

ARTIFICIAL NEST PLATFORMS FOR GOLDEN EAGLES

SAN DIEGO NATIONAL WILDLIFE REFUGE
BUREAU OF LAND MANAGEMENT



FINAL REPORT

July 29, 2014

For the San Diego Association of Governments
Transnet Environmental Mitigation Program
Grant Agreement Number 5001977

Prepared by:
John Martin, Wildlife Biologist
Jill Terp, Refuge Manager
U.S. Fish and Wildlife Service
San Diego National Wildlife Refuge
P.O. Box 746 / 14715 Highway 94
Jamul, CA 91935

INTRODUCTION

Although habitat loss due to development and human disturbance are the primary causes of a decline of golden eagles (*Aquila chrysaetos*) in San Diego County, scarcity of nest sites in remaining suitable habitat may be a factor in limiting the distribution of eagles. Eagle habitat may be constrained to the degree that there is not a high-quality nest site in a block of habitat that is sufficiently large and free of disturbance to support foraging golden eagles, and provision of such a nest site would render that large block of habitat suitable for breeding.

San Miguel Mountain within the San Diego National Wildlife Refuge (SDNWR) supports a historic golden eagle nest site. The San Miguel nest site was known to be occupied by breeding eagles in the early 1900s, and sporadic records suggest that eagles used it throughout 20th century. The Wildlife Research Institute began monitoring the site annually in 1990. According to their records, eagles successfully fledged young from the site in 13 of 14 years between 1990 and 2004 (Dave Bittner, Wildlife Research Institute, pers. comm.). In 2008, WRI noted human disturbance on the hillside near the nest, in the form of off-road vehicles, illegal immigrants, and Border Patrol activities. In 2007, the entire area, including the nest site, burned in the Harris Fire, and the nest ledge collapsed, presumably due to cracking of the supporting rock due to thermal expansion and subsequent cooling. Eagles occupied the territory but did not nest successfully from 2005-2007. An eagle was observed doing a territorial display near the summit of San Miguel in early October 2007 (shortly before the fire). Since then there have been no reported observations suggesting that territorial eagles use the site, but occasionally subadult birds have been seen foraging in Proctor Valley (John Martin, SDNWR, pers. obs.; David Hogan, Chaparral Institute, pers. comm.)

The off-road vehicles, the illegal immigrant traffic, and the construction of the Rolling Hills Ranch and Bella Lago housing developments may also have played a part in motivating the adult pair of eagles to abandon the site and may have contributed to the 3 years of unsuccessful nesting on San Miguel. But the apparent abandonment of the territory coincides temporally with the collapse of the nest site. Now that illegal off-road driving has been curtailed by the new fence on Proctor Valley Road, and illegal immigrant traffic has been reduced (apparently by the construction of the border fence), provision of an especially attractive nest site in this historic location may induce the eagles to return.

Golden eagles characteristically maintain multiple nests in a territory and alternate nests after 1-3 years in a nest. The San Miguel territory might be rendered more attractive to eagles by providing an alternate nest site in addition to replacing the collapsed historic nest site. To provide nesting microhabitat for golden eagle (*Aquila chrysaetos*), and make large areas of suitable foraging habitat for eagles suitable for nesting as well, we enhanced vertical rock outcrops at two sites to provide sufficient support for nests. A vertical rock outcrop on the north end of the Jamul Mountains, on land managed by the Bureau of Land Management (BLM), has vertical sections of rock that would be difficult for a predator to access, but lack a sufficient ledge to support an eagle's nest. We created an additional artificial nest platform on that outcrop as well (Figure 1).

METHODS

A Grant Agreement (# 5001977) between U.S. Fish and Wildlife Service and San Diego Association of Governments (SANDAG) was signed on August 31, 2012.

National Environmental Policy Act (NEPA) compliance was finalized for the Refuge's location on November 9, 2012, and included clearance from U.S. Fish and Wildlife Service's Cultural Resources Branch. Representatives of the Jamul Indian Village did not respond to our September 27, 2012, inquiry regarding any potential cultural interest they may have in either site. San Diego National Wildlife Refuge Biologist John Martin visited the BLM platform site with their Cultural Resources Specialist, George Klein, on January 22, 2013. Shortly afterward, we received clearance from BLM's Archaeological Resources Branch that we were authorized to proceed at that site.

On December 22, 2012, we issued a sole-source contract (Contract# F13PX00270) to Frontier Environmental Solutions, Inc. ("FES"; 420 Palm Dr., Ridgecrest, CA 93555-2606) to design, fabricate, and install the platforms. FES has extensive experience working in remote BLM locations in hazardous situations requiring climbing gear and drilling into rock; much of their work involves closing mine entrances with wildlife-friendly gates or other structures. In late February 2013, Ed Winchester, FES President, and John Martin, SDNWR biologist, made reconnaissance trips to both prospective platform sites; a subsequent reconnaissance trip occurred on July 8, 2013 to determine the final location for the artificial nest platform on San Miguel Mountain. Between January and early April 2013, we collaborated with FES on the platform design, including the size, nest base material, mounting, and bracing. The platforms are approximately 10 foot by 10 foot metal frames with a metal mesh platform to allow drainage; metal anchors and braces would be bolted to the platform and attached to the rock face.

The disassembled platform, personnel, and equipment were flown to the installation sites by helicopter (Figure 2). The installation at the BLM site took approximately 5 days to complete; the rock drilling at this location was more difficult than anticipated. On April 29, 2013, FES finalized the installation of the nest platform on the BLM Jamul Mountains site (Figures 3 and 4).

Due to other project obligations, FES's installation at the San Miguel Mountain site was delayed until summer. This site posed challenges since the first location selected had a beehive within the rock face's cracks. Drilling into the rock was likely to disturb the bees and pose a safety risk to the construction crew. Despite repeated attempts to remove the bees, we were not successful. Therefore, John Martin and Ed Winchester found a second location nearby to install the platform; however, the selected site had less vertical rock face and could be more susceptible to terrestrial predators jumping down from above. A predator deterrent fence of two-foot high wire mesh was erected above the platform connecting down the sides (Figure 5). The installation at the SDNWR site took four days and was completed on August 20, 2013. Figure 6 shows a view from the platform looking southwest with the development of Chula Vista in the background.

In November 2013, USFWS personnel climbed to both artificial nest platforms and constructed "nests" of sticks collected in the vicinity (Figure 7). We also decorated both sites with white

latex paint, applied with a squirt bottle, to mimic raptor droppings and attract the attention of passing eagles.

MONITORING

John Martin monitored the platforms and surrounding eagle habitat at the San Miguel Mountain and the Jamul Mountains sites (Tables 1 and 2) beginning in January 2014, and continued into May 2014. To monitor the San Miguel Mountain site, John observed the platform and vicinity from Proctor Valley Road, and from San Diego National Wildlife Refuge lands in Proctor Valley (Figure 1). The Jamul Mountains site (Figure 1) was monitored from the parking lot or from the wildlife pond at Rancho Jamul Ecological Reserve. The naked eye, 8 X binoculars, and a 20-60 X spotting scope were used to scan the platform, rock outcrops within a few hundred meters, and the surrounding sky. When eagles were observed, location, behavior, indications of territoriality, age if possible, and any features that might help identify individuals were noted.

Table 1. Monitoring effort for artificial golden eagle (*Aquila chrysaetos*) nest platform on Bureau of Land Management land, Jamul Mountains, Jamul, California.

Date	Minutes of Observation	Eagles Observed
7-Jan-14	0:30	0
9-Jan-14	0:15	0
10-Jan-14	0:12	0
13-Jan-14	0:32	0
3-Feb-14	0:20	0
12-Feb-14	0:50	0
21-Feb-14	0:30	0
4-Mar-14	0:46	0
5-Mar-14	0:24	0
17-Mar-14	0:31	0
9-Apr-14	0:50	1
8-May-14	0:40	0
Total Time	6:20	

Table 2. Monitoring effort for artificial golden eagle (*Aquila chrysaetos*) nest platform on San Diego National Wildlife Refuge, San Miguel Mountain, Jamul, California.

Date	Minutes of Observation	Eagles Observed
7-Jan-14	0:16	0
13-Jan-14	0:32	0
4-Feb-14	0:41	0
13-Feb-14	0:10	0
18-Feb-14	0:17	0
24-Mar-14	1:41	1
31-Mar-14	1:35	2
4-Apr-14	4:48	3
10-Apr-14	3:35	2

14-Apr-14	0:10	1
24-Apr-14	3:10	0
6-May-14	1:55	0
8-May-14	0:40	0
26-June-14	0:30	0
Total Time	20:00	

RESULTS

The platforms were successfully installed in time to serve as nest substrates in the 2014 breeding season.

Summary of observations of eagles

Jamul Mountains

One eagle was observed on April 9, 2014, while monitoring the platform on the Jamul Mountains. Plumage indicated that it was a young subadult, likely hatched in 2013. It was first seen soaring low over the grasslands at Rancho Jamul Ecological Reserve then climbed high and departed heading southwest. It may have approached the platform as closely as 1000 meters, but showed no indication of interest.

San Miguel Mountain

On February 18, 2014, we received reports from a frequent volunteer for San Diego National Wildlife Refuge, of a golden eagle that was sighted and photographed repeatedly in Proctor Valley. The volunteer lives in the Proctor Valley area and frequently horseback rides there, observing wildlife. The volunteer shared several photographs sufficiently detailed to identify some individual eagles by age, molt status, and/or damage to feathers. On March 25, the volunteer saw two eagles together, and on March 29, took photographs of them flying and perched (Figure 8) at sufficiently close range to determine their ages. One was an older subadult, probably hatched in 2009-2010, while the other was in full adult plumage and was therefore more than 5 years old.

On March 31, after seeing photographs taken the prior weekend, the pair was seen in the canyon where the San Miguel Mountain platform was installed. The age and location strongly suggested that they were the same birds photographed previously. They frequented a rock outcrop approximately 200 meters from the platform. Their close association with a rock outcrop that could serve as a nest substrate suggested they were investigating a potential nest site. No indications of nesting, carrying of nest material, or other behaviors indicating that they were actively nesting were observed.

On April 4, John Martin had the pair of eagles in view more or less continuously for four hours. They frequented the rock outcrop where they were seen the previous week, perching on it and gliding low back and forth in front, above, and below it. But on this date they covered a much wider area than during observations the previous week. The birds repeatedly traveled back and forth between the San Miguel platform area and Jamul Mountains, where the other platform was installed. It is impossible to see the Jamul Mountains platform from Proctor Valley, and my

attempts to contact other SDNWR or State staff at Rancho Jamul for them to look for the birds on the Jamul side were unsuccessful. A third eagle, a young subadult, was present on several occasions that morning, and elicited many territorial displays of undulating flight from both members of the pair associated with the San Miguel site. Locations of the displays ranged from the slope above Rolling Hills Ranch to Jamul Mountain, and suggested that the pair considered Jamul Mountain a part of their territory. When departing the site after observing the eagles for hours, the pair was in the canyon with the San Miguel platform and during the last moments of observation John saw the adult eagle soaring low over the canyon as it had done for much of the morning, then it glided up to the artificial nest platform and landed on it. About 10 seconds later, the subadult also glided up to the platform and landed next to the adult. They remained perched on the platform for approximately 1-2 minutes then jumped off and resumed gliding over the canyon.

On April 10, the eagle pair was in view for approximately one hour. In contrast to the previous observations, they did not come to the canyon with the platform for the entire duration of the observation, but instead soared low and high approximately 1500-4000 meters northeast and east-northeast of the canyon. Minutes after locating the first eagle, three hikers were noted on the ridge just above (about 50-60 meters from) the rock outcrop that had been the focal point of the eagles' activity for the preceding couple of weeks. The hikers lingered on the ridge for well over an hour, while the eagles remained away from, but in view of, the site, presumably aware of the hikers. Over five hours of subsequent observation on three different days yielded one brief sighting of a single eagle.

Monitoring of the sites will resume with the start of 2014-15 breeding season in approximately November 2014.

DISCUSSION

We observed a territorial pair of eagles frequenting the immediate vicinity of the artificial nest ledge on San Miguel Mountain and using it briefly as a perch. They did not nest, but their failure to nest on the platform (or at all) is not likely due to any deficiency of the platform. One member of the pair was a subadult, and thus may not have been ready to begin nesting. In addition, southern coastal San Diego County received extremely low rainfall in the winter/spring of 2013-2014; as of May 8, 2014, cumulative precipitation for the rain year was 4.75 inches. The extremely low precipitation this year has resulted in dramatically lower-than-average primary productivity. In light of a probable deficit of prey to feed developing young, the pair of eagles may have simply refrained from breeding this season.

The deleterious effects of human disturbance on eagles, including inhibition of normal foraging and nest attendance, depredation of eggs or nestlings, death of eggs or nestlings due to overheating or chilling, and abandonment of the territory are well-documented (Bittner, J. D. unpubl. data; Camenzind 1969; D'Ostilio 1954; Fyfe and Olendorff 1976; Olendorff 1971; Scott 1985; Steidl et al. 1993; Suter and Jones 1981; Watson 1997). In studies of golden eagle populations in the southwest (New Mexico and Texas) and the Front Range of the Rocky Mountains (New Mexico, Colorado and Wyoming), Boeker and Ray (1971) reported that human disturbance accounted for at least 85% of all known nest losses. It is not unreasonable to assume

that the off-trail hikers documented on April 10 caused the territorial pair of eagles on San Miguel Mountain to abandon the territory. This is precisely the sort of human disturbance that we need to avoid to allow eagles to use the nest platforms that we installed, and to persist on San Diego National Wildlife Refuge and throughout coastal southern California. We hope to create a trail system that minimizes such disturbance.

ACKNOWLEDGMENTS

We thank the San Diego Association of Governments' Environmental Mitigation Program for their support of this project to conserve golden eagles, their support of outreach and volunteer programs that benefit the San Diego National Wildlife Refuge and other conserved lands and led to the volunteer who reported and photographed eagles in Proctor Valley, and for their continued support to conserve native biological diversity in coastal San Diego County.

LITERATURE CITED

- Boeker, E. L., and T. D. Ray. 1971. Golden eagle population studies in the southwest. *Condor* 73:463-467.
- Camenzind, F. J. 1969. Nesting ecology and behavior of the Golden Eagle (*Aquila chrysaetos* L.). Brigham Young Univ. Sci. Bull. Biol. Ser. 10(4):4-15.
- D'Ostilio, D. O. 1954. Nesting status and food of the Golden Eagle in northern Colorado. Master's Thesis, University of Colorado, Boulder. 48 pp.
- Fyfe, R. W., and R. R. Olendorff. 1976. Minimizing the dangers of nesting studies to raptors and other sensitive species. Canadian Wildl. Serv., Occas. Paper # 23.
- Olendorff, R.R. 1971. Falconiform reproduction; a review. Part 1. The pre-nestling period. Raptor Res. Foundation Report # 1. Vermillion, SD.
- Scott, T. A. 1985. Human impacts on the Golden Eagle population of San Diego County. Master's Thesis. San Diego State Univ. San Diego, CA.
- Steidl, R.J., K.D. Kozie, G.J. Dodge, T. Pehowski, and R.E. Hogan. 1993. Effects of Human Activity on Breeding Behavior of Golden Eagles in Wrangell-St. Elias National Park and Preserve: A Preliminary Assessment. National Park Service, Wrangell-St. Elias National Park and Preserve, Copper Center, Alaska, WRST Research and Resource Management Report; 93-3.
- Suter, G. W. II and J. L. Jones. 1981. Criteria for Golden Eagle, Ferruginous Hawk, and Prairie Falcon nest site protection. *Raptor Research* 15(1):12-18.
- Watson, J. 1997. The Golden Eagle. 1st ed. T and A. D. Poyser, London, U.K.

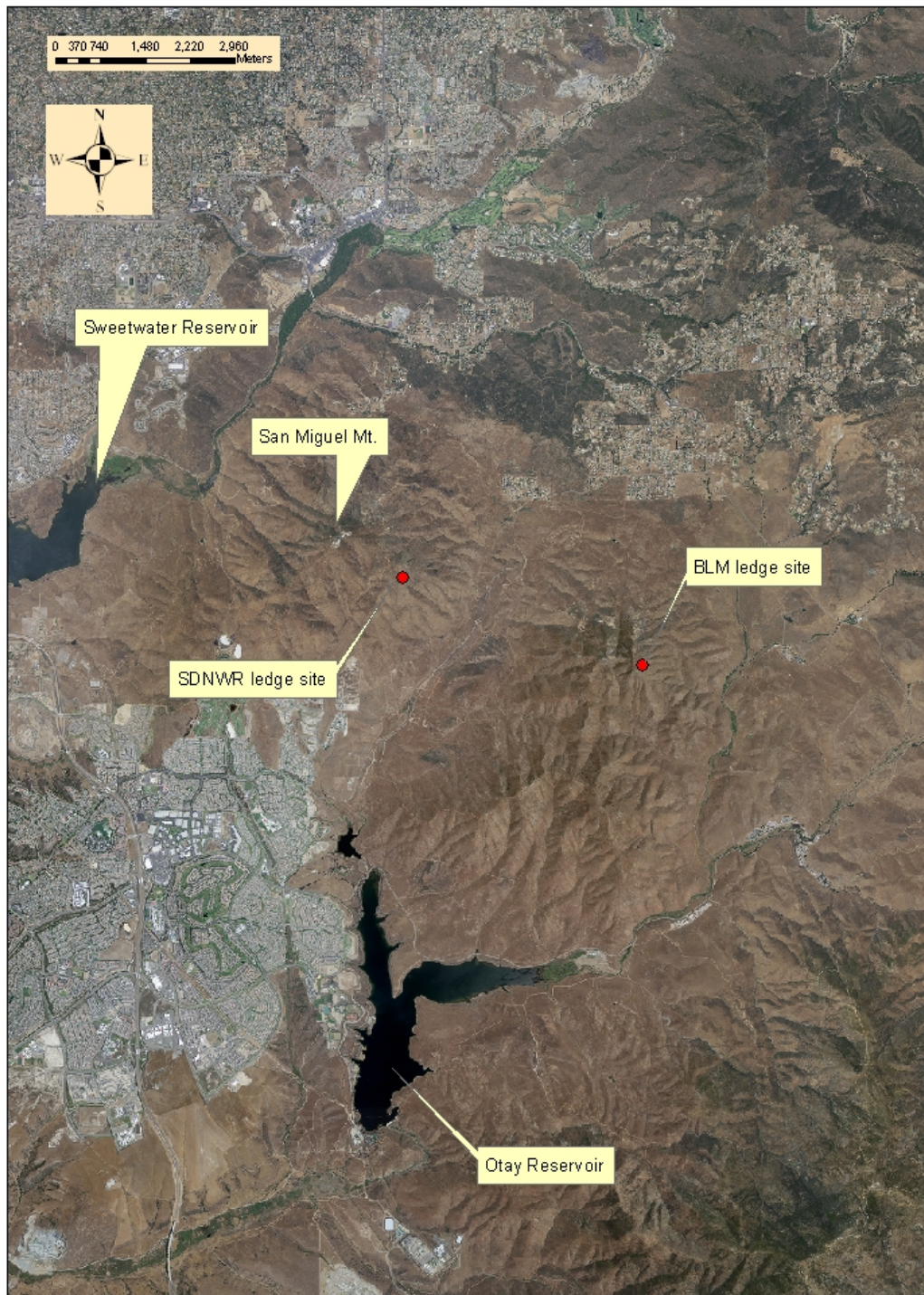


Figure 1. Locations of two artificial nest platforms for Golden Eagles (*Aquila chrysaetos*) installed in 2013 on San Diego National Wildlife Refuge, and Bureau of Land Management-managed lands, Jamul, San Diego County, California.



Approximate
location of BLM
nest site on
Jamul Mountain.

Figure 2. Transportation of materials and equipment to construct the artificial nest ledges was accomplished with a helicopter. Photo by J. Terp, USFWS.



Figure 3. BLM Site installation. Rock face drilled to receive platform brace. Photo by Frontier Environmental Solutions.



Figure 4. BLM Site installation. Platform in place and bracing being installed. Photo by Frontier Environmental Solutions.



Figure 5. SDNWR Site installation. Platform in place; note wire predator deterrent fencing around/above platform. Photo by Frontier Environmental Solutions.



Figure 6. SDNWR Site installation. Platform in place; view to City of Chula Vista developments. Photo by Frontier Environmental Solutions.



Figure 5. BLM site. USFWS staff constructed a platform of sticks to suggest the beginning of a nest at each site. White latex paint was sprayed on the surrounding rocks to suggest eagle droppings. Photo by John Martin, US7FWS.



Figure 8. Pair of golden eagles perching in Proctor Valley, late March 2014. Photo by D. Ekhaml.