

**Bald Eagle Restoration on the California Channel Islands**  
**January — December 2011**  
**10<sup>th</sup> Annual Report**



Restoring Natural Resources  
harmed by DDTs and PCBs

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**10<sup>th</sup> 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, there have been a total of 70 successful hatchings 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 2011, there were seven known nesting attempts on Santa Catalina Island, three on Santa Cruz Island, one on Anacapa Island, and two on Santa Rosa Island. A total of 14 chicks hatched (nine on Catalina, three on Santa Cruz, one on Santa Rosa, one on Anacapa) in ten nests. On Santa Catalina Island, single chicks were produced at the Middle Ranch and Two Harbors nests. Twins were produced at the Rattlesnake and Seal Rocks nests, and the West End nest had triplets. The Twin Rocks nest failed after about 11.5 weeks of incubation. The single chick at the Middle Ranch nest died of unknown causes after about a week. The eight remaining Santa Catalina chicks successfully fledged; three are known to be alive, and one is known dead as of 31 December 2011.

On Santa Cruz Island, the Sauces, Pelican Harbor, and Cueva Valdez pairs each hatched and fledged a single chick. The Pelican Harbor pair built a new nest near Twin Harbors, about

1.5 km NNW of their previous location. The Cueva Valdez pair built a new nest in Hazards Canyon, about 4 km W of the 2010 nest. The Sauces pair used the same nest as in previous seasons. All three nests fledged one eaglet, and all three were alive as of 31 December 2011.

On Santa Rosa Island, the Trap Canyon and Lopez Canyon pairs used the same nests as in 2010. Both pairs were observed incubating eggs in late February. However, eagle K-36, the Lopez Canyon male from 2010, was replaced by A-39, a bird released in 2005 on Santa Cruz Island. When we returned to Santa Rosa Island the first week of April, we found that both nests had failed. No birds were on the Trap Canyon nest, and the Lopez Canyon nest had fallen out of the tree. One dead chick approximately 1 week old was found in the nest remains.

The first known nest on Anacapa Island since 1949 was discovered in late March. We returned to check nesting status in early June and found a single chick about 8 weeks old. We banded the chick and it fledged by early July. The transmitter malfunctioned and its status was unknown as of the end of the year.

As of the end of December 2011, there are approximately 56 bald eagles on the California Channel Islands. There are 36 known eagles on the northern Channel Islands, including four originally released on Santa Catalina Island. Seventeen known eagles are on Santa Catalina Island, including one bird originally released on Santa Cruz Island. These are minimum numbers, as it is likely that there are others that were not documented in 2011. Three additional birds were seen on San Clemente Island, two from Catalina and one from Santa Cruz. Seven other eagles (six from Catalina, one from Santa Cruz) are being tracked on the mainland via their GPS transmitters (one bird) or were sighted on the mainland in 2011.

Bald eagles have continued to visit Anacapa Island more frequently in the spring and summer and Santa Rosa Island in the late summer through early winter. These time periods correspond with the seabird breeding season on Anacapa Island and the guided hunts of mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) on Santa Rosa Island. With the removal of deer and elk on Santa Rosa in late 2011, use of this island by eagles may change in coming years.

The successful hatching of bald eagles on four of the Channel Islands in 2011, including the newly added Oak Canyon pair on Anacapa, continues the recent success of the bald eagle restoration program. The eagles are moving freely among the islands (they are known to have

been on all but San Nicolas and Santa Barbara Islands in 2011), and there is the potential for a new breeding pair on San Clemente Island in 2012. There could be 15 or more active nests on the Channel Islands in 2012, including the possibility of nesting attempts by the first two naturally produced chicks from the 2006 season (A-49 and A-60), as they will be six years old next season.

## **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, the U.S. Navy, and the Ventura County Office of Education. We also would like to thank this year's field crew: Steffani Jijon, Don Jones, Helen Johnson, Kim Smith., Maria Dominguez, and Ania Wrona. Cedrick Villasenor located the nest on West Anacapa Island. Funding for the project was made available by the Montrose Settlements Restoration Program.

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# INTRODUCTION

Since 2006, bald eagles (*Haliaeetus leucocephalus*) have successfully bred on four of the eight California Channel Islands for the first time since their extirpation nearly 50 years earlier. Although human persecution likely played a role in the eagles' decline, the introduction of the organochlorine pesticide DDT into the Southern California Bight (Fig. 1) is what is believed to have led to the disappearance of bald eagles from the Channel Islands. 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).

The Institute for Wildlife Studies (IWS), in cooperation with the United States Fish and Wildlife Service (FWS), California Department of Fish and Game, and the Santa Catalina Island Conservancy, initiated reintroduction efforts on Santa Catalina Island, California (Catalina; Fig. 1) with the release of 33 young eagles from hacking towers between 1980 and 1986. Breeding



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

attempts in 1987 and 1988 failed, most likely due to residual DDE (Garcelon et al. 1989). 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).

From 1989 through 2008, the reintroduced population on Catalina was maintained primarily by fostering chicks at active nest sites (66 chicks) and through hacking of 21 additional birds. 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). As a result of increased hatching success during artificial incubation (47% hatching success 2005-2006 compared to 17.3% 1989-2004) and natural breeding on Santa Cruz Island (Santa Cruz) in 2006 (see below), we began leaving eggs in some Catalina nests in 2007 and discontinued egg removals altogether in 2009. To date, adult bald eagles on Catalina have successfully reared 92 of 104 chicks that were either fostered into nests, hatched from two of three healthy eggs placed into nests, or naturally hatched from eggs left in the nest since 2007 (36 chicks). All the breeding pairs on Catalina have now hatched at least two chicks each (range 2-8).

Bald eagle restoration expanded to the northern Channel Islands in 2002 with the release of 61 eagles from hacking towers on Santa Cruz over a 5-year period. In 2006, two separate pairs on Santa Cruz successfully hatched and fledged one chick (Sharpe 2007), the first known bald eagle chicks to hatch naturally in the wild on the California Channel Islands since 1950 (Miller 1950). There are now four breeding pairs on Santa Cruz, two on Santa Rosa Island (Santa Rosa), and one on Anacapa Island (Anacapa).

In 2011, we monitored all known bald eagle nests on the Channel Islands and searched for additional breeding eagles. In this report we summarize the results of the 2011 bald eagle season.

## **STUDY AREA**

In 2011, we monitored bald eagles on Catalina, Santa Cruz, Santa Rosa, and Anacapa. Catalina is located 34 km south of Long Beach, California. The island is 34 km long, 0.8 to 13.0 km wide, and covers 194 km<sup>2</sup> (Fig. 2). Elevations range from sea level to 648 m. Mean annual minimum and maximum temperatures in Avalon are approximately 12 and 20° C, respectively, and yearly precipitation averages 30.2 cm (Western Regional Climate Center Website; <http://www.wrcc.dri.edu>).

The northern Channel Islands, which are composed of San Miguel Island (San Miguel), Santa Rosa, Santa Cruz, and Anacapa 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. 3). The island is approximately 249 km<sup>2</sup> with a maximum elevation of 753 m. Santa Cruz is the most rugged and topographically diverse of the northern Channel Islands and has a

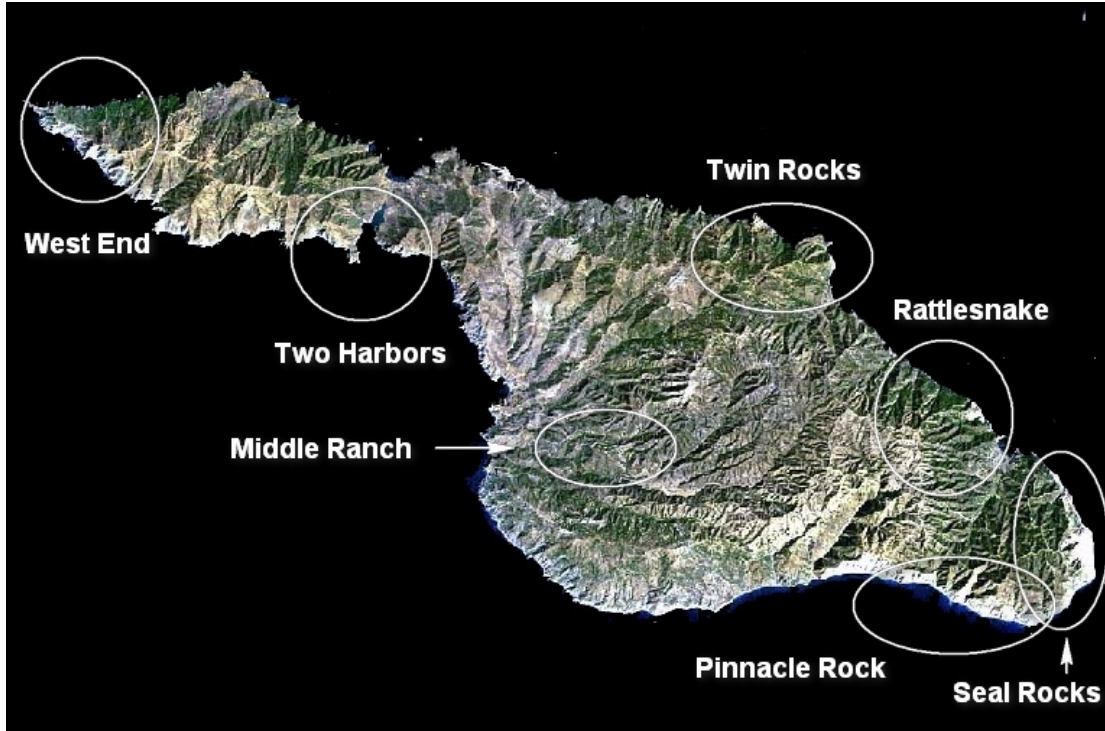


Figure 2. Santa Catalina Island, CA and the active bald eagle breeding territories in 2011.

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 the western 76% of the island.

Santa Rosa is the second largest of the Channel Islands and is owned by the NPS (Fig. 3). The island encompasses approximately 214 km<sup>2</sup> and is less topographically diverse than Santa Cruz. A central mountain range reaches an elevation of 484 m and the coastal habitat varies from



Figure 3. Northern Channel Islands with active bald eagle breeding territories in 2011.

gentle slopes and sandy beaches to sheer cliffs (Channel Islands National Park website, <http://www.nps.gov/chis>).

Anacapa, which is comprised of three islets (East, Middle, and West Anacapa) is owned by the NPS and is the smallest of the Channel Islands (Fig. 3). The island encompasses approximately 2.8 km<sup>2</sup> and is about 8 km from end to end (Channel Islands National Park website, <http://www.nps.gov/chis>).

## **METHODS**

### **Permitting**

IWS has the required Memorandum of Understanding with the California Department of Fish and Game to conduct bald eagle research on the California Channel Islands and a banding permit from the United States Geological Survey's Bird Banding Laboratory allowing us to band and radio-tag eagles.

### **Surveying and Nest Monitoring**

Observations of adult eagles began in January at each of the nest sites. We also conducted weekly ground surveys of Catalina and Santa Cruz to locate new nesting pairs. Because of logistical constraints, we only surveyed Santa Rosa about one week per month. For the northern Channel Islands, we mapped our survey routes using Arcview (ESRI, Redlands, CA) GIS software so that survey crews could more easily identify areas that needed to be searched. 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 four nests on Catalina (West End, Rattlesnake, Twin Rocks, and Two Harbors nests), the Sauces nest on Santa Cruz, and the Lopez and Trap Canyon nests on Santa Rosa, 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>). In addition, the Sauces nest was streamed on the Channel Islands Live! site ([http://chil.vcoe.org/eagle\\_cam.htm](http://chil.vcoe.org/eagle_cam.htm)).

We used radio-telemetry (Catalina) and GPS-PTT transmitters (Microwave Telemetry

Inc., Columbia, MD; northern Channel Islands only) to locate and monitor fledged eagles every 1-3 days during their first month of flight. We attempted to observe, or at least determine that the birds were moving, a minimum of once per week through December, or until they left the islands. For eagles banded on Catalina, we attached a VHF transmitter (Communications Specialists, Inc., Orange, CA) that transmitted a signal once per second, but also transmitted a unique identifier once per hour that could be received by remote telemetry towers on the western portion of Catalina and in Orange County. When a tower received a signal, the data were transmitted to Communications Specialists, where they were integrated into a web page that we could access to determine which birds were identified and which tower(s) received the signal. We were able to locate the birds for visual monitoring using a VHF telemetry receiver (R-1000; Communications Specialists, Inc., Orange, California). If the transmitter failed to move for 2-6 hours it switched to mortality mode (2-3 pulses/second) and indicated a mortality signal in its hourly transmission of the unique identifier. The GPS-PTT units record GPS locations of the bird up to 14 times per day and then upload the data to a satellite approximately every three days. The data can then be retrieved via computer from Argos, Inc. (Largo, Maryland). We checked for new data daily and any bird that had not moved more than 50 m in a day was located as soon as feasible to determine its status.

## **Marking and Sampling**

We entered each nest when the eagle chicks were approximately 8 weeks old to equip them with federal leg bands, wing markers (orange on Catalina, light blue on NCI), and a backpack-style GPS-PTT or VHF radio-transmitter (described above). We also collected a blood sample (~10 cc) for future contaminant analyses, made morphological measurements to determine sex (Bortolotti 1984, Garcelon et al. 1985), and collected three breast feathers and a dried blood sample for stable isotope analyses. Sex was confirmed later with a blood sample sent for DNA analyses (Avian Biotech International, Tallahassee, FL).

## **Monitoring of Previously Released Eagles**

We closely monitored the status of all GPS-tagged eagles fledged in previous years. On Catalina, as we went about our other activities, we used vehicle-based telemetry units 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 also kept records of sightings from observers on the islands and the mainland.

## RESULTS

### Surveying and Nest Monitoring

#### *Santa Catalina Island*

Nests were located in February and March in all seven previously active territories on Catalina (Twin Rocks, Pinnacle Rock, Seal Rocks, West End, Two Harbors, Rattlesnake, Middle Ranch; Fig. 2).

*Twin Rocks Territory.* The territory was used by the same pair that used it from 1998-2010 (Fig. 2). The male, K-33, was a bird that hatched from a Catalina egg in 1992 and the female, K-17, was a bird released at the Bulrush hacktower in 1984. The birds used their 2010 nest located on an inaccessible cliff face and were seen at the nest several times during January and February. We saw the first egg in the nest on 6 March and a second egg on 8 March. The eggs failed to hatch, but the birds continued to incubate until around 25 May (~11.5 weeks of incubation).

*West End Territory.* The West End pair used the same nest that has been used since 1991. The male, K-01, was produced by captive birds at the ACC and fostered into the Pinnacle Rock nest in 2000. The female was released at the Sweetwater hacktower in 1986. K-01 had disappeared around 14 September 2010 and another male, K-51 had been seen at the nest throughout the fall/early winter. K-01 reappeared on 13 January and resumed his role as the breeding male. We monitored the nest primarily via our live web cam and birds were seen at the nest throughout February. The first egg was laid on 23 February, a second on 26 February, and a third on 3 March. The eggs hatched on 3, 5, and 7 April, respectively.

We entered the nest on 30 May to equip the birds with leg bands, transmitters, and wingmarkers, and to obtain blood samples (Fig. 4, Table 1). We continued to monitor the birds



until they fledged between 30 June and 3 July. All the fledglings remained on the island until mid-August. On 30 August K-14 was found dead floating between Anacapa and Santa Cruz. K-12 was seen and photographed in Alberta, Canada on 3 October and is known to have survived through the end of the year. We had no further sightings of K-13 after 17 August.



**Figure 4. The West End triplets at the time of banding, Santa Catalina Island, CA, 2011.**

**Pinnacle Rock Territory.** The Pinnacle Rock pair used the same nest as in 2010. The female, K-56, was hatched from a Seal Rocks egg and fostered into the Seal Rocks nest in 2005. The male, K-65, was hatched at the Bulrush tower in 1986. We observed the first egg on 16 February and a second egg on 18 February. One egg disappeared around 24 February. The second egg failed to hatch and was last seen in the nest on 24 March.

Table 1. Biographical data for bald eagle chicks hatched at nests on Santa Catalina Island, CA, during 2011.

Federal Band	Sex	Wing Tag	Date Fledged	Territory	Status <sup>a</sup>	Comments
679-04101	F	K-18	6/23	Two Harbors	Alive	On Catalina 11/21
679-04102	F	K-07	~6/14	Seal Rocks	Unknown	
679-04103	M	K-08	~6/14	Seal Rocks	Unknown	
679-04104	F	K-15	~6/20	Rattlesnake	Alive	On Catalina 12/22
679-04105	M	K-19	~6/20	Rattlesnake	Unknown	
679-04106	F	K-12	7/2	West End	Alive	Pakowki Lake, Alberta, Canada 10/1
679-04107	M	K-13	6/30	West End	Unknown	
679-04108	M	K-14	7/2	West End	Dead	Found floating near Anacapa Is. 8/28

<sup>a</sup> As of 12/31/11

**Seal Rocks Territory.** The Seal Rocks pair used the same nest as in 2010. The female, K-34, is from the captive ACC eagles and was hatched 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 eagles were seen incubating two eggs on 15 February and the eggs hatched between 1700 hrs on 19 March and 1230 hours on 21 March. Assuming a 35-day incubation period for the last egg laid (1-4 days longer for 1<sup>st</sup> egg), we estimate that the second egg was laid on 14 February, because the younger chick looked recently hatched on 21 March.

We entered the nest on 16 May to equip the birds with leg bands, transmitters, and wingmarkers and to collect blood and feather samples for contaminants and stable isotope analyses (Fig. 5, Table 1). K-08 fledged around 6 June and K-07 fledged around 14 June. K-08 remained on the island until about 25 August, and K-07 was last confirmed on the island on 25 July.



**Figure 5. The Seal Rocks chicks at the time of banding, Santa Catalina Island, CA, 2011.**

*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. Activity was noted at the nest throughout February, and the female laid eggs on 17 and 21 February. One of the eggs disappeared around 20 March, but the remaining egg hatched late on 26 March or early on 27 March.

We entered the nest on 22 May to install a leg band, transmitter, and wingmarkers on the chick, and to obtain blood and feather samples (Fig.6, Table 1). The eaglet fledged on 23 June and continued to visit and be fed at the nest through mid-October. The bird was last located on the island on 21 November.



**Figure 6. The Two Harbors chick at time of banding, Santa Catalina Island, CA, 2011.**

**Rattlesnake Territory.** The Rattlesnake pair returned to the nest in Gallagher’s Canyon where they successfully bred in 2010. 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. The first egg was seen in the nest on 18 February and a second egg was seen on 23 February. One of the chicks hatched on 26 March and the second hatched on 29 March.

We entered the nest on 24 May to install a leg band, transmitter, and wingmarkers on each chick, and to obtain blood and feather samples (Fig. 7, Table 1). Both eaglets fledged sometime between 17 and 20 June. K-19 was last located on the island on 22 August, and K-15 remained on the island through the end of the year.

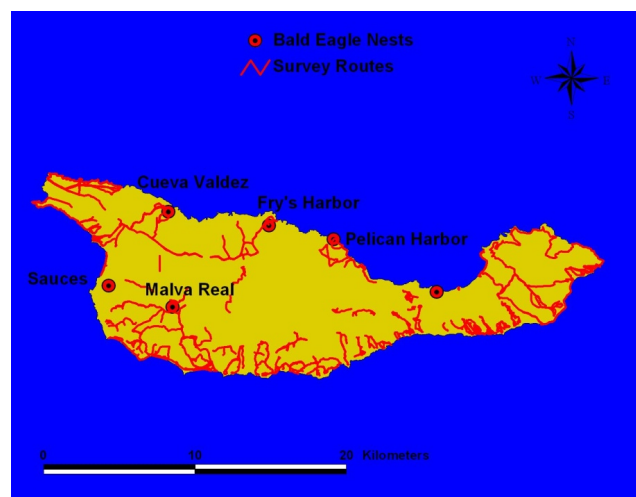


**Figure 7. The Rattlesnake chicks at the time of banding, Santa Catalina Island, CA, 2011.**

**Middle Ranch Territory.** The Middle Ranch pair used the same nest as in 2010. The male, K-93, was produced by eagles at the ACC in 1999 and was hacked at the Bulrush hacktower on Catalina. The female, A-37, was produced by eagles at the ACC in 2005 and hacked from the South Tower on Santa Cruz. We first saw the eagles in incubation posture on 4 March and were able to confirm two eggs in the nest on 9 March. We saw one chick in the nest on 13 April, but the nest failed by 20 April.

### **Santa Cruz Island**

We surveyed much of Santa Cruz by foot in 2011 (Fig. 8). We concentrated surveys in areas outside of known breeding territories in an effort to locate new territories and nests. Areas that were difficult to reach by foot, such as the central north coast, were surveyed by boat, and we conducted a helicopter



**Figure 8. Survey routes (in red) and nests found and/or monitored (named by territory) on Santa Cruz Island, CA in 2011.**



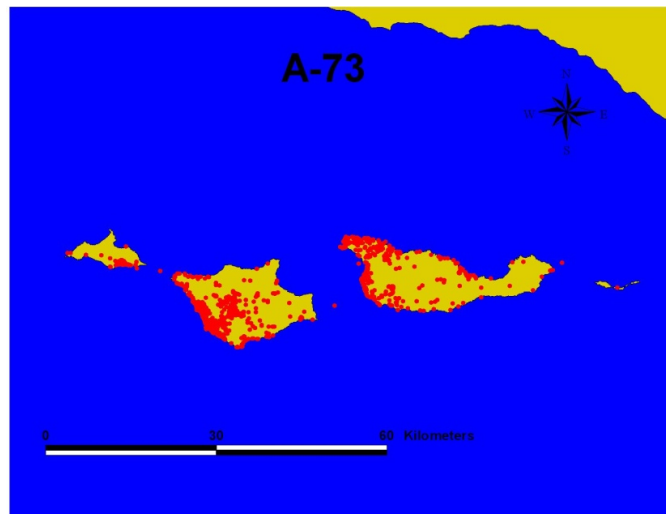
survey of the island on 6 April. Some areas were surveyed repeatedly because of continued sightings of eagles without known nesting. During surveys, we located four new nests, two in the Pelican Harbor territory, one in the Cueva Valdez territory, and one in the Fry's Harbor territory, and monitored the previously known nests in the Sauces and Malva Real territories (Fig. 8).

**Sauces Territory.** The pair used the same Sauces Canyon nest as in 2010. Male A-40, a bird hacked on Santa Cruz in 2005, replaced A-28. The female, A-27, was collected from Alaska and hacked on Santa Cruz in 2004. The first egg was laid on 3 March and a second was not seen until 15 March. A single chick hatched on 9 April.

We entered the nest on 2 June to install a leg band, transmitter, and wingmarkers on the eaglet, and to obtain blood samples (Fig. 9, Table 2). The eagle fledged on 28 June and remained on the western portion of Santa Cruz until it made a flight to Anacapa on 30 August. It was back on Santa Cruz the morning of 31 August and remained on the island until it flew to Santa Rosa on 11 September. It remained on Santa Rosa through the end of the year, except for visits to San Miguel on 30 September, 15 October, and 3-11 December, and visits to Santa Cruz on 16-21 October and 13-17 December (Fig. 10).



**Figure 9. The Sauces Canyon chick prior to banding on Santa Cruz Island, CA in 2011.**



**Figure 10. Movements of Eagle A-73 on the northern Channel Islands, CA in 2011.**

Table 2. Biographical data for bald eagle chicks hatched at nests on the northern Channel Islands, CA, during 2011.

Federal Band	Sex	Wing Tag	Date Fledged	Territory	Status <sup>a</sup>	Comments
679-04109	M	A-73	6/28	Sauces	Alive	On Santa Rosa
679-04110	F	A-74	6/25	Pelican Harbor	Alive	On Santa Cruz
679-04111	M	A-75	7/1	Oak Canyon	Unknown	Transmitter malfunctioned 7/28
679-04112	F	A-76	7/15	Cueva Valdez	Alive	On Santa Rosa

<sup>a</sup> As of 12/31/11

***Pelican Harbor Territory.*** The Pelican Harbor pair remained together for a sixth breeding season. The male, K-10, was produced by the ACC and fostered into the Twin Rocks nest on Catalina in 2001. The female, K-26, also was produced by the ACC and fostered into the West End nest on Catalina Island in 2002. The pair began constructing a nest near Chinese Harbor in the eastern portion of the Pelican Harbor territory (Fig.3), and we placed a camera on the nest on 26 January. The adults were seen at the nest several times after the camera installation, then stopped visiting the nest. We conducted surveys to locate other possible nests in their territory and located the birds on 27 February incubating on a nest near Twin Harbors, close to the western boundary of their territory. We confirmed a chick in the nest on 9 April.



**Figure 11. The Pelican Harbor chick at the time of banding on Santa Cruz Island, CA, 2011.**

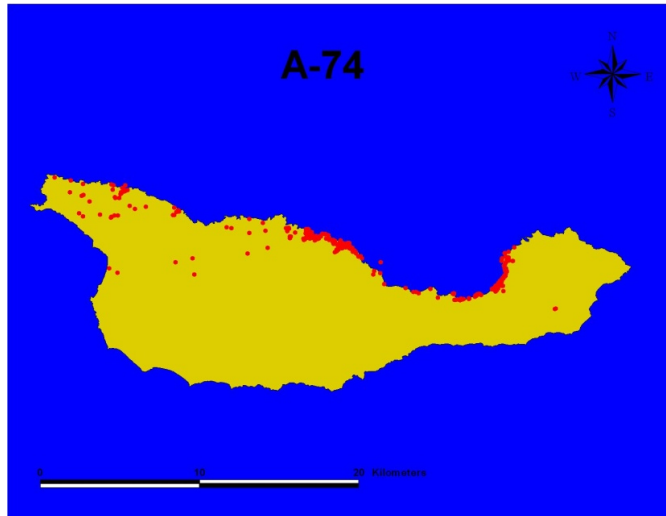
We entered the nest on 3 June to install a leg band, transmitter, and wingmarkers on the eaglet, and to obtain blood and feather samples (Fig. 11, Table 2). The eaglet fledged on 25 June, and we continued to monitor the bird via the data provided by its GPS-PTT transmitter and opportunistic sightings.

The bird remained on Santa Cruz until at least 23 August, at which time its transmitter malfunctioned (Fig. 12). It is known to have survived through the year, spending time on both Santa Rosa and Santa Cruz.

*Cueva Valdez Territory.* The Cueva Valdez pair built a new nest this season in Hazard's Canyon on the north coast of the island (Fig. 3). The male, A-00, was produced by the ACC and hatched on Santa Cruz in 2002. The female, A-16, was removed from a nest in Alaska and hatched on Santa Cruz in 2003. We located the nest with an incubating adult on 27 March. A single chick hatched around 27 April.

We entered the nest on 21 June to install a leg band, transmitter, and wingmarkers on the eaglet, and to obtain blood samples (Fig. 13, Table 2). Based on the GPS data, the eaglet fledged on 15 July. She stayed on Santa Cruz until 8 September and made her first flight to Santa Rosa by 11 September. She flew to Santa Cruz on 16 October, but returned to Santa Rosa on 25 October, where she remained for the rest of the year, except for short visits to San Miguel on 25-28 November, 3-6 December, and 12-13 December (Fig. 14).

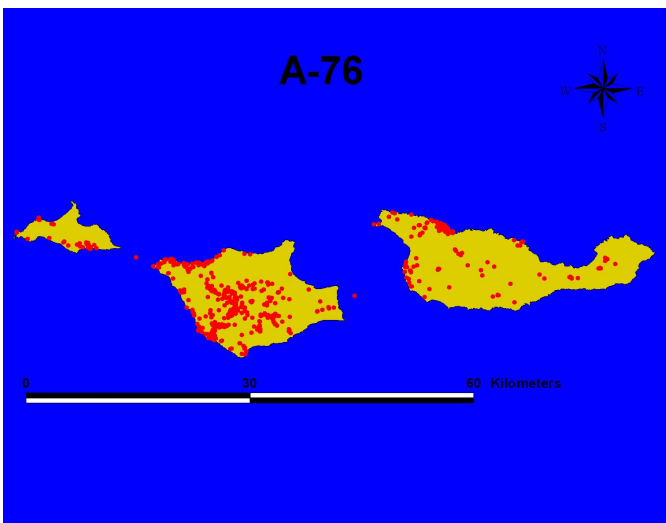
*Malva Real Territory.* The Malva Real pair appears to have separated in 2011. Male K-11, produced at the ACC and fostered into the West End nest on Catalina in 2001, remained on Santa Cruz. Female A-17, a 2003 Alaskan female, began the



**Figure 12. Movements of Eagle A-74 on Santa Cruz Island, CA in 2011.**

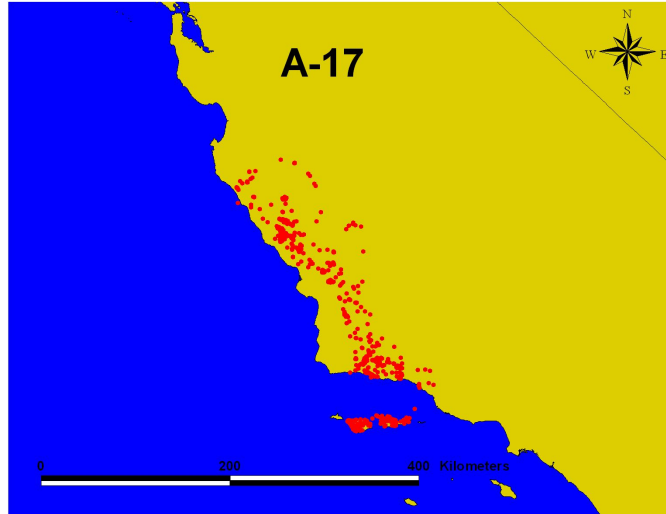


**Figure 13. The Cueva Valdez chick at the time of banding on Santa Cruz Island, CA, 2011.**



**Figure 14. Movements of Eagle A-76 on the northern Channel Islands, CA in 2011.**

year on Santa Cruz, but flew to Santa Rosa on 3 January. She remained there until 29 January, before returning to Santa Cruz. She made two more round-trips to Santa Rosa and back to Santa Cruz during February, before flying to the mainland on 24 February. She remained in Santa Barbara County until at least 7 March and was back on Santa Cruz and then Santa Rosa on 10 March. She spent March and early April on Santa Rosa and Santa Cruz, but then returned to the mainland on 8 April. She visited Santa Barbara, San Luis Obispo, and Monterey counties during April and then returned to Santa Cruz on 23 April. She flew to Santa Rosa on 26 April, returned to Santa Cruz on 9 May, and then returned to the mainland on 10 May. This time she visited Santa Barbara, Ventura, San Luis Obispo, Monterey, San Benito, and Kings counties. She returned to Santa Cruz on 8 October and flew to Santa Rosa the next day. She remained on Santa Rosa through the rest of the year, except for a trip to Santa Cruz on 13-16 December (Fig. 15).



**Figure 15. Movements of Eagle A-17 in central and southern California in 2011.**

During the helicopter survey on 6 April we spotted Female A-35 in the territory, so it is possible that she will replace A-17.

Besides the known nesting territories, we surveyed the following known or assumed territories where we had seen pairs on a regular basis, but did not find any signs of nesting.

*Yellowbanks Territory.* The original Yellowbanks pair moved to Anacapa this season (see below). Eagle A-48, a female from the ACC that was hacked on Santa Cruz in 2006 was repeatedly seen in the territory, but we never saw a mate (Fig. 16).

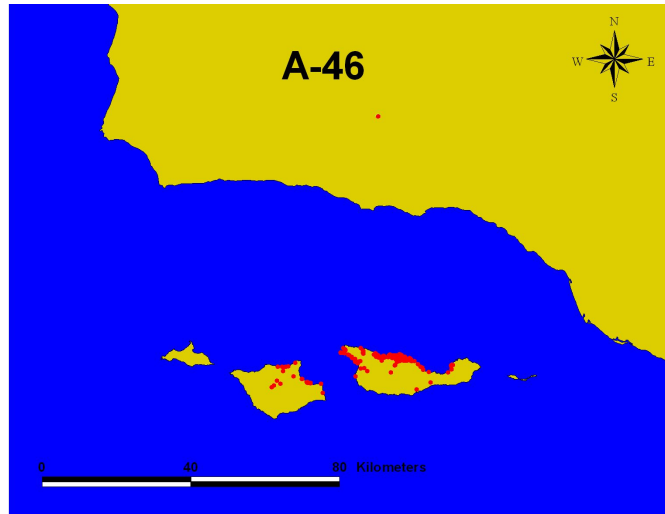


**Figure 16. Non-breeding bald eagle territories on Santa Cruz Island, CA.**



*Willows Territory.* Last season we saw A-45, a 2005 ACC-produced male, and A-51, a 2006 ACC-produced female, on the south side of the island around the Willows area (Fig. 16). Both birds were seen together in the area in 2011, but there was no indication of nesting.

*Fry's Harbor Territory.* Eagle A-46, a 2006 ACC-produced male, spent most of his time in the Fry's Harbor area (Fig. 16), where he was seen often with A-24, a female collected in Alaska in 2004. A-46 was on the mainland on 1 January on a return trip from the Pacific Northwest (see Sharpe 2011). He flew to Santa Cruz by 4 January, where he remained throughout the year, except for two short trips to Santa Rosa on 4-9 February and 10-11 September (Fig. 17). Because he is still carrying a GPS transmitter, we are confident that there was not a nesting attempt. However, we did locate a potential nest for future use in Fry's Canyon during the helicopter survey.



**Figure 17. Movements of Eagle A-46 in southern California in 2011.**

*Smugglers Territory.* Female A-57 and male A-58, both birds produced at the ACC and hacked on Santa Cruz in 2006 spent much of the year together on the southeastern portion of Santa Cruz. Both birds are carrying functioning GPS units, so we are certain there was no nesting. It was discovered this season that the GPS transmitters were switched between A-57 and A-59 at the time of banding in 2006. Therefore, all data reported for A-59 in previous reports are actually those of A-57, and vice versa.

Eagle A-57 began the year on Santa Cruz, but made three trips to Santa Rosa between 4 January and 19 February, each lasting 2-7 days. She remained on Santa Cruz from 12 April through 23 July, except for six visits to Anacapa that lasted 1-4 days. She flew to Santa Rosa on 23 July and remained there through 25 October. On 26 October she flew to Santa Cruz, but returned to Santa Rosa on 2 November. She flew to Santa Cruz on 15 November and remained in the Smuggler's Harbor area through the end of the year (Fig. 18).



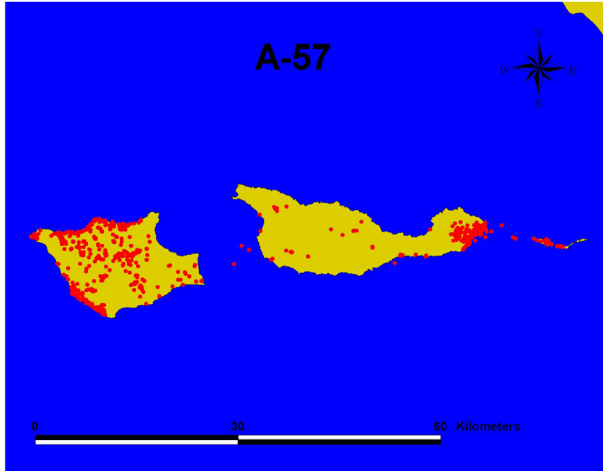


Figure 18. Movements of Eagle A-57 on the northern Channel Islands, CA in 2011.

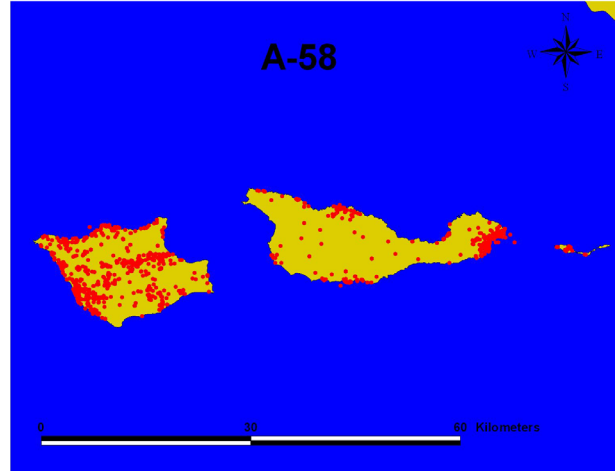


Figure 19. Movements of Eagle A-58 on the northern Channel Islands, CA in 2011.

Eagle A-58 began the year on Santa Rosa and made his first trip to Santa Cruz on 29 January. He remained on Santa Cruz through mid-August, except for trips to Santa Rosa on 7-17 February and 25 April – 3 May, and to Anacapa on 18 July – 4 August. He returned to Santa Rosa on 15 August and spent most of the year there, except for trips to Santa Cruz on 26 -28 October, 15 November – 6 December, and 15-31 December (Fig. 24).

### ***Santa Rosa Island***

We spent 22 February to 1 March, 5-12 April, and 26 April to 3 May surveying for eagles on Santa Rosa. During those surveys we were able to cover most of the coastal areas of the island, as well as many of the canyons (Fig. 20). We located two active nests in 2011: Trap Canyon and Lopez Canyon (Fig. 20).

*Trap Canyon Territory.* The Trap Canyon pair used the same nest as in 2010 located in an unnamed canyon between Cow and Verde Canyons on the north shore of the island (Fig. 17). The male, A-08, was removed from a nest in Alaska and hacked on Santa Cruz in 2002. The female, A-22,

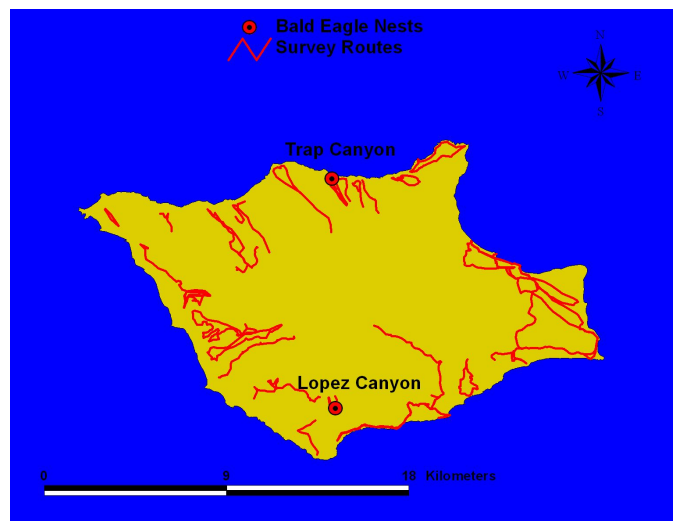


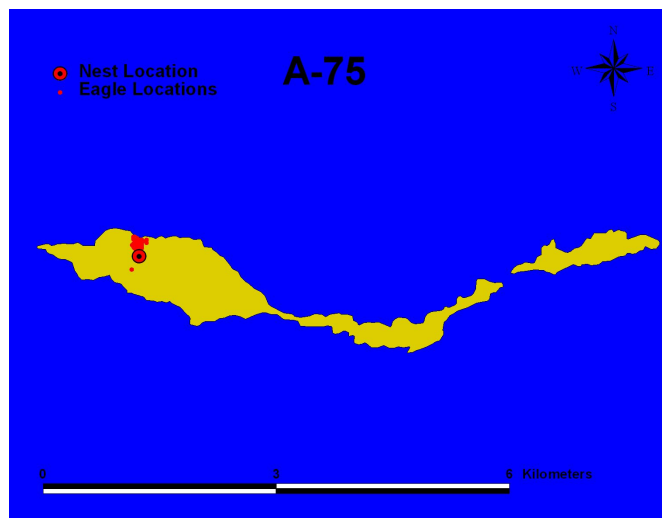
Figure 20. Survey routes (in red) and active bald eagle nests on Santa Rosa Island, CA, 2011.

was produced by the ACC and hacked on Santa Cruz in 2004. The pair was found incubating on 25 February, but when we returned on 6 April the nest had failed.

**Lopez Canyon Territory.** The previous male, K-36, was replaced by A-39 this season. A-39 was produced by the ACC and hacked on Santa Cruz in 2005. The female, A-43, also was produced by the ACC and hacked on Santa Cruz in 2005. The birds used the same nest as in 2010, which is in a large toyon (*Heteromeles arbutifolia*; Fig. 20). The birds were observed incubating on 23 February, at which time there was a single egg. A second egg was seen on 28 February. When we returned to check the nest on 5 April a large portion of it had blown out of the tree and there was a dead chick < 1 week old in the nest remains. There were no further nesting attempts.

### **Anacapa Island**

**Oak Canyon Territory.** A nesting pair was located on West Anacapa Island on 29 March by a researcher working on a different project (Fig. 18). This territory was occupied by the birds that were previously in the Yellowbanks territory on Santa Cruz. Female A-11 was removed from a nest near Juneau, AK in 2002 and released from a hack tower on Santa Cruz. Male A-21 was collected from Alaska in 2003 and released from a hack tower on Santa Cruz. Access to West Anacapa is restricted during the seabird breeding season, so we were unable to check the nest again until 7 June. At that time we found a single chick approximately 8 weeks old and were able to equip it with a leg band, transmitter, and wingmarkers (Table 2). Based upon the GPS data the bird fledged on 15 July, but its transmitter failed on 28 July (Fig. 21).



**Figure 21. Movements of A-75 and the nest location on Anacapa Island, CA in 2011.**

## 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 25-28 eggs this season, of which 14 (50-56%) hatched (Table 3). Twelve chicks (86%) fledged and 6-11 (50-92%) of the fledged eaglets survived until the end of the year (five known alive, one known dead, seven unknown status).

Table 3. Summary of nesting attempts by bald eagles on the California Channel Islands in 2011.

Island/Nest	Eggs		Chicks		Number Surviving Until End of Year
	Incubated	Hatched	Fledged		
Santa Catalina Island					
Twin Rocks	2	0	0		.
West End	3	3	3		1-2
Pinnacle Rock	2	0	0		.
Seal Rocks	2	2	2		0-2
Two Harbors	2	1	1		1
Rattlesnake	2	2	2		1-2
Middle Ranch	2	1	0		0
TOTAL	15	9	8		3-7
Santa Cruz Island					
Pelican Harbor	1-2	1	1		1
Sauces	2	1	1		1
Cueva Valdez	2	1	1		1
TOTAL	5-6	3	3		3
Santa Rosa Island					
Trap Canyon	1-3	0	0		.
Lopez Canyon	2	1	0		0
TOTAL	3-5	1	0		0
Anacapa Island					
Oak Canyon	2	1	1		0-1
TOTAL	2	1	1		0-1
All Islands Combined	25-28	14	12		6-11

## Monitoring of Previously Released/Hatched Bald Eagles

Besides monitoring this year's fledglings, we continued to monitor the eagles that had been released or hatched naturally on the Channel Islands prior to 2011. Twenty-eight bald eagles that were released or hatched on Catalina in previous years were seen during 2011, which included two mortalities (Table 4). Fifteen of the birds were on Catalina, four on Santa Cruz, two on San Clemente Island, and seven on the mainland. We found bones, leg bands and portions of K-16's wing markers near the Middle Ranch nest under some power lines. She was last seen in that area in early 2004 and likely died around that time period.

Table 4. Status of bald eagles released or fledged from nests on Santa Catalina Island, CA prior to 2011 and seen in 2011.

FWS Leg Band	Sex <sup>1</sup>	Patagial Marker	Nest/Release Tower	Fledge Year	Status, Latest Location <sup>2</sup>
629-16077	F	K-17	Bulrush Tower	1984	Alive, Twin Rocks pair, Catalina Is.
629-16085	F	NA	Sweetwater Tower	1986	Alive, West End pair, Catalina Is.
629-16089	M	K-65	Bulrush Tower	1986	Alive, Pinnacle Rock pair, Catalina Is.
629-19925	M	K-25	Pinnacle Rock	1992	Alive, Seal Rocks pair, Catalina Is.
629-19923	M	K-33	Seal Rocks	1992	Alive, Twin 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.
629-29497	M	K-93	Bulrush Tower	1999	Alive, Middle Ranch 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.
629-02790	M	K-23	Pinnacle Rock	2002	Alive, Bow, WA 1/25/11
629-02782	M	K-11	West End	2001	Alive, Malva Real pair, Santa Cruz Is.
629-02784	F	K-16	Seal Rocks	2001	Dead, remains found Catalina 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, San Clemente Is.
629-47398	F	K-56	Seal Rocks	2005	Alive, Pinnacle Rock pair, Catalina Is.
629-52428	M	K-73	West End	2007	Alive, Santa Catalina, CA 7/7/11
629-52433	F	K-79	Two Harbors	2007	Alive, Black Butte Res., CA 8/11
629-52442	F	K-83	Two Harbors	2008	Alive, Butte Valley, CA 5/18/11
629-52443	M	K-88	Twin Rocks	2008	Alive, San Clemente Is., 2/9/11
629-52446	F	K-67	West End	2008	Alive, Santa Cruz Is., 7/29/11
629-52449	F	K-87	Two Harbors	2009	Alive, Catalina Is. 11/5/11
629-03429	F	K-97	West End	2009	Alive, Lk. Cachuma, CA 4/17/11
679-03433	F	K-04	Two Harbors	2010	Alive, injured in Duvall, WA, 2/14/11
679-03434	M	K-06	Two Harbors	2010	Dead, Willamette Valley, OR 3/8/11

<sup>1</sup> Determined by karyotyping and/or morphometrics.

<sup>2</sup> As of 12/31/11 unless otherwise noted.

As of December 31, 13 of the eagles previously released or naturally hatched on Santa Cruz and Santa Rosa are being monitored via GPS data and 19 others were identified during our surveys or through sightings by other observers (Table 5). During 2011, we had no known mortalities of eagles released on the northern Channel Islands in previous years (Table 5).

Table 5. Status of bald eagles released or fledged from nests on Santa Cruz and Santa Rosa Islands, CA in 2002-2010 and known to have been alive in 2011.

FWS Leg Band	Sex <sup>1</sup>	Patagial Marker	Source <sup>2</sup>	Fledge Year	Status, Latest Location <sup>3</sup>
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 <sup>†</sup>	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 4/8/11.
629-47372	F	A-24	Alaska	2004	Alive, Fry's Harbor pair, Santa Cruz Is.
629-47375	F	A-27	Alaska	2004	Alive, Sauces pair, Santa Cruz Is.
629-47377	M	A-29	Alaska	2004	Alive, Santa Cruz Is. 2/16/11
629-47380	F	A-32	Alaska	2004	Alive, San Clemente Is.
629-47385 <sup>†</sup>	F	A-34	Zoo	2005	Alive, Santa Rosa Is.
629-47386	F	A-35	Zoo	2005	Alive, Santa Cruz 4/6/11
629-47388	F	A-37	Zoo	2005	Alive, Middle Ranch pair, Catalina Is.
629-47391	M	A-40	Zoo	2005	Alive, Sauces pair, Santa Cruz Is.
629-47399	F	A-43	Zoo	2005	Alive, Lopez Canyon pair, Santa Rosa Is.
629-02800	M	A-45	Zoo	2005	Alive, Willows pair, Santa Cruz Is.
629-52404 <sup>†</sup>	M	A-46	Zoo	2006	Alive, Fry's Harbor pair, on mainland.
629-52406 <sup>†</sup>	F	A-48	Zoo	2006	Alive, Santa Cruz Is. 8/19/11
629-52407	F	A-49	Pelican Harbor	2006	Alive, Santa Cruz Is.
629-52410	F	A-51	Zoo	2006	Alive, Willows pair, Santa Cruz Is.
629-52411 <sup>†</sup>	F	A-52	Zoo	2006	Alive, Santa Rosa Is.
629-52419 <sup>†</sup>	F	A-57	Zoo	2006	Alive, Smugglers pair, Santa Cruz Is.
629-52420 <sup>†</sup>	M	A-58	Zoo	2006	Alive, Smugglers pair, Santa Cruz Is.
629-52422 <sup>†</sup>	M	A-60	Malva Real	2006	Alive, Santa Rosa Is.
629-52438 <sup>†</sup>	M	A-64	Pelican Harbor	2008	Alive, Santa Cruz Is.
629-03432 <sup>†</sup>	M	A-67	Trap Canyon	2010	Alive, Santa Rosa Is.
629-03435	M	A-68	Pelican Harbor	2010	Alive, Santa Rosa Is. 9/8/11
629-03436 <sup>†</sup>	M	A-69	Pelican Harbor	2010	Alive, Santa Rosa Is.
629-03440 <sup>†</sup>	F	A-70	Lopez Canyon	2010	Alive, Santa Rosa Is.
629-03443	F	A-71	Sauces	2010	Alive, Santa Rosa Is. 2/21/11
629-03444 <sup>†</sup>	M	A-72	Cueva Valdez	2010	Alive, Santa Cruz Is.

<sup>1</sup> Determined by karyotyping for birds from San Francisco Zoo, and morphometrics for Alaskan birds.

<sup>2</sup> Bald eagles from the 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).

<sup>3</sup> As of 12/31/11, unless otherwise noted.

<sup>†</sup> Carrying a GPS transmitter.

### **A-29 Movements**

Eagle A-29 began the year on Santa Rosa Island and then flew to Santa Cruz on 13 February. We stopped receiving new data on 16 February (Fig. 22).

### **A-34 Movements**

Eagle A-34 spent 1 January through 15 February on Santa Rosa. She flew to Santa Cruz on 16 February, but returned to Santa Rosa on 21 February, where she remained for the next month. She flew to Santa Cruz on 22 March and then spent about 2 hours on Anacapa the evening of 25 March, before returning to Santa Cruz. On 5 April, she returned to Santa Rosa. She made one short visit to Santa Cruz on 25 April to 1 May and then spent 2 May to 31 December on Santa Rosa (Fig. 23).

### **A-48 Movements**

Eagle A-48 spent the year through 19 August on Santa Cruz, except for a short visit to Anacapa on 10 March. We did not receive any further data on the bird through the end of the year (Fig. 21).

### **A-52 Movements**

Eagle A-52 spent time on all four northern Channel Islands and the mainland in 2011 (Fig. 25). She started the year on Santa Rosa and flew to Santa Cruz on 30

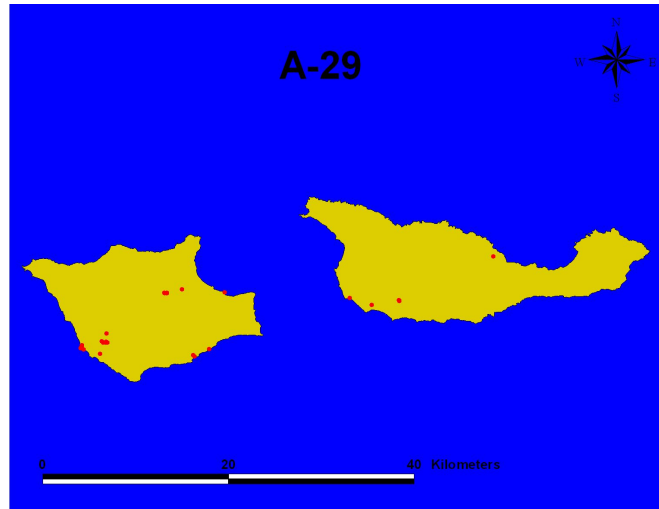


Figure 22. Movements of Eagle A-29 on the northern Channel Islands, CA in 2011.

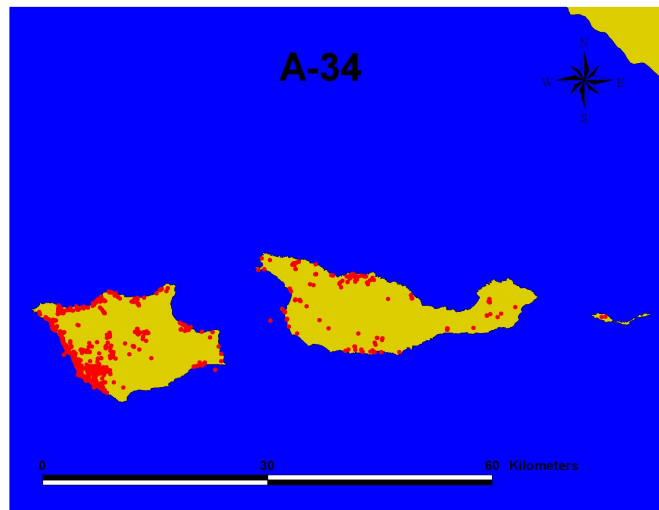


Figure 23. Movements of Eagle A-34 on the northern Channel Islands, CA in 2011.

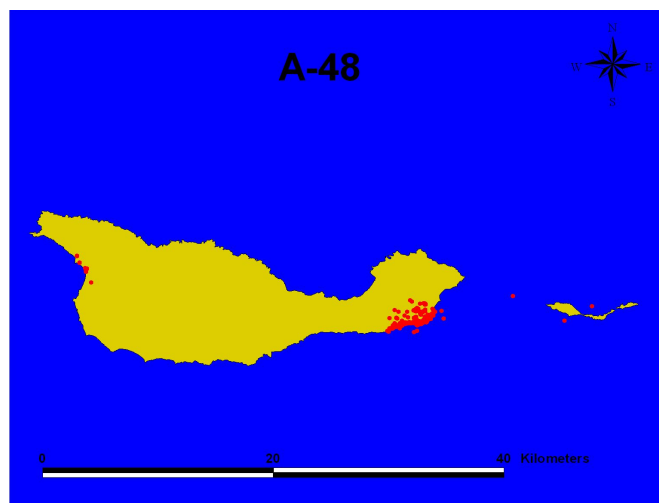


Figure 24. Movements of Eagle A-48 on the northern Channel Islands, CA in 2011.

January. She moved to the mainland on 1 February and remained there through the month. She returned to Santa Cruz on 4 March, moved to Santa Rosa on 10 March, and then went to San Miguel on 19 March. She flew to Santa Cruz on 29 March, Santa Rosa on 2 April, and returned to San Miguel on 10 April. She again flew to Santa Cruz, Santa Rosa and back to San Miguel on 11 April, 22 April, and 23 April, respectively. On 8 May she flew to Santa Rosa, and then flew to Anacapa via Santa Cruz on 16 May.

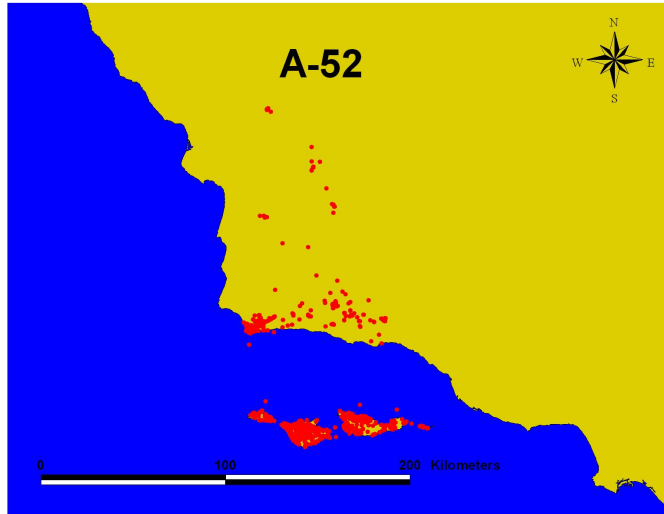
She did not leave Anacapa until 19 August, when she returned to Santa Cruz. She flew to Santa Rosa on 22 August and remained there through 25 October, except for short trips to San Miguel on 10-22 September and Santa Cruz on 25-29 September. On 25 October, she flew to Santa Cruz and then spent 27 October – 17 November on the mainland. She flew to Santa Rosa on 17 November and then spent the remainder of the year flying between San Miguel and Santa Rosa, spending 2-15 days at a time on each island. She ended the year on Santa Rosa.

**A-60 Movements**

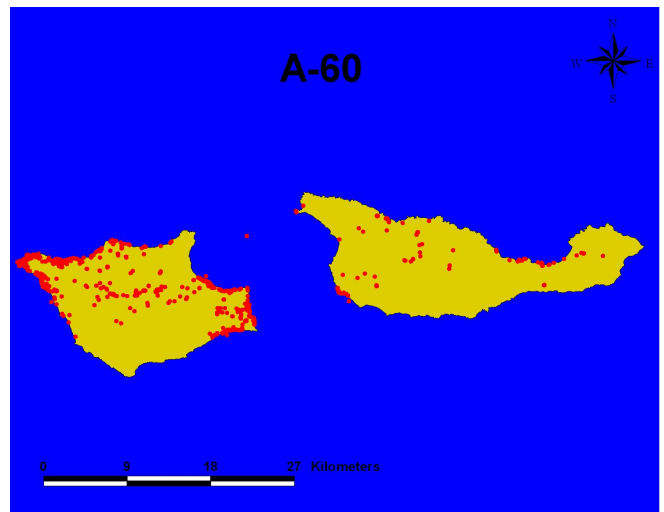
Eagle A-60, the 2006 Malva Real chick, spent most of the year on Santa Rosa (Fig. 26). He made five visits to Santa Cruz on 4-6 February, 14-29 March, 12-14 April, 11-16 May, and 11-15 June.

**A-64 Movements**

Eagle A-64, one of the 2008 Pelican Harbor chicks, began the year on Santa Rosa and moved between islands frequently during the first two months, including two week-long visits to Santa Cruz on 10 January and 10 February, and five visits to San Miguel that each lasted less than a day. On 23 February, he flew to Santa Cruz and remained there through 14 October. He



**Figure 25. Movements of Eagle A-52 in California in 2011.**



**Figure 26. Movements of Eagle A-60 on the northern Channel Islands, CA in 2011.**

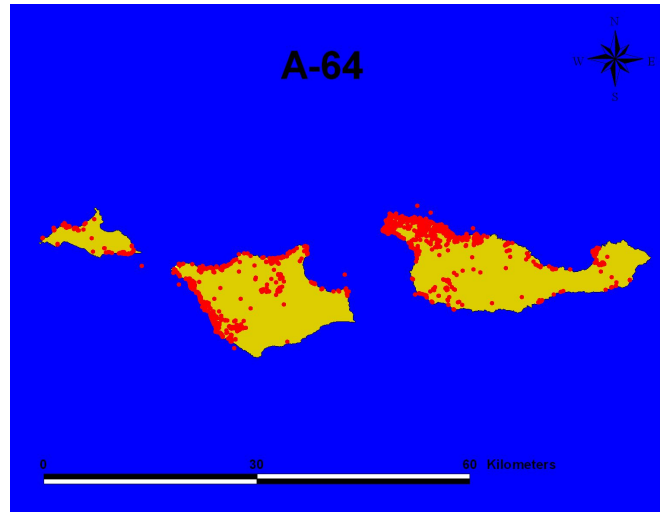
flew to Santa Rosa on 15 October and spent most of his time there through early December, but visited San Miguel on 11-14, 24-25, and 27-28 November, and Santa Cruz on 16-23 November. He flew to Santa Cruz on 6 December and remained there through the end of the year (Fig. 27).

### **A-67 Movements**

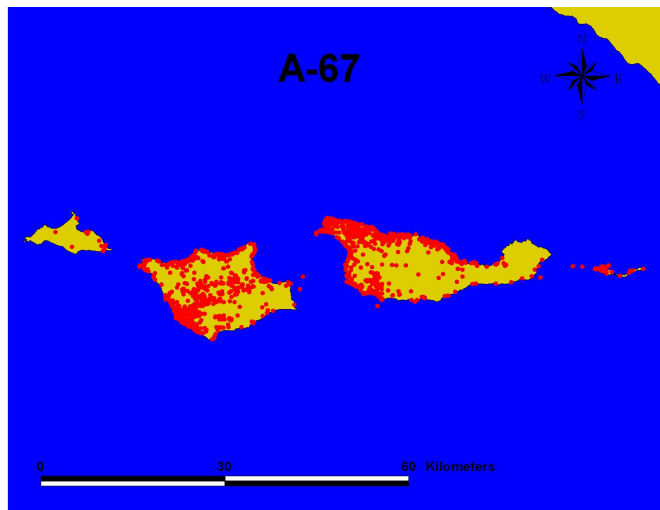
Eagle A-67, the 2010 Trap Canyon chick, began the year on Santa Rosa and visited all four of the northern Channel Islands during the year (Fig. 27). He flew to Santa Cruz on 21 March and then to Anacapa on 25 March, where he remained through April, except for two visits to Santa Cruz on 1-3 and 21-22 April. On 30 April, he flew to Santa Rosa via Santa Cruz, before moving to San Miguel on 1 May. He returned to Santa Rosa on 3 May before moving to Santa Cruz for the period 15 May – 11 September, except for a visit to Santa Rosa on 4-17 June. On 11 September he returned to Santa Rosa, where he spent the rest of the year, except for visits to Santa Cruz on 4-13 and 14-22 December, and to Anacapa on 13-14 December.

### **A-68 Movements**

Eagle A-68, one of the 2010 Pelican Harbor chicks, visited all four northern Channel Islands and the mainland in 2011 before dropping its transmitter in September (Fig. 29). He spent much of January on Santa Cruz, but visited Santa Rosa on 3-12 and 20-25 January. He flew to the mainland on 31 January and returned to Santa Cruz on 3 February. He made trips to



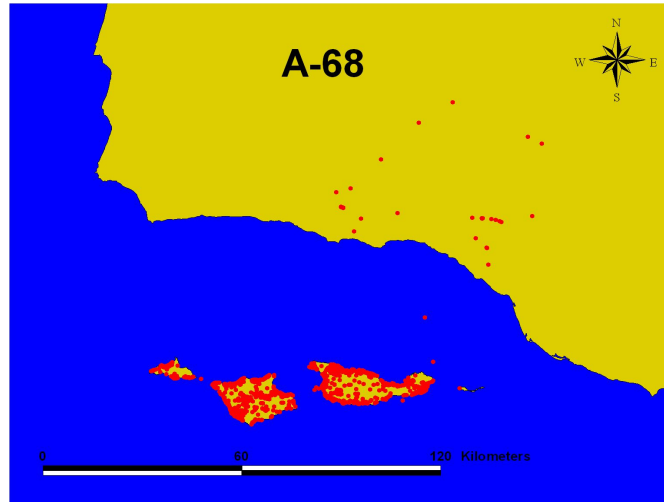
**Figure 27. Movements of Eagle A-64 on the northern Channel Islands, CA in 2011.**



**Figure 28. Movements of Eagle A-67 on the northern Channel Islands, CA in 2011.**



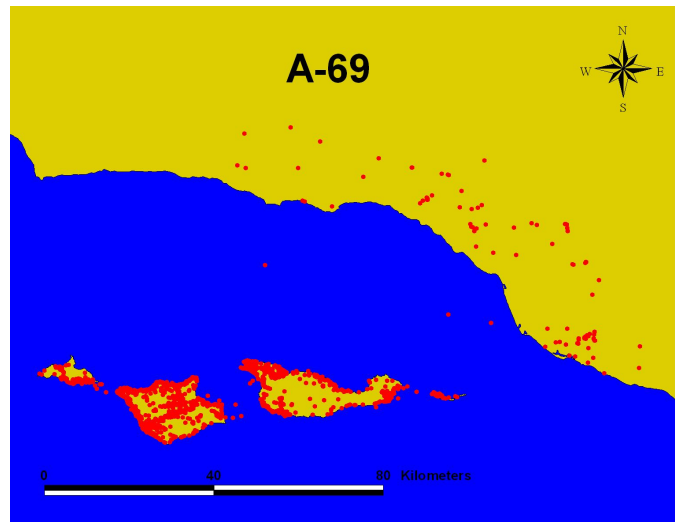
Santa Rosa on 9-19 February, 27 February – 17 March, and 6-13 April before making a one-day trip to Anacapa on 14 April. On 1 May he flew to Santa Rosa, San Miguel and back to Santa Rosa. He made visits to Santa Cruz on 12 May – 9 June and 29 June-5 July and to San Miguel on 17-24 June and 6-14 July before dropping his transmitter on Santa Rosa around 9 September (Fig. 29).



**Figure 29. Movements of Eagle A-68 in southern California in 2011.**

### **A-69 Movements**

Eagle A-69, the other 2010 Pelican Harbor chick, moved among the northern Channel Islands and the mainland more than any other bird and moved too many times to describe in detail (Fig. 30). It spent most of January on Santa Rosa and then began making frequent movements. He visited Santa Cruz 25 times with the longest stay lasting seven days, Anacapa 16 times with the longest stay lasting eight days, the mainland twice with the longest visit lasting eight days, eight visits to San Miguel with the longest visit lasting three days, and 18 additional visits to Santa Rosa with the longest stay lasting from 12 August – 4 November. He ended the year on Santa Rosa.



**Figure 30. Movements of Eagle A-69 in southern California in 2011.**

### **A-70 Movements**

Eagle A-70, the 2010 Lopez Canyon chick, spent 1 January – 17 February on Santa Rosa. She flew to Santa Cruz on 17 February and to Anacapa on 20 February. She returned to Santa Cruz on 21 February before returning to Santa Rosa on 1 March. On 21 March she returned to Santa Cruz and then made five visits to Anacapa between 22 March and 15 May. She spent 16-31 May on Santa Rosa before flying to Anacapa via Santa Cruz on the afternoon of 31 May. She remained on Anacapa until 8 June before returning to Santa Cruz. She spent 18 June – 31

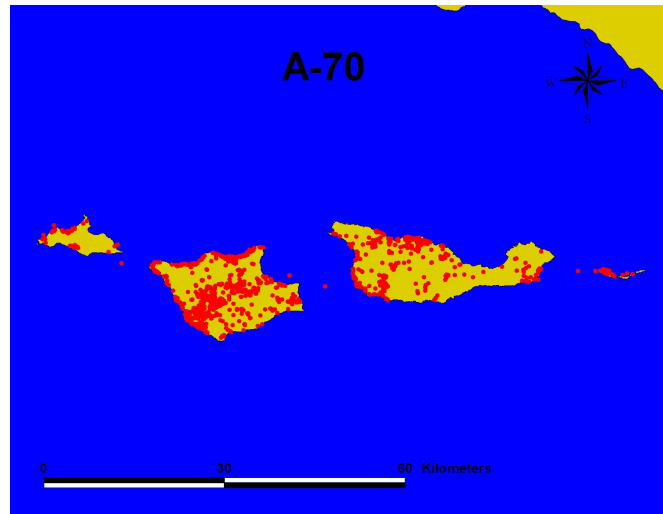
December on Santa Rosa, except for four trips to San Miguel that lasted 1-4 days (Fig. 31).

### **A-72 Movements**

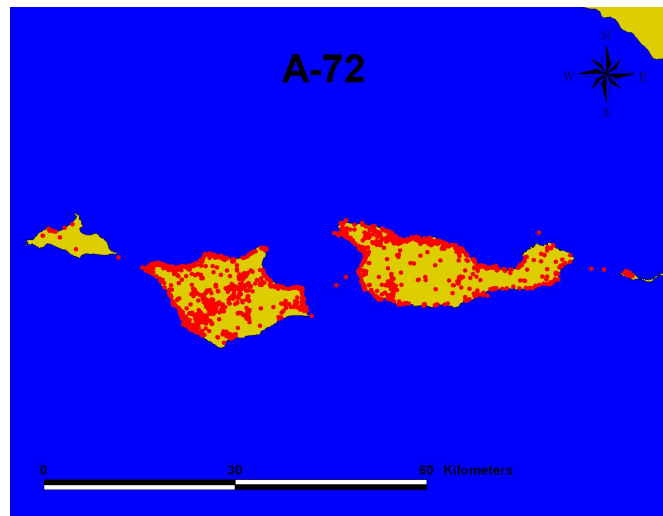
Eagle A-72, the 2010 Cueva Valdez chick, visited all four of the northern Channel Islands in 2011 (Fig. 32). He began the year on Santa Rosa and began movements to other islands at the end of the month. From 29 January to 23 July he visited Santa Cruz 11 times, Anacapa four times, Santa Rosa seven times, and San Miguel once. Each visit lasted from two hours to one month. He returned to Santa Rosa on 24 July and spent much of the remainder of the year there, except for short trips to Santa Cruz on 26 October – 1 November, 1-17 and 30-31 December, and to San Miguel on 24-25 November.

### **Overall Island Use**

During 2011, we received 50,972 GPS locations on the islands from 19 different eagles that spent at least part of the year on the northern Channel Islands. Santa Cruz and Santa Rosa were used more than any other islands (Fig. 32). Time spent on Anacapa was highest from April-July, with a maximum of only 17.3% of points (April). Use of Santa Rosa was higher than any other island in January-February and August-December (peak of ~85% of points in October) and use of Santa Cruz was higher than any other island in March-July (peak of ~62% in June). Use of San Miguel was highest in December with a peak of 14.6% of data points (Fig. 33).



**Figure 31. Movements of Eagle A-70 on the northern Channel Islands, CA in 2011.**



**Figure 32. Movements of Eagle A-72 on the northern Channel Islands, CA in 2011.**

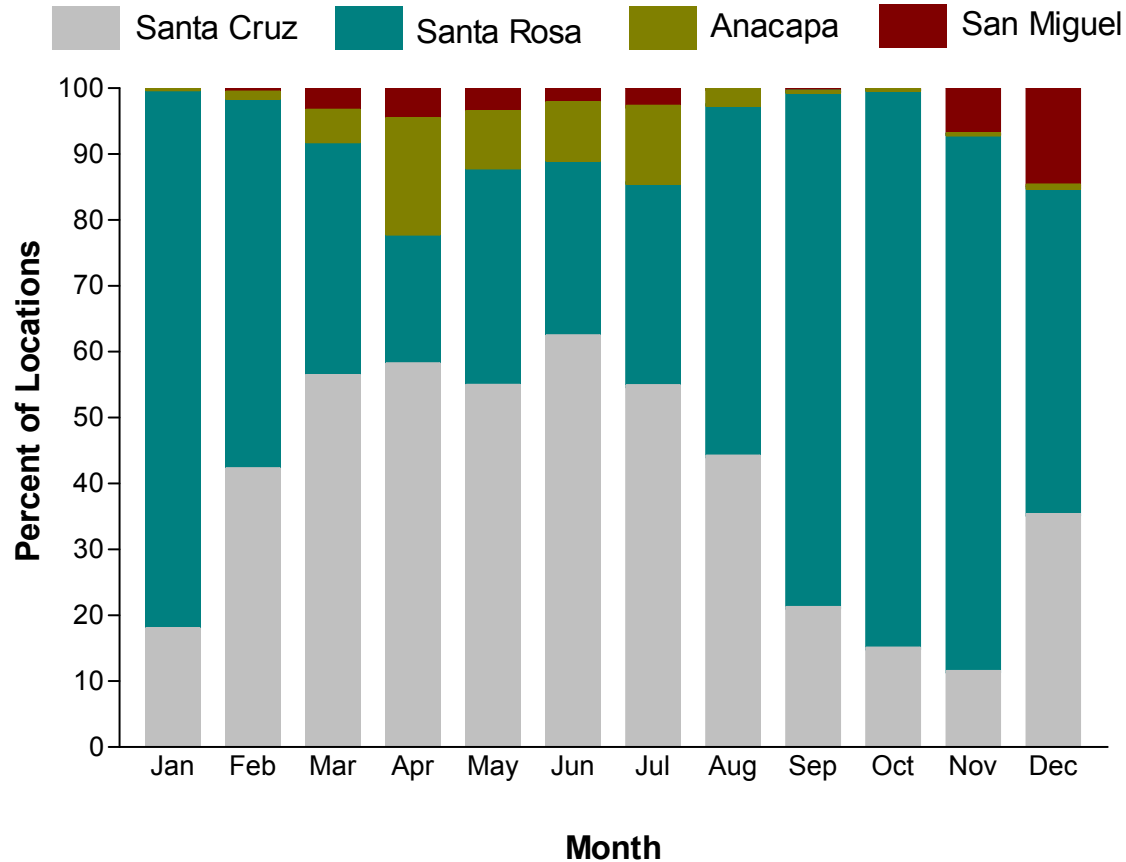


Figure 33. Use of the northern Channel Islands, CA by bald eagles during 2011. The bars represent the percent of GPS points on each island by month.

## DISCUSSION

Bald eagle reproductive effort on the Channel Islands in 2011 was the same as that in 2010, except that breeding expanded to Anacapa. There were a total of 13 known breeding attempts on four different islands: seven on Catalina, three on Santa Cruz, two on Santa Rosa, and one on Anacapa. Ten (77%) of the nests were successful at hatching at least one chick (14 chicks total, average=1.4 chicks/nest) and there was 86% fledging success. In comparison, nesting success of bald eagles in northern California averaged 67% and they produced 0.97 young/year (Jenkins and Jackman 2006).

For the first time since 1949, bald eagles successfully bred on Anacapa in 2011. Unfortunately, West Anacapa has restricted access during the spring because of large numbers of breeding brown pelicans (*Pelecanus occidentalis*) and other seabirds. We will coordinate trips to the island in 2012 to coincide with visits by seabird researchers. We also will attempt to place a

camera on the nest in fall 2012 so that breeding activity can be monitored remotely.

Patterns of island use were similar as in previous years. There was increased usage of Anacapa in the spring and summer, which corresponds with the seabird breeding season. Use of Anacapa increased from 2010 levels, but is lower than in 2007-2009. The continued decreases in use of Anacapa may be a result of 1) a territorial pair of bald eagles on West Anacapa and 2) an aging population that is starting to remain in established territories. As in previous years, more birds began spending time on Santa Rosa starting in September, which corresponds with the start of fall hunting for mule deer and elk on that island. More eagles were on Santa Rosa in January than any other island, possibly taking advantage of the marine mammal breeding season and the resulting carcass availability. The deer and elk were removed from Santa Rosa at the end of 2011, so it is likely that island use in fall/winter will change over the next couple of years.

We expect the number of bald eagle nests to increase on Santa Cruz and Santa Rosa and remain stable on Catalina in 2012. There were additional pairs or potential pairs that we observed on Santa Cruz in 2011 that did not breed (i.e., Malva Real, Frazier Point, Willows, Yellowbanks, Fry's Harbor, Smugglers), so there could be up to nine pairs on Santa Cruz in 2012. Although no additional pairs were observed on Santa Rosa in 2011, we could have pair formation among some of the younger birds that are on the island. Therefore, in 2012, there could be 15-20 breeding pairs on the California Channel Islands.

## **RECOMMENDATIONS**

Because more of the younger eagles will be of breeding age in 2012, we recommend that continued efforts be made to search for new nesting pairs on the Channel Islands. Personnel should spend February through May surveying Catalina, Santa Cruz and Santa Rosa, and respond to sightings of adults on other islands. Continued efforts should be made to survey the more inaccessible portions of the islands by foot, boat, and helicopter.

We did not survey Santa Rosa or San Miguel by helicopter in 2011 because of the high cost and surveys have proven to be ineffective in locating nests. In 2012, we suggest doing a helicopter survey of the coast of Catalina, which has not been intensively surveyed in several years because we have not had access to a boat and much of the coast is difficult to view from land.

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