Bald Eagle and Golden Eagle Research on the California Channel Islands

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Prepared by:

Peter B. Sharpe
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 2020 bald eagle and golden eagle season, which was cut short in March 2020 due to restrictions related to travel and housing in response to the pandemic.

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 conduct any activities on San Miguel, San Nicolas, or Santa Barbara islands in 2020.

Santa Rosa Island (hereafter 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).

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 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

We began surveying for bald eagles in January or February at each of the territories known from previous monitoring efforts. Surveys and monitoring were discontinued on all islands except Catalina in early March as travel and housing restrictions were implemented to combat the pandemic. Most monitoring in 2020 was conducted via live web cams at 2 active nests on Catalina (West End and Two Harbors) and 1 nest on Santa Cruz (Sauces) that enabled close, remote observations of nesting and were available for viewing through iws.org or Explore.org. Additionally, we had placed trail cams at many other eagle nests on Santa Rosa, Santa Cruz, and Catalina islands that allowed us to determine outcomes of breeding attempts when the cameras were collected in fall 2020.

Golden Eagles

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

Marking and Sampling

We did not conduct any bald eagle banding activities in 2020.

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.

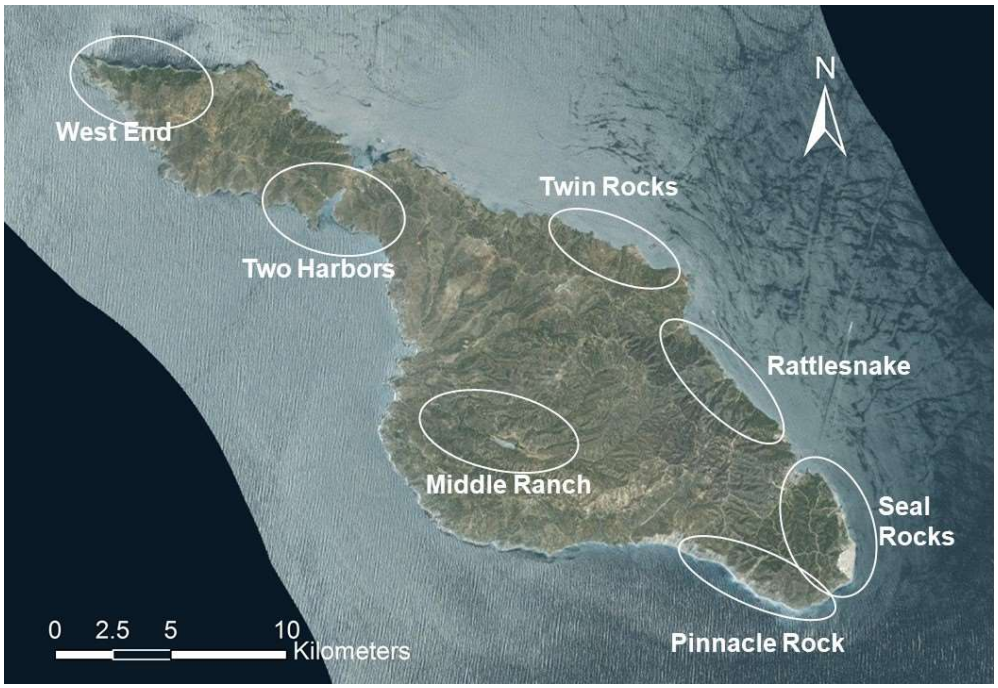

Figure 2. Bald eagle territories on Santa Catalina Island, CA in 2020.

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 was confirmed as K-80 from trail cam images, an ACC-produced bird that was fostered into the West End nest in 1998. The female has lost both wing markers, but photos confirmed she was K-47, an ACC-produced bird that was fostered into the Seal Rocks nest in 2004. Based upon trail cam images, the first egg was laid on 26 February, but disappeared during the night of 27 February. The first egg of a second clutch was laid on 15 March and a second egg was laid overnight on 18 March. One egg was crushed on 31 March and the second egg broke on 6 April. There were no more breeding attempts. We replaced the batteries and SD cards in the trail cam during the fall.

Two Harbors Territory. The Two Harbors pair (Fig. 2) used the same nest as in 2019. 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 web camera. The first egg was laid on 27 February and a second was laid on 1 March. One egg broke on 20 March, but a chick hatched from the second egg on 5 April. The eaglet fledged on 26 June.

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 A-61, a bird that hatched at the Los Pinos nest on Santa Cruz in 2016. We monitored breeding activity via a live web cam. K-91 laid eggs on 20 and 23 February, but common ravens (*Corvus corax*) took the eggs on 24 February. The first egg of the second clutch was laid on 18 March and taken by a raven on 20 March. A second egg was laid on 21 March and taken by a raven on 29 March. All eggs were removed when the male left them unattended. There were no further breeding attempts.

Pinnacle Rock Territory. The Pinnacle Rock pair (Fig. 2) used the same nest as in 2019. 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 6 March, but there was only 1 egg present on 1 April. A chick was present on 15 April. The chick was still in the nest on 17 June, but no birds were present on 2 July. We assume the bird fledged successfully.

Seal Rocks Territory. The Seal Rocks pair (Fig. 2) used a new nest this year. The female was K-32, who hatched at the Seal Rocks nest in 2013. There was a new, unbanded male. We didn't find the new nest until 28 March and couldn't see how many eggs were present. The birds incubated until at least 21 May, which was well past potential hatching dates. There were no birds present at the nest on 17 June. We placed a trail cam on the nest during the fall.

Middle Ranch Territory. The Middle Ranch pair (Fig. 2) used the same nest as in 2019. The female previously lost both her wing markers, but we confirmed she was A-37 from her leg bands. She 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 21 February. There was one nestling present on 30 March. The eaglet fledged by 17 June and was seen flying around the nest area.

Twin Rocks Territory. The Twin Rocks pair (Fig. 2) used the same nest as in 2019. 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. Eggs were laid on 19 and 23 February and a chick hatched on 29 March. The chick fledged around 14 June. We replaced the batteries and SD card in the trail cam in the fall.

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. 3).

Figure 3. Bald Canyon eagle territory on San Clemente Island. CA in 2020.

Bald Canyon Territory. The Bald Canyon pair moved to a new nest in 2020, which wasn't located until 16 April. There were two eaglets present on 31 May (around 7 weeks old) and one fledgling was seen soaring near the nest on 3 July.

Santa Cruz Island

We surveyed the 9 known breeding territories on Santa Cruz and located active nests in 5 territories (Fraser Point, Fry's Harbor, Pelican Harbor, Sauces Canyon, and Malva Real; Fig. 9), but our survey efforts ended on 2 March.

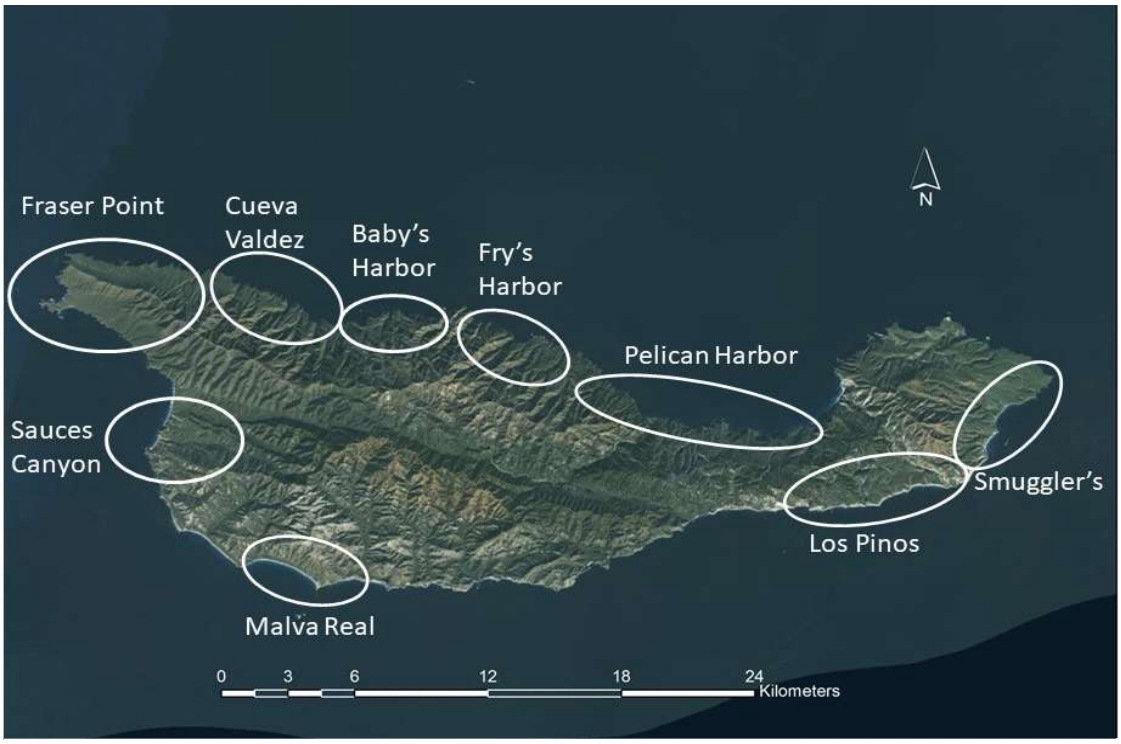

Figure 4. Bald eagle territories on Santa Cruz Island, CA in 2020.

Fraser Point Territory. The Fraser Point pair (Fig. 4) moved to a new nest, which we located on 30 January. The birds were incubating during our last visit on 29 February. We don't know the outcome of the breeding effort. We placed a trail cam on the new nest during the fall.

Los Pinos Territory. The Los Pinos pair (Fig. 4) did not use their historic nest and we could not locate a new nest before surveys ended. Trail cam images indicated that neither adult visited the

historic nest during 2020.

Fry's Harbor Territory. The Fry's Harbor pair (Fig. 4) used a new nest close to the coastline. They were incubating on our last visit on 27 February and we don't know the outcome of the breeding attempt.

Pelican Harbor Territory. The Pelican Harbor pair (Fig. 4) had not laid eggs as of our last visit on 1 March, but we know they did not use their 2019 nest because we recovered trail cam photos from that nest in December 2020. 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.

Smuggler's Territory. We did not locate a new nesting site for the Smuggler's pair (Fig. 4) before surveys of the area ended on 2 March. Their previous nest fell out of the tree in 2019.

Baby's Harbor Territory. We saw the Baby's Harbor pair (Fig. 4) in the vicinity of their 2019 nest during our last visit on 27 February. 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 placed a trail cam on their nest in 2019, but were unable to recover the camera in 2020.

Sauces Canyon Territory. The Sauces Canyon pair (Fig. 4) returned to their 2019 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 21 February, but broke almost immediately. A second egg was laid on 29 February, but it broke the same day. They laid a third egg on 4 March, but it broke on 5 March. A fourth egg was laid on 7 March, but broke on 11 March. There were no further breeding attempts.

Cueva Valdez Territory. The Cueva Valdez territory (Fig. 4) had no known nesting attempts in 2020. We saw female A-98, a 2014 bird that hatched at either the Pelican Harbor or Fraser Point

nest (2 females received same wing marker number) soaring in the territory on 27 February with 3 other eagles.

Malva Real Territory. The Malva Real pair (Fig. 4) used the same nest as in 2019 and our observations are based upon trail cam footage. The female was A-71, hatched at the Sauces Canyon nest in 2010. The male was K-11, who was produced by birds at the ACC and fostered into the West End nest on Catalina (Fig. 2) in 2001. They laid their first egg on 9 March and a second egg on 13 March. One egg disappeared around 27 March and a chick was confirmed on 18 April. The eaglet fledged around 11 July.

Santa Rosa Island

We located active nests in 2 known territories on the island (Lopez Canyon and Trap Canyon), a pair present in the East Point territory, and a first known nest in the Mud Tank territory (Fig. 5). NPS employees checked some nests for us after February.

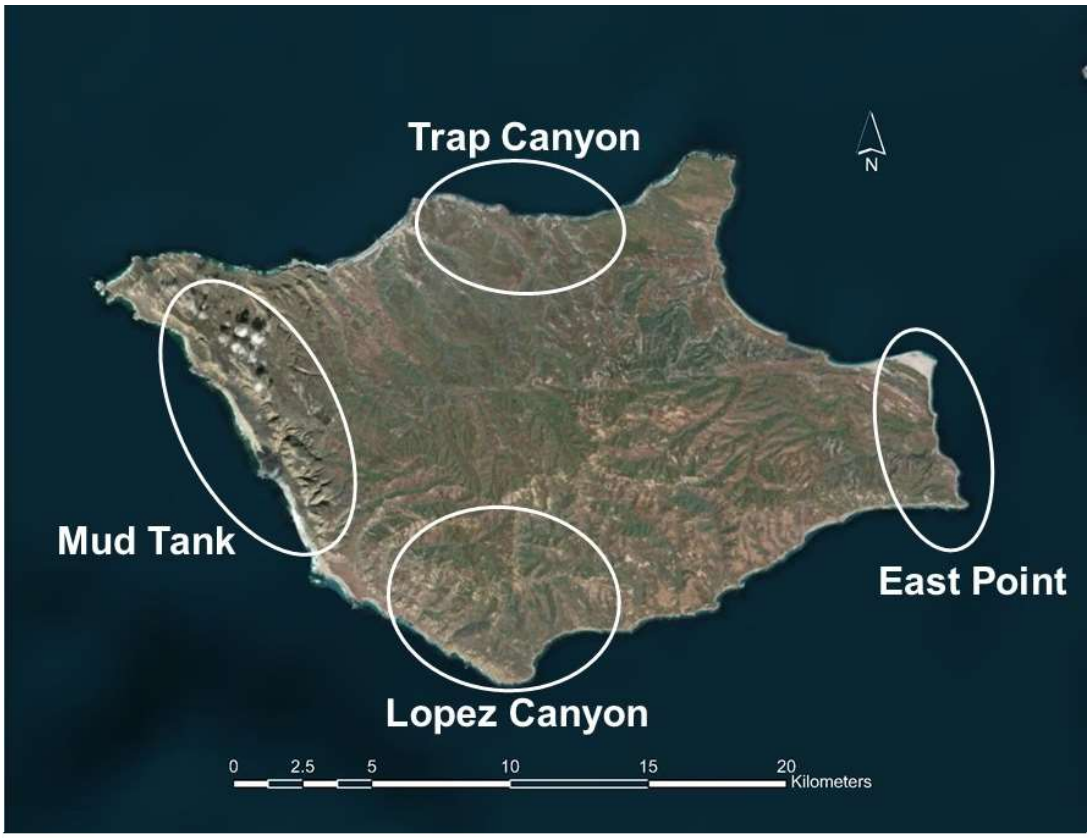

Figure 5. Bald eagle territories on Santa Rosa Island, CA in 2020.

Lopez Canyon Territory. The Lopez Canyon pair (Fig. 5) used the same nest as in 2019. The male was A-69, a 2010 Pelican Harbor chick. The female was A-43, a bird produced by the ACC and hacked on Santa Cruz in 2005. We observed the birds incubating on 12 February. Based upon trail cam images collected in the fall, eggs were laid on the nights of 2 and 6 February. Chicks hatched on 10 and 13 March. The chicks died on the nest on 15 April and 4 May of unknown causes. We replaced the batteries and SD card in the trail cam in the fall.

Trap Canyon Territory. The Trap Canyon pair (Fig. 5) used a new nest in 2020. The pair was present on 12 February, a nestling was seen on 12 April, and a fledgling was present on 3 June.

East Point Territory. We observed a pair of eagles at a nest in the East Point territory (Fig. 5) on 13 February. The male was A-66, a bird that hatched in the Baby's Harbor territory (Fig. 4) in 2016. We could not confirm the identity of the female and do not know the outcome of any nesting attempts. We placed a trail cam on this nest in the fall in preparation for the 2021 season.

Mud Tank Territory. There have been adult eagles observed along the southwestern coast of Santa Rosa for years, but we observed the first known nesting attempt in the newly named Mud Tank territory (Fig. 5) this year. We could not identify either adult. The birds were incubating at a ground nest on 12 February. An NPS biologist observed a fledgling in the area on 5 June.

Anacapa Island

Oak Canyon Territory. Our trail cams captured images of the Oak Canyon pair (Fig. 6) at both of their historic nests throughout the nesting season, but they did not produce any eggs. We confirmed the female was A-11, a bird removed from a nest near Juneau, AK and released from the South Hacktower on Santa Cruz in 2002. We could not confirm the identity of the male.

Figure 6. The Oak Canyon bald eagle territory on Anacapa Island, CA in 2020.

Nesting Summary

Based upon our limited observations in 2020, we confirmed there were 19 pairs of bald eagles across all the Channel Islands this season, with no confirmation of pairs in another 3 historical territories. There were 15 known nesting attempts with a minimum of 29 eggs laid, 11 chicks produced, and 9 known fledglings. There was likely more productivity, but we do not know the breeding status and/or outcome in 7 of 9 known territories on Santa Cruz.

Monitoring of Previously Released/Hatched Bald Eagles

During 2020, we confirmed the status of 55 bald eagles from previous years through nest observations, trail cam images, and reports directly to IWS or via the Bird Banding Lab (Table 1). Only 1 eagle from previous seasons is known to have died in 2020.

Golden Eagle Surveying

We confirmed a single golden eagle on the islands in 2020. It was seen on 6 January in the Cueva Valdez bald eagle territory on Santa Cruz (Fig. 4) and is assumed to be the same bird that has been in the area since 2016.

Table 1. Status of bald eagles released from hacking towers or fledged from nests on the California Channel Islands prior to 2020 that had confirmed sightings in 2020.

FWS Leg Band	Sex[a]	Patagial Marker	Nest/Origin	Fledge Year	Status, Latest Location[b]
629-39815	M	K-80	Zoo	1998	Alive, Rattlesnake pair, Catalina Is. 2020
629-39816	M	K-81	West End	1998	Alive, Two Harbors pair, Catalina Is. 2020
629-39817	F	K-82	Pinnacle Rock	1998	Alive, Two Harbors pair, Catalina Is. 2020
629-29499	F	K-02	West End	2000	Alive, San Dimas, CA 5/4/20
629-02782	M	K-11	Zoo	2001	Alive, Malva Real pair, Santa Cruz Is. 2020
629-02793	F	K-26	West End	2002	Alive, Pelican Harbor pair, Santa Cruz Is. 2020
629-14048	F	A-11	Alaska	2002	Alive, Oak Canyon pair, Anacapa Is. 2020
629-47371	F	K-47	Zoo	2004	Alive, Rattlesnake pair, Catalina Is. 2020
629-47375	F	A-27	Alaska	2004	Alive, Baby's Harbor pair, Santa Cruz Is. 2020
629-47380	F	A-32	Alaska	2004	Alive, Bald Canyon pair, San Clemente Is. 2020
629-47388	F	A-37	Zoo	2005	Alive, Middle Ranch pair, Catalina Is. 2020
629-47391	M	A-40	Zoo	2005	Alive, Sauces pair, Santa Cruz Is. 2020
629-47399	F	A-43	Zoo	2005	Alive, Lopez Canyon pair, Santa Rosa Is. 2020
629-52406	F	A-48	Zoo	2006	Alive, Sauces pair, Santa Cruz Is. 2020
629-52407	F	A-49	Pelican Harbor	2006	Alive, Fraser Point pair, Santa Cruz Is. 2020
629-52425	M	K-00	Pinnacle Rock	2007	Alive, Twin Rocks pair, Catalina Is. 2020
629-52438	M	A-64	Pelican Harbor	2008	Alive, Fraser Point pair, Santa Cruz Is. 2020
629-52433	F	K-79	Two Harbors	2007	Alive, Lake Piru, CA 10/13/20
629-52443	M	K-88	Twin Rocks	2008	Alive, Pinnacle Rock pair, Catalina Is. 2020
629-52450	F	K-91	Two Harbors	2009	Alive, West End pair, Catalina Is. 2020
679-03429	F	K-97	West End	2009	Dead, Ojai Raptor Center, CA 4/5/20
679-03432	M	A-67	Trap Canyon	2010	Alive, Pt. Mugu, CA 12/13/20
679-03435	M	A-68	Pelican Harbor	2010	Alive, Baby's Harbor pair, Santa Cruz Is. 2020
679-03436	M	A-69	Pelican Harbor	2010	Alive, Lopez Canyon pair, Santa Rosa Is. 2020
679-03439	F	K-95	Pinnacle Rock	2010	Alive, Twin Rocks pair, Catalina Is. 2020
679-03443	F	A-71	Sauces	2010	Alive, Malva Real pair, Santa Cruz Is. 2020
679-04101	F	K-18	Two Harbors	2011	Alive, Catalina Is. CA 10/2/20
679-04103	M	K-08	Seal Rocks	2011	Alive, Middle Ranch pair, Catalina Is. 2020
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. 2020
679-04146	F	A-91	Malva Real	2014	Alive, Breeding at Romona Grasslands, CA 3/1/20
709-03052	M	A-94	Lopez Canyon	2014	Alive, Breeding San Diego Co, CA 7/3/20
709-03054	M	A-96	Trap Canyon	2014	Alive, Temecula, CA 12/28/20
709-03057	F	K-40	Seal Rocks	2014	Alive, Charleston, UT 5/20/20
709-03058	M	K-41	Seal Rocks	2014	Alive, Johnstown, CA 4/9/20
709-03059	F	K-43	Two Harbors	2014	Alive, Klamath Falls, OR 4/11/20

Table 4. Continued

FWS Leg Band	Sex[a]	Patagial Marker	Nest/Release Tower	Fledge Year	Status, Latest Location[b]
709-03067	F	A-54	Fraser Point	2015	Alive, near Olympia, WA 11/27/20
709-03077	F	K-57	Seal Rocks	2015	Alive, Breeding at Lake Wohlford., CA 3/20/20
709-03080	M	A-50	Lopez Canyon	2015	Alive, Lake Nacimiento, CA. 4/11/20
709-03085	M	A-61	Los Pinos	2016	Alive, West End pair, Catalina Is. 2020
709-03087	M	A-63	Sauces Canyon	2016	Alive, Santa Cruz Is. 1/28/20
709-03093	F	K-64	Seal Rocks	2016	Alive, Sandberg, CA 2/24/20
709-03095	M	K-68	Pinnacle Rock	2016	Alive, Orange Co. CA 2/19/20
709-03096	M	K-69	Rattlesnake	2016	Alive, Catalina Is., CA 3/15/20
709-03097	F	A-99	Baby's Harbor	2016	Alive, Santa Rosa Is., CA 3/1/19
709-03098	M	A-66	Baby's Harbor	2016	Alive, Santa Barbara, CA 11/20/20
709-03099	M	A-02	Fraser Point	2017	Alive, Santa Cruz Is., CA 4/5/20
709-07048	F	A-07	Lopez Canyon	2017	Alive, Tule Lake NWR, CA 3/2/20
709-07362	F	N/A	Los Pinos	2018	Alive, Big Bear Lake, CA 5/6/20
709-07367	F	N/A	Fraser Point	2018	Alive, Santa Cruz Is., CA 5/29/20
709-07369	F	N/A	Sauces Canyon	2018	Alive, Santa Cruz Is., CA 1/29/20
709-07370	M	N/A	Sauces Canyon	2018	Alive, Santa Cruz Is., CA 5/16/20
709-07374	F	N/A	Baby's Harbor	2018	Alive, Santa Cruz Is., CA 5/31/20
829-00026	M	N/A	Trap Canyon	2019	Alive, Santa Cruz Is., CA 5/10/20
829-00602	M	N/A	Pelican Harbor	2019	Alive, Edwards Air Force Base, CA 11/28/20

[a] Determined by karyotyping and/or morphometrics.
[b] As of 12/31/20 unless otherwise noted.

DISCUSSION

Bald Eagles

Due to housing and travel restrictions related to the pandemic, we were unable to monitor adequately the breeding population on all the islands, except Catalina. Four chicks hatched from a minimum of 15 eggs laid at 7 nests on Catalina, all of which fledged. The Catalina hatching success of 27% was the lowest it has ever been since we stopped artificial incubation of eggs after the 2008 season and 57% nest success on Catalina was the lowest it has been since 2012 (Sharpe 2013). Four of the eggs on Catalina were lost to ravens at the West End nest (2 clutches of 2 eggs each) after the inexperienced male left the nest during incubation duties. Of more concern was the loss of 2 chicks at approximately 1 and 2 months of age at the Lopez Canyon nest on Santa Rosa. Both died on the nest and starvation is unlikely because there appeared to be

sufficient food available.

In the fall of 2020 we replaced the batteries and SD cards in the Reconyx trail cams that we had placed on most of the eagle nests on Catalina, Santa Cruz, Anacapa, and Santa Rosa in 2019 so that we can get better information on nesting chronology and outcome without the need to regularly monitor the nests in 2021. The trail cams allowed us to identify the breeding adults on several nests in 2020 by their leg bands or patagial wing tags and determine the breeding chronology and nesting success on 4 nests (alternate nests were used or no breeding occurred in 6 other territories)

In 2021, we will attempt to conduct more widespread surveying and consistent monitoring on Santa Cruz, Santa Rosa, and Catalina Islands. If nesting occurs at nests with trail cams, we will rely on the camera images to determine breeding chronology, which will allow us more time to survey for additional territories and monitor nests with no live web cams or trail cams.

Golden Eagles

There was only 1 known golden eagle on the Channel Islands in 2020, located on northwestern Santa Cruz in the Cueva Valdez bald eagle territory, where we believe it disrupted bald eagle breeding in 2018-2019. We will continue to monitor this area in 2021. 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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