Bald Eagle Restoration on the California Channel Islands

January — December 2014

13th Annual Report

MONTROSE SETTLEMENTS RESTORATION PROGRAM

MSRP

Restoring Natural Resources
harmed by DDTs and PCBs

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January — December 2014

13th Annual Report

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EXECUTIVE SUMMARY

Bald eagles (*Haliaeetus leucocephalus*) once nested on all the California Channel Islands off the coast of southern California, but disappeared by the early 1960s. Human persecution contributed to the population decline, but the introduction of DDT into the Southern California Bight, starting in the late 1940s, is thought to have led to their ultimate extirpation from Southern California.

The Institute for Wildlife Studies (IWS) began bald eagle restoration efforts on Santa Catalina Island in 1980, but residual DDT continued to impact the birds and successful reproduction was inhibited. 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. Two pair of eagles successfully fledged one chick each from nests at Pelican Harbor and Malva Real on Santa Cruz Island. Since 2006, we have banded 95 chicks that hatched successfully in nests on Santa Cruz, Santa Rosa, Anacapa, and Santa Catalina Islands, and IWS has not manipulated eggs or nestlings at any nest on Santa Catalina Island since 2008.

In 2014, there were 7 known nesting attempts on Santa Catalina Island, 5 on Santa Cruz Island, and 2 on Santa Rosa Island. A total of 15 chicks are known to have hatched (5 on Catalina, 6 on Santa Cruz, and 4 on Santa Rosa) in 10 nests. On Santa Catalina Island, twins were produced at the Seal Rocks nest, and single chicks were produced at the Two Harbors, Pinnacle Rock, and Rattlesnake nests. The Rattlesnake chick fell from the nest shortly before fledging age and broke both tibia. She was successfully rehabilitated and released back on the island in early fall. There were no known mortalities among the 2014 cohort through the end of the year.

On Santa Cruz Island, the Fraser Point and Pelican Harbor nests each hatched and fledged two eaglets, and the Cueva Valdez and Malva Real nests each hatched and fledged a single eaglet. The Fry's Harbor and Los Pinos pairs are not known to have bred in 2014.

On Santa Rosa Island, the Lopez Canyon and Trap Canyon nests both successfully raised

two eaglets to fledging. One of the Lopez Canyon chicks was found on the ground at banding, but appeared to be healthy. Up to that time, we were only able to confirm one chick in the nest because of poor visibility due to the nest location.

Due to the presence of nesting seabirds, we had limited access to West Anacapa Island to observe the Oak Canyon nest clearly. The adults were present, but we could not determine their nesting status from our vantage point on boats.

A potential breeding pair was located on the southeastern portion of San Clemente Island for the first time since restoration efforts began. The pair is comprised of A-32 (female) from Santa Cruz Island and K-76 (male) from Santa Catalina Island. The pair built a nest, but it is unknown whether they laid eggs.

As of the end of December 2014, we estimate that there are at least 43 bald eagles on the California Channel Islands. In the second half of the year, there were 24 eagles known to be on the northern Channel Islands, 15 eagles on Santa Catalina Island, and 4 eagles on San Clemente Island. Eight additional eagles were on the mainland and were either tracked via their GPS transmitters or were sighted and reported by mainland observers.

We expect to have additional nesting attempts in 2015, especially among the birds on Santa Cruz Island. We estimate that there will be 7 nests on Santa Catalina Island, 12 nests on the northern Channel Islands, and 1 nest on San Clemente Island. We will continue our annual surveys for new nests and monitoring of known nests through the 2015 breeding season.

ACKNOWLEDGMENTS

IWS thanks the National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), California Department of Fish and Wildlife, National Oceanic and Atmospheric Administration (NOAA), The Nature Conservancy, the Santa Catalina Island Conservancy, the U.S. Navy, and the Ventura County Office of Education. We also would like to thank this year's field crew: David Rempel, Maria Dominguez, Nathan Melling, James Butch, Ania Wrona, Yozora Tadehara, and Lindsay Gedacht. David Garcelon handled contract administration, permitting, and provided editorial comments on the final report. Funding for the project was made available by the Montrose Settlements Restoration Program.

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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 of 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 removed 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 (L. Kiff, Expert Report) 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 (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 on 5 of the 8 islands, with successful breeding on 4 of the islands. As of 2014, there were 8 pairs on Catalina, 7 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). This report summarizes the results of our 2014 bald eagle surveying and monitoring efforts.

STUDY AREA

In 2014, 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 California 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 The Nature Conservancy (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

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 eagle research on the California Channel Islands, a banding permit from the United States Geological Survey's Bird Banding Laboratory (# 21564) allowing us to band and radio-tag eagles, and a research permit from the NPS (Permit # CHIS-2013-SCI-0004).

Surveying and Nest Monitoring

Observations of adult eagles began in January or February at each of the known territories. We also conducted weekly ground surveys of Catalina, Santa Cruz, and Santa Rosa to locate new nesting pairs. Bald eagle surveys were conducted concurrently with surveys for

peregrine falcons (*Falco peregrinus*). We used GPS units to record our survey routes, which were downloaded daily to the free Garmin Basecamp™ program, and allowed us to evaluate areas that needed additional surveys and to share data among our biologists. Once we confirmed nesting eagles, we set up observation blinds or found partially hidden locations from which to observe the nests. We monitored the chronology of nesting through incubation and chick-rearing. We had established video cameras prior to the nesting season at 3 active nests on Catalina (West End, Twin Rocks, and Two Harbors) and 1 nest on Santa Cruz (Sauces), which enabled close, remote observations of nesting activity. The West End, Two Harbors, and Sauces nests were available for live viewing on our website (http://www.iws.org).

Marking and Sampling

We entered each nest when the eagle chicks were approximately 8 weeks old to equip them with federal leg bands and patagial wing markers (orange on Catalina, light blue on NCI). 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 could be large males or small females, sex was confirmed later with a blood sample sent for DNA analyses (Avian Biotech International, Tallahassee, FL). We discontinued the general use of all types of transmitters in 2014 because of a lack of personnel to track the birds post-fledging.

Monitoring of Previously Released Eagles

We closely monitored the status of eagles from previous years that had been outfitted with GPS-PTTs (Microwave Telemetry Inc., Columbia, Maryland). On Catalina, as we went about our other activities, we used vehicle-based telemetry VHF receivers to scan for previously released eagles that had stayed on or returned to the island. During monitoring and other field work we searched for other eagles that were no longer carrying functioning transmitters. We entered sighting information from observers on the islands and the mainland using Paradox (Corel Corporation, Ottawa, Ontario) database software.

RESULTS

Surveying and Nest Monitoring

Santa Catalina Island

Nests were located in February and March in all 7 previously active territories on Catalina (Pinnacle Rock, Seal Rocks, West End, Two Harbors, Twin Rocks, Rattlesnake, Middle Ranch; Fig. 2), and a new territory (Empire) was located (Fig. 2). We surveyed much of the island for new territories in conjunction with peregrine falcon surveys.

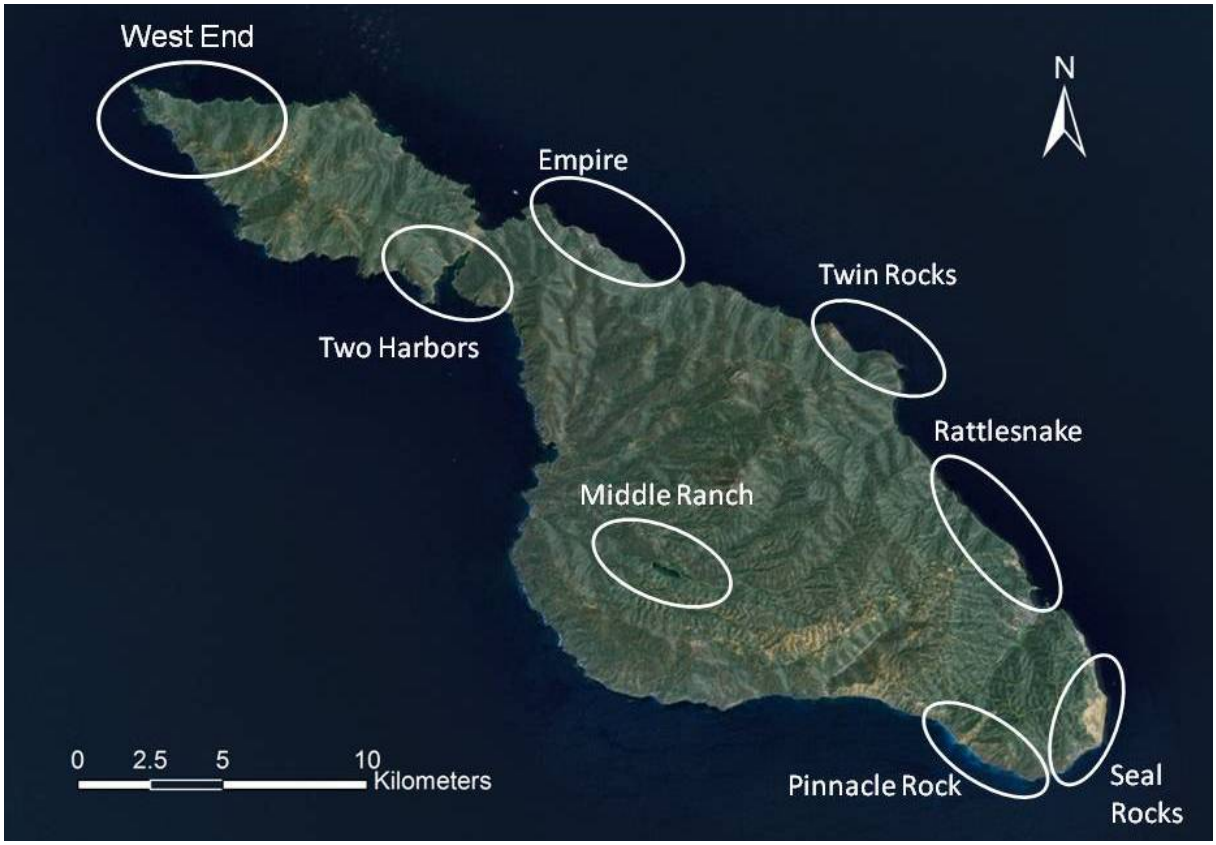

Figure 2. Bald eagle territories on Santa Catalina Island, CA, in 2014.

West End Territory. The West End pair (Fig. 2) did not breed in 2014. The original female, who bred from 1991-2013, disappeared in late 2013. A new female, K-87 (a 2009 Two Harbors chick), was seen at the nest starting in October 2013 with the territorial male, K-01, but she was displaced by K-91, also a 2009 Two Harbors chick, in early April 2014. Although females were present throughout the breeding season, no eggs were laid.

Pinnacle Rock Territory. The Pinnacle Rock pair used the same nest as in 2013. The female has no wing markers, so her identification is unknown, although she could still be K-56, who hatched from a Seal Rocks egg and was fostered into the Seal Rocks nest in 2005. The male, K-73, hatched from an egg removed from the West End nest in 2007 and was fostered back to the West End nest. We observed the first egg on 4 March and a second egg on 8 March. We confirmed that there was a chick in the nest on 10 April.

Figure 3. The Pinnacle Rock chick after banding on Santa Catalina Island, CA, in 2014.

We entered the nest on 4 June to equip the bird with leg bands, wing markers, and to obtain blood samples (Fig. 3, Table 1). We continued to monitor the bird until it fledged around 8 July. K-44 was not seen again on Catalina once he left the Pinnacle Rock territory, but survived the year and was seen on Vancouver Island, British Columbia in January 2015.

After the breeding season, the territorial male K-73, apparently left the island and traveled north. He was found dead underneath a power line near Glenwood, WA on 16 October.

Table 1. Biographical data for bald eagle chicks hatched at nests on Santa Catalina Island, CA, during 2014.

Federal Band	Sex	Wing Tag	Date Fledged	Territory	Status[a]	Comments
709-03057	F	K-40	~6/7/14	Seal Rocks	Alive	Seen near Bremerton, WA 12/18/14
709-03058	M	K-41	~6/7/14	Seal Rocks	Unknown	.
709-03059	F	K-43	6/14/14	Two Harbors	Unknown	.
709-03063	M	K-44	~7/8/14	Pinnacle Rock	Alive	Known to have survived into 2015
709-03066	F	K-46	See text	Rattlesnake	Alive	On Santa Catalina Island 12/31/14

[a] As of 12/31/14

Seal Rocks Territory. The Seal Rocks pair used the same nest as in 2013. The female, K-34, is from the captive ACC eagles and was hacked at the Bulrush tower in 1993. The male, K-25, hatched from an egg from the West End territory and was fostered into the Pinnacle Rock nest in 1992. The birds were found incubating two eggs on 11 February and two chicks hatched between 13 and 17 March.

Figure 4. The Seal Rocks chicks prior to banding on Santa Catalina Island, CA, in 2014.

We entered the nest on 9 May to equip the birds with leg bands and wing markers and to collect blood samples for contaminant analyses (Fig. 4, Table 1). We continued to monitor the birds until they fledged around 7 June (Table 1). Neither bird was seen again on Catalina after leaving the Seal Rocks territory, but K-40 is known to have traveled to the mainland and survived through the end of the year (Table 1).

Two Harbors Territory. The Two Harbors pair used the same nest as last season. 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. The nest was monitored primarily via our live web cam. The first egg was laid on 15 February and the second egg on 17 February, but it broke within an hour. The remaining chick hatched on 24 March.

Figure 5. The Two Harbors chick at banding on Santa Catalina Island, CA, in 2014.

We entered the nest on 15 May to equip the bird with leg bands and wing markers and to collect blood samples for contaminant analyses (Fig. 5, Table 1). We continued to monitor the bird until it fledged on 14 June, and she was not seen again in 2014 once she left the Two Harbors territory.

Rattlesnake Territory. The Rattlesnake pair built a new nest in a eucalyptus tree above the Catalina Island Marine Institute. The male, K-80, was produced by eagles at the ACC in 1998 and was fostered into the West End nest. The female, K-47, was produced by eagles at the ACC in 2004 and was fostered into the Seal Rocks nest. We confirmed the birds were incubating on 17 February and saw 2 eggs on 20 February. One chick hatched around 23 April and the second egg eventually disappeared.

We entered the nest on 14 June to install a leg band and wing markers, and to obtain blood samples (Table 1). We monitored the nest until 26 June, at which time a branch above the nest fell from the tree and caused the chick to fall to the ground, breaking both tibia. We transported her to the Serrano Animal and Bird Hospital in Lake Forest, California, where she had the legs surgically repaired. We brought her back to Catalina on 10 July and placed her in a 5'x6' cage in our former incubation room (Fig. 6) while her legs healed. We moved her to a 10'x10' cage inside of our educational bald eagle's aviary on 3 September, and then released her into the aviary on 11 September.

Figure 6. The Rattlesnake chick in rehabilitation at our office in Avalon, CA, in 2014.

During rehabilitation all of her tail feathers had been severely damaged. We received permission from Region 8 of the U.S. Fish and Wildlife Service to imp (replace) the tail feathers from a deceased juvenile bald eagle on to K-46, which was done on 8 October. On the morning of 13 October, we removed K-46 from the aviary, fit her with a VHF backpack-mounted transmitter and released her on a hillside about 100 m from her nest. We provided supplemental food in the form of mackerel,

quail, and deer carcasses in various locations around the nest canyon, but island foxes and ravens ate the majority of the food. K-46 disappeared from the area around 19 October. We were unable to relocate her until she was reported on a rooftop in Avalon on 30 October.

She remained in town until 19 November, at which time we noticed that she had lost 7-8 of the 12 tail feathers we had imped. Ravens frequently harassed her while she was perched and were observed pulling at her tail feathers. Because of the potential threat of ravens, power lines, and humans, we recaptured K-46 on 20 November and moved her to Thompson Reservoir at Middle Ranch. She remained at or near the reservoir through the end of the year. We continued to provide supplemental food as necessary, but observed her feeding on fish and birds that she had acquired on her own.

Middle Ranch Territory. The Middle Ranch pair used the same nest as in 2013. The male, K-88, hatched at the Twin Rocks nest in 2008 and was new to the territory in 2014. The female, A-37, was produced by eagles at the ACC in 2005 and hacked from the South Tower on Santa Cruz. The birds were first found incubating on 6 March. On 10 March the birds were incubating one egg, but a second broken egg was on the edge of the nest. The remaining egg disappeared on 12 April and there were no further nesting attempts.

Twin Rocks Territory. The Twin Rocks pair used the same nest that was used in 2013. The male, K-00, hatched at the Pinnacle Rock nest in 2007. The female, K-17, was a bird released at the Bulrush hacking tower in 1984. The birds were found incubating a single egg on 19 February and two eggs on 21 February. The pair incubated through 17 March, but the nest was abandoned by 26 March and there were no further nesting attempts.

Empire Territory. A new territory was formed northeast of Two Harbors in 2014. The male, K-51, was produced by eagles at the ACC in 2005 and fostered at the Pinnacle Rock nest. The female, K-03, hatched at the Seal Rocks nest in 2007. We located the new nest in a boulder field at the Empire Quarry on 24 February. The birds were incubating one egg on 17 March and had a second egg by 20 March. The pair incubated until 24 April, which was past the expected hatch date. The incubating adult left the nest and ravens broke the eggs within minutes. There were no further nesting attempts.

Santa Cruz Island

We surveyed the 7 known breeding territories on Santa Cruz and located active nests in 5 territories (Sauces, Pelican Harbor, Fraser Point, Cueva Valdez, Malva Real; Fig. 7). We surveyed much of the island for new territories in conjunction with peregrine falcon surveys, but we located no other breeding pairs.

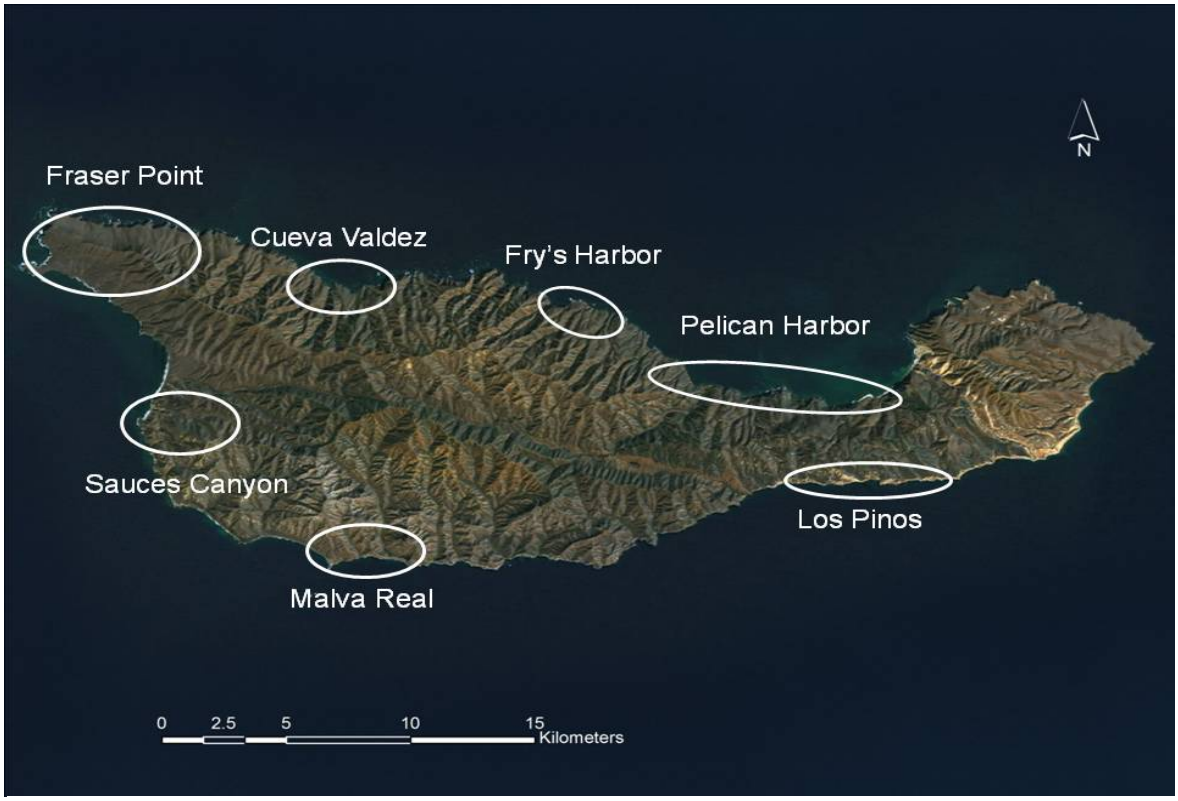

Figure 7. Bald Eagle territories on Santa Cruz Island, CA, in 2014.

Sauces Canyon Territory. The Sauces Canyon pair (Fig. 7) used the same nest as in 2013. 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 15 February, but broke on 22 February. The first egg of a second clutch was laid on 16 March, but soon after the egg was laid A-40 returned with a large, forked stick that got caught around A-48's neck, causing her to step on and break the egg. There were no further nesting attempts.

Pelican Harbor Territory. The Pelican Harbor pair (Fig. 7) is composed of male K-10, produced by the ACC and fostered into the Twin Rocks nest on Catalina in 2001, and female K-26, produced by the ACC and fostered into the West End nest on Catalina Island in 2002. The

pair used a nest that had been constructed in 2013. They were found incubating on 2 March, but our observation point did not allow us to determine how many eggs were laid. Two chicks were present on 8 April.

We entered the nest on 29 May to install leg bands and wing markers on the eaglets, and to obtain a blood sample (Table 2). The chicks were last seen at the nest on 29 June.

Table 2. Biographical data for bald eagle chicks hatched at nests on the northern Channel Islands, CA, during 2014.

Federal Band	Sex	Wing Tag	Date Fledged	Territory	Status[a]	Comments
679-04146	F	A-91	~5/26/14	Malva Real	Unknown	Put chick in nest at banding
709-03051	M	A-93	~5/25/14	Lopez Canyon	Unknown	
709-03052	M	A-94	~5/25/14	Lopez Canyon	Unknown	
709-03053	F	A-95	~6/15/14	Trap Canyon	Unknown	
709-03054	M	A-96	~6/15/14	Trap Canyon	Unknown	
709-03055	M	A-97	~6/19/14	Fraser Point	Unknown	Put chick in nest at banding
709-03056	F	A-98	~6/19/14	Fraser Point	Alive?	A-98 seen in Bremerton, WA 12/17
709-03060	M	A-92	~6/30/14	Pelican Harbor	Unknown	Seen 8/26 at Point Arena Lighthouse
709-03061	F	A-98	~6/30/14	Pelican Harbor	Alive?	A-98 seen in Bremerton, WA 12/17
709-03062	F	NA	~7/7/14	Cueva Valdez	Unknown	Put chick in nest at banding

[a] As of 12/31/14

Cueva Valdez Territory. The Cueva Valdez pair (Fig. 7) used the same nest as in 2012. The male, A-00, was produced by the ACC and hacked on Santa Cruz in 2002. The female, A-16, was removed from a nest in Alaska and hacked on Santa Cruz in 2003. We found the adults incubating eggs on 17 March and there was a chick present on 28 April.

On 22 May, the chick was no longer in the nest, but the adults were still actively defending the area. We went to check around the nest tree on 24 May and found the eaglet on the ground and healthy. We returned to band the eaglet on 26 May (Table 2) and placed it back in the nest. The chick fledged by 7 July.

Malva Real Territory. The Malva Real pair (Fig. 7) used the same nest in Malva Real Canyon that they used in 2013. We were unable to determine the identities of the breeding adults. The male has no wing markers, but the placement of the leg bands suggests it may still be K-11, produced at the ACC and fostered into the West End nest on Catalina in 2001. The female had a

blue wing marker, but we could not read the number. We believe she is still A-35, an ACC-produced bird that was released on Santa Cruz in 2005. We found the birds in incubation posture on 1 February and a chick was present on 3 March.

We entered the nest on 24 April to install leg bands and wing markers on the eaglet, and to obtain a blood sample (Table 2). The eaglet fledged by 26 May.

Los Pinos Territory. We observed individual adults at or near the 2013 Los Pinos nest (Fig. 7) on 11 and 25 February, and the pair was present on 2 March. Single adults were present on 11, 13, and 25 March, with possible incubation on 25 March. However, no birds were present on the last 3 visits on 8, 14, and 26 April.

Fry's Harbor Territory. Eagle A-46, a 2006 ACC-produced male, and A-24, a female collected in Alaska in 2004 were observed in their territory throughout the season, but the only time that an adult was seen at the nest constructed in 2013 was on 13 March (Fig. 7). On 7 October, we received a report that a boater had found the carcass of A-24 on the beach at Platt's Harbor, within the Fry's Harbor territory. A-46 is still carrying a functioning GPS-PTT and remained on Santa Cruz Island throughout the year (Fig. 8).

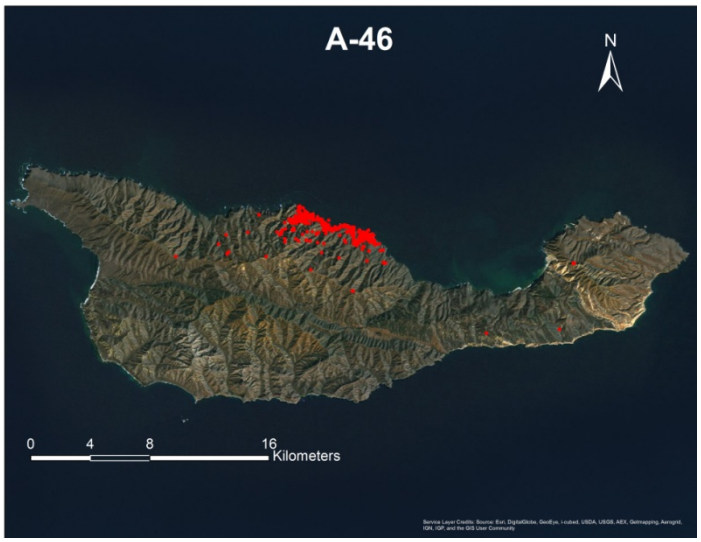

Figure 8. Movements of Eagle A-46 on Santa Cruz Island, CA, in 2014.

Fraser Point Territory. We located the Fraser Point pair (Fig. 7) incubating at the 2013 nest on 12 February. Female A-49 hatched at the Pelican Harbor nest in 2006, the first chick to hatch naturally since bald eagle restoration efforts began on the Channel Islands. The male, A-64, is a brother of A-49 that hatched at the Pelican Harbor nest in 2008. We found the adults incubating on 12 February and observed at least one chick on 28 March. A second chick was confirmed on 10 April.

We entered the nest on 5 May to install leg bands and wing markers on the eaglets, and to obtain a blood sample (Fig. 9, Table 2). Upon our arrival there was only one chick in the nest. Upon a search beneath the nest, we located the second chick on the ground, but otherwise healthy. We banded both chicks and returned them to the nest. We continued observing the nest until the chicks fledged between 8 and 19 June.

Figure 9. The Fraser Point chicks on Santa Cruz Island, CA, in 2014.

Santa Rosa Island

We located active nests in the two known active territories on the island, Trap Canyon and Lopez Canyon (Fig. 10), and surveyed most of the coastline for new territories.

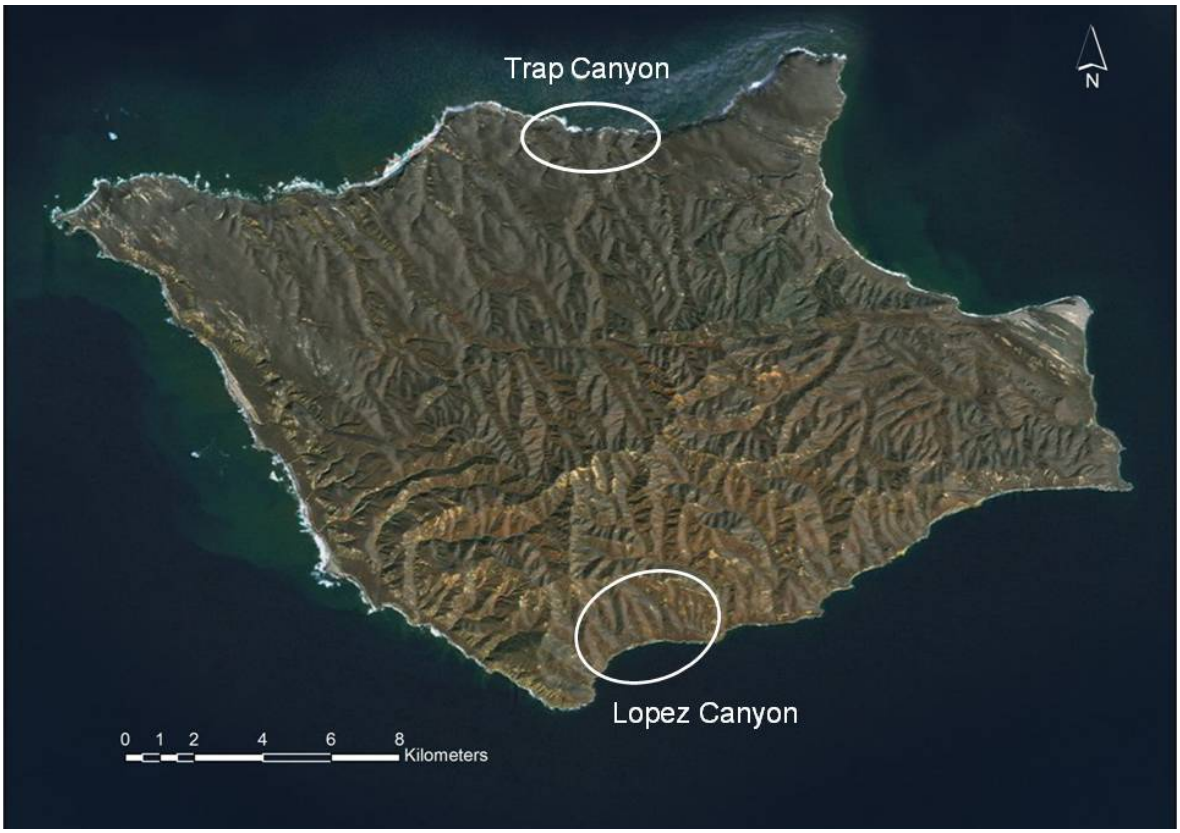

Figure 10. Bald eagle territories on Santa Rosa Island, CA, in 2014.

Trap Canyon Territory. The Trap Canyon pair used the nest they used in 2013 (Fig. 10). The male, A-08, was an Alaskan bird hacked on Santa Cruz in 2002. The female, A-22, was produced by the ACC and hacked on Santa Cruz in 2004. Observation points for this nest are limited and it is difficult to view the nest from the closest observation point without disturbing the nest, so many observations were made from an observation point approximately 5 km away. We were not able to determine the status of the nest until 13 April, at which time there were two 3-4 week old eaglets present.

Figure 11. The Trap Canyon before banding on Santa Rosa Island, CA, in 2014.

We entered the nest on 3 May to install leg bands and wing markers on the eaglets, and to obtain a blood sample (Fig. 11, Table 2). A-96 fledged between 21 and 29 May and the remaining nestling was confirmed fledged on 15 June.

Lopez Canyon Territory. The Lopez Canyon pair (Fig. 10) used the same nest in a large toyon (*Heteromeles arbutifolia*) as in previous years. Both the male, A-39, and the female, A-43, were produced by the ACC and hacked on Santa Cruz in 2005. The birds were observed incubating on 12 February. At least one chick was seen in the nest on 16 March and we could not confirm the presence of a second chick during 6 visits through 23 April.

Figure 12. The Lopez Canyon bald eagle chicks at the time of banding on Santa Rosa Island, CA, in 2014.

We entered the nest on 1 May to attach leg bands and, wing markers, and to draw blood for contaminant analyses (Fig. 12; Table 2). We found a chick on the ground at the base of the nest tree and one in the nest, which had partially collapsed along one edge. The chick on the ground appeared to

be in good health and was fit with wing markers A-93 and returned to the nest. We continued to monitor the nest until the chicks fledged around 25 May. Both fledglings were still in the territory on our last visit on 25 June.

Anacapa Island

We surveyed Anacapa from our Zodiac and during peregrine falcon surveys aboard the *Retriever*. We found a nesting pair in the previously known Oak Canyon territory (Fig. 13).

Figure 13. The Oak Canyon bald eagle territory on Anacapa Island, CA, in 2014

Oak Canyon Territory. The pair on West Anacapa Island used the same nest as in 2013 (Fig. 13). Access to the island was restricted because of seabird nesting, so we were unable to access the island in 2014 or confirm breeding outcome. There was an adult in the nest on 25 March, but we could not determine whether a chick was present. On 16 May, both adults were west of the nest canyon, and a photograph taken of the nest from the water on 25 May did not show any large nestlings.

San Clemente Island

Bald Canyon: We located a pair on the southeastern coast of San Clemente that had built a nest, but there were no chicks observed, and we do not know whether the pair attempted to reproduce in 2014. The female was A-32, an Alaskan bird that was hacked on Santa Cruz in 2004. The male was K-76, a chick that hatched from an egg removed from the Twin Rocks nest, who was later fostered into the Twin Rocks nest. The territory was named Bald Canyon (Fig. 14).

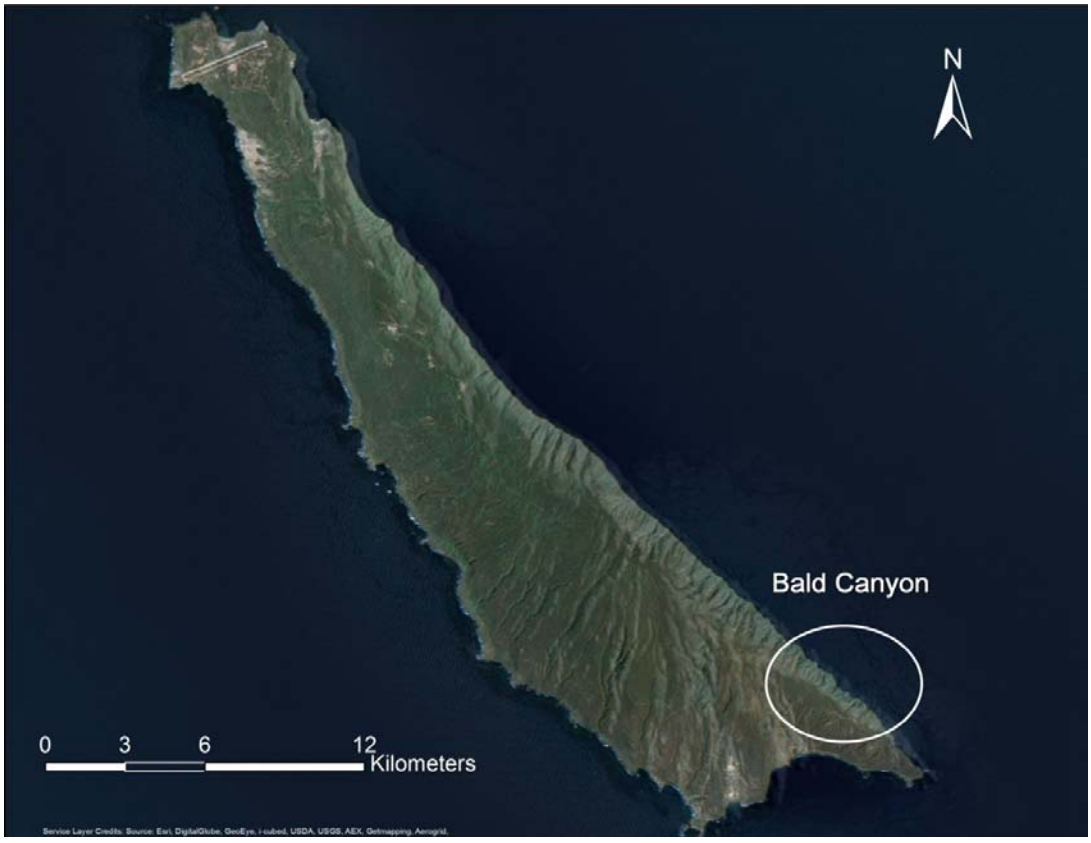

Figure 14. Bald eagle territory located on San Clemente Island, CA, in 2014.

Nesting Summary

Based upon our observations and the number of chicks that hatched in nests on the Channel Islands, we estimate that the eagles laid 26-28 eggs this season, of which 15 (54-58%) hatched (Table 3). Fourteen chicks (93%) fledged from nests and the Rattlesnake chick was released after rehabilitation. Between 5 and 15 (33-100%) of these eaglets survived until the end of the year (5 known alive, 10 unknown status).

Table 3. Summary of nesting attempts by bald eagles on the California Channel Islands in 2014.

Island/Nest	Eggs Incubated	Chicks Hatched	Chicks Fledged	Number Surviving Until End of Year
Santa Catalina Island				
West End	0	0	0	.
Pinnacle Rock	2	1	1	1
Seal Rocks	2	2	2	1-2
Two Harbors	2	1	1	0-1
Twin Rocks	2	0	0	.
Rattlesnake	2	1	1	1
Middle Ranch	2	0	0	.
Empire	2	0	0	.
TOTAL	14	5	5	3-5
Santa Cruz Island				
Pelican Harbor	2	2	2	1-2
Sauces	2	0	0	.
Cueva Valdez	1-2	1	1	0-1
Malva Real	1-2	1	1	0-1
Fraser Point	2	2	2	0-2
Los Pinos	0	0	0	.
Fry's Harbor	0	0	0	.
TOTAL	8-10	6	6	1-6
Santa Rosa Island				
Trap Canyon	2	2	2	0-2
Lopez Canyon	2	2	2	0-2
TOTAL	4	4	4	0-4
Anacapa Island				
Oak Canyon	Unknown	Unknown	Unknown	Unknown
TOTAL	NA	NA	NA	NA
All Islands Combined	26-28	15	15	4-15

Monitoring of Previously Released/Hatched Bald Eagles

We continued to monitor the eagles that had been released or hatched naturally on the Channel Islands prior to 2014. Thirty bald eagles that were released or hatched on Catalina in previous years were seen during 2014 (Table 4). Thirteen of the birds were on Catalina, 3 on

Santa Cruz, 1 on Santa Rosa, 3 on San Clemente, and 10 on the mainland. Two of the mainland reports were of dead adults (Table 4).

Table 4. Status of bald eagles released or fledged from nests on Santa Catalina Island, CA, prior to 2014 and seen in 2014.

FWS Leg Band	Sex[1]	Patagial Marker	Nest/Release Tower	Fledge Year	Status, Latest Location[2]
629-16077	F	K-17	Bulrush Tower	1984	Alive, Twin Rocks pair, Catalina Is.
629-19925	M	K-25	Pinnacle Rock	1992	Alive, Seal Rocks pair, Catalina Is.
629-19928	F	K-34	Bulrush Tower	1993	Alive, Seal Rocks pair, Catalina Is.
629-39815	M	K-80	West End	1998	Alive, Rattlesnake pair, Catalina Is.
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, Lake Hemet, CA
629-02780	M	K-10	Twin Rocks	2001	Alive, Pelican Harbor pair, Santa Cruz Is.
629-02782	M	K-11	West End	2001	Alive, Malva Real pair, Santa Cruz Is.
629-02793	F	K-26	West End	2002	Alive, Pelican Harbor pair, Santa Cruz Is.
629-47371	F	K-47	Seal Rocks	2004	Alive, Rattlesnake pair, Catalina Is.
629-47395	M	K-51	Pinnacle Rock	2005	Alive, Empire pair, Catalina Is.
629-52425	M	K-00	Pinnacle Rock	2007	Alive, Twin Rocks pair, Catalina Is.
629-52428	M	K-73	West End	2007	Dead, Glenwood, WA 10/16/14
629-52430	M	K-76	Twin Rocks	2007	Alive, San Clemente Island 6/11/14
629-52433	F	K-79	Two Harbors	2007	Alive, Harbor City, CA 11/8/14
629-52434	F	K-03	Seal Rocks	2007	Alive, Empire pair, Catalina Is.
629-52442	F	K-83	Two Harbors	2008	Alive, Escondido, CA 2/16/14
629-52443	M	K-88	Twin Rocks	2008	Alive, San Clemente Is. 6/11/14
629-52446	F	K-67	West End	2008	Alive, Murrieta, CA 7/13/14
629-52449	F	K-87	Two Harbors	2009	Alive, San Clemente Is. 6/11/14
629-52450	F	K-91	Two Harbors	2009	Alive, West End pair, Catalina Is.
679-03439	F	K-95	Pinnacle Rock	2010	Alive, Santa Rosa Island 2/20/14
679-04101	F	K-18	Two Harbors	2011	Alive, Catalina Island 10/16/14
679-04103	M	K-08	Seal Rocks	2011	Alive, San Luis Obispo, CA 1/30/14
679-04117	F	K-20	Seal Rocks	2012	Alive, Big Bear, CA 2/5/14
679-04118	M	K-21	Seal Rocks	2012	Dead, Salmon River, ID 2/25/14
679-04133	F	K-32	Seal Rocks	2013	Alive, Nisqually, WA 9/10/14
679-04136	M	K-27	West End	2013	Alive, Hood River, OR 12/24/14

[1] Determined by karyotyping and/or morphometrics.

[2] As of 12/31/14 unless otherwise noted.

Thirty-two eagles that were released on Santa Cruz or hatched naturally on the northern Channel Islands in previous years were seen in 2014 (Table 5). Fourteen of the birds were on Santa Cruz, 10 on Santa Rosa, 2 on Anacapa, 1 on San Miguel, 1 on Catalina, 1 on San Clemente, and 3 on the mainland. Although 7 eagles were carrying functioning GPS-PTTs at the beginning of the year, there are only 3 birds with functional GPS-PTTs as of 31 December.

A-17 Movements

Eagle A-17 visited the four northern Channel Islands and the mainland in 2014 (Fig. 15). She began the year on Santa Rosa Island and started visiting Santa Cruz on 1 February. She returned to Santa Rosa on 8 February, but made additional visits to Santa Cruz on 9-11 February, 17-20 February, 25 February – 3 March, 9-12 March, 17-18 March, and 25-26 March. On 26 March, she flew to the mainland via Anacapa. She moved north and spent most of her time in central California, although she made a visit to the Santa Barbara coast in early April. On 6 May, she returned to Santa Cruz and flew to Santa Rosa on 11 May. We received no data on 21-27 May, but she was back on Santa Cruz on 28 May. She returned to Santa Rosa on 31 May and was back on Santa Cruz on 13 June, after another lapse in data from 6-12 June. She returned to Santa Rosa on 17 June and remained there through the end of the year, except for a visit to San Miguel on 5-6 November.

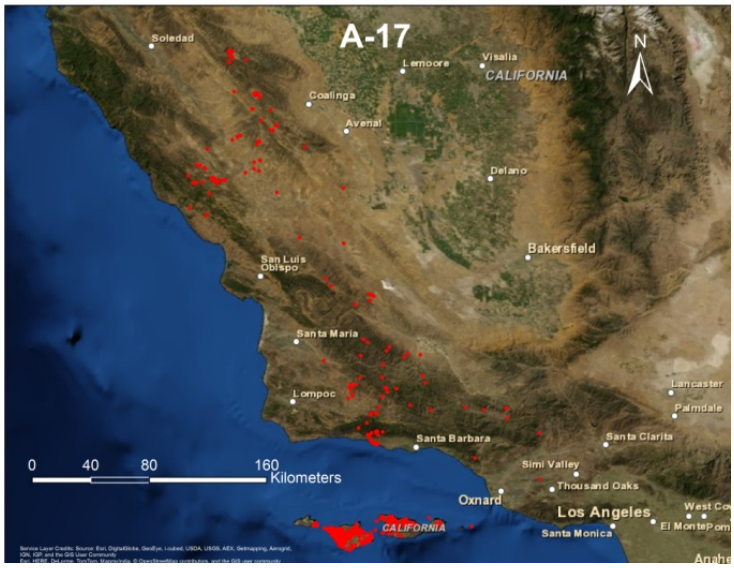

Figure 15. Movements of Eagle A-17 in 2014.

A-58 Movements

We received data from A-58 only through 2 March, after which there was no additional data through the end of the year. During the first two months of the year he remained in his territory on the eastern portion of Santa Cruz (Fig.16).

Table 5. Status of bald eagles released or fledged from nests on Santa Cruz and Santa Rosa Islands, CA in 2002-2012 and known to have been alive in 2014.

FWS Leg Band	Sex[1]	Patagial Marker	Source[2]	Fledge Year	Status, Latest Location[3]
629-02795	M	A-00	Zoo	2002	Alive, Cueva Valdez pair, Santa Cruz Is.
629-14045	M	A-08	Alaska	2002	Alive, Trap Canyon pair, Santa Rosa Is.
629-14048	F	A-11	Alaska	2002	Alive, Oak Canyon pair, Anacapa Is.
629-47359	F	A-16	Alaska	2003	Alive, Cueva Valdez pair, Santa Cruz Is.
629-47360†	F	A-17	Alaska	2003	Alive, Santa Rosa Is.
629-47356	M	A-21	Alaska	2003	Alive, Oak Canyon pair, Anacapa Is.
629-47366	F	A-23	Zoo	2004	Alive, Fort Hunter-Liggett, CA
629-47372	F	A-24	Alaska	2004	Dead, Fry's Harbor pair, Santa Cruz Is.
629-47375	F	A-27	Alaska	2004	Alive, Baby's Harbor, Santa Cruz Is.
629-47380	F	A-32	Alaska	2004	Alive, San Clemente Is.
629-47388	F	A-37	Zoo	2005	Alive, Middle Ranch pair, Catalina Is.
629-47390	M	A-39	Zoo	2005	Alive, Lopez Canyon pair, Santa Rosa
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
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.
629-52419	F	A-57	Zoo	2006	Alive, Smuggler's pair, Santa Cruz Is.
629-52438	M	A-64	Pelican Harbor	2008	Alive, Fraser Point pair, Santa Cruz Is.
679-03432	M	A-67	Trap Canyon	2010	Alive, Azusa, CA 12/29/14
679-03435	M	A-68	Pelican Harbor	2010	Alive, Baby's Harbor, Santa Cruz Is.
679-03436†	M	A-69	Pelican Harbor	2010	Alive, Santa Rosa Is.
679-03440	F	A-70	Lopez Canyon	2010	Alive, Santa Rosa Is. 6/28/14
679-03443	F	A-71	Sauces Canyon	2010	Alive, Santa Rosa Is. 3/22/14
679-03444	M	A-72	Cueva Valdez	2010	Alive, Santa Cruz Is. 1/12/14
679-04109	M	A-73	Sauces Canyon	2011	Alive, Santa Cruz Is. 7/14
679-04110	F	A-74	Pelican Harbor	2011	Alive, Santa Barbara, CA 6/26/14
679-04124	M	A-81	Sauces Canyon	2012	Alive, Santa Rosa Is. 4/19/14
679-04127	M	A-84	Pelican Harbor	2012	Alive, Santa Rosa Is. 5/4/14
679-04142	F	A-89	Fraser Point	2013	Alive, San Miguel Is. 3/31/14

[1] Determined by karyotyping for birds from San Francisco Zoo, and morphometrics for Alaskan birds.

[2] San Francisco Zoo (Zoo), wild nests near Juneau, Alaska (Alaska), or nests on Santa Cruz (Pelican Harbor, Malva Real, Sauces, Cueva Valdez) or Santa Rosa (Trap Canyon, Lopez Canyon).

[3] As of 12/31/14, unless otherwise noted. † Carrying a GPS transmitter.

A-60 Movements

We received intermittent data from Eagle A-60, the 2006 Malva Real chick, but it spent most of the year on Santa Rosa and Santa Cruz, before we stopped receiving data on 21 October (Fig. 17). He was on Santa Rosa on 16-18 January, 6 February – 5 September, and 18 September – 21 October, and on Santa Cruz 25 January – 1 February and 14 September.

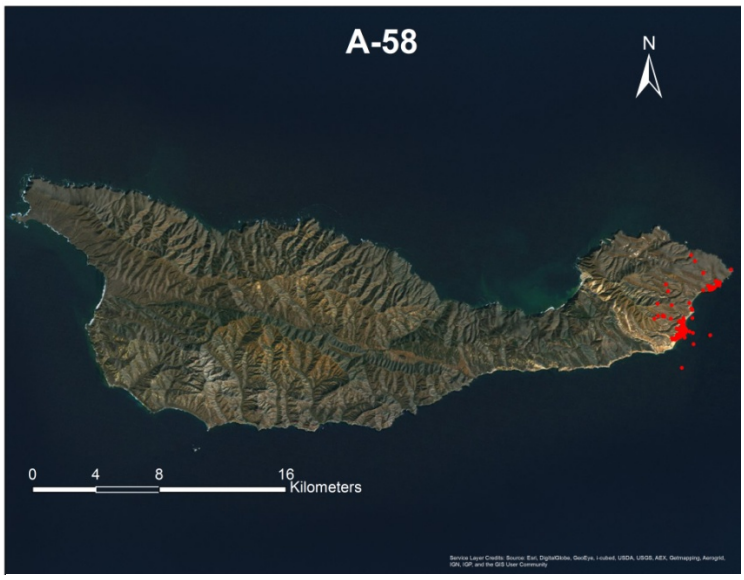

Figure 16. Movements of Eagle A-58 on Santa Cruz Island, CA, in 2014.

A-69 Movements

Eagle A-69, a 2010 Pelican Harbor chick, began the year around Point Conception on the mainland. (Fig. 18). We received no data from 13 January – 12 February, by which time she had moved to Santa Cruz. We received no data from 14-21 February, and she had moved to Santa Rosa by 23 February. Again, we received no data from 27 February – 5 March, and she had moved to Santa Cruz by 6 March.

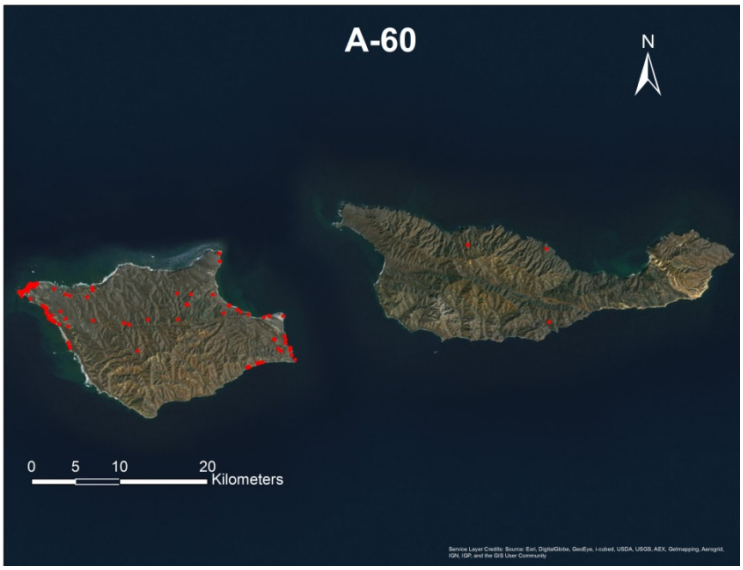

Figure 17. Movements of Eagle A-60 on the northern Channel Islands, California in 2014.

She moved back to Santa Rosa on 21 March and remained there through at least 4 April. We had no data from 5-13 April, and she was back on Santa Cruz from at least 14-19 April. She had moved back to Santa Rosa by 22 April and remained there through the end of the year.

A-70 Movements

Eagle A-70, the 2010 Lopez Canyon chick, spent the entire year on Santa Rosa or Santa Cruz (Fig. 19). She spent 3-6 January on Santa Rosa. On 6 January, she flew to Santa Cruz, returned to Santa Rosa after 2 hours, spent an hour on Santa Rosa, then returned to Santa Cruz, where she remained until 14 January. She spent 14-23 January, 9-22 February, and 7 March – 27 June on Santa Rosa. The reminder of the time was spent on Santa Cruz. We received no data from 28 June – 19 July, and the transmitter fell off on 20 July.

A-72 Movements

Eagle A-72, the 2010 Cueva Valdez chick, dropped his transmitter on 12 January, at which time he was on Santa Cruz Island (Fig. 20). He was seen on the mainland in January 2015.

Figure18. Movements of Eagle A-69 in southern California during 2014.

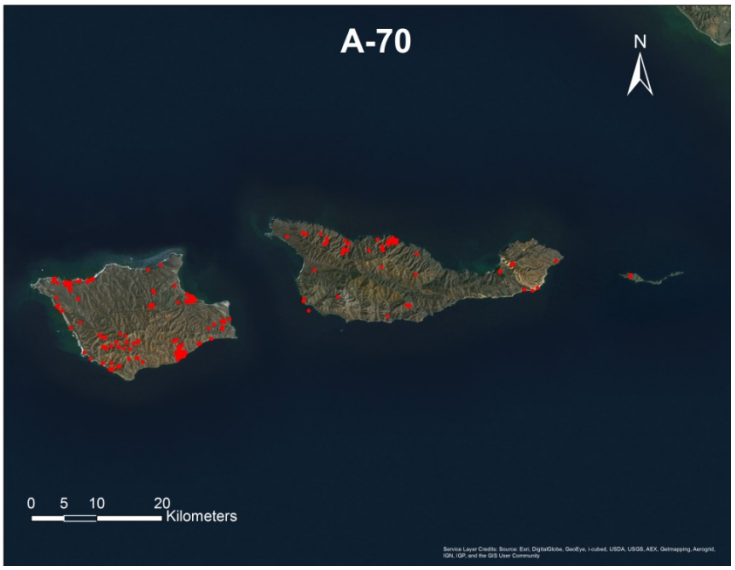

Figure 19. Movements of Eagle A-70 on the northern Channel Islands, CA, in 2014.

DISCUSSION

Productivity on the northern Channel Islands was higher in 2014 than in 2013 (10 fledglings vs 6 fledglings, respectively). The decrease in productivity on Catalina was a result of the lack of breeding by the West End pair and failures by the Twin Rocks, Middle Ranch, and Empire pairs. The Twin Rocks female, K-17, is the oldest female on the Channel Islands, at 30

years of age, and has been unproductive for the past two years, which may be due to her age. This was the first year of breeding for the Empire pair and the Middle Ranch male, so inexperience could have contributed to nesting failures.

Figure 20. Movements of Eagle A-72 on the northern Channel Islands, CA, in 2014.

The 2014 nests produced 1.07 fledglings/breeding attempt, the same productivity as in 2013. However, the productivity levels were flipped between the northern Channel Islands and Catalina in 2014 as compared to 2013. In 2014, there were 1.43 fledglings/attempt on the northern Channel Islands (0.75 fledglings/attempt in 2013) and 0.71 fledglings/attempt on Catalina (1.42 fledglings/attempt in 2013). Overall nesting success was 71% (86% on northern Channel Islands, 57% on Catalina). This is the first year in which productivity on the northern Channel Islands has surpassed that on Catalina. The overall productivity rate was higher than the Pacific Region Bald Eagle Recovery Plan's target of 1.0 fledgling/attempt and 65% nesting success (U.S. Fish and Wildlife Service 1986). Therefore, if the recent rates of reproduction persist, the eagle population appears to be able to maintain itself without human intervention.

In 2015, we expect the number of bald eagle nests to remain stable on Anacapa and Catalina, but we expect an increase in nesting pairs on Santa Rosa and Santa Cruz. On Santa Cruz we expect the Smuggler's Harbor birds to begin nesting, as well as a pair that was seen at Baby's Harbor (A-27 and A-68). There is the potential for a new pair on Santa Rosa (A-17 and A-60), which would be interesting, as A-17 is thought to have killed A-60's mother in the Malva Real territory on Santa Cruz in 2008. There is also the possibility that a pair on San Clemente Island (A-32 and K-76) could be confirmed as breeders in 2014. IWS personnel will be conducting peregrine falcon surveys again on all 8 Channel Islands in 2015, so we will likely find any breeding bald eagles on islands where they are not currently known to breed.

RECOMMENDATIONS

Because of the unknown status of bald eagles on San Clemente, the sightings of untagged juveniles, and the discovery of a nest in 2014, an effort should be made to survey San Clemente to determine the status of any eagles that may be nesting there. Continued efforts should be made to survey the more inaccessible portions of the Channel Islands by foot and boat to locate potential new pairs and to determine the nesting status of known pairs.

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