# Bald Eagle and Golden Eagle Research on the California Channel Islands
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*Prepared by:*

Peter B. Sharpe
and
Nathan Melling
Institute for Wildlife Studies
Post Office Box 1104
Arcata, California 95518

*Prepared for:*

California Department of Fish and Wildlife

# INTRODUCTION

## Bald Eagles

Bald eagles (*Haliaeetus leucocephalus*) once bred on all 8 of the California Channel Islands, but the population was extirpated by the early 1960s (Kiff 1980), likely due to the introduction of the organochlorine pesticide DDT into the Southern California Bight. DDE (a DDT metabolite) levels have been found to be inversely correlated with eggshell thickness and productivity in bald eagles (Hickey and Anderson 1968, Wiemeyer et al. 1984). The Institute for Wildlife Studies (IWS) initiated reintroduction efforts on Santa Catalina Island, California (hereafter Catalina; Fig. 1) by releasing 33 young eagles from hacking towers between 1980 and 1986. Breeding attempts in 1987 and 1988 failed (Garcelon et al. 1989) and mean levels of DDE in egg remains recovered from nests were twice as high as that which has been shown to cause complete reproductive failure (Wiemeyer et al. 1984). Eggs also exhibited thinning of the shell (Kiff 1994) and areas of gross structural abnormalities of the eggshell that resulted in rapid water loss and a weakening of the eggshell (Risebrough 1998).


**Figure 1. California Channel Islands located off the coast of southern California, USA.**

From 1989 through 2008, the reintroduced population on Catalina was maintained by placing artificial eggs in nests and removing the weakened eggs for artificial incubation. Sixty-six chicks were fostered into active nests and 21 additional birds were released from hacking towers. Foster chicks were from mainland wild nests (4 chicks), produced by captive adults at the Avian Conservation Center (ACC) at the San Francisco Zoo (38 chicks) or hatched from eggs removed from the Catalina nests and artificially incubated (24 chicks).

IWS expanded bald eagle restoration to the northern Channel Islands beginning in 2002 with the release of 61 eagles from hacking towers on Santa Cruz Island (hereafter Santa Cruz) over a 5-year period. In 2006, two pairs on Santa Cruz successfully hatched and fledged one chick each (Sharpe 2007), the first known bald eagle chicks to hatch naturally in the wild on the California Channel Islands since 1950 (Miller 1950). As a result of increased hatching success during artificial incubation and natural breeding on Santa Cruz, we began leaving eggs in some Catalina nests in 2007 and discontinued egg removals altogether in 2009.

The number of breeding pairs on the Channel Islands is slowly increasing and we have documented territorial pairs and successful breeding on 5 of the 8 islands.

## Golden Eagles

The island fox (*Urocyon littoralis*) is the smallest North American canid and one of the most geographically restricted canid species, being found on only 6 of the 8 California Channel Islands (Coonan 2001). During the 1990s, fox populations declined precipitously on 4 of the 6 islands. On Catalina, one of the southern Channel Islands, a 90-95% decline in the fox population (*U. l. catalinae*) was attributed to an outbreak of canine distemper virus (Timm et al. 2000). Fox densities on Santa Cruz (*U. l. santacruzae*) and San Miguel islands (*U. l. littoralis*) declined from an estimated mean of 7.1 foxes/km$^2$ (~1300 and 350 adults, respectively) in 1993 to 0.8 foxes/km$^2$ (~130 and 15 adults, respectively) in 1998 (Roemer et al. 2001). Although regular surveys were not conducted for the foxes on Santa Rosa (*U. l. santarosae*), trapping data from 1998 and 2000, as well as anecdotal evidence, indicated that the fox densities had declined on that island as well (Suckling and Garcelon 2000).

Evidence from fox carcasses recovered on Santa Cruz indicated that golden eagles (*Aquila chrysaetos*) were the primary cause of fox mortality on the northern Channel Islands (Roemer et

al. 2001). The decline in island fox populations occurred concurrently with an increase in golden eagle sightings on the northern Channel Islands. Breeding by golden eagles on the northern Channel Islands, which represented the first breeding record of this species on the islands, was confirmed in 1999 (Roemer et al. 2001).

Because of the threat posed by golden eagles to island fox populations, The Nature Conservancy (TNC) and the National Park Service (NPS), the two land management organizations responsible for the island fox on the northern Channel Islands, desired immediate and intensive actions to ensure that fox survival in the wild was brought to a level sufficient for population recovery. Starting in 1999, a sustained effort to live-capture golden eagles and remove them from Santa Cruz and Santa Rosa resulted in a substantial reduction of the golden eagle population (Latta et al. 2005). Between 1999 and 2006 a total of 32 free-flying and 11 nestling eagles were trapped and removed from the island by the University of California Santa Cruz Predatory Bird Research Group (SCPBRG) and IWS (Latta 2005, Institute for Wildlife Studies 2006).

Despite the removal of the last known breeding golden eagles on the Channel Islands in 2006, there have been sightings of golden eagles on the islands and continued golden eagle-related island fox mortalities, although the mortalities are infrequent in the past few years. IWS continues to monitor for the presence of golden eagles and remains available to trap and remove the eagles if TNC and the NPS decide that golden eagles are having a significant impact on island fox populations.

This report summarizes the results of the 2019 bald eagle and golden eagle season.

# STUDY AREA

The California Channel Islands are composed of eight islands located off the coast of southern California (Fig. 1). All of the Channel Islands are subject to a Mediterranean climate regime characterized by cool, wet winters and warm, dry summers (Coonan and Schwemm 2009). The northern Channel Islands, which are composed of San Miguel Island, Santa Rosa Island, Santa Cruz, and Anacapa Island are located approximately 20 to 44 km off the coast of Ventura and Santa Barbara counties (Junak et al. 1995) and are a tightly clustered group with no more than 9.6 km separating adjacent islands (Moody 2000; Fig. 1). The southern Channel

Islands, which are composed of San Nicolas Island, Santa Barbara Island, Catalina, and San Clemente Island, are located 32-79 km from the mainland (Junak et al. 1995) and are more remote and scattered than the northern islands, with the closest islands (Santa Catalina and San Clemente Islands) separated by 34 km (Moody 2000; Fig. 1). We did not survey San Miguel or Santa Barbara islands in 2019.

Santa Rosa Island (hereafter Santa Rosa) is the second largest of the Channel Islands and is owned by the National Park Service (NPS; Fig. 1). The island is approximately 24 x 16 km and encompasses about 217 $km^2$ with a central mountain range reaching an elevation of approximately 475 m (Junak et al. 1995, Rick 2009). The central highland is dissected by drainages; a relatively gentle marine terrace occurs north of the highland, whereas steep, deeply incised drainages comprise much of the south portion of the island (Coonan and Schwemm 2009).

Santa Cruz is the largest of the 8 Channel Islands and is owned by the NPS (eastern 24% of the island) and TNC (western 76% of the island). The island measures about 38 km long by 12 km wide at its widest point (Fig. 1), encompassing approximately 249 $km^2$ with a maximum elevation of 753 m (Junak et al. 1995).

Anacapa Island (hereafter Anacapa), which is composed of 3 islets (East, Middle, and West Anacapa; Fig. 1) is owned by the NPS. The island encompasses approximately 2.8 $km^2$, spanning about 8 km from end to end and reaching a maximum elevation of 283 m (Junak et al. 1995).

Catalina is located 34 km south of Long Beach, California and is owned primarily by the Catalina Island Conservancy (~88%). The island is 34 km long, 0.8 to 13.0 km wide, and has an area of 194 $km^2$ and a maximum elevation of 648 m (Junak et al. 1995; Fig. 1).

San Nicolas Island (hereafter San Nicolas), owned by the U.S. Navy, is the most remote of the Channel Islands. It is located 98 km from the mainland (Junak et al. 1995) and 45 km from its nearest neighbor, Santa Barbara Island (Moody 2000; Fig. 1). It is approximately 13 x 5 km in size and has an area of about 58 $km^2$ and a maximum elevation of 277 m (Junak et al. 1995).

San Clemente Island (hereafter San Clemente), owned by the U.S. Navy, is the southernmost of the Channel Islands, located approximately 92 km off the coast of California (Fig. 1). The island is 143 $km^2$, about 34 km long, and has a high point of 610 m (Willey 1997). It is characterized by a series of marine terraces on the west side and a steep escarpment on the east side (Kaiser et al. 2009).

# METHODS

## Permitting

IWS has the required Memorandum of Understanding and Scientific Collecting Permits (Permit #s SC-2485 [Peter Sharpe] and SC-0932 [David Garcelon]) with the California Department of Fish and Wildlife to conduct bald and golden eagle research on the California Channel Islands and a banding permit from the United States Geological Survey's Bird Banding Laboratory (# 21564) allowing us to band bald eagles.

## Surveying and Nest Monitoring

### *Bald Eagles*

Observations of adult eagles began in January or February at each of the territories known from previous monitoring efforts. In conjunction with surveys for peregrine falcons (*Falco peregrinus*), we conducted monthly or bi-monthly ground surveys of Catalina, Santa Cruz, and Santa Rosa to locate any new bald eagle nesting pairs. Other islands were surveyed opportunistically. We used GPS units to record our survey routes and plotted the data using Garmin Basecamp™, which allowed us to share data among our biologists and evaluate areas that needed additional surveys. Once we confirmed nesting eagles, we found unobtrusive observation points from which to monitor the chronology and outcome of nesting attempts. We had established video cameras prior to the nesting season at 2 active nests on Catalina (West End and Two Harbors), 2 nests on Santa Cruz (Sauces, Fraser Point), and 1 nest on San Clemente (Bald Canyon) that enabled close, remote observations of nesting and were available for viewing through iws.org or Explore.org.

### *Golden Eagles*

We surveyed for golden eagles in conjunction with surveys for bald eagles and peregrine falcons on Santa Cruz, Santa Rosa, and Catalina.

## Marking and Sampling

We entered each bald eagle nest when the chicks were approximately 5-7 weeks old to equip them with federal leg bands and orange Acraft leg bands with alphanumeric codes (Acraft Sign & Nameplate Co., Edmonton, Alberta, Canada). We made morphological measurements to estimate the sex of nestlings (Bortolotti 1984, Garcelon et al. 1985).

## Monitoring of Previously Released/Hatched Bald Eagles

During monitoring and other field work we searched for non-territorial eagles on the islands. In addition, we received sighting information from the public, either directly or through the Bird Banding Lab, which we entered in a Microsoft Access database (Microsoft Corporation, Redmond, WA).

# RESULTS

## Bald Eagle Surveying and Nest Monitoring

### *Santa Catalina Island*

We located nests in February and March in 7 previously active territories on Catalina (Pinnacle Rock, Seal Rocks, West End, Two Harbors, Twin Rocks, Rattlesnake, Middle Ranch; Fig. 2) and we did not locate any new territorial pairs.

*Rattlesnake Territory.* The Rattlesnake pair (Fig. 2) used the same nest in Gallagher's Canyon that they used last year. The male has lost his wing markers, but is likely K-80, an ACC-produced bird that was fostered into the West End nest in 1998. The female has lost both wing markers, but a photo of her leg band confirmed she was K-47, an ACC-produced bird that was fostered into the Seal Rocks nest in 2004. We confirmed the birds were incubating on 24 February and that there was at least 1 chick present on 4 April. We entered the nest on 15 May to equip the single eaglet with leg bands (Table 1, Fig. 3).

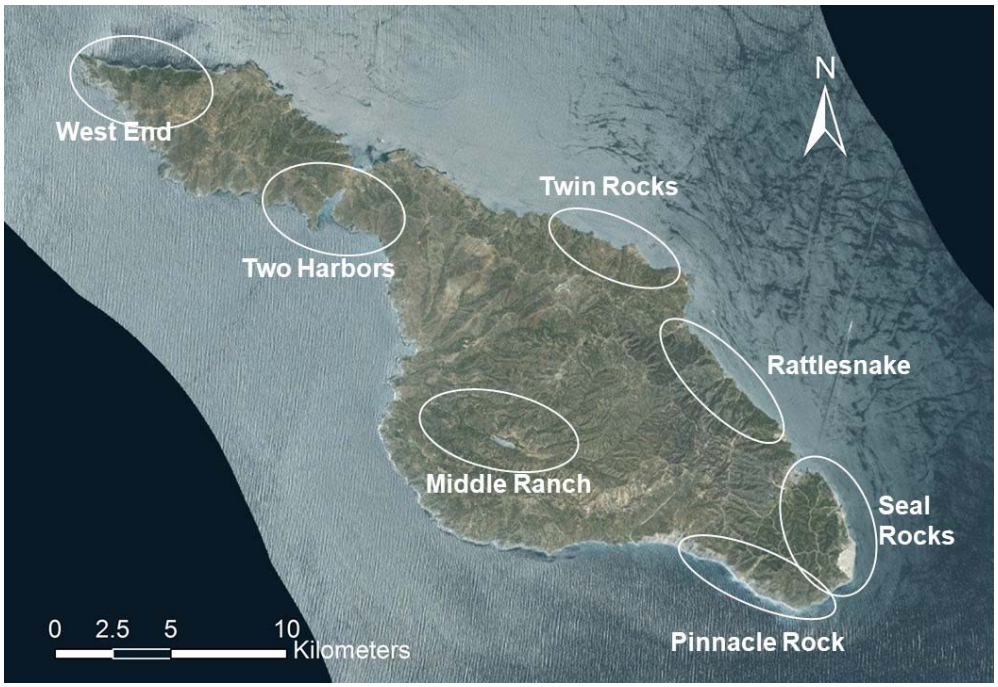


**Figure 2. Bald eagle territories on Santa Catalina Island, CA in 2019.**

*Two Harbors Territory*. The Two Harbors pair (Fig. 2) returned to their original nest that was last used in 2016. The male, K-81, was an ACC-produced eagle that was fostered into the West End nest in 1998. The female, K-82, hatched from an egg removed from the West End nest in 1998 and was fostered into the Pinnacle Rock nest. Nesting activity was monitored via the live camera. The first egg was laid on 23 February and a second was laid on 27 February. Chicks hatched on 3 and 4 April and we entered the nest on 16 May to fit the birds with leg bands (Table 1, Fig. 4).

*West End Territory*. The West End pair (Fig. 2) used the same nest that has been used since 1991. The female was K-91, a 2009 Two Harbors chick, and the male was K-01, a bird produced at the ACC and fostered into the Pinnacle Rock nest in 2000. We

**Figure 3. Rattlesnake chick before banding on Santa Catalina Island. CA in 2019.**

**Figure 4. The Two Harbors chicks at banding on Santa Catalina Island, CA in 2019.**

monitored breeding activity via a live web cam. K-91 laid eggs on 8, 11, and ~13 February (camera system was offline for a week). Chicks hatched on 17, 19, and 22 March. We entered the nest on 4 May to equip the birds with leg bands (Fig. 5, Table 1).

**Figure 5. The West End chicks before banding on Santa Catalina Island, CA in 2019.**

*Pinnacle Rock Territory.* The Pinnacle Rock pair (Fig. 2) used the same nest as in 2018. The female had no wing markers. The male was K-88, who hatched at the Twin Rocks nest in 2008 and was the breeding male at the Middle Ranch nest in 2014 before moving to the Pinnacle Rock territory in 2017. We observed 2 eggs on 8 March, but there was only 1 egg present on 22 March. A chick was present on 12 April (Table 1). We did not band this chick due to schedule constraints.

Table 1. Biographical data for bald eagle chicks hatched at nests on the southern Channel Islands, CA during 2019.

| Federal Band | Acraft Band | Sex | Date Fledged | Territory | Status[c] |
|---|---|---|---|---|---|
| 829-00020[a] | 11/A | M | 6/20/19 | West End | Unknown |
| 829-00021[a] | 26/A | F | 6/14/19 | West End | Unknown |
| 829-00022[a] | 33/A | F | 6/13/19 | West End | Unknown |
| 829-00023[a] | 56/A | F | ~6/21/19 | Twin Rocks | Unknown |
| 829-00027[a] | 12/A | M | ~6/21/19 | Rattlesnake | Unknown |
| 829-00028[a] | 57/A | F | 6/26/19 | Two Harbors | Unknown |
| 829-00029[a] | 24/A | M | 6/11/19 | Two Harbors | Unknown |
| 829-00603[b] | 38/A | F | 6/1/19 | Bald Canyon | Unknown |
| 829-00604[b] | 74/A | F | 6/1/19 | Bald Canyon | Alive, San Clemente Is., 9/3/19 |
| NA | NA | . | ~6/30/19 | Pinnacle Rock | Unknown |
| NA | NA | . | ~6/8/19 | Middle Ranch | Unknown |

[a] Catalina
[b] San Clemente
[c] As of 12/31/19 or date specified

*Seal Rocks Territory.* The Seal Rocks pair (Fig. 2) used the same nest as in 2018. The female was K-32, who hatched at the Seal Rocks nest in 2013. We believe the male was K-25, who hatched from an egg from the West End territory and was fostered into the Pinnacle Rock nest in 1992 (oldest known eagle on the Channel Islands). The birds were found incubating 1 egg on 24

February, but had lost the egg by 4 April. There were no further breeding attempts.

*Middle Ranch Territory.* The Middle Ranch pair (Fig. 2) used a new nest this season at the western end of Thompson Reservoir. The female previously lost both her wing markers, but we believe she was A-37, who was produced by eagles at the ACC and hacked on Santa Cruz in 2005. The male was K-08, who hatched at the West End nest in 2010. The birds had at least 1 egg by 20 February. There was at least one nestling present on 20 March (Table 1). We were unable to band this eaglet because the nest is located in the top of a eucalyptus tree with no safe anchor points for a climbing rope.

*Twin Rocks Territory***.** The Twin Rocks pair (Fig. 2) used the same nest as in 2018. The male was K-00, who hatched at the Pinnacle Rock nest in 2007, and the female was K-95, who hatched at the Pinnacle Rock nest in 2010. These birds are half-siblings because there were different females breeding at the Pinnacle Rock nest in 2007 and 2010. The birds were incubating on 24 February and there were at least two nestlings present on 4 April. We entered the nest for banding on 6 May and there was only 1 eaglet present (Fig. 6, Table 1).

**Figure 6. Twin Rocks chick at banding on Santa Catalina Island, CA in 2019.**

***San Clemente Island***

We surveyed for and monitored eagles on San Clemente Island in conjunction with other research on the island and located 1 active nest in the historic Bald Canyon territory (Fig. 7).


**Figure 7. Bald Canyon eagle territory on San Clemente Island. CA in 2019.**

*Bald Canyon Territory.* We placed a camera on the Bald Canyon nest (Fig. 7) in the fall of 2015 for remote monitoring because the Navy restricts access to the nesting area throughout most of the year. We were unable to verify the identity of the male this season, but we believe he was K-76, hatched at the Twin Rocks nest in 2007. The female was A-32, who was collected from a nest near Juneau, AK in 2004 and released from the North hacking tower on Santa Cruz. The birds laid their first egg on 12 March and a second egg on 15 March. The first chick hatched on 17 April and a second chick hatched on 19 April. We entered the nest on 1 June to equip the birds with leg bands (Table 1, Fig. 8).

**Figure 8. The Bald Canyon chicks at banding on San Clemente Island, CA in 2019.**

***San Nicolas Island***

We surveyed for eagles on San Nicolas Island in conjunction with peregrine falcon surveys, but did not locate any breeding bald eagles. We did observe a single bald eagle (1-2 years old) on 11 March.

***Santa Cruz Island***

We surveyed the 9 known breeding territories on Santa Cruz and located active nests in 8 territories (Baby's Harbor, Fraser Point, Fry's Harbor, Los Pinos, Pelican Harbor, Sauces Canyon, Smuggler's, and Malva Real; Fig. 9). We surveyed most of the island for new territories in conjunction with peregrine falcon surveys but located no additional territories.

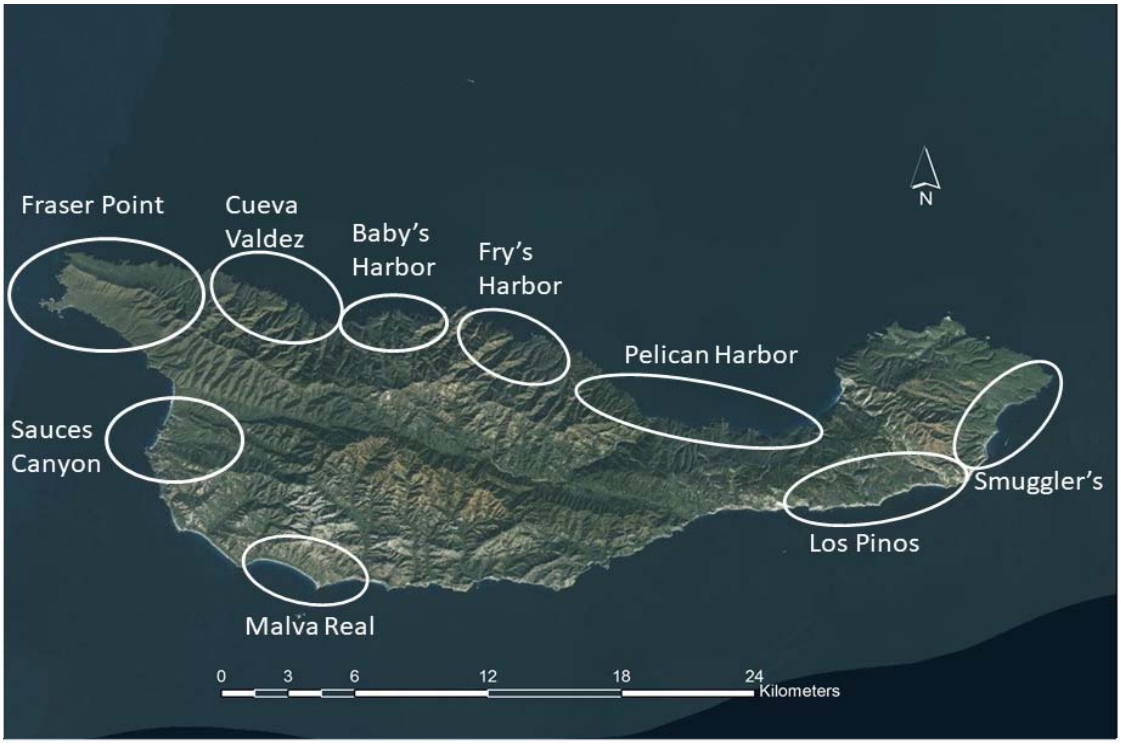


**Figure 9. Bald eagle territories on Santa Cruz Island, CA in 2019.**

*Fraser Point Territory.* The Fraser Point pair (Fig. 9) returned to their 2018 nest along the northwestern coast of the island. The male was A-64, who hatched at the Pelican Harbor nest in 2008. The female was A-49, who hatched at the Pelican Harbor nest in 2006 and was the first known chick to naturally hatch on the islands since 1950. We monitored nesting activity via a live web cam. A-49 laid her first egg on 1 February, followed by a second egg on 3 February, and a third egg on 6 February. The first chick hatched on 9 March, the second on 11 March, and the third on 14 March. We entered the nest on 29 April to equip the chicks with leg bands (Fig. 10, Table 2).

**Figure 10. The Fraser Point eaglets at banding on Santa Cruz Island, CA in 2019.**

Table 2. Biographical data for bald eagle chicks hatched at nests on the northern Channel Islands, CA during 2019.

| Federal Band | Acraft Band | Sex | Date Fledged | Territory | Status[c] |
|---|---|---|---|---|---|
| 829-00015[a] | 32/A | F | ~6/7/19 | Los Pinos | Unknown |
| 829-00016[a] | 41/A | F | 6/9/19 | Sauces | Unknown |
| 829-00017[a] | 34/A | F | 6/6/19 | Fraser Point | Unknown |
| 829-00018[a] | 45/A | M | 5/27/19 | Fraser Point | Unknown |
| 829-00019[a] | 55/A | M | 5/24/19 | Fraser Point | Unknown |
| 829-00024[a] | 36/A | M | ~6/10/19 | Fry's Harbor | Unknown |
| 829-00025[a] | 48/A | M | ~6/10/19 | Fry's Harbor | Unknown |
| 829-00026[b] | 28/A | M | ~6/24/19 | Trap Canyon | Unknown |
| 829-00030[a] | 43/A | F | >6/20/19 | Baby's Harbor | Unknown |
| 829-00601[a] | 25/A | M | >6/20/19 | Baby's Harbor | Dead, San Luis Obispo Co. 9/5/19 |
| 829-00602[a] | 18/A | M | ~6/21/19 | Pelican Harbor | Unknown |
| NA | NA | NA | >6/21/19 | Oak Canyon | Unknown |
| NA | NA | NA | >6/21/19 | Oak Canyon | Unknown |

[a] Santa Cruz Island
[b] Santa Rosa Island
[c] As of 12/31/19 or date specified

*Los Pinos Territory*. The Los Pinos pair (Fig. 9) used the same nest as in 2018. The female has lost her wing markers, but could still be A-51, an ACC-produced bird that was released from the South hacking tower on Santa Cruz. The male also has lost his wing markers, but could still be A-45, a 2005 ACC-produced male released from the North hacking tower. The birds were found incubating on 4 February. There was 1 nestling present on 15 March. We entered the nest on 28 April to equip the chick with leg bands (Table 2, Fig. 11).

**Figure 11. The Los Pinos eaglet at banding on Santa Cruz Island, CA in 2019.**

*Fry's Harbor Territory.* The Fry's Harbor pair (Fig. 9) used the same nest as in 2018. We were unable to identify either adult, though it is likely the male was A-46, a 2006 ACC-produced male released from the North hacking tower. The birds were found incubating on 18 February and there was at least 1 nestling present on 30 March. We confirmed 2 chicks were present on 25 April and entered the nest on 8 May to equip them with leg bands (Table 2, Fig. 12).

**Figure 12. The Fry's Harbor eaglets at banding on Santa Cruz Island, CA in 2019.**

*Pelican Harbor Territory.* The Pelican Harbor pair (Fig. 9) returned to their 2018 nest. The male has lost his wing tags, but we believe he is still K-10, a male produced by the ACC and fostered into the Twin Rocks nest on Catalina in 2001. The female was K-26, who was produced by the ACC and fostered into the West End nest on Catalina in 2002. We observed incubation on 26 February and there was at least 1 nestling present on 11 April. We entered the nest on May 23 to equip a single chick with leg bands (Fig. 13, Table 2).

**Figure 13. The Pelican Harbor chick at banding on Santa Cruz Island, CA in 2019.**

*Smuggler's Territory.* The Smuggler's pair used the same nest as in 2018. The male was unidentified, but is likely still A-58, an ACC bird hacked on Santa Cruz in 2006. The female had no wing tags. We observed the pair incubating 2 eggs on 4 February. They were still incubating on 14 March, but the nest had fallen out of the tree by the next day. There were no further breeding attempts.

*Baby's Harbor Territory.* The Baby's Harbor pair (Fig. 9) used the same nest as in 2018. The male was unidentified, but is likely A-68, a bird hatched at the Pelican Harbor nest in 2010. The female was A-27, a bird removed from a nest near Juneau, AK in 2004 and released from the South hacking tower on Santa Cruz. We found the birds incubating on 17 March and there was 1 nestling present on 14 April and 2 nestlings on 24 April. We entered the nest on 22 May to equip the chicks with leg bands (Fig. 14, Table 2).

**Figure 14. The Baby's Harbor chicks at banding on Santa Cruz Island, CA in 2019.**

*Sauces Canyon Territory.* The Sauces Canyon pair (Fig. 9) returned to their 2018 nest. The male was A-40, a bird from the ACC that was hacked on Santa Cruz in 2005. The female, A-48, an ACC-produced bird, was hacked on Santa Cruz in 2006. This nest was monitored via a live-streaming web camera. The first egg was laid on 5 February. A second egg was laid on 8 February, but both eggs broke on 11 February, the same day that a third egg was laid. A chick hatched on 19 March and we entered the nest on 29 April to equip the chick with leg bands (Fig. 15, Table 2).

**Figure 15. The Sauces Canyon chick at banding on Santa Cruz Island, CA in 2019.**

*Cueva Valdez Territory.* The Cueva Valdez territory had no known nesting attempts in 2019. The male from 2017 was not seen for the duration of the season. The female, A-98, is a 2014 bird that hatched at either the Pelican Harbor or Fraser Point nest (2 females received same wing marker number). An adult golden eagle was observed in the territory on 4 and 17 March. The golden eagle may be the same individual that was documented in the Fraser Point territory since 2016 and the Cueva Valdez territory in 2018.

*Malva Real Territory.* The Malva Real pair (Fig. 9) used the same nest as in 2018. The male was A-71, hatched at the Sauces Canyon nest in 2010. Due to lack of wing tags, we were unable to confirm the identity of the other adult. The pair were confirmed incubating on 13 March and continued incubating through at least 4 June with no successful hatching.

### *Santa Rosa Island*

We located active nests in 2 known territories on the island (Lopez Canyon and Trap Canyon; Fig. 16), and surveyed much of the coastline for new territories.

*Lopez Canyon Territory.* The Lopez Canyon pair (Fig. 16) used a new nest in upper Trancion Canyon. The male was A-69, a 2010 Pelican Harbor chick. We were not able to verify the female's identity, but we believe she was A-43, a bird produced by the ACC and hacked on Santa Cruz in 2005. We observed the birds incubating on 28 February, but the nest failed between 28 March and 12 April. There were no further nesting attempts.

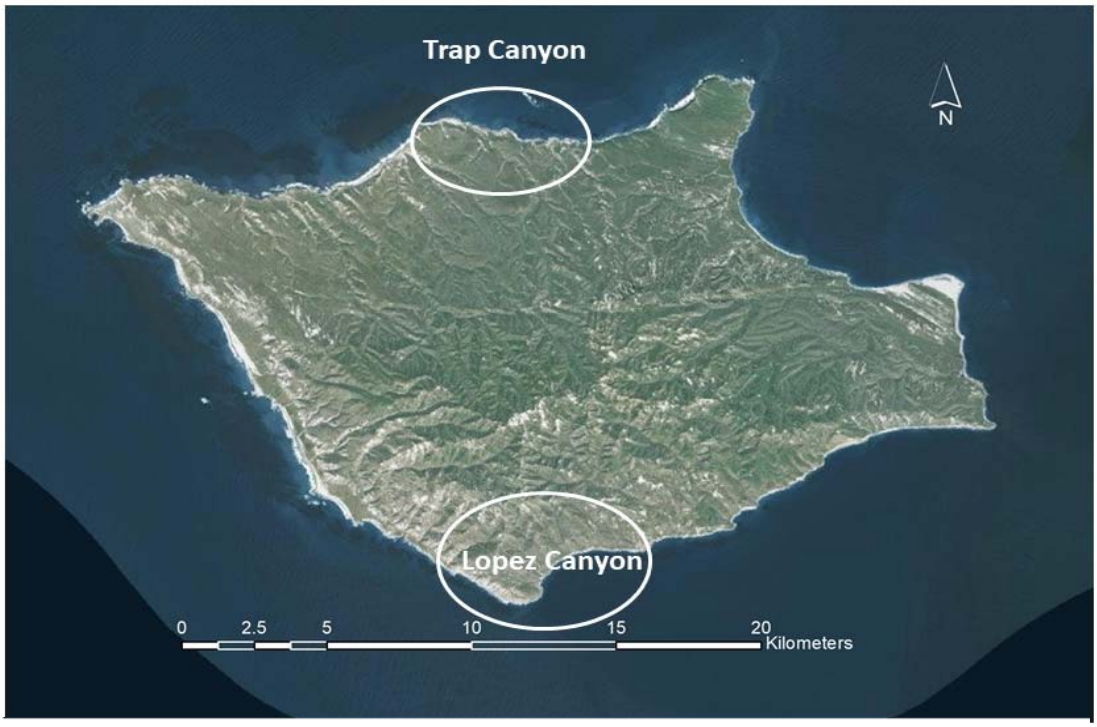


**Figure 16. Bald eagle territories on Santa Rosa Island, CA in 2019.**

*Trap Canyon Territory*. The Trap Canyon pair (Fig. 16) returned to their 2017 nest. We could not confirm the identity of either adult due to a lack of wing tags. We found the birds incubating on 26 February and there was a nestling present on 26 March. We entered the nest on 12 May to equip the chick with leg bands (Fig. 17, Table 2).

**Figure 17. The Trap Canyon chick at banding on Santa Rosa Island, CA in 2019.**

### *Anacapa Island*

*Oak Canyon Territory*. We were able observe the pair in the historic Oak Canyon territory (Fig. 18) five times between 18 March and 21 June. The birds appeared to be incubating on 5 April and aerial photos taken around 20 May showed two nestlings present. At least one eaglet appeared to be in the nest on 21 June. We are unable to band at this nest due to breeding seabird activity on the island.


**Figure 18. The Oak Canyon bald eagle territory on Anacapa Island, CA in 2019.**

## Nesting Summary

Based upon our observations, there were 19 pairs of bald eagles across all the Channel Islands this season, all of which nested and laid a minimum of 33 eggs. A minimum of 25 chicks hatched (76% hatching success) and all but one of the known chicks fledged (Table 3). Nesting success was 79% and productivity was 1.26 fledglings/breeding attempt.

## Monitoring of Previously Released/Hatched Bald Eagles

During 2019, we had confirmed sightings of 41 identified bald eagles that were released or hatched on the Channel Islands in previous years (Table 4). Fifteen were observed on the mainland, 12 on Catalina, 10 on Santa Cruz, 3 on Santa Rosa, and 1 on San Clemente. Two identified females successfully bred on the mainland. Eagle 679-03429, a 2009 bird from the West End nest, raised one chick at Lake Casitas, CA. Eagle 679-04128, a 2013 bird from the Lopez Canyon nest, raised two chicks in Anaheim Hills, CA. In addition, Eagle 709-03077, a 2015 bird from the Seal Rocks nest, bred unsuccessfully at Lake Wohlford in San Diego County, CA.

## Golden Eagle Surveying

We confirmed a single golden eagle on the islands in 2019. It was seen repeatedly throughout the year on the northwestern portion of Santa Cruz, mostly within the Cueva Valdez bald eagle territory (Fig. 9).

# DISCUSSION

## Bald Eagles

The Channel Island bald eagle population had the highest productivity in the history of the restoration project with 24 fledglings. Nesting success and productivity has varied greatly since 2009 when we discontinued manipulating Catalina nests, ranging from a high of 85% nest success and 1.15 fledglings per breeding attempt in 2010 to a low of 47% nest success and 0.71 fledglings/attempt in 2015. This season's nest success (79%) and productivity (1.26

fledglings/attempt) was higher than in 2018 (67% and 1.1 fledglings/attempt) and meets the Pacific Region Bald Eagle Recovery Plan's target of 65% nesting success and productivity of 1.0 fledgling/attempt (U. S. Fish and Wildlife Service 1986). Since 2009, the mean success and productivity across all the islands has been 66% and 1.0 fledglings/attempt, respectively.

In 2020, we expect a similar number of breeding attempts. There is the potential for new pairs to create territories, especially along the southern coast of Santa Cruz and the southwest coast of Santa Rosa where we occasionally see adult eagles. Due to the 2017 funding cuts we

Table 3. Summary of nesting attempts by bald eagles on the California Channel Islands in 2019.

| Island/Nest | Min # Eggs Laid | Min # Chicks Hatched | Min # Chicks Fledged | Number Surviving Until End of Year |
|---|---|---|---|---|
| Santa Catalina Island | | | | |
| West End | 3 | 3 | 3 | 0-3 |
| Pinnacle Rock | 2 | 1 | 1 | 0-1 |
| Seal Rocks | 1 | 0 | . | . |
| Two Harbors | 2 | 2 | 2 | 0-2 |
| Twin Rocks | 2 | 2 | 1 | 0-1 |
| Middle Ranch | 1 | 1 | 1 | 0-1 |
| Rattlesnake | 1 | 1 | 1 | 0-1 |
| TOTAL | 12 | 10 | 9 | 0-9 |
| San Clemente Island | | | | |
| Bald Canyon | 2 | 2 | 2 | 0-2 |
| TOTAL | 2 | 2 | 2 | 0-2 |
| Santa Cruz Island | | | | |
| Baby's Harbor | 2 | 2 | 2 | 0-1 |
| Sauces | 3 | 1 | 1 | 0-1 |
| Fry's Harbor | 2 | 2 | 2 | 0-2 |
| Fraser Point | 3 | 3 | 3 | 0-3 |
| Los Pinos | 1 | 1 | 1 | 0-1 |
| Smuggler's | 2 | 0 | . | . |
| Pelican Harbor | 1 | 1 | 1 | 0-1 |
| Malva Real | 1 | 0 | . | . |
| TOTAL | 15 | 10 | 10 | 0-9 |
| Santa Rosa Island | | | | |
| Trap Canyon | 1 | 1 | 1 | 0-1 |
| Lopez Canyon | 1 | 0 | . | . |
| TOTAL | 2 | 1 | 1 | 0-1 |
| Anacapa Island | | | | |
| Oak Canyon | 2 | 2 | 2 | 0-2 |
| TOTAL | 2 | 2 | 2 | 0-2 |
| All Islands Combined | 33 | 25 | 24 | 0-23 |

Table 4. Status of bald eagles released from hacking towers or fledged from nests on the California Channel Islands prior to 2019 that had confirmed sightings in 2019.

| FWS Leg Band | Sex[a] | Patagial Marker | Nest/Origin | Fledge Year | Status, Latest Location[b] |
|---|---|---|---|---|---|
| 629-39816 | M | K-81 | West End | 1998 | Alive, Two Harbors pair, Catalina Is. |
| 629-39817 | F | K-82 | Pinnacle Rock | 1998 | Alive, Two Harbors pair, Catalina Is. |
| 629-29498 | M | K-01 | Pinnacle Rock | 2000 | Alive, West End pair, Catalina Is. |
| 629-29499 | F | K-02 | West End | 2000 | Alive, Fresno, CA 11/21/19 |
| 629-02793 | F | K-26 | West End | 2002 | Alive, Pelican Harbor pair, Santa Cruz Is. |
| 629-47366 | F | A-23 | Zoo | 2004 | Dead, Welby, CA 10/18/19 |
| 629-47371 | F | K-47 | Zoo | 2004 | Alive, Rattlesnake pair, Catalina Is. |
| 629-47375 | F | A-27 | Alaska | 2004 | Alive, Baby's Harbor pair, Santa Cruz Is. |
| 629-47380 | F | A-32 | Alaska | 2004 | Alive, Bald Canyon pair, San Clemente Is. |
| 629-47391 | M | A-40 | Zoo | 2005 | Alive, Sauces pair, Santa Cruz Is. |
| 629-52406 | F | A-48 | Zoo | 2006 | Alive, Sauces pair, Santa Cruz Is. |
| 629-52407 | F | A-49 | Pelican Harbor | 2006 | Alive, Fraser Point pair, Santa Cruz Is. |
| 629-52438 | M | A-64 | Pelican Harbor | 2008 | Alive, Fraser Point pair, Santa Cruz Is. |
| 629-52443 | M | K-88 | Twin Rocks | 2008 | Alive, Pinnacle Rock pair, Catalina Is. |
| 629-52425 | M | K-00 | Pinnacle Rock | 2007 | Alive, Twin Rocks pair, Catalina Is. |
| 629-52450 | F | K-91 | Two Harbors | 2009 | Alive, West End pair, Catalina Is. |
| 679-03429 | F | K-97 | West End | 2009 | Alive, Breeding at Lake Casitas, CA |
| 679-03432 | M | A-67 | Trap Canyon | 2010 | Alive, Siskiyou Co., CA 3/23/19 |
| 679-03436 | M | A-69 | Pelican Harbor | 2010 | Alive, Lopez Canyon pair, Santa Rosa Is. |
| 679-03439 | F | K-95 | Pinnacle Rock | 2010 | Alive, Twin Rocks pair, Catalina Is. |
| 679-03443 | M | A-71 | Sauces | 2010 | Alive, Malva Real pair, Santa Cruz Is. |
| 679-03445 | M | K-98 | Middle Ranch | 2010 | Alive, Catalina Is., CA 3/17/19 |
| 679-04103 | M | K-08 | Seal Rocks | 2011 | Alive, Middle Ranch pair, Catalina Is. |
| 679-04128 | F | A-85 | Lopez Canyon | 2013 | Alive, Breeding in Anaheim Hills, CA |
| 679-04133 | F | K-32 | Seal Rocks | 2013 | Alive, Seal Rocks pair, Catalina Is. |
| 679-04146 | F | A-91 | Malva Real | 2014 | Alive, Ramona, CA 11/10/19 |
| 709-03052 | M | A-94 | Lopez Canyon | 2014 | Alive, San Diego Co., CA 2/26/19 |
| 709-03054 | M | A-96 | Trap Canyon | 2014 | Alive, San Diego Co., CA 4/28/18 |
| 709-03057 | F | K-40 | Seal Rocks | 2014 | Alive, Lake Pleasant, AZ 1/16/19 |
| 709-03059 | F | K-43 | Two Harbors | 2014 | Alive, Qualicum Beach, BC 11/14/19 |
| 709-03077 | F | K-57 | Seal Rocks | 2015 | Alive, Breeding at Lake Wohlford., CA 4/28/19 |
| 709-03080 | M | A-50 | Lopez Canyon | 2015 | Alive, Santa Cruz Is. 2/3/19 |
| 709-03082 | M | N/A | Bald Canyon | 2015 | Dead, Klamath Co., OR 7/4/19 |
| 709-03085 | M | A-61 | Los Pinos | 2016 | Alive, Catalina Is., CA 11/22/19 |
| 709-03096 | M | K-69 | Rattlesnake | 2016 | Alive, Litchfield, CA 4/6/19 |
| 709-03097 | F | A-99 | Baby's Harbor | 2016 | Alive, Santa Rosa Is., CA 3/1/19 |

Table 4. Continued

| FWS Leg Band | Sex[a] | Patagial Marker | Nest/Release Tower | Fledge Year | Status, Latest Location[b] |
|---|---|---|---|---|---|
| 709-07046 | M | A-04 | Fraser Point | 2017 | Alive, Santa Cruz Is., CA 7/4/19 |
| 709-03098 | M | A-66 | Baby's Harbor | 2016 | Alive, Santa Rosa Is., CA 3/1/19 |
| 709-07359 | M | A-14 | Baby's Harbor | 2017 | Alive, Santa Cruz Is., CA 7/27/19 |
| 709-03099 | M | A-02 | Fraser Point | 2017 | Alive, Klamath Falls, OR 1/1/18 |
| 709-03100 | M | A-03 | Fraser Point | 2017 | Alive, Lewiston, CA 10/20/19 |

[a] Determined by karyotyping and/or morphometrics.
[b] As of 12/31/19 unless otherwise noted.

will continue to have a reduced survey effort in 2020 with just 2 staff members. In anticipation of the limited staff, we placed Reconyx trail cams on most of the eagle nests on Catalina, Santa Cruz, Anacapa, and Santa Rosa so that we can get better information on nesting chronology and outcome without the need to regularly monitor the nests. The trail cams should allow us to identify the breeding adults by their leg band numbers now that most have lost their wing markers.

## Golden Eagles

There was only 1 known golden eagle on the Channel Islands in 2019, located on northwestern Santa Cruz. This eagle seems to have disrupted the breeding activity of the Cueva Valdez pair in 2018 and 2019. We will continue to monitor this area in 2020. If the golden eagle remains on the island, we will revisit the possibility of translocating the bird to the mainland if it appears to be having an impact on the island fox population and/or continues to disrupt bald eagle breeding.

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