

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 chrysaetos*) 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 sabiniana*) 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.

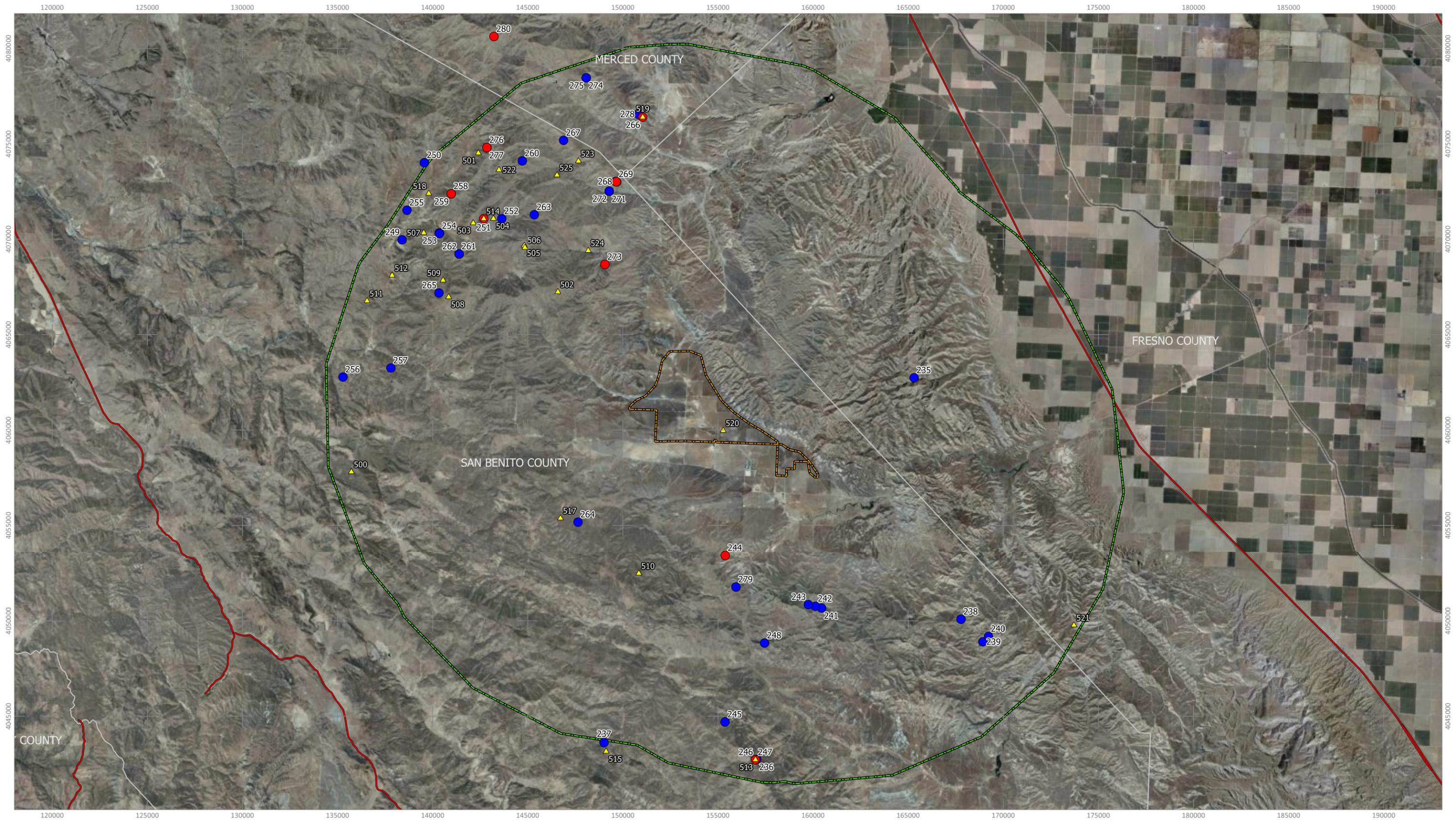
6.0 RESULTS & DISCUSSION

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.



- County Border
 - Major Road
 - Proposed Project Boundary
 - Study Area
-
- Observation Type
- Active Golden Eagle Nest
 - Inactive Golden Eagle Nest
 - Golden Eagle Observation



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

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



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



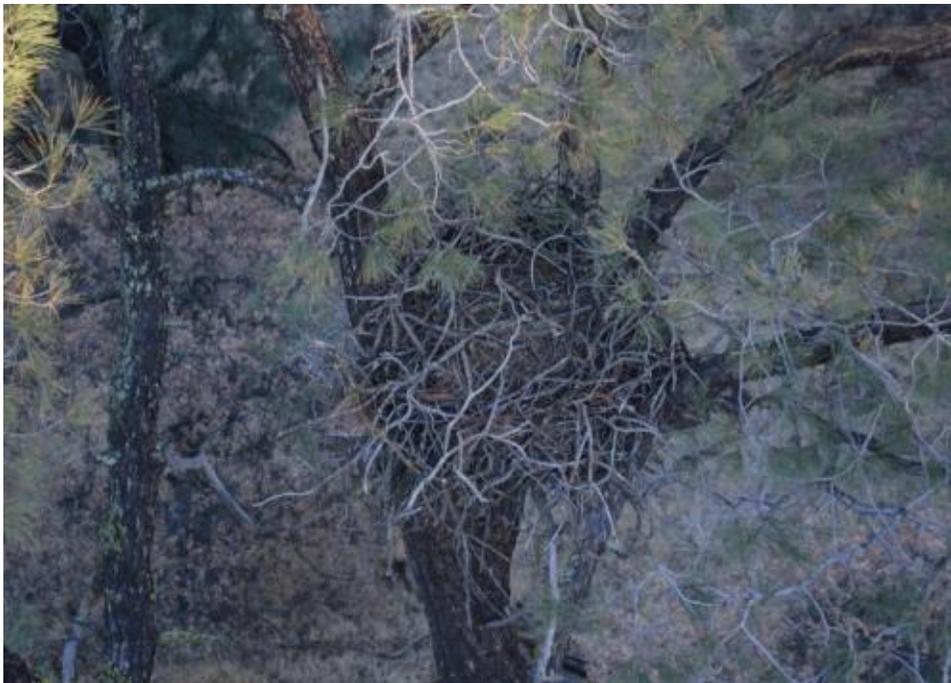
Nest ID 255



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	Prairie 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	

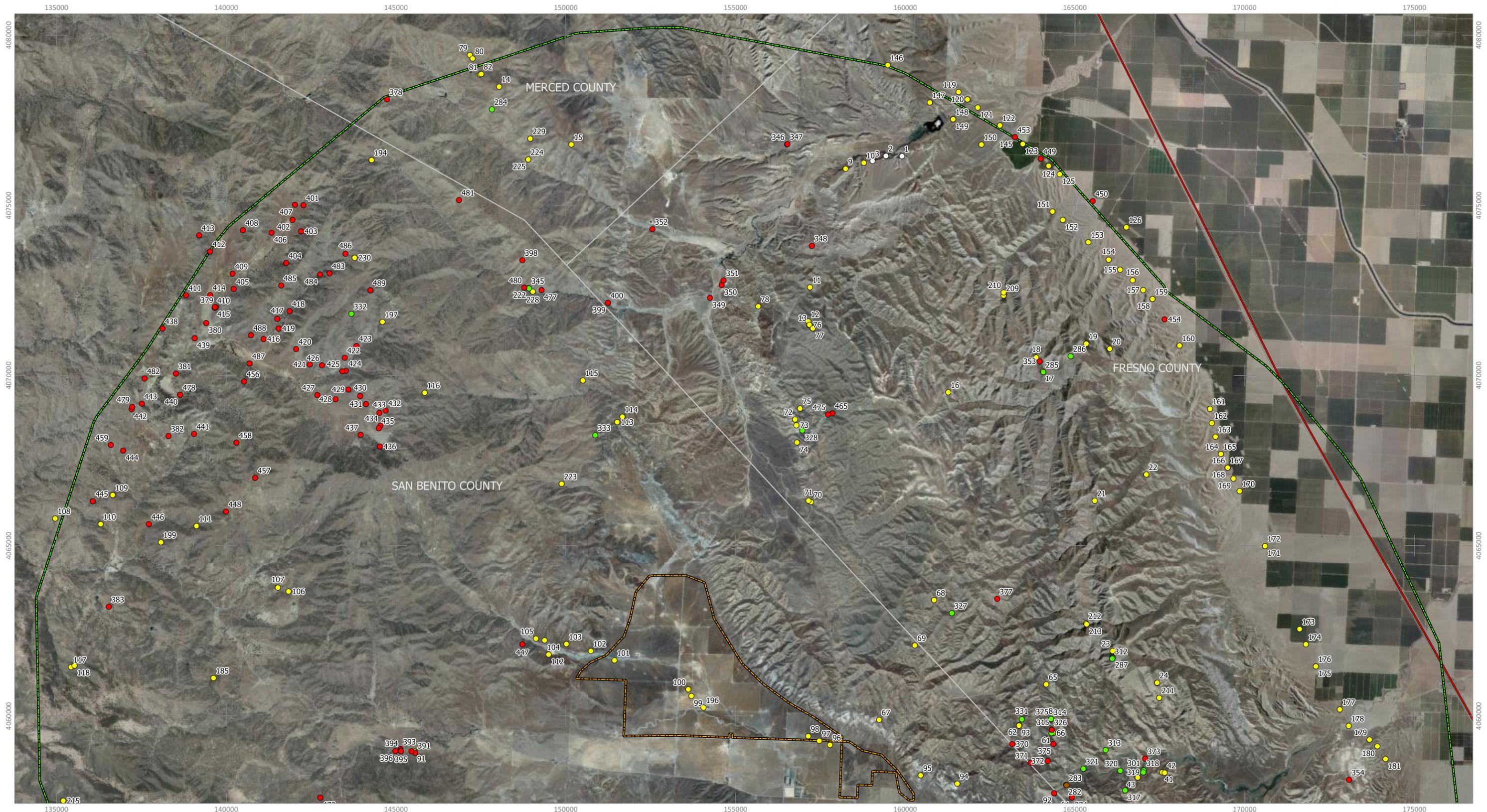
ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
366	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.07	
367	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	6.42	
368	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	1.26	
369	Red-tailed Hawk	Cliff	Empty	0	Inactive	1.85	
370	Red-tailed Hawk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

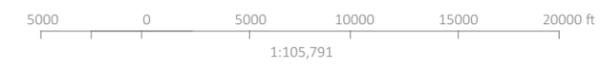
ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
418	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.14	
419	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.10	
420	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.62	
421	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.26	
422	Red-tailed Hawk	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	



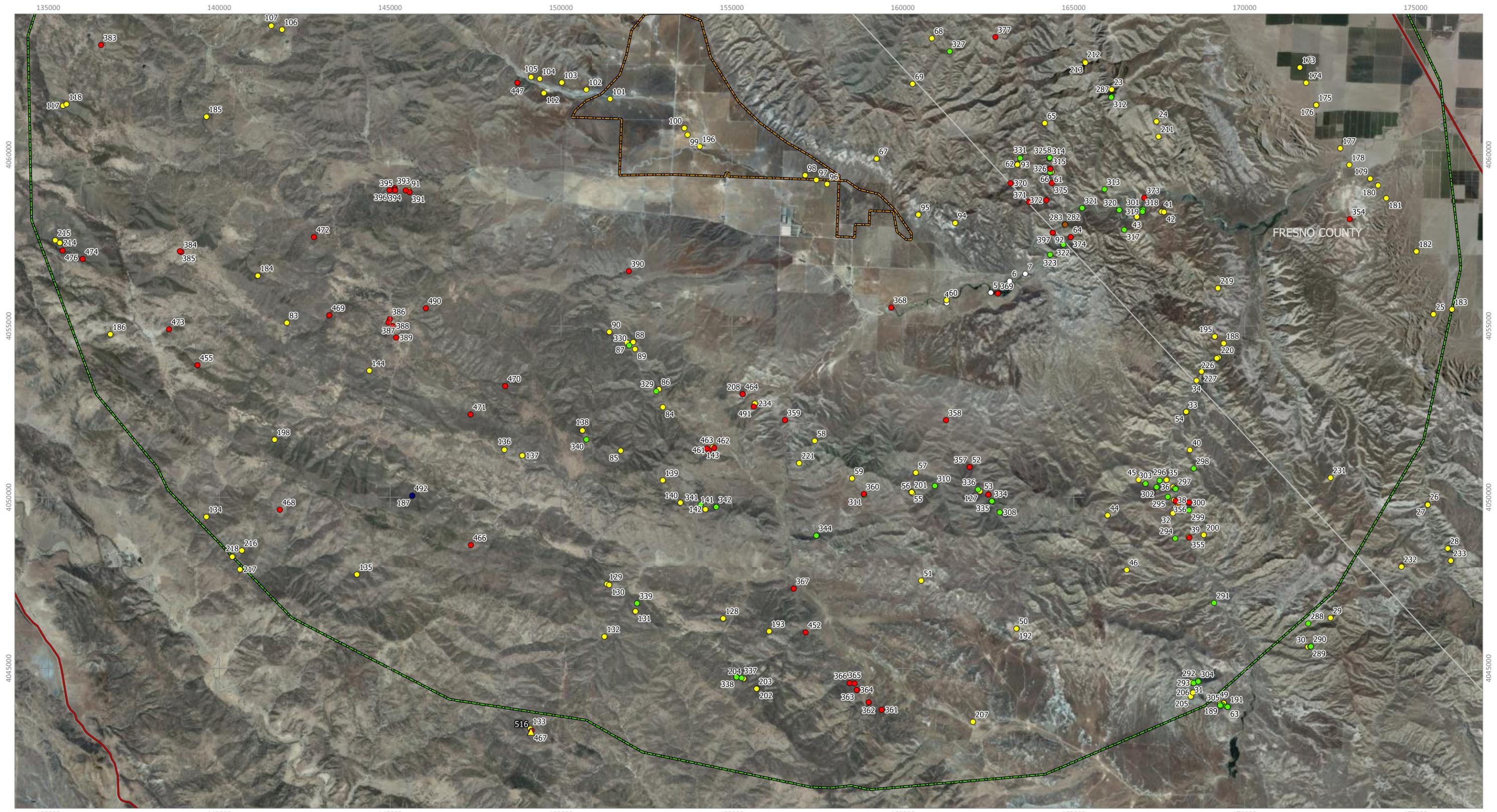
- County Border
 - Major Road
 - Proposed Project Boundary
 - Study Area
- Nest Locations**
- Barn Owl
 - Common Raven
 - Prairie Falcon
 - Great Horned Owl
 - Red-tailed Hawk
 - Turkey Vulture



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





- 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



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



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	Melospiza 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:

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22672 Lambert Street, Suite 606 | Lake Forest, California 92630 | Phone: 949-272-0905 | Fax: 949-666-7630 | bloombiological.com

- 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



Permits & Certifications

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

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.

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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 &

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

Certifications

USGS Bird Banding Subpermitee (22905-F)

Selected

Publications

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

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

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

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



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

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

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

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

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