Bald Eagle Restoration on the Northern Channel Islands, California

January — December 2007

6th Annual Report

MONTROSE SETTLEMENTS RESTORATION PROGRAM

MSRP

Restoring Natural Resources
harmed by DDTs and PCBs

Bald Eagle Restoration on the Northern Channel Islands, California
January — December 2007
6th 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 1960's. 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.

In 2002, the Institute for Wildlife Studies (IWS) initiated a 5-year bald eagle restoration feasibility study on Santa Cruz Island, under contract with the National Park Service. IWS released 61 eagles from 2002-2006. In 2006, we had the first known nesting attempts on the northern Channel Islands since bald eagle restoration began. Two pairs of eagles successfully fledged one chick each from nests at Pelican Harbor and Malva Real on Santa Cruz Island. Both pairs attempted nesting again in 2007, but only the Pelican Harbor pair was successful at fledging a single chick.

As of the end of December 2007, 31 of the 61 bald eagles released from towers and 2 of the 3 chicks that hatched in nests are known to be alive. There are 29 eagles remaining on the northern Channel Islands (5 from 2002, 3 from 2003, 6 from 2004, 6 from 2005, 9 from 2006), three birds are known to be on the mainland (1 from 2003, 1 from 2005, 1 from 2006), and one 2004 bird is on Santa Catalina Island. There are also three eagles previously released on Santa Catalina Island that are resident on Santa Cruz Island.

Bald eagles have continued to use Santa Rosa Island, especially from the fall through spring, where they have been seen feeding on carcasses and gut piles of mule deer (*Odocoileus hemionus*) and Roosevelt elk (*Cervus canadensis*) left from the guided hunts and culling activities, and on marine mammal carcasses on the beaches. Many of the birds then move to West Anacapa Island during the spring and summer, which corresponds with the marine bird breeding season.

The successful breeding of bald eagles on Santa Cruz Island for a second year, coupled with the high survival and retention rates of bald eagles on the northern Channel Islands, are reason for optimism regarding the success of the program. The eagles are moving freely among the islands, which suggests that our releases will eventually repopulate the four northern Channel

Islands. We are seeing more birds that appear to have formed pair bonds, so we expect the breeding population to increase substantially in the next few years.

ACKNOWLEDGMENTS

IWS thanks the National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), California Department of Fish and Game, National Oceanic and Atmospheric Administration (NOAA), The Nature Conservancy and the U.S. Navy for their cooperation. We also thank our 2007 field personnel, D. Rempel, C. Little, A. Day, R. Dibala, J. Dooley, K. Dyer, and K. Smith. Funding for the project was made available by the Montrose Settlements Restoration Program.

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INTRODUCTION

Bald eagles (*Haliaeetus leucocephalus*) were once common residents on the California Channel Islands off the coast of Southern California (Fig. 1). A minimum of five pairs nested on Santa Cruz Island, three pairs on Santa Rosa Island, three pairs on San Miguel Island, and three pairs on Anacapa Island in the early 1900's (Kiff 1980, 2000), but they disappeared by the 1960's.

Figure 1. The California Channel Islands off the coast of southern California.

Bald eagle numbers began declining on the Channel Islands in the late 19th Century, largely due to human persecution. However, the ultimate cause of bald eagle extirpation from the Channel Islands was likely the introduction of the organochlorine pesticide DDT into the Southern California Bight. DDE (a metabolite of DDT) levels have been found to be inversely correlated with eggshell thickness and productivity in bald eagles (Hickey and Anderson 1968, Wiemeyer et al. 1984). DDE levels of 3-5 ppm wet weight in bald eagle eggs have been associated with reduced productivity, with reproductive failure approaching 100% with DDE levels of >15 ppm (Wiemeyer et al. 1984). The last confirmed successful nesting of bald eagles on the Channel Islands prior to 2006 was on Santa Rosa Island in 1950 (M. Daily, personal communication).

The Institute for Wildlife Studies (IWS), in cooperation with the United States Fish and Wildlife Service (FWS), initiated a program to reintroduce bald eagles to Santa Catalina Island,

California (Fig. 1) in 1980. Thirty three young eagles were released from three hacking towers over a six-year period (Garcelon 1988). Many of these birds matured and formed breeding pairs on the island, but all the eggs produced broke in the nest. Concentrations of DDE in the remains of eggs removed from failed nests averaged 32.9 ppm, implicating this contaminant as the causal agent of reproductive failure (Garcelon et al. 1989).

The likely source of the DDT contamination was traced to the Montrose Chemical Corporation in Torrance, California, once the largest DDT manufacturer in the world. It is believed that this company dumped DDT-contaminated waste through the sewer systems from 1947 to the early 1970s, as well as at deep-water dump sites near Santa Catalina Island. A decade-long lawsuit against the polluters was settled in December 2000, providing approximately $30 million for natural resource restoration in the Southern California Bight, including bald eagles.

In April 2002, the Montrose Trustee Council, comprised of representatives from National Oceanic and Atmospheric Administration (NOAA), FWS, National Park Service (NPS), California Department of Fish and Game (CDF&G), California State Lands Commission, and the California Department of Parks and Recreation, approved funding to begin an experimental reintroduction of bald eagles to the northern Channel Islands. From 2002 to 2006, IWS hacked 61 young eagles on Santa Cruz Island, primarily from wild nests near Juneau, Alaska and captive birds at the San Francisco Zoo. IWS biologists carefully monitored the population to determine how well they adapted to the new environment and recaptured birds to determine their body burdens of organochlorine contaminants. Although DDE was found in blood samples collected from six eagles captured post-release, it is not clear how this will translate into DDE levels in eggs.

The ultimate indication of a successful reintroduction is the ability of the birds to hatch healthy chicks. In 2006, the first two pair of bald eagles bred on Santa Cruz Island. Both nests produced single chicks, which both fledged and remained on the islands (Sharpe 2007). In 2007 we transitioned from the five-year feasibility study to the current monitoring phase. The goals of the on-going monitoring program are to search for and monitor nests to determine their outcome and to recapture eagles for contaminants analyses. This report summarizes the monitoring and trapping efforts made from January through December in 2007.

STUDY AREA

The northern Channel Islands, which are composed of San Miguel, Santa Rosa, Santa Cruz, and Anacapa Islands (west to east), are located approximately 19 to 44 km off the coast of Ventura and Santa Barbara counties (Fig. 2). Our monitoring was conducted primarily on Santa Cruz and Santa Rosa Islands. Santa Cruz Island is the largest of the eight California Channel Islands, measuring about 38 km in length and 12 km wide at its widest point (Fig. 2). The land area is approximately 249 km^2 with a maximum elevation of 753 m. Santa Cruz Island 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 - 20.9° 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 and manages the western 76% of the island. Santa Rosa Island is the second largest of the Channel Islands and is owned by the NPS. The island encompasses approximately 214 km^2 and is less topographically diverse than Santa Cruz Island. A central mountain range reaches an elevation of 484 m and the coastal habitat varies from gentle slopes and sandy beaches to sheer cliffs (http://www.nps.gov/chis).

Figure 2. The northern Channel Islands. From west to east: San Miguel Island, Santa Rosa Island, Santa Cruz Island, Anacapa Island.

METHODS

Permitting

IWS has the required Federal Fish and Wildlife Permit (Permit TE744878-8) and a Memorandum of Understanding with the CDF&G to conduct bald eagle research on the northern Channel Islands. IWS has a banding permit from the United States Geological Survey's Bird Banding Laboratory allowing banding and radio-tagging of the eagles.

Surveying and Nest Monitoring

We conducted an aerial survey of the four northern Channel Islands in March 2007 to search for breeding and non-breeding eagles. Santa Cruz and Santa Rosa Islands were also surveyed by foot and/or boat from February through April 2007 to search for eagles. Nests found during the surveys were monitored several times per week to determine the outcome of any breeding attempts.

Monitoring

Figure 3. PTT GPS unit with VHF transmitter (gray) attached to the side. The whole unit weighs approximately 100 g.

Each eagle that was released via hacking or that fledged from wild nests was equipped with a combination satellite/VHF transmitter (Fig. 3), patagial wing markers, and a federal leg band. We attached the transmitters so that they would detach after 2-3 years, the approximate lifespan of the transmitters. The satellite transmitters record hourly GPS locations of the bird up to 14 times per day and then upload them to a satellite approximately every three days. We also collected ~10 cc of blood from each bird at the time of banding to allow for baseline contaminant analyses.

IWS biologists closely monitored all GPS-tagged eagles to determine their status. Much of our monitoring was conducted remotely using the data provided by the GPS transmitters. Data were retrieved daily via computer from Argos, Inc. (Largo, Maryland). Any bird that had not moved more than 50 m in a day was immediately located to determine its status. Otherwise, we attempted to locate each bird at least 2-3 times per week during the first 2-3 months following fledging using a VHF telemetry receiver (R-1000; Communications Specialists, Inc., Orange, California).

Trapping

This season we continued efforts to trap older bald eagles to collect blood and feather samples for contaminants and stable isotope analyses. Trap sites were selected in areas where bald eagles were frequently observed. Prior to trapping efforts we placed deer or fish carcasses at

the trap site to attract eagles to the area. At each trap site we used a bownet and/or a net launcher. The bownet was placed in the ground, covered with dirt and grass, and baited with a pig or deer hindquarters. The net launcher, which can carry a 4x4 m net over a baited area, was set and camoflauged near bait. Traps generally were set before daylight and observed from a blind.

RESULTS

Surveying and Nest Monitoring

A helicopter survey of Anacapa, Santa Cruz, Santa Rosa, and San Miguel Islands was conducted on 22 March. A total of 12 eagles were located on the islands (nine adult or near adults, and three subadults) but only the two nests from 2006 (Pelican Harbor and Malva Real) were detected. No additional nests were located during foot or boat surveys.

Pelican Harbor Nest

The Pelican Harbor pair remained together this year. The male, K-10, was fostered into the Twin Rocks nest on Santa Catalina Island in 2001. The female, K-26, was fostered into the West End nest on Catalina Island in 2002. Both eagles have been on Santa Cruz Island since 2005.

In 2006, we had placed a camera about 90 m from the nest. Prior to the 2007 breeding season we moved the camera to a tree about 30 m from the nest so that we could get a better view of nesting activity. As in 2006, the camera feed was broadcast live on the internet through a cooperative agreement with the Ventura County Office of Education and funding by the Montrose Settlements

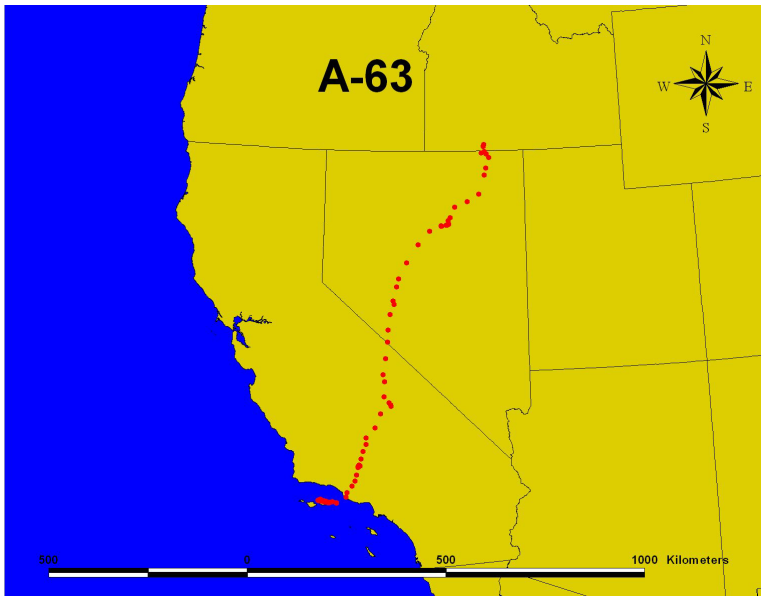

Figure 4. Movements of Bald Eagle A-63 across the western United States in 2007.

Restoration Program. We saw the first egg in the nest on 5 March and a second egg on 9 March. One of the eggs broke on 30 March, but the other chick successfully hatched on 13 April.

We visited the nest on 8 June to band the 8-week-old eaglet. It was fit with wingmarkers, a GPS/VHF transmitter, and a federal leg band. We collected blood and feather samples for contaminant and stable isotope analyses. The bird (A-63) took its first flight on 28 June and remained in its parents' territory for approximately a month before beginning to explore the islands. A-63 flew to Anacapa Island on 7 August and to the mainland on 8 August. It was found dead in the middle of a road in northern Nevada on 15 August, likely due to a collision with a car (Fig. 4).

Malva Real Nest

On 7 March the GPS locations from a 5-year-old female (A-04) indicated that she was spending her nights and about half of her days at the same location. A-04 was released on Santa Cruz Island in 2002. We confirmed that the pair had nested on the ground, as they had in 2006. She remained paired with K-11, an eagle fostered into the West End nest on Catalina Island in 2001. The birds continued incubating at the nest until 23 March, when the nest failed for an unknown reason. Upon examination of the nest we found only a few pieces of broken eggshell, which were collected and stored for analyses.

Monitoring

Besides monitoring this year's fledgling, we continued to monitor the eagles that have been released or hatched naturally prior to 2007. As of 31 December, 21 of the previously released or naturally hatched birds are being monitored via GPS data and 33 birds are known to be alive (Table 1). We had two known mortalities during 2007.

A-02 Movements

Eagle A-02 spent the entire year on either Santa Rosa or Santa Cruz Islands. It started the year on Santa Rosa Island and remained there through 14 February, except for two trips to Santa Cruz Island that lasted 2-5 days. On 14 February it flew to Santa Cruz Island and remained there through 18 September, except for a 12-day visit to Santa Rosa from 1-13 March. During the remainder of the year it spent 18 September - 26 October, 12 November – 1

December, and 11-12 December on Santa Rosa Island, and the rest of its time on Santa Cruz Island (Fig. 5).

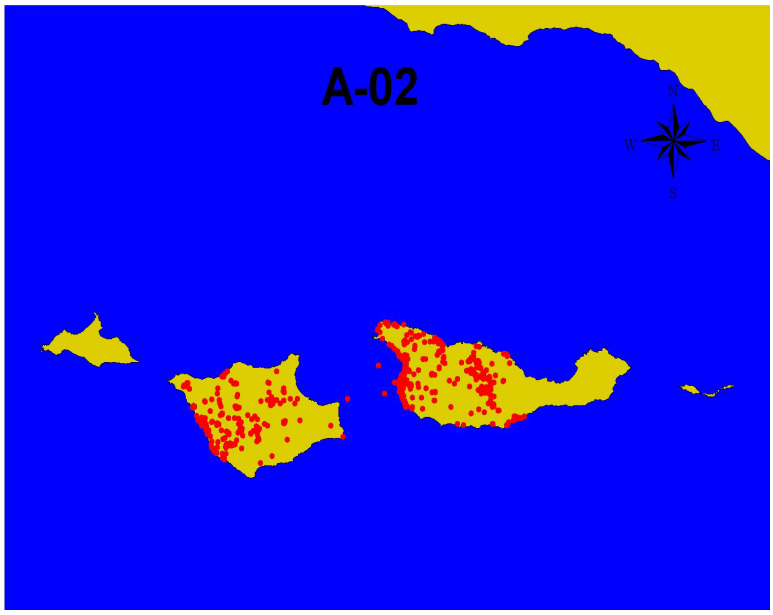

Figure 5. Movements of Bald Eagle A-02 on the California Channel Islands in 2007.

A-04 Movements

Eagle A-04 spent from 1 January to 20 September on Santa Cruz Island, mostly in her territory in the Malva Real area. She visited Santa Rosa Island from 20 September through 4 October and 21-27 October. Otherwise, she could be found on Santa Cruz Island (Fig. 6).

Table 1. Status of bald eagles released or fledged from nests on Santa Cruz Island in 2002-2007 and known to have been alive in 2007.

FWS Leg Band	Sex[1]	Patagial Marker	Source[2]	Release/ Fledge Date	Status, Latest Location[3]
629-02795	M	A-00	Zoo	6/25/02	Alive, Santa Cruz Is.
629-02798†	F	A-02	Zoo	6/25/02	Alive, Santa Cruz Is.
629-14042†	F	A-04	Alaska	8/15/02	Alive, Santa Cruz Is.
629-14045	M	A-08	Alaska	8/26/02	Alive, Santa Rosa Is.
629-14048	F	A-11	Alaska	9/7/02	Alive, Santa Cruz Is.
629-47359	F	A-16	Alaska	8/21/03	Alive, Santa Cruz Is.
629-47360†	F	A-17	Alaska	8/21/03	Alive, Santa Rosa Is.
629-47363	F	A-19	Alaska	8/21/03	Alive, c. California 4/4/07
629-47356	M	A-21	Alaska	8/31/03	Alive, Santa Rosa Is.
629-47365	F	A-22	Zoo	7/09/04	Alive, Santa Rosa Is.
629-47372	F	A-24	Alaska	8/18/04	Alive, Santa Rosa Is.
629-47375	F	A-27	Alaska	8/19/04	Alive, Santa Cruz Island 6/3/07
629-47376	M	A-28	Alaska	8/19/04	Alive, Santa Cruz Is.

Table 1. Continued.

FWS Leg Band	Sex[1]	Patagial Marker	Source[2]	Release/ Fledge Date	Status, Latest Location[3]
629-47377†	M	A-29	Alaska	8/19/04	Alive, Santa Rosa Is.
629-47380	F	A-32	Alaska	9/12/04	Alive, Santa Catalina Is.
629-47381†	M	A-33	Alaska	10/9/04	Alive, Santa Rosa Is.
629-47385†	F	A-34	Zoo	7/02/05	Alive, Santa Cruz Is.
629-47386†	F	A-35	Zoo	7/02/05	Alive, Santa Rosa Is.
629-47387†	F	A-36	Zoo	7/02/05	Alive, Santa Rosa Is.
629-47390†	M	A-39	Zoo	7/02/05	Alive, Washington
629-47391†	M	A-40	Zoo	7/02/05	Alive, Anacapa Is. 3/20/07
629-47399†	F	A-43	Zoo	7/20/05	Alive, Santa Rosa Is.
629-02800	M	A-45	Zoo	7/20/05	Alive, Santa Rosa Is. 10/7/07
629-52404†	M	A-46	Zoo	6/8/06	Alive, Vancouver, B.C.
629-52406†	F	A-48	Zoo	6/14/06	Alive, Santa Rosa Island
629-52407†	F	A-49	Pelican	6/13/06	Alive, Santa Rosa Island
629-52410†	F	A-51	Zoo	6/25/06	Alive Santa Rosa Island
629-52411†	F	A-52	Zoo	6/25/06	Alive, Santa Rosa Island
629-52417†	F	A-55	Zoo	6/28/06	Alive, Santa Rosa Island
629-52419	F	A-57	Zoo	6/29/06	Alive, Santa Cruz Island 8/31/07
629-52420†	M	A-58	Zoo	6/29/06	Alive, Santa Rosa Island
629-52421†	F	A-59	Zoo	6/29/06	Alive, Santa Rosa Island
629-52422†	M	A-60	Malva	7/17/06	Alive, Santa Rosa Island
629-52424†	F	A-62	Rehab	8/12/06	Dead, Santa Rosa Island 10/18/07
629-52436†	M	A-63	Pelican	6/28/07	Dead, Nevada 8/15/07

[1] Determined by karyotyping for birds from San Francisco Zoo, and morphometrics for Alaskan birds.
[2] Bald eagles from the Avian Conservation Center, San Francisco Zoo, California (Zoo), wild nests near Juneau, Alaska (Alaska), the Pelican Harbor (Pelican) or Malva Real (Malva) nests on Santa Cruz Island, or a rehabilitation center in northern California (Rehab).
[3]As of 12/31/07. unless otherwise noted.
† Carrying a GPS transmitter.

A-17 Movements

We trapped A-17 in October (see below), but its new transmitter did not function properly following release. The data we did receive showed the bird on the eastern tip of Santa

Rosa Island between 19 November and 10 December. The transmitter is now functioning and we are receiving regular data from the bird.

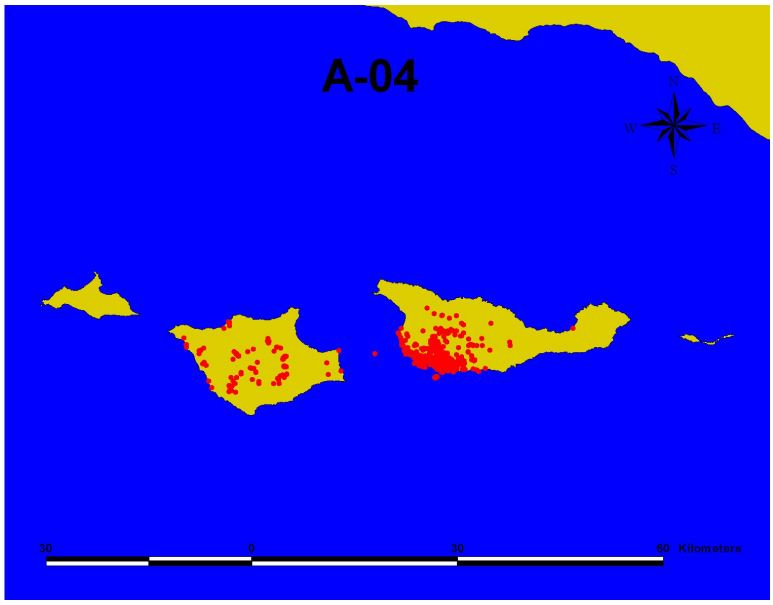

Figure 6. Movements of Bald Eagle A-04 on the California Channel Islands in 2007.

A-29 Movements

Eagle A-29 spent the entire year on either Santa Rosa or Santa Cruz Islands. Data showed it was on Santa Rosa Island from 1 January - 11 February, 17 February - 15 March, and 21 October through the end of the year. The rest of the year it was on Santa Cruz Island, including its longest stay there from 18 March - 21 October (Fig. 7).

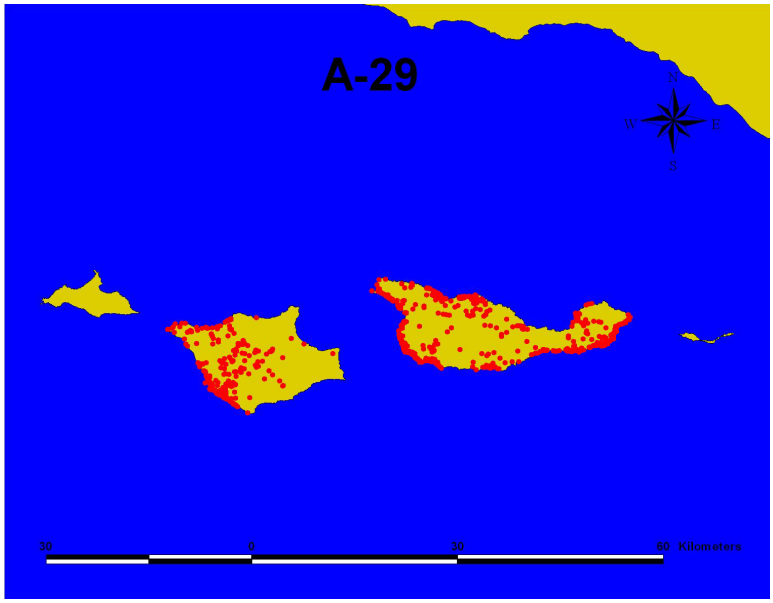

Figure 7. Movements of Bald Eagle A-29 on the California Channel Islands in 2007.

A-33 Movements

Eagle A-33 moved among more islands than any other tagged eagle in 2007, spending time on Santa Rosa, Santa Cruz, Anacapa, Santa Barbara, and San Nicolas Islands, as well as on the mainland (Fig. 8). It did not remain on a particular island or on the mainland for more than three weeks at a time until the end of November. By the end of the day on 1 January it had already visited Santa Rosa, Santa Cruz, and Anacapa Islands. On 12 January it flew from Santa Cruz to San Nicolas Island. On 14 January it flew to Santa Barbara Island and then returned to San Nicolas Island the next day. It returned to Santa Cruz

Island on 20 January and moved among the northern Channel Islands until 13 February. On 13 February it flew to the mainland for the first time. It remained in the general area of Ventura, flying as far west as Point Conception. On 19 February it returned to Santa Cruz Island and continued moving among the islands until it returned to the mainland on 21 March. This trip lasted about a week and the bird flew approximately 150 km inland to the northeast before returning to Santa Cruz Island via Anacapa Island on 29 March. The rest of the year was spent moving among Santa Cruz, Santa Rosa, and Anacapa Islands. On 22 November it flew to Santa Rosa Island and remained there through the end of the year.

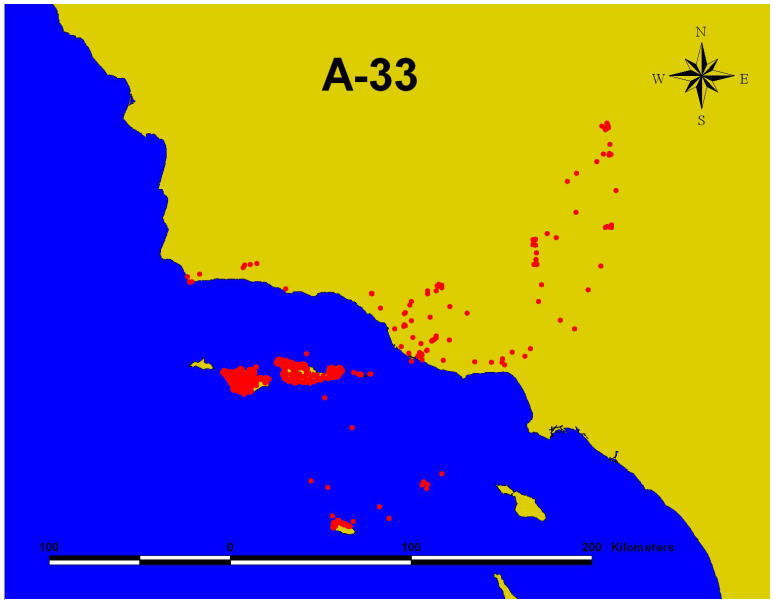

Figure 8. Movements of Bald Eagle A-33 in 2007.

A-34 Movements

Eagle A-34 spent 1 January to 21 February on Santa Rosa Island. On 21 February it flew to Santa Cruz Island and then on to Anacapa Island. It spent most of the period between 21 February and 9 August on Anacapa, visiting Santa Cruz Island on 9-12 March and 13-19 May. On 9 August it flew to Santa Cruz Island and then moved to Santa Rosa Island on 17 August, where it spent the remainder of the year (Fig. 9).

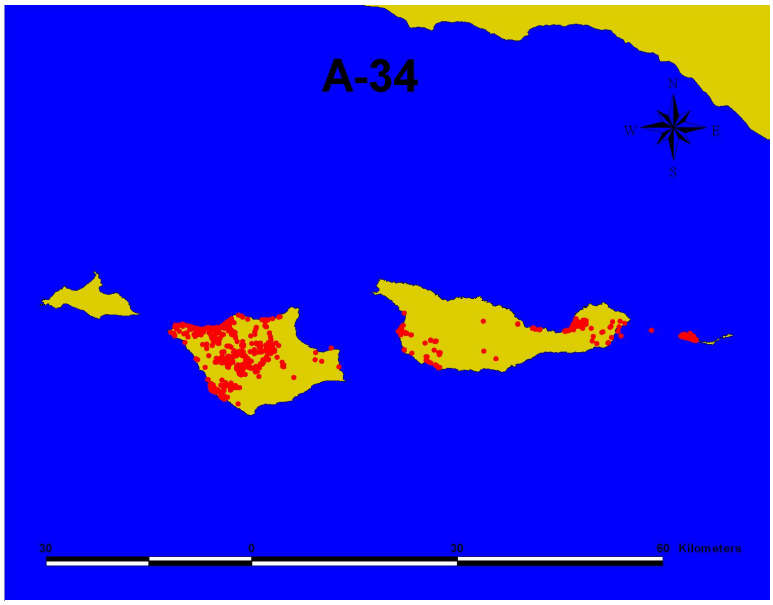

Figure 9. Movements of Bald Eagle A-34 on the California Channel Islands in 2007.

A-35 Movements

Eagle A-35 spent 1 January through 11 April on Santa Rosa Island, except for two trips to Santa Cruz Island and one trip to San Miguel Island, each lasting from 1-5 days (Fig. 10). It spent 11 April to 3 May on Santa Cruz Island and then moved on to Anacapa Island until 15 August. It spent 15 August to 7 October on Santa Cruz Island, except for a return to Anacapa Island from 4-6 September. Except for a 2-day return to Santa Cruz Island at the beginning of December, it spent 7 October through the end of the year on Santa Rosa Island.

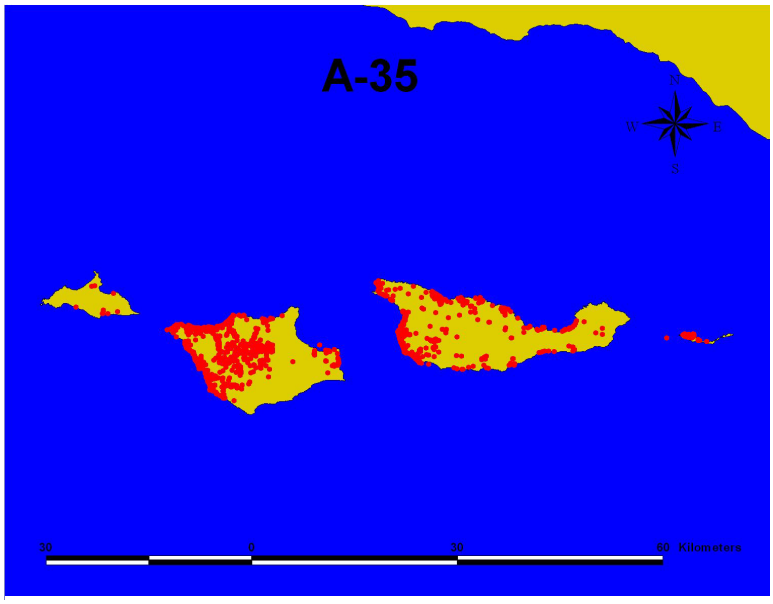

Figure 10. Movements of Bald Eagle A-35 on the California Channel Islands in 2007.

A-36 Movements

Eagle A-36 spent 1 January through 11 February on Santa Rosa Island. It flew to Santa Cruz Island on 11 February, and then to Anacapa Island on 12 February (Fig. 11). During March-May it was found primarily on Anacapa Island, but returned to Santa Cruz five times, each trip lasting 2-8 days. It remained on Anacapa Island from 19 May through 25 August before returning to Santa Cruz again. It flew to Santa Rosa

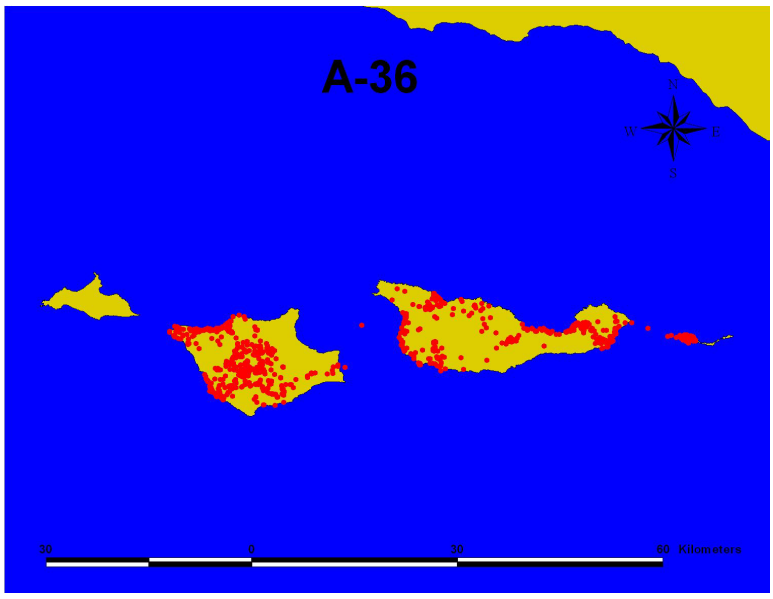

Figure 11. Movements of Bald Eagle A-36 on the California Channel Islands in 2007.

Island on 18 September, and except for a 2-day return trip to Santa Cruz Island in early December, it remained on the island through the end of the year.

A-39 Movements

Eagle A-39 spent the entire year in Washington State or British Columbia (Fig. 12). Its GPS signal disappeared in late 2006, most likely because too little sun was hitting the solar panel. We began getting data again on 11 January, at which time it was in British Columbia. It moved to Washington on 20 February and remained there until 30 July. It returned to British Columbia on 30 July and remained there until its transmitter stopped again around 2 November.

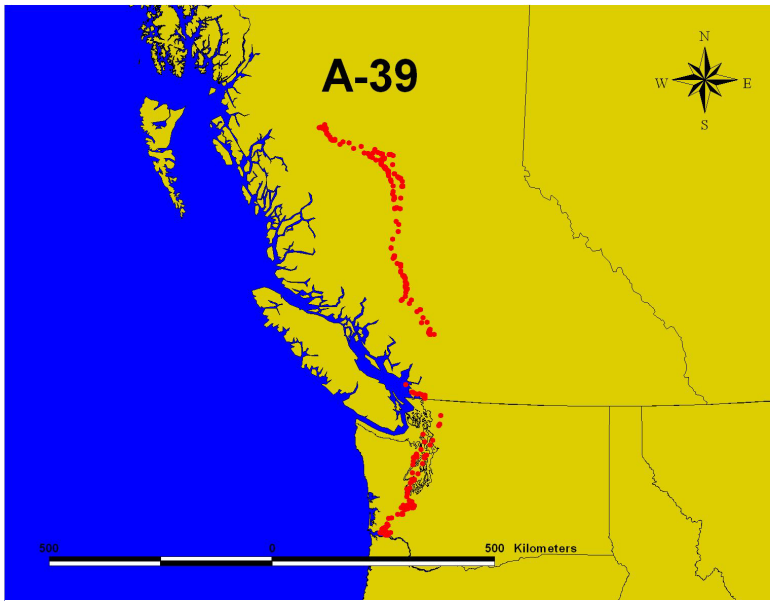

Figure 12. Movements of Bald Eagle A-39 in British Columbia and Washington in 2007.

A-40 Movements

Eagle A-40 started the year on Santa Cruz Island, but made visits to Santa Rosa Island on 12-15 January and to Anacapa Island on 23 January - 1 February. On 7 February it returned to Anacapa again, making one-day trips to Santa Cruz Island on 20-21 February and 9-10 March. Its signal stopped moving on West Anacapa around 16 March (Fig. 13). Because we are not allowed on that island during most of the year, we were unable to retrieve the transmitter. The bird's current status is unknown.

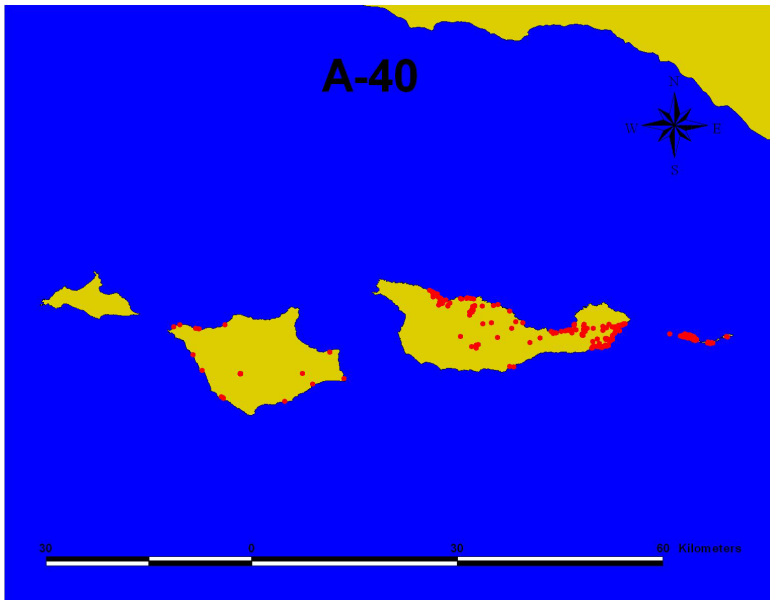

Figure 13. Movements of Bald Eagle A-40 on the California Channel Islands in 2007.

A-43 Movements

Eagle A-43 remained on the northern Channel Islands in 2007, but moved among them often (Fig. 14). It started the year on Santa Rosa Island, flew to Santa Cruz Island on 12 January, and to Anacapa Island on 13 January. It flew back and forth between Anacapa and Santa Cruz Islands multiple times between 16 January and 12 June, with three visits to Santa Rosa Island on 17-19 February, 11-18 March, and 2-10 June. It spent most of the period from 12 June through 25 July on Anacapa Island, except for two days on Santa Cruz in mid-July. We did not get data from 26 July through 4 August, but it was on Santa Cruz Island from 5-7 August and then flew to Santa Rosa Island on 7 August and stayed until 20 December. It ended the year on Santa Cruz Island.

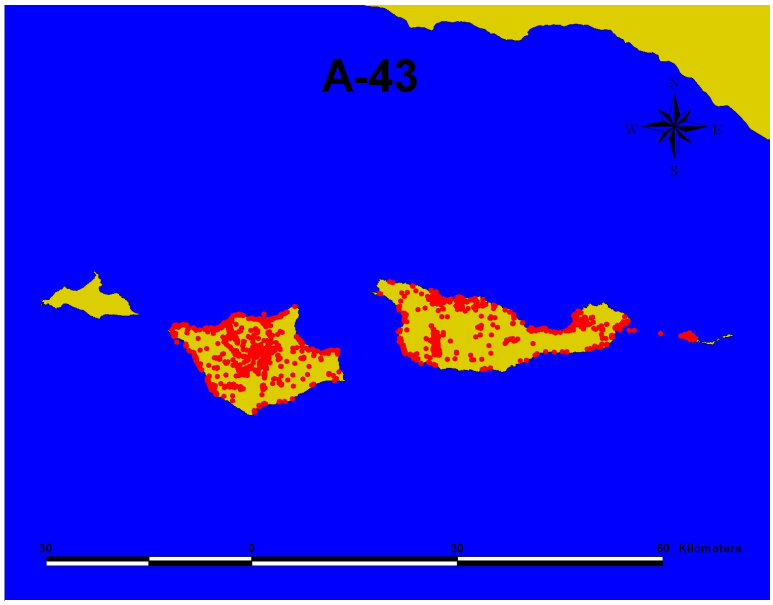

Figure 14. Movements of Bald Eagle A-43 on the California Channel Islands in 2007.

A-45 Movements

Eagle A-45 was on Santa Rosa Island at the beginning of the year (Fig. 15). We received no data from 9 January through 8 July, probably because the battery was not being adequately charged by the solar panel. In early July it was on Anacapa Island. It flew to Santa Cruz Island on 29 July, returned to Anacapa Island on 1 August, flew back to Santa Cruz Island on 4 August, and then

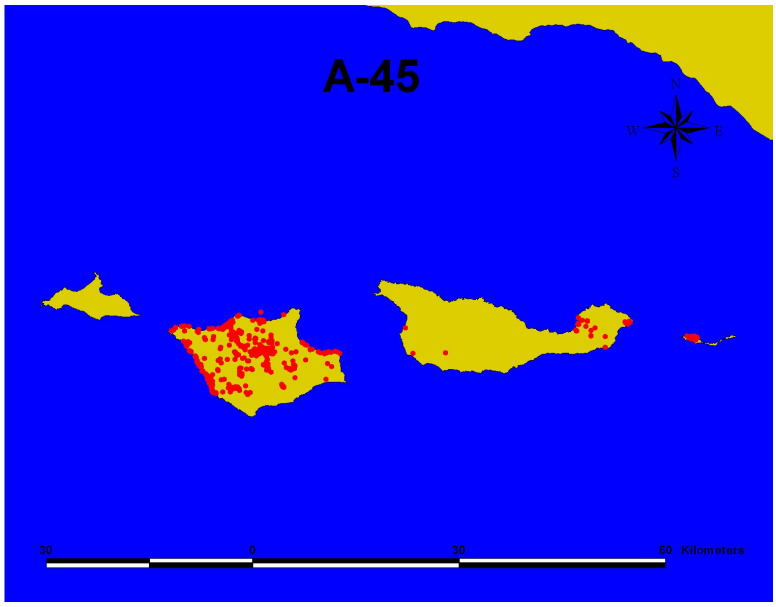

Figure 15. Movements of Bald Eagle A-45 on the California Channel Islands in 2007.

moved to Santa Rosa Island on 6 August. It remained on Santa Rosa Island until it dropped its transmitter at the end of August.

A-46 Movements

Eagle A-46 spent most of the year in Washington and northern Oregon (Fig. 16). On 5 May it crossed into northern California, circled down to central California and then back to northeastern California via western Nevada. On 8 June it crossed back into Oregon and spent the rest of the year in Oregon and Washington.

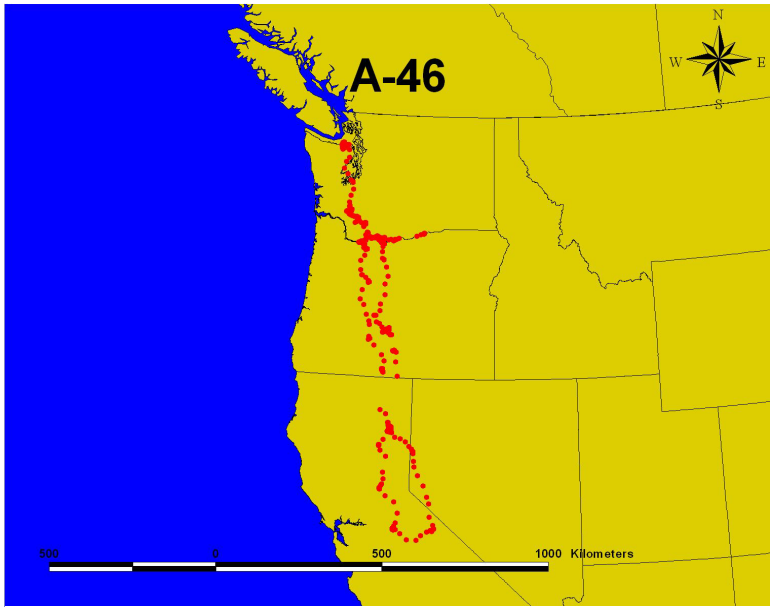

Figure 16. Movements of Bald Eagle A-46 on the mainland in 2007.

A-48 Movements

Eagle A-48 began the year on Santa Rosa and stayed there until 24 February, except for two trips to San Miguel Island, each lasting less than a day (Fig. 17). On 24 February it moved to Santa Cruz Island and then flew to Anacapa Island the next day. Except for two 1-2 day trips to Santa Cruz Island, it remained on Anacapa Island until 25 August. It then moved to Santa Cruz Island for two days before returning to Santa Rosa Island for the rest of the year.

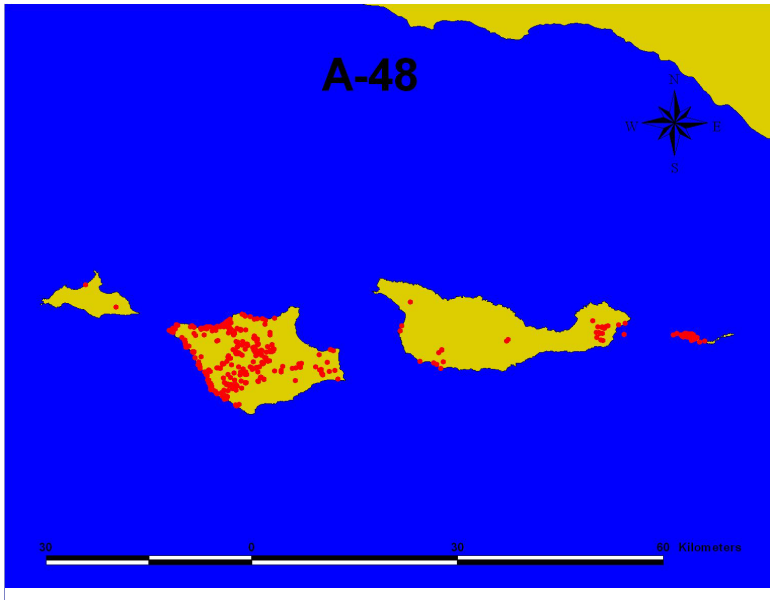

Figure 17. Movements of Bald Eagle A-48 on the California Channel Islands in 2007.

A-49 Movements

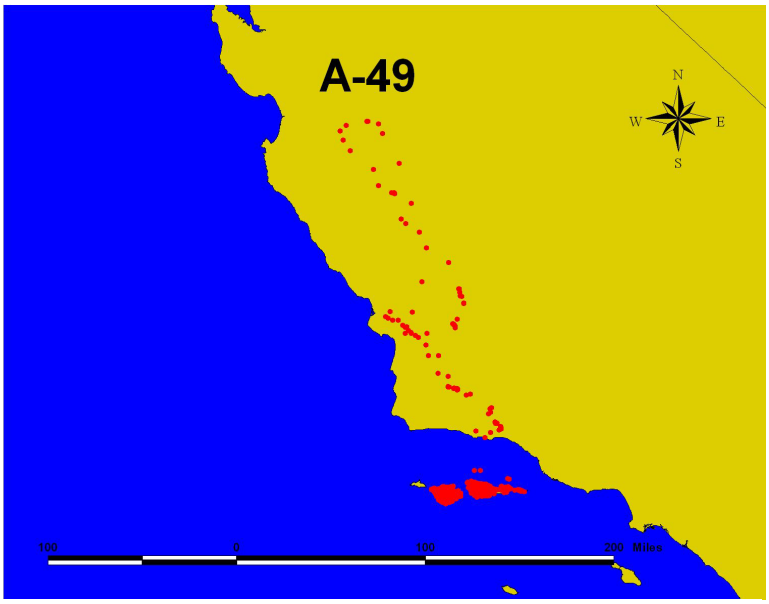

Figure 18. Movements of Bald Eagle A-49 in 2007.

Eagle A-49, the first naturally hatched eaglet on the Channel Islands since bald eagle restoration activities began in 1980, moved between the islands and to the mainland in 2007 (Fig. 18). It spent 1 January through 11 February on Santa Rosa Island before moving to Santa Cruz Island for 3 days. On 14 February it made its first of many visits to Anacapa Island, returning to Santa Cruz on 19 February. Between 21 February and 1 March it flew to Anacapa Island three more times, staying for a few hours to a few days. It returned to Santa Rosa Island on 3 March and alternated week-long stays on Santa Rosa and Santa Cruz Islands through 26 March. On 29 March it flew from Santa Cruz Island to the mainland, moving as far north as the Monterey Bay area. It returned to Santa Cruz Island on 11 April and remained there until 7 May. After a week-long stay on Santa Rosa Island, it returned to Santa Cruz and then flew to Anacapa Island on 23 May. It spent the majority of its time on Anacapa Island through 13 August, with the exception of three trips to Santa Cruz Island that lasted 1-5 days, and a 4-day visit to Santa Rosa Island. After staying on Santa Cruz Island from 13-18 August, it flew to Santa Rosa Island, where it remained through the end of the year, except for a trip to Santa Cruz Island on 16-21 December.

A-51 Movements

Eagle A-51 spent most of the year on either Santa Rosa or Anacapa Islands. Between 1 January and 10 April it was on Santa Rosa, except for three 2-4 day visits to Santa Cruz Island in February, March, and April. On 10 April it left Santa Rosa Island, spent a day on Santa Cruz Island, and then flew to Anacapa Island, where it remained until 13 August, except for a trip to Santa Cruz Island on 11-15 May. It left Anacapa on 13 August, spent a week on Santa Cruz, and then returned to Santa Rosa Island, where it remained for the rest of the year (Fig. 19).

A-52 Movements

Eagle A-52 moved between islands frequently in 2007. It spent 1-11 and 15-23 January on Santa Rosa Island and 11-15 and 23-31 January on Santa Cruz Island. It made a trip to Anacapa Island on 31 January and spent most of its time there through 3 September. However, it did make seven visits to Santa Cruz Island during that time, spending 2-13 days on the island each trip. On 3 September it flew to Santa Cruz Island and spent three days there before flying to Santa Rosa Island. Except for a one-week visit to Santa Cruz Island in early December, the bird remained on Santa Rosa through the end of the year (Fig. 20).

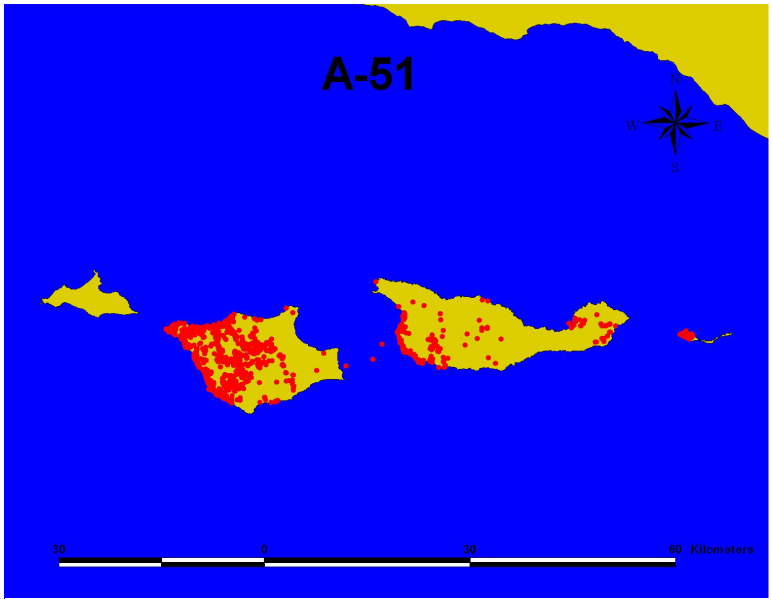

Figure 19. Movements of Bald Eagle A-51 on the California Channel Islands in 2007.

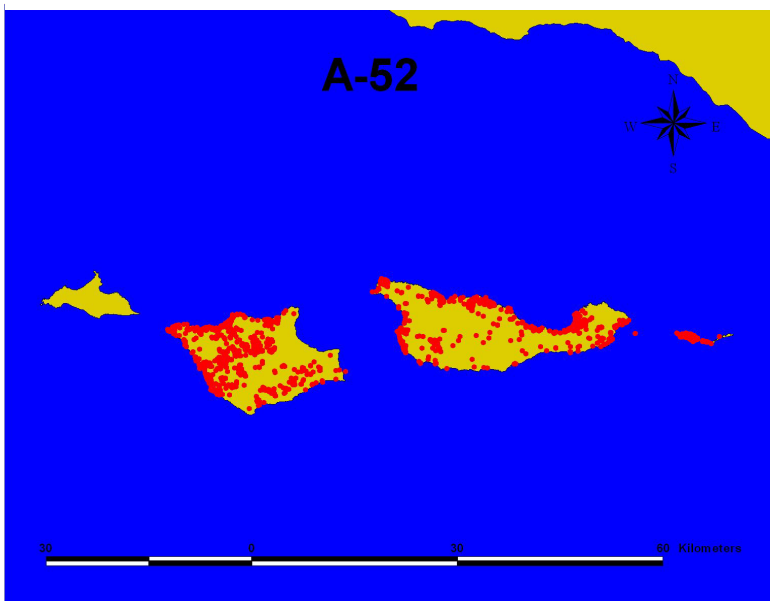

Figure 20. Movements of Bald Eagle A-52 on the California Channel Islands in 2007.

A-55 Movements

Eagle A-55 started the year on Santa Cruz Island, but flew to Santa Rosa Island on 15 January (Fig. 21). Except for a 3-day visit to Santa Cruz Island from 13-16 February, it remained on Santa Rosa through 16 March. It moved back to Santa Cruz Island and remained there through 23 May, except for a trip to Santa Rosa from 13-18 April. On 23 May it flew to Anacapa Island and stayed until 17 July. It then spent 17 July - 18 August on Santa Cruz Island, 18 August - 6 September on Santa Rosa Island, and 6-22 September on San Miguel Island. It then returned to Santa Rosa Island, where it

remained through the rest of the year, except for two short trips to Santa Cruz on 28-29 September and 21-25 December.

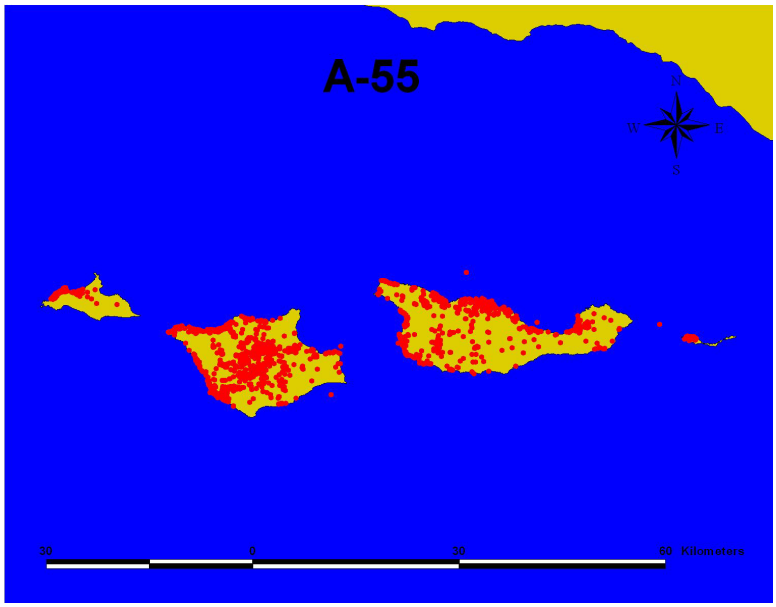

Figure 21. Movements of Bald Eagle A-55 on the California Channel Islands in 2007.

A-58 Movements

Eagle A-58 spent 1 January through 1 February on Santa Rosa Island. On 2 February it flew to Santa Cruz Island and then to Anacapa Island, where it remained until 9 March. During the period from 9 March to 1 September it flew back and forth between Anacapa Island and Santa Cruz Island 22 times, with short trips to Santa Rosa Island on 23-24 May and 14-22 August. The trips to Santa Cruz Island lasted from a few hours to three days. On 1 September it flew to Santa Cruz Island and then to Santa Rosa Island on 3 September. Except for a trip to Santa Cruz Island from 20-22 November, it spent the remainder of the year on Santa Rosa Island (Fig. 22).

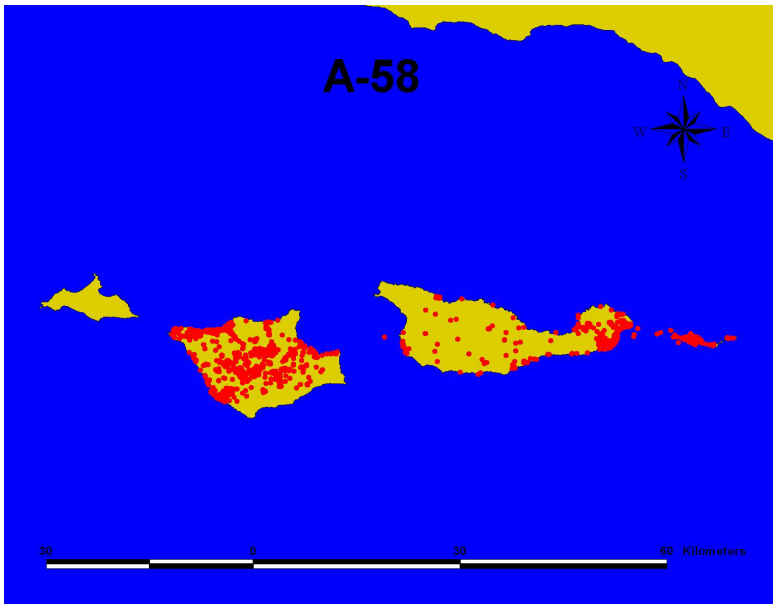

Figure 22. Movements of Bald Eagle A-58 on the California Channel Islands in 2007.

A-59 Movements

Eagle A-59 spent 1 January through 3 March on Santa Rosa Island. It moved to Santa Cruz Island on 25 March, and then on to Anacapa Island on 28 March, where is remained

through 14 August. It spent 15 August through 6 September on Santa Cruz Island and then moved to San Miguel Island, via Santa Rosa Island, on 6 September. It stayed on San Miguel through 28 September before returning to Santa Rosa Island, where it remained through the end of the year (Fig. 23).

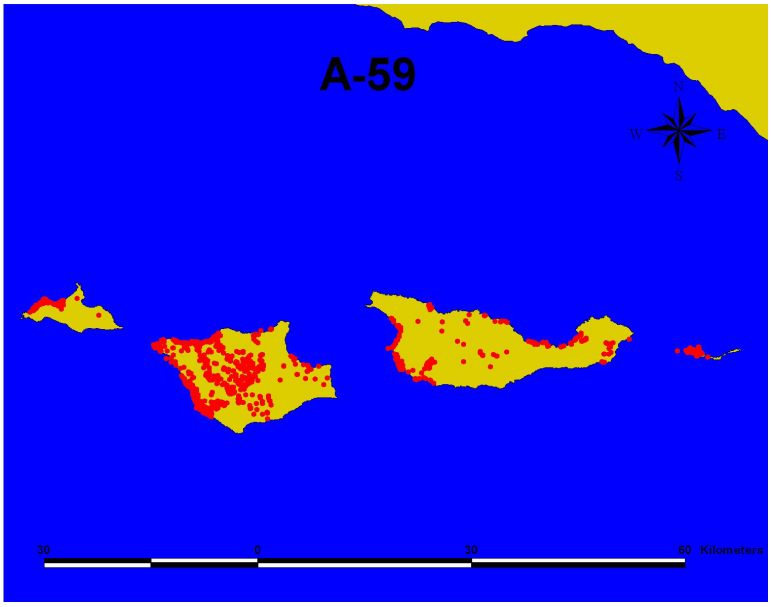

Figure 23. Movements of Bald Eagle A-59 on the California Channel Islands in 2007.

A-60 Movements

Bald Eagle A-60, an eagle produced by the Malva Real pair in 2006, began the year on Santa Rosa Island and remained there until 30 March, except for short visits to Santa Cruz Island on 11-17 February and 2-24 March. On 30 March it flew to Santa Cruz Island and remained there until 14 June, except for one visit to Santa Rosa Island on 23-29 May. On June 14 it flew to Santa Rosa Island and then to San Miguel Island, where it remained for 3 days. On 17 June it returned to Santa Rosa Island, flew on to Santa Cruz Island on 20 June, and then on to Anacapa Island on 21 June. It remained on Anacapa Island until 25 August, spent two days on Santa Cruz Island and then returned to Santa Rosa Island for the rest of the year, except for a 3-day visit to Santa Cruz Island on 30 November - 2 December (Fig. 24).

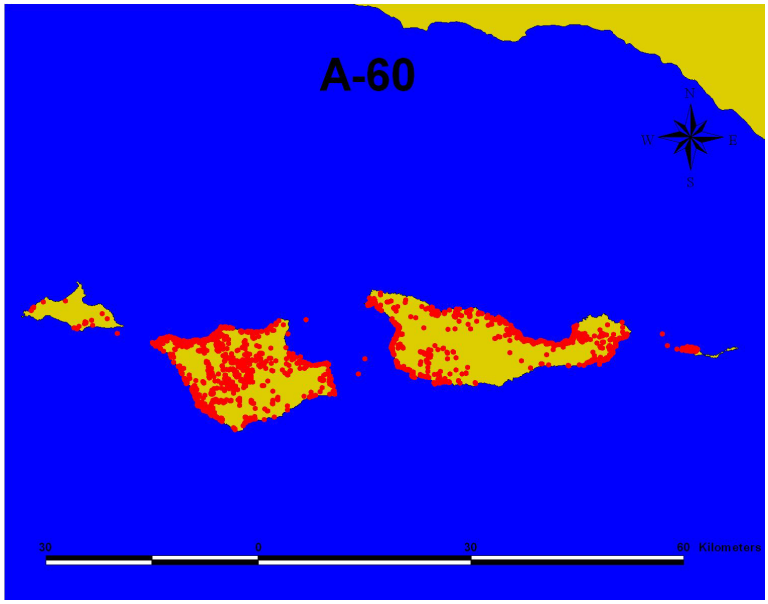

Figure 24. Movements of Bald Eagle A-60 on the California Channel Islands in 2007.

A-62 Movements

We only had data for Eagle A-62 from 3-25 May, at which time it was on southeastern Santa Rosa Island. It was found dead in the area on 8 October (Fig. 25). There was no indication of cause of death, but the carcass was sent to the FWS for analyses for lead contamination.

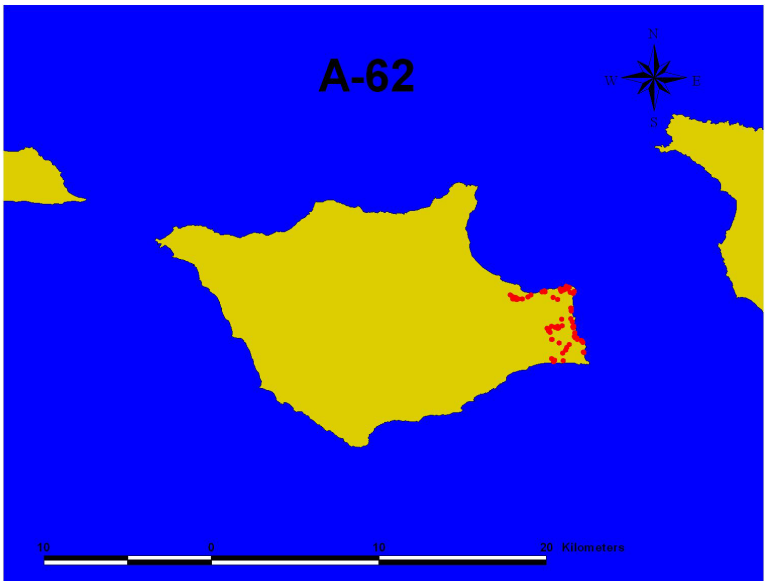

Figure 25. Movements of Bald Eagle A-62 on the California Channel Islands in 2007.

Survival

We calculated survival of all eagles released or hatched on the northern Channel Islands in two ways. Using the Kaplan-Meier Estimate of Survival, first year survival is 69.9% and survival to five years of age (the oldest birds from our releases) is 60.2% (Fig. 26). This analysis takes into account birds of unknown status by censoring them from the data after they were last known to be alive. Alternately, if we assume that all birds of unknown status are dead, then current survival for the 2002 cohort is 41.7% (5 of 12 birds), 40% (4 of 10) for the 2003 cohort, 58.3% (7 of 12) for the 2004 cohort, 58.3% (7 of 12) for the 2005 cohort, and 58.8% (10 of 17) for the 2006 cohort. The only bird produced in 2007 did not survive.

Overall Island Use

The GPS units on the birds continue to be the most effective way to monitor the free-flying eagles released or hatched on the northern Channel Islands. During 2007, we received 71,924 GPS locations from the 22 eagles carrying functioning transmitters during the year. The time eagles spent on each of the northern Channel Islands varied by time of the year. They spent more time on Santa Rosa Island during January and February, and more time on Anacapa Island from April through July. March and August seemed to be transition periods during which the birds were moving to/from Anacapa Island (Fig. 26). Compared to island use in 2006, there was less use of San Miguel Island and Santa Cruz Islands and more use of Santa Rosa Island in

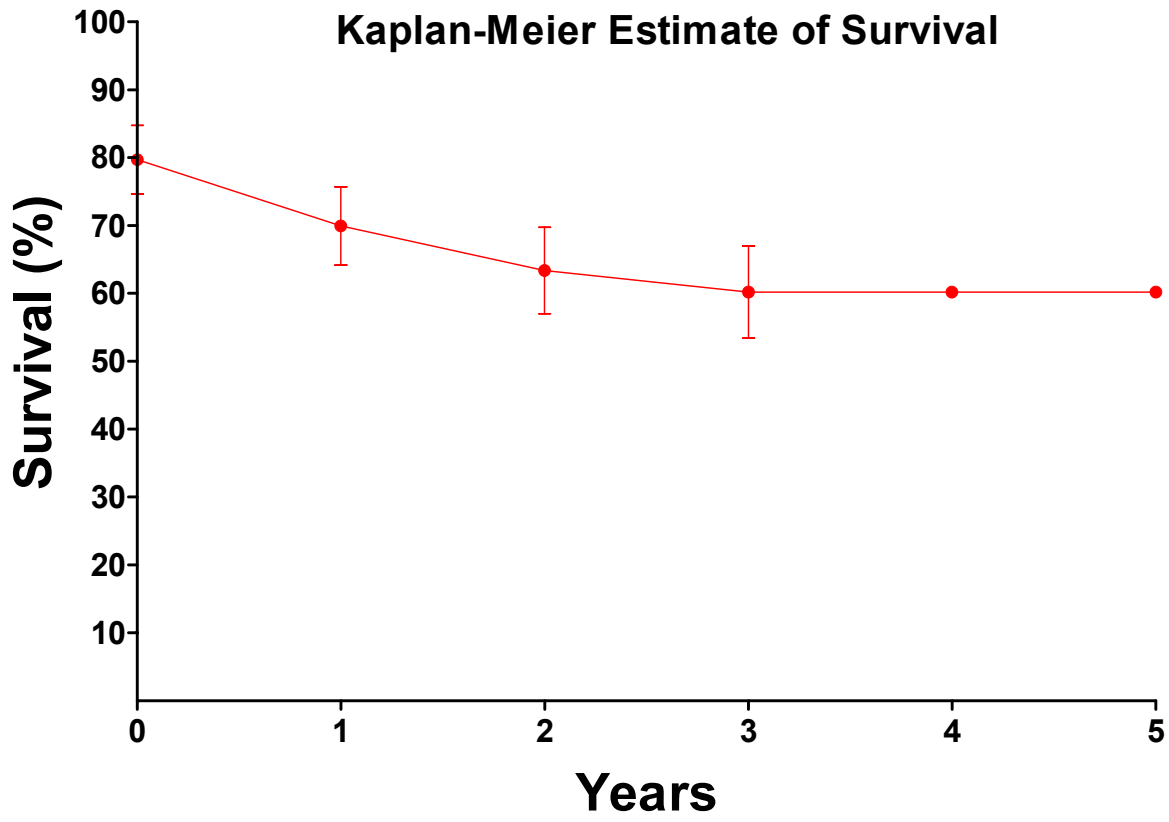

Figure 26. Kaplan-Meier Estimate of Survival for bald eagles released or hatched on the northern Channel Islands, California from 2002 – 2007. The vertical bars are the standard error of the estimate.

2007. Overall use of Anacapa Island was similar to 2006, except the peak of use shifted to later in the year (Fig. 27).

Trapping

During 2007, we spent 54 days attempting to trap bald eagles on the northern Channel Islands. We set a bownet and/or a net launcher on Santa Cruz Island on 29 days between 10 January and 18 September. On Santa Rosa Island we set traps for 19 days between 3 October and 3 December. In addition, we attempted to trap eagles using a floating fish noose on 6 days between 13 July and 2 September. Rough ocean conditions made it difficult to properly set the fish noose and limited the days that it was feasible to attempt this technique.

We were only able to trap one bird, A-17, a female released in 2003. She was trapped on Santa Rosa Island using a bownet on 8 October. She was equipped with a new GPS unit, which should allow us to find her nest if she breeds in 2007.

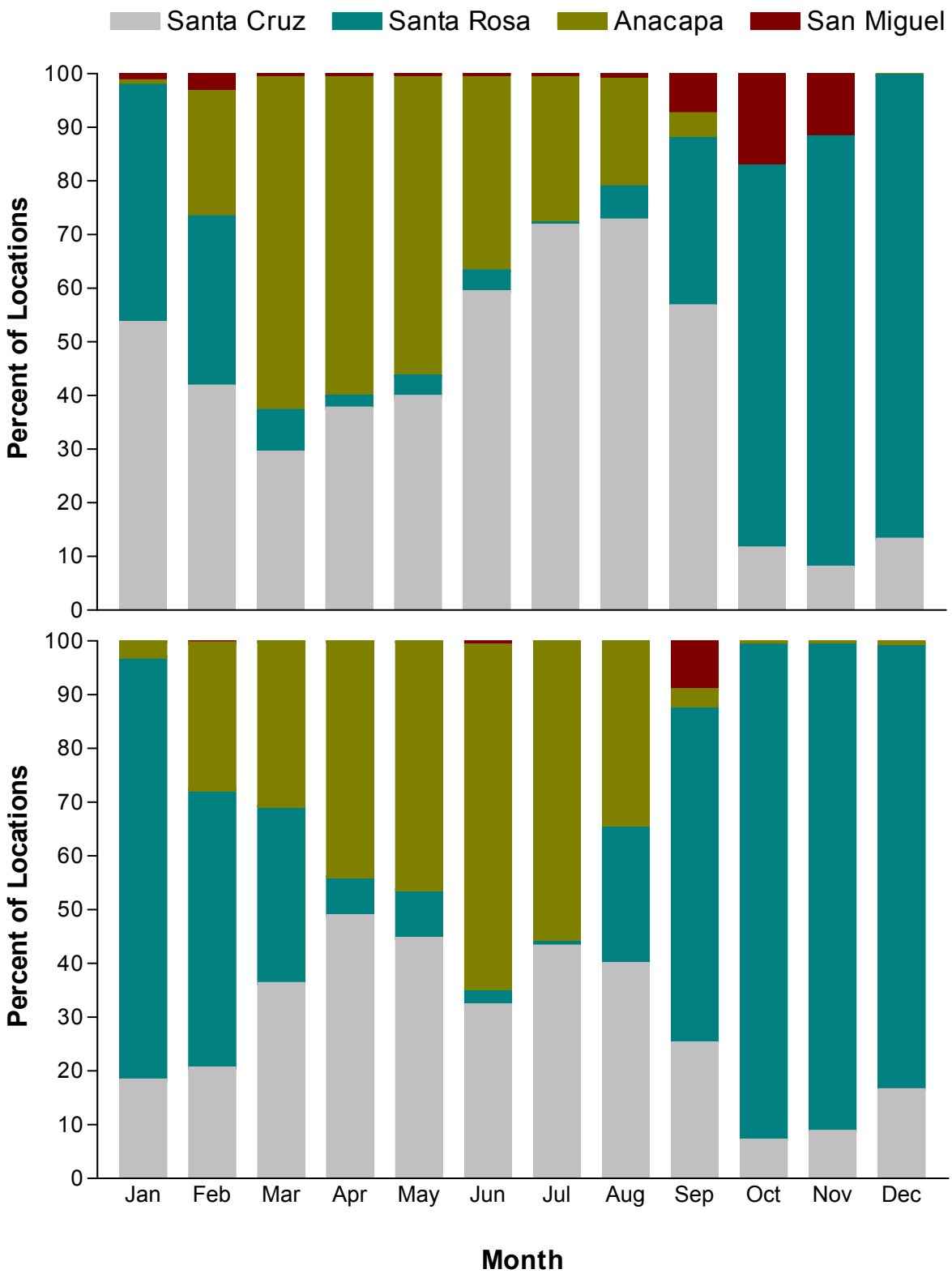

Figure 27. Use of the northern Channel Islands, California by bald eagles during 2006 (top) and 2007 (bottom). The bars represent the mean percent of time spent on each island as determined by GPS data.

Tissue Sampling

We collected blood and feather samples from the eaglet banded at the Pelican Harbor nest and from the adult recaptured on Santa Rosa Island.

DISCUSSION

For the second year we had successful bald eagle reproduction on Santa Cruz Island. The Pelican Harbor pair have been on the northern Channel Islands for at least 2-3 years. Their ability to successfully hatch eggs after feeding on local resources for this period of time is encouraging. Continued monitoring will be necessary to determine if their ability to successfully hatch their eggs becomes compromised.

Additional pairs appear to have formed on Santa Cruz and Santa Rosa Islands and they should be old enough to begin breeding in 2008. On Santa Cruz Island we have been monitoring a pair in the Cueva Valdez area on the northern shore. The 2002 male (A-02) and the 2003 female (A-16) were seen together repeatedly, but we saw no nesting activity in 2007. On Santa Rosa Island we have seen a young pair composed of a 2002 male (A-08) and a 2004 female (A-22) on the north shore. Both of these pairs should be old enough to begin breeding in 2008.

We had only two known mortalities in 2007 and survival remains high among the older birds. Unfortunately, the one chick produced in 2007 was killed on the mainland, so there is no 2007 cohort of eagles on the islands. We expect the number of breeding pairs to increase steadily over the next few years as more birds mature, which increases the likelihood of regular input of young eagles into the population.

RECOMMENDATIONS

We expect additional pairs of eagles to form and begin reproducing in 2008 and suggest that continued efforts be made to search for nesting eagles on the four northern Channel Islands. Personnel should spend February through May surveying Santa Cruz and Santa Rosa Islands. A helicopter survey should be made of all four northern Channel Islands in mid-March to search for nests that may not be detected from boat or foot surveys.

We recommend making a more targeted trapping effort in 2008. There is a large amount of food available on the northern Channel Islands for bald eagles, making it difficult to draw

eagles to a trapping site. We believe it will be more efficient to attempt to recapture known territorial adults using a floating fish noose so that we can get information on their contaminant load, which can then be correlated with their nesting success or failure. Target trapping also should reduce significantly the person-hours necessary to trap each individual.

Attempts should also be made to trap subadults on Santa Rosa Island during the fall. During trapping efforts on Santa Rosa Island in 2007, GPS data and visual observations indicated that eagles were returning to certain carcasses repeatedly, even when there was little left but bones and skin. To take advantage of this behavior during the fall of 2008, we recommend setting traps (net launcher or bow net) at carcasses that we know eagles are already visiting, instead of setting out our own carcasses.

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