Bald Eagle Restoration on the California Channel Islands

January — December 2017

16th Annual Report

MONTROSE SETTLEMENTS RESTORATION PROGRAM

MSRP

Restoring Natural Resources
harmed by DDTs and PCBs

Bald Eagle Restoration on the California Channel Islands

January — December 2017

16th Annual Report

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EXECUTIVE SUMMARY

The Institute for Wildlife Studies (IWS) began bald eagle (*Haliaeetus leucocephalus*) restoration efforts on Santa Catalina Island in 1980, nearly 20 years after bald eagles had disappeared from the Channel Islands due to human persecution and the introduction of DDT into the Southern California Bight. Unfortunately, residual DDT continued to impact the birds and the population was maintained by artificial incubation of the fragile eggs, fostering of chicks to active nests, and continued release of birds from hacking towers. In 2002, IWS initiated a 5-year bald eagle restoration feasibility study on Santa Cruz Island, in cooperation with the National Park Service, to determine whether the eagles could reproduce successfully if located farther from the primary DDT source off the Palos Verdes Peninsula. IWS released 61 eagles on Santa Cruz Island from 2002-2006. In 2006, the first known nesting attempts occurred on the northern Channel Islands and 2 pairs of eagles successfully fledged one chick each. The following year we began leaving eggs in some of the nests on Catalina and discontinued nest manipulations in 2009. Since 2006, we have banded 134 chicks that hatched naturally in nests on Santa Cruz, Santa Rosa, Anacapa, Santa Catalina, and San Clemente Islands.

In 2017, there were 17 known nesting attempts on the Channel Islands: 6 on Santa Catalina Island, 7 on Santa Cruz Island, 2 on Santa Rosa Island, 1 on Anacapa Island, and 1 on San Clemente Island. Overall nesting success was 71% (12 of 17 attempts) and a minimum of 17 chicks are known to have hatched in 12 nests, all of which fledged (1.0 fledglings/nesting attempt). This productivity was higher than in 2016 and met the target set by the U.S. Fish and Wildlife Service. Most failures occurred early in the incubation period.

Based upon the sightings of birds this year, we estimate that there are at least 45 bald eagles on the Channel Islands. These primarily are breeding adults and it is likely that there are additional juveniles/subadults/adults present that have not been seen or identified. Eighteen additional eagles originally from the islands were reported on the mainland.

In 2018, we expect an increase in the number of active eagle nests, as the female at Cueva Valdez has reached breeding age and the Malva pair may resume breeding. We will continue our annual bald eagle monitoring on the 5 islands on which they breed in 2017, but due to staffing cuts our efforts will be reduced.

ACKNOWLEDGMENTS

We would like to thank the NPS, United States Navy (USN), TNC, and the Santa Catalina Island Conservancy for their cooperation and allowing us access to their property to conduct our surveys and monitoring. We thank the NPS and the USN for providing transportation to and from the islands. We thank Annie Little and Jennifer Boyce for assisting in project coordination. David Garcelon handled contract administration, permitting, and provided editorial comments on the final report. Finally, we appreciate the hard work and dedication of this season's field crew: Nate Melling, Aaron Wuori, Russell Seeley, Sarah Dantuono-Brown, Lily Harrison, Jessica Rempel, Nicole Desnoyers, and Justyn Stahl. Jim Campbell-Spickler helped insure that the nest entries were made quickly and safely, for both the birds and personnel. The Sauces, West End, and Two Harbors nest cams and live streams were provided by Explore.org. The network connection to Santa Cruz was provided by the Ventura County Office of Education.

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INTRODUCTION

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 (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).

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

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

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 (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. As of 2017, there were 7 pairs on Catalina, 9 pairs on Santa Cruz, 2 pairs on Santa Rosa Island (Santa Rosa), 1 pair on Anacapa Island (Anacapa), and 1 pair on San Clemente Island (San Clemente).

STUDY AREA

In 2017, we monitored bald eagles on Catalina, Santa Cruz, Santa Rosa, Anacapa, and San Clemente. Catalina, located 34 km south of Long Beach, California, is owned primarily by the Santa Catalina Island Conservancy (~90%). The island is 34 km long, 0.8 to 13.0 km wide, and has an area of 194 km^2, 80 km of coastline, and maximum elevation of 648 m (Junak et al. 1995; Fig. 1).

The northern Channel Islands, which are composed of San Miguel, Santa Rosa, Santa Cruz, and Anacapa Islands, are located approximately 19 to 44 km off the coast of Ventura and Santa Barbara counties (Fig. 1). Santa Cruz is the largest of the eight Channel Islands, measuring about 38 km in length and 12 km wide at its widest point (Fig. 1). The island is approximately 249 km^2 with a maximum elevation of 753 m. Santa Cruz is the most rugged and topographically diverse of the northern Channel Islands and has a Mediterranean climate, with mean monthly temperatures ranging from 11.7 - 20.9º C and a mean annual rainfall of 50 cm (Junak et al. 1995). The NPS owns and manages the eastern 24% of the island and TNC owns the western

76% of the island.

Santa Rosa is the second largest of the Channel Islands and is owned by the 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).

Anacapa, which is composed of three 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).

San Clemente, owned by the U.S. Navy, is the southernmost of the California 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

Surveying and Nest Monitoring

Observations of adult eagles began in January or February at each of the known territories. In conjunction with surveys for peregrine falcons (*Falco peregrinus*), we conducted weekly or bi-weekly ground surveys of Catalina, Santa Cruz, and Santa Rosa to locate any new bald eagle nesting pairs. 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 1 active nest on Catalina (West End), 1 nest on Santa Cruz (Sauces), and 1 nest on San Clemente (Bald Canyon) that enabled close, remote observations of nesting activity. The 3 nests were available for live viewing on our website (http://www.iws.org). The Sauces cam was also streamed via Explore.org.

Marking and Sampling

We entered each bald eagle nest when the chicks were approximately 6-8 weeks old to equip them with federal leg bands, patagial wing markers (orange on Catalina, light blue on NCI), and orange A-craft leg bands with alphanumeric codes (Acraft Sign & Nameplate Co., Edmonton, Alberta, Canada). We also collected a blood sample (~10 cc) for future contaminant analyses, and made morphological measurements to determine sex (Bortolotti 1984, Garcelon et al. 1985). For birds that had measurements that were inconclusive, sex was confirmed later with a blood sample sent for DNA analyses (Avian Biotech International, Tallahassee, FL).

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 islands and mainland from the public, either directly or through the Bird Banding Lab. We entered sighting information in a Microsoft Access database (Microsoft Corporation, Redmond, WA).

RESULTS

Surveying and Nest Monitoring

Santa Catalina Island

Nests were located 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 that they used in 2016. The male has lost both wing markers, but we believe he is still K-80, who was produced by eagles at the ACC in 1998 and was fostered into the West End nest. The female has lost both wing markers, but we believe she is still K-47, who was produced by eagles at the ACC in 2004 and was fostered into the Seal Rocks nest. We confirmed the birds were incubating at least 1 egg

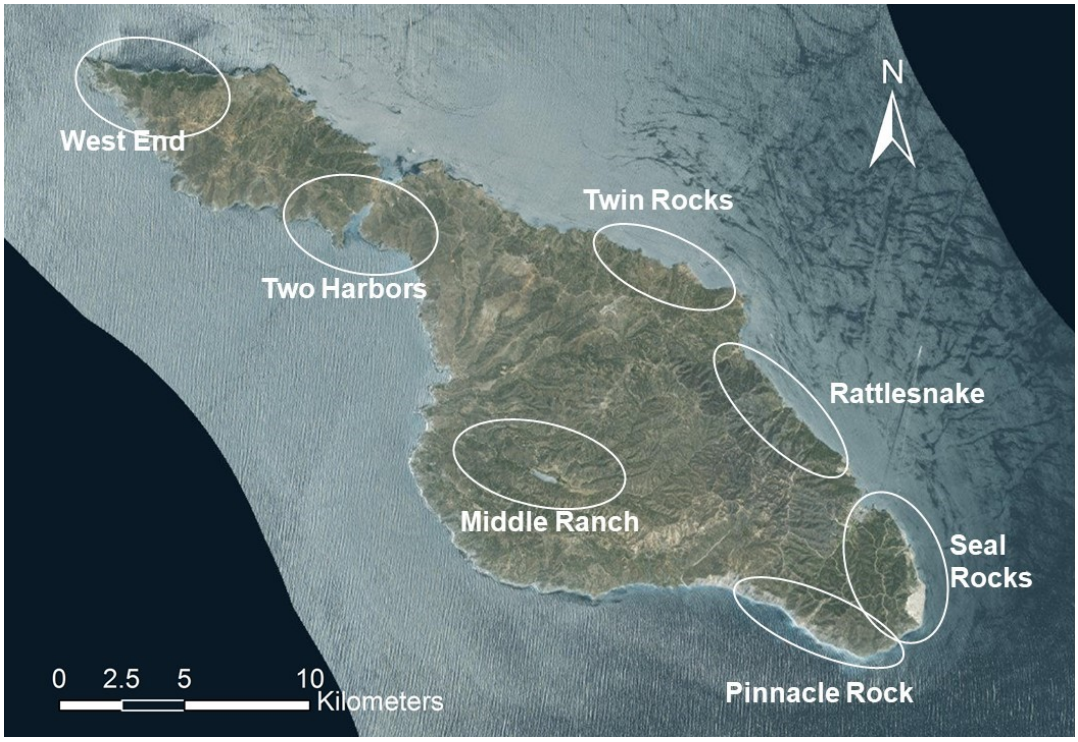

Figure 2. Bald eagle territories on Santa Catalina Island, CA in 2017.

on 1 March and confirmed two eggs on 9 March. There was 1 chick (1-2 days old) and 1 egg in the nest on 4 April. The second egg did not hatch and eventually disappeared. We entered the nest on 18 May to equip the chick with leg bands and patagial wing markers and to collect a blood sample for contaminant analyses (Table 1, Fig. 3). We monitored the nest until the eagle fledged around 1 July.

Figure 3. Rattlesnake chick before banding on Santa Catalina Island, CA in 2017.

Two Harbors Territory. The Two Harbors pair (Fig. 2) built a new nest about 150 m south of their previous nest along the same ridgeline. The male, K-81, is 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. We discovered the birds in incubation posture on the new nest on 10 March and there was at least 1 chick present on 12

Table 1. Biographical data for bald eagle chicks hatched at nests on the southern Channel Islands, CA during 2017.

Federal Band	Acraft Band	Sex	Wing Tag	Date Fledged	Territory	Status[c]
709-07049	71/A	M	K-71	~7/1/17	Rattlesnake[a]	Dead, 8/24/17, Lockwood, CA
709-07050	72/A	F	K-72	~6/26/17	Two Harbors[a]	West End territory, 8/7/17
709-07351	73/A	M	K-73	6/21/17	West End[a]	Unknown
709-07352	47A	M	K-74	6/21/17	West End[a]	Unknown
709-07353	70/A	F	NA	~7/3/17	Pinnacle Rock[a]	Unknown
709-07355	01/A	F	NA	7/2/17	Bald Canyon[b]	Unknown
709-07356	15/A	M	NA	6/28/17	Bald Canyon[b]	Unknown

[a] Catalina
[b] San Clemente
[c] As of 12/31/17 or date specified

April. We entered the nest on 19 May to equip a single chick with leg bands and patagial wing markers and to collect blood samples for contaminant analyses (Table 1, Fig. 4). The eagle fledged by 26 June, at which time it was seen along a nearby ridge via a live webcam on the previous nest.

Figure 4. Two Harbors chick after banding on Santa Catalina Island, CA in 2017.

West End Territory. The West End pair (Fig. 2) used the same nest that has been in use 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. A winter storm destroyed the remote camera system on the nest, but we were able to monitor activity at the nest from a secondary camera located about 550 m from the nest. K-91 began laying eggs between 17 and 23 February, which hatched around 26 March. We entered the nest on 19 May to equip the birds with leg bands and patagial wing markers and to collect blood samples for contaminant analyses (Fig. 5, Table 1). Both eagles fledged on 24 June.

Pinnacle Rock Territory. The Pinnacle Rock pair (Fig. 2) used the same nest as in 2016. The female has no wing markers, but we were able to confirm that she has a USGS leg band on her left leg, which is an indication that she is from the islands. The male was K-88, who hatched at the Twin Rocks nest in 2008 and was the breeding male in the Middle Ranch nest in 2014. We observed 2 eggs on 7 March (laid after 22 February). There was 1 chick in the nest on 6 April. We entered the nest on 20 May and equipped the chick with leg bands and collected blood samples for contaminant analyses (Table 1, Fig 6). The chick had fledged by 3 July.

Figure 5. West End chicks before banding on Santa Catalina Island, CA in 2017.

Figure 6. The Pinnacle Rock chick on Santa Catalina Island, CA in 2017.

Seal Rocks Territory. The Seal Rocks pair (Fig. 2) used the same nest as in 2012 after the nest tree they used in 2013-2016 fell in a land slide during the winter rains. The female is believed to be K-34, who was produced by captive ACC eagles and hacked on Catalina in 1993. The male is believed to be 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 9 March. The egg disappeared between 18 and 31 March and the birds did not attempt to renest.

Middle Ranch Territory. The Middle Ranch (Fig. 2) female has lost both her wing markers, but we believe she is 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 were present throughout the season and made visits to the nest, but there were no known nesting attempts.

*Twin Rocks Territory***.** The Twin Rocks pair used the same nest as in 2015 (no known pair present in 2016). The male was K-00, who hatched at the Pinnacle Rock nest in 2007. 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 appeared to be incubating on 9 March, but no birds were present on 16 March and there were no further nesting attempts. The birds were last seen together in their territory on 5 July.

Empire Territory. We were unable to locate a pair of eagles in the historic Empire territory this season.

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 eagle territory on San Clemente Island, CA in 2017.

Bald Canyon Territory. We placed a camera on the Bald Canyon nest (Fig. 3) 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 is K-76, hatched at the Twin Rocks nest in 2007. The female is 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 5 March and a second egg on 8 March. The first chick hatched on 11 April and a second chick hatched on 13 April. We entered the nest on 27 May to equip the birds with leg bands and to collect blood samples for contaminant analyses (Table 1, Fig. 8). The male fledged on 28 June and the female fledged on 2 July.

Figure 8. The Bald Canyon chicks after banding on San Clemente Island, CA 2017.

Santa Cruz Island

We surveyed the 9 known breeding territories on Santa Cruz and located active nests or evidence of successful reproduction in 7 territories (Baby's Harbor, Fraser Point, Fry's Harbor, Los Pinos, Pelican Harbor, Sauces Canyon, Smuggler's; Fig. 9). We surveyed most of the island for new territories in conjunction with peregrine falcon surveys, but located no additional territories.

Fraser Point Territory. The Fraser Point pair (Fig. 9) used a new nest along the northwestern coast of the island after their previous nest collapsed during the winter storms. 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 chick to naturally hatch on the islands since 1950. These birds are full siblings. We did not locate the new nest until 15 March, at which time they had at least 2 chicks. We confirmed that there were 3 chicks present on 14 April and entered the nest on 8 May to equip the chicks with leg bands and patagial wing markers and to obtain blood

samples for contaminants analyses (Fig. 10, Table 2). All 3 eagles had fledged by 21 June.

During the fall, we installed a new camera system on the nest so that we can get better views of nesting activity if they reuse this nest in 2018.

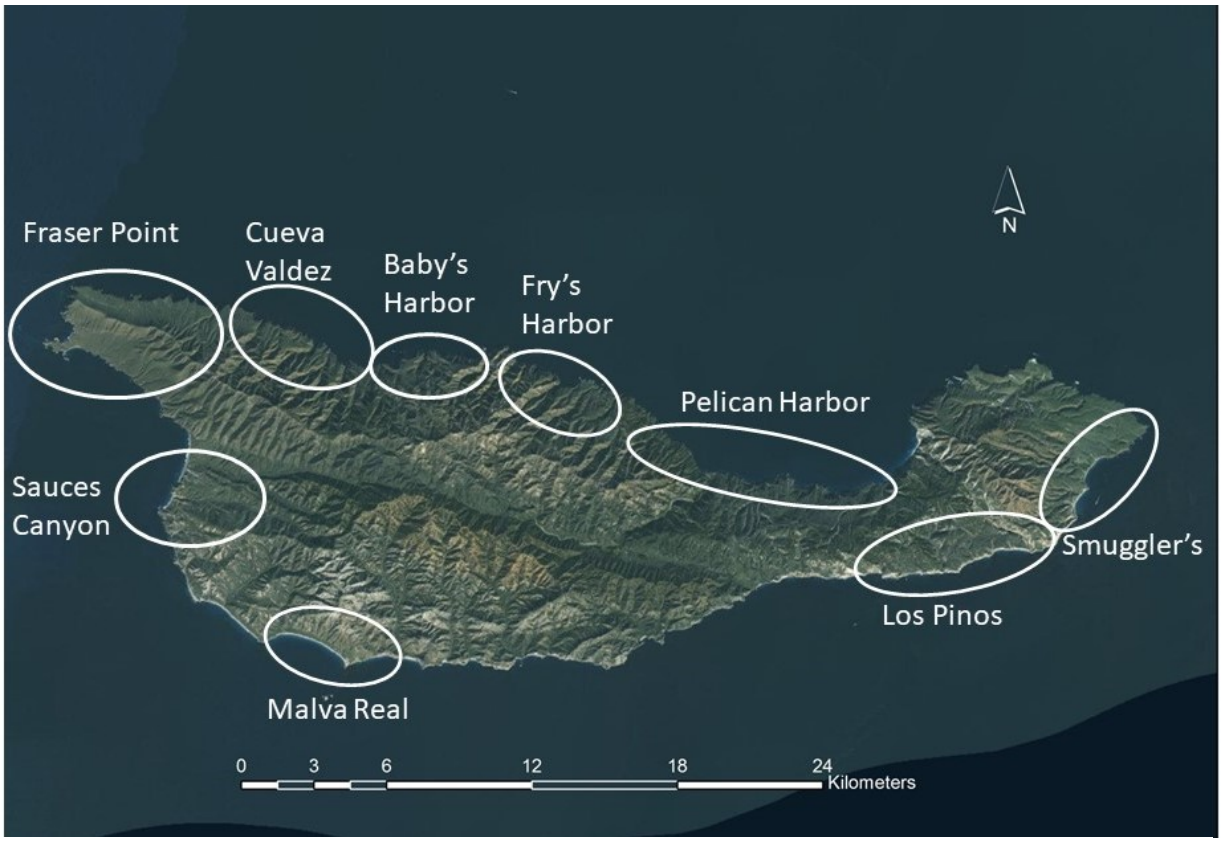

Figure 9. Bald eagle territories on Santa Cruz Island, CA in 2017.

Los Pinos Territory. Since 2015, the Los Pinos female (A-51, 2006 ACC-produced eagle released from South hacking tower) has been breeding successfully in an area previously used by the Smuggler's pair and we had assumed that she had paired with the Smuggler's male. However, at the end of the 2017 season we located a pair of eagles with an untagged fledgling

Figure 10. The Fraser Point eaglets after banding on Santa Cruz Island, CA in 2017.

Table 2. Biographical data for bald eagle chicks hatched at nests on the northern Channel Islands, CA during 2017.

Federal Band	Acraft Band	Sex	Wing Tag	Date Fledged	Territory	Status[c]
709-03099	02/A	M	A-02	~6/21/17	Fraser Point[a]	Alive on mainland
709-03100	03/A	M	A-03	~6/21/17	Fraser Point[a]	Unknown
709-07046	04/A	M	A-04	~6/21/17	Fraser Point[a]	Unknown
709-07047	05/A	F	A-05	~6/23/17	Los Pinos[a]	Unknown
709-07048	07/A	F	A-07	~6/9/17	Lopez Canyon[b]	Alive, Willow Springs, CA 7/27/17
709-07354	09/A	M	NA	6/9-7/6/17	Fry's Harbor[a]	Unknown
709-07357	10/A	F	A-09	~7/10/17	Pelican Harbor[a]	Unknown
709-07358	13/A	M	A-13	~7/6/17	Baby's Harbor[a]	Unknown
709-07359	14/A	M	A-14	~7/6/17	Baby's Harbor[a]	Unknown
NA	NA	?	NA	~6/23/17	Smuggler's Harbor	Unknown

[a] Santa Cruz Island
[b] Santa Rosa Island
[c] As of 12/31/17 or date specified

perched ~200 m east of A-51. We believe that this area is the boundary between the original Los Pinos and Smuggler's territories (Fig. 9) and we have been considering these two pairs to be a single pair. Therefore, we believe the successful breeding that has occurred at the "Smuggler's" territory since 2015 should be attributed to the Los Pinos pair.

In 2017, A-51 bred with an unidentified male with a USGS band on his right leg, so it could still be A-45, a 2005 ACC-produced male released from North hacking tower. The birds used the same nest as in 2016 (identified as Smuggler's territory in 2016 report [Sharpe 2017]) and were found incubating on 18 February. There was 1 nestling estimated to be about 2 weeks old on 14 March. We entered the nest on 9 May to equip the chick with leg bands and patagial wing markers and to obtain a blood sample for contaminants analyses (Table 2). The eagle fledged between 29 May and 24 June.

Fry's Harbor Territory. The Fry's Harbor pair (Fig. 9) used a nest up the canyon from Fry's Harbor. The male is A-46, a 2006 ACC-produced male released from the North hacking tower, but we were unable to identify the new female that replaced A-24 that died in 2015. The birds were observed incubating on 3 March and there was 1 chick present on 2 April. We entered the nest on 24 May to equip the chick with leg bands and to obtain a blood sample for contaminants analyses (Table 2, Fig. 11). The eagle fledged between 9 June and 6 July.

Pelican Harbor Territory. The Pelican Harbor pair (Fig. 9) made a new nest ~400 m further up the canyon from their original 2006 nest. The male was K-10, produced by the ACC and fostered into the Twin Rocks nest on Catalina in 2001. The female was K-26, produced by the ACC and fostered into the West End nest on Catalina in 2002. We did not locate the new nest until 16 April, at which time there was a single chick estimated to be 5-7 days old. We entered the nest on 24 May to equip the chick with leg bands and patagial wing markers and to obtain a blood sample for contaminants analyses (Fig. 12, Table 2). The eagle had fledged by 10 July.

Figure 11. The Fry's Harbor eaglet before banding on Santa Cruz Island, CA in 2017.

Figure 12. The Pelican Harbor chick after banding on Santa Cruz Island, CA in 2017.

Baby's Harbor Territory. The Baby's Harbor pair (Fig. 9) used the same nest as in 2016. The male was 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 19 March and there were 2 chicks about 3 weeks old on 6 May. We entered the nest on 11 June to equip the chicks with leg bands and patagial wing markers and to obtain blood samples for contaminant analyses (Fig. 13, Table 2). Both eagles had fledged by 6 July.

Smuggler's Territory. The Smuggler's pair (Fig. 9) bred successfully at an unknown nest location. We did not see wing markers on either bird, so we were unable to identify them. The adults were seen with an untagged fledgling on 23 June and 12 July near Middle Anchorage.

Sauces Canyon Territory. The Sauces Canyon pair (Fig. 9) used the same nest as in 2016. Male A-40, a bird from the ACC, was hacked on Santa Cruz in 2005. The female, A-48, an ACC-produced bird, was hacked on Santa Cruz in 2006. The first egg was laid on 31 January and broke on 1 February. A second egg was laid on 3 February and broke within a couple of hours. A third egg was laid on 6 February and broke within an hour. A fourth egg was laid on 9 February and broke within a half hour. A fifth egg was laid on 12 February and broke soon afterwards. A sixth egg (first of second clutch) was laid on 3 March and broke on 4 March. A seventh egg was laid on 9 March and an eighth egg was laid on 12 March. The last two eggs both broke on the morning of 14 March. There were no further nesting attempts.

Figure 13. The Baby's Harbor chicks after banding on Santa Cruz Island, CA in 2017.

We entered the nest on 25 July to collect shell fragments for analyses. The shell thicknesses were measured at the Western Foundation of Vertebrate Zoology and found to have a thickness of 0.360 $\pm$ 0.010 mm ($\bar{x} \pm$ SD). This is approximately 38% thinner than the pre-DDT mean of 0.586 mm for bald eagle eggs collected on the Channel Islands and adjacent mainland California (Kiff 1994).

Cueva Valdez Territory. The Cueva Valdez pair (Fig. 9) had no known nesting attempts in 2017. The male has lost his wing markers, but we believe he is still A-00, who was produced by the ACC and hacked on Santa Cruz in 2002. The previous female, A-74, was replaced by A-98, a 2014 bird that hatched at either the Pelican Harbor or Fraser Point nest (2 females received same wing marker number). The lack of a breeding attempt is likely associated with the female being only 3 years old. In 2018, when she reaches 4 years old, she could begin breeding.

Malva Real Territory. The Malva Real pair (Fig. 9) was seen throughout the season, but there was no evidence that they nested. The female was A-71, hatched at the Sauces Canyon nest in 2010. We were unable to confirm the identity of the male.

Santa Rosa Island

We located active nests in the 2 known territories on the island, Lopez Canyon and Trap Canyon (Fig. 5), and surveyed much of the coastline for new territories. There was little access to the southeastern quarter of the island because winter rains and decommissioning of roads by the NPS made the area inaccessible by vehicle.

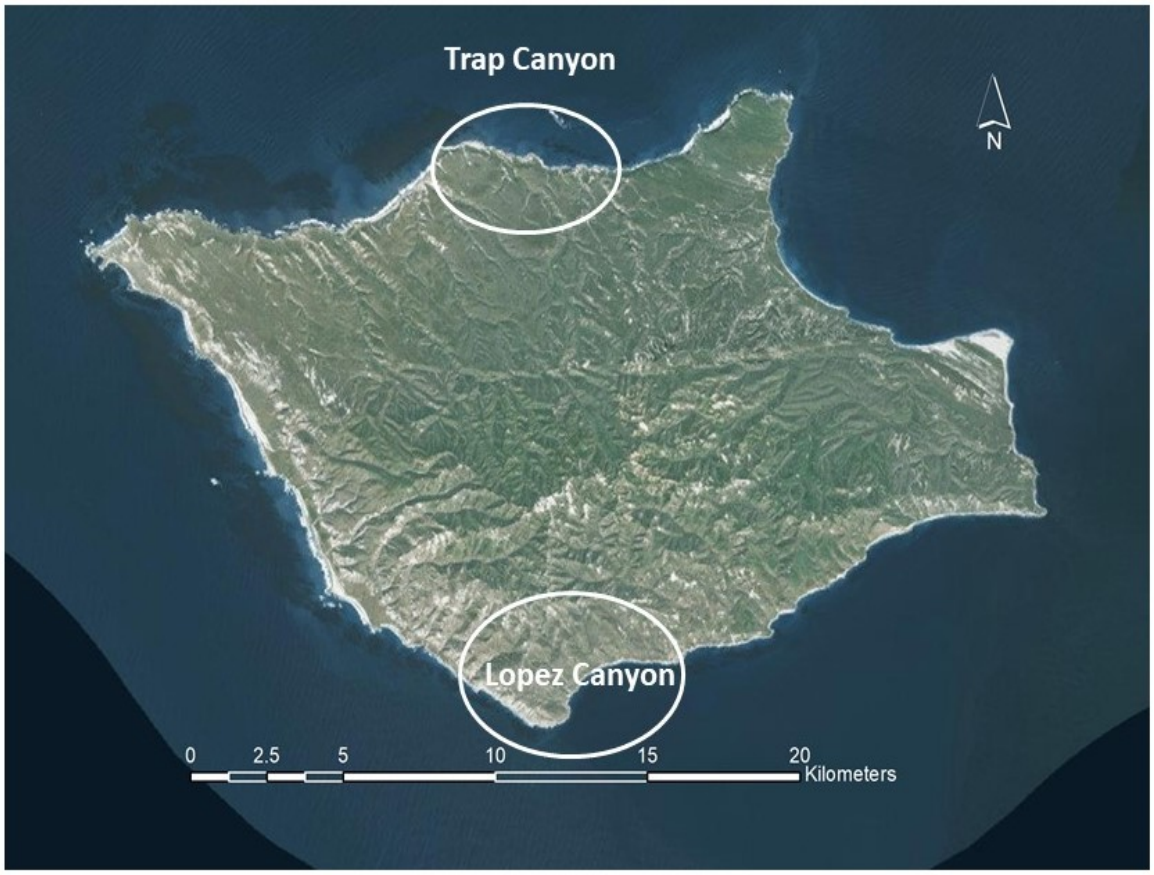

Figure 14. Bald eagle territories on Santa Rosa Island, CA in 2017.

Lopez Canyon Territory. The Lopez Canyon pair (Fig. 14) 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. The birds were observed incubating on 5 March and an approximately 2-week-old chick was observed on 30 March. We entered the nest on 15 May to attach leg bands and patagial wing markers and to draw blood for contaminant analyses (Fig. 15, Table 2). We continued monitoring until the chick fledged around 9 June.

Trap Canyon Territory. The Trap Canyon pair (Fig. 14) used the same nest as in 2012. We could not confirm the identity of the male, but we believe he is still A-08, an Alaskan bird hacked on Santa Cruz in 2002. The female was A-22, a bird produced by the ACC and hacked on Santa Cruz in 2004. The birds were found incubating on 5 March, but had failed by 29 March. There were no further breeding attempts.

Figure 15. The Lopez Canyon chick after banding on Santa Rosa Island, CA in 2017.

Anacapa Island

We surveyed Anacapa aboard the vessel *Retriever* on 3 April, 22 May, 19 June, and 12 July. We found a nesting pair in the historic Oak Canyon territory (Fig. 16).

Figure 16. The Oak Canyon bald eagle territory on Anacapa Island, CA in 2017.

Oak Canyon Territory. The pair on West Anacapa Island used the same nest as in 2016 (Fig. 16). The male was A-21, which was collected from Alaska in 2003 and released from a hacking tower on Santa Cruz. We could not confirm the identity of the female, but she had blue wing markers and we believe she was A-11, who was removed from a nest near Juneau, AK in 2002 and released from a hacking tower on Santa Cruz. The birds appeared to be incubating on 3 April. On 22 May, both adults were perched on a ridge ~100 m from the nest. One adult was in the nest on 19 June and possibly feeding chicks, but fog obscured the nest throughout most of the observation period. Both adults were perched on a hillside east of the nest on 12 July and there were no signs of fledglings. We don't believe that they nested successfully this season.

Nesting Summary

Based upon our observations, there were 20 pairs of bald eagles across all the Channel Islands this season, of which 17 pairs laid a minimum of 31 eggs (8 from Sauces Canyon nest). A minimum of 17 chicks hatched (55% hatching success) and all known chicks fledged (Table 3). Nesting success was 71% and productivity was 1.0 chicks/breeding attempt. Only 1 fledgling is known to have died through the end of the year (K-71 from Rattlesnake) and we have had only 2 other sightings of a fledgling post-dispersal from their natal territory (A-07 from Lopez Canyon, A-02 from Fraser Point early in 2018).

Monitoring of Previously Released/Hatched Bald Eagles

During 2017, we had confirmed sightings of 48 identified bald eagles that were released or hatched on the Channel Islands in previous years (Table 4). Eighteen were seen on the mainland, 12 on Santa Cruz, 11 on Catalina, 4 on Santa Rosa, 2 on San Clemente, and 1 on Anacapa.

DISCUSSION

Productivity has varied greatly on the Channel Islands 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

Table 3. Summary of nesting attempts by bald eagles on the California Channel Islands in 2017.

Island/Nest	Min # Eggs Laid	Min # Chicks Hatched	Min # Chicks Fledged	Number Surviving Until End of Year
Santa Catalina Island				
West End	2	2	2	0-2
Pinnacle Rock	2	1	1	0-1
Seal Rocks	1	0	.	.
Two Harbors	1	1	1	0-1
Twin Rocks	1	0	.	.
Rattlesnake	2	1	1	0
TOTAL	9	5	5	0-4
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	0-2
Sauces	8	0	.	.
Fry's Harbor	1	1	1	0-1
Fraser Point	3	3	3	1-3
Los Pinos	1	1	1	0-1
Smuggler's	1	1	1	0-1
Pelican Harbor	1	1	1	0-1
TOTAL	17	9	9	1-9
Santa Rosa Island				
Trap Canyon	1	0	.	.
Lopez Canyon	1	1	1	0-1
TOTAL	2	1	1	0-1
Anacapa Island				
Oak Canyon	1	0	.	.
TOTAL	1	0	.	.
All Islands Combined	31	17	17	1-16

Table 4. Status of bald eagles released from hacking towers or fledged from nests on the California Channel Islands prior to 2017 that had confirmed sightings in 2017.

FWS Leg Band	Sex[a]	Patagial Marker	Nest/Release Tower	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, Auld, CA 4/8/17
629-02780	M	K-10	Twin Rocks	2001	Alive, Pelican Harbor pair, Santa Cruz Is.
629-02793	F	K-26	West End	2002	Alive, Pelican Harbor pair, Santa Cruz Is.

Table 4. Continued

FWS Leg Band	Sex[a]	Patagial Marker	Nest/Release Tower	Fledge Year	Status, Latest Location[b]
629-47356	M	A-21	Alaska	2003	Alive, Oak Canyon pair, Anacapa Is.
629-47365	F	A-22	Zoo	2004	Alive, Trap Canyon pair, Santa Rosa Is.
629-47375	F	A-27	Alaska	2004	Alive, Baby's Harbor pair, Santa Cruz Is.
629-47391	M	A-40	Zoo	2005	Alive, Sauces pair, Santa Cruz Is.
629-47399	F	A-43	Zoo	2005	Alive, Lopez Canyon pair, Santa Rosa Is.
629-52404	M	A-46	Zoo	2006	Alive, Fry's Harbor 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.
629-52410	F	A-51	Zoo	2006	Alive, Los Pinos pair, Santa Cruz Is.
629-52425	M	K-00	Pinnacle Rock	2007	Alive, Twin Rocks pair, Catalina Is.
629-52430	M	K-76	Twin Rocks	2007	Alive, Bald Canyon pair, San Clemente 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.
629-52450	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, Pt. Mugu, CA 11/6/17
679-03435	M	A-68	Pelican Harbor	2010	Alive, Baby's Harbor pair, Santa Cruz Is.
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	F	A-71	Sauces	2010	Alive, Malva Real pair, Santa Cruz Is.
679-04101	F	K-18	Two Harbors	2011	Alive, Catalina Island, CA 10/4/17
679-04102	F	K-07	Seal Rocks	2011	Alive, Carson Valley, NV 2/17
679-04103	M	K-08	Seal Rocks	2011	Alive, Middle Ranch pair, Catalina Is.
679-04112	F	A-76	Cueva Valdez	2011	Alive, Cave Junction, OR 2/23/17
679-04128	F	A-85	Lopez Canyon	2013	Alive, Poway, CA 4/1/17
679-04133	F	K-32	Seal Rocks	2013	Alive, Glendale Cove, BC 9/4/17
679-04134	F	K-38	Two Harbors	2013	Alive, Chester, CA 11/13/17
679-04137	F	K-28	West End	2013	Alive, Rancho Palos Verdes, CA 11/23/17
679-04142	F	A-89	Fraser Point	2013	Alive, Ft. Rock, OR 11/18/17
709-03052	M	A-94	Lopez Canyon	2014	Alive, Vancouver, WA 11/29/17
709-03053	F	A-95	Trap Canyon	2014	Alive, Lancaster, CA 3/3/17
709-03054	M	A-96	Trap Canyon	2014	Alive, Oak View, CA 5/8/17
709-03058	M	K-41	Seal Rocks	2014	Alive, Poway, CA 4/2/17
709-03059	F	K-43	Two Harbors	2014	Alive, Santa Rosa Island, CA 3/3/17
709-03061	F	A-98	Pelican Harbor	2014	Alive, Cueva Valdez pair. Could be 709-03056
709-03063	M	K-44	Pinnacle Rock	2014	Alive, Cuesta-by-the-Sea, CA 3/29/17

Table 4. Continued

FWS Leg Band	Sex[a]	Patagial Marker	Nest/Release Tower	Fledge Year	Status, Latest Location[b]
709-03075	F	A-53	Los Pinos	2015	Alive, Pinnacles Nat. Monument, CA 3/20/17
709-03066	F	K-46	Rattlesnake	2014	Alive, on Catalina Is. throughout 2017
709-03082	M	N/A	Bald Canyon	2015	Alive, Catalina Island, 2/22/17
709-03085	M	A-61	Los Pinos	2016	Alive, San Clemente Island 2/22/17
709-03087	M	A-63	Sauces Canyon	2016	Alive, Lockwood, CA 12/12/17
709-03092	F	K-62	West End	2016	Alive, Bitterroot Valley, MT 12/6/17

[a] Determined by karyotyping and/or morphometrics.
[b] As of 12/31/17 unless otherwise noted.

season's nest success and productivity increased slightly from that in 2016 (59% and 0.94 fledglings per attempt, respectively) to 71% and 1.0 fledglings/attempt, which 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 64% and 0.96 fledglings/attempt, respectively.

Most nesting failures this season appear to have occurred during the early- to mid-incubation period (2 on Catalina, 1 on Santa Cruz, 1 on Santa Rosa), but it is possible that chicks hatched and died at the Oak Canyon nest on Anacapa. The Sauces female laid and broke 8 eggs in 2 different clutches. Many of these broke within half an hour of being laid. Measurements of shell fragments recovered from the nest indicate that they had extreme thinning (39% thinner than pre-1947 eggs), but we do not know whether thinning was caused by DDE contamination or some other contaminant or physiological problem. We will monitor the Sauces Canyon nest in 2018, and if there are similar nesting results, we may try to trap the female for a physical examination and collection of blood for contaminants analyses.

In 2018, we expect an increase in the number of breeding attempts because at least 3 pairs that did not breed this year had a new individual, which may have led to suspension of breeding at those territories in 2017. There is the potential for a new pair along the southern coast between the Malva Real and Los Pinos territories where we occasionally see adult eagles. Due to funding cuts there will only be 2 biologists conducting surveys in 2018 (down from 7 in 2014-2017), so we will only be able to make nest checks 1-2 times per month on Santa Cruz and Santa Rosa. However, we should be able to get general information on nesting success and productivity.

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