rare, Threatened, or Endangered in California but more common elsewhere
4: Plants of limited distribution – a watch list

Survey Methods

Known nearby populations of potentially occurring special status plant species were visited in order to develop a search image for these special status species and to verify that the timing of on-site survey work would coincide with the period in which these species can be readily seen and are separable from common local species. Reference populations chosen for observation were all located at elevations similar to the study area and within 10 miles of the study area. Reference populations visited in March included forked fiddleneck, recurved larkspur, showy golden madia, San Joaquin woollythreads, and chaparral ragwort. Reference populations visited in April included San Joaquin woollythreads, Santa Clara thorn-mint, Lemmon's jewelflower, and gypsum-loving larkspur. These visits consistently supported the chosen period for the survey as being within the anthesis period of potentially occurring special status species.

Focused special status plant species surveys were conducted by LOA botanists Neal Kramer and Jim Paulus, and LOA ecologists Davinna Ohlson, Nathan Hale, Jessica Celis, Geoff Cline, Molly Goble, and Pamela Peterson, using the same methodology as described for the fall 2009 survey (LOA 2009). In summary, the survey team walked the entire site in evenly-spaced transects, ensuring 100% visual coverage, during the species' blooming period when they would be evident and most identifiable. Emphasis was placed on areas more likely to support suitable habitat for the target species. All vascular plant species observed were recorded in a field notebook. The survey was floristic, striving to identify all species to the level of taxa needed to separate occurring species from the potentially occurring special status species identified during the literature review (Appendices A and B). The survey methodology is consistent with survey protocols outlined by the CNPS and complied with the most recent California Department of Fish and Game guidelines (Appendix C). Surveys were conducted from March 8 through April 9, 2010.

Results: Plant Species Present in March-April 2010

Results of the March-April 2010 botanical survey, which was conducted at the height of the annual growing season, indicate much greater diversity is present than was suggested by the fall 2009 survey alone. The 2010 survey added 137 species to the study area total (202 species as of April 9, see Appendix A). Annuals comprise nearly 100% of the standing vegetation, with the few occurring shrubs confined to the beds and banks of Panoche Creek and Los Aguilas Creek. Non-native species are clearly dominant throughout the study area. Native plant dominance was found only at the patch (below subcommunity) grain.

No federal or state listed plant species were found within the study area. No species that could be confused with either San Joaquin woollythreads or California caulanthus, the two federally-endngered species having the potential to occur on the site, were present in 2010. The survey detected seven populations classifiable as the CNPS List 1B species recurved larkspur (*Delphinium recurvatum*), one populations of the CNPS List 4 gypsum-loving larkspur, and three populations of the CNPS List 4 serpentine leptosiphon (Figure 2). Special status plant identifications in the field, and the mapping of populations, were performed by one of the two LOA botanists who participated in all surveys.

Plants classifiable as recurved larkspur were widely scattered in very small groups, with three of the seven mapped occurrences consisting of a single individual and no occurrence of greater than 20 individuals. A technical memorandum prepared by Dr. Paulus discusses non-characteristic traits common to these plants, including weak sepal coloration, and variations that suggest these plants may be hybrids of *D. recurvatum* with the locally occurring, less sensitive gypsum-loving larkspur (*D. gypsophilum* ssp. *gypsophilum*) and foothill larkspur (*D. hesperium* ssp. *pallescens*) (Appendix D).

Gypsum-loving larkspur was found at one scattered occurrence in Section 19. Unlike the plants in Sections 4 and 8, where the plants could not be separated from recurved larkspur, these plants fit well within the expected species characteristics of gypsum-loving larkspur. Individuals appear to be confined rather narrowly to north or northwest-facing slopes associated with gully habitats that are available only at the fringe of the study area. Larkspurs, which are perennial within the study area, would be difficult to relocate due to their large, deep-seated root systems and possibly narrow habitat requirements.

Serpentine leptosiphon occurred in 2010 in impressive displays totaling several tens of thousands of plants within the study area. Comparatively little is known about the regional distribution of this species. It may reside chiefly in the seedbank for long periods, waiting for a relatively wet climate such as experienced in the spring of 2010. Because it is an annual species, it is possible that avoidance of serpentine leptosiphon during project implementation could be achieved by stockpiling of the topsoil for seedbank relocation to a reserve area.

If ground disturbance activities begin more than three to five years past the date of this survey, then the site should be resurveyed to evaluate any changes in habitat conditions and determine the presence or absence of the target species on the site.

If you have any questions regarding our findings, please contact Rick Hopkins at rhopkins@loainc.com or (408) 281-5885 at your earliest convenience.

Sincerely,

Davinna Ohlson

Davinna Ohlson, M.S.
Senior Project Manager
Plant/Wildlife Ecologist

Enclosures

References

California Department of Fish and Game, Natural Diversity Database, 2010. Special Vascular Plants, Bryophytes and Lichens List (revised January 2010). The Resources Agency, State of California, Sacramento.

California Native Plant Society. 2009. Inventory of Rare and Endangered Vascular Plants of California (7th Edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, CA.

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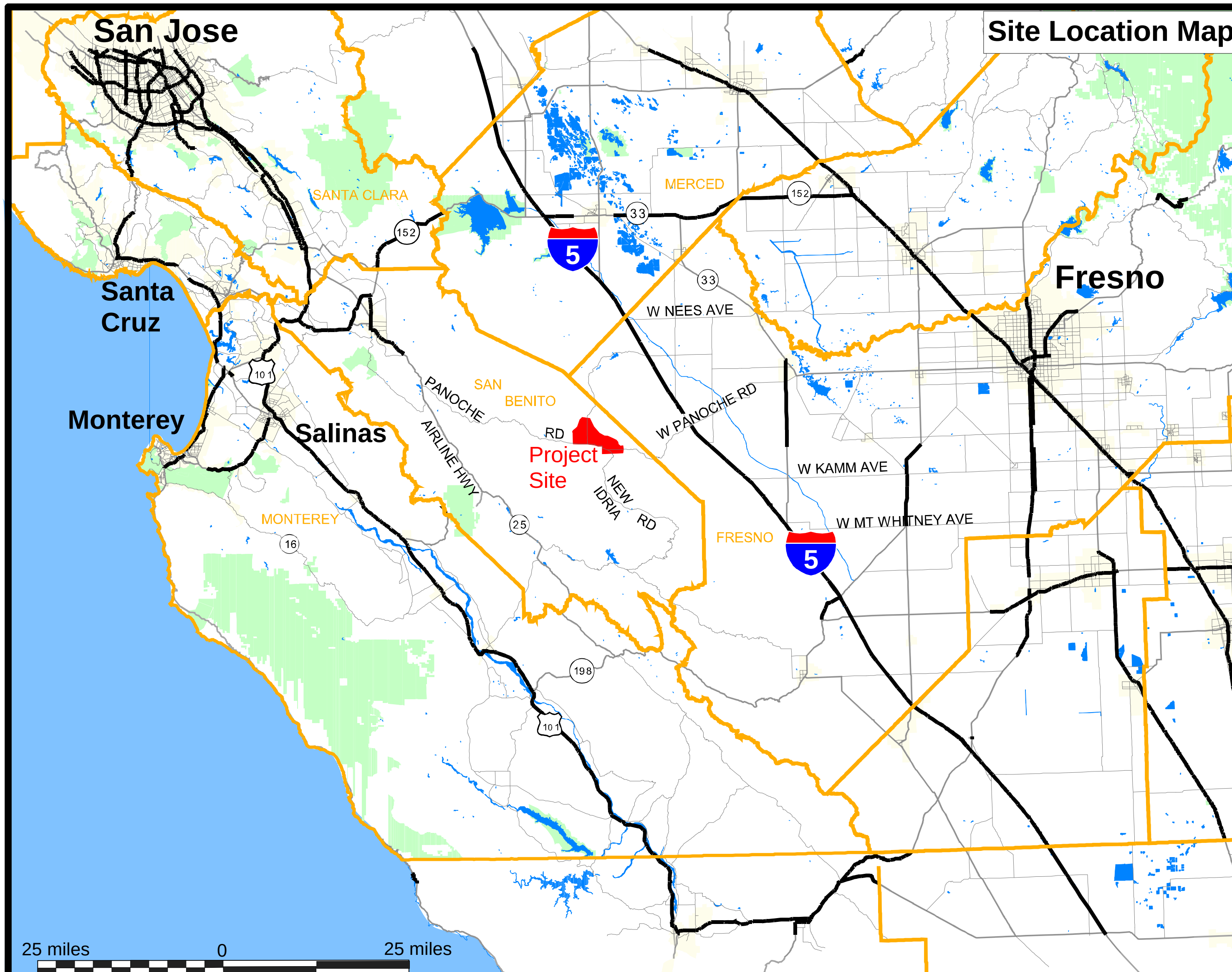
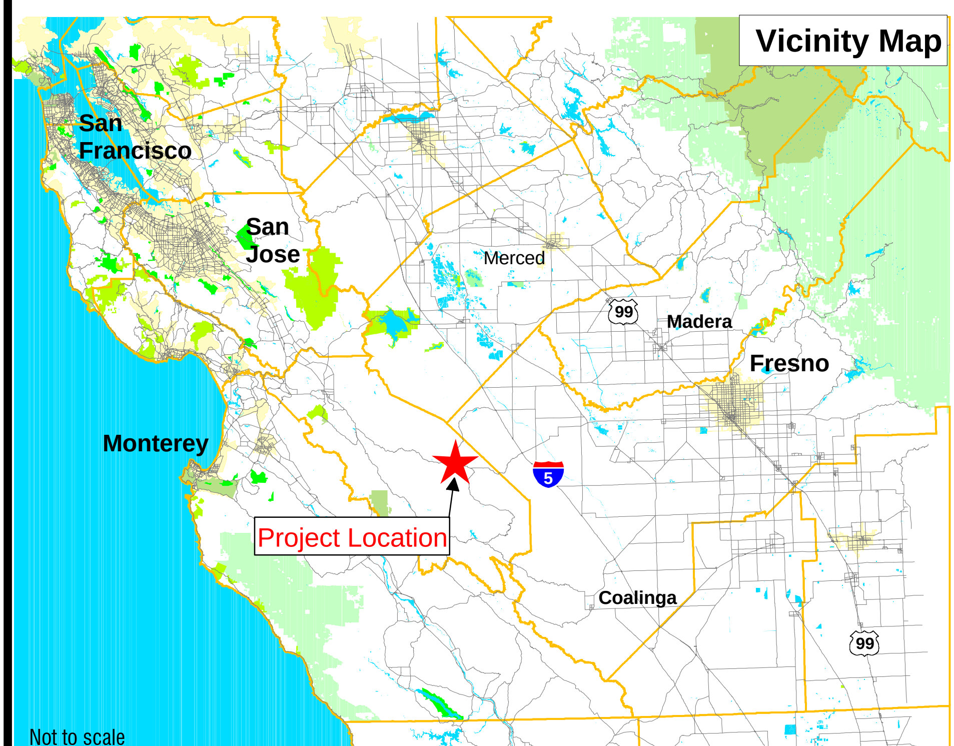
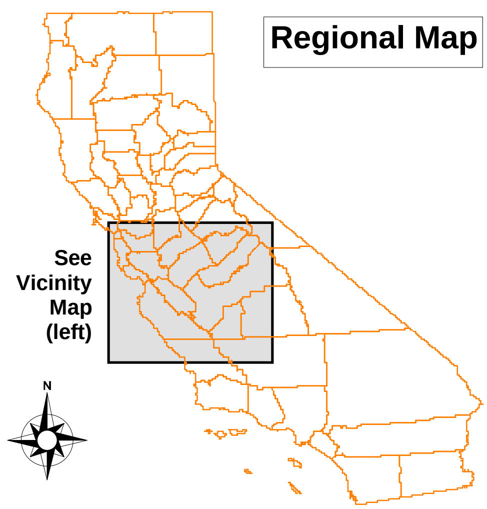


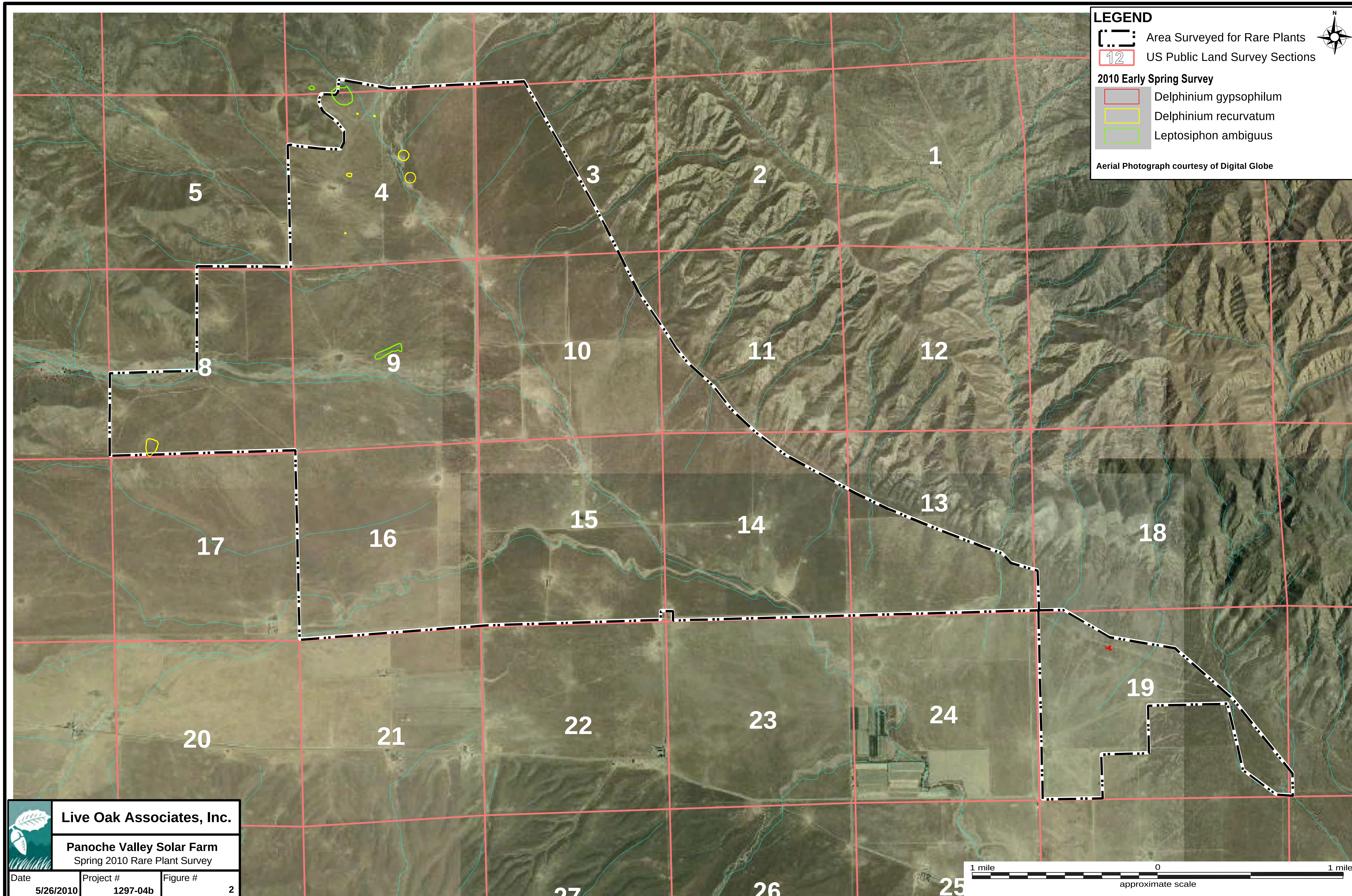




Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1



LEGEND
Area Surveyed for Rare Plants
US Public Land Survey Sections
2010 Early Spring Survey
Delphinium gypsophilum
Delphinium recurvatum
Leptosiphon ambiguus
Aerial Photograph courtesy of Digital Globe
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
1 mile
0
1 mile
approximate scale
Live Oak Associates, Inc.
Panoche Valley Solar Farm
Spring 2010 Rare Plant Survey
Date 5/26/2010
Project # 1297-04b
Figure # 2

APPENDIX A: VASCULAR PLANTS OF THE STUDY AREA

The plants species listed below were observed on the Panoche Valley solar farm site during the field survey conducted by Live Oak Associates in March and April 2010. The U.S. Fish and Wildlife Service wetland indicator status of each plant has been shown following its common name.

OBL - Obligate
FACW - Facultative Wetland
FAC - Facultative
FACU - Facultative Upland
UPL - Upland
+/- - Higher/lower end of category
NI - No investigation

Scientific Name	Common Name	Wetland Status
ALLIACEAE - Allium Family		
Allium crispum	crinkled onion	UPL
Allium howellii var. *howellii*	Howell's onion	UPL
APIACEAE - Carrot Family		
Lomatium dissectum var. *multifidum*	carrot leaved biscut root	UPL
Lomatium utriculatum	common lomatium	UPL
Sanicula bipinnatifida	purple sanicle, snakeroot	UPL
Sanicula crassicaulis	Pacific sanicle, gamble weed	UPL
Tauschia hartwegii	Harweg's umbrellawort/tauschia	UPL
ASTERACEAE - Sunflower Family		
Achyrachaena mollis	blow wives	UPL
Ambrosia acanthicarpa	annual bursage	UPL
Artemisia californica	California sagebrush	UPL
*Centaurea melitensis**	tocalote	UPL
Centaurea sp.*	knapweed/thistle	UPL
Ericameria sp.	goldenbush	UPL
Ericameria cuneata	cliff/rock/wedgeleaf goldenbush	UPL
Ericameria linearifolia	interior/narrow-leaf goldenbush	UPL
Hemizonia sp.	Kellogg's tarweed	UPL
Heterotheca oregona var. rudis	inland Oregon golden aster	UPL
*Hypochaeris glabra**	smooth cat's ear	UPL
Isocoma menziesii var. vernonioides	coastal isocoma, coast goldenbush	FACW
Lasthenia californica	coast/California/common goldfields	UPL
Layia platyglossa	common tidy-tips	UPL
Layia sp.	tidy-tips	FAC/FACW
Logfia filaginoides	logfia	UPL
Malacothrix coulteri	snakes head	UPL
*Matricaria matricarioides**	pineapple weed	FACU
Microseris sp.	microseris	UPL
Microseris douglasii ssp. *douglasii*	Douglas' silverpuffs	UPL
Microseris cf. *sylvatica*	sylvan scorzonella	UPL
Monolopia major	cupped monolopia	UPL

Monolopia stricta	Crum's monolopia	UPL
Psilocarphus brevissimus var. brevissimus	dwarf woolly-heads	OBL
Senecio flaccidus var. douglasii	Douglas' groundsel/shrubby butterweed	UPL
*Senecio vulgaris**	common groundsel	NI*
*Sonchus oleraceus**	common sow thistle	NI*
Stephanomeria sp.		UPL
Tragopogon sp.	salsify, goatsbeard	UPL
Uropappus lindleyi	silverpuffs	UPL
BORAGINACEAE - Borage Family		
Amsinckia menziesii var. intermedia	common fiddleneck	UPL
Amsinckia menziesii var. menziesii	Menzies' /small-flowered fiddleneck	UPL
Amsinckia tessellata	devil's lettuce, checker fiddleneck	UPL
Cryptantha decipiens	gravelbar cryptantha	UPL
Cryptantha flaccida	flaccid cryptantha	UPL
Heliotropium curassavicum	seaside/salt heliotrope	OBL
Pectocarya linearis ssp. ferocula	slender winged combseed	UPL
Pectocarya penicillata	winged combseed	UPL
Phacelia ciliata	Great Valley phacelia	UPL
Plagiobothrys acanthocarpus	adobe popcornflower	OBL
Plagiobothrys canescens	valley popcornflower	UPL
Plagiobothrys humistratus	dwarf popcornflower	OBL
Plagiobothrys nothofulvus	rusty popcornflower	FAC
Plagiobothrys stipitatus var. micranthus	stocked popcornflower	OBL
BRASSICACEAE - Mustard Family		
Athysanus pusillus	common sandweed, dwarf athysanus	UPL
*Brassica nigra**	black mustard	UPL
*Brassica tournefortii**	Asian mustard	UPL
*Capsella bursa-pastoris**	shepherd's purse	FAC-
*Descurainia sp.**	tansymustard	UPL
*Descurainia sophia**	flixweed, tansymustard	UPL
*Eruca vesicaria**	garden rocket	UPL
Guillenia lasiophylla	California mustard	UPL
*Hirschfeldia incana**	summer mustard	UPL
Lepidium dictyotum var. acutidens	alkali peppergrass	OBL
Lepidium dictyotum var. dictyotum	alkali peppergrass	OBL
Lepidium nitidum var. nitidum	shining peppergrass	UPL
Raphanus raphanistrum	painted charlock/wild raddish	UPL
*Sinapis arvensis**	charlock	UPL
*Sisymbrium irio**	London rocket	UPL
*Sisymbrium orientale**	oriental mustard	UPL
Thysanocarpus curvipes	lacepod/fringe pod, ribbed fringepod	UPL
Tropidocarpum gracile	slender keel fruit, dobie pod	UPL
CARYOPHYLLACEAE - Pink Family		
*Herniaria hirsuta var. cinerea**	herniaria	UPL
*Spergularia rubra**	red sandspurry	FAC-
Stellaria media	common chickweed	FACU
Stellaria nitens	shiny chickweed	UPL
CHENOPODIACEAE - Goosefoot Family		
*Atriplex cf. semibaccata**	Australian saltbush	FAC
Atriplex polycarpa	cattle/allscale/desert saltbush	UPL

*Salsola tragus**	Russian thistle, tumbleweed	FACU
CONVOLVULACEAE - Morning-Glory or Bindweed Family		
*Convolvulus arvensis**	bindweed, orchard morningglory	UPL
CRASSULACEAE - Stonecrop Family		
Crassula connata	pigmy weed	UPL
EUPHORBIACEAE - Spurge Family		
Eremocarpus setigerus	turkey mullein, dove weed	UPL
FABACEAE - Legume Family		
Astragalus gambelianus	Gambell's dwarf milkvetch	UPL
Astragalus oxyphysus	Mt. Diablo milkvetch, Diablo locoweed	UPL
Lotus strigosus	hairy lotus	UPL
Lotus wrangelianus	California lotus	UPL
Lupinus albifrons var. *albifrons*	silver bush lupine	UPL
Lupinus bicolor	miniature lupine, Lindley's annual lupine	UPL
Lupinus microcarpus var. *microcarpus*	gully/chick lupine	UPL
Lupinus succulentus	arroyo lupine	UPL
Medicago sp.	burclover	N/A
*Medicago lupulina**	black medic	FAC
*Medicago polymorpha**	burclover	UPL
*Melilotus indicus**	sour clover, Indian melilot	FAC
Trifolium sp.	clover	N/A
Trifolium albopurpureum var. albopurpureum	Indian clover	UPL
Trifolium ciliolatum	tree clover	UPL
Trifolium depauperatum var. amplectens	pale bladder clover	FAC-
Trifolium depauperatum var. truncatum	dwarf sack clover	FAC-
Trifolium willdenovii	tomcat clover	UPL
GERANIACEAE - Geranium Family		
*Erodium botrys**	broad-leaved filaree	UPL
*Erodium brachycarpum**	short fruited filaree	UPL
*Erodium cicutarium**	red-stemmed filaree	UPL
*Erodium moschatum**	white-stemmed filaree	UPL
JUGLANDACEAE - Walnut Family		
*Juglans hindsii**	Northern California blacck walnut	FAC
LAMIACEAE - Mint Family		
*Lamium amplexicaule**	henbit	UPL
LOASACEAE - Loasa Family		
Mentzelia affinis	yellow blazingstar	UPL
Mentzelia dispersa	bushy blazingstar	UPL
Mentzelia pectinata	San Joaquin blazingstar	UPL
Mentzelia veatchiana	Veatch's blazingstar	UPL
MALVACEAE - Mallow Family		
*Malva parviflora**	cheeseweed	UPL
MONTIACEAE - Montia Family		
Calandrinia ciliata	redmaids	FACU*
Claytonia exigua ssp. glauca	blue leaved spring beauty	UPL
MORACEAE - Mulberry Family		
*Morus alba**	white/silkworm mulberry	NI
MYRTACEAE - Myrtle Family		
*Eucalyptus sp.**		UPL

ONAGRACEAE - Evening primrose Family		
Camissonia graciliflora	hill suncup	UPL
Clarkia sp.		UPL
PAPAVERACEAE - Poppy Family		
Eschscholzia californica	California poppy	UPL
Platystemon californicus	California cream cups	UPL
PLANTAGINACEAE - Plantain Family		
Plantago erecta	California plantain	UPL
Veronica peregrina ssp. xalapensis	neckweed	OBL
*Veronica persica**	bird's eye speedwell	UPL
POACEAE - Grass Family		
*Avena barbata**	slender wild oat	UPL
*Avena fatua**	wild oat	UPL
*Bromus diandrus**	ripgut brome	UPL
*Bromus hordeaceus**	soft chess	FACW-
*Bromus madritensis ssp. rubens**	foxtail chess, red brome	UPL
*Cynodon dactylon**	bermuda grass	FAC
Deschampsia danthonioides	annual hairgrass	FACW*
Distichlis spicata	saltgrass	FACW*
Festuca idahoensis	Idaho/blue fescue	NI
*Hordeum marinum ssp. gussoneanum**	Mediterranean barley	FAC
*Hordeum murinum ssp. leporinum**	barnyard/farmer's foxtail, foxtail barley	NI
*Lamarckia aurea**	goldentop	UPL
Melica californica	California melicgrass	UPL
Muhlenbergia rigens	deergrass	FACW
*Poa annua**	annual bluegrass	FACW-
Puccinellia nuttalliana	Nuttall's alkaligrass	OBL
Schismus sp.	Mediterranean grass	UPL
*Schismus arabicus**	Mediterranean grass	UPL
*Schismus barbatus**	common Mediterranean grass	UPL
*Triticum aestivum**	common wheat	UPL
*Vulpia bromoides**	brome fescue	FACW
Vulpia microstachys var. ciliata	Eastwood fescue	UPL
Vulpia microstachys var. pauciflora	Pacific fescue	UPL
*Vulpia myuros var. hirsuta**	hairy rat-tail fescue	FACU*
*Vulpia myuros var. myuros**	rat-tail fescue	FACU*
POLEMONIACEAE - Phlox Family		
Gilia clivorum	purplespot gilia	UPL
Gilia tricolor ssp. tricolor	bird's eyes	UPL
Leptosiphon bicolor	true babystars	UPL
Leptosiphon ambiguus	Serpentine leptosiphon	UPL
Linanthus dichotomus	evening snow	UPL
Microsteris gracilis	slender phlox	FACU*
POLYGONACEAE - Buckwheat Family		
Eriogonum sp.	buckwheat	UPL
Eriogonum gracillimum	rose & white buckwheat	UPL
Rumex sp.	dock	
PRIMULACEAE - Primrose Family		
Dodecatheon clevelandii ssp. patulum	shooting star	UPL
RANUNCULACEAE - Buttercup Family		

Delphinium gypsophilum ssp. gypsophilum	Panoche Creek larkspur	UPL
Delphinium patens ssp. patens	zigzag larkspur	UPL
Delphinium cf. recurvatum	recurved larkspur	
Ranunculus californicus	California buttercup	FAC
ROSACEAE - Rose Family		
Aphanes occidentalis	lady's mantle	UPL
SALICACEAE - Willow Family		
Salix laevigata	red willow	~NI
SAXIFRAGACEAE - Saxifrage Family		
Saxifraga californica	California saxifrage	UPL
SCROPHULARIACEAE – Figwort Family		
Castilleja attenuata	valley tassels	UPL
Castilleja exserta ssp. exserta	purple owls clover	UPL
Triphysaria eriantha ssp. eriantha	butter 'n' eggs	UPL
SOLANACEAE - Nightshade Family		
Datura sp.	thornapple/jimsonweed	UPL
*Nicotiana glauca**	tree tobacco	FAC
Solanum umbelliferum	blue witch	UPL
TAMARICACEAE - Tamarisk Family		
*Tamarix aphylla**	athel	FACW-
THEMIDACEAE - Cluster Lily Family		
Brodiaea terrestris ssp. kernensis	Kern brodiaea	UPL
Dichelostemma capitatum ssp. capitatum	blue dicks	UPL
Muilla maritima	sea muilla	UPL
URTICACEAE - Nettle Family		
*Urtica urens**	dwarf nettle	UPL

APPENDIX B: PLANTS OBSERVED ON THE SITE BY SECTION

The table below details the plant species observed on the Panoche Valley solar farm site by section during the rare plant surveys conducted by LOA in March and April 2010.

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Achyrachaena mollis	X	X				X	X	X		X	
Allium crispum			X								
Allium howellii var. *howellii*							X				X
Amsinckia menziesii var. intermedia	X	X	X	X	X	X	X	X	X	X	X
Amsinckia menziesii var. menziesii	X	X	X	X	X	X	X	X	X	X	X
Aphanes occidentalis			X								
Artemisia californica			X	X						X	
Astragalus gambelianus	X	X	X	X	X	X	X	X	X	X	X
Astragalus oxyphysus			X					X		X	
Athysanus pusillus					X				X		
*Atriplex cf. semibaccata**		X									X
Atriplex polycarpa							X				
*Avena barbata**	X	X	X	X		X	X	X	X	X	
*Avena fatua**	X								X		
*Brassica nigra**	X							X	X	X	
*Brassica tournefortii**						X				X	X
Brodiaea terrestris ssp. kernensis		X		X						X	
*Bromus diandrus**	X	X		X		X	X	X		X	
*Bromus hordeaceus**	X	X	X	X	X	X	X	X	X	X	X
*Bromus madritensis ssp. rubens**	X	X	X	X	X	X	X	X	X	X	X
Calandrinia ciliata	X	X	X	X	X	X	X	X	X		X
Camissonia graciliflora			X								
*Capsella bursa-pastoris**	X	X	X	X	X	X	X	X	X	X	X
Castilleja attenuata	X	X	X	X		X	X	X		X	
Castilleja exserta ssp. exserta	X	X	X	X	X	X	X	X	X	X	X
*Centaurea melitensis**				X				X	X	X	
Centaurea sp.*										X	
Clarkia sp.		X	X	X		X		X		X	
Claytonia exigua ssp. glauca			X								
*Convolvulus arvensis**				X	X				X	X	
Crassula connata	X	X	X	X	X	X	X	X	X	X	X
Cryptantha decipiens			X								
Cryptantha flaccida				X							
*Cynodon dactylon**			X								
Datura sp.								X			
Delphinium cf. recurvatum		X									
Delphinium gypsophilum ssp. gypsophilum											X
Delphinium patens ssp. patens				X							
Delphinum sp.			X								
Deschampsia danthonioides			X								
*Descurainia sophia**	X					X	X	X	X		

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Descurainia sp.*										X	
Dichelostemma capitatum ssp. capitatum	X	X	X	X	X	X	X	X	X	X	X
Distichlis spicata							X	X		X	
Dodecatheon clevelandii ssp. patulum			X	X					X		
Eremocarpus setigerus	X	X	X	X	X	X	X	X	X	X	X
Ericameria cuneata											X
Ericameria linearifolia			X								
Ericameria sp.			X						X		
Eriogonum gracillimum	X										
Eriogonum sp.				X							
*Erodium botrys**					X						X
*Erodium brachycarpum**	X	X	X	X	X	X	X	X	X	X	X
*Erodium cicutarium**	X	X	X	X	X	X	X	X	X	X	X
*Erodium moschatum**	X	X	X	X	X	X	X	X	X	X	X
*Eruca vesicaria**										X	
Eschscholzia californica	X	X		X		X	X	X	X	X	
*Eucalyptus sp.**		X							X	X	
Festuca idahoensis						X					X
Gilia clivorum	X	X					X			X	X
Gilia tricolor ssp. tricolor	X		X	X		X			X	X	X
Guillenia lasiophylla	X	X	X	X	X	X	X	X	X	X	X
Heliotropium curassavicum				X				X		X	
Hemizonia sp.			X								
*Herniaria hirsuta var. cinerea**	X	X	X	X	X	X	X	X	X	X	X
Heterotheca oregona var. rudis								X	X	X	X
*Hirschfeldia incana**			X		X		X	X	X	X	X
*Hordeum marinum ssp. gussoneanum**	X	X	X	X	X	X	X	X	X	X	X
*Hordeum murinum ssp. leporinum**	X	X	X	X	X	X	X	X	X	X	X
*Hypochaeris glabra**			X	X							
Isocoma menziesii var. vernonioides										X	
*Juglans hindsii**											
*Lamarckia aurea**			X								
*Lamium amplexicaule**					X						
Lasthenia californica	X	X		X	X	X	X	X	X	X	X
Layia platyglossa	X	X	X	X	X	X	X	X		X	X
Layia sp.				X							
Lepidium dictyotum var. acutidens		X	X		X						
Lepidium dictyotum var. dictyotum		X	X	X	X		X	X	X	X	X
Lepidium nitidum var. nitidum	X	X	X	X	X	X	X	X	X	X	X
Leptosiphon ambiguus		X		X							
Leptosiphon bicolor		X		X							
Linanthus dichotomus		X		X							
Logfia filaginoides	X	X	X	X		X				X	X
Lomatium utriculatum			X								
Lotus strigosus			X								
Lotus wrangelianus	X	X	X	X		X	X	X	X	X	X

Scientific Name	Section										
	3	**4**	**8**	**9**	**10**	**11**	**13**	**14**	**15**	**16**	**19E**
Lupinus albifrons var. *albifrons*			X								
Lupinus bicolor		X	X	X					X	X	
Lupinus microcarpus var. *microcarpus*		X					X			X	X
Lupinus succulentus	X	X	X			X	X	X		X	X
Malacothrix coulteri							X	X		X	
*Malva parviflora**	X	X	X	X	X	X	X	X		X	X
*Matricaria matricarioides**	X	X	X	X	X	X	X	X	X	X	X
*Medicago lupulina**					X						
*Medicago polymorpha**	X	X	X			X		X	X	X	
Medicago sp.							X				X
Melica californica	X	X					X	X			
*Melilotus indicus**						X		X	X	X	
Mentzelia affinis						X					
Mentzelia dispersa								X			
Mentzelia pectinata									X		
Mentzelia veatchiana			X								
Microseris cf. *sylvatica*			X								
Microseris douglasii ssp. *douglasii*		X	X		X	X	X	X	X	X	
Microseris sp.				X							X
Microsteris gracilis		X	X	X	X			X	X	X	X
Monolopia major	X										
Monolopia sp.											X
Monolopia stricta						X	X	X	X		
*Morus alba**										X	
Muhlenbergia rigens											X
Muilla maritima		X	X	X						X	
*Nicotiana glauca**										X	
Pectocarya linearis ssp. ferocula			X								
Pectocarya penicillata		X				X	X	X	X	X	
Phacelia ciliata			X	X	X		X	X	X		X
Plagiobothrys acanthocarpus	X	X	X	X	X	X	X	X	X	X	X
Plagiobothrys canescens	X	X	X	X	X	X	X	X	X	X	X
Plagiobothrys humistratus		X		X				X	X		
Plagiobothrys nothofulvus			X		X		X		X	X	X
Plagiobothrys stipitatus var. micranthus		X			X		X	X	X	X	
Plantago erecta	X	X	X	X	X		X	X	X	X	X
Platystemon californicus				X				X		X	X
*Poa annua**		X	X	X			X		X		X
Psilocarphus brevissimus var. brevissimus		X	X							X	
Puccinellia nuttalliana		X	X	X					X		X
Ranunculus californicus			X								
Raphanus raphanistrum						X	X			X	
Rumex sp.			X	X					X		
Salix laevigata									X		
*Salsola tragus**			X				X				X
Sanicula bipinnatifida		X	X	X						X	

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Sanicula crassicaulis		X	X	X						X	
Saxifraga californica			X								
*Schismus arabicus**		X	X		X		X		X	X	X
*Schismus barbatus**	X					X		X	X	X	
Schismus sp.				X							
Senecio flaccidus var. douglasii			X	X	X					X	
*Senecio vulgaris**	X	X	X	X	X	X	X	X	X	X	X
*Sinapis arvensis**		X				X		X	X	X	X
*Sisymbrium irio**	X	X	X	X	X	X	X	X	X	X	X
*Sisymbrium orientale**						X		X	X	X	
Solanum umbelliferum								X			
*Sonchus oleraceus**		X								X	X
*Spergularia rubra**		X									
Stellaria media	X	X	X	X	X				X	X	X
Stellaria nitens	X	X	X	X	X	X		X	X	X	
Stephanomeria sp.								X	X		
*Tamarix aphylla**									X		
Tauschia hartwegii		X	X								
Thysanocarpus curvipes	X		X	X	X				X		X
Tragopogon sp.			X								
Trifolium albopurpureum var. albopurpureum	X	X	X	X		X		X	X	X	X
Trifolium ciliolatum		X				X		X		X	
Trifolium depauperatum var. amplectens		X			X		X			X	
Trifolium depauperatum var. truncatum	X	X	X	X		X	X	X	X	X	X
Trifolium sp.											X
Trifolium willdenovii	X	X	X	X	X	X	X	X	X	X	
Triphysaria eriantha ssp. eriantha		X	X	X			X				X
*Triticum aestivum**		X								X	
Tropidocarpum gracile	X	X	X	X	X				X	X	X
Uropappus lindleyi			X	X							
*Urtica urens**				X					X		
Veronica peregrina ssp. xalapensis			X								
*Veronica persica**		X							X	X	
*Vulpia bromoides**	X	X	X	X	X	X	X	X	X	X	X
Vulpia microstachys var. ciliata			X	X	X				X		X
Vulpia microstachys var. pauciflora	X	X	X			X	X	X		X	
*Vulpia myuros var. hirsuta**									X		
*Vulpia myuros var. myuros**	X	X	X	X	X	X	X	X	X	X	X

APPENDIX C

CALIFORNIA NATIVE PLANT SOCIETY BOTANICAL SURVEY GUIDELINES
&
CALIFORNIA DEPARTMENT OF FISH AND GAME PROTOCOLS FOR SURVEYING AND EVALUATING IMPACTS TO SPECIAL STATUS NATIVE PLANT POPULATIONS AND NATURAL COMMUNITIES

CNPS Botanical Survey Guidelines

(from CNPS *Inventory*, 6th Edition, 2001)

The following recommendations are intended to help those who prepare and review environmental documents determine when a botanical survey is needed, who should be considered qualified to conduct such surveys, how surveys should be conducted, and what information should be contained in the survey report. The California Native Plant Society recommends that lead agencies not accept the results of surveys unless they are conducted and reported according to these guidelines.

1. Botanical surveys are conducted in order to determine the environmental effects of proposed projects on all botanical resources, including special status plants (rare, threatened, and endangered plants) and plant (vegetation) communities. Special status plants are not limited to those that have been listed by state and federal agencies but include any plants that, based on all available data, can be shown to be rare, threatened, or endangered under the following definitions:

A species, subspecies, or variety of plant is "endangered" when the prospects of its survival and reproduction are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, or disease. A plant is "threatened" when it is likely to become endangered in the foreseeable future in the absence of protection measures. A plant is "rare" when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.[1]

Rare plant (vegetation) communities are those communities that are of highly limited distribution. These communities may or may not contain special status plants. The most current version of the California Natural Diversity Database's *List of California Terrestrial Natural Communities*[2] should be used as a guide to the names and status of communities.

Consistent with the California Native Plant Society's goal of preserving plant biodiversity on a regional and local scale, and with California Environmental Quality Act environmental impact assessment criteria[3], surveys should also assess impacts to locally significant plants. Both plants and plant communities can be considered significant if their local occurrence is on the outer limits of known distribution, a range extension, a rediscovery, or rare or uncommon in a local context (such as within a county or region). Lead agencies should address impacts to these locally unique botanical resources regardless of their status elsewhere in the state.

2. Botanical surveys must be conducted to determine if, or to the extent that, special status or locally significant plants and plant communities will be affected by a proposed project when any natural vegetation occurs on the site and the project has the potential for direct or indirect effects on vegetation.

3. Those conducting botanical surveys must possess the following qualifications:

a. Experience conducting floristic field surveys;
b. Knowledge of plant taxonomy and plant community ecology and classification;
c. Familiarity with the plants of the area, including special status and locally significant plants;
d. Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
e. Experience with analyzing impacts of a project on native plants and communities.

4. Botanical surveys should be conducted in a manner that will locate any special status or locally significant plants or plant communities that may be present. Specifically, botanical surveys should be:

a. Conducted in the field at the proper times of year when special status and locally significant plants are both evident and identifiable. When special status plants are known to occur in the type(s) of habitat present in the project area, nearby accessible occurrences of the plants (reference sites) should be observed to determine that the plants are identifiable at the time of survey.
b. Floristic in nature. A floristic survey requires that every plant observed be identified to species, subspecies, or variety as applicable. In order to properly characterize the site, a complete list of plants observed on the site shall be included in every botanical survey report. In addition, a sufficient number of visits spaced throughout the growing season is necessary to prepare an accurate inventory of all plants that exist on the

site. The number of visits and the timing between visits must be determined by geographic location, the plant communities present, and the weather patterns of the year(s) in which the surveys are conducted.

c. Conducted in a manner that is consistent with conservation ethics and accepted plant collection and documentation techniques[4,5]. Collections (voucher specimens) of special status and locally significant plants should be made, unless such actions would jeopardize the continued existence of the population. A single sheet should be collected and deposited at a recognized public herbarium for future reference. All collections shall be made in accordance with applicable state and federal permit requirements. Photography may be used to document plant identification only when the population cannot withstand collection of voucher specimens.

d. Conducted using systematic field techniques in all habitats of the site to ensure a thorough coverage of potential impact areas. All habitats within the project site must be surveyed thoroughly in order to properly inventory and document the plants present. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity.

e. Well documented. When a special status plant (or rare plant community) is located, a California Native Species (or Community) Field Survey Form or equivalent written form, accompanied by a copy of the appropriate portion of a 7.5-minute topographic map with the occurrence mapped, shall be completed, included within the survey report, and separately submitted to the California Natural Diversity Database. Population boundaries should be mapped as accurately as possible. The number of individuals in each population should be counted or estimated, as appropriate.

5. Complete reports of botanical surveys shall be included with all environmental assessment documents, including Negative Declarations and Mitigated Negative Declarations, Timber Harvesting Plans, Environmental Impact Reports, and Environmental Impact Statements. Survey reports shall contain the following information:

a. Project location and description, including:
    1. A detailed map of the location and footprint of the proposed project.
    2. A detailed description of the proposed project, including one-time activities and ongoing activities that may affect botanical resources.
    3. A description of the general biological setting of the project area.

b. Methods, including:
    1. Survey methods for each of the habitats present, and rationale for the methods used.
    2. Description of reference site(s) visited and phenological development of the target special status plants, with an assessment of any conditions differing from the project site that may affect their identification.
    3. Dates of surveys and rationale for timing and intervals; names of personnel conducting the surveys; and total hours spent in the field for each surveyor on each date.
    4. Location of deposited voucher specimens and herbaria visited.

c. Results, including:
    1. A description and map of the vegetation communities on the project site. The current standard for vegetation classification, *A Manual of California Vegetation*[6], should be used as a basis for the habitat descriptions and the vegetation map. If another vegetation classification system is used, the report must reference the system and provide the reason for its use.
    2. A description of the phenology of each of the plant communities at the time of each survey date.
    3. A list of all plants observed on the project site using accepted scientific nomenclature, along with any special status designation. The reference(s) used for scientific nomenclature shall be cited.
    4. Written description and detailed map(s) showing the location of each special status or locally significant plant found, the size of each population, and method used to estimate or census the population.
    5. Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms and accompanying maps.

d. Discussion, including:
    1. Any factors that may have affected the results of the surveys (e.g., drought, human disturbance, recent fire).
    2. Discussion of any special local or range-wide significance of any plant population or community on the site.
    3. An assessment of potential impacts. This shall include a map showing the distribution of special status and locally significant plants and communities on the site in relation to the proposed activities. Direct, indirect, and cumulative impacts to the plants and communities shall be discussed.
    4. Recommended measures to avoid and/or minimize direct, indirect, and cumulative impacts.

e. References cited and persons contacted.

f. Qualifications of field personnel including any special experience with the habitats and special status plants present on the site.

3.3.2 References Cited

[1] California Environmental Quality Act Guidelines, §15065 and §15380.

[2] List of California Terrestrial Natural Communities. California Department of Fish and Game Natural Diversity Database. Sacramento, CA.

[3] California Environmental Quality Act Guidelines, Appendix G (Initial Study Environmental Checklist).

[4] Collecting Guidelines and Documentation Techniques. California Native Plant Society Policy (adopted March 4, 1995).

[5] Ferren, W.R., Jr., D.L. Magney, and T.A. Sholars. 1995. The Future of California Floristics and Systematics: Collecting Guidelines and Documentation Techniques. *Madroño* 42(2):197-210.

[6] Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society. Sacramento, CA. 471 pp.

Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities

State of California
CALIFORNIA NATURAL RESOURCES AGENCY
Department of Fish and Game
November 24, 2009[1]

INTRODUCTION AND PURPOSE

The conservation of special status native plants and their habitats, as well as natural communities, is integral to maintaining biological diversity. The purpose of these protocols is to facilitate a consistent and systematic approach to the survey and assessment of special status native plants and natural communities so that reliable information is produced and the potential of locating a special status plant species or natural community is maximized. They may also help those who prepare and review environmental documents determine when a botanical survey is needed, how field surveys may be conducted, what information to include in a survey report, and what qualifications to consider for surveyors. The protocols may help avoid delays caused when inadequate biological information is provided during the environmental review process; assist lead, trustee and responsible reviewing agencies to make an informed decision regarding the direct, indirect, and cumulative effects of a proposed development, activity, or action on special status native plants and natural communities; meet California Environmental Quality Act (CEQA)[2] requirements for adequate disclosure of potential impacts; and conserve public trust resources.

DEPARTMENT OF FISH AND GAME TRUSTEE AND RESPONSIBLE AGENCY MISSION

The mission of the Department of Fish and Game (DFG) is to manage California's diverse wildlife and native plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. DFG has jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations (Fish and Game Code §1802). DFG, as trustee agency under CEQA §15386, provides expertise in reviewing and commenting on environmental documents and makes protocols regarding potential negative impacts to those resources held in trust for the people of California.

Certain species are in danger of extinction because their habitats have been severely reduced in acreage, are threatened with destruction or adverse modification, or because of a combination of these and other factors. The California Endangered Species Act (CESA) provides additional protections for such species, including take prohibitions (Fish and Game Code §2050 *et seq.*). As a responsible agency, DFG has the authority to issue permits for the take of species listed under CESA if the take is incidental to an otherwise lawful activity; DFG has determined that the impacts of the take have been minimized and fully mitigated; and, the take would not jeopardize the continued existence of the species (Fish and Game Code §2081). Surveys are one of the preliminary steps to detect a listed or special status plant species or natural community that may be impacted significantly by a project.

DEFINITIONS

Botanical surveys provide information used to determine the potential environmental effects of proposed projects on all special status plants and natural communities as required by law (i.e., CEQA, CESA, and Federal Endangered Species Act (ESA)). Some key terms in this document appear in **bold font** for assistance in use of the document.

For the purposes of this document, **special status plants** include all plant species that meet one or more of the following criteria[3]:

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1 This document replaces the DFG document entitled "Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities."

2 http://ceres.ca.gov/ceqa/

3 Adapted from the East Alameda County Conservation Strategy available at http://www.fws.gov/sacramento/EACCS/Documents/080228_Species_Evaluation_EACCS.pdf

- Listed or proposed for listing as threatened or endangered under ESA or candidates for possible future listing as threatened or endangered under the ESA (50 CFR §17.12).

- Listed[4] or candidates for listing by the State of California as threatened or endangered under CESA (Fish and Game Code §2050 *et seq.*). A species, subspecies, or variety of plant is **endangered** when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (Fish and Game Code §2062). A plant is **threatened** when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish and Game Code §2067).

- Listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 *et seq*.). A plant is **rare** when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901).

- Meet the definition of rare or endangered under CEQA §15380(b) and (d). Species that may meet the definition of rare or endangered include the following:

    - Species considered by the California Native Plant Society (CNPS) to be “rare, threatened or endangered in California” (Lists 1A, 1B and 2);

    - Species that may warrant consideration on the basis of local significance or recent biological information[5];

    - Some species included on the California Natural Diversity Database’s (CNDDB) *Special Plants, Bryophytes, and Lichens List* (California Department of Fish and Game 2008)[6].

- Considered a **locally significant species,** that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.

Special status natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special status species or their habitat. The most current version of the Department’s *List of California Terrestrial Natural Communities*[7] indicates which natural communities are of special status given the current state of the California classification.

Most types of wetlands and riparian communities are considered special status natural communities due to their limited distribution in California. These natural communities often contain special status plants such as those described above. These protocols may be used in conjunction with protocols formulated by other agencies, for example, those developed by the U.S. Army Corps of Engineers to delineate jurisdictional wetlands[8] or by the U.S. Fish and Wildlife Service to survey for the presence of special status plants[9].

4 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

5 In general, CNPS List 3 plants (plants about which more information is needed) and List 4 plants (plants of limited distribution) may not warrant consideration under CEQA §15380. These plants may be included on special status plant lists such as those developed by counties where they would be addressed under CEQA §15380. List 3 plants may be analyzed under CEQA §15380 if sufficient information is available to assess potential impacts to such plants. Factors such as regional rarity vs. statewide rarity should be considered in determining whether cumulative impacts to a List 4 plant are significant even if individual project impacts are not. List 3 and 4 plants are also included in the California Natural Diversity Database’s (CNDDB) *Special Plants, Bryophytes, and Lichens List.* [Refer to the current online published list available at: http://www.dfg.ca.gov/biogeodata.] Data on Lists 3 and 4 plants should be submitted to CNDDB. Such data aids in determining or revising priority ranking.

6 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

7 http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf. The rare natural communities are asterisked on this list.

8 http://www.wetlands.com/regs/tlpge02e.htm

9 U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

BOTANICAL SURVEYS

Conduct botanical surveys prior to the commencement of any activities that may modify vegetation, such as clearing, mowing, or ground-breaking activities. It is appropriate to conduct a botanical field survey when:

- Natural (or naturalized) vegetation occurs on the site, and it is unknown if special status plant species or natural communities occur on the site, and the project has the potential for direct or indirect effects on vegetation; or
- Special status plants or natural communities have historically been identified on the project site; or
- Special status plants or natural communities occur on sites with similar physical and biological properties as the project site.

SURVEY OBJECTIVES

Conduct field surveys in a manner which maximizes the likelihood of locating special status plant species or special status natural communities that may be present. Surveys should be **floristic in nature**, meaning that every plant taxon that occurs on site is identified to the taxonomic level necessary to determine rarity and listing status. "Focused surveys" that are limited to habitats known to support special status species or are restricted to lists of likely potential species are not considered floristic in nature and are not adequate to identify all plant taxa on site to the level necessary to determine rarity and listing status. Include a list of plants and natural communities detected on the site for each botanical survey conducted. More than one field visit may be necessary to adequately capture the floristic diversity of a site. An indication of the prevalence (estimated total numbers, percent cover, density, etc.) of the species and communities on the site is also useful to assess the significance of a particular population.

SURVEY PREPARATION

Before field surveys are conducted, compile relevant botanical information in the general project area to provide a regional context for the investigators. Consult the CNDDB[10] and BIOS[11] for known occurrences of special status plants and natural communities in the project area prior to field surveys. Generally, identify vegetation and habitat types potentially occurring in the project area based on biological and physical properties of the site and surrounding ecoregion[12], unless a larger assessment area is appropriate. Then, develop a list of special status plants with the potential to occur within these vegetation types. This list can serve as a tool for the investigators and facilitate the use of reference sites; however, special status plants on site might not be limited to those on the list. Field surveys and subsequent reporting should be comprehensive and floristic in nature and not restricted to or focused only on this list. Include in the survey report the list of potential special status species and natural communities, and the list of references used to compile the background botanical information for the site.

SURVEY EXTENT

Surveys should be comprehensive over the entire site, including areas that will be directly or indirectly impacted by the project. Adjoining properties should also be surveyed where direct or indirect project effects, such as those from fuel modification or herbicide application, could potentially extend offsite. Pre-project surveys restricted to known CNDDB rare plant locations may not identify all special status plants and communities present and do not provide a sufficient level of information to determine potential impacts.

FIELD SURVEY METHOD

Conduct surveys using **systematic field techniques** in all habitats of the site to ensure thorough coverage of potential impact areas. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity, which determines the distance at which plants can be identified. Conduct surveys by walking over the entire site to ensure thorough coverage, noting all plant taxa

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10 Available at http://www.dfg.ca.gov/biogeodata/cnddb

11 http://www.bios.dfg.ca.gov/

12 Ecological Subregions of California, available at http://www.fs.fed.us/r5/projects/ecoregions/toc.htm

observed. The level of effort should be sufficient to provide comprehensive reporting. For example, one person-hour per eight acres per survey date is needed for a comprehensive field survey in grassland with medium diversity and moderate terrain[13], with additional time allocated for species identification.

TIMING AND NUMBER OF VISITS

Conduct surveys in the field at the time of year when species are both evident and identifiable. Usually this is during flowering or fruiting. Space visits throughout the growing season to accurately determine what plants exist on site. Many times this may involve multiple visits to the same site (e.g. in early, mid, and late-season for flowering plants) to capture the floristic diversity at a level necessary to determine if special status plants are present[14]. The timing and number of visits are determined by geographic location, the natural communities present, and the weather patterns of the year(s) in which the surveys are conducted.

REFERENCE SITES

When special status plants are known to occur in the type(s) of habitat present in the project area, observe reference sites (nearby accessible occurrences of the plants) to determine whether those species are identifiable at the time of the survey and to obtain a visual image of the target species, associated habitat, and associated natural community.

USE OF EXISTING SURVEYS

For some sites, floristic inventories or special status plant surveys may already exist. Additional surveys may be necessary for the following reasons:

- Surveys are not current[15]; or
- Surveys were conducted in natural systems that commonly experience year to year fluctuations such as periods of drought or flooding (e.g. vernal pool habitats or riverine systems); or
- Surveys are not comprehensive in nature; or fire history, land use, physical conditions of the site, or climatic conditions have changed since the last survey was conducted[16]; or
- Surveys were conducted in natural systems where special status plants may not be observed if an annual above ground phase is not visible (e.g. flowers from a bulb); or
- Changes in vegetation or species distribution may have occurred since the last survey was conducted, due to habitat alteration, fluctuations in species abundance and/or seed bank dynamics.

NEGATIVE SURVEYS

Adverse conditions may prevent investigators from determining the presence of, or accurately identifying, some species in potential habitat of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any given year. Discuss such conditions in the report.

The failure to locate a known special status plant occurrence during one field season does not constitute evidence that this plant occurrence no longer exists at this location, particularly if adverse conditions are present. For example, surveys over a number of years may be necessary if the species is an annual plant having a persistent, long-lived seed bank and is known not to germinate every year. Visits to the site in more

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13 Adapted from U.S. Fish and Wildlife Service kit fox survey guidelines available at www.fws.gov/sacramento/es/documents/kitfox_no_protocol.pdf

14 U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

15 Habitats, such as grasslands or desert plant communities that have annual and short-lived perennial plants as major floristic components may require yearly surveys to accurately document baseline conditions for purposes of impact assessment. In forested areas, however, surveys at intervals of five years may adequately represent current conditions. For forested areas, refer to "Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations", available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

16 U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/botanicalinventories.pdf

than one year increase the likelihood of detection of a special status plant especially if conditions change. To further substantiate negative findings for a known occurrence, a visit to a nearby reference site may ensure that the timing of the survey was appropriate.

REPORTING AND DATA COLLECTION

Adequate information about special status plants and natural communities present in a project area will enable reviewing agencies and the public to effectively assess potential impacts to special status plants or natural communities[17] and will guide the development of minimization and mitigation measures. The next section describes necessary information to assess impacts. For comprehensive, systematic surveys where no special status species or natural communities were found, reporting and data collection responsibilities for investigators remain as described below, excluding specific occurrence information.

SPECIAL STATUS PLANT OR NATURAL COMMUNITY OBSERVATIONS

Record the following information for locations of each special status plant or natural community detected during a field survey of a project site.

- A detailed map (1:24,000 or larger) showing locations and boundaries of each special status species occurrence or natural community found as related to the proposed project. Mark occurrences and boundaries as accurately as possible. Locations documented by use of global positioning system (GPS) coordinates must include the datum[18] in which they were collected;
- The site-specific characteristics of occurrences, such as associated species, habitat and microhabitat, structure of vegetation, topographic features, soil type, texture, and soil parent material. If the species is associated with a wetland, provide a description of the direction of flow and integrity of surface or subsurface hydrology and adjacent off-site hydrological influences as appropriate;
- The number of individuals in each special status plant population as counted (if population is small) or estimated (if population is large);
- If applicable, information about the percentage of individuals in each life stage such as seedlings vs. reproductive individuals;
- The number of individuals of the species per unit area, identifying areas of relatively high, medium and low density of the species over the project site; and
- Digital images of the target species and representative habitats to support information and descriptions.

FIELD SURVEY FORMS

When a special status plant or natural community is located, complete and submit to the CNDDB a California Native Species (or Community) Field Survey Form[19] or equivalent written report, accompanied by a copy of the relevant portion of a 7.5 minute topographic map with the occurrence mapped. Present locations documented by use of GPS coordinates in map and digital form. Data submitted in digital form must include the datum[20] in which it was collected. If a potentially undescribed special status natural community is found on the site, document it with a Rapid Assessment or Relevé form[21] and submit it with the CNDDB form.

VOUCHER COLLECTION

Voucher specimens provide verifiable documentation of species presence and identification as well as a public record of conditions. This information is vital to all conservation efforts. Collection of voucher specimens should

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17 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata. For Timber Harvest Plans (THPs) please refer to the “Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations”, available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

18 NAD83, NAD27 or WGS84

19 http://www.dfg.ca.gov/biogeodata

20 NAD83, NAD27 or WGS84

21 http://www.dfg.ca.gov/biogeodata/vegcamp/veg_publications_protocols.asp

be conducted in a manner that is consistent with conservation ethics, and is in accordance with applicable state and federal permit requirements (e.g. incidental take permit, scientific collection permit). Voucher collections of special status species (or suspected special status species) should be made only when such actions would not jeopardize the continued existence of the population or species.

Deposit voucher specimens with an indexed regional herbarium[22] no later than 60 days after the collections have been made. Digital imagery can be used to supplement plant identification and document habitat. Record all relevant permittee names and permit numbers on specimen labels. A collecting permit is required prior to the collection of State-listed plant species[23].

BOTANICAL SURVEY REPORTS

Include reports of botanical field surveys containing the following information with project environmental documents:

- **Project and site description**
    - A description of the proposed project;
    - A detailed map of the project location and study area that identifies topographic and landscape features and includes a north arrow and bar scale; and,
    - A written description of the biological setting, including vegetation[24] and structure of the vegetation; geological and hydrological characteristics; and land use or management history.

- **Detailed description of survey methodology and results**
    - Dates of field surveys (indicating which areas were surveyed on which dates), name of field investigator(s), and total person-hours spent on field surveys;
    - A discussion of how the timing of the surveys affects the comprehensiveness of the survey;
    - A list of potential special status species or natural communities;
    - A description of the area surveyed relative to the project area;
    - References cited, persons contacted, and herbaria visited;
    - Description of reference site(s), if visited, and phenological development of special status plant(s);
    - A list of all taxa occurring on the project site. Identify plants to the taxonomic level necessary to determine whether or not they are a special status species;
    - Any use of existing surveys and a discussion of applicability to this project;
    - A discussion of the potential for a false negative survey;
    - Provide detailed data and maps for all special plants detected. Information specified above under the headings "Special Status Plant or Natural Community Observations," and "Field Survey Forms," should be provided for locations of each special status plant detected;
    - Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms should be sent to the CNDDB and included in the environmental document as an Appendix. It is not necessary to submit entire environmental documents to the CNDDB; and,
    - The location of voucher specimens, if collected.

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22 For a complete list of indexed herbaria, see: Holmgren, P., N. Holmgren and L. Barnett. 1990. Index Herbariorum, Part 1: Herbaria of the World. New York Botanic Garden, Bronx, New York. 693 pp. Or: http://www.nybg.org/bsci/ih/ih.html

23 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

24 A vegetation map that uses the National Vegetation Classification System (http://biology.usgs.gov/npsveg/nvcs.html), for example *A Manual of California Vegetation*, and highlights any special status natural communities. If another vegetation classification system is used, the report should reference the system, provide the reason for its use, and provide a crosswalk to the National Vegetation Classification System.

- **Assessment of potential impacts**
    - A discussion of the significance of special status plant populations in the project area considering nearby populations and total species distribution;
    - A discussion of the significance of special status natural communities in the project area considering nearby occurrences and natural community distribution;
    - A discussion of direct, indirect, and cumulative impacts to the plants and natural communities;
    - A discussion of threats, including those from invasive species, to the plants and natural communities;
    - A discussion of the degree of impact, if any, of the proposed project on unoccupied, potential habitat of the species;
    - A discussion of the immediacy of potential impacts; and,
    - Recommended measures to avoid, minimize, or mitigate impacts.

QUALIFICATIONS

Botanical consultants should possess the following qualifications:

- Knowledge of plant taxonomy and natural community ecology;
- Familiarity with the plants of the area, including special status species;
- Familiarity with natural communities of the area, including special status natural communities;
- Experience conducting floristic field surveys or experience with floristic surveys conducted under the direction of an experienced surveyor;
- Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
- Experience with analyzing impacts of development on native plant species and natural communities.

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APPENDIX D

DELPHINIUM FOUND WITHIN THE APNOCHE SURVEY AREA (MEMORANDUM FROM DR. JAMES PAULUS)

Memorandum May 3, 2010

To: Davinna Ohlson, project manager
From: Jim Paulus

RE: Delphinium found within the Panoche survey area

Populations of native perennial herbs of the genus *Delphinium* were located in Sections 4, 8, 9 and 19 during surveys conducted in March and April. At least one individual in each located population was exhibiting flowers either upon initial detection or when the population was revisited by the project botanist. Identification to species at each location therefore was based upon available leaf, stem and flower characters. In addition, one individual in Section 8 was excavated in order to observe below-ground characters such as root length and strength of the stem attachment.

Plants in Sections 9 were assigned to the relatively common species *D. patens* ssp. *patens*, based upon above-ground characters exhibited by blooming individuals. Plants identified as *D. patens* ssp. *patens* had relatively dark purple-blue sepals, and petals of similar coloration except for whitish margins and white hairs on the upper surfaces. White petals would be expected of both *D. recurvatum* and *D. gypsophilum*. In addition, the flowers exhibited by *D. patens* were relatively small and crowded in comparison to flowers produced by populations located in other Sections. Sepal spurs were consistently less than 10 mm in length, lateral sepals were less than 15 mm in length, and inflorescence internodes were generally less than 20 mm apart. Plants of *D. recurvatum* or *D. gypsophilum* may be expected to produce at least some flowers of greater overall size and greater spacing within the inflorescence. Finally, the lower stems of *D. patens* in Section 9 were consistently glabrous, but were never glaucous and did not appear as reddish as the stems of *Delphinium* located elsewhere within the survey area.

Plants in Section 19 were assigned to the species *D. gypsophilum* ssp. *gypsophilum* (CNPS 4.2, no state or federal listing), based upon above-ground characters. These plants produced up to 25 flowers per inflorescence, spaced up to 3.5 cm apart and held on pedicels of 10-20 mm length. In general, these plants were robust relative to populations found elsewhere within the survey area, with some individuals standing greater than 1 m tall. The expected size of the stem and inflorescence would be smaller for *D. recurvatum*, which is described as generally less than 60 cm tall and with more crowded flowers due to pedicels spaced generally less than 2.5 cm apart. Also, the plants at had exhibited strongly glaucous lower stems, which is typical of *D. gypsophilum* ssp. *gypsophilum*, but not described in literature sources for *D. recurvatum*. Plants in Section 19 exhibited whitish flowers, with little variation between the sepal and petal colors. Some individuals had a small amount of blue in the sepals, which were observed to be reflexed relatively little (or none) even on older flowers. In contrast, *D. recurvatum* flowers would be generally expected to show greater contrast between sepals (bluish) and petals (white), with reflexed sepals. Characters that did not evoke confident separation included the leaves, which were at most ciliate along the edges, and petals that on some individuals were hairier on the inner surfaces relative to the outer surfaces. Expected characters for *D. gypsophilum* would include puberulent leaf margins and equally hairy petal surfaces.

Plants in Sections 4 and 8 could not be confidently separated from the rare species *D. recurvatum* (CNPS 1B.1, no state or federal listing), based upon above-ground characters and below-ground characters of one individual excavated in Section 8. These plants, comprising eight separate groupings (one in Section 8 and seven in Section 4), generally exhibited greater variation in color of petals and sepals, with some plants having light purple-blue sepals that strongly contrasted with the white petals (Figure 1). No plants in these groups were observed to achieve greater than 60 cm overall height. Stems were observed to be consistently reddish and glabrous, but not glaucous. Inflorescence size (ie, pedicel spacing and length, number of flowers) was consistent with the size expected for *D. recurvatum*, with less than 10 flowers held on glabrous pedicels (ascending at 45 degrees) spaced at about 2 cm apart. Finally, the root system investigated in Section 8 (Figure 2) was highly branched, with a narrowed but firm attachment to the stem. Some plants within each of these groups (all located within an area of about one square mile) exhibited often strong variation in these characters, making positive identification to the species level of taxa difficult. For example, sepal coloration and reflexion varied considerably, with sepal color ranging from white to slightly pinkish (Figure 3) to slightly or rather strongly bluish (Figure 1), and older flowers attaining a range of barely to strongly reflexed. This variability was observed on at least one occasion to occur on a single individual. Petal hairiness with regard to overall amount of hairs and contrast between inner and outer surfaces was also variable, although all plants exhibited some degree of white-hairiness on both the inner and outer surfaces. Leaves were never puberulent, appearing overall glabrous but upon close inspection having ciliate hairs on leaf margins and thus resembling plants separated as *D. gypsophilum* in Section 19. Like all other *Delphinium* found within the survey area except *D. patens* in Section 9, plants in Sections 4 and 8 developed darkish, often greenish, central sepal spots, which is not a character described in the available literature or appearing in herbaria specimen photographs of *D. recurvatum*.

As of this writing, it is speculated that some hybridization has occurred among the *Delphinium* that now populate portions of Sections 4 and 8. Hybridization would account for the relatively high inter- and intra-group variability, and is a generally well-documented trait of local *Delphinium* species. This known tendency for hybridization is thought to be more commonly realized in areas that have been significantly disturbed, and disturbance is certainly in force within the habitat where these plants were found. This area (the flatlands at and near Sections 4 and 8) likely once supported alkaline scrub vegetation, but has been historically used for pasture. It now supports heavily grazed non-native grasslands. Sections 4 and 8 where *Delphinium* populations have survived do not exhibit the tillage lines found in other Sections. The tentatively assigned *Delphinium recurvatum* remains there (despite grazing disturbance), but has possibly responded to habitat alteration by becoming hybridized with other locally occurring species such as *D. gypsophilum* ssp. *gypsophilum* or *D. hesperium* ssp. *pallescens*. It is likely that revisiting all of the populations located in Sections 4 and 8 during fruit and seed maturation will allow more confident assignation to the species level of taxa.

Figure 1. Delphinium cf. recurvatum, Section 4

Figure 3. Delphinium cf. recurvatum, Section 4

Figure 2. Delphinium cf. recurvatum, Section 8

LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

September 17, 2010

Eric Cherniss
Vice President of Project Development
Solargen Energy, Inc.
20400 Stevens Creek Blvd., Suite 700
Cupertino, CA 95014

Subject: Late spring rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN 1297-04c)

Dear Eric:

Live Oak Associates, Inc. (LOA) has completed a focused late spring survey for special status plants (i.e., plants designated as endangered, threatened, or rare, per CDFG, 2010, and plants listed by the California Native Plant Society, per CNPS, 2009) on 4,717 acres of the Panoche Valley Solar Farm site (hereafter referred to as "study area") located along Little Panoche Road in San Benito County, California. Specifically, this survey was conducted to determine whether or not special status plants that would bloom in May, June or July were present within the study area in 2010. The results of a late spring/early fall survey for special status plants that would bloom in August, September, and October have been previously reported in the memorandum "Late summer/early fall rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN1297-04)," date November 24, 2009, and the results of an early spring survey for special status plants that would bloom in March or April have been previously reported in the memorandum "Early spring rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN 1297-04b)," dated June 17, 2010.

Site Location and Existing Conditions

The project site occurs on the floor of Panoche Valley between the Gabilan Range to the west and the Panoche Hills to the east. The survey area is generally bounded to the west, north, and east by open space and rangelands and to the south by Yturiarte Road (Figure 1). Surrounding lands consist of rangelands used for cattle grazing.

The late spring 2010 study area included the same valley floor topography surveyed in early spring (generally, all or portions of Sections 3, 4, 5, 8, 9, 10, 11, 13, 14, 15, and 16, of Township 15 south, Range 10 east, and Section 19 of Township 15 south, Range 11 east). All seasonally flowing creeks, ephemeral drainages and low swales that exhibited surface waters during the

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early spring surveys had become dried as the area entered seasonal drought during the May through July timing of the late spring survey. A few artificially charged ponds associated with cattle grazing remained wet. Rainfall events during the May-July period provided only trace amounts of precipitation. Non-native, annual species, which are clearly dominant throughout the study area, were senescing at the time of the survey. However, the climate in May through early June was unusually cool and moist, providing an excellent opportunity to complete an inventory of later-blooming members of the study area's plant assemblage.

Literature Search and Botanical Survey

A literature search was conducted in order to identify special status plant species that may potentially occur within the study area's available habitats. A review of California Natural Diversity Database records and environmental documentation for area projects, and consultation with local California Department of Fish and Game and Bureau of Land Management botanists (Mr. Dave Hacker, Ms. Ellen Cypher, Mr. Ryan O'Dell) uncovered 23 potentially occurring special status plants (Table 1). Of these, 22 have flowering and fruiting periods (optimal survey times) that fall within the May-July period that was chosen for the late spring botanical survey. This includes San Joaquin woollythreads (*Monolopia congdonii*) and California jewelflower (*Caulanthus californicus*), species that are federally listed as Endangered. The optimal survey times for eight of these species (*Astragalus macrodon*, *Atriplex vallicola*, *Blepharizonia plumosa*, *Cordylanthus mollis* ssp. *hispidus*, *Deinandra halliana*, *Eriogonum vestitum*, *Navarretia nigelliformis* ssp. *radians,* and *Trichostema ovatum*) fall within the survey period chosen for late spring surveys. Due to their normally late development, these species likely would not have been reliably separable from related common species during the March-April early spring survey period.

Table 1. Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2009).

Species	**Status***	**Habitat**	**Blooming Period**
Santa Clara thorn-mint *Acanthomintha lanceolata* Annual herb	CNPS 4	Chaparral, woodland, rocky, often serpentine	March-June
Forked fiddleneck *Amsinckia vernicosa* var. *furcata* Annual herb	CNPS 4	Woodland, grassland	February-May
California androsace *Androsace elongata* ssp. *acuta* Annual herb	CNPS 4	Chaparral, woodland, meadows and seeps, grassland	March-June
Salinas milk-vetch *Astragalus macrodon* Perennial herb	CNPS 4	Chaparral, woodland, grassland	April-July

Table 1 (cont'd.). Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2009).

Species	**Status***	**Habitat**	**Blooming Period**
Crownscale *Atriplex coronata* var. *coronata* Annual herb	CNPS 4	Chenopod scrub, grasslands, and vernal pools, alkaline soils	March–October
Lost Hills crownscale *Atriplex vallicola* Annual herb	CNPS 1B	Chenopod scrub, grasslands, and vernal pools, alkaline soils.	April–August
Big tarplant *Blepharizonia plumosa* Annual herb	CNPS 1B	Dry areas in grasslands	July–October
Round-leaved filaree *California macrophylla* Annual herb	CNPS 1B	Woodland, grassland	March-May
California jewelflower *Caulanthus californicus* Perennial herb	CNPS 1B Federal Endangered	grasslands (non-alkaline), flats	March-May
Lemmon's jewelflower *Caulanthus coulteri* var. *lemmonii* Perennial herb	CNPS 1B	Pinyon-juniper woodland, grassland	March-May
Hispid bird's-beak *Cordylanthus mollis* ssp. *hispidus* Annual herb	CNPS 1B	Meadows and seeps, playas, grasslands, often damp, alkaline	June–September
Hall's tarplant *Deinandra halliana* Annual herb	CNPS 1B	Chenopod scrub, grassland, clay soils	April-May
Gypsum-loving larkspur *Delphinium gypsophilum* ssp. *gypsophilum* Perennial herb	CNPS 4	Chenopod scrub, grassland, clay soils	February-May
Recurved larkspur *Delphinium recurvatum* Perennial herb	CNPS 1B	Chenopod scrub, grassland, alkaline	March-June
Idria buckwheat *Eriogonum vestitum* Annual herb	CNPS 4	Grasslands, open slopes	April–August
Pale yellow layia *Layia heterotricha* Annual herb	CNPS 1B	Pinyon-juniper woodland, alkaline grassland, clay	March-June

Table 1 (cont'd.). Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2009).

Species	Status*	Habitat	Blooming Period
Panoche peppergrass *Lepidium jaredii* ssp. *album* Annual herb	CNPS 1B	Grassland, washes and alluvial fans	February-June
Serpentine leptosiphon *Leptosiphon ambiguus* Annual herb	CNPS 4	Grassland, often serpentine soil	March-June
Showy golden madia *Madia radiata* Annual herb	CNPS 1B	Woodland, grassland	March-May
San Joaquin woollythreads *Monolopia congdonii* Annual herb	CNPS 1B federal Endangered	Chenopod scrub, grassland, sandy	February-May
Shining navarretia *Navarretia nigelliformis* ssp. *radians* Annual herb	CNPS 1B	Woodland, grassland, vernal pools	May-July
Chaparral ragwort *Senecio aphanactis* Annual herb	CNPS 2	Woodland, chaparral	January-April
San Joaquin bluecurls *Trichostema ovatum* Annual herb	CNPS 4	Chenopod scrub, grasslands	July–October

***California Native Plant Society (CNPS) list designations**

1B: Plants Rare, Threatened, or Endangered in California and elsewhere
2: Plants Rare, Threatened, or Endangered in California but more common elsewhere
4: Plants of limited distribution – a watch list

Survey Methods

Known nearby populations of potentially occurring special status plant species were visited in order to develop a search image for these special status species and to verify that the timing of on-site survey work would coincide with the period in which these species can be readily seen and are separable from common local species. Reference populations that were chosen for observation were all located at elevations similar to the study area and within 10 miles of the study area. Reference populations visited in May included forked fiddleneck, crownscale, Lost Hills crownscale, Panoche peppergrass, serpentine leptosiphon, and showy golden madia. The reference populations visited in June included Santa Clara thorn-mint, Salinas milkvetch, gypsum-loving larkspur, Idria buckwheat, and chaparral ragwort. These visits supported the chosen period for the survey as being within the anthesis period of potentially occurring special status species.

Focused special status plant species surveys were conducted by LOA botanists Neal Kramer and Jim Paulus, and by LOA ecologists Nathan Hale, Jessica Celis, Chris Bronny, Colby

Boggs,Yancey Bissonnette, and Wendy Fisher, using the same methodology as described for the Fall 2009 and early spring 2010 surveys (LOA, 2009, 2010). In summary, the survey team walked the entire site in evenly-spaced transects, ensuring 100% visual coverage, during the species' blooming period when they would be evident and most identifiable. Emphasis was placed on areas more likely to support suitable habitat for the target species. All vascular plant species observed were recorded in a field notebook. The survey was floristic, striving to identify all species to the level of taxa needed to separate occurring species from the potentially occurring special status species identified during the literature review (Appendices A and B). The survey methodology is consistent with survey protocols outlined by the CNPS and complied with the most recent California Department of Fish and Game guidelines (Appendix C). Thorough transect surveys were conducted on May 4 through June 4, 2010. Additional surveys conducted July 26-27, 2010, determined the species of 28 *Blepharizonia* populations that were found to be occurring in pre-flowering phenology during the May-June transect surveys.

Results: Plant Species Present in May - July 2010

The results of the May-July 2010 botanical survey indicate greater diversity is present than was suggested by the fall 2009 and early spring 2010 surveys alone. The late spring survey added 37 species to the study area total (239 species as of July 28; Appendix A).

No federal or state listed plant species were found within the study area. No plants that could be confused with either San Joaquin woollythreads or California caulanthus were found in 2010. The survey detected four widely scattered individuals that are classifiable as the CNPS List 1B species recurved larkspur, three populations of CNPS List 4 gypsum-loving larkspur, and four populations of the CNPS List 4 serpentine leptosiphon (Figure 2). All *Blepharizonia* populations visited July 26-27 exhibited mature fruit pappus structures and were determined to be *B. laxa*, a common species. Identifications of special status plants in the field, and the mapping of their populations, were performed by one of the two LOA botanists who participated in all surveys.

Plants classifiable as recurved larkspur (*Delphinium recurvatum*) were found widely scattered in Sections 4 and 13. All occur in relatively flat, open pasture habitat. A technical memorandum prepared by Dr. Paulus discusses non-characteristic traits common to these plants, including weak sepal coloration, and variations that suggest these plants may be hybrids of *D. recurvatum* with the locally occurring, less sensitive *D. gypsophilum* ssp. *gypsophilum* and *D. hesperium* ssp. *pallescens* (Appendix D). Attempts to locate plants with mature fruit and thereby determine species-specific seed characteristics were either thwarted by cows, who had removed nearly all plants of this type that were located during the early spring survey (see Figure 2 in LOA, 2010), or at best resulted in finding sterile, underdeveloped fruits. Sterile fruit production further supports the opinion that plants occurring within the study area are hybrids (LOA, 2010). Sterile fruit and nearly complete destruction by herbivory at flowering are traits of a population or group of plants that is not reproductively self-sustaining.

Gypsum-loving larkspur was found at small occurrences in Sections 13 and 19. Unlike the plants in Sections 4 and 8 (where the plants could not be separated from recurved larkspur), these plants fit well within the expected species characteristics of gypsum-loving larkspur. Individuals appear to be confined rather narrowly to north or northwest-facing slopes associated with gully habitats that are available only at the fringe of the study area. This is the same habitat noted for reference populations of this species. Previously documented occurrences of this species within the study area were confined to Section 19 (LOA, 2010).

Four populations of serpentine leptosiphon were found in bloom during the survey. Serpentine leptosiphon is an annual species. Blooming in this species was observed as late as June 1. The sole occurrence east of Little Panoche Road, an individual apparently isolated in Section 13, may be considered a waif. All other located populations (Figure 2) numbered in the several hundreds, and occurred in more typical serpentine alluvium near the study area's western edge. Considering these populations with the populations documented during the 2010 early spring survey (LOA, 2010), serpentine leptosiphon occurred in 2010 in very impressive displays to the west of Little Panoche Road. In all, several tens of thousands of plants were observed to bloom and set seed within the study area.

Relic, highly disturbed aquatic features that may be classifiable as vernal pools were located in Sections 4, 8, 10, and 16. These features, despite heavy use by livestock, maintain a species assemblage that is unique within the study area. Species found only at these small and isolated seasonal pools (all pools of this type were observed to perch shallow groundwater until May in 2010) are assigned by Reed (1988) as being typical wetland species in California.

If you have any questions regarding our findings, please contact Michele Korpos at mkorpos@loainc.com or (408) 281-5881 at your earliest convenience.

Sincerely,

Davinna Ohlson

Davinna Ohlson
Senior Project Manager
Plant/Wildlife Ecologist

Enclosures

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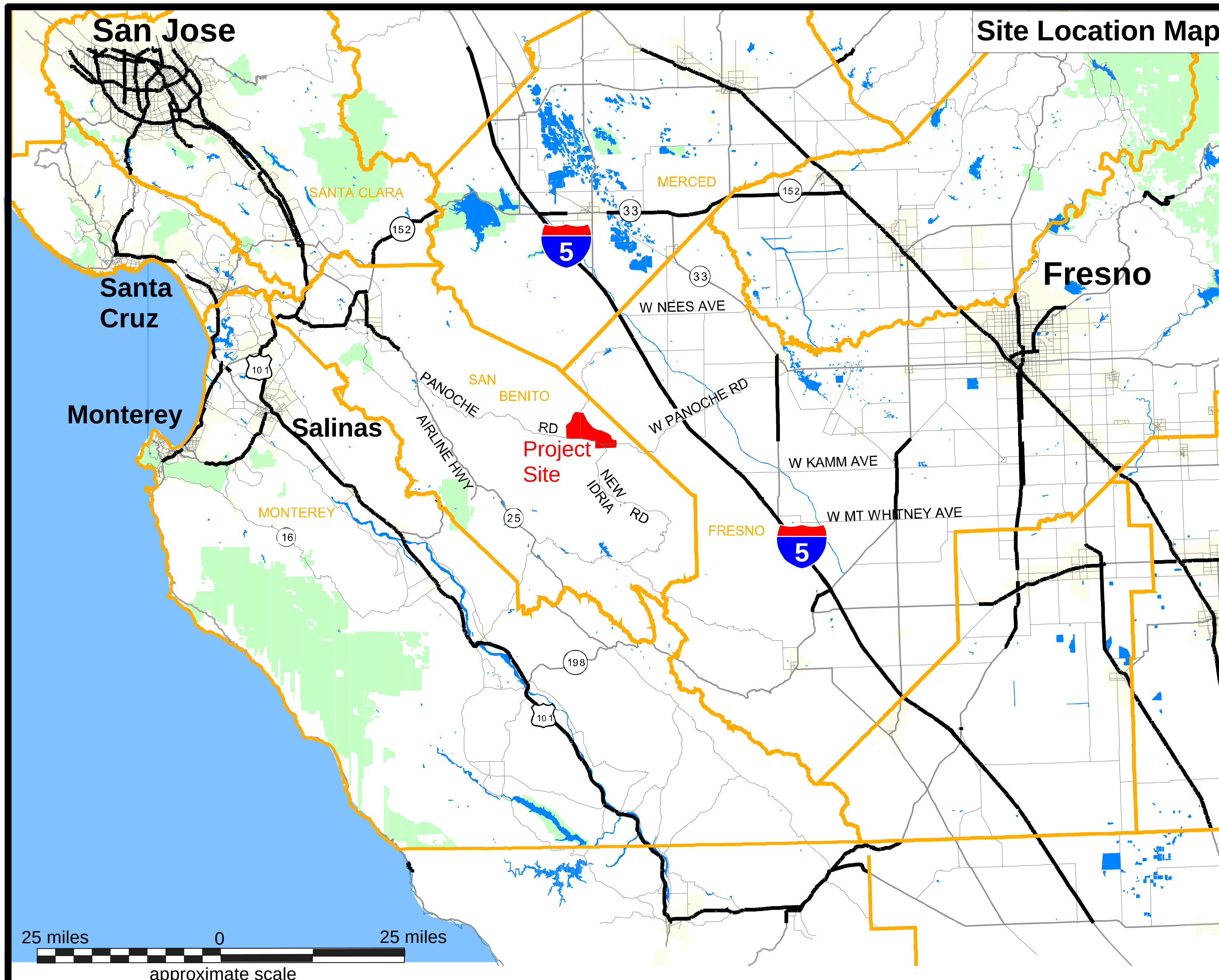
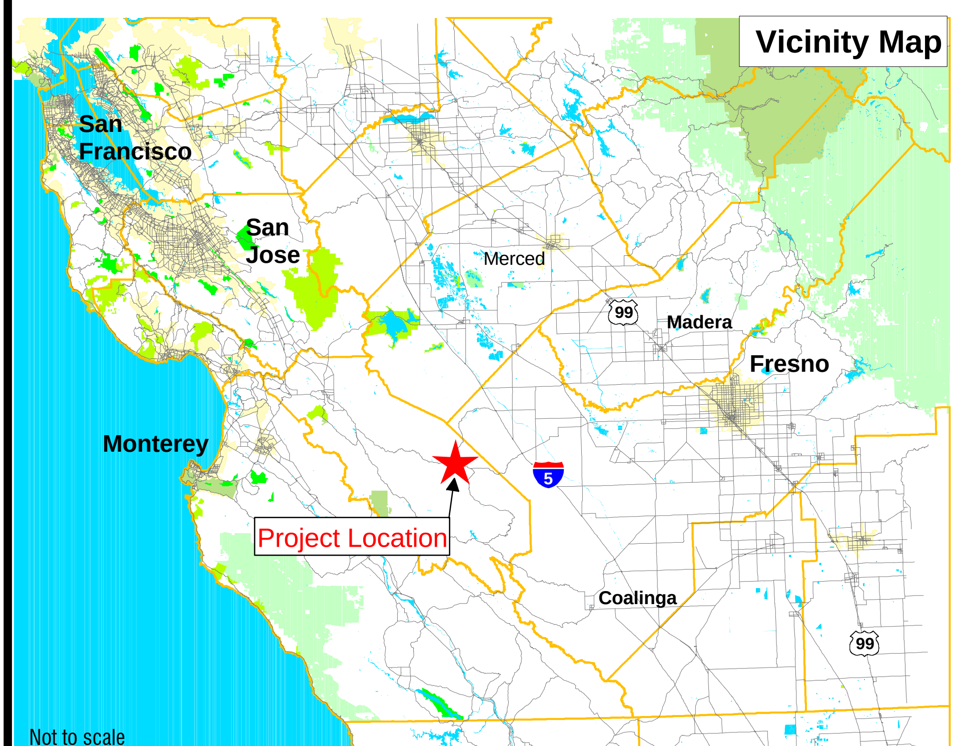
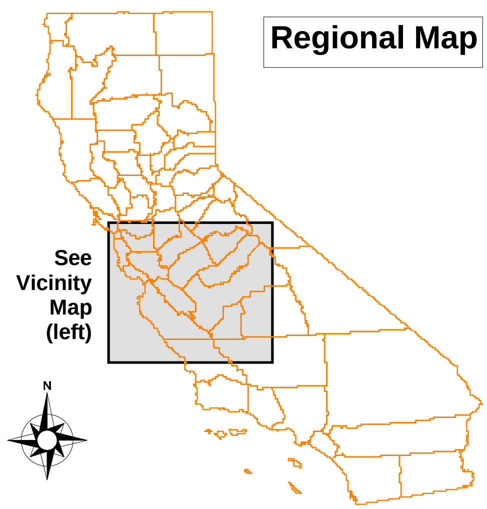


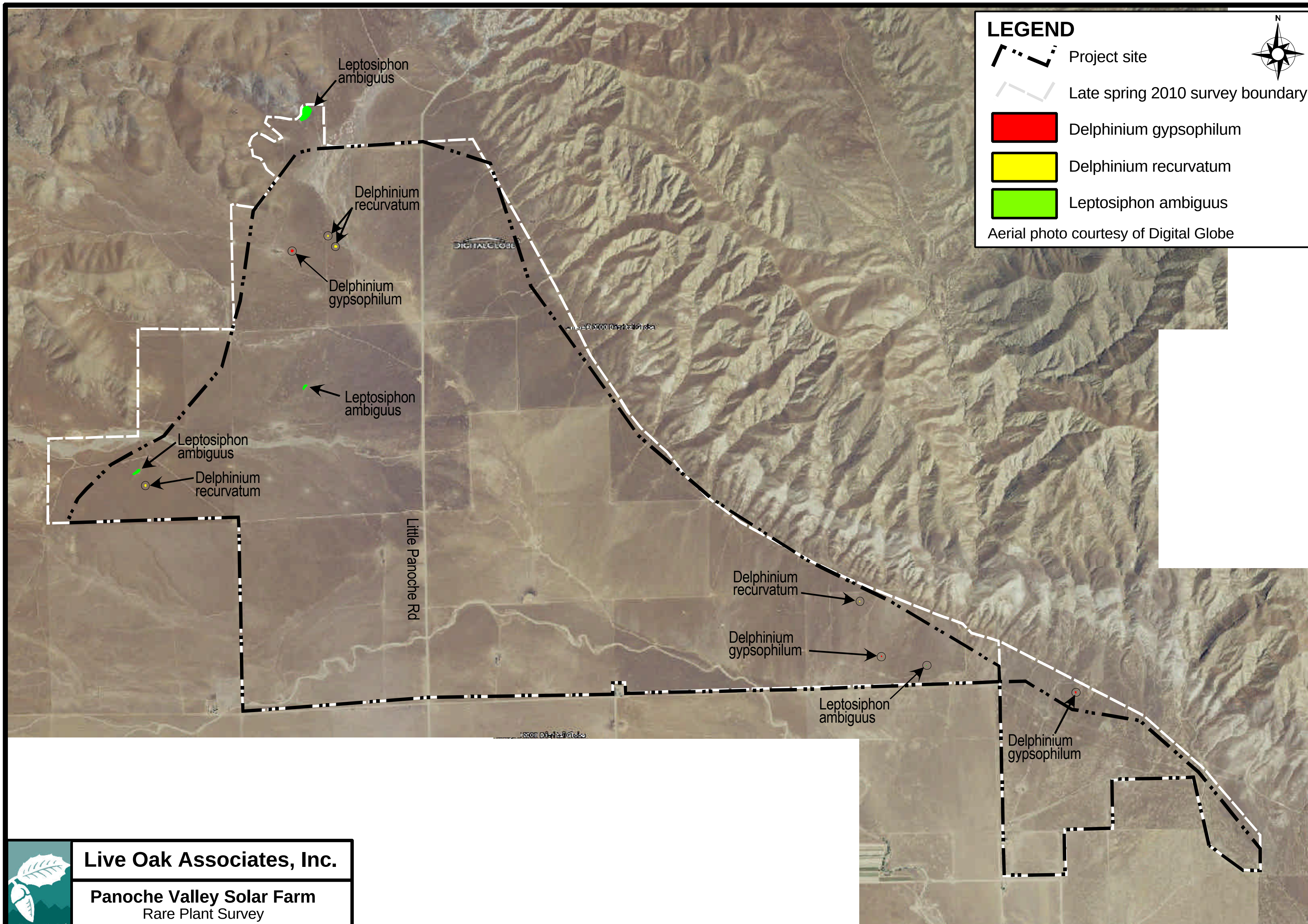




Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1



Live Oak Associates, Inc.

Panoche Valley Solar Farm
Rare Plant Survey
Late Spring 2010

Date	Project #	Figure #
7/29/2010	1297-04c	2

APPENDIX A: VASCULAR PLANTS OF THE STUDY AREA

The plants species listed below were observed on the Panoche Valley solar farm site during the field survey conducted by Live Oak Associates from May through July 2010. The U.S. Fish and Wildlife Service wetland indicator status of each plant has been shown following its common name.

OBL - Obligate
FACW - Facultative Wetland
FAC - Facultative
FACU - Facultative Upland
UPL - Upland
+/- - Higher/lower end of category
NI - No investigation

Scientific Name	Common Name	Wetland Status
AMARANTHACEAE - Amaranth Family		
Amaranthus blitoides	mat/prostrate amaranth	FACW
ALLIACEAE - Allium Family		
Allium crispum	crinkled onion	UPL
Allium howellii var. *howellii*	Howell's onion	UPL
APIACEAE - Carrot Family		
Daucus pusillus	wild carrot	UPL
Lomatium dissectum var. *multifidum*	carrot leaved biscut root	UPL
Lomatium utriculatum	common lomatium	UPL
Sanicula bipinnatifida	purple sanicle, snakeroot	UPL
Sanicula crassicaulis	Pacific sanicle, gamble weed	UPL
Tauschia hartwegii	Harweg's umbrellawort/tauschia	UPL
APOCYNACEAE - Dogbane Family		
Asclepias fascicularis	narrow leaf milkweed	FAC
ASTERACEAE - Sunflower Family		
Achyrachaena mollis	blow wives	UPL
Ambrosia acanthicarpa	annual bursage	UPL
*Anthemis cotula**	dog fennel/Mayweed	FACU
Artemisia californica	California sagebrush	UPL
Artemisia douglasiana	mugwort	FACW
Baccharis salicifolia	mulefat	UPL
Blepharizonia sp.	tarweed	UPL
*Carduus pycnocephalus**	Italian thistle	UPL
*Centaurea melitensis**	tocalote	UPL
Centaurea sp.*	knapweed/thistle	UPL
Chaenactis fremontii	pincushion flower	UPL
Conyza canadensis	Canada horsewood	FAC
Deinandra kelloggii	Kellogg's tarweed	UPL
Ericameria sp.	goldenbush	UPL
Ericameria cuneata	cliff/rock/wedgeleaf goldenbush	UPL
Ericameria linearifolia	interior/narrow-leaf goldenbush	UPL
Euthamia occidentalis	western goldentop	OBL
Gnaphalium sp.	cudweed	-
Helianthus annuus	common sunflower	FAC

Hemizonia congesta ssp. luzulifolia	hayfield tarweed	UPL
Heterotheca oregona var. rudis	inland Oregon golden aster	UPL
Holocarpha heermannii	Heermann's tarweed	UPL
Holocarpha obconica	San Joaquin tarweed	UPL
Holocarpha virgata ssp. virgata	narrow tarplant	UPL
*Hypochaeris glabra**	smooth cat's ear	UPL
*Hypochaeris radicata**	rough/hairy cat's ear	NO
Isocoma acradenia	alkali goldenbush	UPL
Isocoma menziesii var. vernonioides	coastal isocoma, coast goldenbush	FACW
Iva axillaris ssp. robustior	poverty weed	FAC
*Lactuca serriola**	prickly lettuce	FAC
Lagophylla ramosissima	common hareleaf	UPL
Lasthenia californica	coast/California/common goldfields	UPL
Layia platyglossa	common tidy-tips	UPL
Layia sp.	tidy-tips	FAC/FACW
Lessingia nemaclada	slender/thread stem lessingia	UPL
Logfia filaginoides	logfia	UPL
Malacothrix coulteri	snakes head	UPL
*Matricaria matricarioides**	pineapple weed	FACU
Micropus californicus var. californicus	slender cottonweed	UPL
Microseris sp.	microseris	UPL
Microseris douglasii ssp. *douglasii*	Douglas' silverpuffs	UPL
Microseris cf. *sylvatica*	sylvan scorzonella	UPL
Monolopia major	cupped monolopia	UPL
Monolopia stricta	Crum's monolopia	UPL
Psilocarphus brevissimus var. brevissimus	dwarf woolly-heads	OBL
Senecio aronicoides	rayless ragwort/groundsel/butterweed	UPL
Senecio flaccidus var. douglasii	Douglas' groundsel/shrubby butterweed	UPL
*Senecio vulgaris**	common groundsel	NI
*Sonchus asper ssp. asper**	sow thistle	FAC
*Sonchus oleraceus**	common sow thistle	NI
Stephanomeria pauciflora	wire lettuce/desert straw	UPL
Tragopogon sp.	salsify, goatsbeard	UPL
Uropappus lindleyi	silverpuffs	UPL
Xanthium spinosum	spiny cocklebur	FAC+
Xanthium strumarium	rough cocklebur	FAC+
BORAGINACEAE - Borage Family		
Amsinckia tessellata	devil's lettuce, checker fiddleneck	UPL
Plagiobothrys stipitatus var. micranthus	stocked popcornflower	OBL
BRASSICACEAE - Mustard Family		
*Descurainia sophia**	flixweed, tansymustard	UPL
*Lepidium draba ssp. draba**	hoary cress	UPL
*Sisymbrium orientale**	oriental mustard	UPL
CARYOPHYLLACEAE - Pink Family		
*Spergularia bocconi**	sand spurry	UPL
*Spergularia rubra**	red sandspurry	FAC-
CHENOPODIACEAE - Goosefoot Family		
Atriplex fruticulosa	valley/ball saltbush	FACW

*Chenopodium album**	white goosefoot/lamb's quarters	FAC
Chenopodium sp.	goosefoot	-
CONVOLVULACEAE - Morning-Glory Family		
*Convolvulus arvensis**	bindweed, orchard morningglory	UPL
EUPHORBIACEAE - Spurge Family		
Chamaesyce ocellata ssp. ocellata	contura creek sandmat	UPL
FABACEAE - Legume Family		
Astragalus didymocarpus var. didymocarpus	two seeded milk vetch	UPL
Astragalus oxyphysus	Mt. Diablo milkvetch, Diablo locoweed	UPL
Lotus humistratus	hill/short podded lotus	UPL
Lotus strigosus	hairy lotus	UPL
Lupinus microcarpus var. *microcarpus*	gully/chick lupine	UPL
Lupinus succulentus	arroyo lupine	UPL
*Medicago polymorpha**	burclover	UPL
*Medicago sativa**	alfalfa	UPL
*Melilotus indicus**	sour clover, Indian melilot	FAC
Trifolium ciliolatum	tree clover	UPL
Trifolium gracilentum var. gracilentum	pinpoint clover	UPL
Trifolium variegatum	few flowered clover	FACW
FRANKENIACEAE - Frankenia Family		
Frankenia salina	alkali heath	UPL
JUNCACEAE - Rush Family		
Juncus bufonius var. bufonius	toad rush	FACW+
Juncus bufonius var. congestus	clustered toad rush	FACW+
LAMIACEAE - Mint Family		
*Marrubium vulgare**	horehound	FAC
Trichostema lanceolatum	vinegarweed	UPL
LILIACEAE - Lily Family		
Calochortus venustus	butterfly mariposa	UPL
LOASACEAE - Loasa Family		
Mentzelia affinis	yellow blazingstar	UPL
MALVACEAE - Mallow Family		
Malvella leprosa	alkali weed	FAC
MORACEAE - Mulberry Family		
*Morus alba**	white/silkworm mulberry	NI
MYRSINACEAE - Myrsine Family		
*Anagallis arvensis**	scarlet pimpernel	FAC
ONAGRACEAE - Evening primrose Family		
Clarkia purpurea ssp. quadrivulnera	purple clarkia	UPL
Clarkia unguiculata	elegant clarkia	UPL
Epilobium pygmaeum	smooth spike primrose	UPL
Epilobium sp.	fuchsia	-
PAPAVERACEAE - Poppy Family		
Eschscholzia caespitosa	tufted poppy	UPL
PLANTAGINACEAE - Plantain Family		
Plantago elongata	prairie/annual coast/long leaf plantain	FACW
POACEAE - Grass Family		

*Avena barbata**	slender wild oat	UPL
*Avena fatua**	wild oat	UPL
*Bromus diandrus**	ripgut brome	UPL
*Cynodon dactylon**	bermuda grass	FAC
Deschampsia danthonioides	annual hairgrass	FACW
Distichlis spicata	saltgrass	FACW
*Koeleria phleoides**	annual junegrass/bristly Koeler's grass	UPL
Leymus triticoides	creeping wild rye	UPL
*Lolium multiflorum**	Italian rye grass	UPL
*Lolium perenne**	English/perennial rye grass	FAC
Melica harfordii	Harford's melic	UPL
Melica imperfecta	small flowered/California melica	UPL
Nassella pulchra	purple needle grass	UPL
*Phalaris aquatica**	harding grass	FAC+
*Poa annua**	annual bluegrass	FACW-
*Polypogon monspeliensis**	rabbit's foot grass	FACW+
*Triticum aestivum**	common wheat	UPL
*Vulpia myuros var. hirsuta**	hairy rat-tail fescue	FACU
POLEMONIACEAE - Phlox Family		
Gilia angelensis	chaparral gilia	UPL
Leptosiphon ambiguus	Serpentine leptosiphon	UPL
Navarretia pubescens	downy pincushionplant	UPL
POLYGONACEAE - Buckwheat Family		
Chorizanthe membranacea	pink spineflower	UPL
Chorizanthe polygonoides var. polygonoides	knotweed spineflower	UPL
Eriogonum angulosum	anglestem buckwheat	UPL
Eriogonum gracile var. gracile	slender buckwheat	UPL
Hollisteria lanata	false spineflower	UPL
*Polygonum aviculare**	dooryard/oval leaf/common knotweed	FAC
*Rumex crispus**	curly dock	FACW
Rumex salicifolius	willow dock	OBL
Rumex stenophyllus	narrowleaf dock	NI
Rumex sp.	dock	-
RANUNCULACEAE - Buttercup Family		
Delphinium gypsophilum ssp. gypsophilum	Panoche Creek larkspur	UPL
Delphinium recurvatum	recurved larkspur	UPL
SCROPHULARIACEAE - Figwort Family		
Castilleja attenuata	valley tassels	UPL
SOLANACEAE - Nightshade Family		
Datura wrightii	thornapple/jimsonweed	UPL
*Nicotiana acuminata var. multiflora**	many flowered tobacco	UPL
THEMIDACEAE - Cluster Lily Family		
Bloomeria crocea	common goldenstar	UPL
Brodiaea terrestris ssp. kernensis	Kern brodiaea	UPL
VERBENACEAE - Verbena Family		
Verbena lasiostachys	common verbena/vervain	FAC-
ZYGOPHYLLACEAE - Caltrop Family		

*Tribulus terrestris**	puncture vine	UPL

APPENDIX B: PLANTS OBSERVED ON THE SITE BY SECTION

The table below details the plant species observed on the Panoche Valley solar farm site by section during the rare plant surveys conducted by LOA from May through July 2010.

Scientific Name	Section										
	3	**4**	**8**	**9**	**10**	**11**	**13**	**14**	**15**	**16**	**19E**
Achyrachaena mollis			x		x				x		
Amaranthus blitoides	x				x			x			x
Ambrosia acanthicarpa									x		
Amsinckia tessellata									x		x
*Anagallis arvensis**					x						
*Anthemis cotula**									x		
Artemisia douglasiana								x		x	
Asclepias fascicularis			x	x					x	x	
Astragalus didymocarpus var. didymocarpus		x	x	x	x			x	x	x	
Astragalus oxyphysus	x			x	x				x		x
Atriplex fruticulosa		x	x								x
*Avena barbata**					x						
*Avena fatua**			x	x	x	x				x	
Baccharis salicifolia			x								
Blepharizonia sp.						x		x	x	x	x
Bloomeria crocea		x								x	
Brodiaea terrestris ssp. kernensis					x						
*Bromus diandrus**					x				x		
Calochortus venustus			x				x				x
*Carduus pycnocephalus**			x								
Castilleja attenuata									x		
*Centaurea melitensis**	x				x	x	x				
Chaenactis fremontii											x
Chamaesyce ocellata ssp. ocellata	x	x	x	x	x	x	x	x	x	x	x
*Chenopodium album**								x	x		x
Chenopodium sp.		x							x		x
Chorizanthe membranacea			x								
Chorizanthe polygonoides var. polygonoides			x								
Clarkia purpurea ssp. quadrivulnera	x	x	x	x	x	x	x	x	x	x	x
Clarkia unguiculata								x			
*Convolvulus arvensis**	x	x	x				x	x			
Conyza canadensis								x			
*Cynodon dactylon**				x	x					x	
Datura wrightii								x		x	
Daucus pusillus		x	x								
Deinandra kelloggii		x	x	x	x	x	x	x	x	x	
Delphinium cf. recurvatum							x				
Deschampsia danthonioides				x							

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
*Descurainia sophia**		x									
Distichlis spicata									x		
Epilobium pygmaeum										x	
Epilobium sp.		x									
Eriogonum angulosum					x		x	x		x	x
Eriogonum gracile var. gracile				x							
Eriogonum gracillimum								x			x
Eschscholzia caespitosa								x			
Euthamia occidentalis									x		
Frankenia salina		x					x	x			
Gilia angelensis					x						x
Gnaphalium sp.					x						
Helianthus annuus								x			
Heliotropium curassavicum								x	x		
Hemizonia congesta ssp. luzulifolia								x			
Heterotheca oregona var. rudis			x								
Hollisteria lanata											x
Holocarpha heermannii										x	
Holocarpha obconica		x	x		x					x	
Holocarpha virgata ssp. virgata		x	x	x	x					x	
*Hypochaeris glabra**		x								x	
*Hypochaeris radicata**			x								
Isocoma acradenia								x			
Isocoma menziesii var. vernonioides							x	x	x		
Iva axillaris ssp. robustior									x		
Juncus bufonius var. bufonius			x	x	x				x	x	
Juncus bufonius var. congestus					x						
*Koeleria phleoides**	x	x		x			x	x	x		x
*Lactuca serriola**		x			x		x	x	x		
Lagophylla ramosissima			x	x	x			x	x	x	
*Lepidium draba ssp. draba**								x			
Leptosiphon ambiguus							x				
Lessingia nemaclada			x					x	x		
Leymus triticoides								x		x	
Logfia filaginoides									x		
*Lolium multiflorum**	x	x		x	x		x				
*Lolium perenne**		x		x	x		x				
Lomatium utriculatum				x				x			
Lotus humistratus			x							x	
Lotus strigosus							x				
Lupinus microcarpus var. *microcarpus*			x						x		
Lupinus succulentus					x				x		
Malvella leprosa								x	x	x	
*Marrubium vulgare**			x						x		
*Medicago polymorpha**					x						
*Medicago sativa**					x						

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Melica harfordii		x									
Melica imperfecta			x								
*Melilotus indicus**				x	x				x		
Mentzelia affinis								x	x		
Micropus californicus var. californicus			x	x							x
Microseris douglasii ssp. *douglasii*				x							
*Morus alba**									x		
Nassella pulchra			x								
Navarretia pubescens		x	x	x	x	x	x	x	x	x	x
*Nicotiana acuminata var. multiflora**								x			
*Phalaris aquatica**								x			
Plagiobothrys stipitatus var. micranthus				x							
Plantago elongata		x									
*Poa annua**					x					x	
*Polygonum aviculare**				x					x		
*Polypogon aviculare**											
*Polypogon monspeliensis**				x				x	x		
Psilocarphus brevissimus var. brevissimus					x						
*Rumex crispus**								x	x		
Rumex salicifolius			x	x	x						
Rumex sp.					x				x		
Rumex stenophyllus								x			
*Salsola tragus**								x			
Sanicula bipinnatifida			x								
*Schismus arabicus**								x			
Senecio aronicoides							x				
Senecio flaccidus var. douglasii									x		
*Senecio vulgaris**									x		
*Sisymbrium irio**	x										
*Sisymbrium orientale**							x				x
*Sonchus asper ssp. asper**									x		
*Sonchus oleraceus**							x	x	x		
*Spergularia bocconi**		x	x	x							
*Spergularia rubra**			x		x				x		
Stephanomeria pauciflora								x	x	x	x
Tragopogon sp.										x	
*Tribulus terrestris**				x	x			x			
Trichostema lanceolatum	x	x	x	x	x	x	x	x	x	x	x
Trifolium ciliolatum									x		
Trifolium gracilentum var. gracilentum					x			x	x		
Trifolium variegatum									x		
*Triticum aestivum**			x	x	x		x	x	x		
Verbena lasiostachys					x			x			
Vulpia microstachys var. ciliata								x			
*Vulpia myuros var. hirsuta**										x	
Xanthium spinosum								x			

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Xanthium strumarium					x			x	x		

APPENDIX C

CALIFORNIA NATIVE PLANT SOCIETY BOTANICAL SURVEY GUIDELINES
&
GUIDELINES FOR ASSESSING THE EFFECTS OF PROPOSED PROJECT ON RARE, THREATENED AND ENDANGERED PLANTS AND NATURAL COMMUNITIES BY THE RESOURCE AGENCY OF THE CALIFORNIA DEPARTMENT OF FISH AND GAME

CNPS Botanical Survey Guidelines

(from CNPS *Inventory*, 6th Edition, 2001)

The following recommendations are intended to help those who prepare and review environmental documents determine when a botanical survey is needed, who should be considered qualified to conduct such surveys, how surveys should be conducted, and what information should be contained in the survey report. The California Native Plant Society recommends that lead agencies not accept the results of surveys unless they are conducted and reported according to these guidelines.

1. Botanical surveys are conducted in order to determine the environmental effects of proposed projects on all botanical resources, including special status plants (rare, threatened, and endangered plants) and plant (vegetation) communities. Special status plants are not limited to those that have been listed by state and federal agencies but include any plants that, based on all available data, can be shown to be rare, threatened, or endangered under the following definitions:

A species, subspecies, or variety of plant is "endangered" when the prospects of its survival and reproduction are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, or disease. A plant is "threatened" when it is likely to become endangered in the foreseeable future in the absence of protection measures. A plant is "rare" when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.[1]

Rare plant (vegetation) communities are those communities that are of highly limited distribution. These communities may or may not contain special status plants. The most current version of the California Natural Diversity Database's *List of California Terrestrial Natural Communities*[2] should be used as a guide to the names and status of communities.

Consistent with the California Native Plant Society's goal of preserving plant biodiversity on a regional and local scale, and with California Environmental Quality Act environmental impact assessment criteria[3], surveys should also assess impacts to locally significant plants. Both plants and plant communities can be considered significant if their local occurrence is on the outer limits of known distribution, a range extension, a rediscovery, or rare or uncommon in a local context (such as within a county or region). Lead agencies should address impacts to these locally unique botanical resources regardless of their status elsewhere in the state.

2. Botanical surveys must be conducted to determine if, or to the extent that, special status or locally significant plants and plant communities will be affected by a proposed project when any natural vegetation occurs on the site and the project has the potential for direct or indirect effects on vegetation.

3. Those conducting botanical surveys must possess the following qualifications:

a. Experience conducting floristic field surveys;
b. Knowledge of plant taxonomy and plant community ecology and classification;
c. Familiarity with the plants of the area, including special status and locally significant plants;
d. Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
e. Experience with analyzing impacts of a project on native plants and communities.

4. Botanical surveys should be conducted in a manner that will locate any special status or locally significant plants or plant communities that may be present. Specifically, botanical surveys should be:

a. Conducted in the field at the proper times of year when special status and locally significant plants are both evident and identifiable. When special status plants are known to occur in the type(s) of habitat present in the project area, nearby accessible occurrences of the plants (reference sites) should be observed to determine that the plants are identifiable at the time of survey.
b. Floristic in nature. A floristic survey requires that every plant observed be identified to species, subspecies, or variety as applicable. In order to properly characterize the site, a complete list of plants observed on the site shall be included in every botanical survey report. In addition, a sufficient number of visits spaced

throughout the growing season is necessary to prepare an accurate inventory of all plants that exist on the site. The number of visits and the timing between visits must be determined by geographic location, the plant communities present, and the weather patterns of the year(s) in which the surveys are conducted.

c. Conducted in a manner that is consistent with conservation ethics and accepted plant collection and documentation techniques[4,5]. Collections (voucher specimens) of special status and locally significant plants should be made, unless such actions would jeopardize the continued existence of the population. A single sheet should be collected and deposited at a recognized public herbarium for future reference. All collections shall be made in accordance with applicable state and federal permit requirements. Photography may be used to document plant identification only when the population cannot withstand collection of voucher specimens.
d. Conducted using systematic field techniques in all habitats of the site to ensure a thorough coverage of potential impact areas. All habitats within the project site must be surveyed thoroughly in order to properly inventory and document the plants present. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity.
e. Well documented. When a special status plant (or rare plant community) is located, a California Native Species (or Community) Field Survey Form or equivalent written form, accompanied by a copy of the appropriate portion of a 7.5-minute topographic map with the occurrence mapped, shall be completed, included within the survey report, and separately submitted to the California Natural Diversity Database. Population boundaries should be mapped as accurately as possible. The number of individuals in each population should be counted or estimated, as appropriate.

5. Complete reports of botanical surveys shall be included with all environmental assessment documents, including Negative Declarations and Mitigated Negative Declarations, Timber Harvesting Plans, Environmental Impact Reports, and Environmental Impact Statements. Survey reports shall contain the following information:

a. Project location and description, including:
    1. A detailed map of the location and footprint of the proposed project.
    2. A detailed description of the proposed project, including one-time activities and ongoing activities that may affect botanical resources.
    3. A description of the general biological setting of the project area.
b. Methods, including:
    1. Survey methods for each of the habitats present, and rationale for the methods used.
    2. Description of reference site(s) visited and phenological development of the target special status plants, with an assessment of any conditions differing from the project site that may affect their identification.
    3. Dates of surveys and rationale for timing and intervals; names of personnel conducting the surveys; and total hours spent in the field for each surveyor on each date.
    4. Location of deposited voucher specimens and herbaria visited.
c. Results, including:
    1. A description and map of the vegetation communities on the project site. The current standard for vegetation classification, *A Manual of California Vegetation*[6], should be used as a basis for the habitat descriptions and the vegetation map. If another vegetation classification system is used, the report must reference the system and provide the reason for its use.
    2. A description of the phenology of each of the plant communities at the time of each survey date.
    3. A list of all plants observed on the project site using accepted scientific nomenclature, along with any special status designation. The reference(s) used for scientific nomenclature shall be cited.
    4. Written description and detailed map(s) showing the location of each special status or locally significant plant found, the size of each population, and method used to estimate or census the population.
    5. Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms and accompanying maps.
d. Discussion, including:
    1. Any factors that may have affected the results of the surveys (e.g., drought, human disturbance, recent fire).
    2. Discussion of any special local or range-wide significance of any plant population or community on the site.
    3. An assessment of potential impacts. This shall include a map showing the distribution of special status and locally significant plants and communities on the site in relation to the proposed activities. Direct, indirect, and cumulative impacts to the plants and communities shall be discussed.
    4. Recommended measures to avoid and/or minimize direct, indirect, and cumulative impacts.

e. References cited and persons contacted.
f. Qualifications of field personnel including any special experience with the habitats and special status plants present on the site.

3.3.2 References Cited

[1] California Environmental Quality Act Guidelines, §15065 and §15380.

[2] List of California Terrestrial Natural Communities. California Department of Fish and Game Natural Diversity Database. Sacramento, CA.

[3] California Environmental Quality Act Guidelines, Appendix G (Initial Study Environmental Checklist).

[4] Collecting Guidelines and Documentation Techniques. California Native Plant Society Policy (adopted March 4, 1995).

[5] Ferren, W.R., Jr., D.L. Magney, and T.A. Sholars. 1995. The Future of California Floristics and Systematics: Collecting Guidelines and Documentation Techniques. *Madroño* 42(2):197-210.

[6] Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society. Sacramento, CA. 471 pp.

Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities

State of California
CALIFORNIA NATURAL RESOURCES AGENCY
Department of Fish and Game
November 24, 2009[1]

INTRODUCTION AND PURPOSE

The conservation of special status native plants and their habitats, as well as natural communities, is integral to maintaining biological diversity. The purpose of these protocols is to facilitate a consistent and systematic approach to the survey and assessment of special status native plants and natural communities so that reliable information is produced and the potential of locating a special status plant species or natural community is maximized. They may also help those who prepare and review environmental documents determine when a botanical survey is needed, how field surveys may be conducted, what information to include in a survey report, and what qualifications to consider for surveyors. The protocols may help avoid delays caused when inadequate biological information is provided during the environmental review process; assist lead, trustee and responsible reviewing agencies to make an informed decision regarding the direct, indirect, and cumulative effects of a proposed development, activity, or action on special status native plants and natural communities; meet California Environmental Quality Act (CEQA)[2] requirements for adequate disclosure of potential impacts; and conserve public trust resources.

DEPARTMENT OF FISH AND GAME TRUSTEE AND RESPONSIBLE AGENCY MISSION

The mission of the Department of Fish and Game (DFG) is to manage California's diverse wildlife and native plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. DFG has jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations (Fish and Game Code §1802). DFG, as trustee agency under CEQA §15386, provides expertise in reviewing and commenting on environmental documents and makes protocols regarding potential negative impacts to those resources held in trust for the people of California.

Certain species are in danger of extinction because their habitats have been severely reduced in acreage, are threatened with destruction or adverse modification, or because of a combination of these and other factors. The California Endangered Species Act (CESA) provides additional protections for such species, including take prohibitions (Fish and Game Code §2050 *et seq.*). As a responsible agency, DFG has the authority to issue permits for the take of species listed under CESA if the take is incidental to an otherwise lawful activity; DFG has determined that the impacts of the take have been minimized and fully mitigated; and, the take would not jeopardize the continued existence of the species (Fish and Game Code §2081). Surveys are one of the preliminary steps to detect a listed or special status plant species or natural community that may be impacted significantly by a project.

DEFINITIONS

Botanical surveys provide information used to determine the potential environmental effects of proposed projects on all special status plants and natural communities as required by law (i.e., CEQA, CESA, and Federal Endangered Species Act (ESA)). Some key terms in this document appear in **bold font** for assistance in use of the document.

For the purposes of this document, **special status plants** include all plant species that meet one or more of the following criteria[3]:

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1 This document replaces the DFG document entitled "Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities."

2 http://ceres.ca.gov/ceqa/

3 Adapted from the East Alameda County Conservation Strategy available at http://www.fws.gov/sacramento/EACCS/Documents/080228_Species_Evaluation_EACCS.pdf

- Listed or proposed for listing as threatened or endangered under ESA or candidates for possible future listing as threatened or endangered under the ESA (50 CFR §17.12).

- Listed[4] or candidates for listing by the State of California as threatened or endangered under CESA (Fish and Game Code §2050 *et seq.*). A species, subspecies, or variety of plant is **endangered** when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (Fish and Game Code §2062). A plant is **threatened** when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish and Game Code §2067).

- Listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 *et seq*.). A plant is **rare** when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901).

- Meet the definition of rare or endangered under CEQA §15380(b) and (d). Species that may meet the definition of rare or endangered include the following:

  - Species considered by the California Native Plant Society (CNPS) to be "rare, threatened or endangered in California" (Lists 1A, 1B and 2);

  - Species that may warrant consideration on the basis of local significance or recent biological information[5];

  - Some species included on the California Natural Diversity Database's (CNDDB) *Special Plants, Bryophytes, and Lichens List* (California Department of Fish and Game 2008)[6].

- Considered a **locally significant species,** that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.

Special status natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special status species or their habitat. The most current version of the Department's *List of California Terrestrial Natural Communities*[7] indicates which natural communities are of special status given the current state of the California classification.

Most types of wetlands and riparian communities are considered special status natural communities due to their limited distribution in California. These natural communities often contain special status plants such as those described above. These protocols may be used in conjunction with protocols formulated by other agencies, for example, those developed by the U.S. Army Corps of Engineers to delineate jurisdictional wetlands[8] or by the U.S. Fish and Wildlife Service to survey for the presence of special status plants[9].

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4 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

5 In general, CNPS List 3 plants (plants about which more information is needed) and List 4 plants (plants of limited distribution) may not warrant consideration under CEQA §15380. These plants may be included on special status plant lists such as those developed by counties where they would be addressed under CEQA §15380. List 3 plants may be analyzed under CEQA §15380 if sufficient information is available to assess potential impacts to such plants. Factors such as regional rarity vs. statewide rarity should be considered in determining whether cumulative impacts to a List 4 plant are significant even if individual project impacts are not. List 3 and 4 plants are also included in the California Natural Diversity Database's (CNDDB) *Special Plants, Bryophytes, and Lichens List.* [Refer to the current online published list available at: http://www.dfg.ca.gov/biogeodata.] Data on Lists 3 and 4 plants should be submitted to CNDDB. Such data aids in determining or revising priority ranking.

6 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

7 http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf. The rare natural communities are asterisked on this list.

8 http://www.wetlands.com/regs/tlpge02e.htm

9 U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

BOTANICAL SURVEYS

Conduct botanical surveys prior to the commencement of any activities that may modify vegetation, such as clearing, mowing, or ground-breaking activities. It is appropriate to conduct a botanical field survey when:

- Natural (or naturalized) vegetation occurs on the site, and it is unknown if special status plant species or natural communities occur on the site, and the project has the potential for direct or indirect effects on vegetation; or
- Special status plants or natural communities have historically been identified on the project site; or
- Special status plants or natural communities occur on sites with similar physical and biological properties as the project site.

SURVEY OBJECTIVES

Conduct field surveys in a manner which maximizes the likelihood of locating special status plant species or special status natural communities that may be present. Surveys should be **floristic in nature**, meaning that every plant taxon that occurs on site is identified to the taxonomic level necessary to determine rarity and listing status. "Focused surveys" that are limited to habitats known to support special status species or are restricted to lists of likely potential species are not considered floristic in nature and are not adequate to identify all plant taxa on site to the level necessary to determine rarity and listing status. Include a list of plants and natural communities detected on the site for each botanical survey conducted. More than one field visit may be necessary to adequately capture the floristic diversity of a site. An indication of the prevalence (estimated total numbers, percent cover, density, etc.) of the species and communities on the site is also useful to assess the significance of a particular population.

SURVEY PREPARATION

Before field surveys are conducted, compile relevant botanical information in the general project area to provide a regional context for the investigators. Consult the CNDDB[10] and BIOS[11] for known occurrences of special status plants and natural communities in the project area prior to field surveys. Generally, identify vegetation and habitat types potentially occurring in the project area based on biological and physical properties of the site and surrounding ecoregion[12], unless a larger assessment area is appropriate. Then, develop a list of special status plants with the potential to occur within these vegetation types. This list can serve as a tool for the investigators and facilitate the use of reference sites; however, special status plants on site might not be limited to those on the list. Field surveys and subsequent reporting should be comprehensive and floristic in nature and not restricted to or focused only on this list. Include in the survey report the list of potential special status species and natural communities, and the list of references used to compile the background botanical information for the site.

SURVEY EXTENT

Surveys should be comprehensive over the entire site, including areas that will be directly or indirectly impacted by the project. Adjoining properties should also be surveyed where direct or indirect project effects, such as those from fuel modification or herbicide application, could potentially extend offsite. Pre-project surveys restricted to known CNDDB rare plant locations may not identify all special status plants and communities present and do not provide a sufficient level of information to determine potential impacts.

FIELD SURVEY METHOD

Conduct surveys using **systematic field techniques** in all habitats of the site to ensure thorough coverage of potential impact areas. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity, which determines the distance at which plants can be identified. Conduct surveys by walking over the entire site to ensure thorough coverage, noting all plant taxa

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10 Available at http://www.dfg.ca.gov/biogeodata/cnddb

11 http://www.bios.dfg.ca.gov/

12 Ecological Subregions of California, available at http://www.fs.fed.us/r5/projects/ecoregions/toc.htm

observed. The level of effort should be sufficient to provide comprehensive reporting. For example, one person-hour per eight acres per survey date is needed for a comprehensive field survey in grassland with medium diversity and moderate terrain[13], with additional time allocated for species identification.

TIMING AND NUMBER OF VISITS

Conduct surveys in the field at the time of year when species are both evident and identifiable. Usually this is during flowering or fruiting. Space visits throughout the growing season to accurately determine what plants exist on site. Many times this may involve multiple visits to the same site (e.g. in early, mid, and late-season for flowering plants) to capture the floristic diversity at a level necessary to determine if special status plants are present[14]. The timing and number of visits are determined by geographic location, the natural communities present, and the weather patterns of the year(s) in which the surveys are conducted.

REFERENCE SITES

When special status plants are known to occur in the type(s) of habitat present in the project area, observe reference sites (nearby accessible occurrences of the plants) to determine whether those species are identifiable at the time of the survey and to obtain a visual image of the target species, associated habitat, and associated natural community.

USE OF EXISTING SURVEYS

For some sites, floristic inventories or special status plant surveys may already exist. Additional surveys may be necessary for the following reasons:

- Surveys are not current[15]; or
- Surveys were conducted in natural systems that commonly experience year to year fluctuations such as periods of drought or flooding (e.g. vernal pool habitats or riverine systems); or
- Surveys are not comprehensive in nature; or fire history, land use, physical conditions of the site, or climatic conditions have changed since the last survey was conducted[16]; or
- Surveys were conducted in natural systems where special status plants may not be observed if an annual above ground phase is not visible (e.g. flowers from a bulb); or
- Changes in vegetation or species distribution may have occurred since the last survey was conducted, due to habitat alteration, fluctuations in species abundance and/or seed bank dynamics.

NEGATIVE SURVEYS

Adverse conditions may prevent investigators from determining the presence of, or accurately identifying, some species in potential habitat of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any given year. Discuss such conditions in the report.

The failure to locate a known special status plant occurrence during one field season does not constitute evidence that this plant occurrence no longer exists at this location, particularly if adverse conditions are present. For example, surveys over a number of years may be necessary if the species is an annual plant having a persistent, long-lived seed bank and is known not to germinate every year. Visits to the site in more

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13 Adapted from U.S. Fish and Wildlife Service kit fox survey guidelines available at www.fws.gov/sacramento/es/documents/kitfox_no_protocol.pdf

14 U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

15 Habitats, such as grasslands or desert plant communities that have annual and short-lived perennial plants as major floristic components may require yearly surveys to accurately document baseline conditions for purposes of impact assessment. In forested areas, however, surveys at intervals of five years may adequately represent current conditions. For forested areas, refer to "Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations", available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

16 U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/botanicalinventories.pdf

than one year increase the likelihood of detection of a special status plant especially if conditions change. To further substantiate negative findings for a known occurrence, a visit to a nearby reference site may ensure that the timing of the survey was appropriate.

REPORTING AND DATA COLLECTION

Adequate information about special status plants and natural communities present in a project area will enable reviewing agencies and the public to effectively assess potential impacts to special status plants or natural communities[17] and will guide the development of minimization and mitigation measures. The next section describes necessary information to assess impacts. For comprehensive, systematic surveys where no special status species or natural communities were found, reporting and data collection responsibilities for investigators remain as described below, excluding specific occurrence information.

SPECIAL STATUS PLANT OR NATURAL COMMUNITY OBSERVATIONS

Record the following information for locations of each special status plant or natural community detected during a field survey of a project site.

- A detailed map (1:24,000 or larger) showing locations and boundaries of each special status species occurrence or natural community found as related to the proposed project. Mark occurrences and boundaries as accurately as possible. Locations documented by use of global positioning system (GPS) coordinates must include the datum[18] in which they were collected;
- The site-specific characteristics of occurrences, such as associated species, habitat and microhabitat, structure of vegetation, topographic features, soil type, texture, and soil parent material. If the species is associated with a wetland, provide a description of the direction of flow and integrity of surface or subsurface hydrology and adjacent off-site hydrological influences as appropriate;
- The number of individuals in each special status plant population as counted (if population is small) or estimated (if population is large);
- If applicable, information about the percentage of individuals in each life stage such as seedlings vs. reproductive individuals;
- The number of individuals of the species per unit area, identifying areas of relatively high, medium and low density of the species over the project site; and
- Digital images of the target species and representative habitats to support information and descriptions.

FIELD SURVEY FORMS

When a special status plant or natural community is located, complete and submit to the CNDDB a California Native Species (or Community) Field Survey Form[19] or equivalent written report, accompanied by a copy of the relevant portion of a 7.5 minute topographic map with the occurrence mapped. Present locations documented by use of GPS coordinates in map and digital form. Data submitted in digital form must include the datum[20] in which it was collected. If a potentially undescribed special status natural community is found on the site, document it with a Rapid Assessment or Relevé form[21] and submit it with the CNDDB form.

VOUCHER COLLECTION

Voucher specimens provide verifiable documentation of species presence and identification as well as a public record of conditions. This information is vital to all conservation efforts. Collection of voucher specimens should

17 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata. For Timber Harvest Plans (THPs) please refer to the “Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations”, available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

18 NAD83, NAD27 or WGS84

19 http://www.dfg.ca.gov/biogeodata

20 NAD83, NAD27 or WGS84

21 http://www.dfg.ca.gov/biogeodata/vegcamp/veg_publications_protocols.asp

be conducted in a manner that is consistent with conservation ethics, and is in accordance with applicable state and federal permit requirements (e.g. incidental take permit, scientific collection permit). Voucher collections of special status species (or suspected special status species) should be made only when such actions would not jeopardize the continued existence of the population or species.

Deposit voucher specimens with an indexed regional herbarium[22] no later than 60 days after the collections have been made. Digital imagery can be used to supplement plant identification and document habitat. Record all relevant permittee names and permit numbers on specimen labels. A collecting permit is required prior to the collection of State-listed plant species[23].

BOTANICAL SURVEY REPORTS

Include reports of botanical field surveys containing the following information with project environmental documents:

- **Project and site description**
  - A description of the proposed project;
  - A detailed map of the project location and study area that identifies topographic and landscape features and includes a north arrow and bar scale; and,
  - A written description of the biological setting, including vegetation[24] and structure of the vegetation; geological and hydrological characteristics; and land use or management history.

- **Detailed description of survey methodology and results**
  - Dates of field surveys (indicating which areas were surveyed on which dates), name of field investigator(s), and total person-hours spent on field surveys;
  - A discussion of how the timing of the surveys affects the comprehensiveness of the survey;
  - A list of potential special status species or natural communities;
  - A description of the area surveyed relative to the project area;
  - References cited, persons contacted, and herbaria visited;
  - Description of reference site(s), if visited, and phenological development of special status plant(s);
  - A list of all taxa occurring on the project site. Identify plants to the taxonomic level necessary to determine whether or not they are a special status species;
  - Any use of existing surveys and a discussion of applicability to this project;
  - A discussion of the potential for a false negative survey;
  - Provide detailed data and maps for all special plants detected. Information specified above under the headings "Special Status Plant or Natural Community Observations," and "Field Survey Forms," should be provided for locations of each special status plant detected;
  - Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms should be sent to the CNDDB and included in the environmental document as an Appendix. It is not necessary to submit entire environmental documents to the CNDDB; and,
  - The location of voucher specimens, if collected.

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22 For a complete list of indexed herbaria, see: Holmgren, P., N. Holmgren and L. Barnett. 1990. Index Herbariorum, Part 1: Herbaria of the World. New York Botanic Garden, Bronx, New York. 693 pp. Or: http://www.nybg.org/bsci/ih/ih.html

23 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

24 A vegetation map that uses the National Vegetation Classification System (http://biology.usgs.gov/npsveg/nvcs.html), for example *A Manual of California Vegetation*, and highlights any special status natural communities. If another vegetation classification system is used, the report should reference the system, provide the reason for its use, and provide a crosswalk to the National Vegetation Classification System.

- **Assessment of potential impacts**
  - A discussion of the significance of special status plant populations in the project area considering nearby populations and total species distribution;
  - A discussion of the significance of special status natural communities in the project area considering nearby occurrences and natural community distribution;
  - A discussion of direct, indirect, and cumulative impacts to the plants and natural communities;
  - A discussion of threats, including those from invasive species, to the plants and natural communities;
  - A discussion of the degree of impact, if any, of the proposed project on unoccupied, potential habitat of the species;
  - A discussion of the immediacy of potential impacts; and,
  - Recommended measures to avoid, minimize, or mitigate impacts.

QUALIFICATIONS

Botanical consultants should possess the following qualifications:

- Knowledge of plant taxonomy and natural community ecology;
- Familiarity with the plants of the area, including special status species;
- Familiarity with natural communities of the area, including special status natural communities;
- Experience conducting floristic field surveys or experience with floristic surveys conducted under the direction of an experienced surveyor;
- Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
- Experience with analyzing impacts of development on native plant species and natural communities.

SUGGESTED REFERENCES

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APPENDIX D

DELPHINIUM FOUND WITHIN THE PANOCHE SURVEY AREA (MEMORANDUM FROM DR. JAMES PAULUS)

Memorandum May 3, 2010

To: Davinna Ohlson, project manager
From: Jim Paulus

RE: Delphinium found within the Panoche survey area

Populations of native perennial herbs of the genus *Delphinium* were located in Sections 4, 8, 9 and 19 during surveys conducted in March and April. At least one individual in each located population was exhibiting flowers either upon initial detection or when the population was revisited by the project botanist. Identification to species at each location therefore was based upon available leaf, stem and flower characters. In addition, one individual in Section 8 was excavated in order to observe below-ground characters such as root length and strength of the stem attachment.

Plants in Sections 9 were assigned to the relatively common species *D. patens* ssp. *patens*, based upon above-ground characters exhibited by blooming individuals. Plants identified as *D. patens* ssp. *patens* had relatively dark purple-blue sepals, and petals of similar coloration except for whitish margins and white hairs on the upper surfaces. White petals would be expected of both *D. recurvatum* and *D. gypsophilum*. In addition, the flowers exhibited by *D. patens* were relatively small and crowded in comparison to flowers produced by populations located in other Sections. Sepal spurs were consistently less than 10 mm in length, lateral sepals were less than 15 mm in length, and inflorescence internodes were generally less than 20 mm apart. Plants of *D. recurvatum* or *D. gypsophilum* may be expected to produce at least some flowers of greater overall size and greater spacing within the inflorescence. Finally, the lower stems of *D. patens* in Section 9 were consistently glabrous, but were never glaucous and did not appear as reddish as the stems of *Delphinium* located elsewhere within the survey area.

Plants in Section 19 were assigned to the species *D. gypsophilum* ssp. *gypsophilum* (CNPS 4.2, no state or federal listing), based upon above-ground characters. These plants produced up to 25 flowers per inflorescence, spaced up to 3.5 cm apart and held on pedicels of 10-20 mm length. In general, these plants were robust relative to populations found elsewhere within the survey area, with some individuals standing greater than 1 m tall. The expected size of the stem and inflorescence would be smaller for *D. recurvatum*, which is described as generally less than 60 cm tall and with more crowded flowers due to pedicels spaced generally less than 2.5 cm apart. Also, the plants at had exhibited strongly glaucous lower stems, which is typical of *D. gypsophilum* ssp. *gypsophilum*, but not described in literature sources for *D. recurvatum*. Plants in Section 19 exhibited whitish flowers, with little variation between the sepal and petal colors. Some individuals had a small amount of blue in the sepals, which were observed to be reflexed relatively little (or none) even on older flowers. In contrast, *D. recurvatum* flowers would be generally expected to show greater contrast between sepals (bluish) and petals (white), with reflexed sepals. Characters that did not evoke confident separation included the leaves, which were at most ciliate along the edges, and petals that on some individuals were hairier on the inner surfaces relative to the outer surfaces. Expected characters for *D. gypsophilum* would include puberulent leaf margins and equally hairy petal surfaces.

Plants in Sections 4 and 8 could not be confidently separated from the rare species *D. recurvatum* (CNPS 1B.1, no state or federal listing), based upon above-ground characters and below-ground characters of one individual excavated in Section 8. These plants, comprising eight separate groupings (one in Section 8 and seven in Section 4), generally exhibited greater variation in color of petals and sepals, with some plants having light purple-blue sepals that strongly contrasted with the white petals (Figure 1). No plants in these groups were observed to achieve greater than 60 cm overall height. Stems were observed to be consistently reddish and glabrous, but not glaucous. Inflorescence size (ie, pedicel spacing and length, number of flowers) was consistent with the size expected for *D. recurvatum*, with less than 10 flowers held on glabrous pedicels (ascending at 45 degrees) spaced at about 2 cm apart. Finally, the root system investigated in Section 8 (Figure 2) was highly branched, with a narrowed but firm attachment to the stem. Some plants within each of these groups (all located within an area of about one square mile) exhibited often strong variation in these characters, making positive identification to the species level of taxa difficult. For example, sepal coloration and reflexion varied considerably, with sepal color ranging from white to slightly pinkish (Figure 3) to slightly or rather strongly bluish (Figure 1), and older flowers attaining a range of barely to strongly reflexed. This variability was observed on at least one occasion to occur on a single individual. Petal hairiness with regard to overall amount of hairs and contrast between inner and outer surfaces was also variable, although all plants exhibited some degree of white-hairiness on both the inner and outer surfaces. Leaves were never puberulent, appearing overall glabrous but upon close inspection having ciliate hairs on leaf margins and thus resembling plants separated as *D. gypsophilum* in Section 19. Like all other *Delphinium* found within the survey area except *D. patens* in Section 9, plants in Sections 4 and 8 developed darkish, often greenish, central sepal spots, which is not a character described in the available literature or appearing in herbaria specimen photographs of *D. recurvatum*.

As of this writing, it is speculated that some hybridization has occurred among the *Delphinium* that now populate portions of Sections 4 and 8. Hybridization would account for the relatively high inter- and intra-group variability, and is a generally well-documented trait of local *Delphinium* species. This known tendency for hybridization is thought to be more commonly realized in areas that have been significantly disturbed, and disturbance is certainly in force within the habitat where these plants were found. This area (the flatlands at and near Sections 4 and 8) likely once supported alkaline scrub vegetation, but has been historically used for pasture. It now supports heavily grazed non-native grasslands. Sections 4 and 8 where *Delphinium* populations have survived do not exhibit the tillage lines found in other Sections. The tentatively assigned *Delphinium recurvatum* remains there (despite grazing disturbance), but has possibly responded to habitat alteration by becoming hybridized with other locally occurring species such as *D. gypsophilum* ssp. *gypsophilum* or *D. hesperium* ssp. *pallescens*. It is likely that revisiting all of the populations located in Sections 4 and 8 during fruit and seed maturation will allow more confident assignation to the species level of taxa.

Figure 1. Delphinium cf. recurvatum, Section 4

Figure 3. Delphinium cf. recurvatum, Section 4

Figure 2. Delphinium cf. recurvatum, Section 8

LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

RESULTS OF 2010 ADULT AND JUVENILE BNLL SURVEYS CONDUCTED ON SECTION 16 OF TOWNSHIP 15S, RANGE 10E FOR SOLARGEN ENERGY'S PANOCHE VALLEY SOLAR FARM

Prepared by:
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1 INTRODUCTION

The following is a report of findings relating to 2010 adult and juvenile blunt-nosed leopard lizard (*Gamelia sila*)(BNLL) surveys conducted by Live Oak Associates, Inc. (LOA) on a single-Section subset of land within the Panoche Valley Solar Farm project site. The proposed Solargen Energy's Panoche Valley Solar Farm is located approximately 15 miles west of Highway 5 along West Shields, Panoche and Little Panoche Roads in eastern San Benito County.

The outline of the proposed project is irregularly-shaped, and can be found in the Panoche, Mercey Hot Springs, Llanada, and Cerro Colorado 7.5 minute U.S. Geological Survey quadrangles in Sections 3, 4, 8-11, and 13-16 of Township 15 South, Range 10 East; and section 19 of Township 15 South, Range 11 East. The majority of parcels within the site are used for cattle grazing. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1240 feet above sea level to approximately 1400 feet.

1.1 PROJECT DESCRIPTION

Solargen Energy Inc. proposes to construct and operate a 420 Megawatt solar photovoltaic (PV) energy generating facility that would be named the Panoche Ranch Solar Farm (Farm). This site comprises approximately 4885 acres located in the eastern portion of San Benito County.

The Farm is proposed, in part, to support California in meeting the Renewable Portfolio Standard mandate, requiring investor-owned utilities to supply 20% of their total electricity through renewable energy by the year 2010. Benefits of the proposed Farm include the following:

- Direct conversion of sunlight to electricity through the PV effect does not require water to generate electricity
- Solargen's PV panels consist of non-toxic materials such as glass, silicon, concrete and steel
- The Farm would offset potential emissions of greenhouse gases that contribute to climate change and other pollutants such as nitrogen dioxide from fossil fuel fired power plants

The Farm would be constructed on contiguous parcels of land historically used for grazing. A buffer zone with a minimum width of 35-feet would be maintained between the PV panels and surrounding land and the operation of the Farm would not interfere with adjacent land uses currently in place.

The selection of the site in Panoche Valley is based mainly on sun light, topography and proximity to the Moss to Panoche transmission line owned by PG&E. This line provides a

FIGURE 1. VICINITY MAP

unique opportunity to connect energy produced at the Farm to an existing point on the system with available electric transmission capacity. The Panoche Valley offers a relatively level valley floor, occurring between approximately 1240 and 1400 feet above sea level. The Panoche Valley area supports a strong solar resource according to the National Renewable Energy Laboratory Solar Radiation Database (http://www.nrel.gov/gis/data_analysis.html), which has collected data for the last decade on various locations around the United States. The Farm would be expected to remain in operation for at least 30 years, with the possibility of a subsequent re-powering for additional years of operation. The energy produced here would mainly benefit users in San Benito and Fresno Counties, though outlying customers would also receive a portion of their energy from the Farm.

The Farm would consist primarily of PV panels on steel support structures, which would be dark in color. These panels would be arranged in rows, with panels tilting upward and facing south or southwest. Each panel would be 7- by 8-feet and they would stand no more than 15-feet above the ground. The panels would be arranged in blocks, and each block would be supported by an inverter and transformer. These units would stand no more than 25-feet above the ground. Medium-voltage collection system lines would be buried underground. It is believed that this system, with no moving parts, no thermal cycle, no water needs, a low visual profile and underground collection system would help minimize the Farm's potential impacts to the environment.

Due to the topography of the Panoche Valley, the installation of the Farm would not require large-scale grading. The main areas of grading would occur for all-weather access roads, the Farm substation, and an operations and maintenance (OM) facility. The roads would be heavily used during the construction phase, and then rarely used for maintenance in subsequent years.

As stated previously, the Farm would not require water to generate electricity. However, some water would be required for sanitary facilities and for periodic panel cleaning. It is estimated that these uses would require approximately 10.5 acre-feet of water per year, based on a one time per year cleaning schedule. This annual water demand represents approximately 6% of that used for a similar-sized solar thermal facility, based on recent California Energy Commission information. It is estimated that the construction of the Farm would take approximately 6 years to complete, and during this time, additional water would be necessary for sanitary facilities, dust control, initial panel washing and manufacturing concrete. Solargen is exploring opportunities to clean and recycle gray water for reuse onsite. Existing onsite wells should be sufficient to serve the Farm's water needs, however thorough studies of the water resources both onsite and in the greater Panoche Valley area are planned.

An approximately 5-acre substation is proposed as part of the project, and includes an adjacent area of up to 2 acres to be occupied by an OM facility, including a small parking area. One or more cement pads would be constructed as foundations for substation equipment, and other areas would utilize a gravel substrate. An 8-foot chain link fence would be constructed around the substation. These facilities would be strategically placed adjacent to the existing PG&E Moss to Panoche 230 kV transmission line. In addition to the substation and OM facility, there would be approximately one gear switch house for every 40 inverter and transformer combinations, each of which would have similar dimensions to the inverters and transformers.

2 EXISTING CONDITIONS

2.1 BIOTIC HABITATS ASSOCIATED WITH SECTION 16 OF TOWNSHIP 15S, RANGE 10E

Ruderal Grassland: At the time of the adult and juvenile BNLL surveys were conducted (3 May to 9 July, and 2 August to 10 September 2010, respectively), Section 16 the northeast corner of the site was used as a bull pen, and the remainder of the northern half of the Section was grazed in patches during juvenile survey. The southern half of the site was more heavily grazed during the adult surveys. The vegetation on-site included 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*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*) and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. In general, the vegetation on the northern half of the Section was much more dense than on the southern half.

2.2 HISTORY OF BLUNT-NOSED LEOPARD LIZARDS WITHIN THE GREATER 4,885 ACRES OF THE SITE

The blunt-nosed leopard lizard (BNLL) is federally listed as Endangered (11 March 1967, Federal Register 32:4001); is state listed as Endangered (27 June 1971); and is also a Fully Protected species under California Fish and Game Code Section 5050. The California Natural Diversity Database (CNDDB) contains several observations of BNLL on the Valley floor dating between 1979 and 2004.

3 METHODS

The project site is within the known range of the BNLL. Therefore, surveys for adult and juvenile BNLL were conducted on Section 16 of Township 15S, Range 10E (Figure 1), which represents the initial area, or Phase I, of proposed development for the Panoche Valley Solar Farm. These surveys were conducted following the protocol outlined in CDFG's *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard*, May 2004, hereinafter referred to as CDFG Guidelines.

Survey Protocol Constraints:

The currently accepted survey methodology for the BNLL requires the following:

- The maximum width that survey transects can be spaced is 30 meters
- A maximum of 4 surveys on a given site per week and 8 days of surveys within a 30-day period. At least one survey session should be conducted for 4 consecutive days
- Surveys must be conducted within the following temperatures: 25°C-35°C (77°F – 95°F)
- No surveys on overcast days (cloud cover of >90%)
- No surveys when sustained wind velocities exceed 10 mph
- Surveys may begin after sunrise when temperatures are within appropriate ranges, but must end by 1400 hours or when maximum temperatures are reached
- Surveys must be conducted by a minimum of 2 biologists

Qualifications of Researchers:

An acceptable BNLL survey crew should consist of no more than 3 **Level I** researchers for every **Level II** researcher. This restriction should reduce the number of incorrect/missed identifications. The names and affiliations of all researchers must be recorded for each survey day.

- **Level l**: Researcher has demonstrated ability to distinguish BNLL from other common lizard species that may inhabit the area
- **Level II**: Researcher has demonstrated ability to distinguish BNLL from other common lizard species that may inhabit the area and has participated in at least 50 survey days for BNLL (or 25 survey days and a BNLL identification course recognized by/acceptable to the Department of Fish and Game). Researcher has made at least one confirmed field sighting of a BNLL
- A minimum of one confirmed field sighting must be documented for each **Level II** researcher and be available to the Department upon request. As with all BNLL sightings, it should also be submitted to the California Natural Diversity Database. The Information to be included in documentation of BNLL sighting include: Name of researcher, date of survey, location of survey, names of accompanying researchers who can confirm the sighting, and details of sighting (distance, BNLL activity, etc.)

LOA Level II biologists included: Dr. Mark Jennings, Molly Gobel, Yancey Bissonnette, Steve Pruett, Karl Weiss, Missy Chase, Jayanna Miller, Jared Prat and Lisa Wifrey. LOA Level I biologists included: Dan Cordova, Jen Turner, Fabian Pereida, Jared Bigler, Colby Boggs, Neal

Kramer, Chris Bronny, Wendy Fisher, Dave Wappler, Emily Cmapbe, Lidia D'Amico, Danielle Castle, Cecile Shohet, Andy Huck and Katrina Huck.

FIGURE 2 AREA SURVED

LOA conducted adult BNLL surveys, following the CDFG Guidelines, between 3 May and 9 July 2010. Young-of-the-year surveys were conducted between 2 August and 10 September 2010, again following CDFG Guidelines. The results of these surveys are summarized in Section 4 below.

4 RESULTS

Surveys for adult BNLL began on 3 May 2010 and were conducted most days, Monday through Friday, through 9 July 2010, weather permitting. Surveys for juvenile BNLL began on 2 August and ended 10 September 2010. As noted above, these surveys were conducted on Section 16 of Township 15S, Range 10E; the Section containing and Phase I of the proposed Panoche Valley Solar Farm. A total of 12 survey days were conducted during the adult surveys, and a total of 5 survey days were conducted for the juvenile surveys. The first adult BNLL was observed along Panoche Creek on 4 May 2010, the second day of surveys. A total of 12 adult surveys were conducted on Section 16 resulting in 37 observations of adult. Individual adult BNLL were observed throughout the survey window. Table 1 represents the dates and general location of BNLL observations during adult surveys, locations outside of Section 16 occurred outside of protocol parameters when surveyors walked the Panoche Creek wash.

Table 1. Dates and General Locations of Adult BNLL Observations (3 May to 9 July, 2010)

Date	Location*
4-May-2010	SE 1/4
5-May-2010	SE 1/4
5-May-2010	SE 1/4
5-May-2010	SE 1/4
5-May-2010	incidental along wash, Section 15
5-May-2010	incidental along wash, Section 15
5-May-2010	incidental along wash, Section 15
5-May-2010	incidental along wash, Section 15
7-May-2010	incidental along wash, Section 14
7-May-2010	incidental along wash, Section 14
7-May-2010	incidental along wash, Section 14
12-May-2010	On Southern Fence Row
12-May-2010	SE 1/4
13-May-2010	SE 1/4
13-May-2010	SE 1/4
13-May-2010	SE 1/4

14-May-2010	SW 1/4
14-May-2010	SW 1/4
14-May-2010	SE 1/4
19-May-2010	SE 1/4
25-May-2010	SE 1/4
25-May-2010	SE 1/4
25-May-2010	SE 1/4
5-Jun-2010	On Southern Fence Row
1-Jun-2010	SW 1/4
1-Jun-2010	SW 1/4
2-Jun-2010	SE 1/4
2-Jun-2010	SE 1/4
3-Jun-2010	SW 1/4
3-Jun-2010	SE 1/4
4-Jun-2010	SW 1/4
7-Jun-2010	SE 1/4
7-Jun-2010	SE 1/4
7-Jun-2010	SE 1/4
11-Jun-2010	SE 1/4
16-Jun-2010	SE 1/4
16-Jun-2010	SE 1/4
16-Jun-2010	SE 1/4
21-Jun-2010	SE 1/4
22-Jun-2010	SE 1/4
22-Jun-2010	SE 1/4
22-Jun-2010	SE 1/4
6-Jul-2010	SE 1/4

*All in Section 16 unless otherwise noted

Surveys for juvenile BNLL began on 2 August and continued until 10 September 2010. CDFG Guidelines call for a total of 5 complete surveys for juveniles, and Section 16 was surveyed 5 times following CDFG guidelines. The results were similar to the adult surveys, with BNLL being located in similar areas within Section 16 (i.e., in and around Panoche Creek). The dates and general locations of these observations can be seen in Table 2. Figure 2 graphically represents the general locations of select sightings.

Table 2. Dates and General Locations of Juvenile BNLL Observations (3 August - 1 September 2009)

Date	Location within Section 16
08/03/2010	SW 1/4
08/09/2010	SE 1/4
08/10/2010	SE 1/4-4 individuals
08/17/2010	SE 1/4
09/01/2010	SE 1/4

Other grassland species (e.g., BUOW and SJKF) continued to be observed and recorded during juvenile BNLL surveys. The general location and dates of observations are shown on Figure 2.

5 SUMMARY

Adult BNLL surveys were conducted on Section 16 of Township 15S, Range 10E of the proposed Panoche Valley Solar Farm between 3 May and 9 July2010; and juvenile BNLL surveys were conducted between 2 August and 10 September 2010. BNLL adult and juveniles were observed on Section 16.

The adult and juvenile BNLL found in Section 16 were found mainly in association with Panoche Creek, which is consistent with known habitat preferences of washes and floodplains (Warrick et al., 1998), and non-native grasslands (USFWS 1998), among others. Juvenile BNLL were found along the washes and also farther away as they dispersed from their hatching sites. Section 16 supports mid to dense vegetation one main wash. The grasses in the north portion of Section 16 was much more dense than the south portion, which may prove to be too dense to support BNLL populations.

6 REFERENCES

CDFG. 2009. California Natural Diversity Data Base. The Resources Agency, Sacramento, CA.

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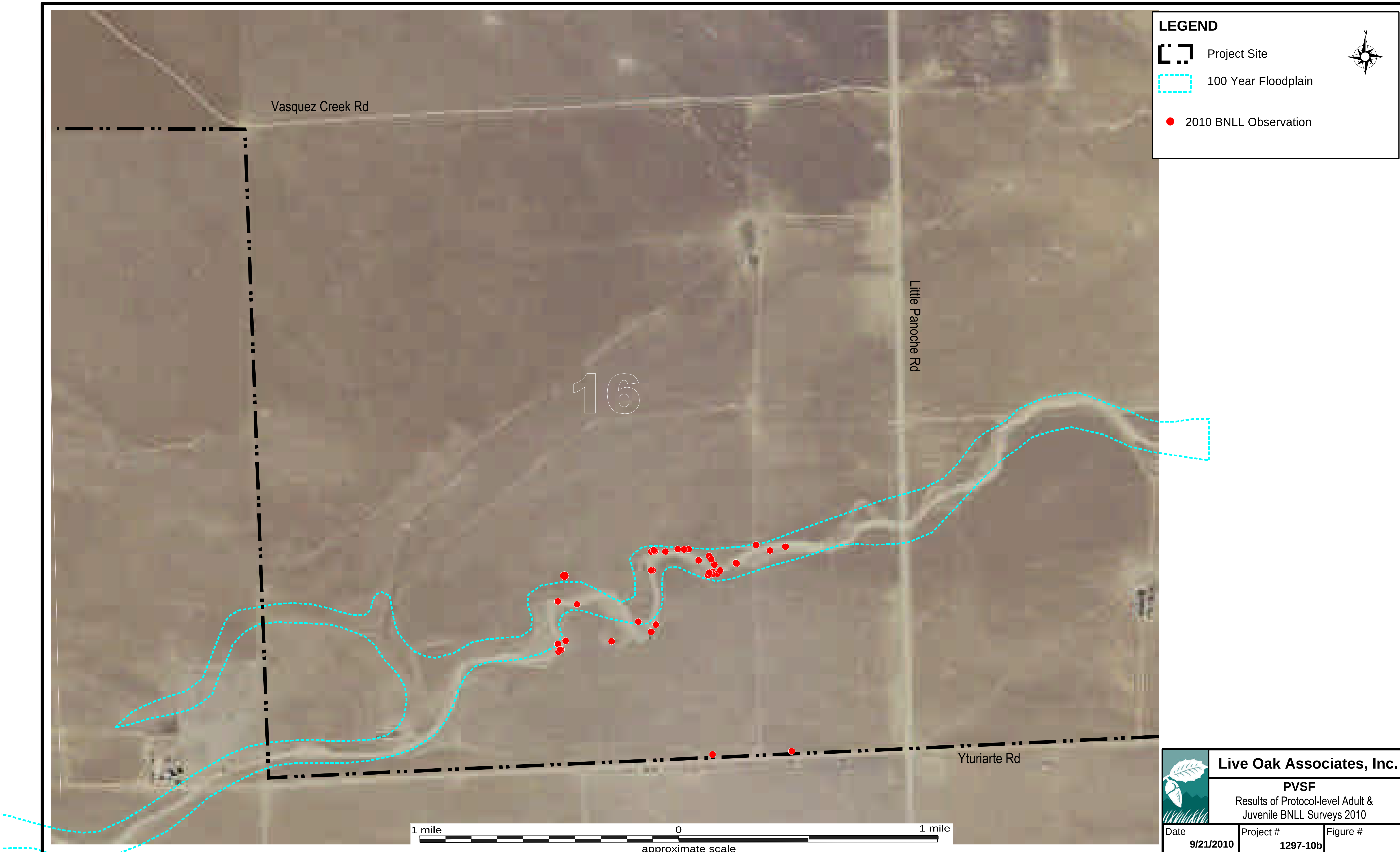
USFWS. 1998. *Recover Plan for Upland Species of the San Joaquin Valley, California*.

Warrick, G.D., T.T. Kato, B.R. Rose. 1998. *Microhabitat Use and Home Range Characteristics of Blunt-Nosed Leopard Lizards*. Journal of Herpetology, V32,N2,pp183-191.

APPENDIX A

APPENDIX B


LEGEND
Project Site
100 Year Floodplain
2010 BNLL Observation
N
Vasquez Creek Rd
Little Panoche Rd
16
Yturiarte Rd
1 mile
0
1 mile
approximate scale
Live Oak Associates, Inc.
PVSF
Results of Protocol-level Adult & Juvenile BNLL Surveys 2010
Date
9/21/2010
Project #
1297-10b
Figure #

LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

DATA REQUEST #8 – 10 September 2010

INTRODUCTION

Live Oak Associates, Inc. (LOA) conducted reconnaissance-level surveys on approximately 10,900-acres of the Silver Creek Ranch (SCR), proposed mitigation lands for the Panoche Valley Solar Farm (PVSF). These surveys were focused on blunt-nosed leopard lizards (*Gambelia sila*; BNLL), giant kangaroo rat (*Dipodomys ingens*; GKR) and San Joaquin kit fox (*Vulpes macrotis mutica*; SJKF). Observations of other species of special concern were also noted. Dr. Mark Jennings and Molly Goble conducted five days of BNLL surveys between 30 August and 3 September; Katrina and Andy Huck conducted three days of mammal surveys between 30 August and 1 September 2010; and Dr. Jim Paulus and Neal Kramer conducted three days of vegetation alliance surveys between 3 and 5 September 2010.

Each of these surveys began by visiting historic observations of relevant species as presented by the California Natural Diversity Database (CNDDB) and spot-checking those areas to determine whether they still support the species. To cover the most ground in the least amount of time, biologists drove as close as possible to historic sightings and then surveyed the areas on foot allowing the greatest amount of visual coverage. Subsequent efforts included other portions of the site that support suitable habitat for the target species. The following is a summary of effort for each segment of the reconnaissance survey.

SURVYES

<u>Vegetation Alliances</u>

Methods/Results

Map elements (vegetation alliances) identified within the study area were visited or viewed from nearby using binoculars. Boundaries between associations were drawn onto georectified 1:24,000 scale color aerial images during field reconnaissance. These polygons were then digitized to facilitate map interpretation. The typical total cover provided by the herbaceous, shrub and tree strata were observed, and a list of associations as signaled by shifts in dominant canopy species abundance was developed for each alliance present. A partial floristic inventory was conducted in concert with the mapping effort. Survey work included searching for extant riparian corridor or spring-driven habitat across the entire area. Observations of riparian habitat indicators such as surface flows, defined channels with evidence of scour, and phreatophytic species prominence were recorded. Due to the late timing of the surveys, potentially occurring rare plant species would be expected to be exhibiting late fruiting or senescing phenology, and so were past their optimal periods for identification. A table of special status plants with the potential to occur onsite is included at the end of this summary, as well as a partial inventory of plants onsite and a habitat map.

The three-day reconnaissance survey for plant alliances produced five distinct alliances. These alliances include California annual grassland, Ephedra californica shrubland, Populus fremontii forest, zonal riparian, and tamarix semi-natural shrubland (see Habitats map).

Blunt-nosed leopard lizard (*Gambelia sila*)

Methods/Results

General habitat and ocular surveys were conducted for BNLL and were concentrated where BNLL have been recorded in the past (in the CNDDB) and in those areas most likely to support BNLL habitat (e.g., barren washes and areas with sparse vegetation on friable soils). Two biologists walked abreast of one another no more than 30 meters apart, stopping from time to time and searching the surroundings through binoculars. The five days of surveys occurred within the juvenile survey period (1 August to 15 September) outlined in the CDFG's *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard*, May 2004 and generally followed the survey methodology. Observations of the target species and other species of special concern were mapped using a Garmin GPS unit.

Of the portions of the SCR that were surveyed, the highest quality habitat for BNLL appears to be in the lower portions of intermittent drainages near Panoche Road. The best habitats were in the SE corner of Section 27, the eastern half of Section 34, and the SW corner of Section 35. A total of 5 juvenile BNLL were observed in these areas (see Figure entitled: Silver Creek Recon BNLL3). The general habitat for all of these areas was sandy washes bordered by rocks and boulders with an abundance of California side-blotched lizards (*Uta stansburiana elegans*). The amount of vegetation present was sparse, especially for introduced grasses.

LOA did not find any juvenile BNLL in the portions of Section 32 (near center) and 35 (in the SE corner) previously recorded by the CNDDB. This could be due to the current presence of dense amounts of vegetation in the intermittent drainages there. Vegetation is almost certainly sparser during drought or below average rainfall years, or in years when these areas are more heavily grazed.

Giant Kangaroo Rat

Methods/Results

Surveys for GKR began in those areas with historic sightings (CNDDB) of the species (primary surveys), represented as polygons on the figure entitled: Silver Creek Recon GKR3; and secondary surveys were conducted in areas with a slope of 11% or less, which represents habitat most likely to support the target species, based on literature review and conversations with the Agencies. Spot-checking involved driving as near a polygon as possible, walking meandering transects and recording observations. Observations of the target species and other species of special concern were noted and mapped with a Trimble GPS unit. Due to some overlap in size class of scat between GKR and Heermann's kangaroo rat (*Dipodomys heermanni*) at 7mm, only rat scats $\geq$ 9mm were recorded as GKR. Possible locations of GKR were mapped as a polygon or a point depending on the amount of confirmed sign. The time constraints of the survey did not allow surveying of every CNDDB polygon. However, every CNDDB polygon that was surveyed (3 of 9) via spot-checking contained confirmed sign of GKR. A small valley, not previously recorded in the CNDDB supported a large colony of confirmed GKR sign (see GKR3).

San Joaquin kit fox

Methods/Results

Surveys for SJKF began in those areas with historic sightings (CNDDB) of the species (primary surveys), represented as polygons on the figure entitled: Silver Creek Recon SJKF3; and secondary surveys were conducted in areas with a slope of 11% or less, which represents habitat most likely to support the target species, based on literature review and conversations with the Agencies. Spot-checking involved driving as near a polygon as possible, walking meandering transects and recording observations. The CNDDB polygon encompassing Section 35 is still utilized by SJKF, confirmed by SJKF scat. The only other CNDDB polygons for SJKF on the SCR occur along Panoche Road, and are presumed to be data from previous road surveys or incidental sightings. LOA identified additional locations within the site containing SJKF scat. Five individuals were observed on the night of 1 September during spotlighting surveys from ranch roads within the site.

CONCLUSION

LOA conducted a brief reconnaissance survey of approximately 10,900-acres of the SCR focusing on vegetation alliances, BNLL, GKR and SJKF. Surveys began by spot-checking historic sightings of species as presented in the CNDDB and were conducted during the juvenile BNLL survey window. LOA confirmed that areas with historic observations of GKR and SJKF are still valid. While no observations of BNLL were made in areas with historic sightings, observations of 5 juvenile BNLL were made in the first two days of surveys in areas with no previous sightings, indicating a relatively healthy population, based on Germano's (CDFG 2009) findings that when the species is abundant it takes an average of 1.18 days of survey effort to observe.

In addition to the target species, a number of other special status species were observed including the San Joaquin coachwhip (*Masticophis flagellum ruddocki*), loggerhead shrike (*Lanius ludovicianus*), San Joaquin antelope squirrel (*Ammospermophilus nelsoni;* SJAS), and American badger (*Taxidea taxus*). Observations of SJAS were initially being GPS'd, however they were so abundant across the site it became necessary to stop recording their locations due to a short survey window and so many acres to cover.

The site also supports potential breeding habitat for the California tiger salamander (*Ambystoma californiense*) in the form of stock ponds and vernal pools. Perennial waters in the Panoche Creek with covered by stands of cottonwood (*Populus fremontii*) could potentially support suitable habitat for California red-legged frog (*Rana draytonii*), especially considering the lack of predacious fish and bullfrogs in these waters.

The *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and the *Blunt-nosed Leopard Lizard 5-Year Review Summary and Evaluation* (USFWS 2010) identified the SCR as a targeted area for protection and subsequent recovery of the suite of upland species occurring in the Panoche Valley and greater Ciervo-Panoche Region. Considering BNLL were not observed this year in areas where they were previously observed (CNDDB), likely due to the dense vegetation occurring there, there is an opportunity to manage the site to increase suitable habitat for BNLL. Opportunities to create breeding ponds for CTS are also likely present onsite. Eradicating tamarix from the drainages would increase biotic value on many levels.

Adding the SCR to the mitigation lands for the proposed PVSF would offer the entire Ciervo-Panoche Region an opportunity to protect already high quality habitat for the suite of upland species that occurs there and enhance habitat for the same species through restoration and adaptive management.

REFERENCES

CDFG. 2004. *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard*.

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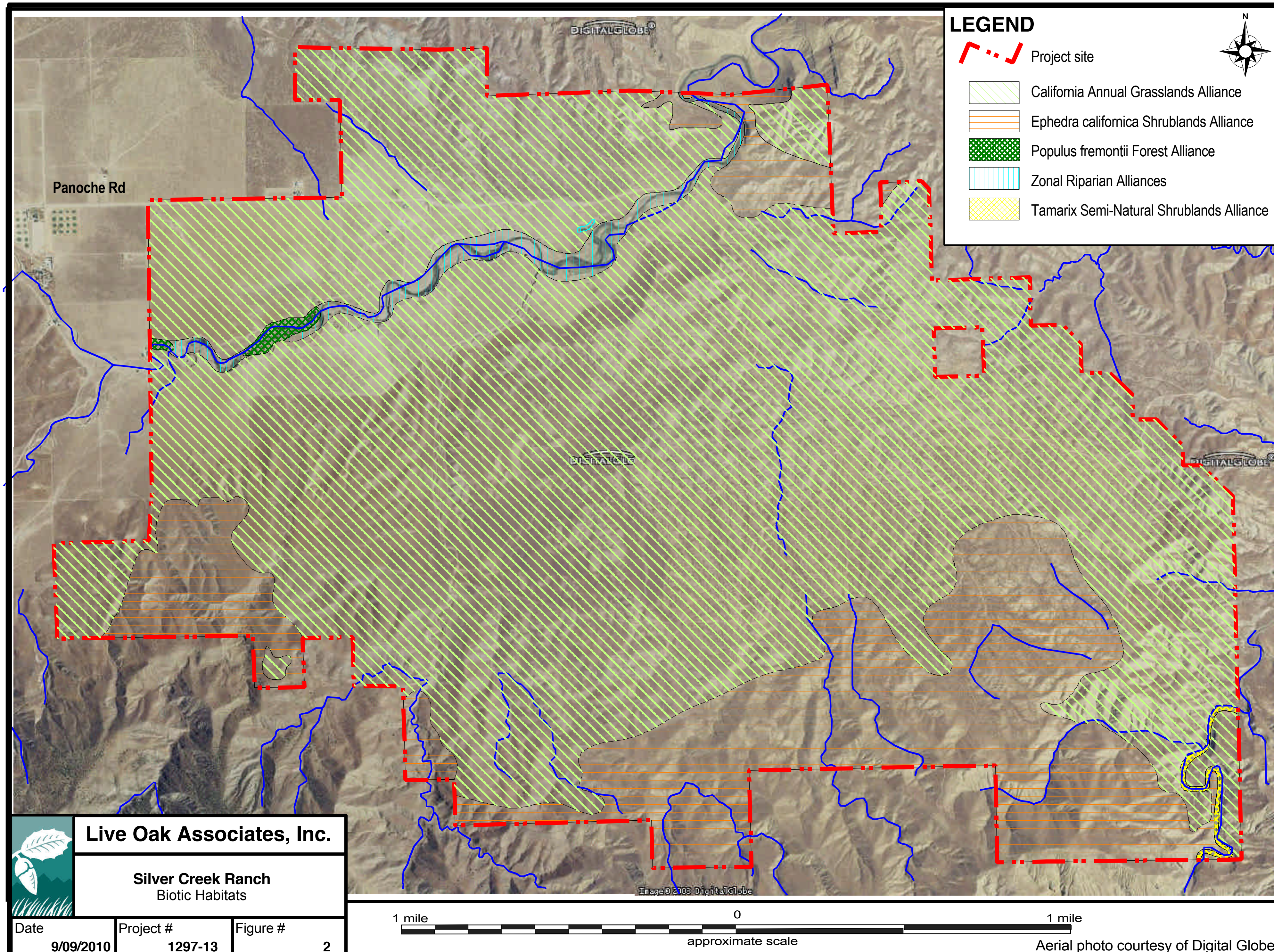


Live Oak Associates, Inc.

Silver Creek Ranch
Biotic Habitats

Date	Project #	Figure #
9/09/2010	**1297-13**	**2**

Table 1. Special status plant species that could potentially occur within the 10,903 acre Silver Creek Ranch proposed Solargen Panoche Mitigation Area. Blooming period is taken from CNPS (2001).

Species	Status*	Habitat	Blooming Period
Santa Clara thorn-mint *Acanthomintha lanceolata* Annual herb	CNPS 4	Chaparral, woodland, rocky, often serpentine	March-June
forked fiddleneck *Amsinckia vernicosa* var. *furcata* Annual herb	CNPS 4	Woodland, grassland	February-May
Salinas milk-vetch *Astragalus macrodon* Perennial herb	CNPS 4	Chaparral, woodland, grassland	April-July
crownscale *Atriplex coronata* var. *coronata* Annual herb	CNPS 4	Chenopod scrub, grasslands, and vernal pools, alkaline soils	March-October
Lost Hills crownscale *Atriplex vallicola* Annual herb	CNPS 1B	Chenopod scrub, grasslands, and vernal pools, alkaline soils.	April-August
western lessingia *Benitoa occidentalis* Annual herb	CNPS 4	Chaparral, grassland, clay soils	May-November
round-leaved filaree *California macrophylla* Annual herb	CNPS 1B	Woodland, grassland	March-May
Lemmon's jewelflower *Caulanthus coulteri* var. *lemmonii* Perennial herb	CNPS 1B	Pinyon-juniper woodland, grassland	March-May
Hall's tarplant *Deinandra halliana* Annual herb	CNPS 1B	Chenopod scrub, grassland, clay soils	April-May
gypsum-loving larkspur *Delphinium gypsophilum* ssp. *gypsophilum* Perennial herb	CNPS 4	Chenopod scrub, grassland, clay soils	February-May

Table 1. (continued)

Species	Status*	Habitat	Blooming Period

recurved larkspur *Delphinium recurvatum* Perennial herb	CNPS 1B	Chenopod scrub, grassland, alkaline	March-June
protruding buckwheat *Eriogonum nudum* var. *indictum* Perennial herb	CNPS 4	Scrubland, woodland, often clay or serpentine	May-December
Temblor buckwheat *Eriogonum temblorense* Annual herb	CNPS 1B	Grasslands, open slopes	May-September
Idria buckwheat *Eriogonum vestitum* Annual herb	CNPS 4	Grasslands, open slopes	April-August
pale yellow layia *Layia heterotricha* Annual herb	CNPS 1B	Pinyon-juniper woodland, alkaline grassland, clay	March-June
Panoche peppergrass *Lepidium jaredii* ssp. *album* Annual herb	CNPS 1B	Grassland, washes and alluvial fans	February-June
serpentine leptosiphon *Leptosiphon ambiguus* Annual herb	CNPS 4	Grassland, often serpentine soil	March-June
showy golden madia *Madia radiata* Annual herb	CNPS 1B	Woodland, grassland	March-May
San Joaquin woollythreads *Monolopia congdonii* Annual herb	CNPS 1B federal Endangered	Chenopod scrub, grassland, sandy	February-May
chaparral ragwort *Senecio aphanactis* Annual herb	CNPS 2	Woodland, chaparral	January-April

***California Native Plant Society (CNPS) list designations**

1B: Plants Rare, Threatened, or Endangered in California and elsewhere
2: Plants Rare, Threatened, or Endangered in California but more common elsewhere
4: Plants of limited distribution – a watch list

Appendix A. Partial plant list developed during field verification of plant associations present in the Solargen Panoche proposed Silver Creek Ranch mitigation area in September 2010. Nomenclature is taken from Hickman (1993) and Jepson Herbarium (2010). Wetland status is taken from Reed (1988). Status codes are given below.

Scientific Name	Common Name	Wetland Status
AGAVACEAE - Agave Family		
Hesperoyucca whipplei[1, 2]	Spanish bayonet	UPL
ALLIACEAE - Onion Family		
Allium crispum[2]	crinkled onion	UPL
APIACEAE - Carrot Family		
Lomatium utriculatum	common lomatium	UPL
ASTERACEAE - Sunflower Family		
Achillea millefolium	yarrow	FACU
Ambrosia acanthicarpa	annual bursage	UPL
Blepharizonia laxa[3]	big tarweed	UPL
*Centaurea melitensis**	tocalote	UPL
Chrysothamnus nauseosus	rabbitbrush	UPL
Deinandra kelloggii[4]	Kellogg's tarweed	UPL
Eastwoodia elegans	yellow mock aster	UPL
Ericameria linearifolia	interior/narrowleaf goldenbush	UPL
Euthamia occidentalis	western goldenrod	OBL
Gutierrezia californica	California matchweed	UPL
Helianthus annuus	common sunflower	FAC-
Isocoma acradenia var. *bracteosa*	alkali goldenbush	UPL
Iva axillaris ssp. robustior	poverty weed	FAC
*Lactuca saligna**	willow lettuce	NI*
*Lactuca serriola**	prickly lettuce	FAC
Lagophylla ramosissima[5]	common hareleaf	UPL
Lasthenia californica	common goldfields	UPL
Lessingia nemaclada	slenderstem lessingia	UPL
Micropus californicus var. *californicus*	slender cottonweed	UPL
Stephanomeria pauciflora	wire lettuce	UPL
Xanthium spinosum	spiny cocklebur	FAC+
Xanthium strumarium	cocklebur	FAC+
BORAGINACEAE - Borage Family		
Amsinckia menziesii	common fiddleneck	UPL
Amsinckia tessellata	checker fiddleneck	UPL
Heliotropium curassavicum	seaside/salt heliotrope	OBL
Phacelia tanacetifolia[6]	tansy phacelia	UPL
BRASSICACEAE - Mustard Family		
Lepidium nitidum var. *nitidum*	shining peppergrass	UPL
*Nasturtium officinale**	water cress	OBL
*Sisymbrium orientale**	oriental mustard	UPL
CARYOPHYLLACEAE - Pink Family		
Herniaria hirsuta var. *cinerea**	gray herniaria	UPL

Scientific Name	Common Name	Wetland Status
CHENOPODIACEAE - Goosefoot Family		
Atriplex argentea var. *mohavensis*	silverscale	FAC
Atriplex fruiticulosa	ball saltbush	
Atriplex lentiformis ssp. *lentiformis*	big saltbush	FAC
Atriplex polycarpa	allscale, desert saltbush	UPL
*Bassia hysopifolia**	fivehorn smotherweed	FAC
*Salsola tragus**	Russian thistle, tumbleweed	FACU
CUPRESSACEAE - Cypress Family		
Juniperus californica	California juniper	UPL
CYPERACEAE - Sedge Family		
Bolboschoenus maritimus[7]	saltmarsh bulrush	OBL
Eleocharis montevidensis	sand spikerush	FACW
Schoenoplectus americanus[8]	three square	OBL
Schoenoplectus pungens[9]	common threesquare	OBL
EPHEDRACEAE - Ephedra Family		
Ephedra californica	California ephedra, Mormon tea	UPL
EUPHORBIACEAE - Spurge Family		
Chamaesyce ocellata ssp. *ocellata*	Contura Creek sandmat	UPL
Croton setigerus[10]	turkey mullein, dove weed	UPL
FABACEAE - Legume Family		
Acacia greggii	catclaw	FACU
Astragalus didymocarpus var. *didymocarpus*	dwarf white milkvetch	
Astragalus oxyphysus	Mt. Diablo milkvetch	UPL
*Lotus corniculatus**	bird's foot trefoil	FAC
Lotus wrangelianus	California lotus	UPL
Lupinus microcarpus	chick lupine	UPL
*Medicago polymorpha**	burclover	UPL
*Melilotus indicus**	sour clover, small melilot	FAC
Prosopis glandulosa var. *torreyana*	mesquite	FACU
Trifolium willdenovii	tomcat clover	UPL
FRANKENIACEAE - Frankenia Family		
Frankenia salina	alkali heath	FACW+
GERANIACEAE - Geranium Family		
*Erodium cicutarium**	red-stemmed filaree	UPL
JUNCACEAE - Rush Family		
Juncus mexicanus	Mexican rush	FACW
Juncus ensifolius	dagger rush	FACW
Juncus xiphioides	iris-leaved rush	OBL
LAMIACEAE - Mint Family		
Salvia carduacea	thistle sage	UPL
Salvia columbariae	chia	UPL
Trichostema lanceolatum	vinegarweed	UPL

Scientific Name	Common Name	Wetland Status
ONAGRACEAE - Evening primrose Family		
Camissonia boothii ssp. *decorticans*	shredding primrose	UPL
Clarkia unguiculata	elegant clarkia	UPL
PLANTAGINACEAE - Plantain Family		
Plantago erecta	California plantain	UPL
POACEAE - Grass Family		
*Avena barbata**	slender wild oat	UPL
*Bromus diandrus**	ripgut brome	UPL
*Bromus hordeaceus**	soft chess	FACW-
Bromus madritensis ssp. *rubens**	foxtail chess, red brome	UPL
Distichlis spicata	saltgrass	FACW*
Hordeum marinum ssp. *gussoneanum**	Mediterranean barley	FAC
Hordeum murinum ssp. *leporinum**	foxtail barley	NI
*Koeleria phleoides**	annual junegrass	
Leymus triticoides	alkali ryegrass	FAC+
Muhlenbergia asperifolia	scratch grass	FACW
Poa secunda ssp. *secunda*	one-sided bluegrass	UPL
*Polypogon monspeliensis**	rabbit's foot grass	FACW+
Vulpia microstachys	annual fescue	UPL
*Vulpia myuros var. myuros**	rat-tail fescue	FACU*
POLEMONIACEAE - Phlox Family		
Eriastrum pluriflorum	manyflowered woollystar	UPL
POLYGONACEAE - Buckwheat Family		
Chorizanthe uniaristida	one-awned spineflower	UPL
Eriogonum angulosum	anglestem buckwheat	UPL
Eriogonum fasciculatum var. *polifolium*	California buckwheat	UPL
Eriogonum gracile var. *gracile*	slender woolly buckwheat	UPL
Eriogonum nudum var. *indictum*	protruding buckwheat	UPL
Hollisteria lanata		UPL
Lastarriaea coriacea	leather spineflower	UPL
Mucronea perfoliata	perfoliate spineflower	UPL
*Rumex stenophyllus**	narrowleaf dock	NI
RANUNCULACEAE - Buttercup Family		
Delphinium sp.	larkspur	UPL
SALICACEAE - Willow Family		
Populus fremontii ssp. *fremontii*	Fremont cottonwood	FACW
Salix exigua	narrow-leaved willow	OBL
Salix laevigata	red willow	~NI
SOLANACEAE - Nightshade Family		
*Nicotiana glauca**	tree tobacco	FAC
Nicotiana quadrivalvis	indian tobacco	UPL
TAMARICACEAE - Tamarisk Family		
*Tamarix ramosissima**	saltcedar	FAC
TYPHACEAE - Cattail Family		
Typha latifolia	broadleaf cattail	OBL

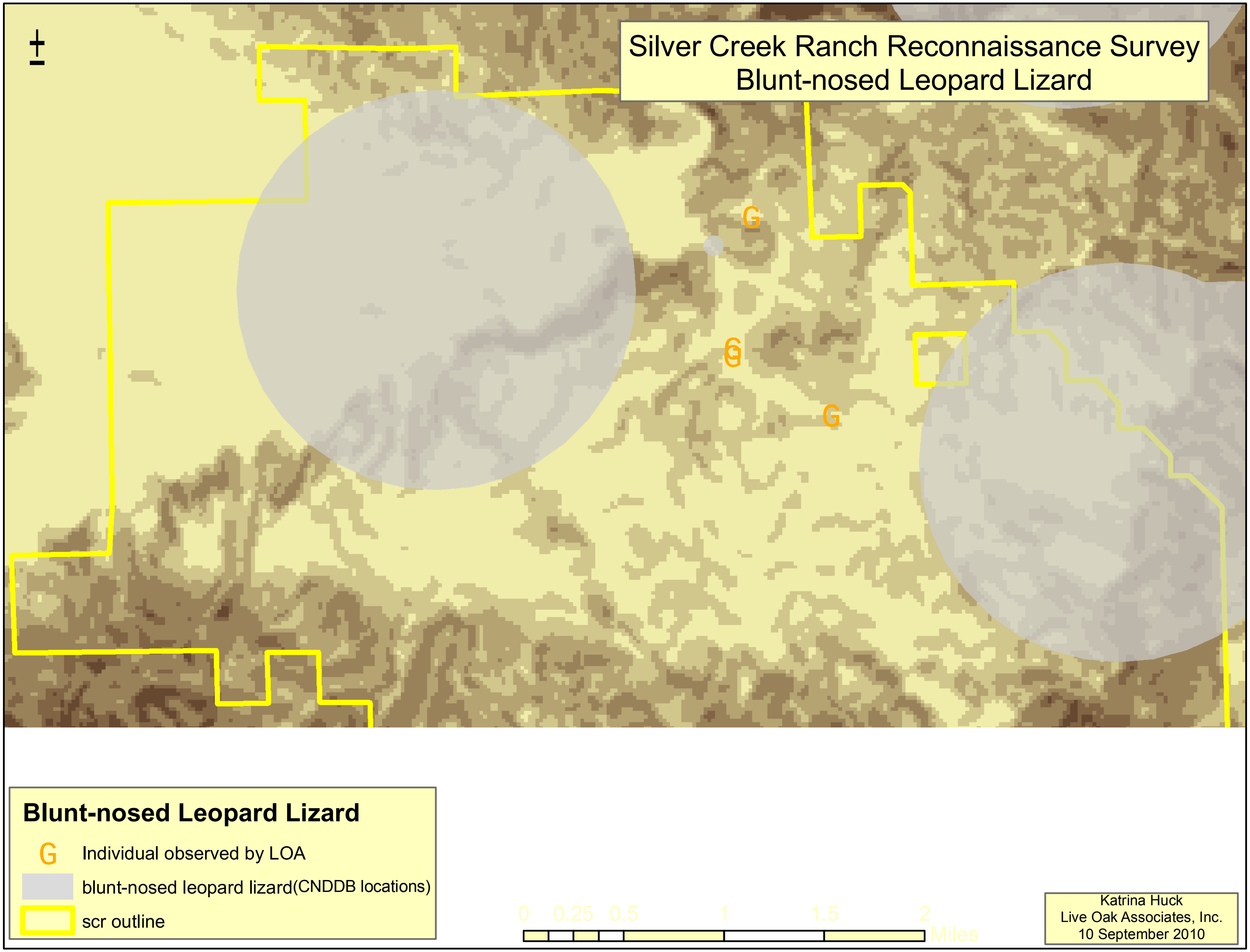
Scientific Name	Common Name	Wetland Status
VISCACEAE - Mistletoe Family		
Phoradendron serotinum ssp. *macrophyllum*[11]	bigleaf mistletoe	UPL
ZANNICHELLIACEAE - Horned-Pondweed Family		
Zannichellia palustris	horned-pondweed	OBL
ZYGOPHYLLACEAE - Caltrop Family		
*Tribulus terrestris**	punture vine	UPL

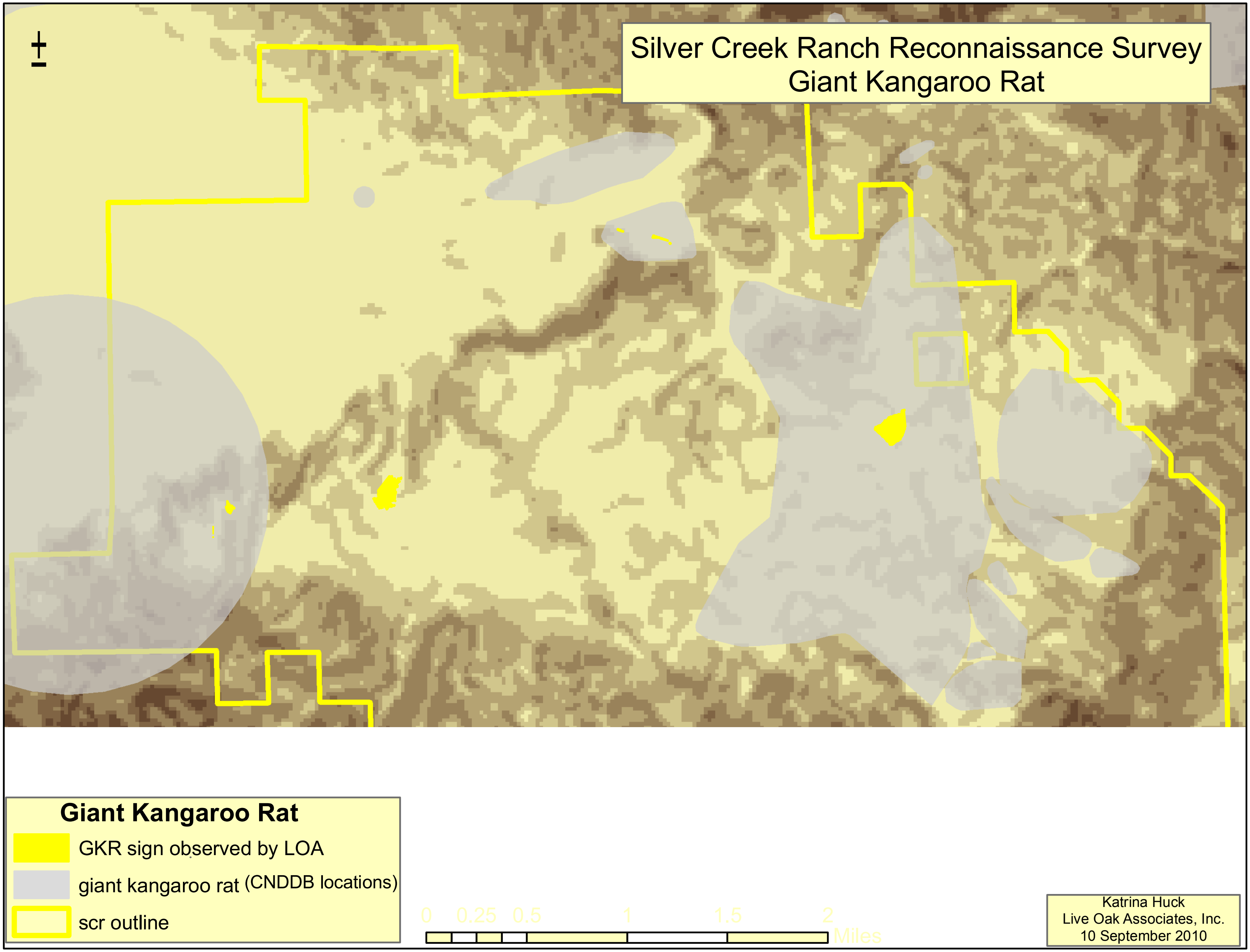
* Indicates introduced non-native species.

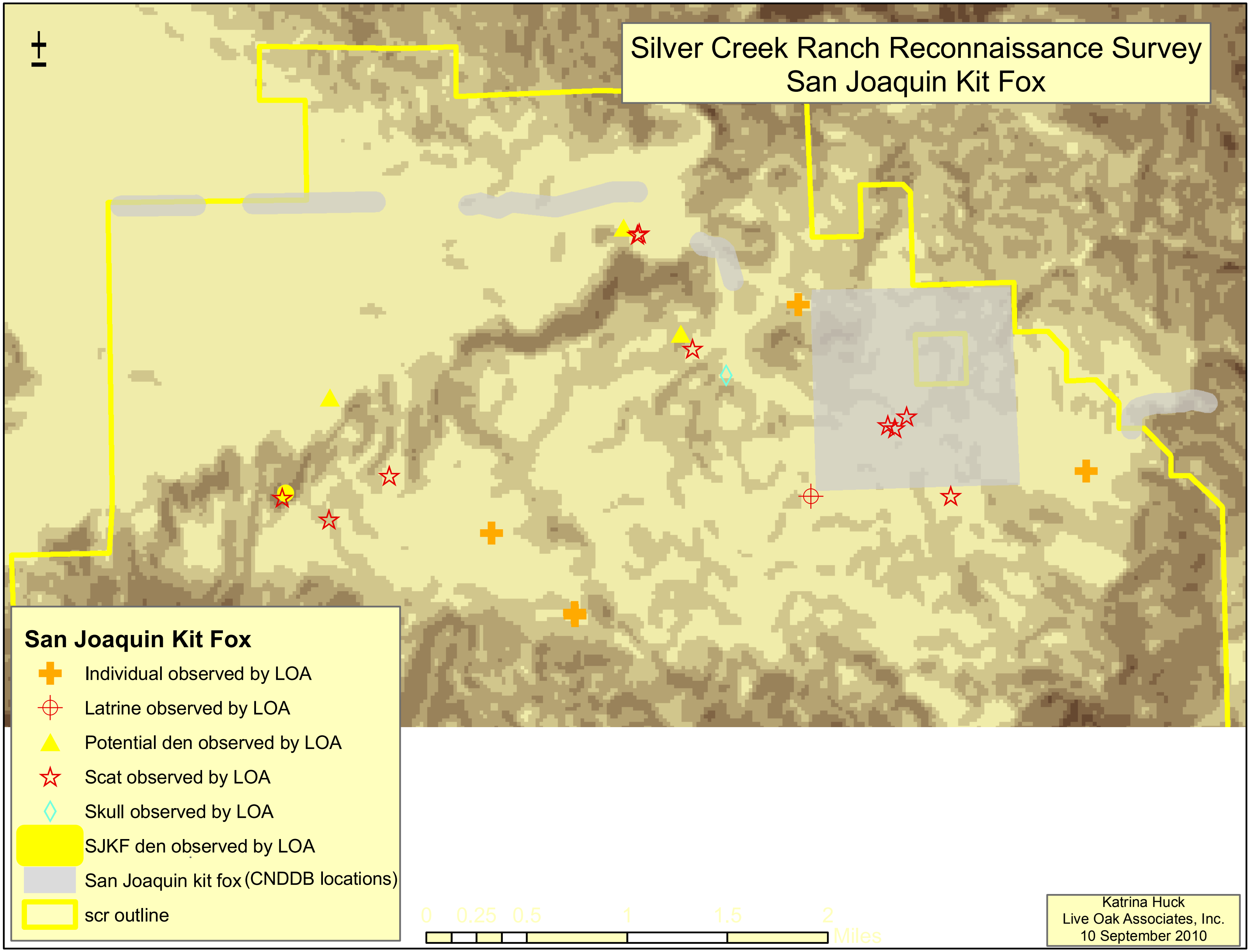
Key to the U.S. Fish and Wildlife wetland indicator status abreviations:

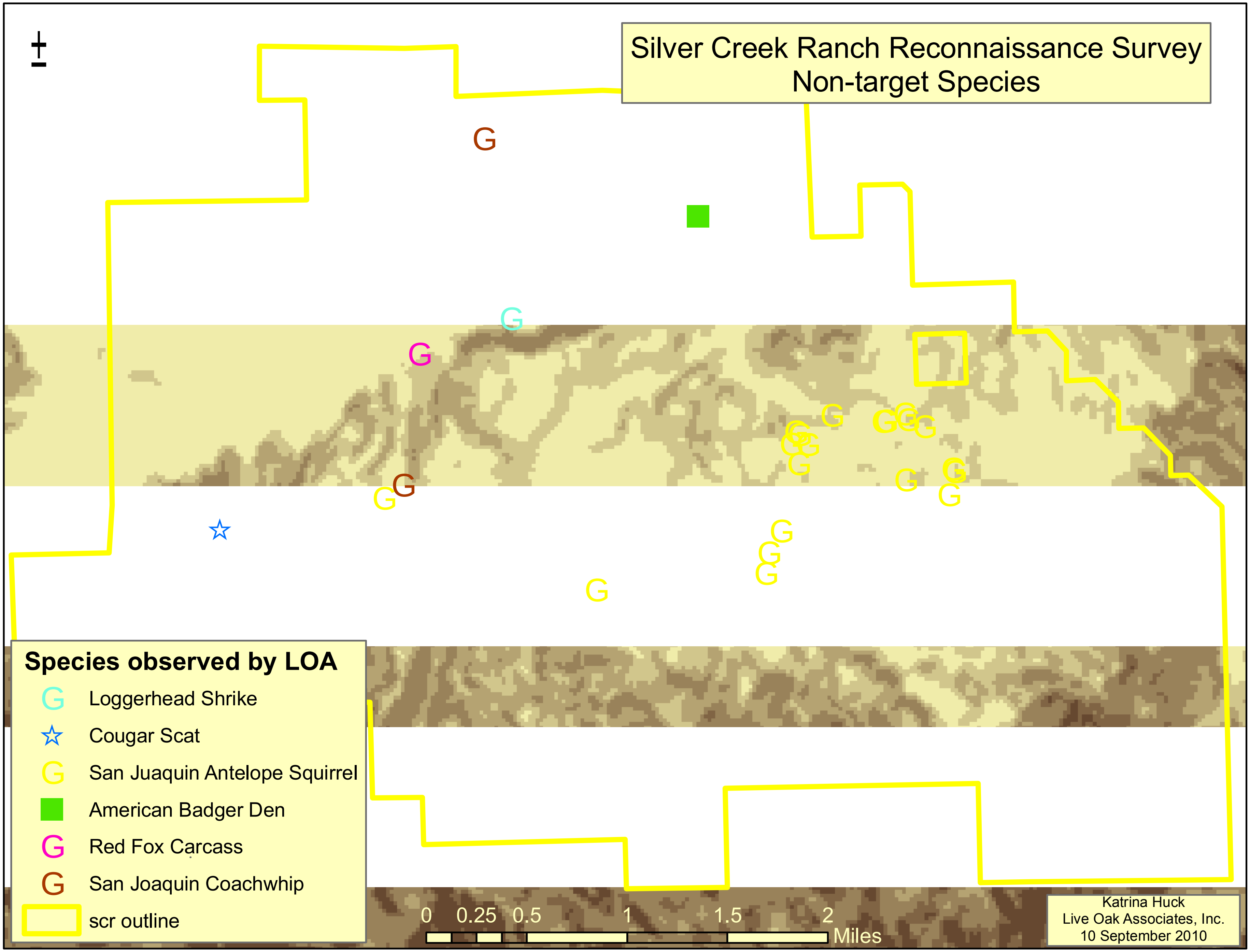
OBL - obligate
FACW - Facultative Wetland
FAC - Facultative
FACU - Facultative Upland
UPL - Upland
+/- - indicates High or Low end of category.
NI - No investigation

1 syn. *Yucca whipplei*
2 formerly included in family Liliaceae
3 syn. *Blepharizonia plumosa* ssp. *viscida*
4 syn. *Hemizonia kelloggii*
5 syn. *Lagophylla ramossissima* ssp. *ramosissima*
6 formerly included in family Hydrophyllaceae
7 syn. *Scirpus maritimus*
8 syn. *Scirpus americanus*
9 syn. *Scirpus pungens*
10 syn. *Eremocarpus setigerus*
11 syn. *Phoradendrom macrophyllum*

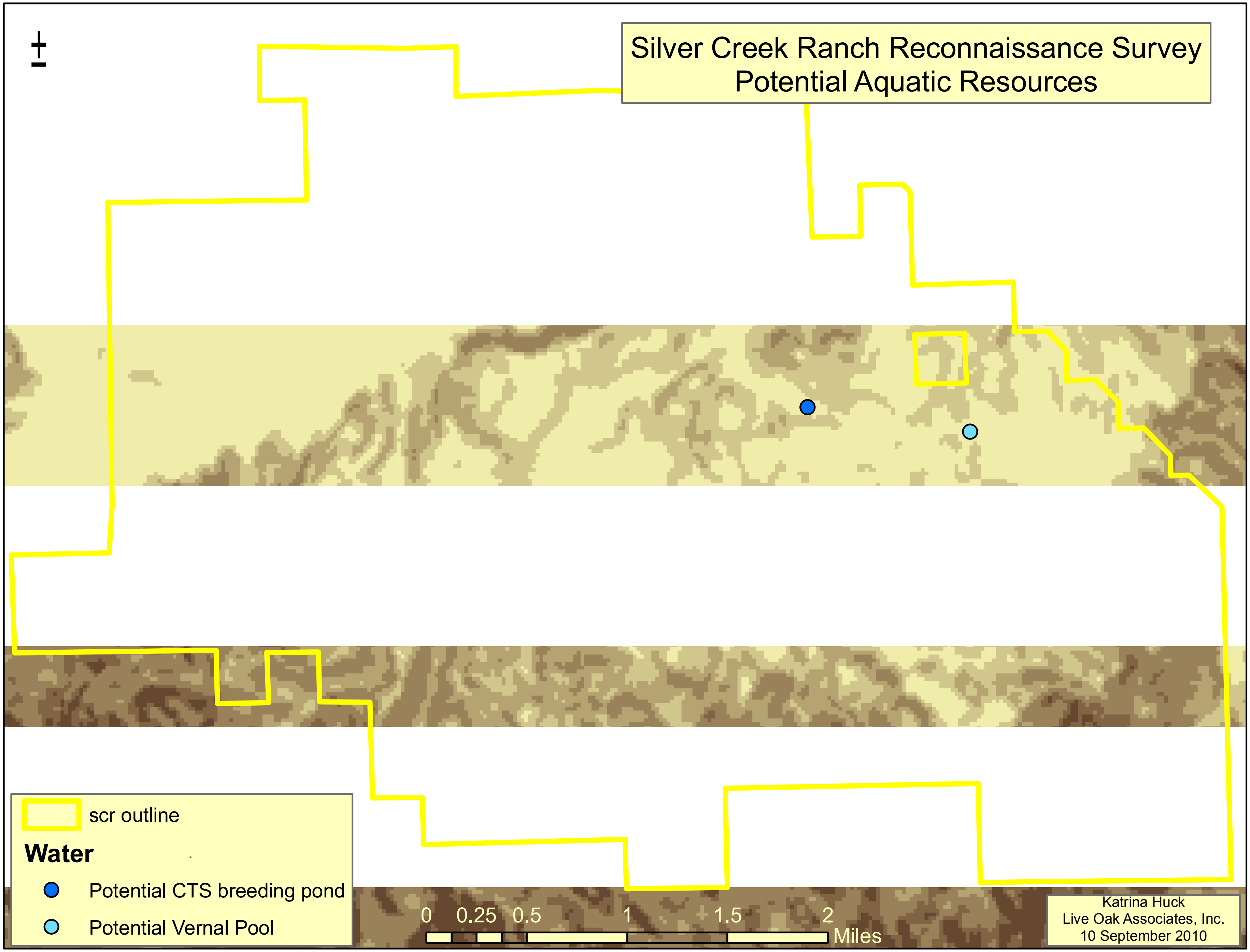

Silver Creek Ranch Reconnaissance Survey
Blunt-nosed Leopard Lizard
G
G
G
G
Blunt-nosed Leopard Lizard
G Individual observed by LOA
blunt-nosed leopard lizard(CNDDB locations)
scr outline
0 0.25 0.5 1 1.5 2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010


Silver Creek Ranch Reconnaissance Survey
Giant Kangaroo Rat
Giant Kangaroo Rat
GKR sign observed by LOA
giant kangaroo rat (CNDDB locations)
scr outline
0
0.25
0.5
1
1.5
2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010


Silver Creek Ranch Reconnaissance Survey
San Joaquin Kit Fox
San Joaquin Kit Fox
Individual observed by LOA
Latrine observed by LOA
Potential den observed by LOA
Scat observed by LOA
Skull observed by LOA
SJKF den observed by LOA
San Joaquin kit fox (CNDDB locations)
scr outline
0 0.25 0.5 1 1.5 2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010



Silver Creek Ranch Reconnaissance Survey
Non-target Species
Species observed by LOA
Loggerhead Shrike
Cougar Scat
San Juaquin Antelope Squirrel
American Badger Den
Red Fox Carcass
San Joaquin Coachwhip
scr outline
0
0.25
0.5
1
1.5
2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010


Silver Creek Ranch Reconnaissance Survey
Potential Aquatic Resources
scr outline
Water
Potential CTS breeding pond
Potential Vernal Pool
0 0.25 0.5 1 1.5 2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office
Species Account
BLUNT-NOSED LEOPARD LIZARD
Gambelia sila

CLASSIFICATION: Endangered
Federal Register 32:4001; March 11, 1967
http://ecos.fws.gov/docs/federal_register/fr18.pdf (PDF)
The blunt-nosed leopard lizard was listed as *Crotaphytus wislizenii silus*. In 1975, it was moved to the genus *Gambelia* as a full species, *Gambelia silus*. More recently, the *specific* name was changed to *sila* to match the gender of the genera name.


Blunt-Nosed Leopard Lizard
Adam Zerrenner, USFWS

STATE LISTING STATUS: The blunt-nosed leopard lizard was listed as endangered by the State of California in 1971.

CRITICAL HABITAT: None designated

RECOVERY PLAN: Final
Recovery plan for the upland species of the San Joaquin Valley, California
http://ecos.fws.gov/docs/recovery_plan/980930a.pdf (PDF)

5-year review: Completed February 2010. No change was recommended.
http://www.fws.gov/ecos/ajax/docs/five_year_review/doc3209.pdf (1 MB)
September 30. 1998

DESCRIPTION:

The blunt-nosed leopard lizard (Gambelia silus) is a relatively large lizard the Iguanidae family. It has a long, regenerative tail, long, powerful hind limbs, and a short, blunt snout. Adult males are slightly larger than females, ranging in size from 3.4 to 4.7 inches in length, excluding tail. Females are 3.4 to 4.4 inches long. Males weigh 1.3 to 1.5 ounces, females 0.8 to 1.2.

Blunt-nosed leopard lizards feed primarily on insects (particularly grasshoppers, crickets and moths), other lizards and occasionally plant material.

Although blunt-nosed leopard lizards are darker than other leopard lizards, they exhibit tremendous variation in color and pattern on their backs. Their background color ranges from yellowish or light gray-brown to dark brown, depending on the surrounding soil color and vegetation. Their undersides are uniformly white. They have rows of dark spots across their backs, alternating with white, cream-colored or yellow bands. See the Recovery Plan for more details about identification.

Males are highly combative in establishing and maintaining territories. Male and female home ranges often overlap. The mean home range size varies from 0.25 to 2.7 acres for females and 0.52 to 4.2 acres for males. Density estimates range from 0.1 to 4.2 lizards per acre. Population densities in marginal habitat generally do not exceed 0.2 blunt-nosed leopard lizards per acre. There are no current overall population size estimates for the species.

Breeding activity begins within a month of emergence from dormancy and lasts from the end of April to the end of June. Male territories may overlap those of several females, and a given male may mate with several females. Two to six eggs are laid in June and July, and their numbers are correlated with the size of the female. Under adverse conditions, egg-laying may be delayed one or two months, or reproduction may not occur at all.

Females typically produce only one clutch of eggs per year. But some may produce three or more under favorable environmental conditions. After about two months of incubation, young hatch from late July through early August, rarely to September.

Seasonal above ground activity is correlated with weather conditions, primarily temperature. Lizards are most active on the surface when air temperatures are between 74° and 104° F, with surface soil temperatures between 72° and 97°. Smaller lizards and young have a wider activity range than the adults.

Leopard lizards use small rodent burrows for shelter from predators and temperature extremes. Burrows are usually abandoned ground squirrel tunnels, or occupied or abandoned kangaroo rat tunnels. Each lizard uses several burrows without preference, but will avoid those occupied by predators or other leopard lizards. In areas of low mammal burrow density, lizards will construct shallow, simple tunnels in earth berms or under rocks.

Potential predators are numerous. They include snakes, predatory birds and most carnivorous valley mammals. Blunt-nosed leopard lizards themselves feed primarily on insects (mostly grasshoppers, crickets and moths) and other lizards.

DISTRIBUTION:

This species is found only in the San Joaquin Valley and adjacent foothills, as well as the Carrizo Plain and Cuyama Valley. It inhabits open, sparsely vegetated areas of low relief on the valley floor and the surrounding foothills. It also inhabits alkali playa and valley saltbush scrub. In general, it is absent from areas of steep slope, dense vegetation, or areas subject to seasonal flooding.

Although the boundaries of its original distribution are uncertain, the species probably ranged from Stanislaus County in the north to the Tehachapi Mountains of Kern County in the south, and from the Coast Range mountains, Carrizo Plain and Cuyama Valley in the west to the foothills of the Sierra Nevada in the east.

The currently occupied range consists of scattered parcels of undeveloped land on the Valley floor, most commonly annual grassland and valley sink scrub. See 5-year review (above) for details.

THREATS:

Habitat disturbance, destruction and fragmentation continue as the greatest threats to blunt-nosed leopard lizard populations. Stebbins first recognized, in 1954, that agricultural conversion of its habitat was causing the extirpation of the blunt-nosed leopard lizard.

Livestock grazing can result in removal of herbaceous vegetation and shrub cover and destruction of rodent burrows used by lizards for shelter. However, light or moderate grazing may be beneficial, unlike cultivation of row crops, which precludes use by leopard lizards.

Direct mortality occurs when animals are killed in their burrows during construction, killed by vehicle traffic, drowned in oil, or fall into excavated areas from which they are unable to escape. Displaced lizards may be unable to survive in adjacent habitat if it is already occupied or unsuitable for colonization.

The use of pesticides may directly and indirectly affect blunt-nosed leopard lizards. The insecticide Malathion has been used since 1969 to control the beet leafhopper, and its use may reduce insect prey populations. Fumigants, such as methyl bromide, are used to control ground squirrels. Because leopard lizards often inhabit ground squirrel burrows, they may be inadvertently poisoned. Visit the California Dept. of Pesticide Regulation Endangered Species Project web page for more information.

Cultivation, petroleum and mineral extraction, pesticide applications, off-road vehicle use, and construction of transportation, communication, and irrigation infrastructures collectively have caused the reduction, fragmentation of populations and decline of blunt-nosed leopard lizards.

REFERENCES FOR ADDITIONAL INFORMATION:

Montanucci, R.R. 1970. Analysis of hybridization between *Crotaphytus wislizenii* and *Crotaphytus silus* (Sauria: Iguanidae) in California. Copeia 1970:104-123.

Montanucci, R.R., R.W. Axtell, and H.C. Dessauer. 1975. Evolutionary divergence among collared lizards (*Crotphytus*), with comments on the status of *Gambelia*. Herpetologica 31:336-347.

Stebbins, R.C. 1954. Amphibians and reptiles of western North America. McGraw-Hill Book Co., Inc., NY.

Thelander, C. ed. 1994. Life on the edge: a guide to California's endangered natural resources. BioSystem Books. Santa Cruz, CA. p 272-273.

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Sacramento, California 95825
Phone (916) 414-6600
FAX (916) 414-6713

Last updated: May 28, 2010

Blunt-nosed leopard lizard
(*Gambelia sila*)

5-Year Review:
Summary and Evaluation

T. Kuhn, U.S. Fish and Wildlife Service 2009

U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
Sacramento, California
February 2010

5-YEAR REVIEW

Blunt-nosed leopard lizard
(*Gambelia sila*)

I. GENERAL INFORMATION

Purpose of 5-Year Reviews:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act (Act) to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, or be changed in status from threatened to endangered. The blunt-nosed leopard lizard was listed as endangered under the Endangered Species Preservation Act in 1967, and was not subject to the current listing processes and, therefore, did not include an analysis of threats to the lizard. However, a review of Federal and State agency materials and scientific publications written at or near the time of listing indicates that listing was in fact based on the existence of threats that would be attributable to one or more of the five threat factors described in section 4(a)(1) of the Act, and we must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In the 5-year review, we consider the best available scientific and commercial data on the species, and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process defined in the Act that includes public review and comment.

Species Overview

The blunt-nosed leopard lizard is endemic to the San Joaquin Valley of central California (Stejneger 1893; Smith 1946; Montanucci 1965, 1970; Tollestrup 1979a). This species typically inhabits open, sparsely vegetated areas of low relief on the San Joaquin Valley floor and in the surrounding foothills (Smith 1946; Montanucci 1965). Holland (1986) described the vegetative communities that blunt-nosed leopard lizards are most commonly found in as Nonnative Grassland and Valley Sink Scrub communities. Other suitable habitat types on the Valley floor for this species include Valley Needlegrass Grassland (Holland 1986), Alkali Playa (Holland 1986), and Atriplex Grassland (Tollestrup 1976).

The species is a relatively large lizard in the Iguanidae family with a long, regenerative tail; long, powerful hind limbs; and a short, blunt snout (Smith 1946; Stebbins 1985). Though their under surface is uniformly white, the species exhibits tremendous variation in color and pattern on the back (Tanner and Banta 1963; Montanucci 1965, 1970), ranging from yellowish or light gray-brown to dark brown. Males are typically larger and weigh more than females; adults range in size from 3.4 to 4.7 inches (Tollestrup 1982) and weigh between 0.8 and 1.5 ounces (Uptain *et al.* 1985). Blunt-nosed leopard lizards use small rodent burrows for shelter from predators and temperature extremes (Tollestrup 1979b). Burrows are usually abandoned ground squirrel

(*Spermophilus beecheyi*) tunnels, or occupied or abandoned kangaroo rat tunnels (*Dipodomys* spp.) (Montanucci 1965). Each lizard uses several burrows without preference, but will avoid those occupied by predators or other leopard lizards. Montanucci (1965) found that in areas of low mammal burrow density, lizards would construct shallow, simple tunnels in earth berms or under rocks. Blunt-nosed leopard lizards feed primarily on insects (mostly grasshoppers, crickets, and moths) and other lizards, although some plant material is rarely eaten or, perhaps, unintentionally consumed with animal prey. They appear to feed opportunistically on animals, eating whatever is available in the size range they can overcome and swallow.

I.A. Methodology used to complete the review: This review was prepared by a staff biologist for the Sacramento Fish and Wildlife Office (Service). This review is based on the *Recovery Plan for the Blunt-Nosed Leopard Lizard* (Service 1980), the *Revised Blunt-Nosed Leopard Lizard Recovery Plan* (Service 1985), the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Recovery Plan) (Service 1998), as well as published literature, agency reports, biological opinions, completed and draft Habitat Conservation Plans (HCPs), unpublished data, and interviews with species experts. No previous status reviews for this species have been conducted. Due to the lack of a threats analysis within the 1967 listing (32 **FR** 4001), this 5-year review contains updated information on the species' biology and threats, and an assessment of that information since the time that 1980 Recovery Plan was drafted. We focus on current threats to the species that are attributable to the Act's five listing factors. The review synthesizes this available information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor analysis, we recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years.

I.B. Contacts

Lead Regional Office –Diane Elam, Deputy Division Chief for Listing, Recovery and Habitat Conservation Planning, Region 8, Pacific Southwest Regional Office, (916) 414-6464

Lead Field Office – Kirsten Tarp, Recovery Branch, Sacramento Fish and Wildlife Office, Region 8, (916) 414-6600

Cooperating Field Office: Mike McCrary, Ventura Fish and Wildlife Office, Region 8, (805) 644-1766

I.C. Background

I.C.1. FR Notice citation announcing initiation of this review: 71 **FR** 16584, April 3, 2006. We did not receive any information in response to our request for information.

I.C.2. Listing history

<u>Original Listing</u>
FR notice: 32 **FR** 4001
Date listed: March 11, 1967*
Entity listed: Species – Blunt-nosed leopard lizard (*Crotaphytus wislizenii silus*)
Classification: Endangered
*****Note: Listing documents at this time did not use the 5 factor analysis method, and did not provide discussion of status and threats.

I.C.3. Species' Recovery Priority Number at start of review: 2C

The Recovery Priority Number for the blunt-nosed leopard lizard is 2C. This Number reflects a high degree of threat, a high recovery potential, and a taxonomic rank of full species (Service 1983). The "C" indicates conflict with construction or other development projects or other forms of economic activity. This determination results from continued degradation and fragmentation of its habitat, perceived and realized threats to extant populations, and the potential for recovery of the species.

I.C.4. Recovery Plan or Outline

Name of plan:	Recovery Plan for Upland Species of the San Joaquin Valley, California
Date issued:	September 30, 1998
Dates of Previous Revisions:	Recovery Plan Blunt-Nosed Leopard Lizard (Service 1980), and Revised Blunt-Nosed Leopard Lizard Recovery Plan (Service 1985)

II. <u>REVIEW ANALYSIS</u>

II.A. Application of the 1996 Distinct Population Segment (DPS) policy

II.A.1. Is the species under review listed as a DPS?

____ ***Yes***
__X_ ***No***

II.A.2. Is there relevant new information for this species regarding the application of the DPS policy?

____ ***Yes***
__X_ ***No***

II.B. Recovery Criteria

II.B.1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

__X_ ***Yes***
_____ ***No***

II.B.2. Adequacy of recovery criteria.

II.B.2.a. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

__X_ ***Yes***
_____ ***No***

II.B.2.b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

_____ ***Yes***
__X__ **No**

II.B.3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors* are addressed by that criterion.

The downlisting and delisting criteria for the blunt-nosed leopard lizard in the Recovery Plan are described below. Listing Factor B is not considered relevant to this species.

Downlisting Criteria
Reclassification to threatened status should be evaluated when the species is protected in specified recovery areas from incompatible uses, management plans have been approved and implemented for recovery areas that include survival of the species as an objective, and population monitoring indicates that the species is stable. Downlisting criteria include:

1) *Protection of five or more areas, each about 5,997 acres or more of contiguous, occupied habitat, including one each on (addresses Listing Factor A):*
    A) *Valley floor in Merced or Madera Counties;*
    B) *Valley floor in Tulare or Kern Counties;*
    C) *Foothills of the Ciervo-Panoche Natural Area;*

A) Present or threatened destruction, modification or curtailment of its habitat or range;
B) Overutilization for commercial, recreational, scientific, or educational purposes;
C) Disease or predation;
D) Inadequacy of existing regulatory mechanisms;
E) Other natural or manmade factors affecting its continued existence.

D) Foothills of western Kern County; and
E) Foothills of the Carrizo Plain Natural Area.

2) *Management Plan approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective (addresses Listing Factor C and E).*
3) *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards 1 per acre through one precipitation cycle (addresses Listing Factor E).*

A brief discussion of each downlisting criterion for the blunt-nosed leopard lizard is presented in the text below, and further abbreviated in Table 1. Appendix A presents detailed information used for analysis of these downlisting criteria in this review, including the level of protection for each of the recovery areas, land management plan status for these areas, and the mean density and stability of blunt-nosed leopard lizard populations. Figures 1 and 2 illustrate the location of known blunt-nosed leopard lizard occurrences reported in the California Department of Fish and Game (CDFG) California Natural Diversity Database (CNDDB) (CNDDB 2006) and the location of large preserves within the range of the blunt-nosed leopard lizard.

1. *Protection of five or more areas, each about 5,997 acres or more of contiguous, occupied habitat, as follows:*

The downlisting criteria for the blunt-nosed leopard lizard require the protection of five or more areas each of about 5,997 acres or more of contiguous, occupied habitat, including one each in the following areas: the Valley floor in Merced or Madera Counties, the Valley floor in Tulare or Kern Counties, the foothills of the Ciervo-Panoche Natural Area, the foothills of western Kern County, and the foothills of the Carrizo Plain Natural Area (Figures 1 and 2). Only in the foothills of the Carrizo Plain Natural Area is the criterion achieved with the protection of 55,000 acres of blunt-nosed leopard lizard habitat by the Carrizo Plain National Monument. There are no preserves containing significant populations of blunt-nosed leopard lizard on the Valley floor in Merced or Madera Counties. Within the Valley floor in Tulare or Kern Counties, the Semitropic Ridge Preserve approaches the criterion by protecting 5,278 acres of contiguous blunt-nosed leopard lizard habitat. Pixley NWR protects 3,000 acres of contiguous habitat in Tulare County. The Lokern Natural Area protects over 13,000 acres in Kern County but in fragmented 10 to 640-acre parcels. Within the Ciervo-Panoche Natural Area, two Areas of Critical Environmental Concern (ACEC), separated by 2 miles, protect 4,800 acres and 3,800 acres of contiguous blunt-nosed leopard lizard habitat, respectively. The ACEC designation is the highest level of protection that the BLM (under Federal Lands Policy and Management Act) can assign to an area; with this designation, the BLM is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, including fish and wildlife resources. Within the foothills of western Kern County, the Occidental Petroleum Ltd. (Oxy), conservation lands protect 2,882 acres of contiguous habitat on the North Flank of Elk Hills and 3,770 acres in Buena Vista Valley. Therefore, the recovery criterion for protection of 5,997 acres of contiguous habitat is achieved in the foothills of the Carrizo Plain Natural Area, but not in the four other specified recovery areas.

Notably, through the development of a draft HCP for Chevron USA, Inc. (Chevron), lands in the *Lokern Natural Area*, and a draft HCP for Oxy of Elk Hills lands in the *Foothills of western Kern County*, the downlisting criterion is expected to also be met for these two areas in the foreseeable future. The draft Chevron Lokern HCP (G. Scott, Chevron, pers. comm. 2006) proposes to protect an additional 11,143 acres in the Lokern area. Thus, in total, approximately 24,303 acres of contiguous blunt-nosed leopard lizard habitat would be protected when added to the other already protected lands in the Lokern area. Similarly, the Oxy Elk Hills HCP (Live Oak & Associates, Inc., *in litt.* 2009) proposes to preserve roughly 38,780 acres of the Naval Petroleum Reserve-1 (NPR-1). Nonetheless, for the purposes of this review, until these HCPs are completed and an incidental take permit for the proposed activities is issued, the habitat protection associated with the proposed HCP remains uncertain.

2. *A management plan has been approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective.*

The downlisting criteria also require that for each protected area a management plan is approved and implemented that includes the survival of blunt-nosed leopard lizard as an objective. The following areas have such management plans: Kern National Wildlife Refuge (NWR); Pixley NWR; the Center for Natural Lands Management (CNLM) lands at Semitropic Ridge Preserve; the CNLM, Plains Exploration & Production Company (PXP), and Bureau of Land Management (BLM) lands in the Lokern Natural Area; the Oxy conservation lands near Elk Hills; the BLM, the Nature Conservancy, and CDFG lands of the Carrizo Plain National Monument; the Coles Levee Ecological Preserve (CLEP); and Kern Water Bank (KWB) Conservation Lands. Whereas, management plans have not been developed for the remaining specified protected areas including: Merced and/or Madera Counties; CDFG lands on the *Semitropic Ridge Preserve;* CDFG and Oxy Lands (outside of the Elk Hills Conservation Area) on the Lokern Natural area; Ciervo-Panoche Natural Area; and, NPR-2. Notably, the management plans for the Carrizo Plain National Monument and the Ciervo-Panoche Natural Area are currently being revised by the BLM. Therefore, the downlisting criterion for the approval and implementation of management plans in all protected areas is partly achieved.

3. *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards per hectare (1 per acre) through one precipitation cycle.*[1]

Long-term population studies have monitored the population trends in blunt-nosed leopard lizard at Elkhorn Plain (Germano *et al.* 2004; Germano and Williams 2005), Semitropic Ridge (Warrick 2006), Lokern (Germano *et al.* 2005; Warrick 2006), Elk Hills (Quad Knopf 2006), Pixley National Wildlife Refuge (NWR; Williams *in litt.* 2006), Buttonwillow Ecological Reserve (ER), Allensworth ER (Selmon *in litt.* 2006), and Coles Levee Ecosystem Preserve (Quad Knopf 2005). Long-term population studies have not been conducted for blunt-nosed leopard lizards in the Cuyama Valley, the Ciervo-Panoche Natural Area, Merced County, or Madera County, the status of these populations is unknown (Stafford *in litt.* 2006).

[1] A precipitation cycle is defined in the Recovery Plan as a period when annual rainfall includes average to 35 percent above-average through greater than 35 percent below-average and back to average or greater.

Table 1. Summary display of each protected area specified in the Recovery Plan for the blunt-nosed leopard lizard and downlisting criteria.

Region	County	Protected Area	Downlisting Criteria 1 (Land Conservation)	Downlisting Criteria 2 (Management Plan for Species Conservation)	Downlisting Criteria 3 (Population Stability)	Comment
Valley Floor	Merced or Madera		Not Achieved (0 acres protected)	Not Achieved	Not Achieved	Large preserves have been designated in western Merced County (e.g. Grasslands Ecological Area, ~179,000 acres) but are seasonally flooded and do not support blunt-nosed leopard lizard (Juarez *in litt.* 2006)
	Kern and Tulare	*Semitropic Ridge Preserve*	Not Achieved (5,278 contiguous acres protected--3,093 acres CNLM; 2,185 acres CDFG)	Achieved on CNLM lands; Not Achieved on CDFG Lands	Not Achieved	Though only slightly less than the specified 5,997 acres of contiguous habitat, only about 1,500 acres of the area support 2 or more lizards per acre (Warrick *in litt.* 2006).
	Kern	*Kern National Wildlife Refuge*	Not Achieved (2,000 contiguous acres protected)	Achieved	Not Achieved	The majority this area is seasonally flooded, allowing for only roughly 2,000 acres of potential blunt-nosed leopard lizard habitat. No confirmed sightings of lizard have been reported in this area since 1996 (Williams *in litt.* 2006).
	Kern	*Lokern Natural Area*	Not Achieved (13,160 acres of highly fragmented land protected--includes 3,858 acres BLM, 3,332 acres CNLM, 968 acres CDFG, 840 acres Plains Exploration and Production (PXP), and 4,162 acres Occidental of Elk Hills (OXY)	Achieved on BLM, CNLM and PXP lands; Not Achieved on CDFG and Oxy Lands (outside of the Elk Hills Conservation Area)	Not Achieved	The largest contiguous block of habitat is ~2,882 acres. The draft Chevron Lokern HCP (Chevron, *in prep.* 2008) would protect an additional 11,143 acres, and result in ~24,303 acres of protected contiguous habitat in the area, if finalized.

Table 1 continued.

Region	County	Protected Area	Downlisting Criteria 1 (Land Conservation)	Downlisting Criteria 2 (Management Plan for Species Conservation)	Downlisting Criteria 3 (Population Stability)	Comment
Valley Floor	Kern	*Buttonwillow Ecological Reserve*	Not Achieved (1,350 contiguous acres protected)	Achieved	Not Achieved[1]	This area contains one of the largest and most stable populations on the Valley Floor (Selmon *in litt.* 2006).
	Kern	*CLEP, KWB Conservation Lands, Tule Elk State Reserve*	Not Achieved (11,291 acres protected--6,059-acre CLEP, 4,263-acre KWB Conservation Lands, and 969-acre Tule Elk State Reserve)	Achieved	Not Achieved	Although these Preserves are sizeable, habitat contiguity is limited by the California Aqueduct, Alejandro Canal, Interstate 5, Highway 43, and Highway 119
	Tulare	*Pixley National Wildlife Refuge*	Not Achieved (6,833 fragmented acres of protected land--principally comprised of 3 large blocks: 4,445, 1,476, and 800 acres)	Achieved	Not Achieved	
	Kern and Tulare	*Allensworth Ecological Reserve*	Not Achieved (5,243 fragmented acres of protected land--principally comprised of 4 large blocks: 2,482, 1,432, 551, and 536 acres.	Achieved	Not Achieved	Blunt-nosed leopard lizard population in this area has declined over the past 15 years (Selmon *in litt.* 2006); no updated data is available.

Table 1 continued.

Region	County	Protected Area	Downlisting Criteria 1 (Land Conservation)	Downlisting Criteria 2 (Management Plan for Species Conservation)	Downlisting Criteria 3 (Population Stability)	Comment
Foothills	San Benito and Fresno	Ciervo-Panoche Natural Area	Not Achieved (16,600 fragmented acres--the largest contiguous block is roughly 4,800 acres)	Not Achieved	Not Achieved	Much of this area is not suitable habitat due to dense vegetation and high clay soils (Lowe *in litt.* 2006; L. Saslaw, pers. comm. 2006); rather the remaining portions have been noted as some of the best habitat in the Region. However, most prime habitat remains unprotected on private lands. Only 3 of the 21 reported occurrences are within BLM ACEC (CNDDB 2006; Lowe *in litt.* 2006).
	Kern	*Elk Hills Conservation Area*	Not Achieved (7,932 fragmented acres--largest contiguous parcel is roughly 3,770 acres)	Achieved	Not Achieved	The Oxy Elk Hills HCP is in draft form; barring any substantive changes before completion, the HCP is expected to result in the preservation of roughly 38,780 acres of Elk Hills NPR-1 (Live Oak & Associates, *in litt.* 2009).
	Kern	*NPR-2*	Not Achieved (9,000 highly fragmented acres within NPR-2 and the adjacent Buena Vista Valley)	Not Achieved	Not Achieved	The Caliente Resource Management Plan is scheduled to be revised to include BLM lands within NPR-2.
	Kern	*Wind Wolves Preserve*	Not Achieved (2,000 contiguous acres protected)	Achieved	Not Achieved	Blunt-nosed leopard lizards have not been observed at the site since the early 1990s.

Table 1 continued.

Region	County	Protected Area	Downlisting Criteria 1 (Land Conservation)	Downlisting Criteria 2 (Management Plan for Species Conservation)	Downlisting Criteria 3 (Population Stability)	Comment
Foothills	San Luis Obispo	Carrizo Plain Natural Area	Achieved (~250,000 largely contiguous acres protected within the BLM National Monument and adjacent CDFG Ecological Reserve, and the Upper Cuyama Valley (Saslaw *in litt.* 2006).	Achieved	Not Achieved for Carrizo Plain Natural Area	The Resource Management Plan for these areas is currently being revised the BLM; though conserving listed species and habitat will continue to be a primary focus of the revisions.
NOTES: [1]Quantified population density estimates are not currently available for Buttonwillow ER due to a lack of surveys.						

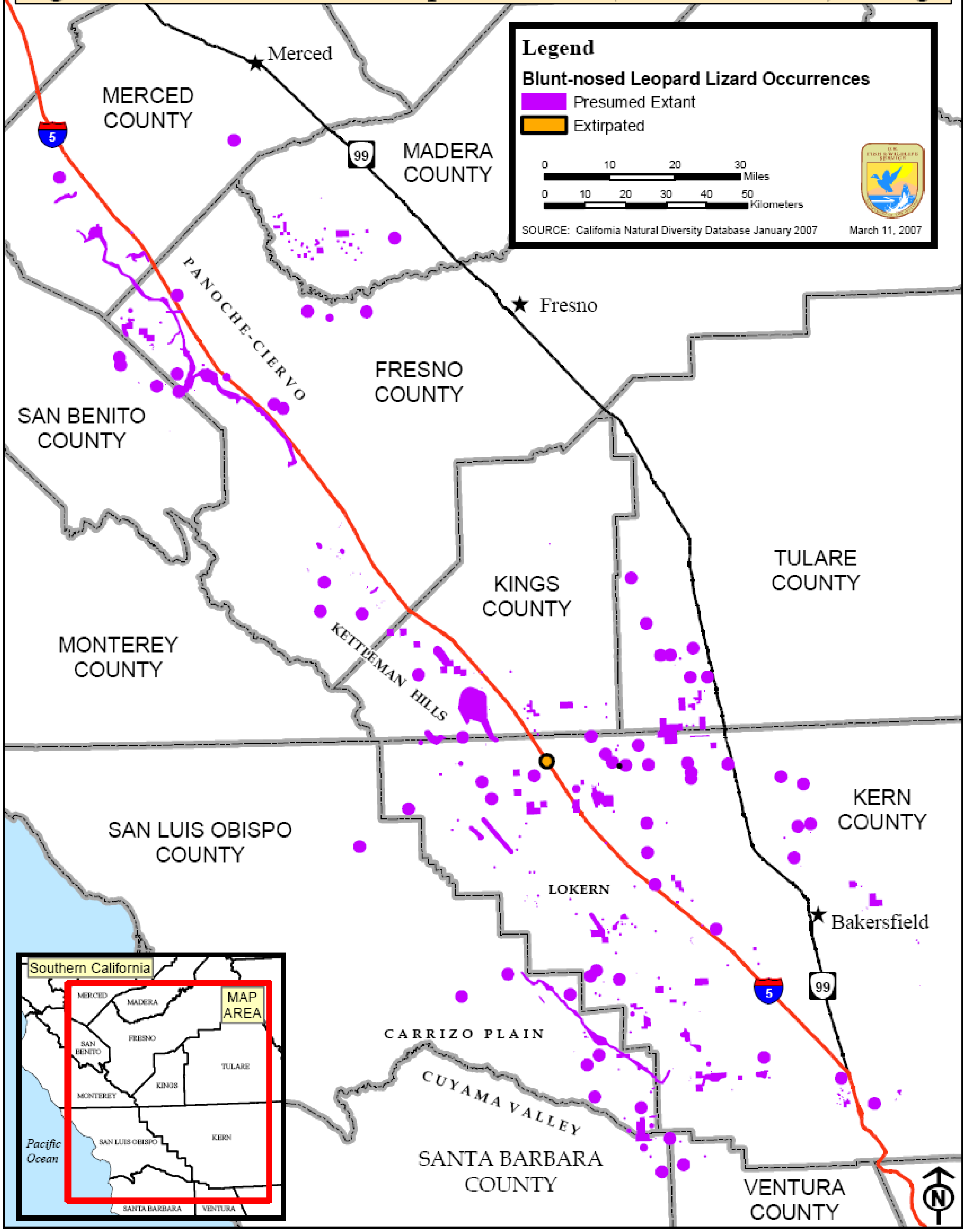

Figure 1. Blunt-Nosed Leopard Lizard *(Gambelia sila)* Range

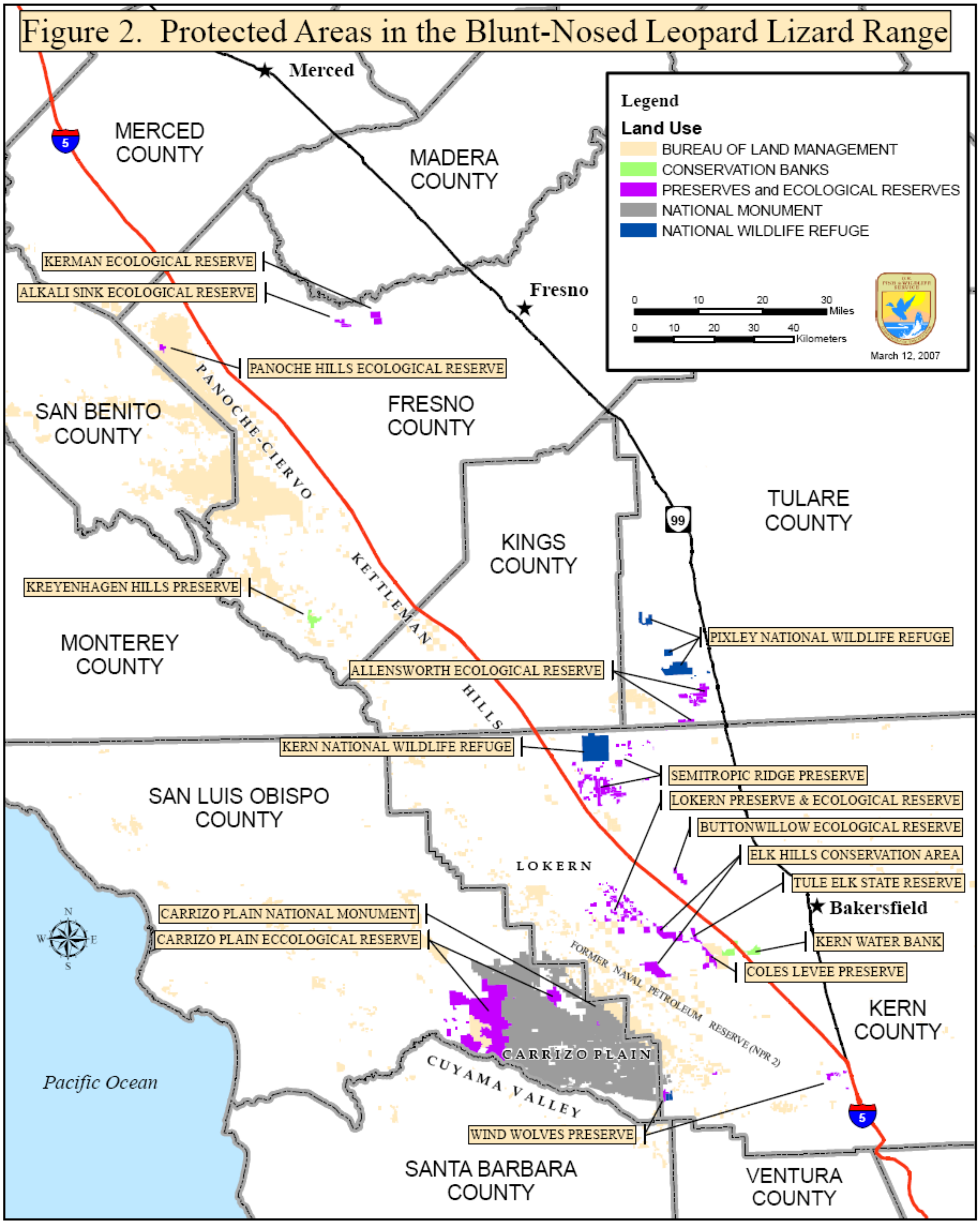
Figure 2. Protected Areas in the Blunt-Nosed Leopard Lizard Range
Merced
MERCED COUNTY
MADERA COUNTY
Legend
Land Use
BUREAU OF LAND MANAGEMENT
CONSERVATION BANKS
PRESERVES and ECOLOGICAL RESERVES
NATIONAL MONUMENT
NATIONAL WILDLIFE REFUGE
Miles
Kilometers
March 12, 2007
KERMAN ECOLOGICAL RESERVE
ALKALI SINK ECOLOGICAL RESERVE
Fresno
PANOCHE HILLS ECOLOGICAL RESERVE
SAN BENITO COUNTY
FRESNO COUNTY
PANOCHE-CIERVO
TULARE COUNTY
KINGS COUNTY
KETTLEMAN
KREYENHAGEN HILLS PRESERVE
MONTEREY COUNTY
PIXLEY NATIONAL WILDLIFE REFUGE
ALLENSWORTH ECOLOGICAL RESERVE
HILLS
KERN NATIONAL WILDLIFE REFUGE
SEMITROPIC RIDGE PRESERVE
SAN LUIS OBISPO COUNTY
LOKERN PRESERVE & ECOLOGICAL RESERVE
BUTTONWILLOW ECOLOGICAL RESERVE
LOKERN
ELK HILLS CONSERVATION AREA
TULE ELK STATE RESERVE
CARRIZO PLAIN NATIONAL MONUMENT
Bakersfield
CARRIZO PLAIN ECCOLOGICAL RESERVE
KERN WATER BANK
COLES LEVEE PRESERVE
FORMER NAVAL PETROLEUM RESERVE (NPR 2)
KERN COUNTY
CARRIZO PLAIN
CUYAMA VALLEY
Pacific Ocean
WIND WOLVES PRESERVE
SANTA BARBARA COUNTY
VENTURA COUNTY

Annual blunt-nosed leopard lizard surveys show that the population density decreased below 2 per hectare during the wet years in the late 1990s at Pixley NWR, while the density remains below 2 per hectare in the Lokern area, the Elk Hills, Coles Levee Ecosystem Preserve, and KWB Conservation Lands. Population density estimates at Semitropic Ridge Preserve were also well below 2 per hectare during spring road surveys in 2005. Elkhorn Plain, however, has been reported to have the highest abundance and density of blunt-nosed leopard lizards recorded in any area with densities up to 16 adults per hectare and 35.6 hatchlings per hectare (Germano and Williams 2005). Therefore, the downlisting criterion for population stability has not been achieved for any of the specified protected areas in the Recovery Plan.

Delisting Criteria

Delisting will be considered when, in addition to the criteria for downlisting, all of the following conditions have been met:

1) *Three additional areas with about 5,997 acres or more of contiguous, occupied habitat including:*
    A) *One on the Valley floor;*
    B) *One along the western Valley edge in Kings or Fresno Counties; and*
    C) *One in the Upper Cuyama Valley of eastern San Luis Obispo and eastern Santa Barbara Counties.*
2) *A management plan has been approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective.*
3) *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards per hectare (1 per acre) through one precipitation cycle.*

Summary of Recovery Criteria

Due to the lack of protection of sufficient habitat in specified recovery areas, the lack of approval and implementation of management plans, and the lack of population stability, the downlisting criteria for blunt-nosed leopard lizard have not been met. Therefore, the delisting criteria for blunt-nosed leopard lizard have also not been met. The acreage of contiguous blunt-nosed leopard lizard habitat protected, adequacy of management plans, and population trends are discussed below for each of the recovery areas specified in the delisting criteria. None of the delisting recovery criteria for protection of habitat, approval and implementation of management plans (except for the Kettleman Hills ACEC), and population stability have been achieved for the specified areas: western Valley edge in Fresno or Kings Counties, Upper Cuyama Valley, and other Valley floor areas. Appendix A includes detailed information used for the analysis of the delisting criteria.

II.C. Updated Information and Current Species Status

Note this section typically includes updated information on species status since the time of listing. However, given the brevity of information included within the 1967 listing rule (Service 1967), and that no previous status reviews for this species have been conducted, the following update presents new information since the issuance of the *Recovery Plan for the Blunt-Nosed Leopard Lizard* (Service 1980).

II.C.1. Biology and Habitat

II.C.1.a. Abundance, population trends, spatial distribution, and biology

Abundance and Population Trend Surveys
Long-term localized population census and plot-based research studies have been conducted in areas on the Valley Floor (Pixley NWR and Lokern Natural Area) and Foothill Regions (Elk Hills Conservation Area, and Elkhorn Plain) in the southern Valley (see Table 2). As these surveys were conducted to achieve various goals and according to different methods, and given that they represent only a small proportion of the species range, they are not directly comparable. However, they provide some insight to abundance and population trends of this species in specific locations.

Long-term studies show blunt-nosed leopard lizard population instability, especially during years of above average precipitation (Germano *et al.* 2004; Germano *et al.* 2005; Germano and Williams 2005; Germano *in litt.* 2006; Williams *in litt.* 2006). The largest and most stable population of blunt-nosed leopard lizards on the Valley Floor is thought to be at Semitropic Ridge Preserve. However, the number of all lizards at Semitropic Ridge Preserve has been decreasing since 2003 for unknown reasons. Establishing corridors between existing natural areas on the Valley floor in Tulare and Kern Counties will be important for maintaining these populations (especially at the smaller Buttonwillow ER). Relocation of blunt-nosed leopard lizards to some areas such as Allensworth ER (where numbers have plummeted in the past 15 years) will also be necessary for persistence of the population (Selmon *in litt.* 2006). Based on population instability and on-going modification and conversion of existing habitat to agriculture, residential or commercial developments, and for petroleum and mineral extraction activities, overall species abundance is considered to be decreasing across its range.

Table 2. Blunt-nosed leopard lizard survey results for Valley Floor and Foothill Protection Areas; note the surveyed areas account for only a small portion of the species range.

County	Survey Location	Duration of Study	Survey Results (interannual trends)	Comments	Source
Valley Floor					
Tulare	Pixley NWR	1993-2006	Decline	Population fluctuations seemed to be negatively correlated with annual precipitation	Williams *in litt.* 2006
Kern	Lokern Natural Area	1997-2005	Variable	Methods included ten-day census surveys of four grazed and four non-grazed plots; more individuals observed in grazed plots than ungrazed in all but one year	Germano *et al.* 2005
Foothill					
Kern	Elk Hills Conservation Area (Oxy conservation lands--North Flank of the Elk Hills, and Buena Vista Valley)	2000-2005	Increase	Combined road and foot surveys	Quad Knopf 2006
Kern	Elkhorn Plain	1988-2003	Variable	One grazed and one non-grazed plot	Williams *et al.* 1993; Germano and Williams 2005

Spatial Distribution (Current Range)

Historically, blunt-nosed leopard lizards occurred in arid lands throughout much of the San Joaquin Valley and adjacent foothills, ranging from San Joaquin County in the north, to the Tehachapi Mountains in the south, as well as in the Carrizo Plain and Cuyama Valley (Montanucci 1965; Germano and Williams 1992a; McGuire 1996). At the time of listing, the blunt-nosed leopard lizard was found in scattered locations in San Joaquin Valley, in the foothills of Tulare and Kern Counties and up the eastern portions of the Coast Range foothills; Fresno, Kern, Madera, Merced, San Luis Obispo and Tulare Counties (Stebbins 1954, and California Department of Fish and Game 1972 as reported in BLM 1972). Due to widespread agricultural development of natural habitat in the San Joaquin Valley, the current distribution of blunt-nosed leopard lizards is restricted to less than 15 percent of its historic range (Germano and Williams

1992a; Jennings 1995). In the remaining habitat that exists, blunt-nosed leopard lizards occur in alkali sink scrub, saltbush scrub, as well as native and nonnative grasslands on the Valley floor and in the surrounding foothills areas (Montanucci 1965; Germano *et al.* 2001; Stebbins 2003).

Although the blunt-nosed leopard lizard has been listed as endangered for nearly 40 years, there has never been a comprehensive survey of the species entire historical range; thus, any changes in the range of the species from the time of listing are currently unknown. It has been reported that the contemporary range of blunt-nosed leopard lizards was confined to a few areas scattered from southern Merced County to southern Kern County, between elevations of 100-2,400 feet (Tollestrup 1979a). However, as reported in the Recovery Plan (Service 1998), blunt-nosed leopard lizards have been found near Firebaugh and Madera (Williams 1990), Ciervo, Tumey, Panoche Hills, Anticline Ridge, Pleasant Valley, Lone Tree, Sandy Mush Road, Whimesbridge, Horse Pasture, and Kettleman Hills Essential Habitat Areas (CDFG 1985). Also, as recently as May 2009, the Endangered Species Recovery Program (ESRP) of California State University, Stanislaus, reported that blunt-nosed leopard lizards had been observed on the Madera Ranch in western Madera County from surveys conducted for the Madera Irrigation District (Kelly *et al*. 2009).

Biology

Microhabitat use and home range characteristics of blunt-nosed leopard lizards were compared at two sites near Elk Hills in Buena Vista Valley that differed in ground cover (Warrick *et al*. 1998). These authors reported that blunt-nosed leopard lizard microhabitat use differed significantly between the two study sites. At the more densely vegetated site, blunt-nosed leopard lizards used dry wash areas significantly more than grassland, floodplain, and road habitats. Conversely, at the more sparsely vegetated site, grassland was used more than wash habitat, and hills were used less than all other habitats.

Warrick *et al.* (1998) also compared home range size, core area size, and amount of overlap of ranges between the sites. The average male home range size was 10.48 acres, and the average female home range size was 4.99 acres. Female home ranges and core areas were overlapped extensively by male ranges at an average of 79.8 percent and 50.3 percent, respectively. Female home ranges were found to overlap the ranges of up to four other males, but were not observed to overlap with other females.

The span of seasonal activity for both adults and hatchlings described in the Recovery Plan Results was corroborated by results of a two-plot study on the Elkhorn Plain (Germano and Williams 2005). This study further postulated that activity levels can be strongly affected by environmental factors—temperature, precipitation and vegetation characteristics. These factors affect lizard behavior by effecting thermoregulation, metabolism, prey densities, and predatory success or mobility. For example, these authors reported that activity was completely absent for 21 months from July 1989 until April 1991 when individuals remained below ground due to dry conditions. In spite of this anomaly, Germano *et al.* (2004) supported the capacity of a 10-day survey to detect the blunt-nosed leopard lizard presence during typical environmental conditions compared to full-season surveys ($r^2 = 0.96$ for adults, $r^2 = 0.99$ for hatchlings/juveniles). Notably CDFG's standardized protocol survey methods (CDFG 2004) require a minimum of 12 days of surveys to assess presence/absence for new ground disturbance during specific ambient air and ground temperature conditions.

Germano and Williams (2005) also compared data from the Elkhorn Plain study to data previously collected in Valley floor habitat and noted the following differences in behavior among the two regions. On the Elkhorn Plain, females were generally gravid by late April or early May, while some females were found with eggs in early July. Clutch size on the Elkhorn Plain ranged from 1 to 6 eggs, with a mean clutch size of 3.4 eggs (varying from 3.1 to 3.8 yearly). Many females produced multiple clutches in a year with up to four clutches observed in a single female. On Valley floor sites, clutch size ranged from 2 to 5 eggs with a mean of 2.9 to 3.3 eggs per clutch, and only a few females produced a second clutch (Montanucci 1967; Tollestrup 1982). The greater clutch size and greater frequency of multiple clutches observed on the Elkhorn Plain compared to the Valley floor was attributed to greater prey abundance with the irruptive population growth of grasshoppers in 1992 (Germano and Williams 2005).

II.C.1.b. Genetics, genetic variation, or trends in genetic variation

Gambelia sila and *G. wislizenii* from the San Joaquin Valley and Mojave Desert, respectively, hybridize in the upper Cuyama Valley near the Santa Barbara – San Luis Obispo County line (Montanucci 1978; Slack 2002). The greatest heterogeneity in color pattern and morphology is concentrated near Ballinger Canyon, with most of the *sila*-like lizards occurring to the north and *wislizenii*-like lizards to the south. The leopard lizard hybrid zone covers about 200 acres in Los Padres National Forest and is associated with an ecotone between *Stipa-Atriplex* grasslands and *Pinus-Juniperus-Artemisia* Great Basin shrub desert (Slack 2002). Most evidence shows that natural selection is opposing the production of hybrids between the two forms of leopard lizards. The intermediate phenotypes have a lower fitness than those approaching the parental species (Montanucci 1978). The hybridization likely began 20,000 years ago when the ranges of the two species overlapped in the vicinity of Ballinger Canyon. Climatic changes since then have resulted in the isolation of the hybrid population (Montanucci 1979). Thus, though not currently protected, the hybrid population is at risk of extinction due to the degradation of its habitat by heavy off-road vehicle (ORV) use, the conversion of 95 percent of its habitat into alfalfa fields, and the construction of roads and oil development activities (Montagne 1979; Slack 2002; Stafford *in litt.* 2006).

II.C.1.c. Taxonomic classification or changes in nomenclature

The blunt-nosed leopard lizard was federally listed in 1967 as *Crotaphytus wislizenii silus* (Service 1967). At the time of listing (Service 1967), this species was named *Crotaphytus silus*, according to Stejneger (1890) first description and nomenclature of the species. However, the precise taxonomic split between the collared and leopard lizard remained largely in debate until Montanucci (1970) argued for specific status based upon the study of hybrids between the long-nosed and blunt-nosed leopard lizards. The taxonomic debate was resolved when Montanucci (1970) separated the genera *Gambelia* from *Crotaphytus*, resulting in the generic epithet name *Gambelia silus* for the blunt-nosed leopard lizard. Montanucci *et al.* (1975) separated all leopard lizards from collared lizards, placing both *silus* and *wislizenii* into the genus *Gambelia* at full species status. Most recently, the specific spelling was changed to *sila* such that its gender agreed with the genera name *Gambelia* (Frost and Collins 1988; Collins 1990; Germano and Williams 1992b).

II.C.2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

The following five-factor analysis describes and evaluates the threats attributable to one or more of the five listing factors outlined in section 4(a)(1) of the Act. The final ruling to list the blunt-nosed leopard lizard as endangered did not include a discussion of the threats to the lizard. The Service is using reports from the California Department of Fish and Game (Laughrin 1970; Morrell 1972, 1975), and the 1980 *Recovery plan for the blunt-nosed leopard lizard* to address threats that affected the lizard at the time of its listing.

II.C.2.a. Factor A, Present or threatened destruction, modification or curtailment of its habitat or range

This section summarizes the threats included under Factor A, and also covers the conservation efforts implemented to reduce threats over the known range of the blunt-nosed leopard lizard. At the time that the blunt-nosed leopard lizard was listed, the conversion of native habitat to agriculture was considered to be the primary threat to species. Additional threats to the blunt-nosed leopard lizard included habitat fragmentation, mineral development (primarily for oil and gas extraction), inappropriate grazing levels, and agricultural pest control, primarily spraying for the beet leafhopper (Montanucci 1965).

Past research on this species reported that collective habitat loss has caused the reduction and fragmentation of populations and decline of blunt-nosed leopard lizards (Stebbins 1954; Montanucci 1965; Service 1980, 1985; Germano and Williams 1993). Since listing, the Service has identified additional potential threats to the blunt-nosed leopard lizard including: landscape leveling and cultivation which caused habitat disturbance, destruction and fragmentation; grazing (under- or over-grazing); mineral development, primarily oil and gas extraction; and, agricultural pest control, primarily spraying for the beet leafhopper (Montanucci 1965). The 1998 Recovery Plan added mortality from vehicle-strikes with roadway traffic and/or ORV (discussed in Factor E) to the threat list.

The loss and modification of habitat due to agricultural conversion and urban development remain the largest threat to the blunt-nosed leopard lizard. Mineral exploration and extraction, and water banking activities also affect a significant portion of the blunt-nosed leopard lizards range. More recently the proposed siting of solar facilities in blunt-nosed leopard lizard habitat is an emerging threat that has the potential to substantially affect blunt-nosed leopard lizard. Specific information of these on-going and recent threats and habitat conservation activities are described in detail below.

Collective habitat loss has caused the reduction and fragmentation of populations and decline of blunt-nosed leopard lizard (Stebbins 1954; Montanucci 1965; Service 1980, 1985; Germano and Williams 1993). Land conversions contribute to declines in blunt-nosed leopard lizard abundance directly and indirectly by increasing mortalities from sources including: displacement and habitat fragmentation, reducing feeding, breeding, and sheltering sites, and by reducing the carrying capacity and prey populations for occupied sites.

Dramatic loss of blunt-nosed leopard lizard habitat has continued to occur since the drafting of the 1980 Recovery Plan. According to Service files and a preliminary assessment of issued biological opinions from 1987 to 2006, roughly 120 projects permitted incidental take of blunt-nosed leopard lizard. In total, these projects allowed for the incidental take of approximately 220 individuals and roughly 21,200 acres of impacts to blunt-nosed leopard lizard habitat. Of these activities, the habitat disturbance was authorized for oil exploration and power generation (2,433 acres permanent and 1,215 acres temporary), road construction and repair (1,387 acres permanent and 469 acres temporary), general operation and maintenance activities (15 acres permanent and 5,120 acres temporary), pipeline construction and repair (264 acres permanent and 853 acres temporary), transmission line and fiber optic cables construction (410 acres permanent and 418 acres temporary), hazardous waste facilities construction (844 acres permanent and 16 acres temporary), prison facilities construction (283 acres permanent and 74 acres temporary), water banking (KWB operations 6,000 acres permanent), and other agricultural, residential, and commercial development activities (covered under the Metropolitan Bakersfield HCP 15,200 acres permanent).

Note, these figures account for only those projects that were reviewed under the Act; the estimations do not include any loss of habitat or adverse effects from habitat conversion that was not reported to the Service. Presently, additional habitat loss can be expected due to on-going modification and conversion of existing habitat for agriculture, residential or commercial developments, oil and gas exploration activities, the construction of water banking facilities, and solar power developments.

Habitat Threats from Agriculture and Urban Development

Conversion of land for agricultural purposes continues to be the most critical threat to the blunt-nosed leopard lizard. Although the increment of habitat loss attributable to urban development appears to be increasing, this activity remains less significant than agriculture for this species. Agricultural conversion is generally not subject to any environmental review and is not directly monitored or regulated. Conversion of privately owned habitat without use of federally supplied water typically does not result in section 7 consultation with the Service, nor is it common for there to be an application for a section 10 incidental take permit (which would include a habitat conservation plan to reduce the effects of the take on the species). In addition, CVP water is used for groundwater recharge by some districts in the San Joaquin Valley. Such recharge may allow nearby landowners to pump groundwater for uses that may affect listed and proposed species.

Conversion of natural lands to agriculture has continued since the listing of the blunt-nosed leopard lizard. The 1980 Recovery Plan reported that between 1976 and 1979, habitat loss for the blunt-nosed leopard lizard was occurring at a rate of approximately 19,200 acres per year (Service 1980). By 1979, roughly 95 percent (approximately 8.1 million acres out of a total 8.5 million acres) of habitat on the San Joaquin Valley floor had been converted or otherwise destroyed (Service 1980; Williams 1985). The California Department of Water Resources has predicted continued loss of wildland habitat to agricultural conversion at a rate of 10,000 to 30,000 acres per year. The California Department of Forestry (1988) predicted wildland habitat losses totaling 465,000 acres in the San Joaquin Valley region between 1980 and 2010 as a result of agricultural conversion and urbanization. Much of the projected loss is likely to occur in the remaining blocks of habitat for listed and proposed species, where conversion also isolates populations by increasing habitat fragmentation, and limits availability of suitable habitat for future recovery of the species

The conversion of blunt-nosed leopard lizard habitat into agricultural fields continues to be a threat to blunt-nosed leopard lizard on private lands on the Valley floor. For example, in August 2006, about 1,300 acres of saltbush scrub and sink scrub habitat were illegally disced for cultivation of melons on the Valley floor along Interstate 5 north of the Kings – Kern County line. Blunt-nosed leopard lizards occur in several locations a few miles from the site (Vance *in litt.* 2006). Another similar instance of illegal discing of saltbush habitat was reported on the Valley floor in Kern County (Krise *in litt.* 2006).

The Panoche Valley was identified an important area for blunt-nosed leopard lizard within the Ciervo-Panoche Natural Area (Service 1998). However, the majority of the Panoche Valley remains unprotected on private lands. In September 2006, the real estate company Schuil and Associates sold a 1,200-acre parcel of rangeland in the Panoche Valley to private interests, and another 9,000 acres of Panoche Valley rangeland are on sale for potential home sites zoned for agricultural rangeland 40-acre minimum site size. The Panoche Creek and Silver Creek were identified as important dispersal corridors within the Ciervo-Panoche Natural Area (Service 1998; Lowe *et al.* 2005; L. Saslaw, BLM, pers. comm. 2006), but the majority of these areas remain unprotected and subject to residential and agricultural development.

Between 1970 and 2000, the human population of the San Joaquin Valley doubled in size; it is expected to more than double again by 2040 (Field *et al.* 1999; Teitz *et al.* 2005). The increasing population combined with the concurrent high demand for limited supplies of land, water, and other resources, has been identified as a principal underlying cause of habitat loss and degradation (Bunn *et al.* 2007).

Numerous large residential housing developments have been proposed in blunt-nosed leopard lizard habitat within the Metropolitan Bakersfield HCP (MBHCP) service area, including the 4,000 acre Gateway Specific Plan, and the 890 acre Canyons residential housing development. Impacts from these large-scale developments would likely extend beyond their physical footprint, considering potential effects upon dispersal corridors and habitat connectivity across the Valley floor. Additionally, the City of Taft recently proposed to expand its sphere of influence to cover roughly 157,570 acres of land (246.2 square miles), including approximately 9,622 acres of land within existing City limits and 147,948 acres of land within the proposed Expansion Area (City of Taft 2009). The recent economic recession in combination with other factors have delayed planning and construction of proposed development in Bakersfield and throughout the Valley; in some cases the applicants have withdrawn their proposals entirely. Nonetheless, blunt-nosed leopard lizard habitat degradation in, and around, Bakersfield, Taft and other urban areas remains a threat on unprotected private lands.

Habitat Threats from Oil and Gas Exploration

Oil and natural gas exploration activities continue to degrade blunt-nosed leopard lizard habitat in western Kern, Kings, and Fresno Counties. The construction of facilities related to oil and natural gas production, such as well pads, wells, storage tanks, sumps, pipelines, and their associated service roads degrade habitat and cause direct mortality to blunt-nosed leopard lizards. Leakage of oil from pumps and transport pipes, and storage facilities, surface mining, and ORV use also degrade blunt-nosed leopard lizard habitat (Madrone Associates 1979; Chesemore 1980; Mullen 1981; Service 1985; Kato and O'Farrell 1986; Service 1998).

From 2001 to present, 38 projects have been permitted through the Oil and Gas Programmatic biological opinion (BLM 2008) with potential to affect blunt-nosed leopard lizards. These 38 projects have impacted approximately 19 acres of occupied or potential habitat. Additionally, under this programmatic opinion the incidental take of four individual blunt-nosed leopard lizards has been reported: one presumed vehicle strike at the Carneros Devils Den area, and one at Kettleman Hills Middle Dome area; and, two assumed predation mortalities. Under the Oil and Gas Programmatic biological opinion, impacts to blunt-nosed leopard lizard habitat are generally minimized by applying a ratio of 3:1 for the purchase and protection of other existing habitat for each acre of suitable habitat impacted (Service 2001, 2003). However, this only results in the protection of existing habitat and not the creation of new blunt-nosed leopard lizard habitat; thus, each project effectively represents a net loss in total habitat.

Formal consultation between the BLM and the Service was initiated on April 10, 2008, for the development of a programmatic biological opinion for seismic exploration projects for which the BLM is the Federal nexus. Thus far, this programmatic opinion is expected to cover four specific projects, and others that may arise in the future. The four seismic exploration projects that have submitted formal requests include: the Buena Vista Seismic Exploration Project near Taft (roughly 128,000 acres) (Occidental of Elk Hills, Inc., *in litt.* 2008); the Chevron's Kettleman Hills Seismic Exploration Project (roughly 131,500 acres) (BioEnvironmental Associates, *in litt.* 2008a); the Aera Energy LLC Seismic Exploration Project near McKittrick (roughly 73,600 acres) (BioEnvironmental Associates, *in litt.*2008b); and, the Belgian Anticline Seismic Exploration Project (roughly 33,270 acres) (E&B Natural Resource Management, *in litt.* 2008). Disturbances associated with these projects are predominantly temporary and are dispersed across large land areas but, nonetheless, have potential to impact blunt-nosed leopard lizards, or adversely affect their habitat. At the time of this review, impacts of these projects on the blunt-nosed leopard lizard are not known. Nonetheless, it is anticipated that blunt-nosed leopard lizards are likely to be adversely affected by vehicle strikes, entombment in burrows, temporary loss or degradation of their habitat, and harassment from noise and vibration. Some blunt-nosed leopard lizards may escape direct injury if burrows are destroyed, but become displaced into adjacent areas. They may be vulnerable to increased predation, exposure, or stress through disorientation, loss of foraging and food base, or loss of shelter. Furthermore, it is expected that any positive results from seismic testing will subsequently result in proposals for oil and gas extraction projects; if these proposals are within listed species habitat, a separate consultation with the Service would be required.

Habitat Threats from the Construction of Water Banking Facilities

The on-going need to provide and secure water supplies for continued urban and rural use throughout California has increased the demand for new construction of water banking facilities. This need was formalized by Executive Order S-06-08 (signed on June 4, 2008 by Governor Arnold Schwarzenegger), which officially declared a statewide drought, and a state of emergency in nine Central Valley Counties with exceptionally urgent water needs: Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern. Currently, the Service is engaged in informal consultation with two proposed water banks that have potential to impact blunt-nosed leopard lizards—Madera Irrigation District's Madera Water Supply Enhancement Project, and Semitropic's Stored Water Recovery Unit. These projects potentially threaten the blunt-nosed leopard lizard by: directly removing habitat (through flooding, or the establishment of infra-structure); changing habitat quality (vegetation structure, higher predation, reduced prey, etc.); and, increasing the incidence of take through vehicle strikes.

The proposed 10,000-acre Madera Water Supply Enhancement Project is proposed as a groundwater recharge bank in western Madera County. The presence of blunt-nosed leopard lizards throughout the proposed site was verified by May 2009 surveys. At this time specific impacts of the project to the blunt-nosed leopard lizards have not yet been determined. However impacts associated with the project are likely given that the project entails the flooding of roughly 700 acres of swale habitat, and the construction of roughly 3,000 acres of percolation ponds. Additional effects to this species, beyond the flooding of suitable habitat, would be attributable to the permanent conversion of habitat to water bank infrastructure including the construction of access roads, powerlines, pipeline and canal conveyance systems, and numerous water extraction well pads. Requirements under the California Environmental Quality Act (CEQA) were completed in September 2005, and the applicant has initiated informal consultation with the Service for this project.

Currently, the Semitropic Water District is proposing the development of a large groundwater extraction project—the Stored Groundwater Recovery Unit—southeast of the Kern NWR, near Semitropic, California (Entrix, GEI Consultants, Inc., and Live Oak & Associates *in litt*. 2008). This project includes the following activities that have potential to affect the blunt-nosed leopard lizard: construction of a well extraction field across five sections of land (roughly 3,000 acres), ancillary well connection pipes, roughly 4 miles of open canal, and 7 miles of large diameter (120-inch) pipeline. The proposed project is located on blunt-nosed leopard lizard habitat near the Semitropic Ridge Preserve and the Kern NWR. At this time, however, potential impacts of the project to the blunt-nosed leopard lizard have not been assessed, but impacts are likely through the permanent conversion of habitat to water bank infrastructure including construction of access roads, powerlines, pipeline and canal conveyance systems, and roughly 65 water extraction well pads. Moreover, the proposed water bank will likely augment the conversion of native lands to agriculture by increasing water supply availability in the southern San Joaquin Valley.

Habitat Threats from Solar Power Developments

Solar power development projects pose potential threats to blunt-nosed leopard lizards and may impact vast amounts of habitat. These projects can destroy, fragment, or impact blunt-nosed leopard lizard habitat by: altering landscape topography, vegetation, and drainage patterns; increasing vehicle-strike mortality; and, reducing habitat quality through interception of solar energy normally reaching the ground surface, affecting ambient air temperatures through habitat shading, and altering soil moisture regimes (Smith 1984; Smith *et al*. 1987). Moreover, recently proposed solar projects tend to be large contiguous blocks of disturbance in undeveloped habitat lands, ranging from hundreds to several thousand acres. Currently, eight solar power farms have been proposed (see Table 3).

Table 3. Solar power projects that have been proposed within blunt-nosed leopard lizard habitat.

Project Name (Applicant)	**Location (Region/County/Protected Area)**	**Proposed Habitat Disturbance (acres)[1]**	**Status**
SunGen (Complete Energy Holdings, Inc., and La Paloma Generating Company LLC)	Valley Floor/Kern	270-290 (P)	Informal consultation has been initiated.
Cymric	Valley Floor/Kern	Unknown	Informal consultation has been initiated.
California Valley Solar Ranch (High Plains Ranch II, LLC, Sun Power Corporation, Systems)	San Luis Obispo/Carrizo Plain	4,365 (P)	Informal consultation has been initiated.
Topaz Solar Farm (First Solar, Inc.)	San Luis Obispo/Carrizo Plain	6,200 (P)	Informal consultation has been initiated.
Carrizo Thermal Solar Farm (Ausra, Inc.)	San Luis Obispo/Carrizo Plain	640 (P); 380 (T)	Formal consultation has been initiated; Ausra, Inc. was purchased by First Solar, Inc. in 2009.
San Joaquin Solar 1 & 2 (San Joaquin Solar, LLC)	Foothills/Fresno/Coalinga	640 (P)	Informal consultation has been initiated.
Sun City and Sun Drag	Foothills/Kings/Avenal	Approximately 1000 (P)	Informal consultation has Not been initiated
Solargen Solargen Energy, Inc.	Foothills/Fresno/Panoche Valley	Total amount not determined but will be between 7,000 and 29,000 (P)	Informal consultation has been initiated.
Notes: [1] Permanent Impacts denoted as (P), Temporary Disturbance denoted as (T).			

Conservation Efforts and Habitat Protection

A total of 14 HCPs have been prepared (13 completed and one HCP currently in draft) for which the permits include take of blunt-nosed leopard lizard and/or impacts to its habitat. These HCPs area summarized in Table 4 below, and described in further detail in Appendix B. Effectively, through section 10 consultations and the HCP process, 89,288 acres of habitat land have been conserved, while a total 30052.6 acres of permanent impacts and 1,527.1 acres of temporary disturbance have been authorized (note, these figures include the California Aqueduct San Joaquin Field Division HCP that is currently in draft).

The Central Valley Project (CVP) was constructed to protect the Central Valley from water shortages and floods. Irrigation water provided through the CVP subsequently facilitated the conversion of native habitats to agricultural lands (Bureau of Reclamation 2006). The effect of this large-scale loss of native habitat reduced populations of several species, which resulted in the listing of over twenty species in the San Joaquin Valley under the under the Act.

Subsequently, Congress passed the Central Valley Project Improvement Act (CVPIA) in 1992, mandating changes in the management of the CVP particularly for the protection, restoration, and enhancement of fish and wildlife. The CVPIA is comprised of several programs, including the CVPIA Habitat Restoration Program (HRP; §3406(b)(1) of the CVPIA). The Central Valley Project Conservation Program (CVPCP) was the result of a section 7 consultation with the Bureau of Reclamation (BOR) for Friant Dam water contracts.

Under the CVPCP, the blunt-nosed leopard lizard was designated as a very high priority for recovery due its imminent threat of extinction, and the fact that CVP actions significantly contributed to the species decline, either directly or indirectly and given that the species is considered to have an imminent threat of extinction. The CVPCP program is funded at approximately 2.3 million dollars annually, and has thus far funded 84 total projects since its commencement; 11 of the 84 are within alkali scrub or annual grassland habitat and specifically include the blunt-nosed leopard lizard as a focal species. Principally these projects have included habitat protection and restoration through the establishment of conservation easements and land acquisition in fee title (see Table 5). Other CVPCP goals for the recovery of the blunt-nosed leopard lizard include: determine habitat management and compatible land uses; conduct surveys for species presence and absence; and, protect key habitat areas within the known range of the species.

A principal program under the CVPIA HRP is the Land Retirement Program (Law 102-575 Title 34, Section 3408(h)), which is designed to reduce irrigated agricultural drainage problems. It comprises an interagency Department of Interior Land Retirement Team and includes representatives from BOR, the Service, and the BLM. It was estimated that by 2040 approximately 400,000 to 554,000 acres of land would become unsuitable for irrigated agriculture if no actions were taken to remedy drainage problems. Under this program, those irrigated agricultural lands that are characterized by low productivity, poor drainage, shallow water tables, and high groundwater selenium concentrations would be retired from irrigated

Table 4. Since the time of listing, 14 HCPs have been developed and implemented (note the California Aqueduct San Joaquin Field Division HCP is currently in draft form); additional information is provided in Appendix B.

HCP	Location (Region/County/Protected Area)	Habitat Protection (acres)	Compensation Area Location	Authorized Impacts to Blunt-Nosed Leopard Lizard Habitat (acres)[1]	Comments
Coles Levee	Valley Floor/Kern	990	Coles Levee Ecosystem Preserve	270 (P)	HCP is not currently valid
Coalinga Cogeneration	Foothills/Fresno	179	On-site	49.6 (P); 27.6 (T)	June 23, 2006, the project used up all of its compensation credits and completed the mitigation requirements.
California Department of Corrections Delano Prison	Valley Floor/Kern	348/514	On-site /Allensworth ER	287 (P); 348 (T)	Compensation includes habitat enhancement and revegetation
California Department of Corrections Statewide Electrified Fence Project	Valley Floor/Kern	282/800[2]	Allensworth ER	Take of 2 Individuals	A restoration plan for the mitigation lands was finalized and approved in February 2003 (EDAW 2003)
Chevron Pipeline	Valley Floor/Kern/Lokern	28	Lokern Area	25.5 (T)	
Granite Construction Phase I	Foothills/Fresno/Coalinga	162	Semitropic Ridge ER	54 (P)	

Table 4 continued.

HCP	Location (Region/County/Protected Area)	Habitat Protection (acres)	Compensation Area Location	Authorized Impacts to Blunt-Nosed Leopard Lizard Habitat (acres)[1]	Comments
Kern County Waste Facilities	Valley Floor/Kern	755[3]	Coles Levee Ecosystem Preserve	251 (P)[3]	Project impacts are limited to 2 acres of blunt-nosed leopard lizard habitat near Lost Hills and 47 acres near Taft in Kern County
KWB Authority	Valley Floor/Kern	4,263	On-site	12,081 (P); 291 (T)	
Metropolitan Bakersfield	Valley Floor/Kern	3:1 compensation for Natural Lands	Off-site	15,200 (P)	Acquired throughout the duration of the HCP as impacts are incurred; the HCP is valid until 2014.
Nuevo Torch	Valley Floor/Kern	840	Lokern Area	850 (P)	Now called PXP
California Aqueduct San Joaquin Field Division	Valley Floor/Kern	567/3,474[4]	On-site	340 (P); 835 (T)	HCP is currently in draft form. Total impacts are limited to 1,295 acres: 1,185 acres of impact will be compensated at time of issuance, 110 acres of impacts will be compensated as they occur

Table 4 continued.

HCP	Location (Region/County/Protected Area)	Habitat Protection (acres)	Compensation Area Location	Authorized Impacts to Blunt-Nosed Leopard Lizard Habitat (acres)[1]	Comments
Seneca and Enron Oil and Gas	Valley Floor/Kern			650 (P)	
Enviro Cycle	Valley Floor/Kern			20 (P)	
Pacific Gas and Electric	Valley Floor and Foothill Regions/ Nine Counties of the San Joaquin Valley/All Protected Areas except Carrizo Plain	360	Areas of occupied and/or suitable habitat to be conserved in perpetuity via future conservation easement	9 (P); 690 (T)	An additional 3, 930 acres of covered activities may occur in suitable habitat
Total		**89,288[5]**		**29,382.6 (P); 1,527.1 (T)**	

Notes: [1]Permanent Impacts denoted as (P), Temporary Disturbance denoted as (T); [2]Compensation included acquisition and enhancement of 282 acres of high quality alkali sink/scrub habitat and an additional 800 acres of low quality laser-leveled farmland, both at Allensworth ER; [3]These figures are comprehensive for compensation and impacts associated with the HCP, and not specific to blunt-nosed leopard lizard impacts specifically; [4]567 acres will be compensated through traditional Service procedures, while the 3,474 acres will be managed to conserve habitat to the maximum extent possible (i.e., habitat may be disturbed or impacted during emergency maintenance and operational procedures); and, [5]This total does not include habitat conservation lands acquired by CDFG through the Metropolitan Bakersfield HCP, and also does not include the 3,474 acres that DWR will manage under the proposed draft California Aqueduct San Joaquin Field Division HCP.

agriculture through a willing seller program. The original goal under the Land Retirement Program was set at 15,000 acres (see Table 5). However, the actual acreage retired thus far for restoration is limited to 9,306 acres: 7,216 acres at Atwell Island in southwestern Tulare County and 2,090 acres at the Tranquility in western Fresno County. The restoration of former irrigated agricultural lands to arid upland and alkali sink habitat are expected to benefit the blunt-nosed leopard lizard. As noted in Table 5, goals for Atwell Island are set at 70 percent restored uplands (alkali scrub), 20 percent flood management, 5 percent riparian, and 5 percent farming. Thus, only 70 percent of the 7,216 acres, or 5,051 acres at Atwell Island would be restored to alkali sink habitat suitable to support blunt-nosed leopard lizards; 2,090 acres at the Tranquility site would be restored to uplands or alkali sink.

Under the CVPCP, HRP or Land Retirement Program there was no obligation for BOR to purchase and conserve a specific amount of land. Conversely however, the California State Water Resources Control Board (SWRCB) in Decision-1641 imposed a mitigation requirement on the Bureau of Reclamation for agricultural land conversions that occurred prior to December 29, 1999 outside the CVP contract supply Consolidated Place of Use. The requirement is referred to as the Encroachment Mitigation. This Decision, which included specific requirements for alkali scrub habitat and grassland habitat, is significant for the recovery of blunt-nosed leopard lizard. The SWRCB identified 45,390 acres of habitat including 23,165 acres of alkali scrub habitat (primarily in the Westlands Water District of western Fresno County) that was converted without authorization under the Act to plowed and irrigated agriculture land, and that needs to be mitigated with in-kind habitat acquired by 2010 (SWRCB 2000). As of May 2009 roughly 9,397 acres (or 40.6 percent of the required 23,165 acres) of alkali scrub habitat had been acquired by BOR (D. Kleinsmith, BOR, *in litt.* 2009). Furthermore, in total only 25,706 acres of habitat for any species had been acquired by May 2009 (as noted in Table 5, 4,960 acres of grassland habitat is speculated to be suitable for blunt-nosed leopard lizards (D. Kleinsmith, *in litt.* 2009).

Although these land acquisition and retirement programs may protect habitat suitable for blunt-nosed leopard lizards, it should be qualified that the suitability of these lands to support blunt-nosed leopard lizard has been only coarsely determined by BOR at this time; the suitability in terms of habitat quality and landscape connectivity has not yet been evaluated by the Service. The biological opinion for the Land Retirement Program (Service 1999) recommended a 5-year Habitat Restoration Study (HRS) to determine the responses of wildlife to land retirement and restoration efforts. HRS objectives were to determine the efficacy of revegetation with native plants and microtopographic contouring for upland habitat restoration and to examine the responses of plants and wildlife at the 800-acre Tranquility study site. Beginning in 1999, vegetation, invertebrates, amphibians, reptiles, birds, and small mammals were all monitored throughout the duration of the project. The California king snake (*Lampropeltis getulus californiae*), gopher snake (*Pituophis melanoleucus*), and western whiptail (*Cnemidophorus tigris multiscutatus*) were the only reptile species observed at the Tranquility site. It is anticipated that species in the vicinity of the Tranquility Site will re-inhabit the area; however due to the distance to the nearest known population, blunt-nosed leopard lizards would most likely have to be reintroduced to the retired lands. To date, there is no available research on

Table 5. Summarized status of BOR acquired mitigation, from the 2007 Consolidated Place of Use Encroachment, which espouses habitat compensation from existing programs, including: CVPCP, HRP, Land Retirement Program projects, as well as BOR's wetlands program (D. Kleinsmith, *in litt.* 2009).

Project Name	Habitat Type	Special Status Species from CPOU FEIR Being Compensated[1]	Project Size (Acres)	Purpose of Project	Location (County)	Estimated Completion Date	Reclamation Percent of Total Funding	Pro-rated Acreage Based on Percent funding
ALKALI SCRUB:								
Allensworth Ecological Reserve Addition	Alkali scrub	San Joaquin kit fox, Tipton kangaroo rat, San Joaquin antelope squirrel, Blunt-nosed leopard lizard.	360	Protection	Tulare and Kern	1998	100%	360
Carrizo Plains National Monument Inholdings	Alkali scrub	San Joaquin kit fox, San Joaquin antelope squirrel, giant kangaroo rat, Blunt-nosed leopard lizard, San Joaquin wooly-threads, California jewel flower, Hoover's wooly star.	665	Protection	Kern	2007	100%	665
Elgorriago Ranch	Alkali scrub	Giant kangaroo rat, San Joaquin antelope squirrel, Blunt-nosed leopard lizard, San Joaquin wooly-threads.	1,231	Protection	Fresno and San Benito	2007	100%	1,231

Table 5 continued.

Project Name	Habitat Type	Special Status Species from CPOU FEIR Being Compensated[1]	Project Size (Acres)	Purpose of Project	Location (County)	Estimated Completion Date	Reclamation Percent of Total Funding	Pro-rated Acreage Based on Percent funding
Goose Lake Land Acquisition	Alkali scrub	Blunt-nosed leopard lizard, Tipton kangaroo rat, San Joaquin kit fox.	Parcel not yet selected.	Protection	Kern	Parcel not yet selected.	100%	Parcel not yet selected.
Land Retirement Demonstration Project (Atwell Island and Tranquility)	Alkali scrub	Potential for all San Joaquin Valley species.	7,141 (5,051 and 2,090, respectively)[2]	Restoration	Fresno, Kings, and Tulare	Unknown	100%	7,141
TOTAL ACRES FOR ALKALI SCRUB		**23,165 acres owed**	**9,397 acres acquired**					**9397**
ANNUAL GRASSLAND: 17,573 acres owed								
Bayou Vista Property	Annual grassland	Swainson's hawk, Tipton kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard.	515	Protection	Tulare	2004	46%	236.9

Table 5 continued.

Project Name	Habitat Type	Special Status Species from CPOU FEIR Being Compensated[1]	Project Size (Acres)	Purpose of Project	Location (County)	Estimated Completion Date	Reclamation Percent of Total Funding	Pro-rated Acreage Based on Percent funding
Carrizo Plains National Monument Inholdings	Annual grassland	San Joaquin kit fox, San Joaquin antelope squirrel, giant kangaroo rat, Blunt-nosed leopard lizard, San Joaquin wooly-threads, California jewel flower, Hoover's wooly star.	800	Protection	Kern	2007	100%	800
Elgorriago Ranch	Annual grassland	Giant kangaroo rat, San Joaquin antelope squirrel, Blunt-nosed leopard lizard, San Joaquin wooly-threads.	1,400	Protection	Fresno and San Benito	2007	100%	1,400
Goose Lake Land Acquisition	Annual grassland	Blunt-nosed leopard lizard, Tipton kangaroo rat, San Joaquin kit fox.	Parcel not yet selected.	Protection	Kern	Parcel not yet selected.	100%	Parcel not yet selected.
Pixley NWR Acquisition	Annual grassland	San Joaquin kit fox, blunt-nosed leopard lizard, Tipton kangaroo rat.	345	Protection	Tulare	2006	100%	345

Table 5 continued.

Project Name	Habitat Type	Special Status Species from CPOU FEIR Being Compensated[1]	Project Size (Acres)	Purpose of Project	Location (County)	Estimated Completion Date	Reclamation Percent of Total Funding	Pro-rated Acreage Based on Percent funding
Romero and Simon-Neuman Ranches	Annual grassland	San Joaquin kit fox, blunt-nosed leopard lizard.	24,589	Protection	Stanislaus, Santa Clara, Merced	1988 to 1999	9.40%	2,311.4
TOTAL ACRES FOR ANNUAL GRASSLAND		**17,573 acres owed**	**4.960 acquired**					**4,960**

Note: [1]The suitability of these lands to support blunt-nosed leopard lizard has been determined by BOR, and has not been reviewed by the Service.[2]Thus far, BOR has acquired 9,306 acres—7,216 acres at Atwell Island and 2,090 acres at Tranquility; however unlike the Tranquility site, restoration goals for Atwell Island are 70 percent restored uplands (alkali scrub), 20 percent flood management, 5 percent riparian, and 5 percent farming. Thus, only 70 percent of the 7,216 acres (5,051.2 acres) at Atwell Island would be alkali sink habitat suitable for the blunt-nosed leopard lizard; whereas, all 2,090 acres at the Tranquility site would be restored to uplands or alkali sink. The total upland habitat or alkali sink habitat for land retirement is 5,051.2 + 2,090 = 7,141.2.

the ability of blunt-nosed leopard lizard to recolonize fallow fields and whether the Land Retirement Program will be successful in providing habitat for the species.

Additionally, the future ownership and status of these lands—whether they would be restored to habitat, or utilized for other purposes (i.e., dry-farmed)—remains unknown. The Land Retirement Program, however, while preventing the application of CVP water to agricultural fields, does not prevent the application of irrigation water from other sources or require the restoration of the lands to native habitat. Often an alternative irrigation supply is provided to the land, which in turn prevents the return of most agricultural fields back to natural habitat.

Furthermore, at present, Reclamation does not plan to pursue any further land acquisitions under the land retirement program authorization (D. Kleinsmith, pers. comm. 2009). Thus it is unlikely that BOR will acquire the additional 16,141 acres by the court ordered deadline.

In conclusion, it is currently unknown whether these programs will offset the blunt-nosed leopard lizard habitat losses that have occurred. Further assessment on the effects of these programs, combined with supplemental research, will be required to determine their contribution on blunt-nosed leopard lizard recovery.

Summary of Factor A Threats

In summary, broad-scale land conversion of natural habitat has resulted in substantial reduction of available blunt-nosed leopard lizard habitat. Service databases report that roughly 35,000 acres of permanent impacts and 10,000 acres of temporary disturbance have been authorized within blunt-nosed leopard lizard habitat (note: these values do not include those acres of additional impacts to scrub and grassland from those programs described above, under the CVP).

Fragmentation of residual habitat, which further isolates remaining blunt-nosed leopard lizard populations, continues due to on-going agricultural conversion of natural habitat, residential development, oil and gas exploration and extraction activities. Though several HCPs and biological opinions, as well as the CVPCP, CVPIA, and Decision-1641 have resulted in the conservation of substantial amounts of land acreage, the use and recolonization of these conserved lands by blunt-nosed leopard lizards is limited by the fragmentation and isolation of the parcels, the distribution of remaining populations, and dispersal abilities of the species.

II.C.2.b. Factor B, Overutilization for commercial, recreational, scientific, or educational purposes

At the time of listing, overutilization for commercial, recreational, scientific, or educational purposes was not considered to be a threat, and is not discussed as a threat in the 1998 Recovery Plan. There are no updates relevant to this factor, nor has the potential of this threat increased noticeably since the 1998 Recovery Plan.

II.C.2.c. Factor C, Disease or predation

At the time of listing predation was not considered a potential threat to survival of the species and its recovery. Montanucci (1965) reported that the list of predators in Madera and Fresno

Counties of the blunt-nosed leopard lizard included the following species: spotted skunk (*Spilogale putorius*), ground squirrel (*Citellus beecheyi*), shrike (*Lanius ludovicianus gambeli*), American kestrel (*Falco sparverius*), burrowing owl (*Speotyto cunicularia hypugaea*), roadrunner (*Geococcyx californianus*), whipsnake (*Masticophis flagellum ruddocki*), gopher snake (*Pituophis catenifer*), coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), and badger (*Taxidea taxus*).

The following animals are currently known to prey on blunt-nosed leopard lizards: whip snakes, gopher snakes, glossy snakes (*Arizona elegans*), western long-nosed snakes (*Rhinocheilus lecontei*), northern Pacific rattlesnakes (*Crotalus viridis oreganus*), common king snakes, western rattlesnakes, loggerhead shrikes (*Lanius ludovicianus*), American kestrels (*Falco sparverius*), prairie falcons (*Falco mexicanus*), burrowing owls (*Athene cunicularia*), greater roadrunners (*Geococcyx californianus*), golden eagles (*Aquila chrysaetos*), red-tailed hawks (*Buteo jamaicensis*), California ground squirrels, spotted skunks (*Spilogale putorius*), striped skunks (*Mephitis mephitis*), American badgers (*Taxidea taxus*), coyotes (*Canis latrans*), and San Joaquin kit foxes (Montanucci 1965; Tollestrup 1979b; Hansen *et al.* 1994; Germano and Carter 1995; Germano and Brown 2003). This list is likely not exhaustive for all incidences of predation that occur across the range of the blunt-nosed leopard lizard, nor has the magnitude of effects derived by predation on population trend and stability been researched at this time. Thus it remains unknown as to whether predation is a major threat to the survival and recovery of this species.

Without mammal burrows, blunt-nosed leopard lizards are more susceptible to predation (Hansen *et al.* 1994). The construction of artificial perches (i.e., fence posts) for burrowing owls, and other predators increases the risk of predation on blunt-nosed leopard lizards (L. Saslaw, BLM, pers. comm. 2006). Additionally, the territorial behavior of blunt-nosed leopard lizard males may expose them to higher rates of predation than if they were secretive (Tollestrup 1982, 1983; Germano and Carter 1995; Lappin and Swinney 1999).

There are no known diseases in blunt-nosed leopard lizards, but endoparasites (nematodes) and ectoparasites (mites and harvest mites) have been reported (Montanucci 1965). The overall effect of the parasites on the blunt-nosed leopard lizard is not currently known.

II.C.2.d. Factor D, Inadequacy of existing regulatory mechanisms

The blunt-nosed leopard lizard was listed as endangered under the Act in 1967, and subsequently listed as an endangered species by the State of California in 1971. At the time of Federal listing, many of the current environmental laws did not yet exist.

There are several State and Federal laws and regulations that are pertinent to federally listed species, each of which may contribute in varying degrees to the conservation of federally listed and non-listed species. These laws, most of which have been enacted in the past 30 to 40 years, have greatly reduced or eliminated the threat of wholesale habitat destruction, although the extent to which they prevent the conversion of natural lands to agriculture is less clear.

State Laws and Regulations in California

The State's authority to conserve rare wildlife and plants is comprised of four major pieces of legislation: the California Endangered Species Act, the Native Plant Protection Act, the California Environmental Quality Act, and the Natural Community Conservation Planning Act.

California Endangered Species Act (CESA): The CESA (California Fish and Game Code, section 2080 *et seq*.) prohibits the unauthorized take of State-listed threatened or endangered species. The blunt-nosed leopard lizard was listed as endangered by the State of California in 1971. The CESA requires State agencies to consult with the California Department of Fish and Game on activities that may affect a State-listed species and mitigate for any adverse impacts to the species or its habitat. Pursuant to CESA, it is unlawful to import or export, take, possess, purchase, or sell any species or part or product of any species listed as endangered or threatened. The State may authorize permits for scientific, educational, or management purposes, and to allow take that is incidental to otherwise lawful activities. The blunt-nosed leopard lizard was listed as State endangered species under CESA on June 27, 1971.

California Department of Fish and Game Code §5050--Fully Protected Reptiles and Amphibians Species: The blunt-nosed leopard lizard is a fully-protected animal under the California Fish and Game Code §5050; fully protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research. Therefore salvage and relocation for this species is not currently an option under State law.

California Environmental Quality Act (CEQA): The CEQA requires review of any project that is undertaken, funded, or permitted by the State or a local governmental agency. If significant effects are identified, the lead agency has the option of requiring mitigation through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA section 21002). Protection of listed species through CEQA is, therefore, dependent upon the discretion of the lead agency involved.

Natural Community Conservation Planning Act: The Natural Community Conservation Program is a cooperative effort to protect regional habitats and species. The program helps identify and provide for area wide protection of plants, animals, and their habitats while allowing compatible and appropriate economic activity. Many Natural Community Conservation Plans (NCCPs) are developed in conjunction with Habitat Conservation Plans (HCPs) prepared pursuant to the Federal Endangered Species Act.

Federal Laws and Regulations

National Environmental Policy Act (NEPA): NEPA (42 U.S.C. 4371 *et seq*.) provides some protection for listed species that may be affected by activities undertaken, authorized, or funded by Federal agencies. Prior to implementation of such projects with a Federal nexus, NEPA requires the agency to analyze the project for potential impacts to the human environment, including natural resources. In cases where that analysis reveals significant environmental effects, the Federal agency must propose mitigation alternatives that would offset those effects

(40 **CFR** 1502.16). These mitigations usually provide some protection for listed species. However, NEPA does not require that adverse impacts be fully mitigated, only that impacts be assessed and the analysis disclosed to the public.

Clean Water Act: Under section 404, the U.S. Army Corps of Engineers (Corps or USACE) regulates the discharge of fill material into waters of the United States, which include navigable and isolated waters, headwaters, and adjacent wetlands (33 U.S.C. 1344). In general, the term "wetland" refers to areas meeting the Corps's criteria of hydric soils, hydrology (either sufficient annual flooding or water on the soil surface), and hydrophytic vegetation (plants specifically adapted for growing in wetlands). Any action with the potential to impact waters of the United States must be reviewed under the Clean Water Act, National Environmental Policy Act, and Endangered Species Act. These reviews require consideration of impacts to listed species and their habitats, and recommendations for mitigation of significant impacts.

Although the blunt-nosed leopard lizard is an upland species typically found in landscapes with limited jurisdictional waters under the Clean Water Act, the Corps has frequently assumed the role of the Federal nexus for both large and small projects in their entirety, even though these projects may only impact a minor amount of jurisdictional water. This approach by the Corps has facilitated numerous consultations under section 7 of the Act that would have otherwise likely required a section 10 permit.

Historically, the Corps interpreted "the waters of the United States" expansively to include not only traditional navigable waters and wetlands, but also other defined waters that are adjacent or hydrologically connected to traditional navigable waters. However, recent Supreme Court rulings have called into question this definition. On June 19, 2006, the U.S. Supreme Court vacated two district court judgments that upheld this interpretation as it applied to two cases involving "isolated" wetlands. Currently, Corps regulatory oversight of such wetlands (e.g., vernal pools) is in doubt because of their "isolated" nature. In response to the Supreme Court decision, the Corps and the U.S. Environmental Protection Agency (USEPA) have recently released a memorandum providing guidelines for determining jurisdiction under the Clean Water Act. The guidelines provide for a case-by-case determination of a "significant nexus" standard that may protect some, but not all, isolated wetland habitat (USEPA and USACE 2007). The overall effect of the new permit guidelines on loss of isolated wetlands, such as vernal pool habitat, is not known at this time.

Endangered Species Act of 1973, as amended (Act): The Act is the primary Federal law providing protection for this species. The Service's responsibilities include administering the Act, including sections 7, 9, and 10 that address take. Since listing, the Service has analyzed the potential effects of Federal projects under section 7(a)(2), which requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that may affect listed species. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 **CFR** 402.02). A non-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with a project.

Section 9 prohibits the taking of any federally listed endangered or threatened species. Section 3(18) defines "take" to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Service regulations (Service 2003) define "harm" to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species. Incidental take refers to taking of listed species that results from, but is not the purpose of, carrying out an otherwise lawful activity by a Federal agency or applicant (50 **CFR** 402.02). For projects without a Federal nexus that would likely result in incidental take of listed species, the Service may issue incidental take permits to non-Federal applicants pursuant to section 10(a)(1)(B). To qualify for an incidental take permit, applicants must develop, fund, and implement a Service-approved Habitat Conservation Plan (HCP) that details measures to minimize and mitigate the project's adverse impacts to listed species. Regional HCPs in some areas now provide an additional layer of regulatory protection for covered species, and many of these HCPs are coordinated with California's related Natural Community Conservation Planning program.

Conversion of land for agricultural purposes continues to be the most critical threat to listed species. Although the increment of habitat loss attributable to urban development appears to be increasing, these activities remain less significant than agriculture for most species. Agricultural conversion is generally not subject to any environmental review and is not directly monitored or regulated. Conversion of privately owned habitat without use of federally supplied water typically does not result in section 7 consultation with the Service, nor is it usual for there to be an application for a section 10 incidental take permit (which would include a habitat conservation plan to reduce the effects of the take on the species). In addition, CVP water is used for groundwater recharge by some districts in the San Joaquin Valley. Such recharge may allow nearby landowners to pump groundwater for uses that may affect listed and proposed species.

<u>Sikes Act</u>: The Sikes Act (16 U.S.C. 670) authorizes the Secretary of Defense to develop cooperative plans with the Secretaries of Agriculture and the Interior for natural resources on public lands. The Sikes Act Improvement Act of 1997 requires Department of Defense installations to prepare Integrated Natural Resource Management Plans (INRMPs) that provide for the conservation and rehabilitation of natural resources on military lands consistent with the use of military installations to ensure the readiness of the Armed Forces. The INRMPs incorporate, to the maximum extent practicable, ecosystem management principles and provide the landscape necessary to sustain military land uses. While INRMPs are not technically regulatory mechanisms because their implementation is subject to funding availability, they can be an added conservation tool in promoting the recovery of endangered and threatened species on military lands.

Federal Land Policy and Management Act of 1976 (FLPMA): The Bureau of Land Management is required to incorporate Federal, State, and local input into their management decisions through Federal law. The FLPMA (Public Law 94-579, 43 U.S.C. 1701) was written "to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development and enhancement of the public lands; and for other purposes." Section 102(f) of the FLPMA states that "the Secretary [of the Interior] shall allow an opportunity for public involvement and by regulation shall establish procedures … to give Federal, State, and local governments and the public, adequate notice and opportunity to comment upon and participate in the formulation of plans and programs relating to the management of the public lands." Therefore, through management plans, the Bureau of Land Management is responsible for including input from Federal, State, and local governments and the public. Additionally, Section 102(c) of the FLPMA states that the Secretary shall "give priority to the designation and protection of areas of critical environmental concern" in the development of plans for public lands. Although the Bureau of Land Management has a multiple-use mandate under the FLPMA which allows for grazing, mining, and off-road vehicle use, the Bureau of Land Management also has the ability under the FLPMA to establish and implement special management areas such as Areas of Critical Environmental Concern, wilderness, research areas, etc., that can reduce or eliminate actions that adversely affect species of concern (including listed species).

National Wildlife Refuge System Improvement Act of 1997: This act establishes the protection of biodiversity as the primary purpose of the National Wildlife Refuge system. This has lead to various management actions to benefit federally listed species.

Summary of Factor D

In summary, the Endangered Species Act is the primary Federal law that provides protection for this species since its listing as endangered in 1967. Other Federal and State regulatory mechanisms provide discretionary protections for the species based on current management direction, but do not guarantee protection for the species absent its status under the Act. Therefore, we continue to believe other laws and regulations have limited ability to protect the species in absence of the Endangered Species Act.

II.C.2.e. Factor E, Other natural or human made factors affecting its continued existence

Although the final rule listing for the blunt-nosed leopard lizard did not include a discussion of threats to the species, agricultural pesticides especially for control of beet leafhopper was identified as a threat near the time of listing (Montanucci 1965). Since the time of listing we have identified the following additional threats: altered vegetation; climate change; broad-scale pesticide use and application; and, vehicle (roadway traffic and ORV) induced mortality. In addition, altered vegetation communities (grazing, exotic grasses, and wildfire regime), vehicle strikes, waterfowl blinds, broad-scale pesticide application, and climate change continue to impact blunt-nosed leopard lizard populations. Furthermore, research has reported that collective habitat loss has caused the reduction and fragmentation of populations and decline of blunt-nosed leopard lizard (Stebbins 1954; Montanucci 1965; Service 1980, 1985; Germano and Williams 1993).

Altered vegetation communities (grazing, exotic grasses, wildfire regime)

The southern San Joaquin Valley of California, as with much of western North America, has been invaded by non-native plant species, since European cattle were brought to the region in the 1500s. Research has reported that the exponential increase in exotic plants has paralleled the increase in human population growth in California (Randall *et al.* 1998). The following exotic species are frequently observed within blunt-nosed leopard lizard habitat, and have adversely affected the species: *Bromus rubens madritensis* (red brome), *Vulpia myuros* (mouse tail fescue) *Schismus arabicus* (Arabian grass), *Hordium murinum glaucum* (foxtail), *Bromus diandrus* (ripgut brome), and *Bromus bordeaceus* (soft chess) (Biswell 1956; Heady 1977; Germano *et al.* 2001). The timing of germination for these introduced grasses is often earlier than most native species, which effectively gives the non-native species a competitive advantage over native plant species for water, nutrients, and sun light. Additionally, an overabundance of residual thatch from the previous year's non-native grass production can have similar adverse effects by shading out or obstructing native seedlings.

Vegetation changes include levels of biomass, cover, density, community structure, or soil characteristics. Changes have generally been attributed to the negative affects of off-highway vehicle use, overgrazing by domestic livestock, agriculture, urbanization, construction of roads and utility corridors, air pollution, military training exercises, and other activities (Lovich and Bainbridge 1999). These authors also reported that secondary contributions to degradation include the proliferation of exotic plant species, higher frequency of anthropogenic fire events, and increased nitrogen deposition. Effects of these impacts include alteration or destruction of macro- and micro-vegetation elements, establishment of annual plant communities dominated by exotic species, destruction of soil stabilizers, soil compaction, and increased erosion.

Introduced grasses and herbs often create an impenetrable thicket for small ground-dwelling vertebrates. Blunt-nosed leopard lizard movement is restricted in dense herbaceous cover, as observed with the ease of catching them by hand in dense grass compared to more open habitats (Germano *et al.* 2001; Germano *et al.* 2004). Radiotelemetry studies near the Elk Hills have documented that blunt-nosed leopard lizards are generally restricted to more open habitats (e.g. washes, roads, grazed pastures) when grass cover is thick, but they may utilize grassland areas if the herbaceous cover is sparse (Warrick *et al.* 1998).

The detrimental ecological effects of livestock grazing have been documented on western lands (Fleischner 1994; Noss 1994). Overgrazing may negatively affect blunt-nosed leopard lizards by soil compaction, damaging rodent burrows that the lizards depend on for cover, and stripping away vegetative cover used by both the lizard and its prey (Hansen *et al.* 1994). However, the cessation of grazing is likely to be even more detrimental to blunt-nosed leopard lizard due to the dense growth of exotic grasses as discussed below (Germano *et al.* 2001; Germano *et al.* 2005).

Long-term studies of blunt-nosed leopard lizard population trends on the Elkhorn Plain and Pixley NWR have shown dramatic declines in numbers following consecutive wet years (Germano *et al.* 2004; Germano and Williams 2005; Williams *in litt.* 2006). On Elkhorn Plain, the decline in blunt-nosed leopard lizard numbers was shown to occur with consecutive years of dense herbaceous cover above 0.65 ounces/ft^2 in the 1990s (Germano *et al.* 2004). Annual grazing studies in the Lokern area from 1997 to 2005 have demonstrated the benefits of livestock grazing in reducing exotic grasses and increasing blunt-nosed leopard lizard numbers (Germano *et al.* 2005). Therefore, recent decisions to severely restrict or eliminate livestock grazing from conservation lands may negatively affect blunt-nosed leopard lizards, especially during wet years (Germano *et al.* 2001). The BLM offices in Hollister and Bakersfield, California, are currently updating their Resource Management Plans (RMP) with respect to grazing in the Ciervo-Panoche areas and the Carrizo Plain National Monument, respectively. Grazing on the Carrizo Plain National Monument is particularly controversial.

Prescribed fire has been analyzed as an alternative habitat management tool, but in an unpublished study, it was less effective than grazing at controlling exotic grasses, and the positive effects lasted for less than one year (L. Saslaw *in litt.* 2006). Additionally, a prescribed burn had the unintended negative consequence of permanently removing native saltbush (Germano *et al.* 2001; Warrick 2006).

The preponderance of exotic grasses in blunt-nosed leopard lizard habitat in the San Joaquin Valley may be partly attributed to elevated levels of atmospheric nitrogen (N) deposition in ecosystems that are naturally N-limited. Weiss (1999) found that dry N deposition from smog in the San Francisco Bay Area has enabled the invasion of exotic annual grasses into native grasslands on nutrient-poor, serpentitic soils resulting in the loss of habitat for the federally threatened bay checkerspot butterfly (*Euphydras editha bayensis*). Other researchers found that increased levels of soil N from elevated atmospheric N deposition in the Mojave Desert could increase the dominance of exotic annual grasses and thereby raise the frequency of fire (Brooks 1999, 2003; Brooks and Pyke 2001).

Of the protected areas with management plans (see Table 1), grazing is employed as a management technique to reduce exotic weed infestations in the following areas:

- All of Pixley NWR, except about 1,000 acres, is managed for blunt-nosed leopard lizard by grazing from November through April each year (Williams *in litt.* 2006);
- The entire Wind Wolves Preserve site is currently grazed by livestock (D. Clendenen, Wildlands Conservancy, pers. comm. 2006);
- The portion of the Semitropic Ridge Preserve administered by the CNLM is grazed by sheep (Warrick *in litt.* 2006), while none of the CDFG administered lands currently have any grazing leases;
- The 1,369 acre Research Natural Area of Kern NWR is managed by winter grazing for blunt-nosed leopard lizard and Tipton kangaroo rat;
- Less than one-fourth of the KWB Conservation Lands are currently grazed by sheep to control exotic grasses that threaten blunt-nosed leopard lizard habitat (KWB Authority 2006).

<u>Vehicle strikes</u>
Blunt-nosed leopard lizard mortality is known to occur as a result of regular automobile traffic and ORV use (Tollestrup 1979b; Uptain *et al.* 1985; Williams and Tordoff 1988). Roads typically surround and often bisect remaining fragments of habitat, increasing the risk of mortality by vehicles and further isolating populations (Service 1998). The blunt-nosed leopard lizard's preference for open areas, such as roads (Warrick *et al.* 1998), makes them especially vulnerable to mortality from vehicle strikes. On May 22, 2005, a blunt-nosed leopard lizard was

reported killed by a vehicle strike on an access road in the Devils Den Oilfield of northwestern Kern County; the road is used by oilfield personnel and ranchers (Booher *in litt.* 2005). On July 19, 2006, a blunt-nosed leopard lizard was reported killed by a vehicle strike on an access road at the Carneros Devils Den area in Kern County, and also at the Kettleman Hills Middle Dome site in Kings County (Garcia *in litt.* 2006; BLM 2008).

During habitat conversion activities, individuals could be killed or injured by operation of heavy equipment (crushing, burial by earthmoving equipment, discing, grading, mowing) or flooding of habitat. Individuals could be harassed during construction by noise, ground vibrations and compaction of burrows, construction lighting, and disruption of foraging and breeding behavior. Individuals not killed directly by operation of equipment would probably find themselves in suboptimal habitat with a decreased carrying capacity due to lower availability of foraging and breeding habitat and greater vulnerability to predation. If individuals were displaced from converted lands into nearby native habitat population densities, intraspecific competition, and predation pressure would be likely to increase. Animals which lost their fear of humans could become more vulnerable to shooting, poisoning, and roadkill.

<u>Waterfowl blinds</u>
Waterfowl blinds are large drums dug part way into the ground and placed at the edges of playas to conceal hunters. When left uncovered, these structures are pitfall traps for blunt-nosed leopard lizards and other reptiles and small mammals resulting in their mortality. In 1991, six blunt-nosed leopard lizards were retrieved from waterfowl blinds around two playas at the Semitropic Ridge Preserve. In 1994, 10 blunt-nosed leopard lizards and 17 Tipton kangaroo rats were found dead in waterfowl blinds (Germano 1995). This author also recommended that hunting clubs should be informed of this problem and active waterfowl blinds should be covered when not in use; abandoned blinds should be removed or filled in. At this time, however, waterfowl blinds are only being retrofitted with covers, or removed on a case by case basis.

<u>Pesticides Use</u>
Pesticide use may directly and indirectly affect blunt-nosed leopard lizards (Jones and Stokes 1977; California Department of Food and Agriculture (CDFA) 1984; Service 1985; Williams and Tordoff 1988; Germano and Williams 1992b). The use of pesticides reduces food available for reproducing blunt-nosed leopard lizards in the spring, and later for hatchlings when they should be storing fat to sustain themselves during their first winter (Kato and O'Farrell 1986). The most expansive pesticide program within the range of the blunt-nosed leopard lizard is the broad-scale use of malathion. Malathion is a pesticide regulated by the California Department of Food and Agriculture, and is typically aerially distributed across much of the blunt-nosed leopard lizard range to reduce impacts of the curly top virus on sugar beet production. The most important effect of malathion upon blunt-nosed leopard lizard survival and recovery is the associated reduction in insect prey populations which can last between 2 to 5 days (CDFA 1984).

In a 2000 biological opinion, the Service authorized the renewal of a five-year pesticide use permit to CDFA for use of malathion which included measures to protect the blunt-nosed leopard lizard (Service 2000). These measures allow the aerial application of malathion in some blunt-nosed leopard lizard conservation areas prior to April 15 and after October 15; thus, avoiding the primary blunt-nosed leopard lizard activity period. Notably, in 2006 CDFA treated 53,965 acres with malathion in Kern, Kings, and Fresno Counties (CDFA 2006). The CDFA pesticide use permit for malathion is currently being revised through formal consultation with the Service. Other unregulated pesticides (e.g., common household pyrethroids [California Department of Pesticide Regulation 2006; Keith 2006]) likely pose additional threats to blunt-nosed leopard lizards by reducing insect prey populations. One recent study on the effects of malathion on insect abundance showed a significant decline in the number of ants in malathion-treated plots relative to control plots (Redak 2006); ants are a likely food source for blunt-nosed leopard lizards. Germano *et al.* (2007) reported that the effects of spraying malathion within blunt-nosed leopard lizard habitat remained largely speculative, but warrant expeditious research.

Fumigating rodents in burrows may also harm blunt-nosed leopard lizards that shelter in those burrows (Hansen *et al.* 1994). The U.S. Environmental Protection Agency (USEPA) bulletins governing use of rodenticides have greatly reduced the risk of significant mortality to blunt-nosed leopard lizard populations. The California EPA, CDFA, county agricultural departments, CDFG, and the USEPA collaborated with the Service in the development of County Bulletins that both are efficacious and acceptable to land owners (Service 1998). However, the use of rodenticides in blunt-nosed leopard lizard habitat continues to be a potential threat to the species as this effectively reduces the number of rodents available to dig burrows for secondary use by blunt-nosed leopard lizards.

<u>Climate change</u>
Long-term monitoring studies (Germano *et al.* 1994; Germano *et al.* 2004; Germano and Williams 2005; Williams *in litt.* 2006) show that blunt-nosed leopard lizard populations drastically decline during consecutive years of drought or above average precipitation. Also, blunt-nosed leopard lizard aboveground activity is highly dependent upon temperature. Optimal activity occurs when air temperatures are 74 to 104 degrees Fahrenheit and ground temperatures are 72 to 97 degrees Fahrenheit (Service 1985, 1998). Therefore, blunt-nosed leopard lizard population stability and behavior is very sensitive to any changes in precipitation or temperature. Climate models predict for California an overall warming of 3.0 to 10.4 degrees Fahrenheit by 2100 (Cayan *et al.* 2006) but vary in their predictions for precipitation. VanRheenen *et al.* (2004), however, predicts a decrease in precipitation in the southern San Joaquin. Any significant changes in temperature or precipitation could have drastic effects on blunt-nosed leopard lizard populations. Climate change will likely result in changes in the vegetative communities of blunt-nosed leopard lizard habitat and potentially increase exotic species. However, there is insufficient data available at this time to predict the effects of climate change on the blunt-nosed leopard lizard.

Summary of Factor E
In summary the following threats, since the time of listing the following additional threats to the blunt-nosed leopard lizard have been identified: altered vegetation; climate change; broad-scale pesticide use and application; and, vehicle (roadway traffic and ORV) induced mortality. In addition, altered vegetation communities (grazing, exotic grasses, and wildfire regime), vehicle strikes, waterfowl blinds, broad-scale pesticide application, and climate change continue to impact blunt-nosed leopard lizard populations. These on-going threats pose additional challenges to successful blunt-nosed leopard lizard recovery.

II.D. Synthesis

At the time the species was listed, conversion of natural habitat into agricultural lands in the San Joaquin Valley resulted in the reduction of blunt-nosed leopard lizard habitat to less than 15 percent of its historic range (Service 1985; Germano and Williams 1992a; Jennings 1995). Remaining habitat is highly fragmented and confined to a few scattered areas from southern Merced County to western Kern County (Hansen *et al.* 1994). The blunt-nosed leopard lizard continues to be threatened by degradation to its habitat from the on-going modification and conversion of existing habitat to agriculture, petroleum and mineral extraction, residential and commercial development. In addition, altered vegetation communities (due to grazing, nonnative grasses, and altered wildfire regime), vehicle strikes, waterfowl blinds, broad-scale pesticide application, rodenticide application, and climate change continue to impact blunt-nosed leopard lizard populations. Research has reported that collective habitat loss has caused the reduction and fragmentation of populations and decline of blunt-nosed leopard lizard (Stebbins 1954; Montanucci 1965; Service 1980, 1985; Germano and Williams 1993).

Although some progress in recovery of the species has been made within the southern range of blunt-nosed leopard lizard, the majority of the recovery criteria outlined in the Recovery Plan have not been achieved (see Table 1). The downlisting criteria for the blunt-nosed leopard lizard require the protection of at least 5,997 acres of contiguous habitat in five specified recovery areas representing the geographic range of the species (three in the foothills and two on the Valley floor). Also required for each protected area is the stability of the population (greater than 2 blunt-nosed leopard lizards per hectare through a precipitation cycle) and the approval and implementation of a management plan that includes the survival of blunt-nosed leopard lizard as an objective. Only in the Carrizo Plain Natural Area is the acreage requirement surpassed with the establishment of the Carrizo Plain National Monument; however, long-term population surveys show significant declines in the population during wet years. The 5,278 acre Semitropic Ridge Preserve approaches the acreage requirement for Valley floor habitat in Kern County, but blunt-nosed leopard lizard population densities there are too low. Blunt-nosed leopard lizard habitat is protected in smaller fragments in the foothills of western Kern County and the Ciervo-Panoche area; however, there are no preserves protecting blunt-nosed leopard lizard populations on the Valley floor in Merced or Madera Counties. Therefore, the downlisting criteria have not been met.

In summary, based on the lack of protection of sufficient habitat representing the geographic range of the species, the low density and instability of the populations, and the continuation of threats to the species, we conclude that the blunt-nosed leopard lizard continues to meet the definition of endangered, and is in danger of extinction throughout its known range.

III. RESULTS

III.A. Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (*Indicate reasons for delisting per 50 CFR 424.11):*
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X__ No change is needed

III.B. New Recovery Priority Number __N/A__

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

The five most important actions that should be taken within the next five years to facilitate the recovery of the blunt-nosed leopard lizard include:

1. Facilitate research on the effects of solar projects on blunt-nosed leopard lizard behavior and compatibility.
2. Establish corridors between existing natural areas in Kern and Tulare Counties (i.e., Buena Vista Valley, Elk Hills, Lokern Natural Area, Buttonwillow ER, Semitropic Ridge Preserve, Kern NWR, Allensworth ER, Pixley NWR) (Service 1998; Selmon *in litt.* 2006) to enhance the metapopulation recovery strategy.
3. Establish a preserve or conservation easement on the natural lands of Madera Ranch in western Madera County (Service 1998). Protect blunt-nosed leopard lizard habitat in the Panoche Valley and in dispersal corridors in western Fresno County—Panoche Creek and Silver Creek (Service 1998; Lowe *et al.* 2005), Anticline Ridge, the western rim of Pleasant Valley, Guijarral Hills, and the north end of the Kettleman Hills (Service 1998).
4. Include the flexibility to alter the dates and stocking rates of livestock within all RMP where blunt-nosed leopard lizards have potential to occur, including the Carrizo Plain National Monument RMP, Bakersfield RMP, Caliente RMP and Hollister RMP to adaptively manage annual plant production and prevent the dominance of exotic grasses in blunt-nosed leopard lizard habitat (Germano *et al.* 2001); grazing prescriptions should be tailored to suit the ecological needs specific to the area.
5. Coordinate with hunting clubs for blunt-nosed leopard lizard protection: active waterfowl blinds should be covered when not in use, and abandoned blinds should be removed or filled in to prevent entrapment of blunt-nosed leopard lizard and other wildlife (Germano 1995).

Other important actions that are important to facilitate blunt-nosed leopard lizard recovery include the following items.

Kern County--completion of HCPs and issuance of incidental take permits

- Complete the Kern County Valley Floor HCP
- Complete the Chevron Lokern HCP
- Complete the Oxy of Elk Hills HCP
- Encourage Crimson Resource Management to start an HCP or section 7 formal consultation to protect lands in Buena Vista Valley, NPR-2, and Buena Vista Hills

Habitat management

- Assist the Lokern Coordination Team in the development of the 44,000-acre Lokern Natural Area in western Kern County

Future research and monitoring

- Continue long-term monitoring of population trends on the Valley floor (e.g., Pixley NWR, Lokern Natural Area, Semitropic Ridge Preserve, Buttonwillow ER) and in the foothills (e.g., Carrizo Plain Natural Area , Elk Hills) (Germano and Williams 1992b; Service 1998)
- Census and monitor blunt-nosed leopard lizard populations in western Madera County, central Merced County, and the Ciervo-Panoche Natural Area (Service 1998)
- Study the effects of grazing on blunt-nosed leopard lizard along precipitation gradients in the Elkhorn and Carrizo Plains to determine appropriate grazing prescriptions specific for each area
- Facilitate research on the effects of CVPCP and CVPIA programs on blunt-nosed leopard lizard recovery. Study the effects of translocation (e.g., Allensworth ER) and agricultural land retirement (e.g., Tranquility and Atwell Island sites) on blunt-nosed leopard lizard (Service 1998; Germano and Williams 1992b; Selmon *in litt.* 2006)
- Assess potential effects of malathion upon the prey base of the blunt-nosed leopard lizard (Germano *et al.* 2007) and apply findings to the CDFA Curly Top Virus Control Program.

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Appendix A—Analysis of downlisting Criteria for Blunt-nosed Leopard Lizard 5-Year Review

Summary

The downlisting criteria for the blunt-nosed leopard lizard require the protection of five or more areas each about 5,997 acres or more of contiguous, occupied habitat, including one each in the following areas: the Valley floor in Merced or Madera Counties, the Valley floor in Tulare or Kern Counties, the foothills of the Ciervo-Panoche Natural Area, the foothills of western Kern County, and the foothills of the Carrizo Plain Natural Area (Figures 1 and 2). Only in the foothills of the Carrizo Plain Natural Area is the criterion achieved with the protection of 55,000 acres of blunt-nosed leopard lizard habitat by the Carrizo Plain National Monument. There are no preserves containing significant populations of blunt-nosed leopard lizard on the Valley floor in Merced or Madera Counties. Within the Valley floor in Tulare or Kern Counties, the Semitropic Ridge Preserve approaches the criterion by protecting 5,278 acres of contiguous blunt-nosed leopard lizard habitat. Pixley NWR protects 3,000 acres of contiguous habitat in Tulare County. The Lokern Natural Area protects over 13,000 acres in Kern County but in fragmented 10 – 640-acre parcels. Within the Ciervo-Panoche Natural Area, two ACECs separated by 2 miles protect 4,800 acres and 3,800 acres of contiguous blunt-nosed leopard lizard habitat, respectively. Within the foothills of western Kern County, the Oxy conservation lands protect 2,882 acres of contiguous habitat on the North Flank of Elk Hills and 3,770 acres in Buena Vista Valley. Therefore, the recovery criterion for protection of 5,997 acres of contiguous habitat is achieved in the foothills of the Carrizo Plain Natural Area , but not in the four other specified recovery areas.

The downlisting criteria also require that for each protected area a management plan is approved and implemented that includes the survival of blunt-nosed leopard lizard as an objective. The following areas have such management plans: Kern NWR; Pixley NWR; the CNLM lands at Semitropic Ridge Preserve; the CNLM, PXP, and BLM lands in the Lokern Natural Area; the Oxy conservation lands near Elk Hills; the BLM lands of the Carrizo Plain National Monument; the Coles Levee Ecosystem Preserve; and KWB Conservation Lands. Therefore, the downlisting criterion for the approval and implementation of a management plan in all protected areas is partly achieved.

Lastly, the downlisting criteria require population stability in the protected areas with the mean population density remaining above 2 per hectare through one precipitation cycle. Annual blunt-nosed leopard lizard surveys show that the population density decreased below 2 per hectare during the wet years in the late 1990s at Pixley NWR (Figure 3) while the density remains below 2 per hectare in the Lokern area, the Elk Hills, Coles Levee Ecosystem Preserve, and KWB Conservation Lands. Population density estimates at Semitropic Ridge Preserve were also well below 2 per hectare during spring road surveys in 2005. There is not sufficient data available at this time to determine whether the Ciervo-Panoche Natural Area or any of the other protected areas achieve the population stability criteria. Therefore, the downlisting criterion for population stability has not been achieved for any of the specified recovery areas.

Analysis of Recovery Criteria

1. *Protection of five or more areas, each about 2,428 hectares (5,997 acres) or more of contiguous, occupied habitat, as follows:*

Summary

The downlisting criterion for the protection of contiguous blunt-nosed leopard lizard habitat has been achieved in the following areas:

- Foothills of the Carrizo Plain Natural Area

Whereas currently the downlisting criterion for blunt-nosed leopard lizard habitat protection has yet to be met for the following areas:

- Valley floor in Merced or Madera Counties
- Valley floor in Tulare or Kern Counties
    - *Semitropic Ridge Preserve*
    - *Kern National Wildlife Refuge*
    - *Lokern Natural Area*
    - *Buttonwillow Ecological Reserve*
    - *Coles Levee Ecological Preserve (CLEP), Kern Water Bank (KWB) Conservation Lands, and the Tule Elk State Reserve*
    - *Pixley National Wildlife Refuge*
    - *Allensworth Ecological Reserve*
- Foothills of the Ciervo-Panoche Natural Area
- Foothills of western Kern County
    - *Elk Hills Conservation Area*
    - *Naval Petroleum Reserve #2*
    - *Wind Wolves Preserve*

Assessment

Valley floor in Merced or Madera Counties
There are no large preserves in Merced or Madera Counties containing significant populations of blunt-nosed leopard lizard. The preserves in western Merced County (e.g. Grasslands Ecological Area, roughly 179,000 acres) are seasonally flooded and do not support blunt-nosed leopard lizard (Juarez *in litt.* 2006). Therefore, the downlisting criterion for the protection of contiguous blunt-nosed leopard lizard habitat on the Valley floor in Merced or Madera Counties has not been met.

Valley floor in Tulare or Kern Counties
Several large preserves have been established on the Valley floor in Tulare and Kern Counties containing populations of blunt-nosed leopard lizard (Figure 2). These preserves include Semitropic Ridge Preserve, Kern National Wildlife Refuge (NWR), Lokern Natural Area, Buttonwillow Ecological Reserve (ER), Coles Levee Ecosystem Preserve, Kern Water Bank (KWB), Tule Elk State Reserve, Pixley NWR, and Allensworth ER.

Semitropic Ridge Preserve
The Semitropic Ridge Preserve currently protects about 5,278 acres—comprised of 3,093 acres administered by the Center for Natural Lands Management (CNLM), and 2,185 acres administered by CDFG—of contiguous blunt-nosed leopard lizard habitat on the Valley floor of northwestern Kern County (Cypher *in litt.* 2006, Kern County Recorder 2006, Warrick *in litt.* 2006). About 570 acres of CDFG land west of Goose Lake Canal was excluded from the calculation of contiguous lands at Semitropic Ridge because the canal acts as a barrier to blunt-nosed leopard lizard movement (Warrick *in litt.* 2006). Another 120-acre parcel is currently in escrow for the CDFG (Peterson-Diaz *in litt.* 2006), which when protected would bring the total acres of contiguous lands to 5,398 acres. Therefore, the Semitropic Ridge Preserve comes close to the 5,997-acre downlisting criterion; however, only about 1,500 acres of the preserve meet the criterion of maintaining a blunt-nosed leopard lizard population density of greater than 2 per hectare (Warrick *in litt.* 2006). Therefore, the downlisting criteria for the protection of 5,997 acres of contiguous blunt-nosed leopard lizard habitat on the Valley floor of Kern or Tulare Counties and population stability has not been met.

Kern National Wildlife Refuge
The Kern NWR is located in northwestern Kern County about 4 km (2.5 miles) north of the Semitropic Ridge Preserve. The majority of the Kern NWR is seasonally flooded and does not provide habitat for blunt-nosed leopard lizard. About 2,000 acres of Kern NWR are considered to be potential blunt-nosed leopard lizard habitat; however, there have been no confirmed sightings of blunt-nosed leopard lizard there since 1996 (Williams *in litt.* 2006). Surveys for blunt-nosed leopard lizard were conducted in the 1,369-acre Research Natural Area (Units 11 and 12) in 2001 and 2004, but none were found. In the summer of 2006, surveys were conducted in the recently acquired 631-acre Unit 15, which contains better quality blunt-nosed leopard lizard habitat than Units 11 and 12, but no blunt-nosed leopard lizard were observed there either. More intensive surveys are planned for 2007 (Williams *in litt.* 2006), though at the time of this review, results had not been obtained. Therefore, the downlisting criterion for the protection of 5,997 acres of contiguous blunt-nosed leopard lizard habitat on the Valley floor of Kern or Tulare Counties has not been met.

Lokern Natural Area
The Lokern Natural Area is located in western Kern County about 23 km (14.5 miles) south of the Semitropic Ridge Preserve. Currently, 13,160 acres of the Lokern area are protected on Federal or State lands or under conservation easements. The protected Lokern lands include Bureau of Land Management (BLM) lands (3,858 acres), Center for Natural Lands Management (CNLM) lands (3,332 acres), CDFG lands (968 acres), and Plains Exploration & Production Company (PXP; 840 acres) and Occidental of Elk Hills, Inc. (Oxy; 4,162 acres) conservation lands (Service 1995; Nuevo Energy Company and Torch Operating Company 1999; Kern County Recorder 2006; Quad Knopf 2006; G. Warrick, CNLM, pers. comm. 2006). The protected lands, however, are highly fragmented into parcels ranging in size from 10 to 640 acres creating a checkerboard pattern of protected lands. The largest block of contiguous protected lands in the Lokern

area is 2,882 acres of Oxy conservation lands (Elk Hills Conservation Area) at the southern end of the Lokern area on the North Flank of the Elk Hills. Therefore, the downlisting criterion for contiguous land protection the Valley floor of Kern or Tulare Counties has not been met.

Chevron USA, Inc. (Chevron), the largest landowner in the Lokern area (17,329 acres), owns the intervening 640-acre sections of the checkerboard pattern of protected lands in the Lokern Natural Area. The draft Chevron Lokern Habitat Conservation Plan (Chevron, *in prep.*, 2008) proposes to protect 11,143 acres in the Lokern area and limit permanent disturbance of its undeveloped Lokern lands to 10 percent per 640-acre section, and temporary disturbance to an additional 5 percent. In total approximately 24,303 acres of contiguous blunt-nosed leopard lizard habitat would be protected when added to the other already protected lands in the Lokern area. On August 17, 2006, Chevron reasserted its commitment to complete the proposed HCP and proceed with acquiring and/or protecting the proposed habitat lands (G. Scott, Chevron, pers. comm. 2006). Still, until the HCP is finalized the habitat loss and protection associated with the proposed HCP remains speculative.

Buttonwillow Ecological Reserve
The Buttonwillow ER is located in western Kern County about 21 km (13 miles) southeast of the Semitropic Ridge Preserve and 16 km (10 miles) east-northeast of the Lokern Natural Area. The Buttonwillow ER protects about 1,350 acres of contiguous blunt-nosed leopard lizard habitat. Buttonwillow ER contains one of the largest and most stable blunt-nosed leopard lizard populations (Selmon *in litt.* 2006). Due to the small size of the preserve, however, the Buttonwillow ER does not meet the downlisting criterion for contiguous land protection.

Coles Levee Ecological Preserve, Kern Water Bank Conservation Lands, and the Tule Elk State Reserve
The 6,059-acre Coles Levee Ecosystem Preserve (CLEP), 4,263-acre Kern Water Bank (KWB) Conservation Lands, and 969-acre Tule Elk State Reserve are contiguous protected areas in western Kern County located east of the Elk Hills. However, blunt-nosed leopard lizard movement among and within the three preserves is limited by the California Aqueduct, Alejandro Canal, Interstate 5, Highway 43, and Highway 119.

The California Aqueduct bisects the CLEP creating a barrier to blunt-nosed leopard lizard movement and partitioning the preserve into about 1,280 acres to the west and 4,779 acres to the east. Additionally, portions of the CLEP are highly disturbed by high-density oil and gas drilling activities. Although the permit for CLEP HCP (ARCO Western Energy 1995) is not currently valid—as the current land owner, Aera Energy LLC, failed to initially comply with the terms of the HCP—the area is still managed according to its initial conservatory intent. Notably, no blunt-nosed leopard lizards have been observed at CLEP in recent years (Quad Knopf 2005; J. Jones, Quad Knopf, pers. comm. 2006).

Interstate 5 acts as a barrier to blunt-nosed leopard lizard movement and divides the KWB Conservation Lands into 2,589-acre and 1,674-acre parcels (Jones *in litt.* 2006).

The KWB Conservation Lands are protected under the KWB Authority HCP (KWB Authority 1996) and associated biological opinion (Service 1997). However, there are no records of blunt-nosed leopard lizard on the KWB Conservation Lands except for blunt-nosed leopard lizard introductions (Jones *in litt.* 2006, KWB Authority 2006). Although protocol-level blunt-nosed leopard lizard surveys have not been conducted on the KWB lands, these lands have had numerous other reconnaissance and meandering surveys over the years. Given the repetitive negative results from all of these surveys, the blunt-nosed leopard lizard is considered absent from the area (Jones *in litt.* 2006).

Therefore, due to the lack of blunt-nosed leopard lizard sightings and the barriers to blunt-nosed leopard lizard movement among and within the three preserves—Coles Levee Ecological Reserve, Kern Water Bank Conservation Lands, and Tule Elk State Reserve—the downlisting criterion for the Valley floor of Kern or Tulare Counties.

Pixley National Wildlife Refuge

The 6,833-acre Pixley NWR in southwestern Tulare County is divided into three large sections and several smaller sections; all parcels, with one exception, are separated by at least 1.6 km (1 mile). The largest section (Pixley-Main) covers 4,445 acres, but less than 3,000 acres are considered suitable habitat for blunt-nosed leopard lizard due to seasonal flooding of the wetlands and dense vegetative growth. The second largest section (Los Feliz) is roughly 1,476 acres. Very little reconnaissance has been done in this area, however given that the entire area is grazed it is speculatively considered potential blunt-nosed leopard lizard habitat as suitable vegetation conditions may be present. The third largest section (Horse Pasture) contains 800 acres of potential blunt-nosed leopard lizard habitat although the presence of blunt-nosed leopard lizard has not been documented (Williams *in litt.* 2006). In summary, the largest contiguous block of blunt-nosed leopard lizard habitat at Pixley NWR is 3,000 acres; thus, this downlisting criterion has not been met.

Allensworth Ecological Reserve

The Allensworth ER is owned by CDFG and located in southwestern Tulare County. This ER contains four large blocks of land containing suitable habitat for the species. However, the blocks are separated from each other and do not form contiguous habitat as required by this downlisting criterion. The largest block totals 2,482 acres and is not large enough by itself to meet the recovery goal of 5,997 acres of contiguous blunt-nosed leopard lizard habitat. In addition, the blunt-nosed leopard lizard population at Allensworth Ecological Reserve has been declining over the past 15 years (Selmon, pers. comm. 2006). Therefore, this recovery criterion has not been met for the Valley floor of Kern or Tulare Counties.

The sizes of the blocks are 2,482 acres, 1,432 acres, 551 acres, and 536 acres. The largest block is located about 3 km (1.9 miles) southeast of the Pixley-Main section of the Pixley NWR. The second largest and southernmost block is located about 5 km (3.1 miles) southwest of the largest block and about 18 km (11.2 miles) northeast of Kern NWR. Habitat planning goals include connecting the blocks of natural lands at Allensworth ER with Pixley NWR through land acquisition and retirement of agricultural fields; however, Deer Creek acts a barrier to blunt-nosed leopard lizard movement along the southern boundary of Pixley-Main (P. Williams, Kern NWR Complex, pers. comm. 2006). The number of blunt-nosed leopard lizards at Allensworth ER has also declined over the past 15 years (Selmon *in litt.* 2006). In summary, the largest block at Allensworth ER is 2,482 acres and is not sufficient to meet this downlisting criterion for the Valley floor of Kern or Tulare Counties.

Foothills of the Ciervo-Panoche Natural Area

The BLM owns about 34,000 acres in the Ciervo-Panoche Natural Area that are considered to be blunt-nosed leopard lizard habitat (Lowe 2006). However, only the Areas of Critical Environmental Concern (ACECs) have regulatory protection under the Federal Land Policy and Management Act of 1976. The BLM allows oil and gas leasing with limited surface use stipulations for threatened and endangered species on the four ACECs (BLM 1984, 1997) and thus confer some protection to approximately 16,600 acres of blunt-nosed leopard lizard habitat (Terry 2006).

Some of the best blunt-nosed leopard lizard habitat in the region, however, remains unprotected on private lands in the Panoche Valley and near Silver Creek. Only 3 of the 21 (14 percent) reported occurrences of blunt-nosed leopard lizard are within an ACEC (CNDDB 2006; Lowe *in litt.* 2006). Much of the rest of the Ciervo-Panoche Natural Area is not suitable habitat for blunt-nosed leopard lizard due to dense vegetative cover and clay soils (Lowe *in litt.* 2006; L. Saslaw, pers. comm. 2006). Since the largest protected block of blunt-nosed leopard lizard habitat is 4,800 acres, it does not meet this downlisting criterion for the foothills of the Ciervo-Panoche Natural Area.

Foothills of western Kern County

The foothills of western Kern County contain blunt-nosed leopard lizard habitat on both public and private lands. Protected areas and other public lands containing blunt-nosed leopard lizard habitat occur in the Elk Hills, Naval Petroleum Reserve #2 (NPR-2), and the Wind Wolves Preserve.

Elk Hills Conservation Area

The Oxy conservation lands (Elk Hills Conservation Area) consist of 4,162 acres on the North Flank of the Elk Hills near Lokern and another 3,770 acres in the Buena Vista Valley (Buena Vista Valley) along the southern edge of the Elk Hills. Within the North Flank, only 2,882 acres (mentioned above in the Lokern Natural Area) are contiguous. All 3,770 acres of the Oxy conservation lands in the Buena Vista Valley area are contiguous (Quad Knopf 2006) but are not sufficient to meet this downlisting requirement.

Currently, Oxy has proposed an Oxy Elk Hills HCP (Live Oak & Associates, Inc., *in litt.* 2009) that would permit an additional permanent disturbance of up to 4,000 acres and temporary disturbance of up to 3,000 acres within Elk Hills for oil and gas development. The HCP proposes to preserve 81.8 percent (roughly 38,780 acres) of the 47,409-acre Elk Hills NPR-1 (Live Oak & Associates, Inc., *in litt.* 2009). Until the HCP is finalized and the Service issues the incidental take permit, habitat loss and protection associated with the proposed HCP is speculative.

Naval Petroleum Reserve #2
The BLM owns approximately 9,000 acres in NPR-2 and Buena Vista Valley, mostly in a checkerboard of 640-acre parcels. In 2003 the Service programmatic biological opinion (#1-1-01-F-0063) which covered oil and gas extraction activities on BLM lands was amended to include NPR-2 (Service 2003). However, even though the limits disturbance of high quality habitat (Red Zone Lands) to less than 10 percent per 640-acre section and lower quality habitat (Green Zone Lands) to less than 25 percent (Service 2001), residual habitat on BLM lands has been degraded by past oil and gas exploration activities. Unfortunately, several sections within NPR-2 had already exceeded the disturbance thresholds when the BLM acquired the properties. The biological opinion also limits total permanent disturbance of blunt-nosed leopard lizard habitat on BLM lands throughout Kings and Kern Counties to 180 acres (Service 2001, 2003). Since the BLM lands at NPR-2 are highly fragmented they do not meet the downlisting criterion for the foothills of western Kern County.

Wind Wolves Preserve
About 2,000 acres of potential blunt-nosed leopard lizard habitat is protected on the edge of the large Wind Wolves Preserve. Wildlands Conservancy, a non-profit group, purchased this southwestern Kern County site in 2001. In the early 1990s a blunt-nosed leopard lizard sighting was reported in the Preserve at Rincon Flat near Interstate 5 (CNDDB 2006). However, no blunt-nosed leopard lizards have been observed on the Preserve since that initial report. The 2,000 acres of potential blunt-nosed leopard lizard habitat do not meet the downlisting criterion for the foothills of western Kern County.

Foothills of the Carrizo Plain Natural Area
The 250,000-acre BLM Carrizo Plain National Monument and adjacent CDFG Ecological Reserve protect blunt-nosed leopard lizard populations on the Carrizo Plain Natural Area (about 55,000 acres) and roughly 1,000 acres of the Upper Cuyama Valley (Saslaw *in litt.* 2006). These lands meet the downlisting criterion for the protection of 5,997 acres of contiguous blunt-nosed leopard lizard habitat in the foothills of the Carrizo Plain Natural Area.

2. *A management plan has been approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective.*

Summary

The downlisting criterion for an approved and implemented management plan that includes the continued survival of blunt-nosed leopard lizard as an objective has been met for the following protected areas:

- CNLM lands of the Semitropic Ridge Preserve

- CNLM, PXP, and BLM lands of the Lokern Natural Area
- Oxy lands of the Elk Hills Conservation Area
- Kern and Pixley NWRs
- BLM Hollister RMP
- BLM, TNC, and CDFG lands of the Carrizo Plain National Monument

All other protected areas, including CDFG lands of the Semitropic Ridge, California State Parks Tule Elk State Reserve, Buttonwillow Ecological Reserve Allensworth Ecological Reserve, and Wind Wolves Preserve have not currently been drafted, or do not include the continued survival of the blunt-nosed leopard lizard as an objective. A joint-management plan for the Carrizo Plain Natural Area—Carrizo Plain National Monument (BLM), the Carrizo Plain ER (CDFG), and lands administered by the Nature Conservancy (TNC)—and, the Caliente RMP are also currently being revised. Therefore, the downlisting criterion is only partly met.

Assessment

The CNLM lands of the Semitropic Ridge Preserve and Lokern Natural Area have an approved management plan with a management goal to "prevent the extinction of threatened and endangered species through maintenance of high quality native habitat which supports viable, self-sustaining populations" (Warrick *in litt.* 2006). The Semitropic Ridge Preserve is grazed by sheep to control exotic grasses but the grazing is not very effective during unusually wet years (Warrick *in litt.* 2006). None of the CDFG lands currently have an approved management plan (E. Cypher, pers. comm. 2006; S. Juarez, CDFG, pers. comm. 2006). CDFG does not have any grazing leases for its lands at Semitropic Ridge but would like to at some point (Warrick *in litt.* 2006). Therefore, the criterion has been met for the CNLM lands at Semitropic Ridge and Lokern but not for the CDFG lands.

The Kern NWR and Pixley NWR both have management plans that include the survival of blunt-nosed leopard lizard as an objective. The 1,369-acre Research Natural Area of Kern NWR is managed by winter grazing for blunt-nosed leopard lizard and Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*). Approximately 2,890 acres of Pixley-Main has been designated as endangered species habitat. All of Pixley NWR, except about 1,000 acres, is managed for blunt-nosed leopard lizard by grazing from November through April each year (Williams *in litt.* 2006). Therefore, this criterion has been met for the Kern and Pixley NWRs.

The Caliente Resource Management Plan (RMP) (BLM 1997) covers all BLM lands under the jurisdiction of the Bakersfield field office, but not the more recently acquired NPR-2 lands. The management plan includes the survival of listed species including blunt-nosed leopard lizard as an objective. The BLM is currently revising its Caliente RMP. The new RMP will include NPR-2 and will also provide measures for the protection of the blunt-nosed leopard lizard (L. Saslaw, BLM, pers. comm. 2006). Therefore, the downlisting criterion has been met for the BLM lands under the jurisdiction of the Bakersfield office, except for NPR-2.

The Carrizo Plain Natural Area Management Plan (BLM 1996) established the cooperative management of the 250,000 acres within the Carrizo Plain Natural Area, comprised of: the Carrizo Plain National Monument (BLM), the Carrizo Plain ER (CDFG), and lands administered

TNC. This joint-management plan includes measures for the protection of blunt-nosed leopard lizard. The BLM is currently preparing the Carrizo Plain National Monument RMP that will specifically address management of the Carrizo Plain National Monument (L. Saslaw, pers. comm. 2006). The draft RMP and Environmental Impact Statement (EIS) are currently in preparation, and are expected to be available for public review in fall 2009. Concurrently CDFG is revising its management plan for the protection of blunt-nosed leopard lizard within the Carrizo Plain ER (Stafford *in litt.* 2007). Based on the approval and implementation of the pending revision for the joint-management plans of the Carrizo Plain Natural Area, the downlisting criterion has been met for the BLM, CDFG, and TNC lands of the Carrizo Plain National Monument.

Service biological opinion (file number 1-8-07-F-19) for the revised Hollister RMP was issued in June 2007 (Service 2007), and the RMP was finalized on September 7, 2007. This plan established resource management goals for areas where blunt-nosed lizard habitat was known or had potential to occur, including: the Panoche Hills management unit has approximately 7,800 acres of habitat for sensitive species in the plateau area; and, the Griswold/Tumey Hills management unit includes 2,500 acres of habitat areas for sensitive species in the plateau area in the northern Tumey Hills. Blunt-nosed leopard lizards have been observed on private lands adjacent to the Tumey Hills management unit in the eastern Panoche valley. Lastly, the Coalinga management unit has 14,660 acres designated for sensitive species, including the blunt-nosed leopard lizard. Given BLM's commitment to implement the resource management goals, the biological opinion permitted BLM to take blunt-nosed leopard lizards or impact its habitat by conducting its grazing management, energy and minerals program, vegetation management program, and transportation program. The Hollister RMP therefore achieves this downlisting criterion.

Oxy is currently managing its 7,801 acres of conservation lands (Elk Hills Conservation Area) in Lokern and the Buena Vista Valley for the survival of blunt-nosed leopard lizard and other listed species in accordance with the Elk Hills biological opinion (Service 1995) and the 1998 Conservation Management Agreement. Also within the Elk Hills area, Berry Petroleum was authorized under the North Midway Sunset biological opinion (Service 2006) to develop a management plan that includes the survival of blunt-nosed leopard lizard as an objective for its 1,725 acres of conservation lands in Lokern, Buena Vista Valley, and Midway Valley. Therefore, the downlisting criterion has been met for the Elk Hills Conservation Area, but not yet for the Berry Petroleum lands.

The PXP, Coles Levee, and KWB Authority HCPs contain management plans which include the survival of blunt-nosed leopard lizard as an objective in the Lokern Natural Area, Coles Levee Ecosystem Preserve, and KWB Conservation Lands, respectively (ARCO Western Energy 1995; KWB Authority 1996; Nuevo Energy Company and Torch Operating Company 1999). Less than one-fourth of the KWB Conservation Lands, however, are currently grazed by sheep to control exotic grasses that threaten blunt-nosed leopard lizard habitat (KWB Authority 2006). Chevron and Oxy are currently preparing HCPs for their lands in the Lokern area and Elk Hills, respectively; however, it is unknown when the HCPs will be finalized and approved. Additionally, no management plans have been implemented for blunt-nosed leopard lizard habitat on private lands in the Ciervo-Panoche Natural Area and in western Kern County.

Therefore, the criterion for the approval and implementation of a management plan that includes the survival of blunt-nosed leopard lizard as an objective has been met for the PXP conservation lands in Lokern but not for the Chevron or Oxy lands (outside of the Elk Hills Conservation Area).

In the Lokern area, an interagency cooperative acquisition and management plan for the conservation of the 44,000-acre Lokern Natural Area is in draft form. Participants include Federal agencies (BLM, Service), State agencies (CDFG, California Energy Commission, California State University Bakersfield), private environmental groups and biological consulting firms (The Nature Conservancy [TNC], CNLM, ESRP, McCormick Biological, Inc.), and private oil companies (Chevron; Oxy; Aera Energy, LLC [Aera]; PXP) (Service 1998). The parties periodically meet to coordinate their efforts, but there is no estimate for when the Lokern Natural Area management plan will be approved and implemented. Therefore outside of the CNLM and PXP conservation lands, the recovery criterion has not been met for the Lokern Natural Area.

In summary, only the CNLM lands of the Semitropic Ridge Preserve, the CNLM, PXP, and BLM lands of the Lokern Natural Area, the Oxy lands of the Elk Hills Conservation Area, the Kern and Pixley NWRs, and the BLM, TNC, and CDFG lands of the Carrizo Plain National Monument have a management plan for blunt-nosed leopard lizard that has been approved and implemented. The management plans for the Carrizo Plain National Monument and the Ciervo-Panoche Natural Area are currently being revised by the BLM. Therefore, the downlisting criterion is only partly met.

3. *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards per hectare (1 per acre) through one precipitation cycle*.

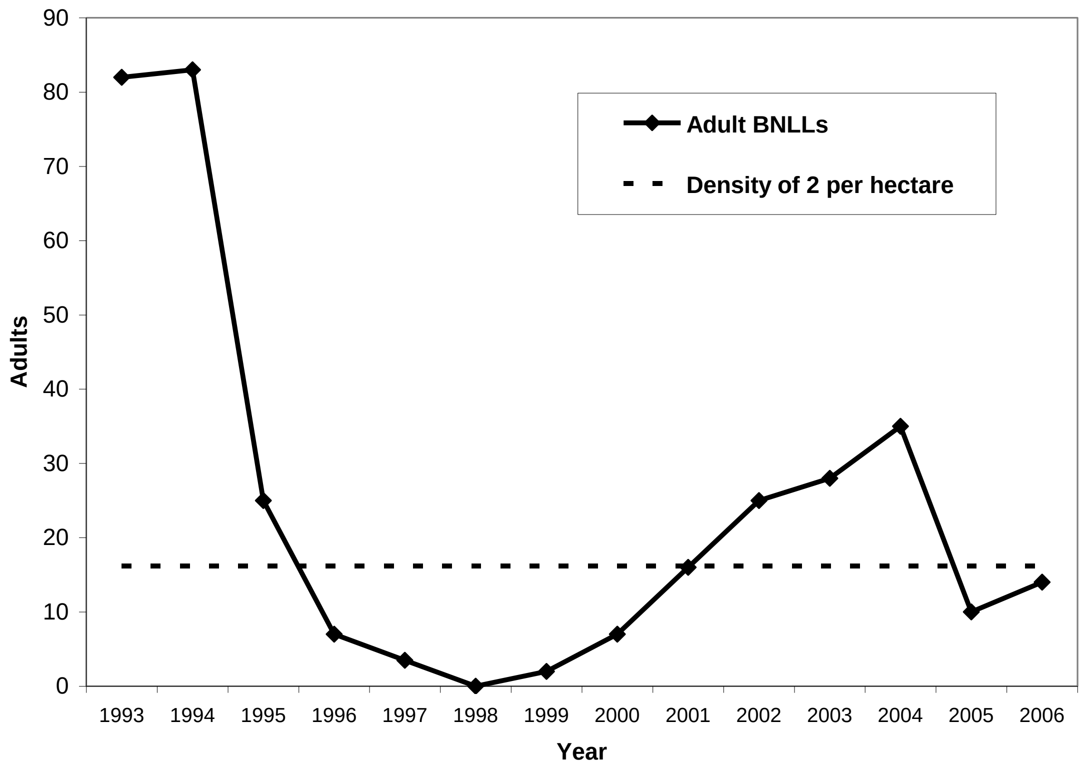
Long-term population studies have monitored the population trends in blunt-nosed leopard lizard at Elkhorn Plain (Germano *et al.* 2004, Germano and Williams 2005), Semitropic Ridge (Warrick 2006), Lokern (Germano *et al.* 2005, Warrick 2006), Elk Hills (Quad Knopf 2006), Pixley NWR (ESRP, Williams *in litt.* 2006), Buttonwillow ER, and Allensworth ER (Selmon *in litt.* 2006), and Coles Levee Ecosystem Preserve (Quad Knopf 2005). However, long-term population studies have not been conducted for blunt-nosed leopard lizard in the Cuyama Valley, the Ciervo-Panoche area, Merced County, or Madera County, the status of these populations is unknown (Stafford *in litt.* 2006).

Pixley NWR

Figure 3 illustrates the population instability of blunt-nosed leopard lizard at Pixley NWR. Spring surveys of adult blunt-nosed leopard lizards from 1993 to 2006 show that the density was below 2 per hectare from 1996 to 2000 during years of above average precipitation. No blunt-nosed leopard lizards were found during surveys in 1998 due to flooding. Blunt-nosed leopard lizard numbers increased from 2001 to 2004 during years of below average precipitation but declined again below 2 per hectare during the wet years 2005 to 2006. Previous short-term studies observed blunt-nosed leopard lizard population densities at Pixley NWR of 0.3 to 10.8 per hectare (Uptain *et al.* 1985), 3.3 per hectare (Tollestrup 1979), and 6.7 to 7.0 per hectare (Williams and Germano 1991). In summary, due to the decline in blunt-nosed leopard lizard numbers during wet years, this downlisting criterion has not been met at Pixley NWR.

Elkhorn Plain
ESRP has monitored population trends of blunt-nosed leopard lizards on the Elkhorn Plain biannually since 1989 (Williams *et al.* 1993; Germano *et al.* 2004; Germano and Williams 2005). From 1989 to 1994, the population density ranged from 4.9 to 20.2 adults per hectare, except for 1990 when the density decreased to 1.7 adults per hectare following two years of severe drought. Then, after several years of above average precipitation, the population density of blunt-nosed leopard lizard decreased in 1995 and remained between 1.7 to 4.9 adults per hectare through 2003. The density remained below 1.8 adults per hectare during the wettest years from 1998 to 2000. Therefore, due to the decline in blunt-nosed leopard lizard numbers during consecutive wet years or years of severe drought, this downlisting criterion has not been met on the Elkhorn Plain.

Figure 3, The number of adult blunt-nosed leopard lizards observed during spring surveys on the Deer Creek West 20-acre plot, Pixley National Wildlife Refuge, Tulare County (Source: ESRP, Williams *in litt.* 2006)



Kern County Valley floor
The largest and most stable population of blunt-nosed leopard lizard is thought to be at Semitropic Ridge Preserve. However, the number of all lizards at Semitropic Ridge Preserve has been decreasing since 2003 (Selmon *in litt.* 2006). At Semitropic Ridge Preserve, road surveys during May and June, 2005, found an average of 6 blunt-nosed leopard lizards per 32-km (20-mile) survey (Warrick 2006), which is far below the criterion for 2 blunt-nosed leopard lizards per hectare. Road surveys, however, are likely overestimates of blunt-nosed leopard lizard population density in an area because of the preference of the species for roads (Warrick *et al.* 1998; Warrick *in litt.* 2006). Additionally, the land manager at Semitropic Ridge Preserve stated that only about 1,500 acres of the preserve comes close to supporting a population density of 2 blunt-nosed leopard lizards per hectare (Warrick *in litt.* 2006). Therefore, the downlisting criterion has not been met at the Semitropic Ridge Preserve. No population density estimates are available at this time for Buttonwillow ER. Blunt-nosed leopard lizard numbers at Allensworth ER are reported to have declined over the past 15 years (Selmon *in litt.* 2006), but no data are available at this time.

At Lokern, road surveys in May and June, 2005, observed an average of 32.7 blunt-nosed leopard lizards per 82-km (51-mile) survey (Warrick 2006). Therefore, the population density estimate—ranging from 0.40 to 1.33 blunt-nosed leopard lizards per hectare—is well below the recovery criterion (Warrick *in litt.* 2006). Additionally, grazed and ungrazed plots on the Lokern were surveyed annually between 1997 to 2005, using a 10-day census survey method. These results indicated that the density of blunt-nosed leopard lizards on ungrazed plots remained less than 0.5 per hectare (notably according to Germano *et al.* (2005) no blunt-nosed leopard lizards were observed during 2000 – 2003); and, densities on grazed plots ranged from 0.06 – 0.25 per hectare during 1997 to 2001, and increased to 0.46 – 1.50 per hectare during 2002 to 2005 (Germano *et al.* 2005). Nonetheless, the downlisting criterion has not been met at Lokern.

At Coles Levee Ecosystem Preserve, blunt-nosed leopard lizard surveys have been conducted annually from 1996 to 2004 (Quad Knopf 2005). Only 10 blunt-nosed leopard lizards were observed during the surveys and no blunt-nosed leopard lizards have been observed in the last three years (Quad Knopf 2005). However, incidental observations of blunt-nosed leopard lizards are occasionally made during other monitoring activities (Quad Knopf 2005). Therefore, the downlisting criterion has not been met at Coles Levee Ecosystem Preserve.

At the KWB Conservation Lands, no protocol-level surveys for blunt-nosed leopard lizards have been conducted and the species has not been observed on numerous reconnaissance and meandering surveys over the years. Thus, the population density is most likely well below 2 blunt-nosed leopard lizards per hectare (Jones *in litt.* 2006; Warrick *in litt.* 2006). Therefore, the downlisting criterion has not been met at the KWB Conservation Lands.

Elk Hills Conservation Area
At a site near the Elk Hills Conservation Area, blunt-nosed leopard lizard population density was previously estimated at 0.40 adults per hectare (Kato *et al.* 1987). More recently, blunt-nosed leopard lizard population trends have been monitored in spring and early fall by means of road and foot surveys from 2001 to 2005 in the North Flank and Buena Vista Valley lands of the Elk Hills Conservation Area (Quad Knopf 2006). Population density estimates from 2000 - 2005—

calculated from the average sightings per mile of road survey (with a width of 50 meters)—remained below 0.02 blunt-nosed leopard lizards per hectare in both the North Flank and Buena Vista Valley (J. Jones, Quad Knopf, Inc., pers. comm. 2006). Foot surveys conducted during the same time periods, supported these low observation numbers, and reported 0.01 blunt-nosed leopard lizards per hectare in the North Flank and from 0.01 – 0.07 blunt-nosed leopard lizards per hectare in Buena Vista Valley. Therefore, due to the continually low densities observed in the North Flank and in Buena Vista Valley, the downlisting criterion has not been met at the Elk Hills Conservation Area.

<u>*Delisting Criteria*</u>

Delisting will be considered when, in addition to the criteria for downlisting, all of the following conditions have been met:

1) *Three additional areas with about 2,428 hectares (5,997 acres) or more of contiguous, occupied habitat including:*
   A) *One on the Valley floor;*
   B) *One along the western Valley edge in Kings or Fresno Counties; and*
   C) *One in the Upper Cuyama Valley of eastern San Luis Obispo and eastern Santa Barbara Counties.*
2) *A management plan has been approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective.*
3) *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards per hectare (1 per acre) through one precipitation cycle.*

<u>Other Valley Floor</u>

The protection of blunt-nosed leopard lizard habitat on the Valley floor in Kern and Tulare Counties and in Merced and Madera Counties is discussed above in the above section on the Downlisting Criteria. None of the protected areas meet the downlisting criterion for the protection of 5,997 acres of contiguous blunt-nosed leopard lizard habitat on the Valley floor in these areas. Therefore, the delisting criterion has also not been met.

<u>Western Valley edge in Kings or Fresno Counties</u>

Alkali Sink Ecological Reserve

The Alkali Sink ER protects 933 acres of alkali sink scrub and Valley annual grasslands blunt-nosed leopard lizard habitat in northwestern Fresno County (Figure 2). The purpose of the Alkali Sink ER Interim Management Plan (Ashford 1990a) is to preserve the remaining Alkali Sink Scrub habitat type, protect habitat for the Fresno kangaroo rat and blunt-nosed leopard lizard from agricultural conversion. There are no population data available at Alkali Sink ER at this time. The 12,000-acre Mendota Wildlife Area is located immediately to the south of the Alkali Sink ER. However, over two-thirds of the Wildlife Area are seasonally flooded and do not support blunt-nosed leopard lizard habitat. No blunt-nosed leopard lizards have been observed at the Mendota Wildlife Area (S. Juarez, CDFG, pers. comm. 2006). Therefore, the Alkali Sink ER and Mendota

Wildlife Area do not meet the delisting criterion for the western Valley edge in Kings or Fresno Counties.

Kerman Ecological Reserve
The Kerman ER is located about 5 miles east of the Mendota Wildlife Area and protects 1,718 acres of Valley Annual Grasslands in northwestern Fresno County (Figure 2). In the Kerman ER Interim Management Plan (Ashford 1990b), protection of Fresno kangaroo rat and blunt-nosed leopard lizard habitat is the principal management focus. Livestock grazing is occasionally permitted to control exotic grasses. Hunting is allowed but vehicles are restricted to roads. There is no population data available for Kerman ER. Therefore, due to its small size, the Kerman ER does not meet the delisting criterion for the western Valley edge in Kings or Fresno Counties.

Kreyenhagen Hills Conservation Bank
The 1,295-acre Kreyenhagen Hills Conservation Bank is located in the foothills of southwestern Fresno County. The conservation bank was established by Wildlands, Inc. for providing mitigation credits for impacts to San Joaquin kit fox (*Vulpes macrotis mutica*) habitat in portions of Fresno and Kings Counties. No blunt-nosed leopard lizards have been observed there (Lopez *in litt.* 2006; Warrick *in litt.* 2006); however, the site has numerous washes that could provide suitable habitat for the species (Lopez *in litt.* 2006). There is one reported occurrence of blunt-nosed leopard lizard approximately one mile off-site within the Jacalitos Creek Watershed (CNDDB 2006, Lopez *in litt.* 2006). In summary, due to the small size of the preserve and lack of sightings of blunt-nosed leopard lizard, the Kreyenhagen Hills Conservation Bank does not meet the delisting criteria for the western Valley edge in Kings or Fresno Counties.

Kettleman Hills Area of Critical Environmental Concern
The BLM's Kettleman Hills ACEC consists of 6,730 acres within the Kettleman Hills of western Kings County. The BLM lands, however, are mostly in a checkerboard pattern of 640-acre and smaller parcels. It is not known how much of the ACEC supports blunt-nosed leopard lizard. The Caliente RMP (BLM 1997) covers the ACEC and meets the criterion for the approval and implementation of a management plan that includes the survival of blunt-nosed leopard lizard as an objective. However, due to the highly fragmented nature of the protected lands, the Kettleman Hills ACEC does not meet the delisting criteria for the western Valley edge in Kings or Fresno Counties.

<u>Upper Cuyama Valley</u>
About 1,000 acres of blunt-nosed leopard lizard habitat is protected on the southern edge of the Carrizo Plain National Monument and Ecological Reserve (Saslaw *in litt.* 2006). Most of the rest of the Cuyama Valley, however, is unprotected on private lands and has been degraded by farming activities. There is no population data for blunt-nosed leopard lizard in Cuyama Valley but the populations are likely decreasing there due to an increasing amount of habitat conversion to intensive irrigated agriculture (Stafford *in litt.* 2006). Therefore, due to the lack of population monitoring data and the lack of protection of sufficient habitat, the delisting criteria for the upper Cuyama Valley have not been met.

Appendix B: Habitat Conservation Plans related to the Blunt-Nosed Leopard Lizard and Biological Opinions

A total of 14 HCPs have been prepared (13 completed and one HCP currently in draft) for which the permit included take of blunt-nosed leopard lizard and/or impacts to its habitat. These HCPs are summarized in Table 4 in the review. Effectively through the HCP process 89,288 acres of habitat land has been conserved, while a total 30,052.6 acres of permanent impacts and 1,527.1 acres of temporary disturbance have been authorized (note, these figures include the California Aqueduct San Joaquin Field Division HCP that is currently in draft). Also, according to a preliminary assessment of issued biological opinions from 1992 to 2006, roughly 120 projects—take of approximately 220 individuals, and roughly 21,200 acres of impacts—were permitted incidental take of blunt-nosed leopard lizard. Of these activities, the greatest amount of habitat disturbance authorized were for oil exploration and power generation (2,433 acres permanent and 1,215 acres temporary), road construction and repair (1,387 acres permanent and 469 acres temporary), general operation and maintenance activities (15 acres permanent and 5,120 acres temporary), pipeline construction and repair (264 acres permanent and 853 acres temporary), transmission line and fiber optic cables construction (410 acres permanent and 418 acres temporary), hazardous waste facilities construction (844 acres permanent and 16 acres temporary), prison facilities construction (283 acres permanent and 74 acres temporary), water banking (KWB 6,000 acres permanent), and other agricultural, residential, and commercial development activities (MBHCP 15,200 acres permanent).

Details of 11 of the HCPs affecting the blunt-nosed leopard lizard are discussed below.

1. The ARCO Western Energy Coles Levee HCP (currently managed by Aera) authorizes the permanent disturbance of 330 acres of natural lands including 270 acres of blunt-nosed leopard lizard habitat (ARCO Western Energy 1995). Mitigation for the disturbance is the preservation of 990 acres through the 6,059-acre Coles Levee Ecological Reserve conservation bank.

2. The Coalinga Cogeneration HCP (Aera Energy and Chervon 1991) authorizes the permanent disturbance of 49.6 acres and temporary disturbance of 27.6 acres of blunt-nosed leopard lizard habitat in the oilfield near Coalinga in southwestern Fresno County. Mitigation for the project is the protection of 179 acres of blunt-nosed leopard lizard habitat near the site. On June 23, 2006, the project used up all of its compensation credits and completed the mitigation requirements.

3. The California Department of Corrections Delano Prison HCP (California Department of Corrections 1991) authorizes the permanent disturbance of 287 acres and temporary disturbance of 348 acres of blunt-nosed leopard lizard habitat near Delano in northern Kern County. Mitigation for the project is the enhancement and revegetation of 348 acres of blunt-nosed leopard lizard habitat on-site and the acquisition of 514 acres of blunt-nosed leopard lizard habitat for protection within the Allensworth ER.

4. The California Department of Corrections Statewide Electrified Fence Project HCP authorizes the incidental take of up to 2 blunt-nosed leopard lizards by electrocution at eight

state prisons in a 5-year period during the 50-year duration of the permit (EDAW 1999). Mitigation for impacts to blunt-nosed leopard lizard includes acquisition and enhancement of 282 acres of high quality alkali sink/scrub habitat and the acquisition and enhancement of an additional 800 acres of low quality laser-leveled farmland at Allensworth ER. However, at this time it is not known whether the restoration of farmland to native habitat will benefit the blunt-nosed leopard lizard. A restoration plan for the mitigation lands was finalized and approved in February 2003 (EDAW 2003). The major components of the plan include: acquisition of 200 acres of privately-owned land next to the existing reserve boundary; installation of protective fencing and seasonal grazing to reduce non-native annual grass cover (as needed) on the newly acquired land; and patrol and maintenance of fences, monitoring of sensitive population trends, trash removal, and management of grazing leases on the existing reserve lands. As of June 11, 2006, the Wildlife Conservation Board (WCB) had identified two potential parcels for acquisition and was pursuing state-required appraisals prior to escrow. However, due to hesitation on the part of the sellers, CDFG and WCB have identified potential alternative acquisitions to satisfy the mitigation requirement (EDAW 2006).

5. The Chevron Pipeline HCP authorizes the temporary disturbance of 25.5 acres of blunt-nosed leopard lizard habitat in the 27G Pipeline Replacement Project (Chevron Pipeline Company 1995). Mitigation for impacts to blunt-nosed leopard lizard is the protection of 28 acres of blunt-nosed leopard lizard habitat within Chevron’s Lokern lands.

6. The Granite Construction Phase I HCP authorizes the permanent disturbance of 54 acres of blunt-nosed leopard lizard habitat for quarrying activities near Coalinga in Fresno County (Granite Construction, Inc. 1993). Mitigation for impacts to blunt-nosed leopard lizard is the protection of 162 acres of blunt-nosed leopard lizard habitat within the Northern Semitropic Ridge ER.

7. The Kern County Waste Facilities HCP authorizes the permanent disturbance of 251 acres of natural lands including 2 acres of blunt-nosed leopard lizard habitat near Lost Hills and 47 acres of blunt-nosed leopard lizard habitat near Taft in Kern County (Kern County Waste Management Department 1997). Mitigation for impacts to blunt-nosed leopard lizard and other listed species is the protection of 755 acres of habitat at Coles Levee Ecosystem Preserve.

8. The KWB Authority HCP authorized the permanent disturbance of 12,081 acres and temporary disturbance of 291 acres of blunt-nosed leopard lizard habitat in Kern County for up to 75 years. Within the 19,900 acre-KWB, 5,900 acres are for routine recharge activities, 481 acres are for permanent water banking facilities, 960 acres are for plant preserves, 5,592 acres between the water basins will be allowed to revert to habitat, 530 acres are mitigation for the Department of Water Resources projects, 3,170 acres are for farming, and 3,267 acres are for conservation banking for third parties (490 acres of which KWB Authority may use for commercial development). Therefore, 4,263 acres of potential blunt-nosed leopard lizard habitat are protected by the KWB Authority HCP.

9. The Metropolitan Bakersfield HCP (MBHCP) and associated biological opinion (Service 1994) covers an area of 408 square miles around Bakersfield, California. The MBHCP allows the permanent disturbance of 15,200 acres of natural lands but does not estimate how much blunt-nosed leopard lizard habitat would be disturbed. The MBHCP states that mitigation for impacts to natural lands is 3:1 and for impacts to open lands (i.e. agricultural lands) is 1:1. However, the MBHCP does not explicitly state that impacts to a listed species must be mitigated for by the acquisition of lands that support the species. About 1,176 acres of blunt-nosed leopard lizard habitat disturbance has been authorized thus far through the MBHCP (Strait *in litt.* 2006); it is not known at this time how much of the habitat acquired as mitigation through the MBHCP supports blunt-nosed leopard lizard.

10. The Nuevo Torch HCP (currently managed by PXP) authorizes the permanent disturbance of 850 acres of blunt-nosed leopard lizard habitat (Nuevo Energy Company and Torch Operating Company 1999). Thus far, an 840-acre conservation easement in the Lokern area is currently being established as mitigation (R. Garcia, PXP, pers. comm. 2006).

11. The California Aqueduct HCP is currently in draft form. The area covered by the HCP includes seven pumping plants, two maintenance centers, and roughly 121 miles of Aqueduct and ROW within 11,816 acres of Kings and Kern Counties. Impacts from project related activities permitted under the HCP could total up to 1,295 acres—895 acres of impact by DWR, 290 acres of impact by third party water contractors, and an additional 110 acres of impact by other third party activities. Notably, the HCP only provides compensation for impacts by DWR and third party water contractors. Compensation for impacts associated with other third parties entering into a Compliance Agreement under the HCP will be provided via off-site compensation land consistent with Wildlife Agency requirements and subject to their approval prior to the initiation of the impacts. Compensation will be achieved through a combination of two approaches: 1) adaptive management of ROW lands to provide suitable habitat for listed species, and; 2) the conservation of three large blocks of habitat near the Buena Vista Pumping Plant, Teerink Pumping Plant, and Chrisman Pumping Plant. Thus, terms and conditions described within the HCP require DWR to manage 3,474 acres of on-site ROW land to minimize impacts to covered species to the maximum extent practicable. While total compensation acreage provided shall be 817 acres, which can be partitioned into: 242 acres of compensation for past completed emergency consultations; and, 567 acres as compensation for HCP covered activities and impacts

In addition to HCPs, numerous biological opinions have authorized disturbance of blunt-nosed leopard lizard habitat. In some earlier cases no compensation was required. For example, the biological opinion for the Laidlaw Environmental Services, Inc. hazardous waste disposal facility (Service 1988) authorized the permanent disturbance of 320 acres of blunt-nosed leopard lizard habitat in the Lokern area without requiring any compensation. In most cases, however, compensation was set at a ratio of 3:1 for permanent disturbance of natural lands.

In summary, the HCP process has facilitated the conservation of 89,288 acres of habitat land has been conserved, while a total 30052.6 acres of permanent impacts and 1,527.1 acres of temporary disturbance have been authorized (note, these figures include the California Aqueduct San Joaquin Field Division HCP that is currently in draft). Also, according to a preliminary assessment of issued biological opinions under section 7 of the Act from 1992 to 2006, roughly 120 projects—take of approximately 220 individuals, and roughly 21,200 acres of impacts—were permitted incidental take of blunt-nosed leopard lizard.

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW

Blunt-Nosed Leopard Lizard (*Gambelia sila*)

Current Classification ______Endangered______

Recommendation resulting from the 5-Year Review

____ **Downlist to Threatened**
____ **Uplist to Endangered**
____ **Delist**
__X_ **No change is needed**

Review Conducted By _ Sacramento Fish and Wildlife Office Staff_________

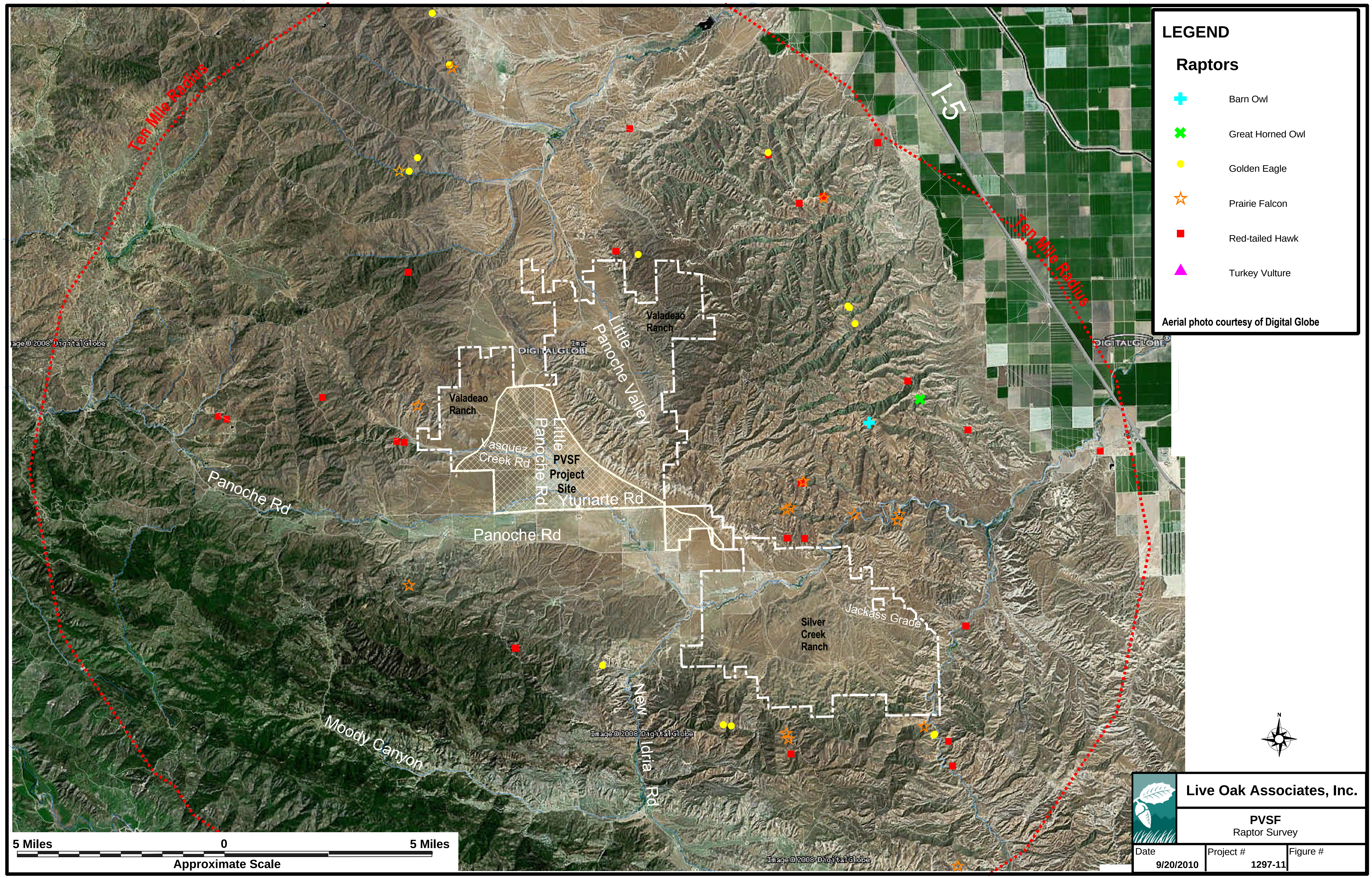
FIELD OFFICE APPROVAL FOR REGION 8:

Lead Field Supervisor, Fish and Wildlife Service

Approve ____________________ Date 2·16·10

Lead Field Supervisor, Cooperating Field Office, Fish and Wildlife Service

Concur Diane K. Noda____________ Date 2/12/10


LEGEND
Raptors
Barn Owl
Great Horned Owl
Golden Eagle
Prairie Falcon
Red-tailed Hawk
Turkey Vulture
Aerial photo courtesy of Digital Globe
Ten Mile Radius
Ten Mile Radius
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Valadeao Ranch
Valadeao Ranch
Little Panoche Valley
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Jackass Grade
Silver Creek Ranch
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Approximate Scale
Live Oak Associates, Inc.
PVSF
Raptor Survey
Date
9/20/2010
Project #
1297-11
Figure #

LIVE OAK ASSOCIATES, INC.
an Ecological Consulting Firm

SUMMARY OF THE CONSERVATION STRATEGY FOR FEDERALLY AND STATE LISTED SPECIES FOR THE PANOCHE VALLEY SOLAR FARM

April 27, 2010

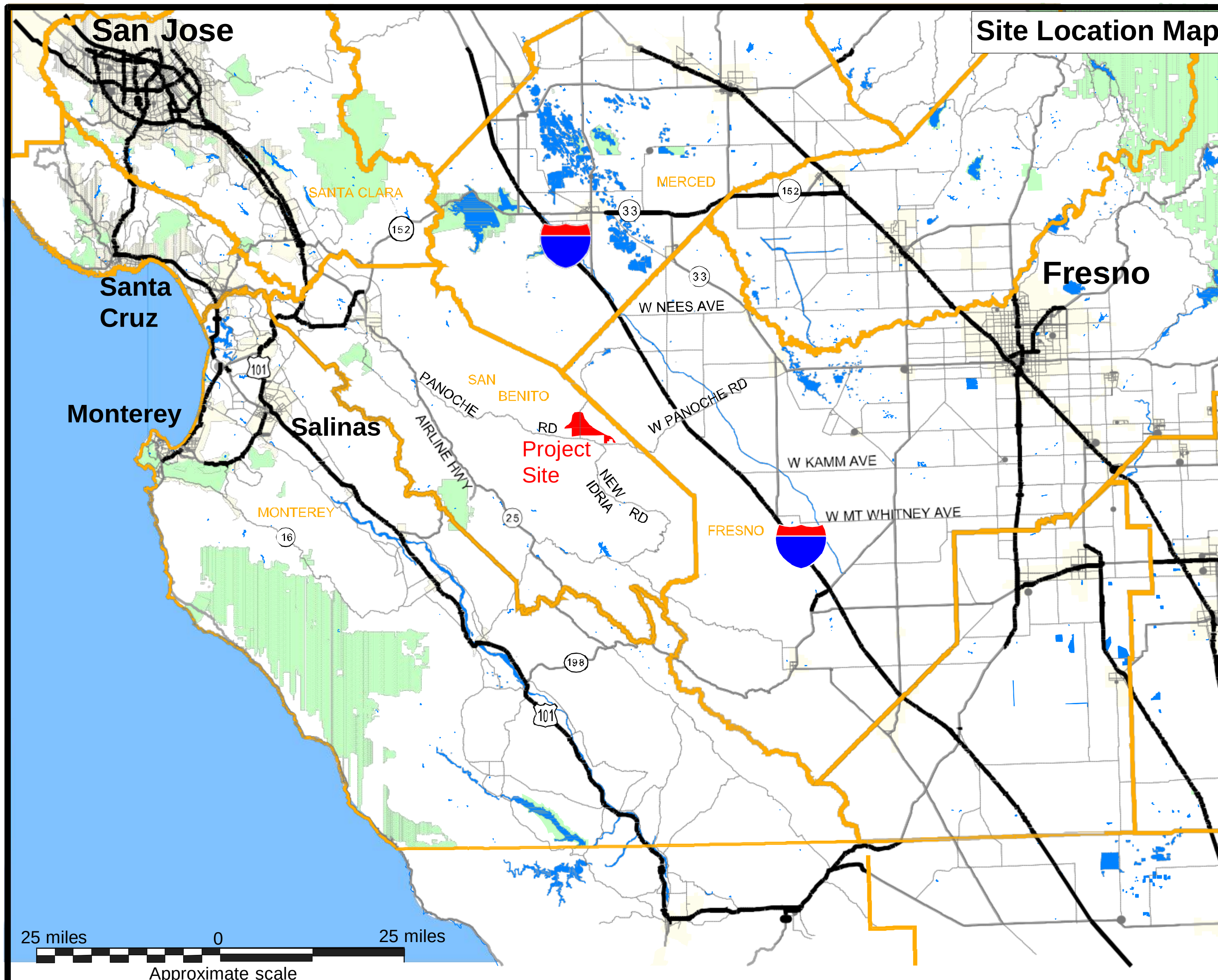
This summary of the conservation strategy proposed by Solargen Energy Inc. for its Panoche Valley Solar Farm (PVSF) outlines measures to avoid, minimize and compensate for take of federal (FESA) and state (CESA) listed species that may be affected by construction and operation of their solar farm (Figure 1). This is not intended to be a comprehensive treatise for the conservation strategy proposed for the PVSF, but provides sufficient detail as to the important components of the plan that have been completed along with on-going analysis and data collection intended to resolve data gaps.

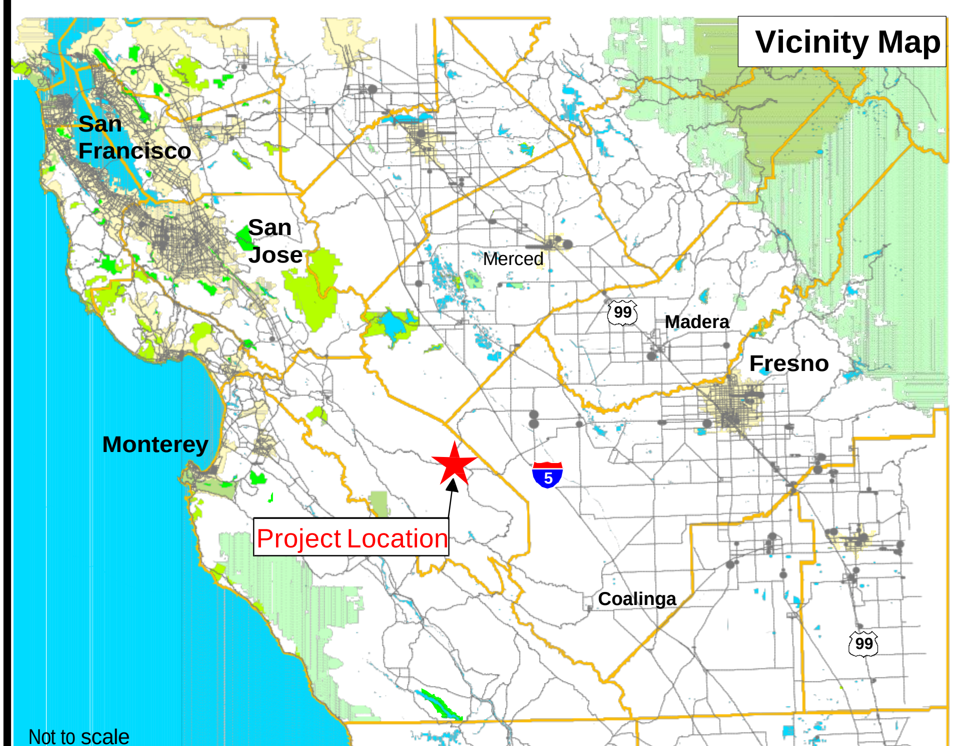
The conservation strategy summarized here, will serve as the foundation for both the Biological Assessment (BA) that is to be submitted to the USFWS for species listed under FESA and the 2081 Application that will be submitted to CDFG for species listed under CESA.

The covered species included in this mitigation plan include the following federal and state listed species:

- Vernal Pool Fairy Shrimp; *Branchinecta lynchi*; Federal threatened
- California Tiger Salamander; *Ambystoma californiense*; Federal and State Threatened
- Blunt-nosed Leopard Lizard; *Gambelia sila*; Federal and State Endangered/California Fully Protected
- Western Burrowing Owl; (*Athene cunicularia*); California Species of Special Concern/Federal Migratory Bird Treaty Act and Fish & Game Code 3501.5
- San Joaquin Antelope Squirrel; *Ammospermophilus nelsoni*; State Threatened
- Giant Kangaroo Rat; *Dipodomys ingens*; Federal and State Endangered
- San Joaquin Kit Fox; *Vulpes macrotis mutica*; Federal Endangered/State Threatened

Two species for which take cannot be authorized by CDFG (blunt-nosed leopard lizard and western burrowing owl) are included in this summary document, for completeness. The USFWS may provide take authorization for impacts to habitat for the blunt-nosed leopard lizard (BNLL), but they may not authorize take of individuals of either the BNLL or the Western burrowing owls (WBO).





Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
4/27/2010	1297-05	1

Both Impacts and associated mitigations for non-listed special status species are being evaluated by the Environmental Impact Report (EIR) that is currently in preparation by the County of San Benito and will not be discussed here.

PROJECT DESCRIPTION

Solargen proposes to construct and operate a 420 megawatt (MW) photovoltaic (PV) solar power plant in Panoche Valley, an unincorporated area of eastern San Benito County. The project would be located on 4,717 acres and would include the following (Figure 2):

Installation of 1,822,800 silicon-based PV panels on framed, the worst case would be the use of 50 Watt panels, and this will give us 8,400,000 panels. The Proposed Nexpower 135 Watt panels will number 3,111,111. Panel count will depend on the panel chosen at the time of construction.

‡single-pole steel support structures,

‡electrical inverters and transformers,

‡an electrical substation,

‡an operations and maintenance (O&M) building,

‡a septic system and leach field,

‡On-site access roads, transmission support towers and line(s) to interconnect with a PG&E transmission line that passes through the project site. Requirements for the switchyard will come from PG&E as they will own a portion of this at the end of the project.

‡Solargen is currently in the early stages of negotiations to sell the S U R M H F W ¶ V electrical output to PG&E.

Solargen has applied to the County of San Benito (County) for a Conditional Use Permit (CUP) to allow a solar power plant to be operated on the site. Because of its responsibility for issuing this permit, the County is the lead agency under the California Environmental Quality Act (CEQA) and is responsible for the preparation of this EIR.

The proposed solar farm site comprises approximately 4,717 acres, is irregularly-shaped, and consists of all or parts of the following (Figure 2):

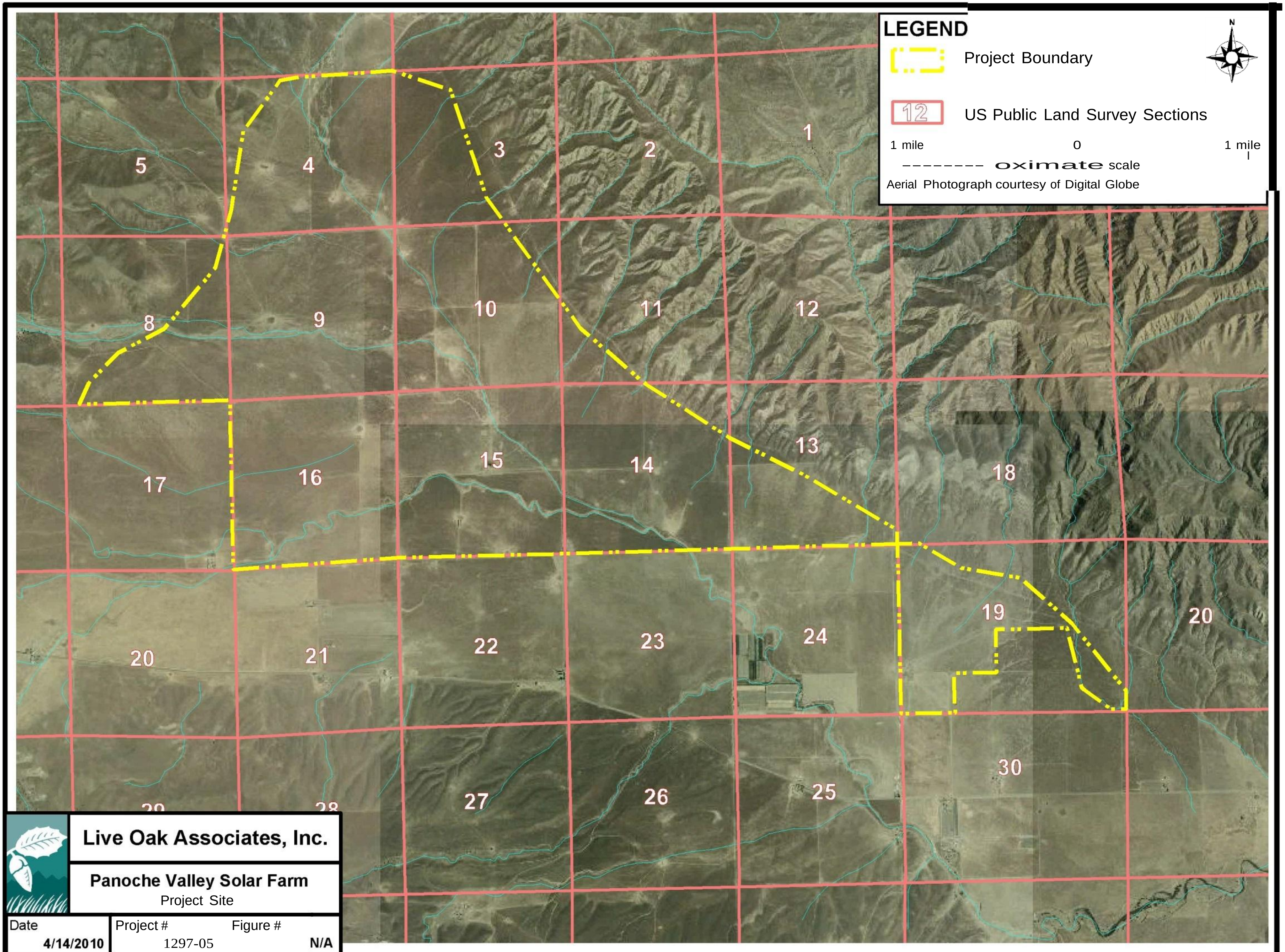
‡ Sections 3, 4, 8-11, and 13-16 of township 15 south, range 10 east; and

‡ Section 19 of township 15 south, range 11 east.

Lands adjacent to the proposed solar farm site are being proposed as mitigation for anticipated impacts to sensitive plant and wildlife impacts (Figure 3). These proposed mitigation lands consist of all or parts of the following:

‡ Sections 19, 30, and 31 of township 14 south, range 11 east;

‡ Section 21-27 and 32-36 of township 14 south, range 10 east;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Live Oak Associates, Inc.
Panoche Valley Solar Farm
Project Site
Date
4/14/2010
Project #
1297-05
Figure #
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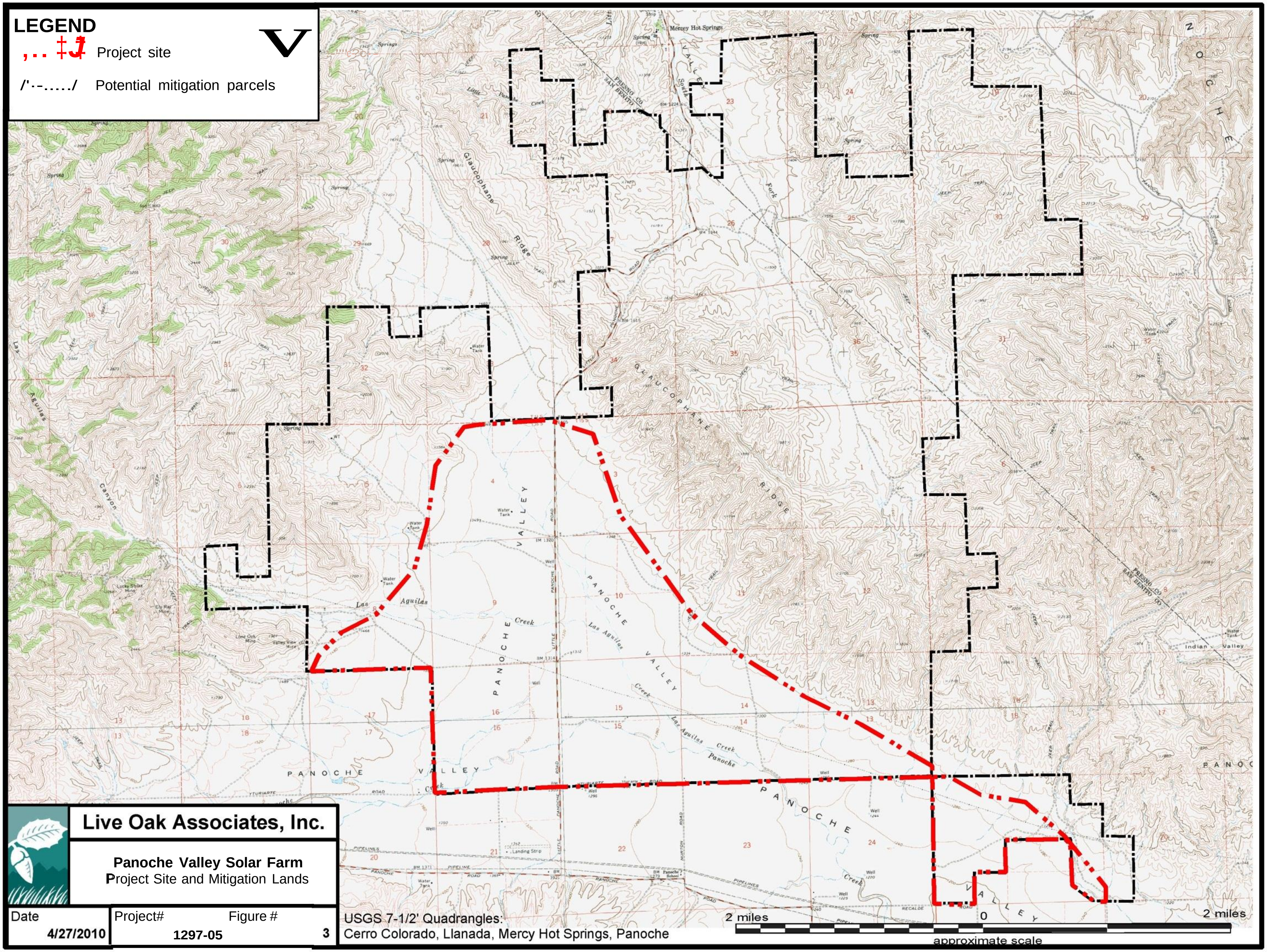

LEGEND
Project site
Potential mitigation parcels
Live Oak Associates, Inc.
Panoche Valley Solar Farm
Project Site and Mitigation Lands
Date
4/27/2010
Project#
1297-05
Figure #
3
USGS 7-1/2' Quadrangles:
Cerro Colorado, Llanada, Mercy Hot Springs, Panoche
2 miles
0
2 miles
approximate scale
PANOCHE VALLEY
GLAUCOPHANE RIDGE
Glaucophane Ridge
Las Aguilas Creek
Panoche Creek
Little Panoche Creek
Mercey Hot Springs
Indian Valley
FRESNO CO
SAN BENITO CO

- ‡ Sections 1-8 and 11-14 of township 15 south, range 10 east; and
- ‡ Sections 6, 7, 19, and 20 of township 15 south, range 11 east.

The proposed solar farm site and a majority of the mitigation lands are all located in the eastern region of San Benito County, California, in an area known as the Panoche Valley. The northeastern extent of the proposed mitigation lands is located in western Fresno County and includes parts of Little Panoche Valley and Glaucophane Ridge.

The majority of parcels within the solar farm site are used for cattle grazing; the remaining lands are homesteads, patches of row crops, grape production and an old dairy. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the aforementioned Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1240 feet National Geodetic Vertical Datum (NGVD) to approximately 1400 NGVD.

ANTICIPATED LEVEL OF TAKE

There is a paucity of data on how PV solar arrays will affect the continued use of the site by the various species, particularly state or federally listed species. Many of these species (BNLL, GKR, SJAS) exhibit life history strategies that would be best classified as r-selected species, with high reproductive capacity that more closely tracks changes in resource production than species with lower reproductive rates that usually exhibit longer lag time in a functional and/or numerical response. In fact, populations of these species that occur on site are known to fluctuate substantially with rainfall patterns ±wetter years tend to produce higher food resources, higher reproductive rates, and increasing populations. Poorer rainfall years, particularly several in a row can lead to depressed populations.

The proposed project would be installed over an area of approximately 4,717 acres (7.4 square miles). However, the proposed design confines the solar arrays, substation, and facility buildings to a footprint of 2,201.5 acres, on-site access roads would occupy approximately 30 acres, and buried electrical collection conduit would occupy 37.4 acres. The remaining 1,680 acres (35% of the site) within the project boundary would be left undisturbed and unshaded. Undisturbed areas would include on-site drainages and riparian buffer zones.

The entire site is currently grazed with no consideration to maintaining the suitability of the site for the target species. These species persist in spite of the current grazing regime, which is driven almost exclusively on economic objectives. Observational data for these species indicate that they generally prefer short grass conditions, with very limited experimental evidence supporting a specific grazing regime.

The project has integrated a number of design features to avoid impacts when possible by avoiding wash and stream habitats - barren areas that may support BNLL or other burrowing species by setting back from the habitat features by minimum of 100 ft from the top of bank.

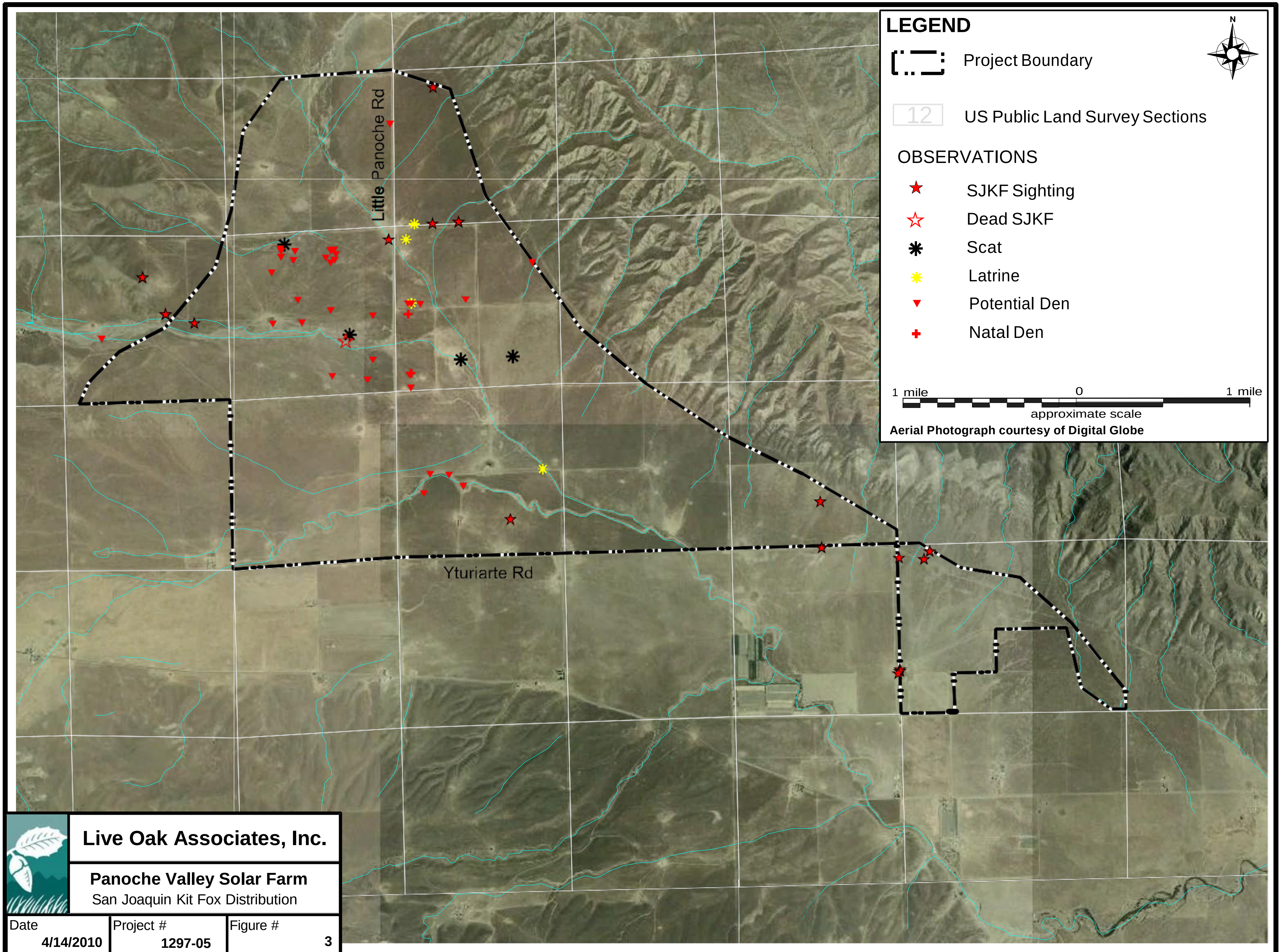
Approximately 12% (603 acres) of the site will be shaded by solar arrays while approximately 35% (1680 acres) of the site will remain undisturbed and unshaded by solar arrays. Little is known how listed species known to occur on site will react to the placement of a solar farm on the landscape. The solar arrays, roads, supporting facilities are expected to have some adverse affect on these species continued use of the site as shading may alter the micro-climate under the arrays, and undisturbed habitats (35% of the site) will be fragmented. However, construction and operation of the solar farm is intended to avoid and minimize impacts to existing resources to the maximum extent practicable and on-going management of the grasslands that will remain on-site are intended to be specifically managed to maximize food productions for such species as GKR and other small burrowing animals. Therefore, while some degradation is expected, it is unreasonable to assume that the site will completely lack suitable habitat attributes for these species to persist at some lower level. These same set of species are known to occur at modest levels within any number of oil fields of varying development density in Kern County ±habitats that are also fragmented by oil wells, pipelines and roads. Admittedly, the percent of the landscaped converted to developed uses in oil fields is usually less, but the fact that the facilities fragment the landscape is undeniable, yet many of these species persist in modest to high numbers as long as suitable habitat attributes exists and food resources remain relatively modest or high.

BO for instance are known to occur in high densities in human altered landscapes. For example, the WBO in the agricultural areas of Imperial County where as much as 70% of the states population presently occurs, is estimated to approach a density 50 times higher than the desert communities would support naturally. WBO actively use agricultural roads and levees in the San Joaquin Valley and occur regularly in grassland habitats adjacent to dense development in the Bay Area Counties. Nonetheless, at buildout, WBO are expected to continue to use the site, but likely to a lesser degree.

The SJKF has been detected on site on number of occasions during biological surveys conducted for this project (Figure 4). This site supports suitable landscape attributes to provide foraging, breeding and movement habitat for the species within a regional context. The recovery plan for upland species of the San Joaquin Valley recognizes the Ciervo-Panoche Natural Area as one of the three remaining core populations for kit fox. While not its preferred habitat, this species is known to use fragmented habitats associated with on-going and developing oil fields in Western Kern County. For example, more than twenty-five years (1979 to 2004) of data were collected at the Naval Petroleum Reservoir (NPR1 and NPR2) that has been in oil production since the early ¶V ZdLWK production increasing markedly since the mid- ¶V SJKF have continued to be detected throughout the oil fields during the last decade, including the rather varied and steep topography associated with NPR1.

A well-known population of kit foxes is associated with the urban environments of the City of Bakersfield ±again, not a preferred circumstance, but evidence that the species response can accommodate human dominated landscapes.

Mammalian carnivores are intelligent and idiosyncratic. While individual kit foxes in the Panoche Valley region have had to contend with some limited traffic, farm houses, pets and other aspects of human existence in a rural environment, they have not had to accommodate



LEGEND
Project Boundary
12
US Public Land Survey Sections
OBSERVATIONS
SJKF Sighting
Dead SJKF
Scat
Latrine
Potential Den
Natal Den
N
1 mile
0
1 mile
approximate scale
Aerial Photograph courtesy of Digital Globe
Little Panoche Rd
Yturiarte Rd
Live Oak Associates, Inc.
Panoche Valley Solar Farm
San Joaquin Kit Fox Distribution
Date
4/14/2010
Project #
1297-05
Figure #
3

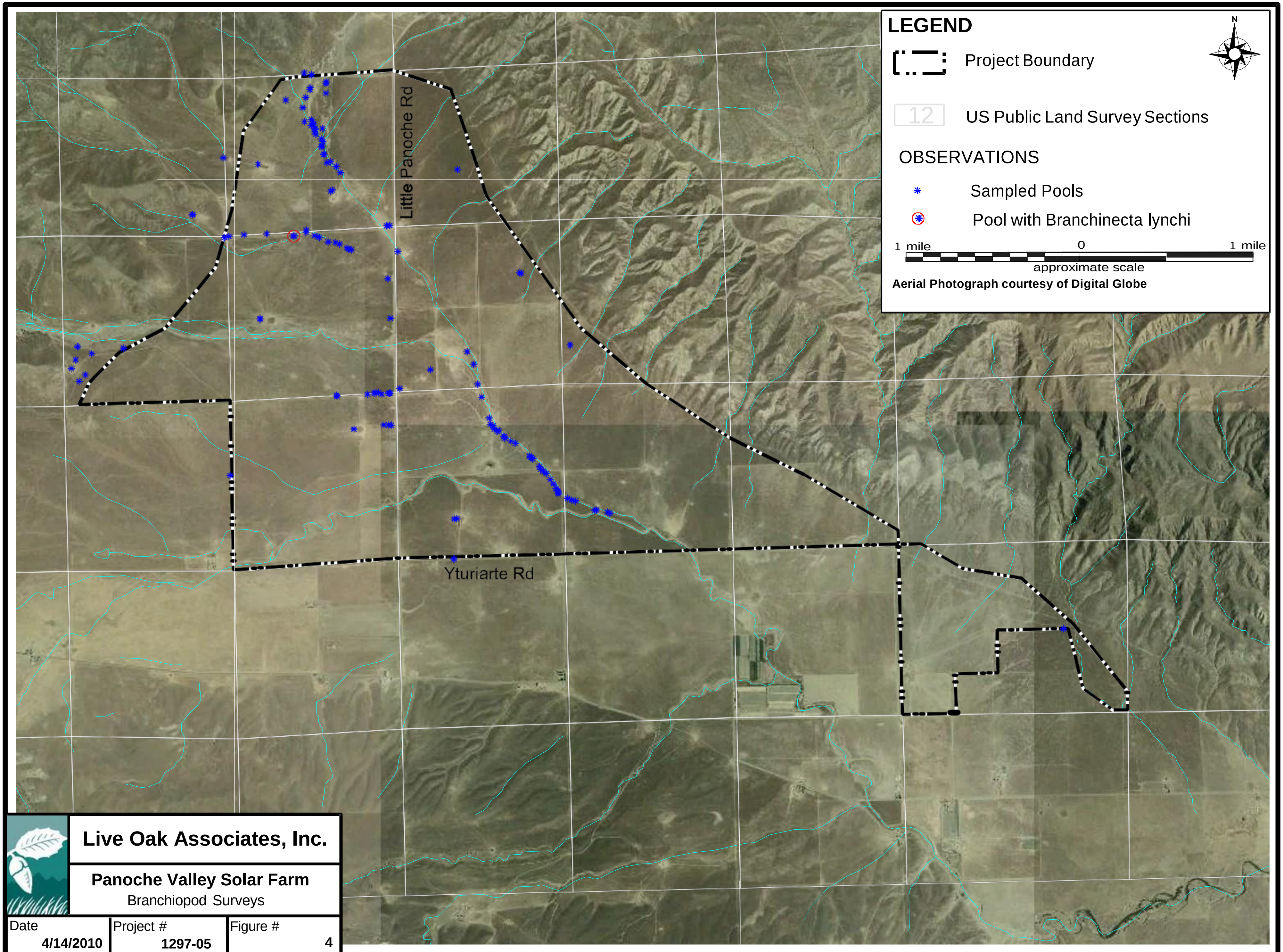
large landscape scale changes, such as a solar farm. Given that the site will be managed largely through grazing to maximize the occurrence of small mammals ±important prey for kit fox, we would expect that kit foxes will take advantage of the availability and distribution of any remaining GKR burrow clusters. The site will be managed to also promote egress and ingress of wildlife species, particularly kit foxes. As foxes are known to den in landscape medians at shopping malls in Bakersfield, we would expect that foxes would continue to use the site also for breeding. As noted for GKR, we do expect the overall value for kit foxes to be less than it was prior to the construction and operation of the solar farm.

A total of 126 pools were sampled for listed brachiopods and CTS. California tiger salamander (CTS) larvae were only detected in one pool just off the western boundary while the listed vernal pool fairy shrimp was detected also in only one pool (Figures 5 and 6). In general these pools are rather devoid of aquatic life and in fact during a one-month period of time the CTS larvae had shown no marked growth ±indicating poor forage production. Larval surveys are on-going and will be completed in May 2010. The first wet season surveys for brachiopod have been completed with follow up dry season surveys planned to be completed during the summer of 2010.

The pool that supports CTS just to the west of the project will remain intact, but solar arrays will be placed in areas to the east of this pond that could support upland habitat for this species. If 2010 larval surveys confirm this as the only breeding locale on site, than solar arrays in the upland habitats to the east of this pond would affect roughly half of the upland habitat associated with this pond. Unlike many development projects that certainly convert the upland habitat east of the pond to developed uses rendering it useless for estivating salamanders, solar farm should retain some residual value, particular if it is managed for small mammals, the burrows of which are critical for CTS.

The San Joaquin antelope squirrel (presently three sighting) appears quite limited and restricted on site. On-going surveys for these three species will provide additional information as to this species rarity on site.

The level of take of habitat cannot be presently estimated BNLL. The level of take for vernal pool fairy shrimp (VPFS) and the San Joaquin antelope squirrel (SJAS) is expected to be rather limited to a small portion of the site. Three species are more common on site and the modifications of the landscape by the solar farm is expected to have a more pronounced affect on these species: WBO, GKR and SJKF. The CTS is also limited in its extent on site, but the amount of habitat affected by the project could range upward of 175 acres (assuming the majority of the population estivates within 2200 ft of the pond). Therefore, for the purpose of this analysis, given the level of proposed landscaped changes, we suggest that the site will degraded by about 60% for these four species. In other words, a 40% residual value will remain for the CTS, WBO, GKR and the SJKF.

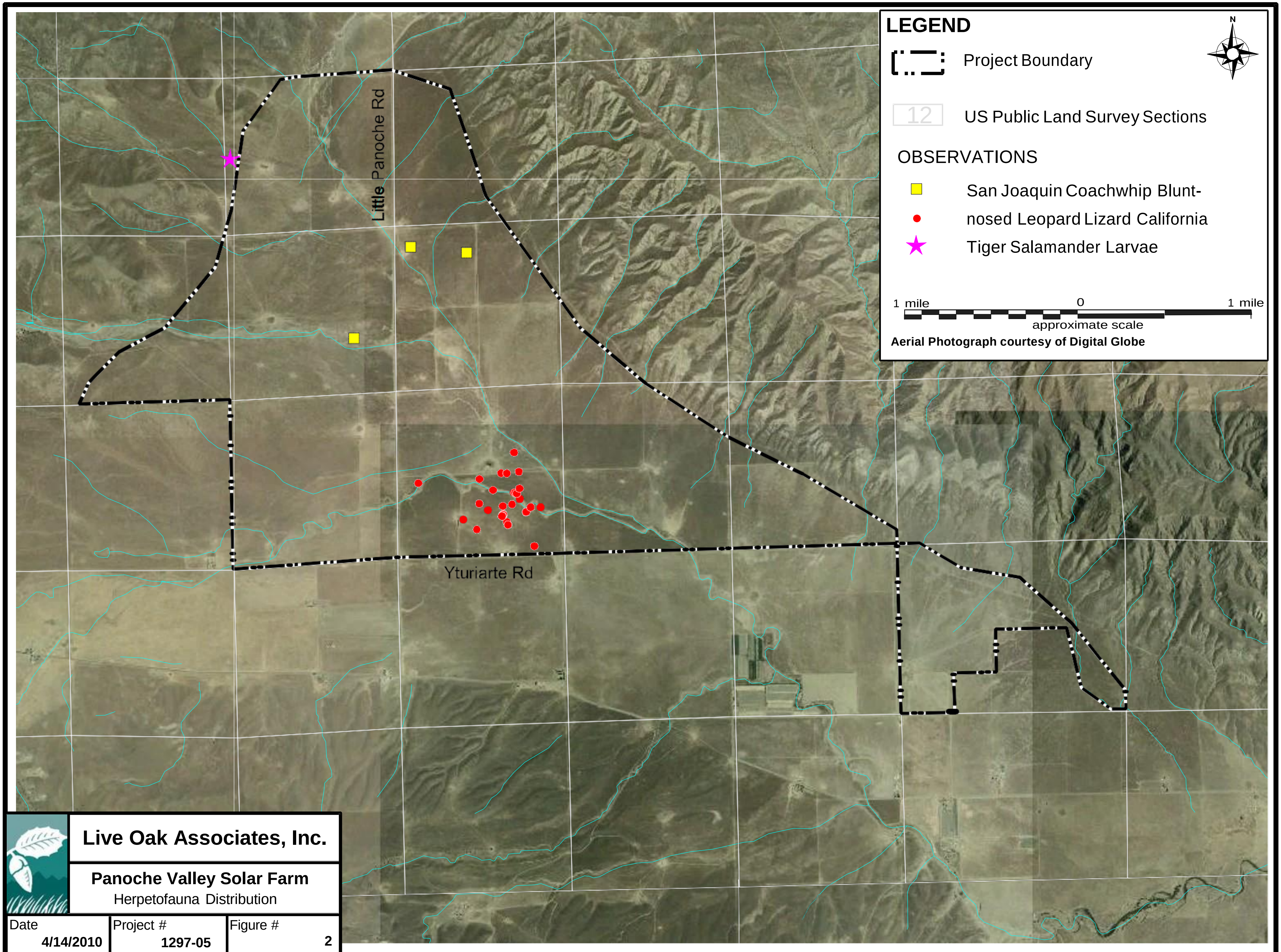


Live Oak Associates, Inc.

Panoche Valley Solar Farm

Branchiopod Surveys

Date	Project #	Figure #
4/14/2010	1297-05	4



LEGEND
N
Project Boundary
12
US Public Land Survey Sections
OBSERVATIONS
San Joaquin Coachwhip Blunt-
nosed Leopard Lizard California
Tiger Salamander Larvae
1 mile
0
1 mile
approximate scale
Aerial Photograph courtesy of Digital Globe
Little Panoche Rd
Yturiarte Rd
Live Oak Associates, Inc.
Panoche Valley Solar Farm
Herpetofauna Distribution
Date
4/14/2010
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1297-05
Figure #
2

Species for Which Take of Individuals Will Not Occur

The project will not result in take of BNLL or WBO.

Blunt-nosed Leopard Lizard
Solargen has developed a three-step process which the Panoche Valley Solar Farm (PVSF) will implement to ensure that the construction and operation of the project fully complies with the Fish and Game Code obligation to avoid take of the fully protected blunt-nosed leopard lizard (BNLL).

Step One ±Avoidance Through Project Design: The occurrence of blunt-nosed leopard lizards (BNLL) in wide, sandy bottomed washes in low relief terrain has been well documented; as a result, all such washes observed during all surveys (protocol and quantitative sampling efforts) are considered to represent potential blunt-nosed leopard lizard habitat and should not be disturbed to the maximum extent practicable. Therefore, Solargen has provided in their design of the photovoltaic facility on the Panoche Valley Solar Farm (PVSF) a buffer of no less than 100 feet from all streams and washes crossing the project site. The buffer will be measured from the top-of-bank for each side of the features. Thus, no disturbance will occur within these habitats, or within ¶ I UtReP edge of these habitats, except for a few unavoidable road crossings (which will be designed to minimize their impact as described below). As a result, the most likely locations for BNLL occurrence on the project site will be avoided.

Step Two ±Avoidance in Construction Areas Through Additional Protocol Surveys: For road crossings through washes that are unavoidable, protocol BNLL surveys (extent of which will be pre-approved by CDFG) will be completed for the limited areas where bridges will be constructed If BNLL are detected during these surveys, then they will be avoided with a 50 ft. buffer and exclusion fencing erected to keep them out of the work area where the bridge is being constructed. Even in the advent of negative survey results, as a matter of precaution, a 30-ft buffer from small mammal burrows in washes will be recognized during construction of bridges over washes. The standard recommendation prohibits vehicles traversing washes except in defined work zones.

For construction of the solar panel arrays, protocol BNLL surveys during the adult season (April 15 to July 15) will precede ground disturbance regardless of type of habitat. This recognizes that construction can occur any time after the completion of these surveys, but prior to the next adult season (see pre-construction and construction monitoring below). Avoidance recommendations and buffers as shown below will be adhered to (Table 1). If BNLL are detected in non-wash habitats during the protocol surveys conducted prior to each phase (or during any sort of survey for that matter), than the project will redesign their solar arrays to accommodate this detection by placing a 5 acre buffer (approximately a 265 ft radius) over the observation in such as to capture areas of high burrow density. Five acres is roughly equivalent to the average female home range as reported by Warrick et al. (1998). In other words, the buffer will not be a simple circle with a 265 ft radius, but a polygon that captures the best available habitat for this detection; with a caveat that no component of the project will occur within 50 ft of this sighting

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1 Compensation for loss of habitat for BNLL associated with this project will be permitted by the U.S. Fish and Wildlife Service (USFWS) via the Section 7 process and will not be discussed in this document.

Step Three ±Avoidance in Construction Areas Through Pre-Construction Surveys and Construction Monitoring: All construction activities must be preceded, by not more than 30 days, by a pre-construction survey for BNLL. If a BNLL is observed within a construction area, that location will conform to the 5-acre buffer as described above. This buffer will immediately be marked by construction fencing or flagging, and will be avoided until it is determined that the BNLL has moved out of the construction zone.

Table 1. Avoidance and Minimization Measures for the BNLL on the PVSF project.

Avoidance and Minimization Measures	**Description**
Avoidance of washes and streams	Washes and streams should be avoided by the project including a 50-ft buffer as measured from the top-of-bank on both sides of these features.
Avoidance Zones for bridge construction ±protocol surveys	Protocol surveys will be conducted during the April 15 to July 15 adult BNLL season prior to any disturbance associated with constructing the limited number of bridges necessary for the project. Therefore, in these few cases where complete avoidance of washes and streams are not feasible the project will establish 30-ft buffers from small mammal burrows (whether BNLL are detected at them or not) in wash bottoms and 50-ft buffers from any observed BNLL location in these features. These buffer zones will be demarcated by construction fencing to ensure that construction crews do not enter the avoidance zone. Monitors will be present during construction activities.
Avoidance for non-wash habitats ± protocol surveys	Protocol surveys will be conducted during the adult season period of April 15 to July 15 prior to any surface disturbance. Project elements will avoid all observations of BNLL based on a 5-acre buffer that will be encompass the sighting and include the best available habitat within this 5-acres; the closest edge of the buffer to the sighting will be 50ft.
Avoidance through pre-construction surveys and construction monitoring	All construction activity including all vehicular traffic should be contained within the defined construction zone. The construction zone will be demarcated with exclusion fencing to ensure that a BNLL does not errantly wander into the construction zone. An on-site monitor will be present during all construction activity in this area. In addition, pre-construction surveys will be conducted no more than 30 days prior

	to any surface disturbance and on-site monitor will be present during all construction activities to ensure that the project does not harm or injure individual BNLL. If a BNLL is detected during construction by the on-site monitor, than the 5-acre buffer as described above will be established around this location and the project will avoid constructing any project elements within this buffer. The project will also implement all BMPs as discussed below.

In addition the avoidance measures discussed above, Solargen will also conduct a series of protocol surveys, quantitative sampling, preconstruction surveys and construction monitoring to further ensure that the project is built and operated in such a way as to remain in compliance with the Fish and Game Code.

Phase I ±Section 16 (2010 Surveys)

The construction of Phase I of the project is now expected to occur on Section 16 (640 acres). Phase I will consist of approximately 200 acres of photovoltaic solar panels, and associated infrastructure. Full protocol-level adult BNLL surveys will be conducted on all of Section 16 between 15 April and 15 July 2010 (12 full surveys will be completed for adults whether BNLL are observed or not). Protocol-level juvenile BNLL surveys (5 full surveys) will be conducted on all of Section 16 between 1 August and 15 September 15 2010 if adult surveys are negative for BNLL presence. All surveys conducted will precisely follow the conditions detailed in & ') * ¶ V 2004 *Approved Survey Methodology for the Blunt-nosed Leopard Lizard*. Appropriate buffers, and the pre-construction surveys and construction monitoring measures described below, will be employed to ensure that no take of BNLL occurs. The quantitative sampling efforts described below and beginning the spring of 2010 will also inform the precise design of Phase I.

Quantitative Sampling (2010)

Based on the site-specific information generated from the 2009 protocol surveys, Live Oak Associates, Inc. developed a quantitative sampling methodology to be employed on the entire 4,717-acre project site in 2010. One purpose of this approach is to inform project design by identifying areas of likely BNLL presence (which areas the project would avoid and preserve) and absence (which areas would be the focus of project construction); as described below, this information would later be supplemented by focused surveys and construction monitoring on a phase-by-phase basis to ensure take avoidance. The sampling methodology will also produce robust BNLL information for the entire project site for purposes of analyzing biological resource impacts in the EIR. This sampling methodology consists of the following:

‡ Quantitative sampling proposed (i.e., occupancy modeling framework ±change over time metrics) over the entire project site for BNLL and other targeted species (e.g., BUOW, SJAS, GKR, SJKF, etc.). 90-random and 45-targeted sampling points distributed across the 4,717-acre project site. Sampling points will be no closer than 280m to ensure independence of the sampling unit and each sampling point will be buffered by a 2 ha (5-

acre) area that will be intensely surveyed consistent with established agency protocol for adult BNLL between 15 April and 15 July 2010. Each sampling unit will be visited 5 times during this 3-month window which allows estimates of important parameters of detection probability, occupancy, colonization and extinction over a multi-season (multi-year) basis. Sampling effort can either be increased spatially or temporally. It is common within an occupancy framework to maximize effort temporally for the expressed purpose of developing detection histories. We have chosen 5 surveys conducted during the adult survey window based on Germano (2009), which states the average time to detect BNLL is 2.27 days (n=48 10-day efforts). The average time to detect the species decreases to 1.18 days when the species is abundant and increases to 3.60 days when the species is sparse.

Full Coverage Surveys for future Phases

For all future phases of project construction, initial project design will be informed by the 2010 sampling methodology and subsequent years of sampling. This will be supplemented phase-by-phase by full protocol-level surveys (12 surveys) for BNLL adults, to be performed between the 15 April and 15 July survey period preceding construction of that phase. As noted above, if no BNLL are detected during the adult survey window, then full coverage surveys will be conducted during the juvenile period (five full coverage surveys conducted between 1 August and 15 September). However, if BNLL are detected during the adult season, then no surveys will be conducted during the juvenile season. Appropriate buffers will be employed to ensure that no take of BNLL occurs.

Pre-construction and Construction Monitoring

As described above, each phase of project construction will be preceded by both (1) the sampling methodology survey, and (2) focused protocol-level surveys for adult BNLL during the optimal survey period of 15 April to 15 July. In addition, Solargen will employ extensive pre-construction and construction monitoring in each construction phase to further ensure that take does not occur. A qualified biologist will (1) conduct one full-coverage pre-construction survey within 30 days prior to the onset of construction, (2) conduct an additional pre-construction survey immediately prior to the onset of construction, and (3) conduct ongoing monitoring of construction activities in any areas that could potentially be occupied by BNLL.

Operation

The project will be operating in such a way as to not harm or injure a BNLL during the life of the project. Standard procedures will be employed as are done for other projects in BNLL range (e.g., oil fields) and will include (but not be limited to), staff training, pre-established speed limits, etc.

The project while designed to not take individuals may result in the loss of some undermined amount of habitat for this species. Those studies discussed above will provide a more precise estimate as to the amount of habitat likely affected by this project.

The current project design is expected to avoid wash and creek habitats in such a manner as these areas are expected to continue to operate at some level for the species. It will not be possible to evaluate the overall affect of the project on the loss of BNLL habitat until such time as the 2010 surveys are complete.

WBO
The WBO is widely distributed in the state with approximately 70% of its population for the state occurring in Riverside and Imperial County. The southern and central San Joaquin Valley is estimated to support approximately 15% of it population. This site may support wintering and breeding habitat for a number of pairs of owls (surveys in 2010 are expected to provide a better measure of their distribution and abundance on the site). While this site may be important for this species, the loss or degradation of the entire project site for this species is not expected to result in jeopardy, given the measures employed to ensure no take of WBO, particularly breeding birds, and given the relative abundance and distribution of this species in the region, off of the project site.

Species for Which Sufficient Data Exist to Estimate Take of Individuals and/or Habitat

As previously discussed, based on current information the project will result in limited loss of habitat for three species: VPFS, CTS and SJAS. As noted above, while only one breeding pond has been identified for CTS, up to 175 acres of upland habitat could be affected (but not eliminated) by this project. For the purpose of this summary, these species will not be considered further. The comprehensive mitigation plan discussed in detail in the BA and 2081 Application will provide suitable details for the relevant species. These documents will address all federal and state listed species to ensure that appropriate avoidance, minimization and compensation measures and employed for each of these species. In addition, the adequacy of the mitigation plan to compensate for loss of habitat for BNLL is not presently known as these surveys are just now getting underway.

Specific Data Analysis Associated with Distance Sampling for GKR and San Joaquin Kit Fox

The methodologies described below and in Appendix A provide good estimates as to the level of take and the adequacy of the mitigation lands to compensate for this impact. For the purpose of this analysis we conducted line transect surveys using distance sampling (Buckland *et al*. 2001) in 63.6 sq km Panoche Valley study area in late February and March 2010. These sampling surveys occurred on both the 4717 acres Project Site and the 11,000acres Mitigation site. North-south transects were walked that were placed at approximately 350 m intervals in the study area (Figure 3). For the analysis, the study area was considered in its entirety and into areas of interest for this effort: the Mitigation Lands (44.5 sq km), the Project Area (19.1 sq km) and, for two transects that spanned both Lands, a combined site Mitigation/Project Area (63.6 sq km).

The locations of target resources and, in some cases, estimated densities were recorded. The methods for burrow cluster data collection were modeled after Townsend 2006 and Townsend & Zahler 2006 for density estimates of burrow cluster and potential San Joaquin kit fox den.

The targets include the following:

Primary Targets

1. Potential kangaroo rat burrows complexes (based on time and shape, other sign)
2. Giant kangaroo rat and giant kangaroo rat burrow complexes

3. San Joaquin Kit Fox and potential San Joaquin kit fox dens (4.5 inches in diameter or greater, other sign)
4. Blunt nosed leopard lizards and habitat
1. San Joaquin antelope squirrel and habitat
2. Badger and badger den (distinct half moon shape ±much wider than tall, other sign)
3. burrowing owl and burrowing owl burrows (burrow with white wash or pellets, burrowing owl feathers)

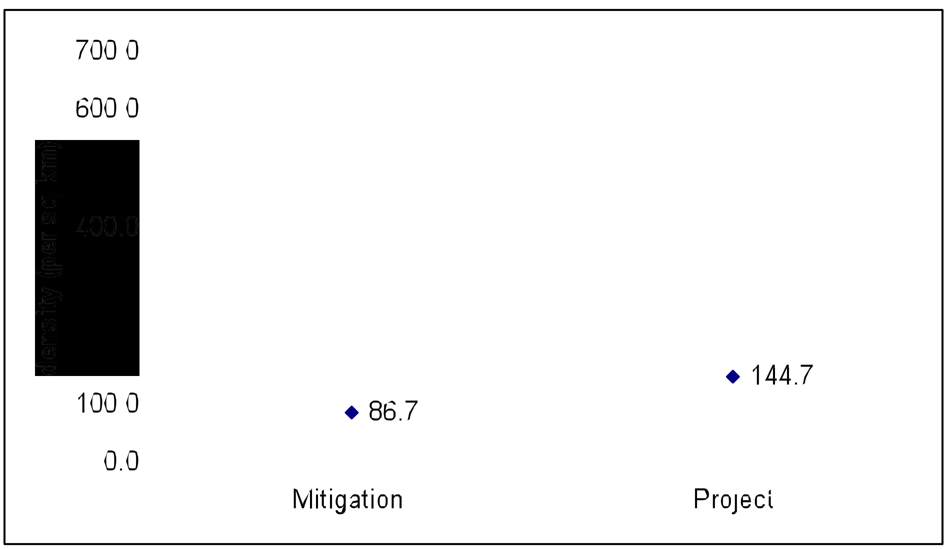
Secondary Targets

3. Carnivore Scat
4. Raptors ±eagles, hawks, falcons, owls
5. Loggerhead Shrikes
6. Mountain Plovers
7. Local carnivores: coyotes, bobcat, cougar, red fox

See Appendix A. for details related to the Methodology and Results. Only relevant information well be summarized in this section.

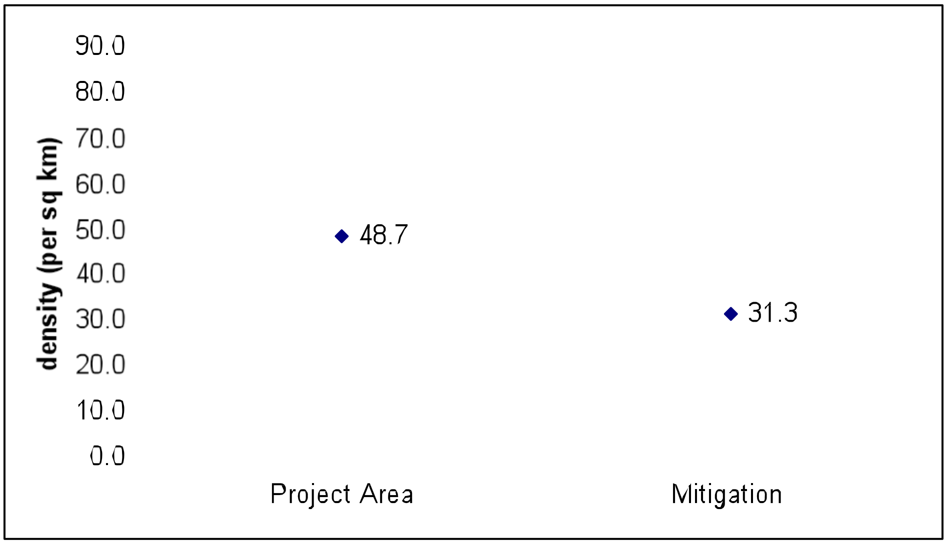
The density of burrow clusters for GKR were higher on the project site than mitigation site, however, the Project Site had much wider confidence intervals due largely to a smaller sample size. Additional data are currently being analyzed and early indications suggest that while there are fewer burrow clusters per km^2 on the mitigation site for GKR, the size of the burrow clusters are much larger on the mitigation lands likely yielding larger populations of GKR for the mitigation site when compared with the Project Site. Those data analysis will be available by the end of April.

Figure 7: Giant kangaroo rat density estimates (with upper and lower CI) for the Mitigation and Project Area



The density estimates for San Joaquin kit fox dens, badger dens, other carnivore dens and burrowing owl burrows was higher on the Project Site than on the mitigation lands (Figure 8).

Figure 8: Density estimates (potential San Joaquin kit fox dens, badger dens, other carnivore dens, and burrowing owl burrows) with upper and lower CI for the Mitigation and the Project Area.



MITIGATION LAND

Biological Goals and Objectives

The biological goals are broad, guiding principles for the conservation program for this project and provide a rationale for the minimization and mitigation strategies. Biological objectives provide direction in management in order to achieve biological goals. These biological goals and objectives are specifically tailored to address the impacts and duration of the permitted activities. The goals and objectives guide the development of an adequate and effective conservation program.

Goal 1
Maintain viable, self-sustaining populations of the Covered Species within the Project Site and associated mitigation lands

Objective: Implement avoidance and minimization measures to minimize impacts of Covered Activities on the Covered Species within the PVSF.

Objective: Identify important movement areas (corridors) for key species and prioritize those lands for acquisition for conservation purposes.

Objective: Establish, enhance and manage permanent conservation areas to benefit the Covered Species.

Objective: Implement a monitoring program that provides sufficient information to determine relative fluctuations in Covered Species numbers in the PVSF and associated conservation lands and provides a feedback loop for adaptive management.

Goal 2

Establish at PVSF and on surrounding lands a Covered Species preserve system that complements and provides important linkages to other conservation lands, lands supporting covered species and conservation efforts in the region

Objective: Contribute monitoring data about the presence and relative abundance of Covered Species on the PVSF and associated conservation lands for use in regional conservation planning.

Goal 3

Minimize and avoid loss of individual Covered Species and their habitats during construction and operation of PVSF

Objective: Avoid and minimize impacts to Covered Species through the implementation of preconstruction surveys, best management practices, and an employee education program

Goal 4

Fully mitigate impacts to CESA-listed Covered Species by improving the existing conservation value of mitigation lands for Covered Species

Objective: Eliminate unauthorized off-road vehicle and pedestrian trespassing on mitigation lands through fencing and security patrols

Objective: Conduct appropriate site-specific habitat restoration and enhancement activities

Goal 5

Establish a conservation program for the PVSF and mitigation lands that are consistent with published recovery plans

Objective: Establish conserved lands in perpetuity in order to benefit Covered Species.

Goal 6

Have no take of the blunt-nosed leopard lizard so long as the species remains a "fully protected" species under California law and no take of burrowing owl under the MBTA and Fish and Game Code Section 3503.5.

Objective: Strictly enforce BNLL-specific pre-construction survey protocols and resulting recommendations, and implement BNLL-specific best management practices, to ensure take of BNLL does not occur.

Objective: Enforce all relevant conservation measures to ensure no take of individual or nesting burrowing owl occurs.

Goal 7

Do not exceed annual take limits of Covered Species

Objective: Use annual reporting to inform USFWS/CDFG about take of Covered Species

Objective: Maintain database to track annual take.

Goal 8

Implement an effective adaptive management program

Objective: Use the on-going monitoring for the project site and mitigation lands to adjust management and avoidance and minimization strategies in order to promote Covered 6SHFLHV¶ viability.

Objective: Collect data systematically on Covered Species on an annual basis and manage data for accessibility.

Objective: Maintain a central database that uses geographical information system for spatial analysis and presentation of Covered Species locations.

Objective: Use unbiased sampling techniques to collect scientifically credible information about Covered Species abundance and distribution.

Objective: Implement a study to measure preferred habitat characteristics for GKR and use this information for future habitat enhancement.

Objective: Utilize methods to verify if monitoring is sufficient to detect species based on sign alone for the GKR.

Compensation Measures

As noted above, the goal of the avoidance and minimization measures is to reduce the potential for take (see Appendix B). Even if the project successfully avoided all take, conversion of land suitable to support the species, may compromise and reduce the amount of suitable habitat available to the regional populations of the covered species. It has been suggested above solar farms do not render a site completely unsuitable and that a residual value of 40% remains for species such as CTS (upland habitat), WBO, GKR, and SJKF. Therefore, Solargen had developed a program for compensating for these impacts to the habitats of covered species.

The compensation program is based on the level of lost value for the covered species on the project site. The primary goal of the compensation program is to ensure that the lands proposed by Solargen to compensate contain the suitable characteristics of, and can be enhanced and restored to support the habitat features required by the species whose habitats were affected.

Solargen has identified approximately 11,000 acres of land to compensate for impacts to covered species. These lands are mostly to the north of the site (Figure 3).

The following principle will be applied to the conservation program:

‡ Compensation lands will be carefully tailored to reflect the relative importance of the specific lands disturbed by the PVSF. The quantitative sampling (results derived from both the distance sampling and occupancy model sampling) will be used to establish the conservation lands of both the PVSF site and the mitigation lands to ensure that the compensation lands provides habitat values and opportunities that allow the project to fully mitigate.

The following are the key elements of the conservation strategy for fully mitigating impacts to habitat for the covered species.

- Solargen will manage the identified Conservation Lands for habitat purposes only.
- Solargen will enhance the existing habitat conditions on the Conservation Lands, in order to meet the “fully mitigated” standard of CESA, through a variety of means depending on site-specific needs. For example, Conservation Lands may be suitably fenced (e.g., wildlife friendly) along public roads in order to prevent trespassing and damaging use by off-road vehicles. In other locations, Solargen may remove non-native species and/or may plant native species. These measures will be detailed in the final mitigation plan.
- Solargen has identified 11,000 acres for mitigation adjoining the project site. As the project is planned in 5 phases Solargen will place a conservation easement on 2,200 acres for each phase. Thus, prior to the construction of Phase I, Solargen will establish a Conservation Easement on 2,200 acres with an appropriate non-wasting endowment. The size of the endowment will be commensurate with the level of monitoring required for the conservation lands and estimated adaptive management activities.
- Conservation Lands will be managed for endangered species from start of the project (i.e., mitigation precedes impact).
- One year prior to the development of a new phase, Solargen will establish a Conservation Easement on 2,200 acres on the mitigation lands until such time as all 11,000 acres are protected.
- Solargen will provide a sufficient financial guarantee based on land cost, enhancement/restoration cost, management cost, etc. for all Conservation Land.

Providing enhancements will improve habitat quality for target species and therefore presumably increase carrying capacity. In addition, connectivity analysis will provide not only metrics as to the suitability of these lands in promoting regional connectivity between subpopulations, but will also provide a framework for other agencies to work toward accomplishing recovery goals beyond this project. For this plan, these lands will be managed consistent with conservation goals. The mitigation lands are a diverse and rich landscape that assist in the recovery of the covered species.

The standard for fully mitigated will be achieved by

1. discouraging and preventing permitted land use changes
2. decreasing and preventing through traffic
3. decreasing and preventing erosion caused by roads
4. preventing unauthorized access to area and providing signage informing people that they are trespassing in a protected area
5. removing trash and other debris not natural to the landscape (broken fencing, old signage, barbed wire, etc.)
6. restoring degraded areas (eroded, devegetated, disturbed) by implementing measures to prevent further erosion and revegetation with locally native plants
7. maintaining connectivity between subpopulations for target species
8. increasing the acreage of contiguous parcels of protected lands thereby decreasing edge effect

9. site specific management plans that exploit opportunities for enhancement (primarily revegetation, vegetation enhancement, grazing, removal of invasives if diminishing habitat value for target species)
10. employing species-specific enhancements

Finally, a potential long-term problem that faces covered species in this region (particularly terrestrial vertebrates) is fragmentation and the resulting effective isolation from other subpopulations. Therefore, preserving 11,000 acres of lands that support the covered species as well as other important species and promotes regional connectivity between and among populations could contribute significantly to maintaining viability for these species for the long term recovery..

Connectivity Analysis: The maintenance of habitats and connective pathways for wildlife species sensitive to human-caused landscape change is one of the most pressing issues in conservation biology. For this reason, Solargen will provide a thorough connectivity analysis to demonstrate that these compensation lands, not only provide suitable habitat attributes for the covered species, but also provides regional connectivity for the relevant species. Appendix C provides a more detailed discussion of the methodologies to be integrated into this conservation plan.

Monitoring: We will employ the multi-season occupancy sampling to generate estimates as to change for covered species on the mitigation lands. The sampling design and effort will be based on findings on the current occupancy sampling effort that is just getting underway for the project site.

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Appendix A. Distance Sampling for the Project Site and Mitigation Lands

Methods: Distance sampling along line transects was conducted to sample burrow clusters, target species and their sign, and suitable habitat. Hand-held GPS units were used to navigate along the transects and record location data. Transect easting coordinates were determined prior to fieldwork. One or two individuals walked along each transect scanning primarily within 50 m of the transect for burrows and then out to the horizon for other target resources (target species, habitat and other wildlife). When two individuals walked together, one was an observer and one was a data recorder to ensure that no animal was counted twice.

Distance sampling methods assume that line transects are located randomly with respect to the distributions of the units of observation, that all objects are detected on the line, no movement prior to detection and accurate measurements of distances to the observations.

Data were collected on burrow clusters and other data continuously along our transects for the first several days of data collection. After February 23, burrow cluster data were collected for 50 m along the transect at 500 m intervals resulting in 2-50 m sections for every 1 km of transect walked. All other target data were collected continuously along the transect.

For the analysis, kangaroo rat burrow clusters were differentiated from giant kangaroo rats by the size of burrows and size of scat. Burrow clusters with larger burrows (3 inches vs 2.5 inches) and the presence of scat of 7mm or longer rather than 5mm in length were considered giant kangaroo rat burrows. In addition, the presence of large hindfoot tracks was also diagnostic, but this was less common due to the fact that it was early spring and the kangaroo rats were less active, and the ground was often compacted due to periodic rainfall.

The software program DISTANCE (v. 5.0; Thomas *et al*., 2005) was used to analyze the data collected from the line transect survey in order to estimate densities of kangaroo rat and giant kangaroo rat burrow clusters. In addition, depending on detection rates, estimates of densities for other target species will be made. Data preparation and analysis followed published guidelines by Buckland *et al*., 2001.

Final model selection was based on the lowest $, & $ N D L N H ¶ V Information Criterion) value (Burnham & Anderson, 1998). Goodness of fit (χ^2) was used to assess the quality of distance data and the general shape of the detection function. The data were right truncated the width of the maximum sighting distance (w) at least 5% in order to improve model fit.

Results: The burrow cluster data were compiled into two groups: the first group represents the smaller burrows including kangaroo rats, giant kangaroo rats and probable San Joaquin antelope squirrel and the second group, the larger burrows including probable San Joaquin kit fox dens, badger dens, other carnivore dens, and burrowing owl burrows. We analyzed these separately.

Kangaroo rat group: The kangaroo rat burrow cluster data, which included kangaroo rat burrows, probable giant kangaroo rat burrows, and, to a lesser extent, probable San Joaquin antelope squirrel burrows as our targets, were collected in two ways: prior to February 23, we collected burrow cluster data continuously along our transects and after that date, we collected this data in discreet 50 m segments spaced every 450 m. Each of these segments was considered as a separate transect for data analysis.

Our effort resulted in 58.42 km walked in 259 transects. The transects in the Mitigation/Project area spanned both the mitigation and project lands so these were combined this into one category representing a smaller effort (6.4 km in 13 transects).

Table 1: Size of study areas, level of walking effort, number of transects for Distance analysis and number of observations used in this analysis for the kangaroo rat burrow cluster analysis

Study Area	***Area (sq km)***	***Effort (m)***	***No. transects***	***obs***
Entire	63.6	58421	259	456
Project	19.1	19279	60	75
Mitigation	44.5	32709	186	372
Mit/Proj	63.6	6436	13	9

We analyzed the entire study area for all targets combined and then post-stratified by stratum (Mitigation Area, Project Area, Mitigation/Project Area). We tested several models (13) using keys (uniform, half normal, and hazard rate) and adjustments (cosine, simple polynomial and hermite polynomial), different right truncation values, and stratified and non-stratified in DISTANCE, generally relying on the delta AIC values for model selection (lowest delta AIC value). We pooled the probability of detection function [g(0)] for stratified samples to calculate density estimates. For theses analyses, the best model (lowest delta AIC) was the hazard rate (key) plus cosine (adjustment term) with 10% truncation of largest values. In order to estimate resource densities for each stratum, we analyzed each stratum separately post stratifying by burrow cluster type using a pooled g(o) from the respective stratum. We tested 13 models for the Project Area stratum. The best model (the lowest delta AIC) was hazard rate (key) with the cosine adjustment and 5% right truncation of the highest values; the addition of a simple polynomial adjustment did not improve model fitting and the values were the same as the selected model. We tested 11 models for the Mitigation Area. The best model (the lowest delta AIC) was negative exponential (key) with the cosine adjustment with 5% right truncation of the greatest values.

The density estimates for the all targets together (Table 2, Figure 1) show that density in the Mitigation Area is greater than in the Project Area; when these density estimates are broken out by resource type, kangaroo rat densities are higher in the Mitigation Area but the GKR densities are lower (Table 2, Figure 2). When the CI is included, there is a large overlap between the two estimates (see Figure 2). The giant kangaroo rat density estimate may be somewhat misleading for the Mitigation Area due to the fact that although we measured the aerial extent of the burrow cluster and the number of burrows, we did not include in this analysis. Several giant kangaroo rat burrow clusters were very large (> 1 ac) in size and contained many burrows and likely several precincts, therefore artificially lowering the overall ³ G H Q V L W \ ´ measured when just considering this as one unit. We hope to rectify in a later more detailed analysis.

Table 2: Density estimates for all ³ N D Q J D U R R´ burrow clusters for the entire study area and stratified by each study area, and for burrow cluster type (GKR = giant kangaroo rat, kangaroo rat, and probable San Joaquin antelope squirrel) for each study area (pooled detection function from each stratum).

Study Area	***Target***	***Density (per sq km)***	***%CV***	***df***	***95% CI (lower)***	***95% CI (upper)***
Entire	All (Krat, gkr, prob SJAS)	1168.6	17.22	154.99	833.8	1638.0
Project Area	All (Krat, gkr, prob SJAS)	272.8	49.27	59.93	107.4	693.3
Mitigation	All (Krat, gkr, prob SJAS)	797.7	14.87	220.29	596.0	1067.6
Mit/Project	All (Krat, gkr, prob SJAS)	98.1	86.11	12.06	19.4	496.5
Mitigation	GKR	86.7	41.65	191	39.4	190.7
Mitigation	kangaroo rat	990.7	15.46	234	731.9	1340.9
Mitigation	probable sjas	14.4	27.69	198.89	8.5	24.7
Project	GKR	144.7	79.50	76.79	35.9	583.3
Project	kangaroo rat	129.7	56.21	99.94	45.9	366.7

Figure 1: Density estimates for all target species (D±SE) in the Mitigation and Project Area

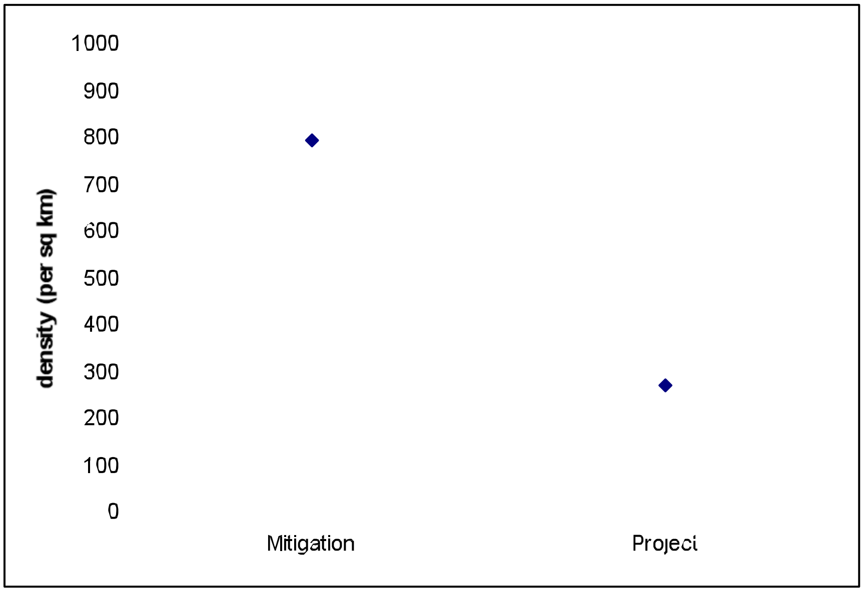
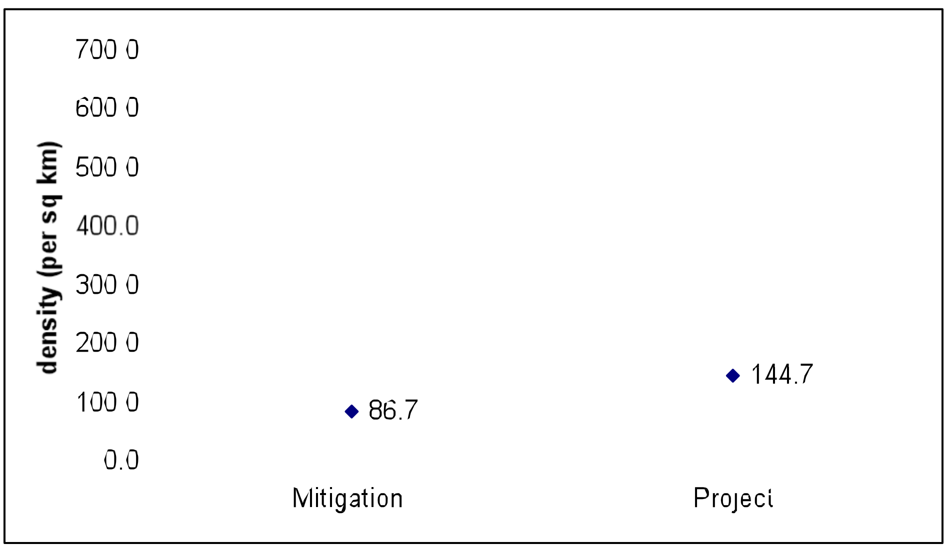


Figure 2: Giant kangaroo rat density estimates (with upper and lower CI) for the Mitigation and Project Areas.



Larger burrows: potential San Joaquin kit fox dens, badger dens, and burrowing owl burrows

We collected carnivore den, potential San Joaquin kit fox den, badger den and burrowing owl burrow location data continuously along our transects. Our total effort resulted in 162.3 km in 60 transects of effort for this analysis. We included the Mitigation/Project Area in two cases where transects were equally distributed in both the Mitigation and Project Area.

Table 3: Size of study areas, level of walking effort, number of transects, and number of observations used for this Distance analysis for potential San Joaquin kit fox den, badger dens, other carnivore dens, and burrowing owl burrows

Study Area	***Area (sq km)***	***Effort (m)***	***No. trans***	***obs***
Entire	63.6	162294	60	163
Project	19.1	40169	17	53
Mitigation	44.5	110737	43	94
Mit/Proj	63.6	11388	2	16

We analyzed the entire study area for all the data combined and then post-stratified by stratum (Mitigation Area, Project Area, Mitigation/Project Area). We tested several models (14) using keys (uniform, half normal, and hazard rate) and adjustments (cosine, simple polynomial and hermite polynomial) with different right truncation values, and stratified and non-stratified in DISTANCE, generally relying on the delta AIC values for model selection (lowest delta AIC value). We pooled the probability of detection function [g(0)] from the entire effort to calculate density estimates for stratified samples. For theses analyses, the best model (lowest delta AIC) was the uniform (key) plus cosine (adjustment term) with 10% right truncation of largest values.

We detected burrowing owl burrows (n = 12), badger dens (n = 12), potential San Joaquin kit fox dens (n = 130), generic carnivore dens (n = 10), coyote dens (n = 8) and a red fox den (red fox observed). San Joaquin kit fox presumably would use most of these structures for shelter and denning with the exception of the larger coyote dens.

The density estimate for the Project Area is greater than the Mitigation Area with overlapping confidence intervals (CI) (Table 4, Fig. 3); standard error bars show some separation of the estimates but the error bars overlap (Fig. 4). I am not at all sure why the density estimate for the Entire study area is so much higher than the other three estimates. The few number of transects walked for the Mitigation/Project Area (n = 2) contributed to the very large CI for this estimate; it is only included here to show why the Entire study area estimate is greater than the other estimates.

Table 4: Density estimates for target resources (potential San Joaquin kit fox den, badger dens, other carnivore dens, and burrowing owl burrows) for the entire study area stratified by each study area. (*D* = density)

Study Area	Target	*D* (per sq km)	%CV	df	95% CI (lower)	95% CI (upper)
Entire	Carnivore dens and burrowing owls burrows	131.9	19.89	4.29	77.5	224.7
Project Area	Carnivore dens and burrowing owls burrows	48.7	26.48	22.01	28.4	83.6
Mitigation	Carnivore dens and burrowing owls burrows	31.3	21.50	65.33	20.5	47.9
Mit/Project	Carnivore dens and burrowing owls burrows	51.9	36.48	1.18	2.2	1234.1

Figure 3: Density estimates (potential San Joaquin kit fox dens, badger dens, other carnivore dens, and burrowing owl burrows) with upper and lower CI (see Table 3 above) for each study area.

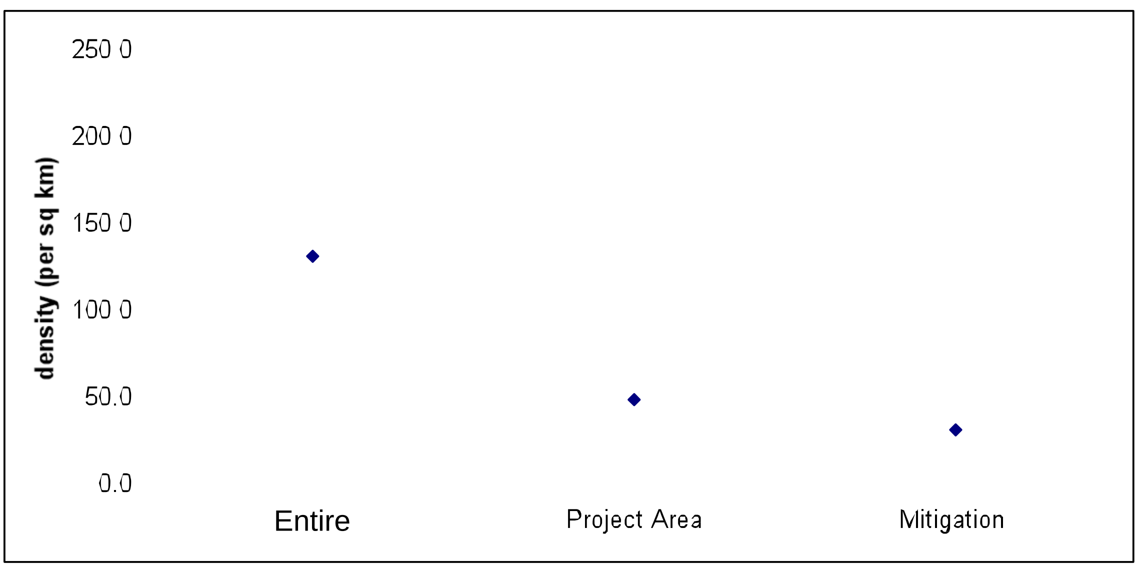


Figure 4: Density estimates (potential San Joaquin kit fox dens, badger dens, other carnivore dens, and burrowing owl burrows) with upper and lower CI (see Table 3 above) for the Mitigation and the Project Area.

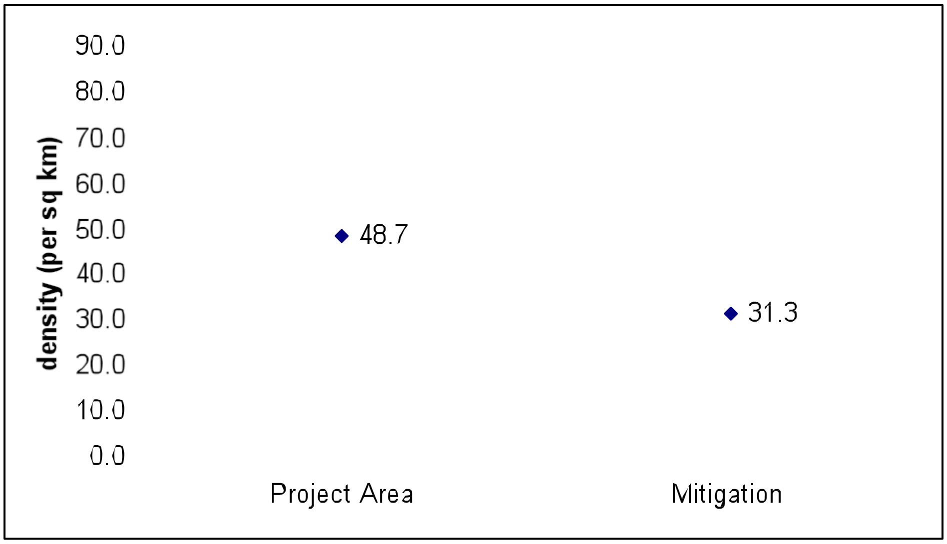
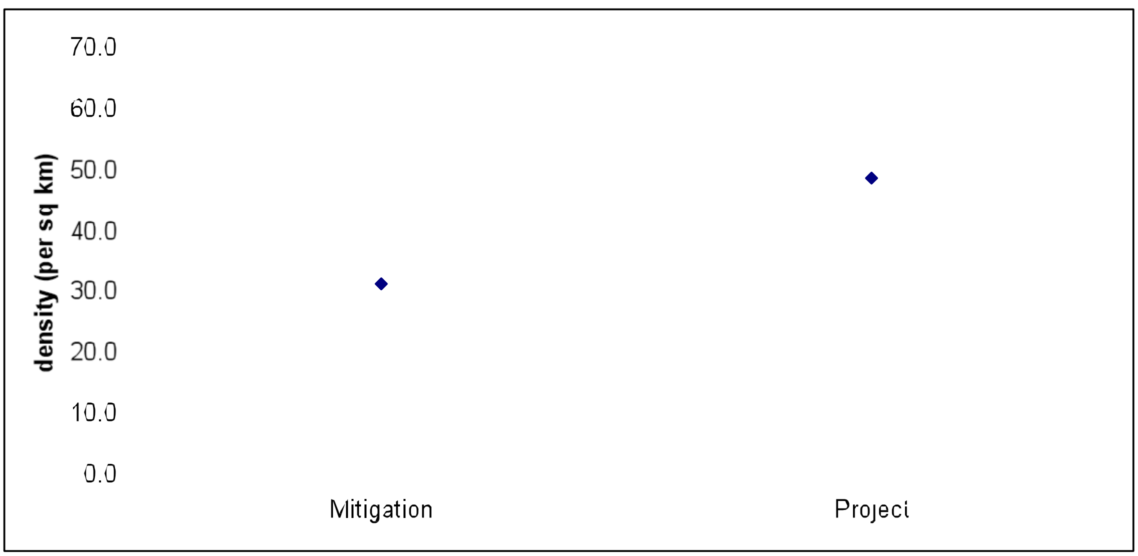


Figure 5: Density estimates (*D*±SE) for potential San Joaquin kit fox dens, other carnivore dens, badger dens and burrowing owl burrows for the Mitigation and Project Areas



APPENDIX B: Best Management Practices

All employees and contractors will be made aware of the BMPs, and those BMPs that are pertinent to employee work conduct will be implemented. They are listed below.

a) Prior to surface disturbance or other covered activity, a qualified wildlife biologist shall conduct a Covered Species education program (tailgate briefing) for all project personnel. Topics to be discussed during the briefing shall include: occurrence and distribution of Covered Species in the project area, take avoidance measures being implemented during the project, reporting requirements if incidental take occurs, and applicable definitions and prohibitions under the California Endangered Species Act.

b) All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a qualified biologist. The biologist(s) shall identify and clearly mark the location of areas where Covered Species was/were identified, dens or burrows and habitats of Covered Species that are to be avoided Appropriate buffers will be established with highly visible markers. When burrows or dens are to be destroyed, a qualified biologist will determine when excavation procedures should be employed to protect individual covered species and when it is not necessary.

c) For some projects, a qualified biologist may determine that [a] biological monitor(s) shall be present while ground disturbing activities are occurring based on the sensitivity of the habitat in which a project occurs. In addition to conducting preconstruction surveys for the project, the biological monitors shall aid crews in satisfying take avoidance criteria and implementing project mitigation measures, will document all pertinent information concerning project effects on Covered Species, and shall assist in minimizing the adverse effects of project activities on Covered Species. Biological monitors shall accompany vehicles and crews throughout the project area if the qualifying biologist considers it necessary in order to avoid sensitive resources.

d) Biological monitors are empowered to order cessation of activities if take avoidance and/or mitigation measures are violated and will notify 6RODUJHQ¶V environmental representative.

e) Unless otherwise allowed under preconstruction procedures (see discussion of b above), all known and potential San Joaquin kit fox dens, known or detected giant kangaroo rat burrows, known or detected San Joaquin antelope squirrel burrows, burrows inhabited by blunt-nosed leopard lizards, blunt-nosed leopard lizard habitat, burrowing owls burrows, shall be protected by implementing the following procedures:

The following table lists avoidance criteria for listed wildlife resources and conditions are as follows:

AVOIDANCE CRITERIA	
Type of Sensitive Area	**Radius of Buffer Zone in Feet**
Occupied kit fox den	100
Known kit fox den	100
Known kit fox natal den	150

Occupied kit fox natal den	200
Potential kit fox den	50
Giant kangaroo rat burrows (active and inactive)	50
San Joaquin antelope squirrel burrows	50
Occupied blunt-nosed leopard lizard burrows	50
Rodent burrow in wash (blunt-nosed leopard lizard habitat)	30
Burrowing owl burrows (breeding season)	250
Burrowing owl burrow (non-breeding season)	150

f) Unless biological monitors allow alterations to routes, all project vehicles shall be confined to existing roads or prominently staked and/or flagged access routes that are surveyed prior to use. All observed Covered Species and their habitat features such as dens, burrows or specific habitats shall be flagged as necessary to alert project personnel to their presence. All project-related flagging shall be collected and removed after completion of the project.

g) Where feasible, Solargen shall make every reasonable effort to avoid the collapse of dens and burrows where practicable by relocating project elements or by using other means as determined to be appropriate. When these features cannot be avoided, a qualified biologist will oversee the excavation and/or collapse of burrows or dens.

h) Biological monitors shall keep an accurate tally of the number of sensitive resources (as listed above) that are damaged, destroyed, or otherwise affected by project activities. Additionally, monitors shall estimate the number of small mammal burrows damaged, destroyed, or otherwise affected. Total number of dens and burrows affected by the project shall be reported in the post-activity compliance report and entered into a central database developed expressly for that purpose.

i) Potential kit fox dens that cannot be avoided may be excavated and back-filled pursuant to USFWS guidelines (June 1999) without prior notification, provided that excavation is approved and supervised by a biological monitor or other qualified biologist. Destruction of all kit fox dens shall be reported in the post-activity compliance report.

j) Solargen shall appoint an company representative who will be the contact source for any employee or contractor who inadvertently kills or injures a Covered Species or who finds a dead, injured, or entrapped individual or who finds a dead, injured or entrapped covered animal species. The representative will be identified during the pre-performance educational briefing.

k) Any contractor, employee(s), or other personnel who inadvertently kills or injures a covered animal species shall immediately report the incident to their representative. The representative shall contact the 6 R O D U J H Q ¶ V environmental representative and, if feasible, a qualified biologist. Solargen will contact CDFG immediately in the case of a dead, injured, or entrapped listed species. The covered Species CDFG contact for immediate assistance is State Dispatch at (916) 445-0045. State Dispatch will contact the local warden or biologist. The qualified biologist will also document all circumstances of death, injury or entrapment of

Covered Species. The biologist will 1) take all reasonable steps to enable the individual animal to escape should it be entrapped, 2) contact CDFG or other appropriate authorities to identify an approved rehabilitation center and appropriate capture and transport techniques should the covered animal be injured, and 3) document circumstances of death in writing and if possible photographing dead animal *in situ* prior to moving.

l) USFWS and CDFG shall be notified in writing within three (3) working days in the event of an accidental death or injury of a San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, or San Joaquin antelope squirrel or of the finding of any dead or injured kit fox, giant kangaroo rat, blunt-nosed leopard lizard, San Joaquin antelope squirrel for other Covered Species. Notification shall include the date, time, and location of the incident or of the finding of a dead or injured animal, and any other pertinent information. The USFWS contact for this information is the Endangered Species, Program Field Office, 2800 Cottage Way, Room W-2605, Sacramento, CA 95825, (916) 414-6600. The CDFG contact information is 1416 9th Street, Sacramento, CA 95814, and (916) 654-4262. Any dead or injured kit fox, giant kangaroo rat, blunt-nosed leopard lizard, or San Joaquin antelope squirrel shall be turned over to the California Department of Fish and Game's Environmental Services Division, Fresno Regional Headquarters at (209) 445-6152 at the D J H Q F \ ¶ V request. The dead covered animal can be transported to California State University at Bakersfield or the Endangered Species Recovery Team in Bakersfield for storage and research if CDFG approves.

m) To prevent inadvertent entrapment of Covered Species, all open holes, steep-walled holes, or trenches more than 2 feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be more no less than 10 inches in width and should reach to bottom of trench). Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals.

n) All spills of hazardous materials shall be cleaned up immediately in accordance with the Solargen Spill Prevention Control Plan.

o) Pets are prohibited at the PVSF.

p) Firearms are prohibited at the PVSF.

q) 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 project sites.

r) Use of rodenticides and herbicides in project areas is prohibited with the exception of those applied near buildings/critical facilities. Only agency approved compounds will be applied (if necessary) 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.

s) All project-related vehicles shall observe a speed limit of 25 mph or less on all except as posted on State and County highway/roads or paved facility roads.

t) Motorized vehicles are prohibited within occupied Covered Species habitat. If not avoidable, that area will be considered temporarily disturbed and size will be limited in width to 25 feet (12.5 feet on either side of the centerline).

u) Appropriate measures shall be undertaken to prevent unauthorized vehicle entry to off-road survey routes in sensitive habitat areas. Signing will be the preferred method to discourage use.

v) Project vehicles shall be confined to existing primary or secondary roads or to specifically delineated project sites (i.e., areas that have been surveyed and described in existing documentation). Otherwise, off-road vehicle travel is not permitted.

w) Upon completion of any project, all areas that are significantly disturbed and not necessary for future operations, shall be stabilized to resist erosion, and revegetated and re-contoured if necessary, to promote restoration of the area to pre-project conditions.

Employee Education Program

The Employee Education Program familiarizes Solargen employees and contractors with BMPs and other measures regarding Covered Species. This program is designed to ensure all personnel who work at the PVSF are aware of and can identify the Covered Species and the measures implemented to protect these species. In addition, contact names and numbers are given to which personnel can report incidents regarding Covered Species.

An employee environmental program (awareness) will be administered to all new employees and to all other employees every 2 years. Upon completion of the program, the employees are given a badge that is required for admittance onto the PVSF. Badges will include the HPSOR\HH¶V picture and will be color-coded and dated in order to show that the employee is current with required training.

Prior to beginning work at the PVSF, all new employees, contractors, and other personnel that work at the PVSF and associated right-of-ways will complete an employee education program that includes a section on Covered Species awareness. Personnel must take the Employee Education Program administered test. Training included in the Employee Education Program pertains to Covered 6SHFLHV¶ identification, Covered 6SHFLHV¶ basic natural history, components of avoidance and minimization program, familiarity with preconstruction surveys and what they are and how they are administered, BMPs, and how to report incidents involving Covered Species.

The employee or contractor for PVSF will be shown examples (i.e., pictures) of Covered Species and their burrows, dens, nests or other sign. Basic natural history facts for each of the Covered Species will be included in information given to employees. All BMPs will be provided in easy to carry pamphlets for reference while working at the PVSF and lands within the 2-mile buffer.

A review of the BMPs will be conducted for each employee and a test will be administered to verify that employees have a familiarity with the provisions in the BMPs.

Appendix C. Connectivity Analysis

The fate of wide-ranging species depends critically on planning efforts that simultaneously consider the habitat requirements and ecological processes that motivate animal movement over long distances. However, planners require more specific information on the features of wildlife habitat that promote or impede the linkage and maintenance of population core areas on large landscapes, including vegetation, topography, and anthropogenic barriers.
The space use needs of large mammals are rarely considered at spatial scales relevant to the species. Often these efforts are based on legal and not bioregional boundaries and, as such, cannot easily accommodate the conservation of wildlife habitats that extend beyond the legal boundaries of sites or planning efforts. In addition, simplistic attempts to identify ³ P R Y H P H Q W F R U U L G R U V ´ usually focus on delineating ³ F R U U L G R U V ´ which can best be defined as ³ U R X W H V that facilitate movement of organisms between habitat I U D J P H Q W V ´ (Hilty et al. 2006:5). Corridor delineation efforts, however, typically invoke simplistic judgment-based exercises describing static habitat patterns, and do not explicitly integrate the ecological *processes* of animal movement (e.g., dispersal). Moreover, corridor studies tend to occur at relatively small spatial scales and emphasize one (or few) possible pathways between patches of habitat presumed to be suitable. For example, some rely on the non-statistical least cost path (LCP) or least cost corridor (LCC) method to identify ³ Z L O G O L I H F R U U L G R U V ´ as it is widely available as a free extension to ArcGIS and relatively simple to run. The challenge is that due to the unrealistic assumptions (e.g., animals have perfect knowledge of their landscape) and overly simplistic results of a single ³ R S W L P D O corridor´, conservation efforts for rare or sensitive species are more likely compromised than benefited.

Some have tried to circumvent the inherent problems with LCP by a tortuous process of rerunning the model with different end points to define multiple pathways. However, all that this accomplishes is to compound the intrinsic flaws of the LCP model, and unfortunately for the untrained eye, provides a ³ U H D V R Q D E O H ´ facsimile of how species move between and among suitable habitat patches. Sadly, this approach merely legitimizes a non-statistical and highly flawed modeling methodology and its resultant ³ V R O X W L R Q V ´. This is why landscape ecologists have argued that complex connectivity measures that not only take into account the movement abilities of the species, but also the distances to all possible population sources, perform better at defining the connectedness of a landscape (Moilanen and Nieminen 2002, Lindenmayer and Fischer 2006). While it is desirable to strive for parsimony (e.g., 2 F N K D P ¶ V Razor) in deriving spatial models, it is a fallacy to believe that overly simplistic models are parsimonious ±it is a bit counter-intuitive, but complex models that do a better job of approximating reality are in fact more parsimonious than simple models that are based on seriously flawed assumptions (e.g., LCP). For example, it is a tautology (i.e., circular) to run a LCP analysis several times trying to identify multiple pathways as the artificial placement of end points ³ S U H G H W H U P L Q H V ´ the pathway. Thus it is a fallacy to believe the multiple LCP runs accomplish the type of analyses that Moilanen and Nieminen (2002) were advocating.

Indeed, when recommended mitigation areas are improperly identified there can be great risk to both animals and resource investments. In this context, landscape-level approaches and predictive, probabilistic models that are rigorously derived and ecologically meaningful are needed.

San Joaquin Kit Fox: The movements of wide-ranging animals, such as the kit fox, are most influenced by the dominant attributes of the habitat mosaic to be navigated, namely vegetation. At the moment, we propose to rely on currently available spatial data on vegetation communities in California which have been derived at a 30-100-m resolution using satellite imagery acquired during the previous decade (e.g., CALVEG, Landfire). We will use USGS digital elevation models (DEMs; 10m) to derive multiple terrain features, including topographic position and landscape ruggedness. Each of these data layers will be subjected to a formal process of expert and literature review in order to vet, classify, and weight each layer (i.e., ³ Y D U L D E O H ´ entering into the habitat and connectivity models described below. Typically, 6 to 8 variables are selected and integrated into these analyses. All data layers and models will be derived using cutting-edge remote sensing and geographic information system applications where appropriate.

As we did for the cougar model in Southern California, the vegetation cover map will not simply be a ranking of various cover classes but the ensuing vegetation map will incorporate patch metrics. In other words, the subsequent value of a pixel will be integrated into the neighborhood by which it is surrounded. This considers the fact that the adjacent land cover types influence the importance of a habitat type for a target species. For example, riparian habitat within a mosaic of oak woodland and chaparral habitats is of higher value for a cougar than riparian habitat contained entirely within an urban matrix. In other words, context is important.

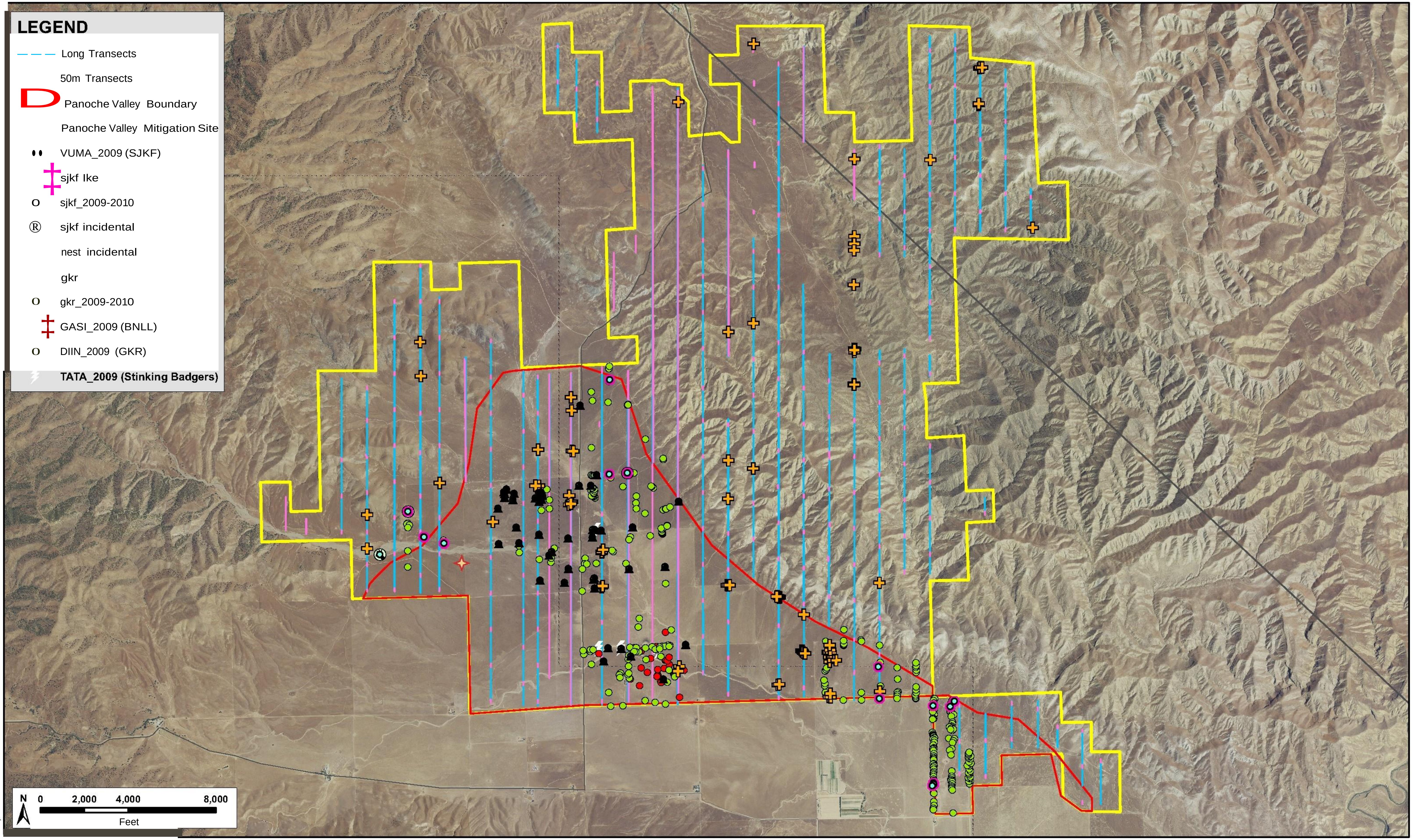
We will develop an expert-based model of habitat suitability for San Joaquin kit fox using the relevant habitat data layers and relying on the ranking of 4 or 5 experts. On a continuous scale of 0 ±1000, each expert will score the relative likelihood of each habitat attribute, R U ³ F H O O V ´ (at the scale of the 30-m grid cell) to ³ V X S S R U W ´ in the day-to-day behaviors of an individual kit fox within an established home U D Q J H Scored values of 1000 indicate ³ P R V W O L N H O \ ´ and values of 0 indicate ³ Q R W F D S D E O H ´ We will use a quantile classification method to initially divide the distribution of cell values for the certain data layers such as topographic position, roads, developments layers into 10 suitability classes (score = « Z K H U H 100 was lowest and 1000 was highest).

We will use a modification to the GIS-based Weighted Linear Combination (WLC) procedure described by Malczewski (2000) to average habitat class score values and to weight and combine individual habitat data layers. We will compute an average expert-defined habitat class score value and create a new layer that assigns this value to each cell in that habitat class. Separately, individual experts will be requested to assign an importance value (on a continuous scale of 0 ± 1000) to each of the habitat layers and will compute a ³ V Z L Q J Z H L J K W ´ (sensu Malczewski 2000) for each layer by dividing its importance value by the sum among all importance values. Briefly, swing weights are derived by asking an expert to compare a change, or swing, from the least- to most-suitable habitat class value for a given habitat layer to a similar change in another habitat layer, and scoring the importance of all layers accordingly. Next we will create a preliminary habitat suitability layer by calculating the average importance value from among all experts, computing a new swing weight for each layer, and then multiplying this value by the average expert-defined habitat class score value at each cell. We will then add the products for each of the final layers together. Finally, we will reclassify these new values using a GIS algorithm that identifies four quartile breaks in the data distribution, where the 75th percentile represents the highest suitability areas. We will use this more parsimonious classification (1=low suitability and 4=high suitability) as our final habitat suitability layer.

To characterize potential large core habitat areas on the study area, we will use a circular moving window and focal-majority operation in the GIS to identify contiguous areas with the highest habitat suitability values that are within a suitable radius (i.e., radius will be based on average home range size for the region) of each 30-m cell on the study area. Importantly, we will consider core habitat areas to be large patches of contiguous high suitability habitat, typically nested within broader suitable areas on the landscape, and that are capable of supporting the minimum prey and cover requirements for source and destination populations of dispersing kit fox.

A key ecological principle is that on large landscapes with suitable and well-connected habitat features, greater numbers of low resistance pathways will permit greater current (or energy) flow between pairs of nodes. That is, greater connectivity among populations or core patches is predicted when more connected pathways are available. Because they have a solid mathematical foundation in random walk theory and probabilistically incorporate all possible pathways linking habitat features, circuit-theoretic models convey greater realism than more common analytical approaches, such as least-cost path analysis (see McRae et al. 2008).

We will use a similar approach for identifying regional connectivity issues for GKR



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Solargen Photovoltaic Facility (3128-01)

May 201

MEMORANDUM

Date: **March 13, 2015**

To: Jennifer Kaminsky

Of: Burns and McDonnell Engineering Company, Inc.

From: Randi McCormick, Principal Biologist

Subject: Early season rare plant surveys of Panoche Solar Project Footprint

Purpose

The purpose of this memorandum is to briefly document an early season rare plant survey conducted by McCormick Biological, Inc. on the Panoche Solar Project Footprint (approximately 2,506 acres) plus a buffer of at least 100 feet located in San Benito County, California (Attachment 1). In addition, eight wire pull sites, three guard structure sites, four temporary work areas, All Dielectric Self-Supporting (ADSS) pole sites and one helicopter landing zone were surveyed. These areas are located within natural lands that represent potential habitat for rare plant taxa along the proposed telecommunications routes for the Panoche Valley Solar Project (Project) within Pacific Gas &Electric (PG&E) right-of-way in San Benito and Fresno Counties. These surveys were conducted in compliance with MM BR-3.1 of the draft Supplemental Environmental Impact Report for the Revised Project.

Survey

Survey methods were consistent with the *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFW 2009) (Protocols). Each of the Project components was surveyed by qualified botanists using walking transects spaced no more than 20 meters apart. Special attention was given to areas of unusual soils and high species diversity. Reference sites that were located within approximately ten miles of the Project Footprint were surveyed for three early season rare plant species, San Joaquin wooly threads (*Monolopia congdonii*), forked fiddleneck (*Amisinckia furcata*), and Panoche peppergrass (*Lepidium jaredii* ssp. *album*), to verify survey timing. All three of these taxa were verified to be in a flowering and fruiting stage that enabled positive identification. Reference sites for all potentially occurring rare plant species were not visited; however, these three species were considered suitable proxies for verification of appropriate timing for potentially occurring early flowering plant species. Several of the target rare plant species are expected to flower later in the season. GPS points were taken to enable follow-up surveys for the plants in these genera that could not be identified during the survey

All plant taxa encountered were identified to the extent possible. Identifications were made using keys contained in The Jepson Manual: Vascular Plants of California (2nd Edition) (2012) and updates found in the Jepson eflora (http://ucjeps.berkeley.edu/IJM.html), containing revisions to taxonomic treatments. Plant identifications were made using a 10x or greater magnification field hand lens and/or were collected and identified using a dissecting microscope.

When encountered, observations of special-status plant species were documented as follows: coordinates were recorded using a handheld global positioning unit, number of plants in the population was counted (<50 individuals) or estimated (>50 individuals), percent of population flowering, vegetative, and/or in fruit was estimated. If enough individuals were present, a voucher specimen was collected following standard botanical collecting guidelines.

The survey was conducted between March 3 and March 13, 2015. Between five and seven surveyors walked parallel transects on the Project Footprint and the 100 foot buffer. Each of the PG&E telecommunications elements was inventoried by one to two surveyors. The target list of rare plants was compiled in the Panoche Valley Solar Project Final EIR, and is shown in Table 1 below:

Table 1: Target List of Rare Plant Species

Species	**Status**	**Flowering Period**	**Comments**
Amsinckia furcata Forked fiddleneck	CRPR 4.2	March-May	
Androsace elongata ssp. *acuta* California androsace	CRPR 4.2	February-April	
Antirrhinum ovatum Oval-leaved snapdragon	CRPR 4.2	May-July	
Astragalus macrodon Salinas milk vetch	CRPR 4.3	April-June	
Astragalus rattanii var. *jepsonianus* Jepson's milk vetch	CRPR 1B.2	April-June	
Atriplex cordulata var. *cordulata* Heartscale	CRPR 1B.2	June-July	
Atriplex coronata var. *coronata* Crownscale	CRPR 4.2	March-October	
Atriplex coronata var. *vallicola* Lost Hills crownscale	CRPR 1B.2	April-September	
Atriplex depressa Brittlescale	CRPR 1B.2	June-October	
Atriplex joaquiniana San Joaquin spearscale	CRPR 1B.2	April-September	
Atriplex minuscula Lesser saltscale	CRPR 1B.1	April-October	
Atriplex subtilis Deltoid bract saltbush	CRPR 1B.2	June-October	
Blepharizonia plumosa Big tarplant	CRPR 1B.1	July-November	
California macrophylla Round leaved filaree	CRPR 1B.1	March-July	

Camissonia benitensis San Benito evening primrose	FT, CRPR 1B.1	April-June	
Campanula exigua Chaparral harebell	CRPR 1B.2	May-June	
Caulanthus californicus California jewelflower	FE, SE, CRPR 1B.1	February-April	
Caulanthus lemmonii Lemmon's wild cabbage	CRPR 1B.2	March-May	
Chorizanthe ventricosa Priest Valley spineflower	CRPR 4.3	May-September	
Chlorophyron molle ssp. *hispidum* Hispid bird's beak	CRPR 1B.1	June-September	
Deinandra halliana Hall's tarplant	CRPR 1B.1	April-May	
Delphinium californicum ssp. *interius* California larkspur	CRPR 1B.2	April-June	
Delphinium gypsophilum ssp. *gypsophilum* Pinoche Creek larkspur		March-June	
Delphinium recurvatum Recurved larkspur	CRPR 1B.2	March-June	
Eriastrum hooveri Hoover's eriastrum	CRPR 4.2	March-July	
Eriogonum gossypinum Cottony buckwheat	CRPR 4.2	March-September	
Eriogonum nudum var. *indictum* Naked buckwheat	CRPR 4.2	April-December	
Eriogonum temblorense Temblor buckwheat	CRPR 1B.2	April-September	
Eriogonum vestitum Idria buckwheat	CRPR 4.3	April-August	
Fritillaria falcata Talus fritillary	CRPR 1B.2	March-May	
Fritillaria viridea San Benito fritillary	CRPR 1B.2	March-May	
Lagophylla diabolensis Diablo Range hare leaf	CRPR 1B.2	April-September	
Layia discoidea Rayless layia	CRPR 1B.1	May	
Layia heterotricha Pale yellow layia	CRPR 1B.1	March-June	
Layia munzii Munz's tidy tips	CRPR 1B.2	March-April	
Lepidium jaredii ssp. *album* Panoche pepper grass	CRPR 1B.2	February-June	
Leptosiphon ambiguus Serpentine leptosiphon	CRPR 4.2	March-June	

Madia radiata Golden madia	CRPR 1B.1	March-May	
Malacothamnus aboriginum Gray bushmallow	CRPR 1B.2	April-October	
Monolopia congdonii San Joaquin woollythreads	FE, CRPR 1B.2	February-May	
Navarretia nigelliformis ssp. *radians* Adobe navarretia	CRPR 1B.2	April-July	
Navarretia prostrata Prostrate navarretia	CRPR 1B.2	April-July	
Phacelia phacelioides Mt. Diablo phacelia	CRPR 1B.2	April-May	
Senecio aphanactis California groundsel	CRPR 2B.2	January-April	
Streptanthus insignis ssp. *lyonii* Arburua Ranch jewelflower	CRPR 1B.2	March-May	

FE = Federally Endangered SE = State Endangered

CRPR = California Plant Rank (California Native Plant Society)
1B = Plants that are rare, threatened, or endangered in California and elsewhere
4 = A watch list; plants of limited distribution
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3: Not very endangered in California

Findings

No federal or state listed rare, threatened or endangered plant species were observed within the survey area during this early season survey. Several plant species ranked by the California Native Plant Society were observed (See Table 1 and Figure 1). Relatively small populations of forked fiddleneck, serpentine leptosiphon, and California groundsel were found within the Project Footprint. In the region, forked fiddleneck is found at several locations numbering in the thousands, while relatively large populations of serpentine leptosiphon (10,000+) and California groundsel (50+) were found outside of the Project Footprint during the survey. The locations of these observations are shown on Figure 1 attached.

Impacts to a small portion of a population (i.e., a few individuals) of plants that are not federally or state-listed, or impacts to a population for which loss of a local population would not substantially affect the range of the species have been considered in the 2010 Final EIR and 2014 Supplement EIR, Section C.6.

Impacts to these species would be reduced through implementation of Mitigation Measures BR-G.1 through BR-G.6 which states, (1) All construction personnel participate in the Worker Environmental Education Program; (2) Best Management Practices (BMPs) for biological resources are implemented; (3) A Habitat Restoration and Revegetation Plan is developed and implemented; (4) Biological construction monitoring is implemented; (5) Conservation easements are created for permanent habitat protection as appropriate; and (6) A Habitat Mitigation and Monitoring Plan is developed and implemented for mitigation lands. MM BR-1.1 would ensure the preparation and implementation of a Weed Control Plan and MM BR-1.2 would ensure the development of a Grazing Plan for vegetation management on the site. In addition, MM AQ-1.1 would reduce impacts from fugitive dust. Finally, MM BR-3.1 would require pre-construction surveys for special-status plant species. These measures would reduce impacts to these CNPS-listed plants. A results survey report will be prepared that includes a list of all plant taxa identified during the survey and recommendations regarding follow-up surveys to fulfill the methods for comprehensive floristic surveys as described in the CDFW Protocols.

Participating Botanists

The following individuals assisted in the early season rare plant surveys for the Panoche Valley Solar Project: Marcus Jones, Ed Kentner, Russell Kokx, Eve Laeger, Randi McCormick, Gene Moise, Keir Morse, and Jordan Zylstra.

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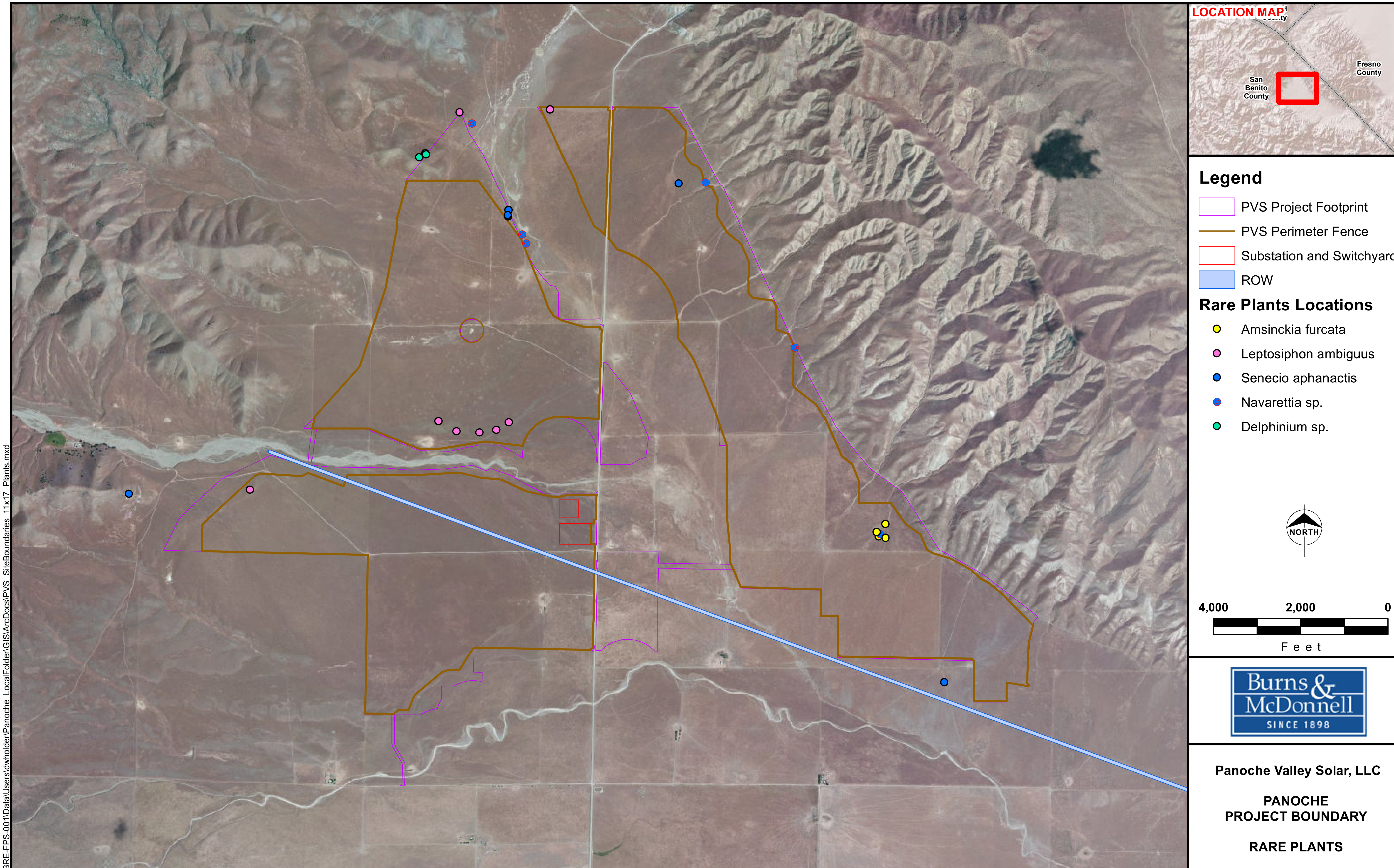

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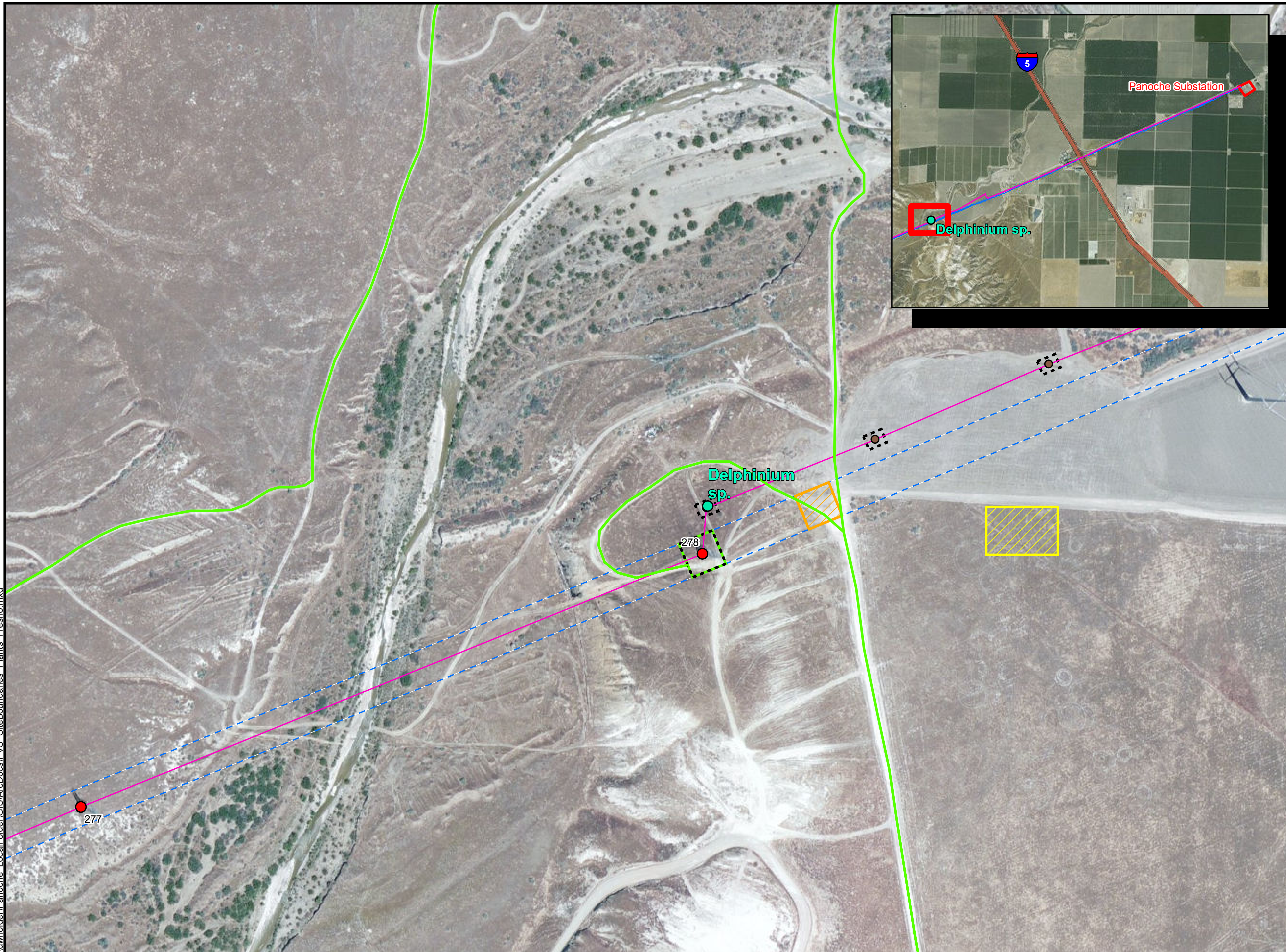
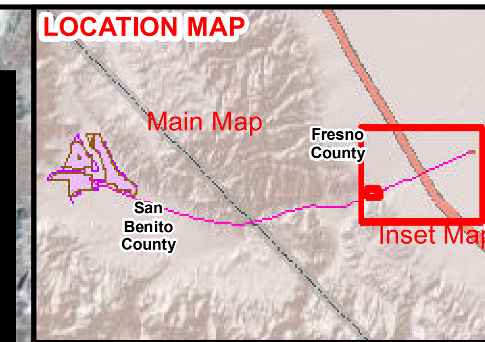
Panoche Valley Solar Project Boundary, 1:24,000, DWHolder, 1/9/2015





Legend

- PVS Project Footprint
- PVS Perimeter Fence
- Existing 12kV Poles for ADSS
- OPGW
- Access Routes
- Work Area
- Work Area - No Ground Disturbance
- Wire Stringing Site
- Helicopter Landing Zone
- ROW Boundary

Rare Plants Locations

- Delphinium sp.

NORTH

400 200 0

Feet

Burns & McDonnell SINCE 1898

Panoche Valley Solar, LLC

PANOCHE PROJECT OPGW

RARE PLANTS

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Panoche Valley Solar Project Boundary, 1:2,400 DWHolder, 3/24/2015