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[via email: dsilverla@me.com]

**SUBJECT:** On the past and present status, and potential future value of the Rancho San Diego Golden Eagle nesting territory, located near the City of Jamul, San Diego County, California.

Dear Dr. Silver:

As a resident of Southern California, and having studied Golden Eagles and other raptors in San Diego County and adjacent counties extensively over the past 45 years, I have observed the responses of raptor populations to various disruptive forces, including encroaching development, drought, wildfire, and human disturbance, to name a few. This letter presents my professional, scientific opinion regarding the status of the Rancho San Diego Golden Eagle nesting territory, located near Jamul, San Diego County, California. The traditional nest site in this territory is located on San Miguel Mountain and was used regularly throughout the 20<sup>th</sup> century by nesting Golden Eagles with the resident pair successfully fledging young as recently as 2004. The territory was occupied by a pair of territorial adult eagles as recently as the 2007 breeding season. In the fall of 2007, the area surrounding the main San Miguel Mountain nest site was burned in the Harris Fire, and the supporting rock and nest collapsed. In 2008, researchers also noted human disturbance on the hillside near the nest, in the form of off-road vehicles, illegal immigrants, and border patrol. Since the 2007 breeding season, no territorial pair of eagles has been documented to occupy or breed in the territory, though substantial recent (USGS) GSM transmitter documentation exists and adult and subadult eagles have been observed foraging in the adjacent Proctor Valley. Development has gradually encroached on this area over time, with suburban homes now present less than one mile of the traditional nest site. The still-undeveloped portion of Proctor Valley is present in the center of the Rancho San Diego territory and provides suitable foraging habitat for eagles, though additional development, such as Otay Ranch Village 14, is proposed and threatens the viability of this territory as I endeavor to explain in this letter.

The lack of breeding activity at this territory for the last nine years poses the question of how much current and future value the land holds for Golden Eagles. Whether the territory is temporarily abandoned and could eventually be re-occupied, or permanently defunct as a breeding territory due to dramatic habitat changes and human disturbance, is an important consideration, particularly in regard to proposed development in the area. If the potential exists for re-occupancy by breeding eagles, then further development would only reduce the probability of that occurring, because Golden Eagles exhibit a strong tendency to avoid human development and disturbances (Scott 1985, Bloom pers. obs.). Whether eagles eventually use the site for breeding again or not, the Proctor Valley has been conclusively shown by recent monitoring data to be important foraging habitat for non-territorial eagles as well as the adjacent Cedar Canyon pair, and other (e.g., non-territorial) eagles that could ultimately be recruited into the regional breeding population. Non-territorial adult “floaters” and subadult birds that will eventually become adults, play an important role in maintaining stability in local populations because they replace territorial adults that die from natural or anthropomorphic causes (Hunt 1998, Katzner 2016).

My opinion provided herein is based upon my own field research and that of other researchers published in the peer-reviewed literature. It is my opinion, based upon the extirpation of several Southern California Golden Eagle territories that I have witnessed in my life, that the continued existence of the Rancho San Diego territory, including the San Miguel Mountain breeding location, for Golden Eagles is tenuous. However, based on available information, which I outline here, and spell out in greater detail in my letter below, it cannot yet be designated as extirpated. Research on Golden Eagles indicates that previously occupied territories or their nests may be vacant for as long as 27 years, and still become re-occupied (Kochert et al. 1999, Kochert and Steenhof 2012). Based on tracked movements of Golden Eagles that have been equipped with GSM (Global System for Mobile communication) GPS transmitters, we know that the species frequently and predictably uses the area that comprises this nesting territory. This suggests that the potential for re-occupancy exists, particularly given that the area surrounding the original nest site has not changed dramatically since it was last occupied by territorial eagles in 2007, with the exception of the final few homes constructed as part of the Rolling Hills and Bella Lago housing developments. Although the probability that the territory will once again become occupied by breeding eagles is difficult to ascertain, it is my opinion that further development within the Proctor Valley would reduce key foraging habitat in the core part of the territory, and that the presence of new structures and human disturbance will cause eagles to avoid the surrounding areas, thereby rendering the territory inviable for future breeding by the species as well as eliminating key foraging habitat for non-territorial eagles in San Diego County and the adjacent Cedar Canyon pair, which has been encroaching into the area, as discussed below.

## REVIEW OF CREDENTIALS

For the past 45 years I have studied raptor populations, including Golden Eagles, throughout much of the Southern California region. In the process, I have banded more than 35,000 raptors (mostly nestlings) in California and produced both, my master's thesis and doctoral dissertation on the subject of their movements. I have authored or co-authored several reports and numerous peer-reviewed publications on the subject of raptors and their ecology, including the following that deal with Golden Eagles:

Katzner, Todd E., D.M. Nelson, M.A. Braham, J. M. Doyle, N.B. Fernandez, A.E. Duerr, P.H. Bloom, M. C. Fitzpatrick, T. A. Miller, R.C.E. Culver, L. Braswell, and J.A. DeWoody. 2016. Golden eagle fatalities and the continental-scale consequences of local wind-energy generation. *Conservation Biology*. 00 (0) 1-11.

Doyle, Jacqueline M., T.E. Katzner, G.W. Roemer, J.W. Cain, III, B. Milsap, C. McIntyre, S.A. Sonsthagen, N. Fernandez, M. Wheeler, Z. Bulut, P.H. Bloom, and J.A. DeWoody. 2016. Genetic structure and viability selection in the Golden Eagle (*Aquila chrysaetos*), a vagile raptor with Holarctic distribution. *Conservation Genetics*. doi:10.1007/s10592-016-0863-0

Poessel, S.A., P.H. Bloom, M.A. Braham, T.E. Katzner. 2016. Age-and season-specific variation in local and long-distance movement behavior of golden eagles. *European Journal of Wildlife Research*. 62:377-393.

Singh, N.J., E. Moss, T. Hipkiss, F. Ecke, H. Dettki, P. Sandstrom, P.H. Bloom, J.W. Kidd, S.E. Thomas, B. Hornfeldt. 2016. Habitat selection by adult Golden Eagles *Aquila chrysaetos* during the breeding season and implications for wind farm establishment. *Bird Study*.

Moss, E.H.R., T. Hipkiss, E. Frauke, H. Dettki, P. Sandstrom, P.H. Bloom, J.W. Kidd, S.E. Thomas, B. Hornfeldt. 2014. Home-range size and examples of post-nesting movements for adult golden eagles (*Aquila chrysaetos*) in Boreal, Sweden. *Journal of Raptor Research*. 48 (2):93-105.

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- Bloom, P.H., W.S. Clark. 2001. Molt and sequence of plumages of golden eagles and a technique for in-hand ageing. North American Bird Bander. 26 (3):97-112. Collins, C.T., P.H. Bloom. 2000. The status of harlan's hawk in southern California. Western Birds. 31:200-202.
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- Harlow, D.L., and P.H. Bloom. 1989. Buteos and the golden eagle. National Wildlife Federation. Proceedings on the Status of Western Raptors. 0:102-110.
- Bloom, P.H. and S.J. Hawks. 1982. Food habits of nesting golden eagles in northeast California and northwest Nevada. Raptor Research. 16 (4):110-115.

My resume is attached.

## GOLDEN EAGLE LIFE HISTORY

### OVERVIEW OF ECOLOGY

The Golden Eagle (*Aquila chrysaetos*) 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. However, some breeding season adult Golden Eagles captured in southern California and equipped with GSM transmitters are known to move widely outside of California (USGS 2016). As with many breeding raptor species in California, Golden Eagles tend to be philopatric and the young that are produced breed close to their natal territories (Bloom 2011).

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 moving thousands of miles to the wintering grounds (McIntyre et al. 2008); 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 the young of domestic livestock, they primarily hunt rabbits, hares, ground squirrels, and prairie dogs (Bloom and Hawks

1982, Olendorff 1976). During the nesting season, coastal southern California eagles focus on rabbits and California ground squirrels but scavenge regularly, and take a diverse variety of prey species (Bloom unpubl.).

#### BREEDING BIOLOGY

Golden Eagles typically reach sexual maturity, form territories, and begin nesting at 4-5 years of age. Kochert et al. (2002) 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, and not infrequently, human-induced adult mortality and alterations to their living space.

Golden eagles inhabit large home ranges in California, and often have more than one nest site within them. This is particularly true on large cliffs or long reaches of rim rock. Dixon (1937) suggested 36 square miles for the average nesting territory size in San Diego County and recent data suggests home ranges may be even larger for some birds in this region (Tracey et al. 2017).

In San Diego County, Dixon (1937) reported up to 12 'alternate' nests in one territory and that nesting material was added to multiple nests annually. Only one nest is used for nesting in a given year, but eagles may use different alternate nests from one year to the next. Thus, even a nest that is inactive one year, maybe important to the pair's reproductive success in another year. Most alternate nests are built within 0.5 mile of other alternate nests. In areas with abundant prey, two occupied nests in adjacent territories may be as close together as 0.5 mile with tree nesting pairs (Bloom pers. obs.). In California, the nests within a territory may all be in trees, all on cliffs, or both; and in some territories with transmission lines, the pairs may construct nests on transmission towers as well. These clusters of nests within a home range that comprise a Golden Eagle territory are more or less permanent, and many of the nests themselves have been known to have been occupied for several decades, particularly those on cliffs, and at least one in a tree (Bloom pers. obs.). In some cases, Golden Eagle nests may have been occupied for centuries, particularly those on desert cliffs.

#### SOUTHERN CALIFORNIA POPULATION STATUS

Historically Golden Eagle breeding populations in the west were recognized as being relatively stable except for the population in southern California where habitat loss was recognized as the probable causal agent (Harlow and Bloom 1989). Scott (1985) found that abandoned territories in San Diego County had more dwellings within 1.6 km and higher human populations within 4.8 km than territories that continued to be occupied (Scott 1985). Golden Eagles fare better when farther from anthropogenic disturbance for a number of reasons, but mainly because human population density is positively correlated with factors that negatively affect eagles, such as habitat loss, habitat fragmentation, habitat degradation, electrocution, vehicle collisions, collisions with wires, lead poisoning, wind farms, shooting and intolerable distances between people and eagle nests or eagles and their preferred hunting areas. Habitat loss continues today, and the number of extant eagle territories have further declined, even in the adjacent Cleveland National Forest and on private lands directly adjacent to the National Forest (Bloom unpubl.).

Historically, the primary form of habitat loss, in southern California was farming, the diversion of water, and the conversion of native habitats into farmland. Today, both foraging and nesting habitat losses continue in the form of residential (including golf courses) and commercial development, parks, wind farms, solar projects, military activity, large mines, and fire. On a fine scale, a territory can be rendered perpetually unoccupied by a persistent single shooter, decades of lead poisoning, or decades of poorly designed electrical poles systematically eliminating adults and or their young each decade. However, unless the

habitat is permanently altered so as to make it inhabitable to eagles, it could in theory again become occupied.

#### TENURE OF TERRITORY AND NEST OCCUPANCY

Igneous geology doesn't change much over the course of a thousand years, and it is reasonable to assume some nest cliffs have held nesting Golden Eagles for many thousands of years. On the other hand, tree nests tend to have short life spans of 1-50 years and fall either when the tree dies, large predators enter and destroy the nest, during inclement weather, or fire. That said, even trees may survive several hundred years and clusters of current and former nest trees within a territory can last well into the distant future. While the nests, their substrates, and territories of Golden Eagles may be occupied for centuries by different individuals, they can become temporarily vacant or permanently extirpated for a variety of reasons, outlined by Kochert and Steenhof (2012) as follows:

- (1) the territory has become temporarily vacant due to disturbance or local changes in prey abundance (Newton 1979);
- (2) members of the pair have died and may not yet be replaced (Ratcliffe 1993);
- (3) nesting populations have declined for reasons unrelated to the suitability of the nesting habitat (e.g., pesticide contamination; Ratcliffe 1993); or
- (4) the habitat around the nest has become permanently unsuitable for supporting nesting pairs.

In all but the last case, an unoccupied territory may become occupied again after some period of inactivity. Periodic inactivity at nest sites or territories has probably occurred, and continues to occur, naturally due to disruption such as wildfire, earthquakes, or because of drought conditions, coupled with low prey numbers. In contemporary times, anthropogenic disturbance such as outdoor recreation activities (hiking, rock climbing, off-road vehicle activity), land maintenance, temporary construction activities, or may lead to the abandonment of a nest site or territory (Kochert and Steenhoff (2012).

In the case of (4) above, a territory can ultimately become extirpated due to permanent, irreversible changes to the land. This has occurred in coastal areas of San Diego County, where many of the eagle nesting territories described by Dixon (1937) are now extirpated due to residential and other types of development. Territories along the urban interface (such as the San Miguel nesting territory) are considered to be at high risk of extirpation arising from permanent changes to the habitat caused by development, coupled with higher levels of disturbance due to the encroaching human population.

Results from a 41-year study of Golden Eagle nest use in southern Idaho by Kochert and Steenhoff (2012) reveal that the use of alternate nests within territories is largely intermittent with "Two nests being unused for 21 and 27 years after 1971 before being used every 1 to 3 years thereafter." The same study also found that eagles "reoccupied a territory that had been vacant for 16 consecutive yr, and reused one of the old nests after 22 yr of nonuse", and that "Occasionally eagles built new nests on or near sites of nests that had been destroyed or had fallen off the cliff. Eagles built a nest on the exact spot of a nest that burned 2 yr previous, and eagles built three more nests 4, 10, and 26 m, respectively, from sites where nests had fallen 22, 28, and 31 yr earlier. Eagles built a new nest in 2010 on the same ledge that contained a dilapidated Golden Eagle nest 40 yr earlier.

#### PAST AND CURRENT STATUS OF THE RANCHO SAN DIEGO TERRITORY

Museum records document that the Rancho San Diego territory has been occupied by breeding Golden Eagles since at least 1920 (WFVZ 2017) and the Wildlife Research Institute (WRI) has monitored it since

1990, documenting the successful fledging of young in 13 of 14 years between 1990-2004 (pers. comm. to John Martin, USFWS from David Bittner). The territory was occupied by a pair of territorial adult eagles as recently as the 2007 breeding season, but no nesting activity or territorial adults have been documented in the last nine breeding seasons.

Development has gradually encroached on this area over time, with suburban sprawl approaching from the north, west and, in more recent years, from the southwest, including the Rolling Hills and Bella Lago housing developments, which were constructed mainly between 2005 and 2012. Much of San Miguel Mountain itself is protected from development by the San Diego National Wildlife Refuge, and the Jamul Mountain area to the southwest is protected as Bureau of Land Management lands. Between the two, lies the largely undeveloped Proctor Valley, which provides suitable foraging habitat for Golden Eagles in the core of the Rancho San Diego nesting territory. Development has now reached into the southwestern end of the Proctor Valley, with homes now present less than one mile of the traditional nest site in this territory.

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). In 2008, WRI noted human disturbance on the hillside near the nest, in the form of off-road vehicles, illegal immigrants, and border patrol. Since then there have been no reported observations suggesting that territorial eagles use the site, but accounts of direct eagle observations between 2011 and 2016 provided by U.S. Fish and Wildlife Service biologist John Martin, and information that is available from Golden Eagles captured and equipped with GSM transmitters by the U.S. Geological Survey in San Diego County between 2014 and 2016, indicate that the area has been used by numerous Golden Eagles of various ages. Below, I present a summary of Golden Eagles directly observed, or tracked with GSM GPS transmitters, within a rectangular area including the historic San Miguel Mountain nest site and areas within 2.5 to 3 miles in on each side. Likewise, additional eagles not marked with transmitters likely used the area and are not represented in the telemetry data presented below.

Direct observations of Golden Eagles in the vicinity of the Rancho San Diego territory between 2011 and 2016 are displayed below (Figure 1). Each point is labeled with an Identification number, and the data associated with the observation are presented in Table 1, below. Importantly, the direct observations were largely anecdotal and were not part of any structured surveys. As such, they do not include Golden Eagles that were undoubtedly present but not seen during this time.

Figure 1: Locations of direct observations of Golden Eagles in the vicinity of the Rancho San Diego Territory 2011-2016 (Data provided by John Martin, USFWS)



Table 1. Data associated with direct observations of Golden Eagles in the vicinity of the Rancho San Diego Territory 2011-2016 (Data provided by John Martin, USFWS)

<b>Observation ID</b>	<b>Date</b>	<b>Age</b>	<b>Time Start</b>	<b>Time End</b>
1	22-Dec-11	Subadult	N.A.	N.A.
2	2-Apr-12	Subadult	15:27	N.A.
3	31-Mar-14	Unknown	8:21	N.A.
4	31-Mar-14	Adult	9:49	N.A.
5	31-Mar-14	Unknown	9:49	N.A.
6	31-Mar-14	Unknown	9:52	N.A.
7	4-Apr-14	Adult	8:25	13:13
8	4-Apr-14	Subadult	8:25	13:13
9	4-Apr-14	Subadult	8:25	13:13
10	10-Apr-14	Adult	8:15	12:30
11	10-Apr-14	Subadult	8:15	12:30
12	14-Apr-14	Unknown	11:50	N.A.
13	16-Mar-15	Unknown	9:00	12:15
14	16-Mar-15	Unknown	14:30	15:00
15	16-Mar-15	Unknown	14:30	15:00
16	17-Mar-15	Adult	9:14	9:57
17	17-Mar-15	Subadult	9:14	9:57
18	8-Apr-15	Adult	8:45	10:32
19	8-Apr-15	Subadult	8:45	10:32
20	27-Aug-15	Unknown	9:13	11:46
21	30-Nov-15	Unknown	8:30	10:10
22	30-Nov-15	Adult	10:55	11:17
23	29-Dec-15	Subadult	8:24	11:31
24	7-Dec-16	Unknown	8:45	11:22

Figure 2: Flight paths of Golden Eagles Tracked with GSM Transmitters while in the vicinity of the Rancho San Diego Territory 2014-2016 (Data provided by USGS)

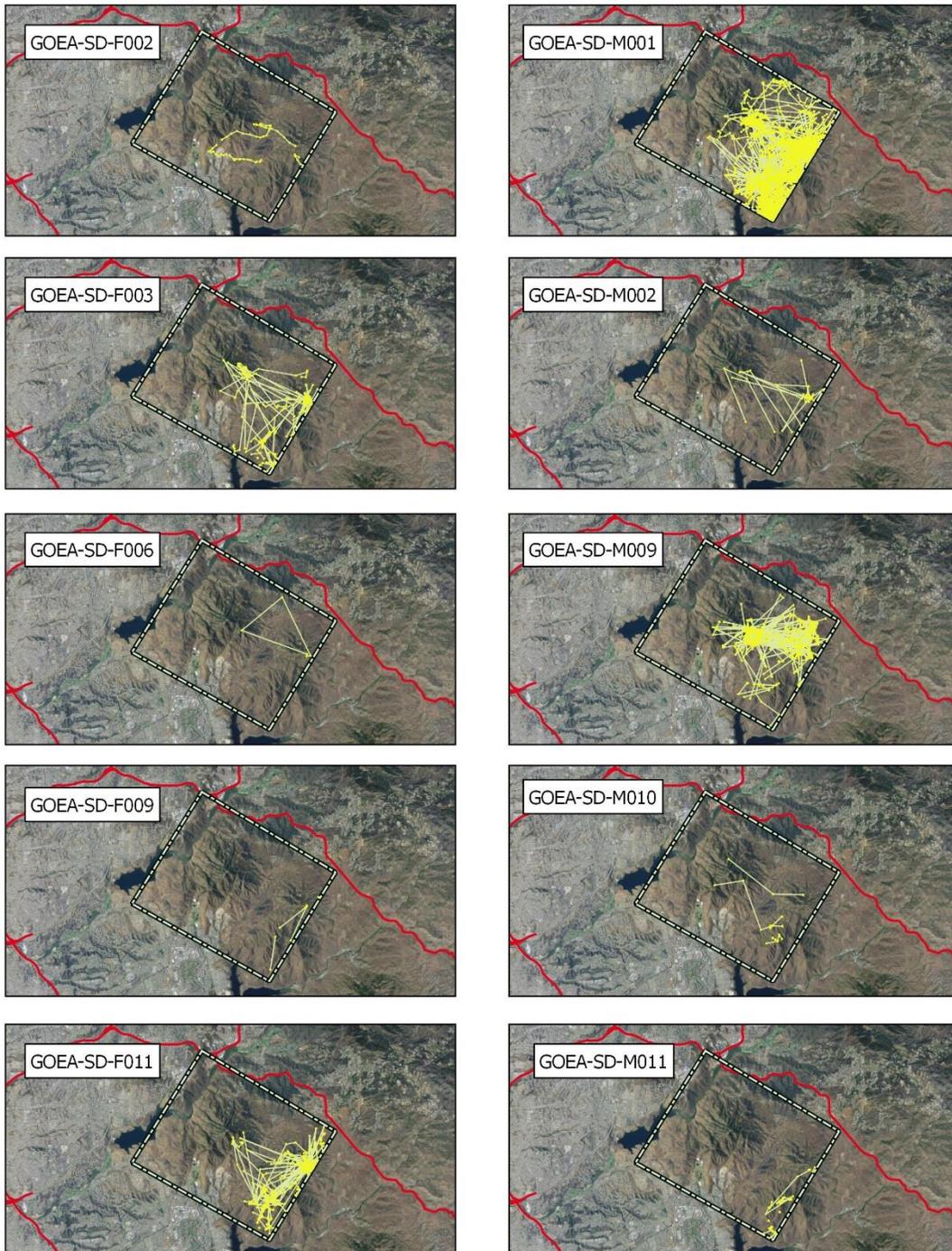


Table 2. Information about flight paths of Golden Eagles tracked with GSM Transmitters while in the vicinity of the Rancho San Diego Territory 2014-2016 (Data provided by USGS).

ID	Age	Sex	Date Min	Date Max	Span in Days	Percent of Days Present	Notes
GOEA-SD-F002	Adult	F	10/15/2015	10/15/2015	1	100.0%	
GOEA-SD-F003	Adult	F	12/17/2014	5/12/2015	147	28.6%	Female occupying neighboring Cedar Canyon
GOEA-SD-F006	Adult	F	3/14/2015	3/14/2015	1	100.0%	
GOEA-SD-F009	Adult	F	11/26/2015	12/2/2015	7	57.1%	
GOEA-SD-F011	Subadult (TY/FY)	F	12/21/2015	5/4/2016	136	51.5%	
	Subadult (TY/FY)	F	8/19/2016	8/30/2016	12	58.3%	
	Adult	M	12/13/2014	4/27/2016	502	43.4%	Male occupying neighboring Cedar Canyon
GOEA-SD-M001	Adult	M	7/14/2015	9/13/2015	62	27.4%	
GOEA-SD-M002	Adult	M	2/12/2015	4/15/2015	63	6.3%	Trapped in Marron Valley in 2015; mainly spent time in Mexico 2015-2016
GOEA-SD-M009	Subadult (TY/FY)	M	12/14/2015	2/2/2016	51	100.0%	
GOEA-SD-M010	Juvenile (HY)	M	12/17/2015	12/19/2015	3	100.0%	
GOEA-SD-M011	Adult	M	1/8/2016	1/12/2016	5	100.0%	

The telemetry data show that at least 10 Golden Eagles used the habitat in the vicinity of the Rancho San Diego territory for foraging, including adult and subadult birds. This included occasional use by the adjacent Cedar Canyon pair, to the southeast and near Otay Mountain. The Cedar Canyon male and female adults are marked with GIS transmitters and display typical territorial behavior over the area, though a nest site has yet to be documented for the pair. In addition to the encroachment from the Cedar Canyon pair, one male (GOEA-SD-M011) and one female (GOEA-SD-F009) spent significant amounts of time in the vicinity of the Rancho San Diego territory from late 2014 into the spring 2015. Both were in their fourth year (FY) in 2015, meaning they would have become breeding age in 2016 and potential territory holders.

Although raptors have large home ranges, and Golden Eagles in particular, the most frequently used portions of their home ranges are usually those nearest the nest, allowing them to conserve energy while caring for their young, or defending their territory. When foraging, eagles often perch on high terrain that overlooks their hunting grounds, and glide down from high above to surprise prey. For radioed Golden Eagles using this territory, they most frequently used coastal sage scrub and grassland areas to the east of the nest peak in Proctor Valley and the surrounding foothills (Figure 2). The gentle terrain of the valley floor is high quality habitat for jackrabbits and other prey essential for the eagles. Although there are not many points in Proctor Valley itself, relative to the foothills on either side, points in the valley are likely under-represented because relatively more time is spent watching the area from the above and on either side, and relatively little time is spent capturing and consuming prey on the valley floor.

## ON THE FUTURE OF THE RANCHO SAN DIEGO TERRITORY

The Rancho San Diego territory has not been occupied by a pair of territorial adult Golden Eagles for 9 breeding seasons, but has been used for foraging by at least 10 eagles marked with GPS units during this time (and an unknown number of unmarked birds). There are many reasons why the territory could have become unoccupied after 2007, including increased human disturbance, the loss of the traditional nest site, loss of habitat due to the Harris fire, or even the mortality of one or both adult breeders. It may be coincidental that the territory became unoccupied after the collapse of the long-standing traditional nest site, but it is very plausible that this was an important factor. As described above, the loss of a nest site can result in temporary abandonment of a territory by nesting Golden Eagles. Kochert et al. (2012) documented eagles re-occupying an abandoned territory after 16 years, re-using nest sites after 27 years of inactivity, and re-establishing destroyed nest sites in the same locations after 22-40 years. This suggests that the absence of breeding birds from the Rancho San Diego territory for the past 9 breeding seasons is not, alone, sufficient evidence to conclude the territory is inviable.

The off-road vehicles, the illegal immigrant traffic, and the final construction of nearby developments may have led the adult pair of eagles to abandon the site in 2008. Likewise, these factors may have contributed to the 3 years of unsuccessful nesting on San Miguel in 2005-2007. Similarly, the San Diego County Golden Eagle nesting territory known as Iron Mountain, near Ramona, has lost a significant proportion of its nesting territory and foraging habitat to housing developments such that the pair is now typically unsuccessful at nesting attempts, but an equally important threat is that recreation in the form of rock climbing and hiking near the nest in the spring causes nest desertions. Still, disturbance in the vicinity of the Rancho San Diego territory appears to be coming under control. According to the USFWS (San Diego NWR 2011), illegal off-road driving has been curtailed by a new vehicle-barrier fence on Proctor Valley Road, and illegal immigrant traffic has been reduced (apparently by the construction of the border fence).

The territory may remain unoccupied by breeding eagles because the quality of habitat has been temporarily affected by the 2007 Harris Fire. Kochert and Steenhof (1999) studied the effects of fire on Golden Eagle breeding success, and found that success in territories where more than 30% of the area burned was lower two years post-burn, was lowest from 4 to 6 years post-burn, and returned to the 1-year post-burn level after 10-11 years. The effects of fire can be complicated though, and fire could actually improve eagle foraging habitat in San Diego County if it results in thinning of the dense chaparral and makes foraging conditions more favorable for eagles.

This period of inoccupancy in the Rancho San Diego territory has also coincided with a period of severe drought. During dry years, there is less vegetation available to support small mammal populations, and thus, a lower prey-base for eagles to forage on. According to Milsap et al. (2015), prey availability is the most important determinant of nesting territory occupancy and breeding activity. With changes in the precipitation regime, it is conceivable that prey populations will increase, and the territory will become more desirable.

## RELATIONSHIP TO THE CEDAR CANYON PAIR

Another factor that may influence probability of re-occupation in the Rancho San Diego territory is the current use of the lands by the adjacent Cedar Canyon pair. In studying the effects of fire on Golden Eagle breeding success, Kochert and Steenhof (1999) showed that when a territory was abandoned after being impacted by fire, the neighboring pair often expanded their activities into the newly unoccupied territory. If the Cedar Canyon pair successfully defends a portion of the former Rancho San Diego territory, the probability of re-occupation may be reduced because there may not be enough resources left for a pair to eke out a living. On the other hand, if the Cedar Canyon pair extends its territory into Proctor Valley, it could become vital to persistence of this pair, as continued adverse impacts from encroaching development, recreation, or other human uses can be anticipated. Alternatively, during periods of high prey abundance, there may be sufficient resources for two pairs to co-exist, and the probability of recolonization would increase accordingly.

Irrespective of future scenarios, the *current* status of Proctor Valley as important foraging habitat in a region that has elsewhere suffered significant habitat depletion must not be overlooked. If Proctor Valley is developed, eagle use in the directly impacted areas will be eliminated. Given the strong propensity of Golden Eagles to avoid human disturbance, it is all but certain that the surrounding lands will be avoided out to a certain distance, and this behavioral avoidance may fragment the habitat available to eagles to a greater extent than can be appreciated by looking at development footprints alone. Indeed, development in the valley floor may effectively eliminate use of the areas west of Proctor Valley altogether. Whether this occurs or not, the direct loss of habitat known to be regularly used by adult and subadult Golden Eagles, including the territorial Cedar Canyon pair, would have a direct and negative impact on regional eagle populations.

These are just some of the many factors to consider when evaluating the future value of Rancho San Diego nesting territory to eagles in San Diego County. By no means is it a simple matter, but in my mind, the bottom line is this: while there are many possible outcomes if the remaining habitat in the Rancho San Diego territory is left undisturbed - including re-occupancy and successful breeding by Golden Eagles - a *certainty* is that, if development is allowed to continue in prime foraging areas such as Proctor Valley, then this well-documented, traditional Golden Eagle nesting territory will become permanently extirpated. Furthermore, any loss of habitat now used for foraging or as fly-over space to access adjacent habitat, will lessen the viability of currently extant breeding territories.

If you have any questions or comments regarding this letter, please call me at 949-272-0905.

Sincerely,

**BLOOM BIOLOGICAL, INC.**



Peter H. Bloom, Ph.D.  
Zoologist



Michael J. Kuehn, Ph.D.  
Senior Biologist/Statistical Analyst

## LITERATURE CITED

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

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### Qualifications

Peter Bloom has been a professional environmental consultant for more than 40 years, principally in California and surrounding states. 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

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 700 hours conducting helicopter and fixed-wing nest survey work and aerial radio-tracking of eagles, California condors, hawks, and herons. Experience includes:

- Provided expertise on eagle ecology and behavior for a study evaluating the efficacy of detection and deterrence technologies at an operating California wind facility where golden eagle mortality is an issue.
- Served in an advisory capacity in the development of multiple Eagle Conservation Plan (ECP) documents for alternative energy projects.
- Led more than 700 hours of aerial helicopter surveys for nesting eagles and other raptors for various governmental, public and private landowners.
- Conducted research on Golden Eagles and California Condors at Tejon ranch in the early 1980's, the helped lead to the permanent preservation of 240,000 of the 270,000-acre ranch.
- In 2015 and 2016, trapped and equipped 15 Golden Eagles with GSM transmitters in northeastern California in a collaboration with USGS to understand impacts of development and recreation on eagle movements.
- In 2014 and 2015, trapped and equipped 13 Golden Eagles with GSM transmitters in southern California in a collaboration with USGS to understand impacts of development and recreation on eagle movements.
- From 1975 to 1979, conducted reptile, amphibian, small mammal, and avian surveys as part of vertebrate inventory of 3.25 million acres of public land on the Susanville District, California. Banded more than 100 Golden Eagle nestlings.
- Conducted a Statewide assessment of Swainson's Hawks in California in 1979, resulting in the species' listing as a California threatened species.

- Education** Ph.D., Natural Resources, College of Natural Resources, University of Idaho, Moscow  
M.S., Biology, California State University, Long Beach  
B.S., Zoology, California State University, Long Beach
- Awards** Graduation with Honors – Best Thesis Award School of Natural Sciences 1979  
The Wildlife Society Western Section: Professional of the Year, 2005  
Association of Field Ornithologists: Bergstrom Award, 1981  
The Nature Conservancy: \$27,000 for satellite transmitters, 2004 and 2006
- Permits & Certifications** Federal endangered species recovery permit (TE-787376) for red-legged frog (including placement of transmitters and transponders), arroyo toad, California gnatcatcher (including banding), least Bell's vireo (including banding), southwestern willow flycatcher (including banding), California least tern, snowy plover, peregrine falcon (banding), bald eagle (banding), and Swainson's hawk (banding).
- California scientific collecting permit and memorandum of understanding for all raptors, including state-threatened Swainson's hawk, reptiles, amphibians, small mammals, and many additional species of birds, including state-threatened western yellow-billed cuckoo, California least tern, snowy plover, peregrine falcon, and bald eagle  
Federal Master Banding Permit No. 20431  
    Federal Bird Marking and Salvage Permit  
    Predator Management Permit  
    Migratory Bird Relocation Permit (burrowing owl and other species)
- Selected Publications** Bloom, P.H., J.W. Kidd, and S.E. Thomas, T. Hipkiss, B. Hornfeldt, M. Kuehn. 2015. Trapping success using carrion with bow nets to capture adult golden eagles in Sweden. *Journal of Raptor Research*. 49 (1):92-97.
- Bloom, P.H., M.D. McCrary, J.M. Scott, J.M. Papp, K.J. Sernka, S.E. Thomas, J.W. Kidd, E.H. Henckel, J.L. Henckel, and M.J. Gibson, 2015). Northward summer migration of red-tailed hawks fledged from southern latitudes. *Journal of Raptor Research*. 49 (1):1-17.
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- Doyle, J.M., T.E. Katzner, P.H. Bloom, Y. Ji, B.K. Wijayawardena, J.A. DeWoody. 2014. The genome sequence of a widespread apex predator, the golden eagle (*Aquila chrysaetos*). *Plos One*. 9 (4):1-11.
- T.R. Kelly, P.H. Bloom, S. Torres, Y. Hernandez, R. Poppenga, W.M. Boyce, C.K. Johnson. 2011. Impact of the lead ammunition ban on reducing lead exposure in golden eagles and turkey vultures in California. *Plos One*. 18 pgs.
- Bloom, P.H., W.S. Clark. 2001. Molt and sequence of plumages of golden eagles and a technique for in-hand ageing. *North American Bird Bander*. 26 (3):97-112.
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# Michael Kuehn, Ph.D. | Senior Biologist & Statistical Analyst

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## Qualifications

Dr. Kuehn is an avian ecologist with experience conducting field research throughout the Americas from Ecuador to Alaska. He has a broad working knowledge of terrestrial vertebrate groups ranging from birds and mammals to amphibians and reptiles, and has taught courses about their ecology and identification at UC-Santa Barbara. He is familiar with the fauna and flora of California from coastal to montane areas, as well as the Mojave/Sonoran Desert regions. He has studied nesting birds for 20 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. In the field, Dr. Kuehn has experience conducting stationary (point count) surveys and nesting surveys for passerines and raptors, including Golden Eagles. Dr. Kuehn also has experience in the trapping and placement of leg bands on birds, as well as satellite telemetry tracking devices on Golden Eagles and other raptors. 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 six years in a variety of capacities to help design and conduct ecological assessments and prepare permitting documents, including the following:

- Managed numerous large-scale environmental assessments, involving the development of statistically valid pre-construction and post-construction avian survey protocols that meet federal and state permit requirements for alternative energy projects.
- Participated in teams to prepare multiple Eagle Conservation Plans and other environmental compliance documents for alternative energy projects applying for USFWS programmatic incidental eagle take permits, including taking the lead on statistical analyses
- Provided statistical expertise and study design support for evaluating the efficacy of detection and deterrence technologies at an operating wind facility where golden eagle mortality is an issue
- Acted as an assistant to Lead Biologist Dr. Peter Bloom on over 450 hours of aerial (helicopter) Golden Eagle nesting surveys southern and central California, during which more than 120 active nests, and more than 50 nests with eggs or young were observed.
- Conducted field surveys for a variety of passerine birds and raptors, including 10-minute point counts for passerines, long site Migration and Bird Use Counts focusing on Golden Eagles and other raptors, and call-playback surveys targeting Elf Owls
- Assisted in trapping raptors including the trapping and placement of GPS transmitters on six adult Golden Eagles in California and Oregon and three juvenile Golden Eagles in Northern California, as well as placement of leg bands on approximately 40 other large diurnal raptors in these locales.
- Worked as a Lead Raptor Nesting Survey Biologist conducting nest searching and monitoring for the Sunrise Powerlink Project in San Diego and Imperial counties in California

- 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.

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.

## 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

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

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

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

## Permits &

## Certifications

USGS Bird Banding Subpermitee (22905-F)

## Selected

## Publications

Bloom, P.H., J.W. Kidd, S.E.Thomas, T. Hipkiss, B. Hornfeldt, and M. Kuehn. 2015. Trapping success using carrion with bow nets to capture adult golden eagles in Sweden. *Journal of Raptor Research*. 49 (1):92-97.

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.

Bateman, H.L., T.L. Dudley, D.W. Bean, S.M. Ostojka, 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.

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.