

**Bald Eagle Restoration on the Northern Channel Islands,
California
January — December 2005
4th Annual Report**



Restoring Natural Resources
harmful by DDTs and PCBs

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California
January — December 2005
4th 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. Since that time, 46 eagles have been released on the island. The birds have been released using a technique called "hacking" and the population has been intensively monitored to determine how well they have adapted to the new environment and whether they are accumulating body burdens of organochlorine contaminants that could prohibit successful breeding.

IWS released 12 eagles from hacking towers in 2005, bringing the total number of birds released since 2002 to 46. These eagles were acquired from captive-breeding eagles at the San Francisco Zoo (11 birds) or wild nests in Alaska (1 bird that recovered from avian pox). Each bird was equipped with a GPS/VHF telemetry package to allow post-release monitoring. Two of this year's released eagles died. One died in September when it got stuck in a flume at a fish hatchery in Washington and the Alaskan bird died of unknown causes on Santa Cruz Island in November. In addition, a bird was recovered alive on Santa Rosa Island with lead poisoning and a broken wing. That bird was taken to the Orange County Birds of Prey Center for treatment and is expected to fully recover.

As of the end of December 2005, 31 of the 46 bald eagles released are still on the northern Channel Islands (seven from 2002, six from 2003, 11 from 2004, seven from 2005). One bird released in 2005 is alive in Washington. Two other birds released on Santa Cruz in 2003, which have lost their transmitters, were on the mainland during 2005. In addition to the birds released on Santa Cruz, three eagles previously released on Santa Catalina Island are now on Santa Cruz Island and there have been several sightings of unmarked bald eagles on the northern Channel Islands.

Bald eagles on Santa Cruz Island have been observed feeding primarily on feral pig

carcasses, although they occasionally have been seen feeding upon marine mammal carcasses in the Chinese Harbor area. Bald eagles have continued to use Santa Rosa Island, especially during 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.

It is unknown whether bald eagles on the northern Channel Islands will ingest enough DDT-contaminated food to affect their breeding in the future. In 2005, IWS trapped two eagles released in 2002 and collected blood for contaminants analyses. We also have continued collection of potential food items to evaluate DDE contamination.

The high survival and retention rates of released bald eagles on the northern Channel Islands are reason for optimism regarding the success of the program. The continued movement of eagles among the islands indicates that the releases on Santa Cruz Island are likely to restore bald eagles to two or more of the northern Channel Islands. Additionally, the sightings of unmarked bald eagles and eagles from Catalina indicate that other eagles are being attracted to the islands, further increasing the population of bald eagles on the northern Channel Islands.

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, U.S. Navy, Alaska Department of Fish and Game, U.S. Forest Service, and the Avian Conservation Center (ACC) at the San Francisco Zoo. 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 Northern 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, but 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 was on Anacapa Island in 1949 (Kiff 1980). The decline in bald eagle populations in southern California was concurrent with declines in seabird breeding success in the Southern California Bight and with continent-wide declines in bald eagle populations, much of which was also attributed to the impacts of DDT (Risebrough et al. 1971, Anderson et al. 1975, Grier 1982, Wiemeyer et al. 1984).

Efforts to restore bald eagles on the California Channel Islands began in 1980 when 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, CA (Fig. 1). Between 1980 and 1986, 33 eagles were released on the island from three different artificial nest or "hacking" platforms (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 implicated this contaminant as the causal agent of the lack of productivity (Garcelon et al. 1989). Eggs removed from nests on Santa Catalina Island exhibited little thinning of the shell, but exhibited areas of gross structural abnormalities of the eggshell that resulted in rapid water loss and a weakening of the eggshell (Risebrough 1998). Mean levels of DDE in egg remains removed from nests in 1987 and 1988 were twice as high as that which has been shown to cause complete reproductive failure (Wiemeyer et al. 1984), indicating that there was still a large amount of DDE in the food chain.

The probable source of the DDE was discovered around 1970. The Montrose Chemical Corporation, which was once the largest DDT manufacturer in the world, is believed to have dumped DDT from their Torrance, California facility through the sewer systems emptying into the ocean at White's Point on the Palos Verdes Peninsula from 1947 to the early 1970s. In 1990, the U.S. Department of Justice and the California Attorney General filed a lawsuit against this company, alleging that they were responsible for releasing DDT and other hazardous chemicals into the environment. In December 2000 a settlement was reached that provided \$30 million for natural resource restoration in the Southern California Bight, including bald eagles (Department of Justice press release, 12/19/00).

The Montrose Settlements Restoration Program was developed to oversee the settlement

monies set aside for natural resource restoration. The Trustee Council that oversees the program is composed of representatives of Federal and State agencies that have interests in the Southern California Bight, including the National Oceanic and Atmospheric Administration (NOAA), United States Fish and Wildlife Service (FWS), National Park Service (NPS), California Department of Fish and Game, California State Lands Commission, and the California Department of Parks and Recreation.

In April 2002, the Trustee Council approved funding to begin an experimental reintroduction of bald eagles to the northern Channel Islands, which are further from the pollution source and could have low enough levels of contaminants in the food chain to allow successful reproduction by bald eagles. The project and funding was administered through the National Park Service, Channel Islands National Park, who contracted with IWS to begin a 5-year experimental reintroduction. The project called for IWS to release 12 bald eagles per year on Santa Cruz Island and then carefully monitor the population to determine how well they adapted to the new environment and whether they accumulated body burdens of organochlorine contaminants that would prohibit successful breeding. Reintroduction through hacking has been a successful tool in reestablishing bald eagles and other raptor species into formerly occupied habitat (Newton 1988, Nye 1988, Cade 2000) and IWS has already reintroduced bald eagles as a nesting population on Santa Catalina Island, showing that the technique could be successful on the Channel Islands (Garcelon 1988).

This report summarizes the fourth season of releases and monitoring conducted from January through December 2005.

STUDY AREA

Santa Cruz Island is located approximately 20 miles off the coast of Ventura and Santa Barbara counties. 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 km² with 124 km of shoreline and 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

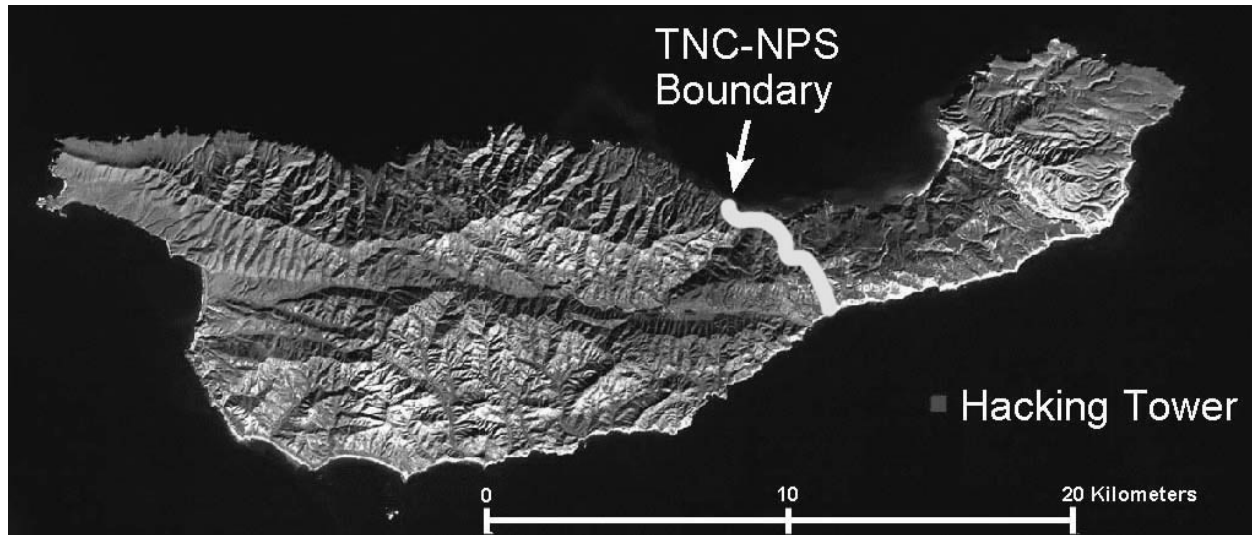


Figure 2. Santa Cruz Island, California with the boundary between The Nature Conservancy (TNC) and National Park Service (NPS) properties.

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.

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 the bald eagle restoration feasibility study 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 the eaglets prior to release and a Letter of Authorization from NOAA that allows collecting and possessing biological samples from dead marine mammals for contaminant and stable isotope analyses.

Bald Eagle Acquisition

In 2005, 11 of the 12 young bald eagles were acquired from the Avian Conservation Center (ACC) at the San Francisco Zoo, CA. The twelfth eagle was removed from a nest near

Juneau, Alaska in 2004 and kept in captivity until 2005 because it had a severe case of avian pox.

Bald Eagle Hacking

The eagles were placed in one of two hacking towers (North or South Tower) upon arrival on Santa Cruz Island (Fig. 2). Two to four birds were placed in each cage and fed fish and feral pig (*Sus scrofa*) until their release. Each cage was monitored remotely using a wireless video system to ensure that each bird was eating and healthy. We also kept daily records of how much food was placed in and removed from each cage, as well as of the general behavior and appearance of each bird.

When they were approximately 11 weeks old, we fitted each bird with a combination satellite/VHF transmitter (Fig. 3), patagial wing markers, and Fish and Wildlife Service leg band. The satellite transmitters record GPS locations of the bird and then upload them to a satellite approximately every three days. This would allow us to relocate birds that we were unable to find using traditional VHF telemetry. We also collected ~10 cc of blood from each bird for baseline contaminant analyses.



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

When the birds were approximately 12 weeks old, we opened the release doors on each cage. It took up to two weeks for the birds to fledge from the towers. We continued to place food items in and around the towers to provide a known food source for the birds while they developed their flight/scavenging skills.

Post-Release Monitoring

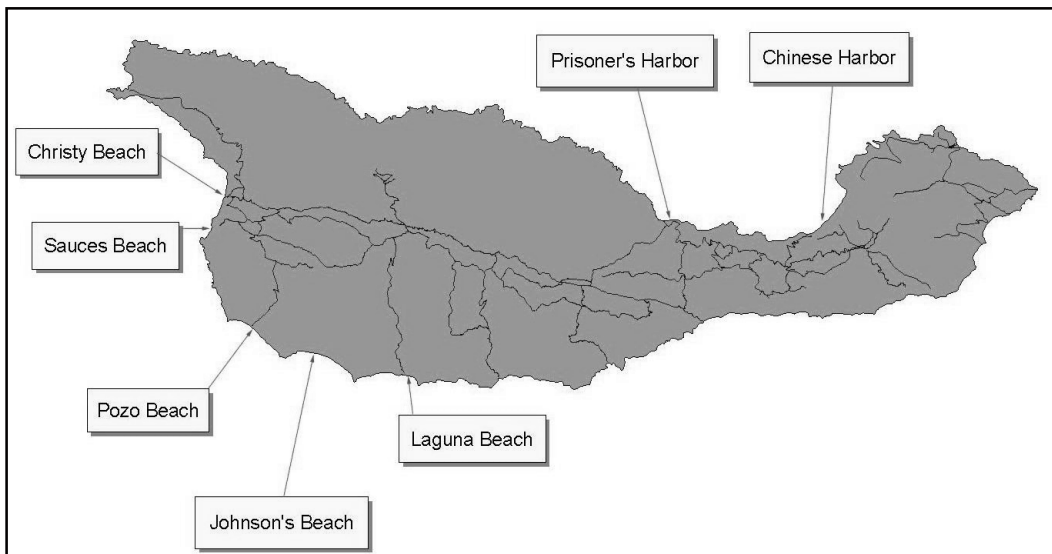
Following the release of the eagles we closely monitored each bird to ensure that they were finding food and healthy. We usually were able to locate the birds for visual monitoring using a VHF telemetry receiver (Model R1000, Communications Specialists, Inc., Orange, California).

Eagles that we were unable to locate using VHF telemetry could usually be relocated using the GPS data that we retrieved via computer from Argos, Inc. (Largo, Maryland) satellites. We attempted to locate each bird at least 2-3 times per week. We also placed Cuddeback digital trail cameras at carcasses to assist us in identifying feeding birds and help verify that individuals were finding food.

Beach Watch Surveys

To gain a better understanding of the potential contamination that bald eagles might acquire by feeding on beached animals, IWS biologists conducted monthly surveys of seven beaches on

Santa



Cruz:

Figure 4. Locations of beaches on Santa Cruz Island, California where monthly surveys were conducted for beached carcasses from January to December 2005.

Chinese Harbor, Prisoner's Harbor, Laguna Beach, Johnson's Beach, Pozo Beach, Sauces Beach, and Christy Beach (Fig. 4). Beaches were monitored at low tide to maximize likelihood of finding beached organisms. Data were collected by walking the beaches and recording findings onto a standard datasheet (Appendix I). The information recorded for each carcass located included species (if possible), stage of decomposition, age and sex (if possible), evidence of scavenging, evidence for the cause of death, the presence of oil, and whether a photograph was taken. Carcass location was recorded with a hand-held GPS unit and photographs of carcasses were taken using a Canon PowerShot A70 digital camera. Data were later entered into an Access

(Microsoft Corp., Redmond, Washington) database created by the NPS. Location data were entered into ArcView GIS (ESRI, Redlands, California) to aid in correlating beach use by the eagles with known carcass locations.

When possible, we placed a video camera near marine mammal carcasses to record foraging occurrences by bald eagles. The system consisted of a tripod-mounted color video camera in a weatherproof housing, a VCR in a modified Pelican case, a 12-volt deep-cycle battery, and a flexible solar panel. In order to ensure the safety of the equipment it had to be placed well above high tide near the carcass and the site had to receive direct sunlight for at least several hours per day to recharge the battery.

Trapping

In 2005, we continued efforts to trap older bald eagles to collect follow-up 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 pig carcasses at the trap site to attract eagles to the area. A bownet was placed in the ground, covered with dirt and grass, and baited with a pig hindquarters. Traps were set before daylight and observed from a blind. If a target bald eagle entered the trap we tripped the trigger with a remote control. We collected approximately 10 cc of blood and several breast feathers from each trapped bird. Trapped eagles were also given a West Nile vaccine and if necessary their transmitter was replaced with a refurbished unit.

Tissue Sampling

To determine bald eagle exposure to contaminants through their diet and to create a stable isotope food web model, samples of bald eagle blood and feathers, and other tissue (muscle and adipose) samples of feral pigs, marine mammals, and seabirds were collected for analyses. These sample analyses will be used to predict the likelihood of successful future bald eagle reproduction on the northern Channel Islands. The protocol for tissue collection was developed

by the FWS and IWS (Appendix II) and finalized in September 2003. Samples were stored in chemically clean glass containers and frozen for later shipment to the Woods Hole Group for DDE/PCB analyses, and Northern Arizona University for stable isotope analyses.

RESULTS

Bald Eagle Acquisition

On 1 June, seven young bald eagles produced at the San Francisco Zoo's ACC facility were flown by private plane to Camarillo, California. These birds were taken by boat to Santa Cruz Island on the morning of 2 June and placed in the South Tower.

On 22 June we transported three eaglets produced at the ACC to Santa Cruz Island by plane. These birds were placed into the North Tower. The remaining two birds, one from the ACC and one from Alaska that had recovered from avian pox, were transported to Santa Cruz Island on 7 July and placed in the North Tower.

Bald Eagle Hacking

Three birds from the ACC that were placed into the South Tower were banded on 29 June (Table 1). We banded the remaining four birds in the South Tower on 30 June. These birds were released on 2 July. The birds in the North Tower were banded on 15 July and released on 20 July (Table 1).

Post-Release Monitoring

IWS personnel began daily post-fledging tracking and monitoring of the eagles as soon as the nest box doors were opened. Food, in the form of feral pig carcasses, was placed in front of the hack tower initially, and then moved further from the towers to encourage the young birds to search for food.

Table 1. Identification, release information, and current status of bald eagles released on Santa Cruz Island, California 2005.

FWS Leg Band	Sex ^a	Patagial Marker	Source ^b	Release Point	Release Date	Status/Latest Location ^c
629-47385	F	A-34	Zoo	South Tower, Box 3	7/02/05	Alive on Santa Rosa Island
629-47386	F	A-35	Zoo	South Tower, Box 3	7/02/05	Orange Co. Birds of Prey
629-47387	F	A-36	Zoo	South Tower, Box 3	7/02/05	Alive on Santa Cruz Island
629-47388	F	A-37	Zoo	South Tower, Box 4	7/02/05	Alive on Santa Cruz Island
629-47389	M	A-38	Zoo	South Tower, Box 4	7/02/05	Died in WA around 9/26/05
629-47390	M	A-39	Zoo	South Tower, Box 4	7/02/05	Alive in Washington State
629-47391	M	A-40	Zoo	South Tower, Box 4	7/02/05	Alive on Santa Cruz Island
629-47392	M	A-41	AK	North Tower, Box 2	7/12/05	Died on Santa Cruz 11/4/05
629-47393	F	A-42	Zoo	North Tower, Box 2	7/12/05	Alive on Santa Rosa Island
629-47399	F	A-43	Zoo	North Tower, Box 1	7/20/05	Alive on Santa Rosa Island
629-47400	M	A-44	Zoo	North Tower, Box 1	7/20/05	Alive on Santa Rosa Island
629-02800	M	A-45	Zoo	North Tower, Box 1	7/20/05	Alive on Santa Cruz Island

^a Determined by karyotyping for birds from San Francisco Zoo, California and morphometrics for Alaskan birds.

^b Bald eagles from the San Francisco Zoo, California (Zoo), wild nests near Juneau, Alaska (AK).

^c Status as of 31 December 2005.

A-34 Movements

Eagle A-34 remained on Santa Cruz Island until 5 October, at which time it flew to Santa Rosa Island. It remained on Santa Rosa through the rest of 2005 (Fig. 5).

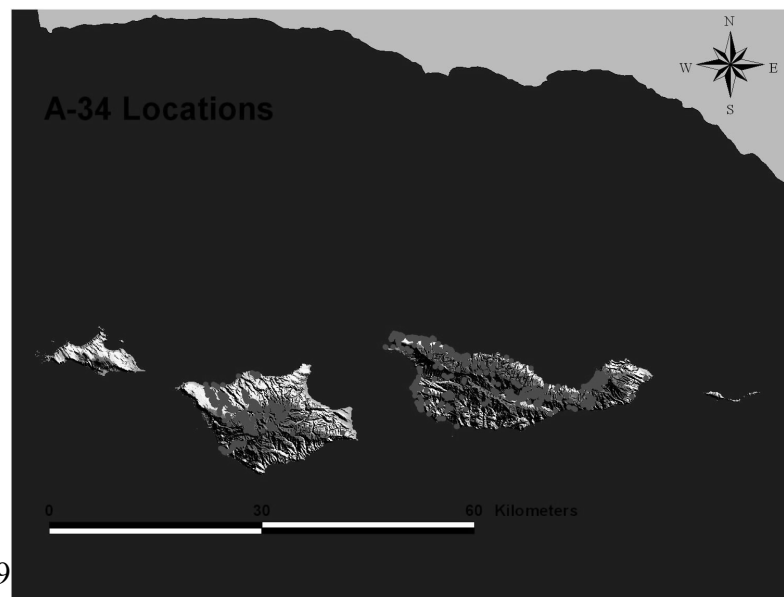


Figure 5. Movements of Bald Eagle A-34 on the northern

A-35 Movements

Eagle A-35 remained on Santa Cruz Island for about 1.5 months following its release. On 16 August it flew to Santa Rosa Island, where it remained until December (Fig. 6). In mid-December the GPS data indicated that the bird was not moving more than 50 m per day. On 19 December we flew to Santa Rosa Island and found A-35 on the ground with a broken wing. It was transported to the mainland on 20 December and examined by IWS veterinarian Winston Vickers. Blood was collected for analyses and the bird was found also to have lead poisoning, with a blood lead level of 52.2 micrograms/dl ("normal" level for eagles and condors is 6 - 12 micrograms/dl according to IDEXX, Westbrook, ME). The bird was then transported to the Orange County Birds of Prey Center where it underwent treatment for lead poisoning and for the broken wing. We plan on releasing it back onto Santa Cruz Island in the spring of 2006.

A-36 Movements

Eagle A-36 remained on Santa Cruz Island until 28 September. It flew to Santa Rosa

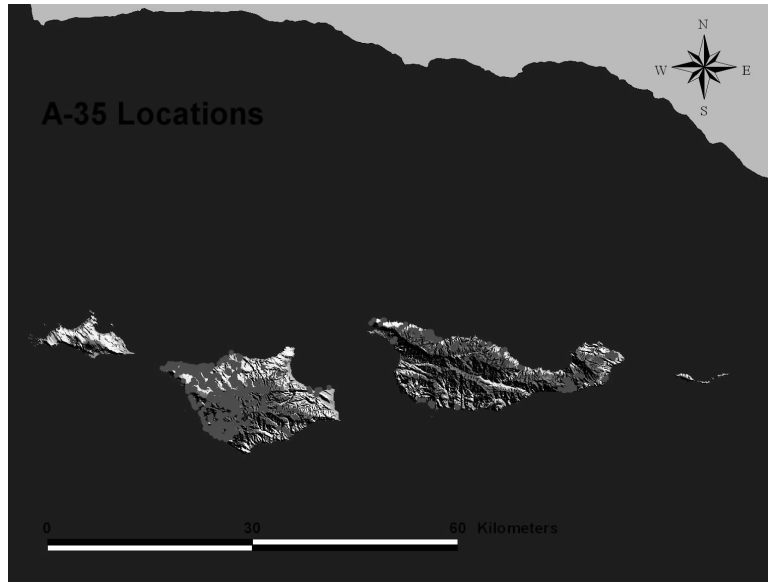


Figure 6. Movements of Bald Eagle A-35 on the northern Channel Islands, California in 2005.

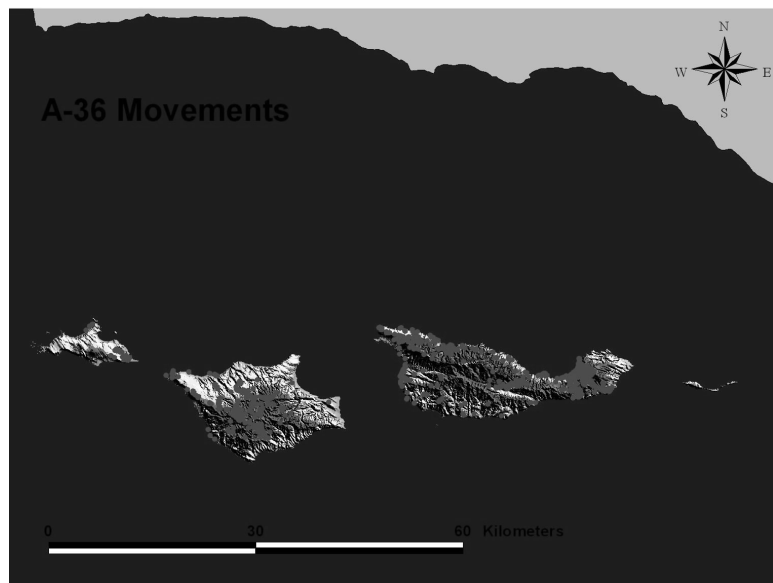


Figure 7. Movements of Bald Eagle A-36 on the northern Channel Islands, California in 2005.

Island and remained there until at least 11 November. There was a gap in the GPS data until 15 November, at which time the bird was on San Miguel Island. It flew back to Santa Rosa Island on 19 November, stayed a week, and then flew to Santa Cruz Island, where it remained through December (Fig. 7).

A-37 Movements

Eagle A-37 remained on Santa Cruz Island until 28 September, at which time it flew to Santa Rosa Island. It remained on Santa Rosa Island until 27 November before returning to Santa Cruz Island. It remained on Santa Cruz through the end of the year (Fig. 8).

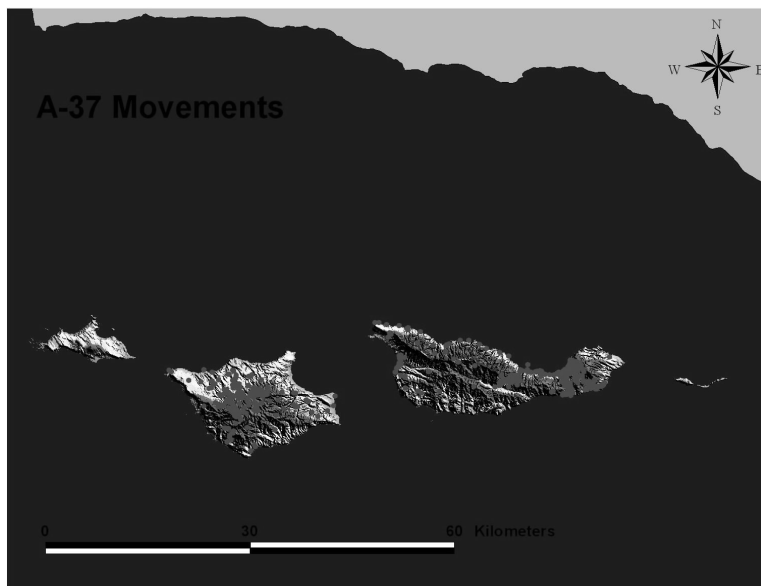


Figure 8. Movements of Bald Eagle A-37 on the northern Channel Islands, California in 2005.

A-38 Movements

Eagle A-38 stayed on Santa Cruz Island until 18 July and then flew to Anacapa Island for nearly a month. It returned to Santa Cruz for two days on 17 August and then began making regular flights between Santa Cruz and Anacapa Islands every 2-6 days until 5 September. On 5 September, A-38 flew due east from Anacapa Island to the mainland between 1400 and



Figure 9. Movements of Bald Eagle A-38 in the western United States in 2005.

1500 hours. It crossed into Oregon on 11 September and into Washington on 17 September (Fig. 9). On 27 September we received a report that the bird had been found dead in a flume at a private trout farm. It had apparently been unable to extricate itself from the narrow flume and either drowned or died of hypothermia.

A-39 Movements

Eagle A-39 stayed on Santa Cruz Island until 18 August, at which time it flew due east to the mainland between 1300 and 1700 hours (Fig. 10). It crossed into Oregon on 24 August and into Washington on 27 August. It stayed near the southernmost arm of the Puget Sound until we lost its satellite data on 29 October

and did not receive any more information through the end of the year (it began transmitting again in 2006). A-38 and A-39 ended up within 5 km of each other in Washington, even though they left the islands at different times and took different routes north (Figs. 9 and 10).

A-40 Movements

Eagle A-40 remained on Santa Cruz Island until 9 September. It spent 9 September through 28 September on Santa Rosa Island and then spent two days on San Miguel Island (Fig. 11). The bird returned to Santa



Figure 10. Movements of Bald Eagle A-39 in the western United States in 2005.

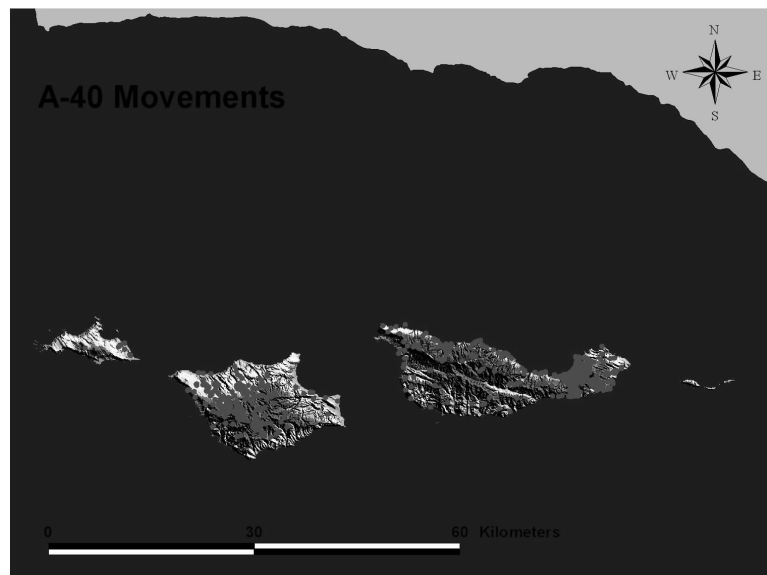


Figure 11. Movements of Bald Eagle A-40 on the northern Channel Islands, California in 2005.

Rosa Island on 30 September and then returned to Santa Cruz Island for two days on 15 October. It spent 16 October through 22 November on Santa Rosa before returning to Santa Cruz, where it spent the rest of the year.

A-41 Movements

Eagle A-41 was originally removed from a nest in Alaska in 2004. Once on Santa Cruz Island it started showing signs of an infection of avian pox. It was kept in captivity on Santa Cruz Island, and then later on Santa Catalina Island, until its lesions disappeared in 2005. Once released it spent most of its time on the beaches on the eastern end of the island (Fig. 12). We observed the bird many

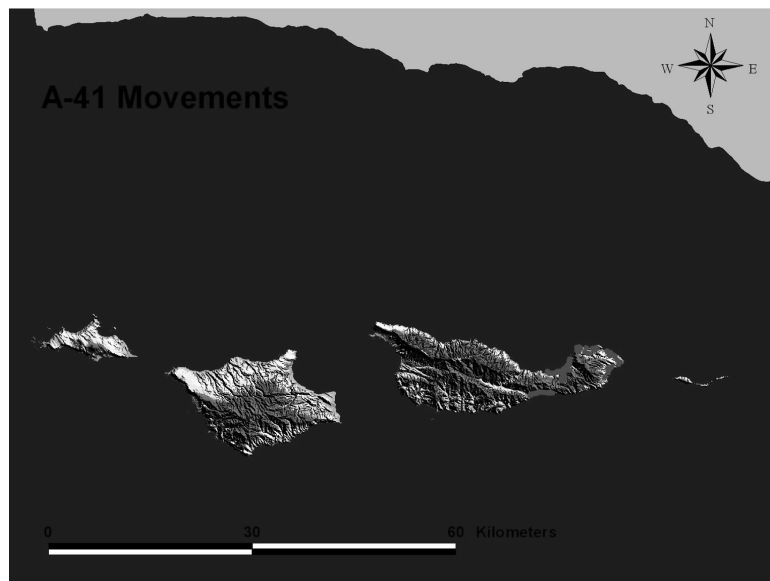


Figure 12. Movements of Bald Eagle A-41 on the northern Channel Islands, California in 2005.

times, but it never seemed to leave the beaches on the eastern portion of the island. We continued to monitor the bird until it was found dead near the beach at Valley Anchorage on 4 November. Cause of death was possibly starvation because it did not move into the interior of the island where there was plentiful food in the form of feral pig carcasses.

A-42 Movements

Eagle A-42 stayed on Santa Cruz Island until 25 July. It then flew to Anacapa Island where it stayed until 18 August (Fig. 13). It then flew back to Santa Cruz Island, spending less than a week on the island. It left Santa Cruz around noon on 23 August, spending less than five hours on Santa Rosa Island before flying to San Miguel Island (visited three islands in less than 5 hours). It stayed on San Miguel for a day before returning to Santa Rosa Island, where it spent the rest of the year.

A-43 Movements

Eagle A-43 remained on Santa Cruz Island through 5 October, except for a one hour visit to Anacapa Island on 12 September. On 6 October it flew to Santa Rosa Island, where it remained until 16 October. On 16 October it flew to San Miguel Island, but returned to Santa Rosa by 17 October, where it remained through the rest of the year (Fig. 14).

A-44 Movements

Eagle A-44 remained on Santa Cruz Island until 30 July, when it flew to Anacapa Island. It remained on Anacapa for nearly a month before returning to Santa Cruz Island on 27 August (Fig. 15). It stayed on Santa Cruz until it flew to Santa Rosa Island on 20 September, where it remained through the end of the year.

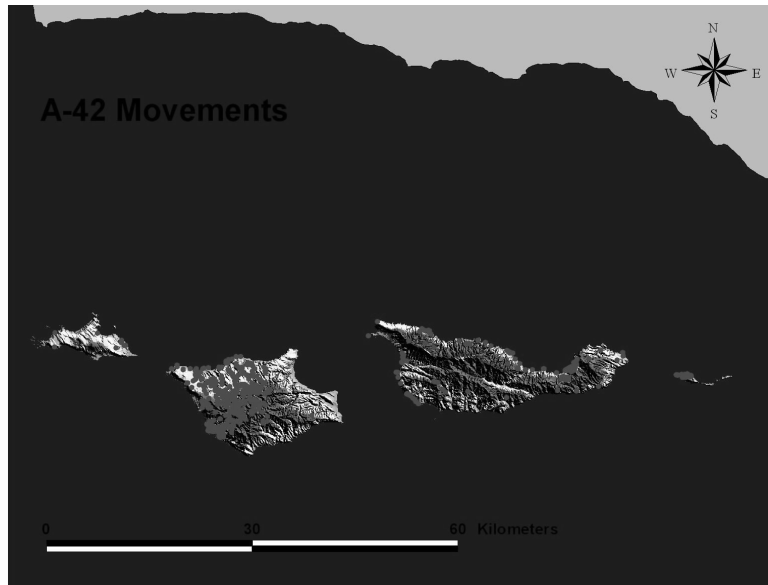


Figure 13. Movements of Bald Eagle A-42 on the northern Channel Islands, California in 2005.

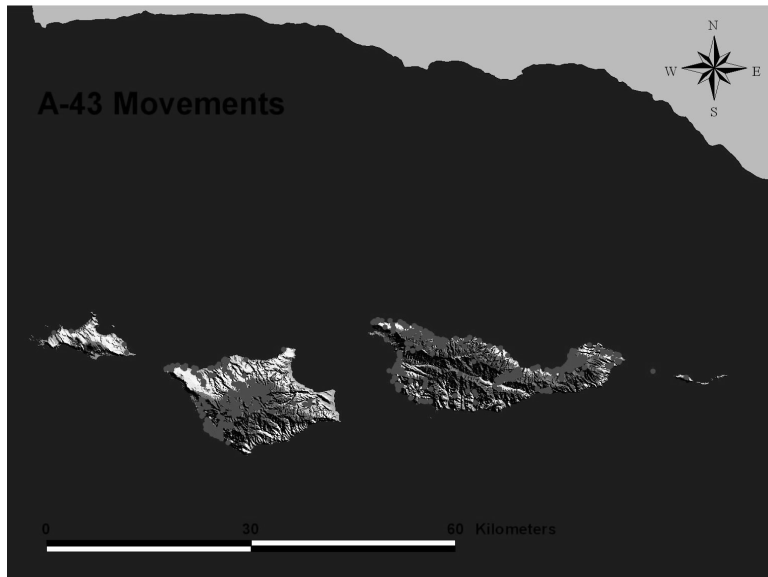


Figure 14. Movements of Bald Eagle A-43 on the northern Channel Islands, California in 2005.

A-45 Movements

Eagle A-45 moved among the four northern Channel Islands more than any other 2005 release (Fig. 16). After its release, it stayed on Santa Cruz Island until 12 August, at which time it flew to Anacapa Island. It returned to Santa Cruz Island on 17 August, where it remained until 10 September. It flew to Anacapa Island on 10 September, returned to Santa Cruz on 11 September, flew back to Anacapa on 12 September, and returned to Santa Cruz on 13 September. A-45 remained on Santa Cruz until 28 September, at which time it flew to Santa Rosa Island. It flew to San Miguel Island on 16 October, returned to Santa Rosa Island on 17 October, and then flew to Santa Cruz Island on 12 December, where it remained through the end of the month.

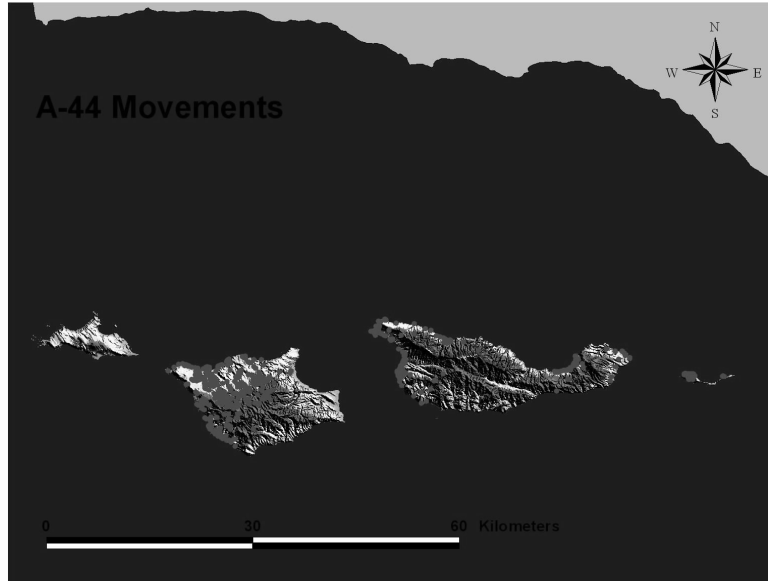


Figure 15. Movements of Bald Eagle A-44 on the northern Channel Islands, California in 2005.

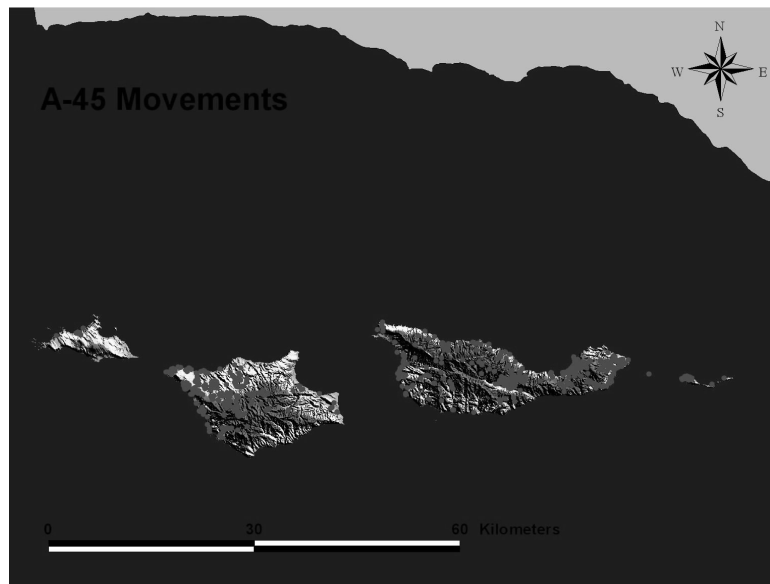


Figure 16. Movements of Bald Eagle A-45 on the northern Channel Islands, California in 2005.

In addition to monitoring the newly released eagles, IWS continued to monitor the birds released in 2002 through 2004. Below is a brief summary of the movements and status of these birds during 2005. Each bird is referred to by its patagial tag number (Table 2).

Table 2. Identification, release information, and current status of bald eagles released on Santa Cruz Island,

California during 2002-2004.

FWS Leg Band	Sex ¹	Patagial Marker	Source ²	Release Point	Release Date	Fledge Date	Status, Latest Location ³
629-02795	M	A-00	Zoo	North Tower, Cage 1	6/25/02	6/26/02	Alive, Santa Cruz Is.
629-02796	F	A-01	Zoo	North Tower, Cage 1	6/25/02	6/28/02	Unknown
629-02798	F	A-02	Zoo	North Tower, Cage 2	6/25/02	6/30/02	Alive, Santa Cruz Is.
629-02797	F	A-03	Zoo	North Tower, Cage 2	6/25/02	6/30/02	Dead
629-14042	F	A-04	Alaska	North Tower, Cage 2	8/15/02	8/15/02	Alive, Santa Cruz Is.
629-14041	F	A-05	Alaska	North Tower, Cage 2	8/15/02	8/15/02	Dead
629-14043	M	A-06	Zoo	North Tower, Cage 1	8/19/02	8/20/02	Alive, Santa Rosa Is.
629-14044	M	A-07	Alaska	North Tower, Cage 1	8/17/02	8/20/02	Dead
629-14045	M	A-08	Alaska	South Tower, Cage 3	8/26/02	8/27/02	Alive, Santa Rosa Is.
629-14046	F	A-09	Alaska	South Tower, Cage 3	8/26/02	8/27/02	Dead
629-14047	F	A-10	Alaska	South Tower, Cage 4	9/7/02	9/9/02	Alive, Santa Rosa Is.
629-14048	F	A-11	Alaska	South Tower, Cage 4	9/7/02	9/9/02	Alive, Santa Cruz Is.
629-47354	F	A-12	Zoo	North Tower, Cage 2	6/13/03	6/13/03	Alive, mainland
629-47355	F	A-13	Zoo	North Tower, Cage 2	7/01/03	7/01/03	Alive, mainland
629-47364	M	NA	Zoo	North Tower, Cage 1	7/25/03	7/25/03	Alive, Rehab.
629-47361	F	A-14	Alaska	South Tower, Cage 3	8/21/03	8/23/03	Dead
629-47357	M	A-15	Zoo	North Tower, Cage 1	7/25/03	7/25/03	Dead
629-47359	F	A-16	Alaska	South Tower, Cage 3	8/21/03	8/22/03	Alive, Santa Rosa Is.
629-47360	F	A-17	Alaska	South Tower, Cage 3	8/21/03	8/23/03	Alive, Santa Rosa Is.
629-47362	F	A-18	Alaska	South Tower, Cage 4	8/21/03	8/23/03	Dead
629-47363	F	A-19	Alaska	South Tower, Cage 4	8/21/03	8/21/03	Alive, Santa Cruz Is.
629-47358	F	A-20	Alaska	North Tower, Cage 2	8/31/03	9/02/03	Dead
629-47356	M	A-21	Alaska	North Tower, Cage 2	8/31/03	9/02/03	Alive, Santa Cruz Is.
629-47365	F	A-22	Zoo	North Tower, Cage 1	7/09/04	7/09/04	Alive, Santa Cruz Is.
629-47366	F	A-23	Zoo	North Tower, Cage 2	7/26/04	7/26/04	Unknown
629-47372	F	A-24	Alaska	South Tower, Cage 4	8/18/04	8/31/04	Alive, Santa Rosa Is.
629-47373	M	A-25	Alaska	South Tower, Cage 4	8/18/04	8/18/04	Dead
629-47374	M	A-26	Alaska	South Tower, Cage 4	8/18/04	8/23/04	Dead

Table 2. Continued.

FWS Leg Band	Sex ¹	Patagial Marker	Source ²	Release Point	Release Date	Fledge Date	Status, Latest Location ³
629-47375	F	A-27	Alaska	South Tower, Cage 3	8/19/04	8/27/04	Alive, Santa Rosa Is.
629-47376	M	A-28	Alaska	South Tower, Cage 3	8/19/04	8/24/04	Alive, Santa Rosa Is
629-47377	M	A-29	Alaska	South Tower, Cage 3	8/19/04	8/23/04	Alive, Santa Cruz Is.
629-47378	F	A-30	Rehab	South Tower, Cage 4	8/19/04	8/19/04	Dead
629-47379	F	A-31	Alaska	North Tower, Cage 1	9/12/04	9/12/04	Unknown
629-47380	F	A-32	Alaska	North Tower, Cage 1	9/12/04	9/12/04	Alive, Santa Cruz Is.
629-47381	M	A-33	Alaska	South Tower, Cage 4	10/9/04	10/9/04	Alive, Santa Cruz Is.

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), or Shasta Wildlife Rescue and Rehabilitation Center, Redding, California (Rehab).

³ As of 12/31/05.

A-00 Movements

A-00 has visited all of the northern Channel Islands and the mainland since its release in 2002. The bird's GPS transmitter fell off on Anacapa in May 2003. The bird was observed on Santa Cruz Island on 17 March 2005.

A-02 Movements

Eagle A-02 was recaptured on Santa Cruz Island on 7 April 2005 and equipped with a new GPS/VHF transmitter. It spent most of 2005 on Santa Cruz Island (Fig. 17), although it flew to Santa Rosa Island on 28 September and remained there through at least 15 October. We received no GPS data from 16-24 October, but the bird

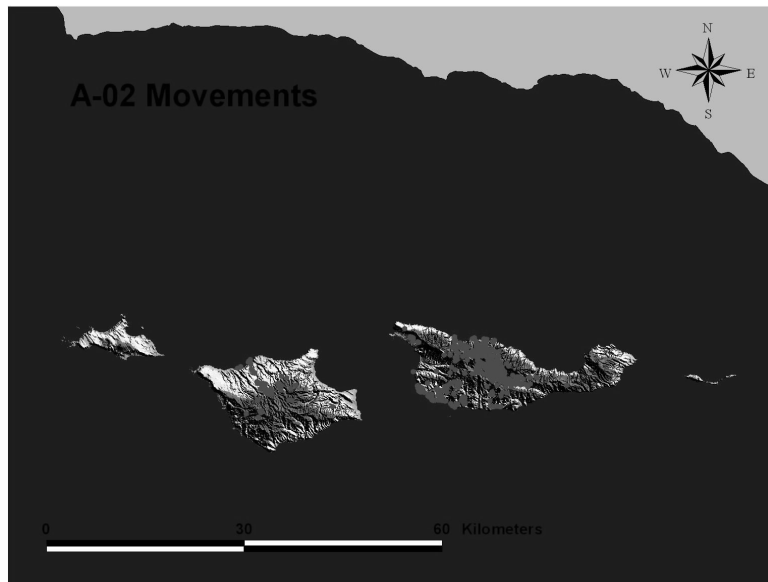


Figure 17. Movements of Bald Eagle A-02 on the northern Channel Islands, California in 2005.

had returned to Santa Cruz Island by 25 October and remained there through the rest of the year. This bird appears to be forming a territory in the Lady's Harbor area on the north side of Santa Cruz Island.

A-04 Movements

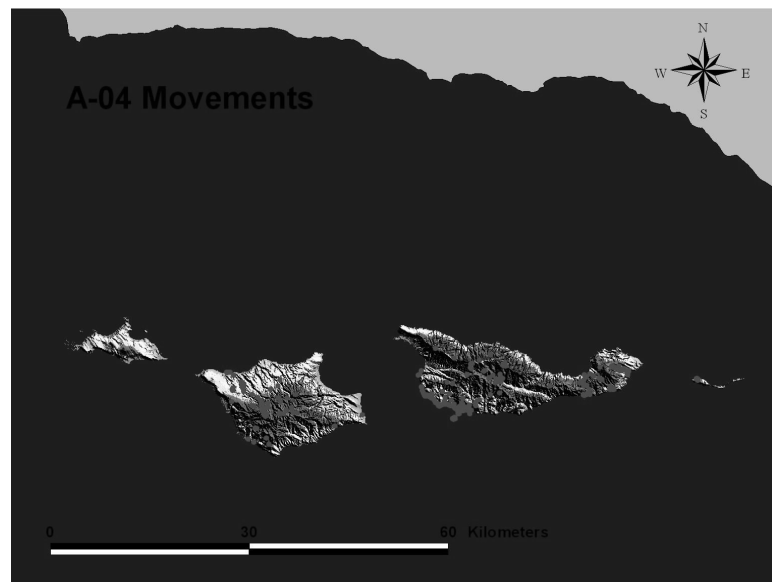
Eagle A-04 was recaptured on 12 August 2005 and equipped with a new GPS/VHF transmitter (Fig. 18). She remained on Santa Cruz Island until 11 September, at which time she flew to Anacapa Island for a day, returning to Santa Cruz on 12 September (Fig. 19). On 16 October, she flew to Santa Rosa Island and remained there through 25 November. On 26 November, she returned to Santa Cruz Island and remained there through December. Most of her GPS points were in the Punta Arena area on the southwest portion of the island in the later part of the year, suggesting she may be establishing a territory there.

A-10 Movements

Eagle A-10 dropped its transmitter in December 2002. It was seen on Santa Rosa Island on 22 April 2005.

A-11 Movements

Eagle A-11 dropped its transmitter in September 2003.



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