

**BEACH WALK MONITORING
ON THE NORTHERN CHANNEL ISLANDS, CALIFORNIA
2005 ANNUAL REPORT**



CHANNEL ISLANDS NATIONAL PARK

Cover image: Smugglers Cove, Santa Cruz Island, April 2005

**National Park Service
Channel Islands National Park**

Technical Report

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ABSTRACT

The 2005 results are presented for the Channel Islands National Park Beach Walk Monitoring Program. This program was conducted by the National Park Service and the Institute of Wildlife Studies with funding from the Montrose Settlements Restoration Program. The primary objective of the program was to better understand the potential for contamination that the Bald Eagles might acquire by feeding on carcasses at the islands. To accomplish this, a program of Beach Walk surveys was initiated in 2002 to determine the timing and distribution of animal carcasses being deposited on island beaches. In 2005, nine beaches on Santa Cruz Island were monitored monthly. Additionally, three beaches were surveyed on San Miguel Island (1 to 3 times) and nine beaches were surveyed on Santa Rosa Island (1 to 3 times). Standard protocols were used to conduct the surveys. Carcasses encountered were identified to species if possible and other information was collected, such as condition of the carcass, whether it was scavenged, or if it was oiled. Other information about the presence of humans, animals, and types and relative amounts of tar and marine debris was also recorded. In 2005, 125 beach surveys were conducted. Of those, 93 were on Santa Cruz Island, 25 were on Santa Rosa Island, and seven were on San Miguel Island. A total of 178 carcasses were observed. Of that number, 27 percent of the carcasses were birds and 65 percent were pinnipeds. Fish, invertebrates and other mammals comprised about seven percent of the total. At least 20 different species of birds were represented, almost all were seabirds. Among the marine mammals, the California Sea Lion (*Zalophus californianus*) was the most abundant, with a total of 63 carcasses. Northern Elephant Seal (*Mirounga angustirostris*) carcasses numbered 24, and Harbor Seals (*Phoca vitulina*) seven. There was one unidentified pinniped, and two unidentified birds. The majority of dead sea lions were adults, while most of the elephant seal carcasses were immature animals.

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EXECUTIVE SUMMARY

Bald Eagles (*Haliaeetus leucocephalus*) were released on Santa Cruz Island in 2002 and 2003 as part of a study to determine the feasibility of restoring them to the northern Channel Islands off the coast of southern California. Bald Eagles once nested on all the northern Channel Islands, but the introduction of DDT into the Southern California Bight led to their disappearance by the early 1960's.

To better understand the potential for contamination that the Bald Eagles might acquire by feeding on carcasses, a program of Beach Walk surveys was initiated in 2002. In 2005, nine beaches on Santa Cruz Island were monitored monthly by biologists from the Institute for Wildlife Studies and the National Park Service with funding from the Montrose Settlements Restoration Program. Additionally three beaches were surveyed on San Miguel Island (1 to 3 times) and nine beaches were surveyed on Santa Rosa Island (1 to 3 times) by National Park Service biologists.

Standard protocols were used to conduct the surveys. Carcasses encountered were identified to species if possible and other information was collected, such as condition of the carcass, whether it was scavenged, or if it was oiled. Other information about the presence of humans, animals, and types and relative amounts of tar and marine debris was also recorded. Marine mammal carcasses were of most interest because of the potential for high contaminant levels, but bird and other animal carcasses were recorded as well.

In 2005, 125 beach surveys were conducted. Of those, 93 were on Santa Cruz Island, 25 were on Santa Rosa Island, and seven were on San Miguel Island. A total of 178 carcasses were observed. Of that number, 27 percent of the carcasses were birds and 65 percent were pinnipeds. Fish, invertebrates and other mammals comprised about seven percent of the total. At least 20 different species of birds were represented, almost all were seabirds. Among the marine mammals, the California Sea Lion (*Zalophus californianus*) was the most abundant, with a total of 63 carcasses. Northern Elephant Seal (*Mirounga angustirostris*) carcasses numbered 24, and Harbor Seals (*Phoca vitulina*) seven. There was one unidentified pinniped, and two unidentified birds. The majority of dead sea lions were adults, while most of the elephant seal carcasses were immature animals.

This was the first year that beached pinnipeds were more abundant than birds on Santa Cruz Island. Also different from previous years, June and July surveys had the highest counts. Those high counts were because of dead sea lions, presumably affected by Domoic Acid poisoning. Domoic Acid is a by product of diatoms (*Pseudo-nitzschia sp.*) which in turn builds up in tissues of planktivores such as sardines, that sea lions and harbor seals eat. Pinnipeds and some seabirds have been affected in increasing numbers in recent years.

Most of the carcasses (90%) were recorded as scavenged. Bald Eagles and other birds have been observed feeding on beached carcasses. Only a few carcasses were lightly oiled, (about three percent of the total) but it is not known whether they were oiled before or after death. Many were in an advanced state of decomposition.

At least 54 species of live animals were observed during surveys in 2005 with over 8,687 individuals counted. Elephant seals and Western Gulls made up about half the total number. Western Snowy Plover counts on Santa Rosa Island were the highest in years with 218 counted on the winter survey in January 2006.

Humans were only observed on nine of the 125 surveys and six of those were at Smugglers Cove or Prisoners Harbor on Santa Cruz Island.

ACKNOWLEDGEMENTS

We thank the Institute for Wildlife Studies (IWS), University of California Natural Reserve, Santa Cruz Island, and The Nature Conservancy (TNC) for conducting surveys and providing access to the island beaches on TNC property. Funding for the project was made available by the Montrose Settlements Restoration Program.



Yellowbanks, Santa Cruz Island, April 2005

INTRODUCTION

In 2002, a Bald Eagle reintroduction program began at Channel Islands National Park with the release of twelve eagles on Santa Cruz Island. Bald Eagles once nested on all the Channel Islands off the coast of southern California, but disappeared by the early 1960s. Contamination from the organochlorine pesticide, DDT, is thought to be the main cause of the disappearance of Bald Eagles from the Southern California Bight. DDE (a metabolite of DDT) levels are magnified through the food chain by bioaccumulation since the chemicals are stored in animal fat and do not readily breakdown.

To gain a better understanding of the potential contamination that Bald Eagles might acquire by feeding on beached animals, a program of Beach Walk surveys was initiated. A pilot study was initiated in June 2002, on East Santa Cruz Island beaches, to adapt the Beach Walk protocol and develop a database. In 2003, monitoring was expanded to include west Santa Cruz, and eventually Santa Rosa, and San Miguel Islands (Richards and Rich 2004). Nine beaches on Santa Cruz Island were monitored monthly by biologists from the Institute for Wildlife Studies (IWS) and the National Park Service (NPS). Quarterly monitoring of seven beaches on Santa Rosa Island began in 2004 and in 2005-2006 we were able to check two more. Two beaches on San Miguel Island were monitored three times in 2005-2006 and third beach (Cardwell Point) was surveyed once.

These surveys also serve as a baseline for natural levels of beached animals at the islands. In the event of an oilspill, disease outbreak, or climate change for example, it would be important to understand the background levels of beached animals to detect changes in quantities and types of carcasses. Monitoring both living and dead animals of beaches is important in understanding changes in the marine ecosystem and this program can assist in the early detection of both natural and man-caused environmental perturbations.

Funding for this program came from the Montrose Settlements Restoration Program. Funding from the restoration program is being re-prioritized in 2006 and the beachwalk monitoring will be discontinued at least in part. Previous results have been reported in Richards and Rich 2004, Rich and Richards, 2005 and various quarterly reports. This report summarizes the results of surveys in 2005 (including January 2006). Snowy Plover counts from winter 2005-2006 are also reported here.

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 with a land area of approximately 98 square miles (24,789 ha) and a coastline of about 76 miles (123 km). In 2004, nine beaches on Santa Cruz Island were monitored monthly by biologists from the Institute for Wildlife Studies (IWS) and the National Park Service (NPS). Beaches monitored include Chinese Harbor, Prisoner's Harbor, Laguna Beach, Johnston's Beach, Poza (aka. Pozo) Beach, Sauces Beach, Christy Beach, Smugglers Cove and Yellowbanks Beach (See Fig.1). These sites were chosen because they are the largest and most accessible beaches covering most of the coastline. The beaches on the northwest portion of the island are generally small pocket beaches and access is difficult except by boat.

Santa Rosa Island is the second largest of the Channel Islands, and lies six miles to the west of Santa Cruz Island, about 26.5 miles off the mainland coast from Santa Barbara. It is about 84 square miles (21,220 ha) with 52 miles (84 km) of coast. The first survey of Santa Rosa beaches was conducted in

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November 2003. In 2005, NPS personnel conducted surveys on eight beaches on a quarterly basis, in May, August, and January (2006). Beaches monitored include Sandy Point, Bee Rock (East and West), Tecalote Canyon, Arlington Canyon, Soledad Canyon, Skunk Point, Water Canyon, and China Camp (including Cluster Point) (See Fig. 1). A single survey was done at Mud Tank Beach in January. Compared to Santa Cruz, Santa Rosa is used more frequently by pinnipeds and there are more beaches that face into the prevailing wind and currents.

San Miguel Island is about 14 square miles (3,796 ha), with 29 miles (46 km) of coastline. It is located three miles west of Santa Rosa Island, and is the farthest west of the Channel Islands. Point Bennett, on the southwestern tip of the island, and Cardwell Point on the southeastern end, are well known pinniped breeding areas. In the past decade Cuyler Harbor and Simonton Cove beaches have been receiving increased use by northern elephant seals, particularly in the winter months, for breeding and general haulouts. Surveys were conducted by NPS personnel on San Miguel Island in January and May of 2005 and January 2006. Beaches monitored include Cuyler Harbor and Simonton Cove (See Fig. 1) and one survey of Cardwell Point. Point Bennett and Southeast Beaches were not sampled because of the sensitivity of large numbers of marine mammals present most of the year.

Wind and current modeling by the Minerals Management Service (MMS) show that Santa Cruz Island has the potential for being the most impacted island in the event of an oil spill. Generally, beaches facing northwest into the prevailing winds are the most susceptible to oil fouling and also to deposition of debris and potentially to beached animal carcasses. A five year marine debris monitoring program from 1989-1993 on Santa Rosa and San Miguel Islands supported this model with Sandy Point on Santa Rosa and Simonton Cove on San Miguel Island having the most debris (Richards 1994). Both beaches face northwest.

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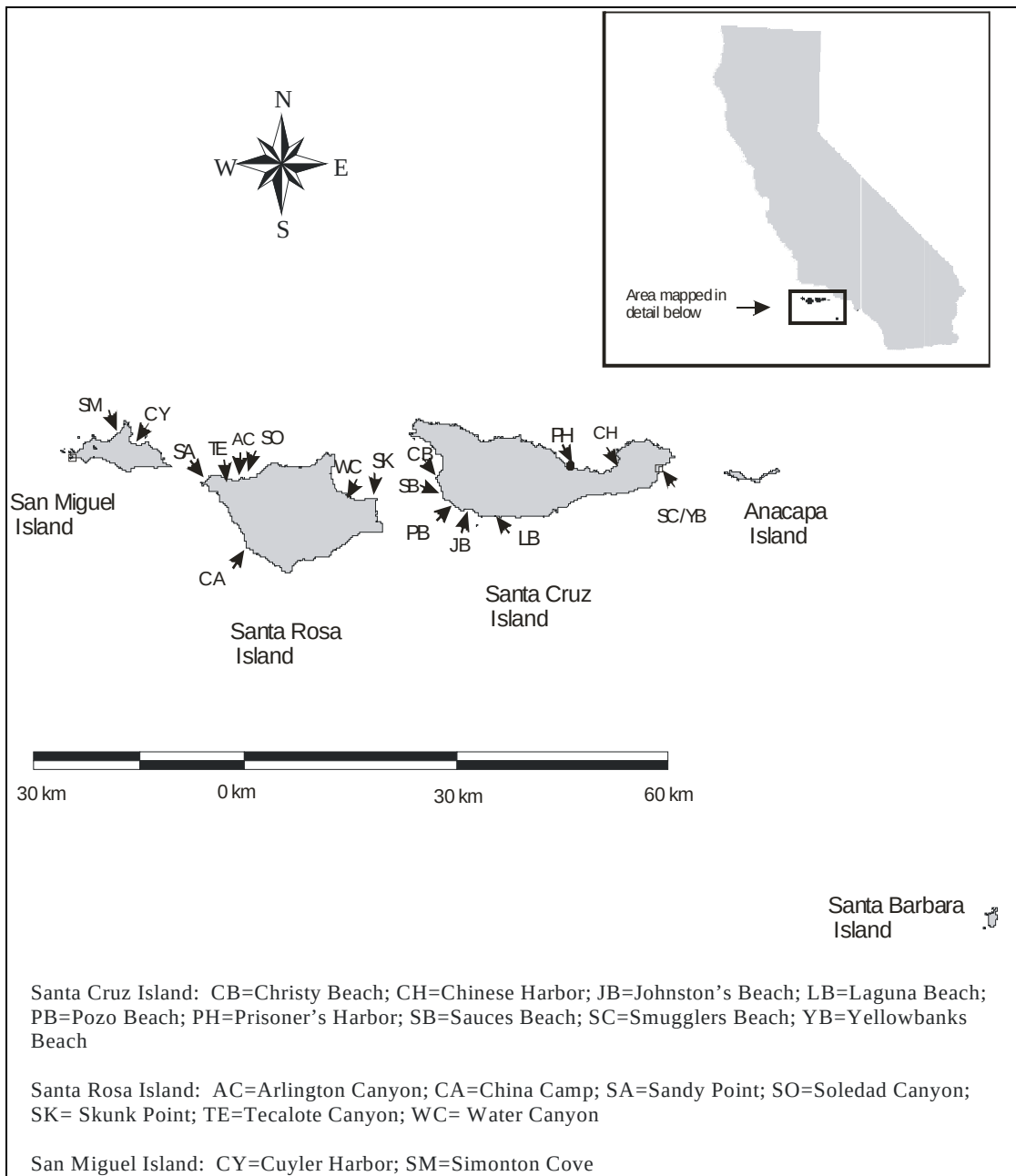


Figure 1. Locations of monitored beached on the Channel Islands

METHODS

The beached animal survey methods were adapted primarily from Beach Watch programs at the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries. A standard data sheet was developed for this program and a handbook was written to describe the program and standardize the field protocol (Richards and Rich 2004). A database was created using Microsoft Access by Laurie Kurilla of Peace of Mind Technology under contract to the NPS.

Beaches were monitored at low tide if possible to maximize the likelihood of finding beached organisms. Biologists walked the beaches monthly or quarterly, documenting findings onto a standard datasheet. Beached animals were the primary interest of the surveys; however, numbers of live animals present and notes on marine debris and human activity were also recorded. Information about each carcass included species identification (if possible), stage of decomposition, age and sex (if possible), presence of tags, evidence of scavenging, evidence for cause of death, the presence of oil, and whether a photograph was taken. Photos are archived for verification of questionable identification and to create a reference/training library for monitors. A toe is clipped from bird carcasses to mark it for future identification, and if found again a second toe is clipped.

Live animals encountered during surveys were identified and counted. Animals with tags were noted if present. Human activity was noted as were signs of animal foraging or plant invasion.

Surveys in 2005 were primarily conducted by Paula Rich (PJR), Dan Richards (DVR), and Rocky Rudolph (RRR) of the National Park Service, and Jessica Dooley (JAD), Dave Rempel (DTR), Chris Little (CML), and Peter Sharp (PBS) of the Institute for Wildlife Studies. (See Appendix A, list of survey dates, locations, and surveyors).

The Santa Cruz beaches were normally sampled once per month. We aimed for quarterly samples at the Santa Rosa and San Miguel beaches. Beaches at each of those islands were surveyed three times with winter survey being conducted in January 2006. Logistics and funding for this project restricted us to monitoring Santa Rosa and San Miguel when we could combine it with other sampling generally, (typically done in conjunction with Rocky Intertidal Monitoring). Occasionally, weather or road conditions prevented access to a beach and a monitoring event was missed. Sometimes a beach not on our Beach Walk schedule was surveyed if the opportunity presents itself. This included Mud Tank and Tecalote Canyon beaches on Santa Rosa Island and Cardwell Point on San Miguel.



Paula Rich recording general notes on tar and beach wrack, Arlington Canyon, Santa Rosa Island, May 2005

RESULTS

Carcass types, amounts, and conditions

In the 2005 sampling season (incl. January 2006), 125 beach surveys were conducted. Of those, 93 were on Santa Cruz Island (SCI), 25 were on Santa Rosa Island (SRI), and seven were on San Miguel Island (SMI). Appendix B summarizes the sites and dates monitored. Tables 1 through 7 summarize the condition, type, and number of beached organisms found on each island.

Tar and debris were subjectively categorized as absent, low, moderate, or high. In 2005, tar was absent or not recorded on 58 beaches, low abundance on 53 beaches, moderate on 12 (7-SCI, 4-SRI, 1-SMI), and high on one (Christy Beach, SCI). Beaches with moderates tar were Smugglers Cove, Sauces, Chinese Harbor, and Christy on SCI; Arlington, Tecalote and Skunk Point on SRI; and Simonton on SMI. Both fresh and weathered tar was found and tar ranged from small balls to sheets nearly 0.5 square meters in size. Tar was often attached to wood and plastic debris. Marine debris was absent or not recorded on only 11 surveys, low on 70, moderate on 38 (32-SCI, 5-SRI, 1-SMI), and high on five (all at Chinese harbor or Christy Beach).

The total number of carcasses found on all three islands was 179. Of that number, 27 percent of the carcasses were birds and 65 percent were pinnipeds. Fish, invertebrates and other mammals comprised about seven percent of the total. At least 20 different species of birds were represented, all were seabirds except one common raven. Among the marine mammals, California sea lions (*Zalophus californianus*) were the most abundant with a total of 63 carcasses. Northern elephant seal (*Mirounga angustirostris*) carcasses numbered 24, and harbor seals (*Phoca vitulina*) seven. Other mammal carcasses included five dolphins and one feral pig. There was one unidentified pinniped, and two unidentified birds. Unidentified animals were all partial samples without enough for a full identification. Pinnipeds were the most abundant category on all three islands in 2005. Sea lions were the most abundant species on Santa Cruz and Santa Rosa Islands, while elephant seals were most abundant on San Miguel Island.

Some carcasses may have been counted on subsequent surveys. We clipped toes of dead birds to identify then as having been found once, but rarely encountered those marks. Mammals were generally not marked in any way. Because waves often redistributed the carcasses, they were difficult to identify as previously found.

In 2005, 26% of the carcasses found were in a state of mummification or were simply skeletons (Table 1). Normally we did not record mammal bones scattered on beaches. Birds were generally recorded, even when just a partial body was found because they tended not to persist and it was difficult to make judgment calls about counting, since most birds were predated or scavenged.



Sooty Shearwater, typical of scavenged bird carcass. Santa Rosa Island, Aug. 2005

Table 1. Amounts and conditions of carcasses, all monitored islands, 2005

179 total carcasses

159 scavenged (90% of total)

6 oiled (3 at <2%, 2 at 2-33%, 1 unk.) (3.3% of total)

	1 (alive, dying)	2 (fresh dead)	3 (decomposing)	4 (dried, mummified)	Total
Birds	2	7	19	17	48*
Fish + invertebrates		3	1	3	7
Pinnipeds		9	83	25	117
Other mammals		1	4	1	6
Total	2 (1%)	20 (11%)	107 (60%)	47 (26%)	179

(*some condition data unknown or not recorded)

In most cases the cause of death was unknown. Predation was blamed for the deaths of about 6% of the animals. One cormorant was thought to have succumbed to choking on a fish. Five pinnipeds were thought to be possible victims of Domoic Acid poisoning. That number may have been higher.

Carcasses were considered oiled if any petroleum product or residues were detected on plumage or fur of carcasses, including incidental tar or crude oil picked up post-mortem while floating or from the beach itself. About three percent of the carcasses were oiled. The number of dead birds that were oiled was 8.3%. Species oiled included California sea lion, dolphin, Black-vented Shearwater *Puffinus opisthomelas*, Rhinoceros Auklet *Cerorhinca monocerata*, Pacific Loon *Gavia pacifica*, and Common Murre *Uria aalge*. In most cases the amount was minor (<2% oil cover). It cannot be determined how many of these were oiled posthumously after reaching the beach.

At least 90% of the total carcasses had been scavenged to some extent (96% of the dead birds were scavenged or predated). Only eight of the 159 dead animals were recorded as “not scavenged” (three were seabirds) while the rest were undetermined regarding scavenged. Some of these may have been victims of predation. Predation was probably responsible for more than the six percent of the deaths

attributed to that cause, as some birds were little more than a wing and some bones. Typically, the breast muscle was gone from most bird carcasses. Peregrine Falcons, *Falco peregrinus*, are relatively common at the islands and may have been responsible for most predation. Most marine mammal carcasses had been scavenged to some extent. Gulls and ravens are quick to scavenge the eyes and are often able to gain access to the internal organs. The majority of flesh and fat rots for some time until buried by sand or it mummifies.



Dolphin carcass, condition mummified, from China Camp, Santa Rosa Island, August 2005.

Santa Cruz Island

Santa Cruz Island was the emphasis for the study since Bald eagles were released on that island. Eagle Biologists from the Institute for Wildlife studies conducted monthly samples on most beaches with National Park Service staff sampling at Smugglers Cove and Yellowbanks beaches on the east end of the island. A total of 93 beach walks were conducted on 10 different beaches on Santa Cruz Island in 2005 (compared to 100 surveys in 2004 and 64 in 2003). A total of 80 carcasses were found in 2005 surveys (Table 2). The majority of them had been scavenged. Over half of the carcasses were in a state of decomposition, but Santa Cruz Island had a relatively high number (11%) of fresh dead which may have been a reflection of the sampling frequency and the number of beaches surveyed. The low number of dried/mummified carcasses may be due to scavenging pigs on Santa Cruz Island.

Unlike previous years, mammals were the most common carcasses on the Santa Cruz Island beaches, with 56 (70%) in all (Table 3). Most of those (48 of the 56) beached mammals were California sea lions. Two cetaceans were found. Because of the state of decomposition they were only tentatively identified; one as an unidentified dolphin, the other as a Risso's dolphin, *Grampus griseus*. The total of

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48 sea lions found in 2005 was nearly double the 26 found in 2004. The four harbor seals were the most found on any of the islands. One dead feral pig (*Sus scrofa*) was found on Smugglers Cove beach.

Twenty-one bird carcasses from 12 species were found in 2005. Pelagic cormorants were the most common species found. Of note was a Xantus's Murrelet, *Synthliboramphus hypoleucus*, found in fairly good condition (for a dead bird). Two injured gulls were found alive but stranded. One had monofilament line and a fishing weight tangled around its wing. Three fish were found including one sizable salmon at Sauces Beach. One mollusk was noted.

China Beach and Christy beaches (table 3) stand out as deposition sites. Prevailing wind and currents bring debris and animals to those beaches.



Western Gull with fishing line on wing, Smugglers Cove, April 2005

Table 2. Amounts and conditions of carcasses, Santa Cruz Island, 2005

80 total carcasses
75 scavenged (93.7% of total)
None were identified as oiled

	1 (alive, dying)	2 (fresh dead)	3 (decomposing)	4 (dried or mummified)	Total
Birds	2	4	10	3	21 *
Fish+invertebrates		2		1	3
Pinnipeds		3	46	4	53
Other mammals		1	2		3
Total	2	10	58	8	80

(*some condition data unknown or not recorded)

Table 3. Beached animals found on Santa Cruz Island, 2005

Species	Survey beach (number of surveys in 2005)								total
	SC-CB (12)	SC-CH (12)	SC-JB (11)	SC-LB (12)	SC-PB (11)	SC-PH (12)	SC-SB (12)	SC-SC/YB (7)	
Birds									21
Brandt's Cormorant <i>Phalacrocorax</i> <i>penicillatus</i>		1							1
Brown Pelican <i>Pelecanus occidentalis</i>		2				1			3
Black-vented Shearwater <i>(Puffinus opisthomelas)</i>			1						1
Common Loon <i>Gavia immer</i>			1						1
Eared Grebe <i>Podiceps nigricollis</i>	1								1
Heermanns Gull <i>(Larus heermanni)</i>						1			1
Northern Fulmar <i>(Fulmarus glacialis)</i>							1		1
Pelagic Cormorant <i>(Phalacrocorax</i> <i>pelagicus)</i>	1			1		1	1	1	5
Sooty Shearwater <i>(Puffinus griseus)</i>								1	1
Surf Scoter <i>(Melanitta perspicillata)</i>						1			1
Western Gull <i>(Larus occidentalis)</i>				1			1		2
Xantus's Murrelet <i>(Synthliboramphus</i> <i>hypoleucus)</i>								1	1
unknown species		2							2
Fish & Invertebrates									3
Fish (unid)			1				1		2
mollusc (unid)						1			1
Mammal									56
California Sea Lion <i>(Zalophus californianus)</i>	13	20	2		1	4	5	3	48
Cetacean	2								2
Harbor Seal <i>(Phoca vitulina)</i>	2	2							4
pinniped (unid)		1							1
Ferel pig								1	1
Grand Total	24	28	5	2	1	9	9	7	80

Santa Cruz Island: CB=Christy Beach; CH=Chinese Harbor; JB=Johnston's Beach; LB=Laguna Beach; PB=Pozo Beach; PH=Prisoners Harbor; SB=Sauces Beach; SC=Smuggler's Cove; YB=Yellowbanks Beach

Santa Rosa Island

On Santa Rosa Island, 23 beach walks were conducted on 9 different beaches in 2005 (table 5). No dead or dying animals were found on Mud tank Beach. About 70% of the carcasses were pinnipeds, with the most common being California Sea Lion at a total count of 32. Northern Elephant Seal carcasses numbered eight. Both counts were much lower than counts in 2004. There were also three cetacean carcasses; two were thought to be common dolphin, *Delphinus delphis*, and one a Risso's dolphin, *Grampus griseus*. Bird carcasses numbered 14, or 23% of the total. Only six different species were represented and Western Gulls were by far the most numerous species. Three fish carcasses were found. Soledad Canyon Beach had the most carcasses in the combined surveys. The high spring tides were sweeping the beaches in January 2006 and all the beaches were fairly clean of debris and carcasses. Breeding elephant seals were also abundant on most of the beaches at that time, and though limiting access to portions of some beaches, their presence was not felt to be a factor in only two carcasses being found.

Many of the carcasses (44%) were dried/mummified, the same amount labeled as decomposing (Table 4). Almost all had been scavenged to some extent. Only two of the 61 carcasses were oiled, both recorded as minor amounts and only oiled on wings and feet.

Table 4. Amounts and conditions of carcasses, Santa Rosa Island, 2005

61 total carcasses
 54 scavenged (88.5%)
 2 oiled (all at <2%) (3.3 %)

	1 (alive, dying)	2 (fresh dead)	3 (decomposing)	4 (dried mummified)	Total
Birds		1	4	9	14
Fish		1		3	4
Pinnipeds		2	21	17	40
Other mammals			2	1	3
Total		3	27	27	61

Table 5. Beached animals found on Santa Rosa Island, 2005

Species	Survey beach (number of surveys in 2005)								total
	SR-AC (3)	SR-BW (3)	SR-CA (3)	SR-SA (3)	SR-SK (3)	SR-SO (3)	SR-TE (2)	SR-WC (3)	
Birds									14
Brandt's Cormorant					1				1
<i>Phalacrocorax penicillatus</i>									
Black-vented Shearwater						1			1
<i>(Puffinus opisthomelas)</i>									
cormorant (unid)						1			1
<i>(Phalacrocorax sp.)</i>									
Pelagic Cormorant						1			1
<i>(Phalacrocorax pelagicus)</i>									
Pigeon Guillemot					1				1
<i>(Cepphus columba)</i>									
Western Gull	1	1				2	1	4	9
<i>(Larus occidentalis)</i>									
Fish & Invertebrates									4
						2	1		3
Fish (unid)									
Sea hare								1	1
<i>(Aplysia sp.)</i>									
Mammal									43
California Sea Lion	2	3	2	8	5	10	2		32
<i>(Zalophus californianus)</i>									
Cetacean			1		1	1			3
Northern Elephant Seal		1	5	1		1			8
<i>(Mirounga angustirostris)</i>									
Grand Total	3	5	8	9	8	19	4	5	61

Santa Rosa Island: AC=Arlington Canyon; BW=Bee Rock West; CA=China Camp(includes Cluster Point); SA=Sandy Point; SC=Smuggler's Cove; SK=Skunk Point; SO=Soledad Beach; TE=Tecalote Beach; WC=Water Canyon (one survey was done at Mud Tank but no beached animals were found)

San Miguel Island

A total of seven beach surveys were conducted on San Miguel Island between January 2005 and January 2006 with 37 carcasses found (Table 6). The relatively high number of fresh carcasses and low percentage that were scavenged was because of the elephant seal breeding (one adult and three pups were found fresh dead in January 2006).

As at the other islands, pinnipeds were the most numerous category (24 total or 64%) on San Miguel, but unlike the other islands, elephant seals were the most abundant (16 total, 43%). Dead seabirds totaled 13 in the surveys with 10 species found (Table 7). Pelagic cormorants were the most numerous bird found. Most of these animals were found on Simonton Cove, a northwest facing beach which tends to have a high degree of deposition. One survey was done at Cardwell Point on the east end of San Miguel. Elephant seals were present on all three beaches but only affected access at Cardwell. Four of the carcasses there were juvenile elephant seals. The high number of elephant seals at Cuyler Harbor was probably a factor of the large number of seals breeding and natural mortality of pups on the beach at that time. Cardwell Point also had a large breeding colony of seals and most the carcasses were elephant seal pups.

The percentage of decomposing carcasses at San Miguel was the highest of the three islands at 56%. The amount of oiling was slightly higher than at other islands but a natural seep off shore deposits tar frequently on Harris Point and Simonton Cove and it is possible that the animal became tarred after death. Of note were a Tufted Puffin, *Fratercula cirrhata*, and two Rhinoceros Auklets, *Cerorhinca monocerata*.

Table 6. Amounts and conditions of carcasses found on San Miguel Island, 2005

37 total carcasses

30 scavenged (81% of total)

3 oiled (1 at <2%, and 2 at 2-33%) (8.1% of total)

	1 (alive, dying)	2 (fresh dead)	3 (decomposing)	4 (dried mummified)	Total
Birds		2	5	5	13 *
Fish					0
Pinnipeds		4	16	4	24
Other mammals					0
Total		6	21	9	37

(*some condition data unknown or not recorded)

Table 7. Beached animals found on San Miguel Island, 2005

Survey beach (number of surveys in 2005)

Species	SM-CH (3)	SM-CW (1)	SM-SM (3)	Total
Birds				13
Brandt's Cormorant			1	1
<i>Phalacrocorax penicillatus</i>				
Cassin's Auklet			2	2
<i>Ptychoramphus aleuticus</i>				
Common Murre			1	1
<i>Uria aalge</i>				
Common Raven		1		1
<i>Corvus corax</i>				
unidentified gull			1	1
<i>Larus</i> sp.				
Northern Fulmar			2	2
<i>(Fulmarus glacialis)</i>				
Pacific Loon			1	1
<i>(Gavia pacifica)</i>				
Rhinoceros Auklet			2	2
<i>(Cerorhinca monocerata)</i>				
Tufted Puffin			1	1
<i>Fratercula cirrhata</i>				
Western Gull	1			1
<i>(Larus occidentalis)</i>				
Fish & Invertebrates				0
Mammal				24
California Sea Lion	1		4	5
<i>(Zalophus californianus)</i>				
Northern Elephant Seal	8	6	2	16
<i>(Mirounga angustirostris)</i>				
Harbor Seal	1		2	3
<i>(Phoca vitulina)</i>				
Grand Total	11	7	19	37

San Miguel Island: CH-Cuyler Harbor; SM=Simonton

TEMPORAL CHANGES in BEACHED ANIMALS

Santa Cruz Island

Seasonally, June and July had the highest number of beached organisms on the 2005 surveys, primarily due to high numbers of California sea lions (fig. 2). During those two months on Santa Cruz Island, there were 20 sea lions and four harbor seals found beached. Domoic Acid poisoning was suspected in at least five instances in June. No Pinnipeds were found in the late October sample. In 2005, the greatest number of bird carcasses in any month (5) was found in January followed by four in April.

Sampling began in 2002 with surveys of Smugglers Cove and Yellowbanks beaches. Lyndal Laughrin surveyed many of the western Santa Cruz Island beaches in through a portion of 2002 and 2003 counting only marine mammal carcasses, and those counts are included in the data presented in figure 2.

Invertebrate and fish numbers seem to be driven by random events, possibly storms. The August 2002 sample recorded 12 sea hares, *Aplysia* spp., thrown up on the beach by high swells on Yellowbanks beach. In October 2003 there were six thornback rays, *Platyrrhinoidis triseriata*, found on China beach. Most other events were single small fish or sea hares.

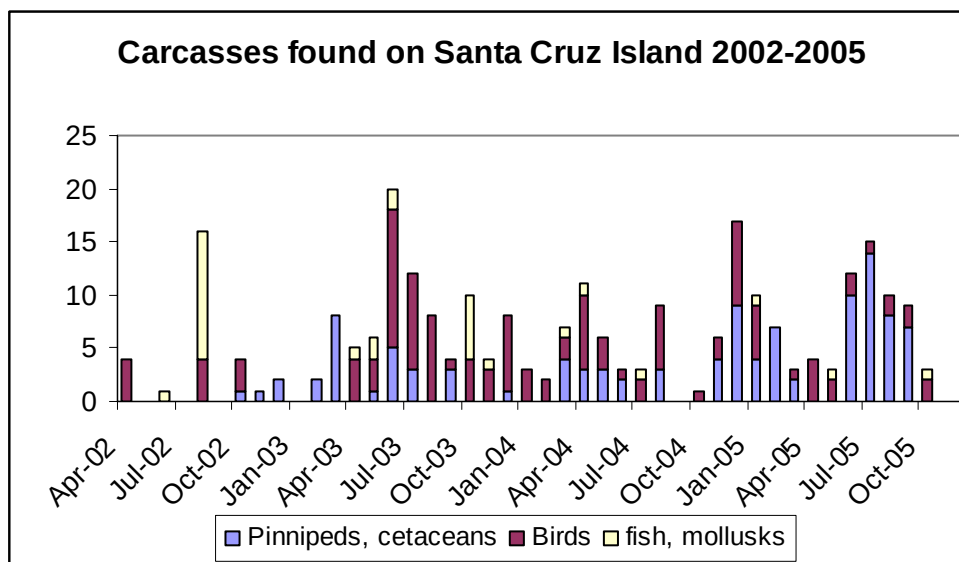


Figure 2. Monthly trends of carcasses found on Santa Cruz Island, 2002-2005. Monthly data are total counts and may reflect different numbers of beaches surveyed. Surveys before April 2003 were limited in scope and number of beaches.

Santa Rosa Island

Seasonal trends are difficult to determine from limited quarterly samples. The largest number of carcasses on Santa Rosa Island, 77, was recorded in November of 2003. Nearly half of those were Northern Fulmars from a large mortality event that occurred along the California coast that winter. Pinnipeds outnumbered birds in every other survey in 2004 and 2005. High numbers of sea lions in May and July 2004 may be related to Domoic Acid outbreaks in 2004. The low number of carcasses found in January 2006 was probably at least partially due to high tides clearing the beaches.

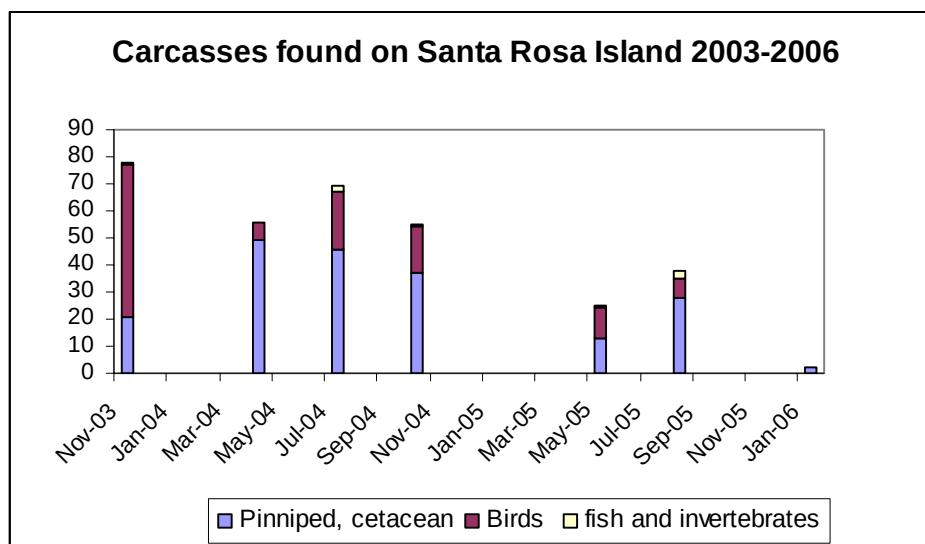


Figure 3. Numbers of carcasses found on Santa Rosa Island, 2003-2004

San Miguel Island

No consistent seasonal pattern was discernable at San Miguel Island. The highest seasonal count was January 2004 where the majority of carcasses were Northern Fulmars from the same event that lead to the highest count on Santa Rosa Island. Pinnipeds carcasses outnumbered birds on all other surveys except the April 2005 survey where the nine birds outnumbered the five pinnipeds.

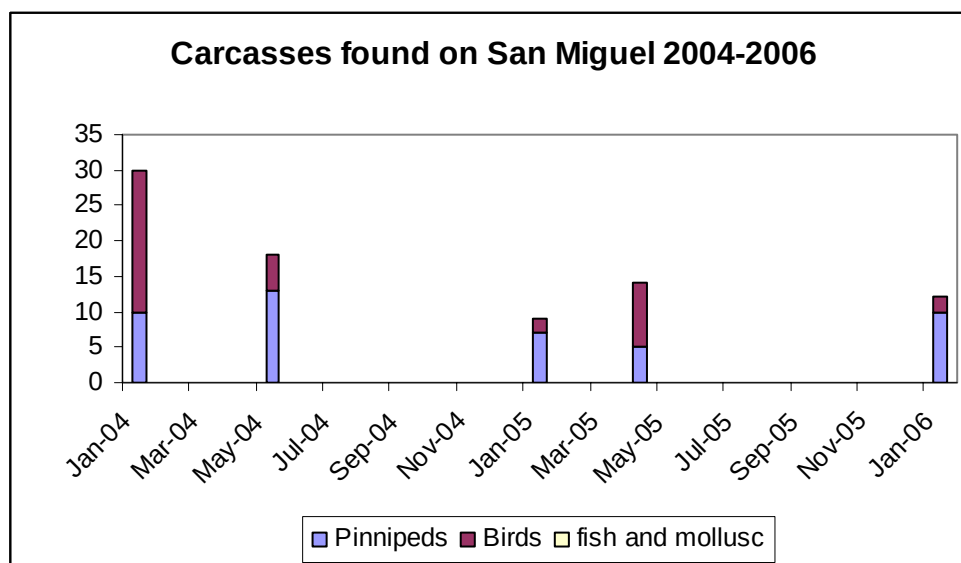


Figure 4. Numbers of carcasses found on San Miguel Island, 2005-2006

AGE AND SEX OBSERVATIONS

As we saw in 2004, the majority of sea lion carcasses found were adults. The majority of elephant seals were either immature or were pups, and harbor seals were split between pups and adults (Table 8) Age could not be determined in many of the animals and sex was not determined in most cases, particularly with birds.

Table 8. Numbers of pinnipeds and birds by age and sex, 2005-2006

Age	California Sea Lion		Northern Elephant Seal		Harbor Seal		Bird	
	Total number	Sex*	Total number	Sex	Total number	Sex	Total number	Sex
Adult	45	6M 2F 37U	3	1M 2U	2	U	30	U
Pup	2	U	12	U	3	U	FirstYear 2	
Immature or first year	12	2F 10U	49	U	0		SecondYear 1	U
Unknown age	25	U	0		2	U	14	U

Sex*: M = male, F = female, U = unknown

HUMAN ACTIVITY

In 2005, there were nine records of human activity during the surveys, involving a total of 44 individuals. The most records were at Smugglers with four. Three groups were island staff or residents. Beach walking seemed to be the most common activity. Since 2002, there were only three instances of human activity counted during surveys on Santa Rosa Island two of those happened to be in 2005. By far the most observations were at Prisoner's Harbor where there is a pier and Smugglers Cove, which is a popular anchorage where boaters are allowed to land and campers often walk over from Scorpion Valley. Human activity for all surveys (2002-2006) is presented in Appendix C.



Beach Sculpture at Smugglers Cove, Santa Cruz Island April 2005

LIVE ANIMAL OBSERVATIONS

Eight bald eagles were seen on three different surveys in 2005. At least 54 species were found, represented by 8687 individuals during the 123 surveys during 2005-2006. A complete listing of the live animal species counted on transects is presented in Appendix B. The number of separate observations (surveys) and total number of individuals of selected species are below in Table 9. Large groups (>100) of Western gulls, Willets, Western Snowy Plovers, Sanderlings, Pelagic Cormorants, elephant seals, Black-bellied Plovers and Brown Pelicans were observed on one or more surveys. Two feral pigs were seen on Santa Cruz Island beaches in 2005, but over the three years of surveys, 27 were seen on beaches and tracks were recorded numerous times. These counts only represent birds and mammals that were actually using the beach from the surf to the bluff or vegetation line or lagoons, including those seen flying. Live animal counts are useful to determine the distribution of wildlife use and potential resources at risk in the event of an oil spill.

Table 9. Selected observations and umbers of live animals in 2005-2006

species	Number of sightings	Number of individuals
California Sea Lion	5	8
Northern Elephant Seal	18	2622*plus others uncounted
Black Oystercatcher	38	161
American Oystercatcher	7	12
Killdeer	45	234
Black-bellied Plovers	9	269
Brown Pelicans	22	863
Common Raven	35	141
Cormorants (all)	12	494
Heermann's Gull	9	192
Sanderling	8	516
Snowy Plover	22	462
Willetts	4	108
Whimbrel	6	107
Unidentified Gull	10	273
Western Gull	66	1575

Western Snowy plovers

Snowy Plovers, *Charadrius alexandrinus*, are of particular interest because they are listed threatened under the federal Endangered Species Act. Monitors were instructed to pay particular attention to plovers and carefully record their numbers. However, the beach surveys were not always done with plover counts in mind and conditions may not have always been ideal for counting because of sun angle, wind, or other conditions. Elephant seals may have hindered some winter counts, but overall we were able to work around them. Particular effort was made to count snowy plovers in spring 2005 and January 2006 for the region-wide surveys. Tables 10-12 present the counts for Snowy Plovers from all surveys since 2003. Snowy Plovers were searched for on all surveys but counts of zero are not reported here.

Both breeding and wintering numbers have been declining since the early 1990's on San Miguel and Santa Rosa Islands. On Santa Rosa Island, snowy plovers were found primarily on three beaches Bee Rock beaches (both east and west), China Camp, and the Skunk Point complex (including Oat Point

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Beach and Southeast Anchorage). The winter count of 218 on Santa Rosa Island in January 2005 was the highest count in many years there. The 2005 summer count of 93 on Santa Rosa Island was also higher than recent years. China Camp had moderate number of summer birds which we have seen in the past (Lerma and Richards 1997) but the winter birds don't seem to use that beach.

On Santa Cruz Island, snowy plovers were primarily found on Johnstons Beach. Numbers there were not especially high but tended to be fairly steady throughout the year. More snowy plovers were seen in 2004 than in 2005 (Table 12). The totals reported are a reflection of the number of surveys and totals should not be compared between islands.

Two banded snowy plovers were seen on Bee Rock beach on January 12, 2006. One was Yellow over Aqua on the left leg with Yellow over Pink on the right, this bird was banded at Salinas State Beach in 2001 according to Francis Bidstrup. The other had Aqua over Green on the left and White over Aqua on the right and was banded at Moss Landing Salt Ponds in 2004. A third banded bird was seen at Skunk Point with a single white band on the left and an orange band on the right with a center ring of tape. This bird was banded in either 1995 (unlikely) or was banded in 2004 at Bandon, OR.

Table 10. Snowy plover counts on San Miguel Island

BEACHCODE	MONITOREVENTDATE	BEACHDESCRIPTION	SPECIES	TOTAL
SM-CH	1/28/2006	Cuyler Harbor	SNPL	2
SM-SM	1/22/2005	Simonton Beach	SNPL	2
SM-SM	1/8/2004	Simonton Beach	SNPL	1

Table 11. Snowy Plover counts on Santa Rosa Island

BEACHCODE	MONITOREVENTDATE	BEACHDESCRIPTION	SPECIES	TOTAL
SR-SK	1/13/2006	Skunk Point	SNPL	137
SR-BW	1/12/2006	Bee Rock West	SNPL	81
SR-SK	8/4/2005	Skunk Point	SNPL	35
SR-CA	8/3/2005	China Camp	SNPL	24
SR-BW	8/2/2005	Bee Rock West	SNPL	34
SR-BW	5/29/2005	Bee Rock West	SNPL	2
SR-SK	5/25/2005	Skunk Point	SNPL	15
	2005/2006	SRI total		328
SR-SA	10/15/2004	Sandy Point	SNPL	1
SR-CA	10/14/2004	China Camp	SNPL	21
SR-SK	10/11/2004	Skunk Point	SNPL	18
SR-BW	7/20/2004	Bee Rock West	SNPL	13
SR-SK	7/18/2004	Skunk Point	SNPL	14
SR-SK	4/9/2004	Skunk Point	SNPL	17
	2004	SRI total		84
SR-SK	11/19/2003	Skunk Point	SNPL	9
	2003	SRI total		9

Table 12. Snowy Plover counts on Santa Cruz Island

BEACHCODE	MONITOREVENTDATE	BEACHDESCRIPTION	SPECIES	TOTAL
SC-JB	12/12/2005	Johnstons Beach	SNPL	14
SC-PB	10/15/2005	Posa Beach	SNPL	2
SC-JB	10/15/2005	Johnstons Beach	SNPL	25
SC-CH	9/18/2005	Chinese Harbor	SNPL	4
SC-PB	9/1/2005	Posa Beach	SNPL	8
SC-JB	9/1/2005	Johnstons Beach	SNPL	12
SC-CH	8/20/2005	Chinese Harbor	SNPL	8
SC-JB	8/18/2005	Johnstons Beach	SNPL	32
SC-JB	7/30/2005	Johnstons Beach	SNPL	6
SC-JB	5/19/2005	Johnstons Beach	SNPL	1
SC-JB	4/22/2005	Johnstons Beach	SNPL	1
SC-JB	3/11/2005	Johnstons Beach	SNPL	5
SC-JB	1/17/2005	Johnstons Beach	SNPL	12
	2005	SCI total		130
SC-JB	12/14/2004	Johnstons Beach	SNPL	30
SC-JB	11/21/2004	Johnstons Beach	SNPL	34
SC-CB	11/5/2004	Christy Beach	SNPL	13
SC-JB	10/23/2004	Johnstons Beach	SNPL	30
SC-JB	8/30/2004	Johnstons Beach	SNPL	24
SC-JB	6/30/2004	Johnstons Beach	SNPL	3
SC-JB	4/28/2004	Johnstons Beach	SNPL	6
SC-JB	2/24/2004	Johnstons Beach	SNPL	24
	2004	SCI total		164
SC-JB	11/25/2003	Johnstons Beach	SNPL	7
SC-CB	10/27/2003	Christy Beach	SNPL	3
SC-JB	6/26/2003	Johnstons Beach	SNPL	2
	2003	SCI total		12



Pelicans and other seabirds on Water Canyon Beach, Santa Rosa Island, August 2005

DISCUSSION

One of the significant observations in 2005 was the influx of river cane, *Arundo donax*, debris onto the island beaches. *Arundo* is a non-native species common in southern California riparian areas. This plant does not occur on the islands except when it is carried across the Santa Barbara Channel by currents. Storms early in winter 2005 caused floods that washed tons of debris out rivers. Tons of the cane sticks washed up on mainland beaches and tons of it ended up on island beaches. The north and west side beaches were impacted most, but some even made it to south side beaches. The plants have a thick rhizome and many survived to sprout on the islands. Once established, river cane can form dense thickets that have potential to change the physical characteristics of beaches that would negatively impact both shorebirds and pinnipeds. Surveyors pulled dozens of sprouting plants. Even the dead wood creates physical change by creating dense barriers that may inhibit birds and pinnipeds from accessing upper beach haulouts or foraging areas. The stick piles may extend the entire length of a beach. The sticks and other debris made counts difficult for surveyors. Cane piles were difficult to see around and were dangerous to walk on.



Arundo donax on Soledad Canyon, May 2005 (left) and Tecalote Canyon beach, August 2005 (right). The sticks and other debris occurred after winter storms and persisted through the year.

Ten bald eagles were seen on four occasions at beaches in 2005. Christy Beach and Saucers Beach on Santa Cruz, and Arlington Canyon and China Camp on Santa Rosa Island were the locations of the eagle sightings. Nothing in particular was noted about the behavior of any of these birds. The two at China Camp were on the dune above the elephant seal rookery and dozens of gulls and ravens were on the beach feeding on seal afterbirths. No direct observations of eagles feeding on carcasses were made in 2005.

Various gulls and Common Ravens are commonly seen on beaches picking at dead animals. These birds are probably responsible for most of the scavenging of beached animals. We occasionally see fox tracks on the beaches but it isn't clear if they were scavenging any of the carcasses.

As mentioned in the results, most bird carcasses had been scavenged to some degree. It was uncommon to find a bird that had the breast muscles intact. Though we had no way to tell, we suspect that many of the dead birds were killed by Peregrine Falcons. Bird carcasses typically do not persist long on the beaches. They may be carried off by scavengers to be consumed elsewhere, redistributed elsewhere by

the tides, or get buried relatively quickly. Benson, et al. (1999) showed that 30-50% of new bird carcasses disappear with the first week of being recorded. We clipped toes of dead seabirds to identify them on subsequent counts, but in three years we only encountered preciously clipped toes on three occasions. Some of the dead birds we recorded were not much more than wings; though, so it is possible we encountered some of the carcasses with missing feet a second time.

Lewis and Hunt (1978) surveyed beached birds monthly in the southern California Bight between May 1975 and April 1976, including beaches on Santa Cruz Island. They found considerable difference in accumulation rates between different beaches around Santa Cruz Island. Beaches on the north side (Chinese Harbor, Prisoner's Harbor, and Fraser Point) accumulated dead birds at almost twice the rate of the western beaches (Forney's, Christy's, and West Pozo), and much greater than the south Beaches (Pozo, Johnston's and Malva Real). Rates varied from 0.2 birds /km/month on the south side to 1.5 birds/km/mo on the west to 2.92 birds/km/mo on the north side beaches. These rates are much higher than seen during surveys since 2003.

More significantly Lewis and Hunt 1978 found that 47% of the dead birds were oiled, compared to only 8% oiled in 2005. In three years of this study, we only found 16 oiled animals (four sea lions, one harbor seal and 11 seabirds) and all were less than 33% coated by oil. Lewis and Hunt reported 33% of the dead birds they found as being oil soaked, with oil likely as the cause of death. They found that the most oiled birds occurred on the northern beaches where the most dead birds also occurred. We found the most oiled animals at Simonton and Skunk Point beaches, also beaches of high accumulation. We also found oiled animals at Smugglers Cove which is generally not a high deposition beach.

Another large difference between the Lewis and Hunt counts was that they found significant numbers of Black-legged Kittiwakes (15 on Santa Cruz beaches). The kittiwakes were found along with large numbers of Northern Fulmars during winter months. This was probably an event similar to the winter 2004 where we found so many Northern Fulmars. Black-legged Kittiwakes were not seen at all in our surveys and are an unusual bird in the Santa Barbara Channel. The most abundant dead birds found in 1975-1976 (108 surveys) were Northern Fulmar (46), Sooty Shearwater (23), Western Gull (34), other gulls (18), cormorants (14), and alcids (25). In the 2002-2006 surveys (331 surveys), the most common beached birds were Northern Fulmar (69), Western Gull (65), cormorants (35), Brown Pelicans (13), alcids (15). All Shearwater species only amounted to 10 individuals.

Sampling frequency is an important factor in determining accumulation rates. Lewis and Hunt 1978 found that the rate of beaching shot up when weekly surveys of the Orange County coast were treated as if they were sampled monthly.

Seven dead dolphins were encountered over the course of three years. Identification was usually made difficult by the advanced state of decomposition. One was found in a state of mummification on Santa Rosa (see photo in results section of this report). That carcass had obviously been beached for some time but had not been encountered before. Curiously, none of the dolphins were reported a second time from any of the beaches. This may mean the carcasses fall apart quickly, possibly because they are scavenged heavily, or they get buried rather quickly. Most pinnipeds are not easily identified as having been previously encountered. We did not tag any of them because marks tend not to persist in wind and blowing sand, and frankly most of the observers weren't keen on getting that hands-on.

Seasonally, we might expect more dead sea lions in the summer months. Spring and early summer is a tough time for pups when they are weaned and have to fend for themselves. It is also the time that plankton blooms occur. Domoic Acid is a natural toxin produced by diatoms (*Pseudo-nitzschia* spp.).

Poisoning occurs when filter feeding fish such as anchovies or sardines are consumed by sea lions (or harbor seals or pelicans). As Domoic Acid accumulates in their system, brain lesions occur and live animals exhibit a characteristic head weaving and often die of seizures or stop feeding and starve. From personal observations, it seems that harbor seals tend to die off-shore and are more frequently found floating in kelp beds, rarely beaching. Domoic Acid poisoning was first identified in the 1980's after an outbreak in British Columbia. The first recorded major outbreak in southern California occurred in 2002. *Psuedo-nitzschia* spp. were high in plankton samples collected from the islands in June 2005 and the State Health Director issued a health warning against eating mussels or viscera of certain filter feeding animals (California Department of Health Services 2005).

Elephant seals are at far out at sea most of the year except to molt in the spring and to breed in the winter. We expect more dead elephant seals in the early spring as exhausted males and recently weaned pups succumb to the elements at the end of the breeding period. The majority of dead elephant seals found were young animals. Most elephant seals were found on Santa Rosa and San Miguel Island beaches where they breed. No elephant seals were found on Santa Cruz Island and only one was found on the north side of Santa Rosa Island where they do not breed.

Winter is when we should expect to find more seabirds as migrating birds are in the area and conditions are rough. In summer months, seabirds and shorebirds tend to migrate out the area, or if breeding locally, will be more common in nesting colonies than on beaches. Lewis and Hunt (1978), found this and we certainly saw it with events such as the Northern Fulmar die off in winter 2004. Beached gull numbers tend to increase in the late spring/ early summer creating a small spike in some years. This is probably related to their breeding cycle as they migrate from the mainland to the islands in the spring. Predatory bird attacks and natural deaths would increase with the overall numbers.

The condition of the carcasses tell us a little about how long the animal has been beached but the decomposing category should probably be broken down into early and late stages. Scientifically based criteria are needed to avoid relying on observer's judgment calls. Age and particularly sex determinations were often difficult to make. This information should be collected when it can be determined because the demographics do help explain the causes of some events and will serve as important background information in the case of unusual circumstances.

Live animal counts also provide important baseline information. The distribution and timing of use of beaches by shorebirds is important for managing recreational activities at the islands. No other shorebird counts are done on island beaches throughout the year. Multiple surveys are important since the numbers vary so much by season. Pinniped counts can become overwhelming when elephant seals begin breeding but the general numbers and distribution are useful. Dedicated counts are necessary for accurate numbers but the estimates from the beach walk may serve to fill in gaps in timing or as a general check on surveys. Combining the beach walk surveys with Snowy Plover counts seems natural for time savings and collecting observations. Human activity on the island beaches tends to be low, but that could change and the baseline will be important. It also serves as a comparison to mainland studies and observations about activity may be important to management.

Conclusions and recommendations

Though we did not count and identify debris on a regular basis, personal observations would indicate that there is considerably less plastic debris on the beaches than there was in the early 1990's (Richards 1994). This indicates that legislation and education meant to address this problem is working. Comparing results from this study to Lewis and Hunt (1978) indicates that there is considerably less oil

floating around in the Santa Barbara Channel. At least fewer birds are being oiled and less severely when they were. There also appears to be some changes in the makeup of the seabird community which may be because of the Pacific Decadal Oscillation or broader changes. Whatever the cause, it warrants further monitoring.

Beach Walk Monitoring was conducted for the purpose of identifying the types and amounts of dead marine animals on island beaches as an indication of what re-introduced bald eagles might have available as a prey base. Stranded marine mammals were of particular interest as they bioaccumulate toxins such as DDT. This monitoring is a worthwhile program to help the park understand the dynamics of the island coastlines for both management and natural history application. This three year study provides some baseline information (though more is needed from Santa Rosa and San Miguel Islands), but continued monitoring is necessary to identify specific events and warn of calamities.

This monitoring has the potential to be conducted by trained volunteers. Ideally, sampling would occur monthly on all the northern islands. Practically, difficulties such as available housing space, muddy roads, and breeding pinnipeds will cause gaps in the data that can be collected. Monitoring limited to a few key beaches could possibly be done by dedicated island staff. However, island wide surveys would provide the best information since the high deposition beaches facing the northwest are often the hardest to reach. The basic protocol is sound and can continue as is; however, tighter definitions of some categories used to describe beaches and carcasses with more emphasis on notes might reduce some of the subjective descriptions.



A large specimen of *Arundo donax* growing on Chinese Harbor Beach, Santa Cruz, April 2005
(photo by J. Dooley)

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Appendix A. List of survey dates, locations, and surveyors 2005-2006

In alphabetical order by beach

Paula Rich (PJR), Dan Richards (DVR), Rocky Rudolph (RRR) (National Park Service)
 Jessica Dooley (JAD), Dave Rempel (DTR), Chris Little (CML), and Peter Sharp (PBS) (Institute for
 Wildlife Studies)

BeachCode	BeachDescription	MonitorEventDate	PrimarySurveyor
SC-CB	Christy Beach	7/21/2005	JAD
SC-CB	Christy Beach	3/13/2005	JAD
SC-CB	Christy Beach	4/21/2005	DTR
SC-CB	Christy Beach	2/25/2005	JAD
SC-CB	Christy Beach	9/14/2005	CML
SC-CB	Christy Beach	12/27/2005	CML
SC-CB	Christy Beach	11/21/2005	DTR
SC-CB	Christy Beach	10/29/2005	CML
SC-CB	Christy Beach	8/14/2005	DTR
SC-CB	Christy Beach	1/27/2005	JAD
SC-CB	Christy Beach	5/21/2005	DTR
SC-CB	Christy Beach	6/8/2005	PBS
SC-CH	Chinese Harbor	6/25/2005	JAD
SC-CH	Chinese Harbor	4/6/2005	DTR
SC-CH	Chinese Harbor	5/27/2005	JAD
SC-CH	Chinese Harbor	9/18/2005	CML
SC-CH	Chinese Harbor	7/24/2005	CML
SC-CH	Chinese Harbor	3/7/2005	JAD
SC-CH	Chinese Harbor	11/15/2005	CML
SC-CH	Chinese Harbor	2/9/2005	DTR
SC-CH	Chinese Harbor	12/10/2005	CML
SC-CH	Chinese Harbor	8/20/2005	CML
SC-CH	Chinese Harbor	1/15/2005	JAD
SC-CH	Chinese Harbor	10/30/2005	CML
SC-JB	Johnstons Beach	6/21/2005	DTR
SC-JB	Johnstons Beach	7/30/2005	JAD
SC-JB	Johnstons Beach	9/1/2005	DTR
SC-JB	Johnstons Beach	10/15/2005	CML
SC-JB	Johnstons Beach	8/18/2005	JAD
SC-JB	Johnstons Beach	5/19/2005	JAD
SC-JB	Johnstons Beach	4/22/2005	DTR
SC-JB	Johnstons Beach	3/11/2005	JAD
SC-JB	Johnstons Beach	11/25/2005	JAD
SC-JB	Johnstons Beach	12/12/2005	CML
SC-JB	Johnstons Beach	1/17/2005	JAD
SC-LB	Laguna Beach	6/18/2005	DTR
SC-LB	Laguna Beach	5/6/2005	DTR
SC-LB	Laguna Beach	7/15/2005	DTR
SC-LB	Laguna Beach	3/9/2005	DTR
SC-LB	Laguna Beach	2/24/2005	DTR
SC-LB	Laguna Beach	1/29/2005	DTR
SC-LB	Laguna Beach	8/5/2005	CML
SC-LB	Laguna Beach	4/8/2005	JAD
SC-LB	Laguna Beach	10/27/2005	CML
SC-LB	Laguna Beach	11/12/2005	CML
SC-LB	Laguna Beach	12/11/2005	CML
SC-LB	Laguna Beach	9/30/2005	CML
SC-PB	Posa Beach	10/15/2005	CML

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SC-PB	Posa Beach	6/21/2005	JAD
SC-PB	Posa Beach	5/19/2005	DTR
SC-PB	Posa Beach	3/11/2005	DTR
SC-PB	Posa Beach	9/1/2005	CML
SC-PB	Posa Beach	11/25/2005	DTR
SC-PB	Posa Beach	4/22/2005	JAD
SC-PB	Posa Beach	1/17/2005	JAD
SC-PB	Posa Beach	12/12/2005	DTR
SC-PB	Posa Beach	8/18/2005	CML
SC-PB	Posa Beach	7/30/2005	DTR
SC-PH	Prisoner's Harbor	3/8/2005	JAD
SC-PH	Prisoner's Harbor	4/1/2005	JAD
SC-PH	Prisoner's Harbor	10/28/2005	CML
SC-PH	Prisoner's Harbor	6/16/2005	JAD
SC-PH	Prisoner's Harbor	5/5/2005	JAD
SC-PH	Prisoner's Harbor	7/9/2005	CML
SC-PH	Prisoner's Harbor	9/28/2005	CML
SC-PH	Prisoner's Harbor	11/10/2005	CML
SC-PH	Prisoner's Harbor	2/10/2005	DTR
SC-PH	Prisoner's Harbor	12/7/2005	DTR
SC-PH	Prisoner's Harbor	8/5/2005	JAD
SC-PH	Prisoner's Harbor	1/4/2005	JAD
SC-SB	Sauces Beach	8/14/2005	DTR
SC-SB	Sauces Beach	10/29/2005	CML
SC-SB	Sauces Beach	2/25/2005	DTR
SC-SB	Sauces Beach	11/21/2005	DTR
SC-SB	Sauces Beach	3/13/2005	DTR
SC-SB	Sauces Beach	4/21/2005	JAD
SC-SB	Sauces Beach	1/27/2005	DTR
SC-SB	Sauces Beach	12/27/2005	CML
SC-SB	Sauces Beach	5/21/2005	JAD
SC-SB	Sauces Beach	9/14/2005	DTR
SC-SB	Sauces Beach	7/22/2005	
SC-SB	Sauces Beach	7/21/2005	CML
SC-SB	Sauces Beach	6/8/2005	PBS
SC-SC	Smugglers Cove	3/25/2005	PJR
SC-SC	Smugglers Cove	2/20/2005	PJR
SC-SC	Smugglers Cove	7/25/2005	RRR
SC-SC	Smugglers Cove	9/14/2005	RRR
SC-SC	Smugglers Cove	11/13/2005	DJK
SC-SC	Smugglers Cove	6/2/2005	PJR
SC-SC	Smugglers Cove	4/22/2005	PJR
SC-YB	Yellowbanks	4/22/2005	PJR
SC-YB	Yellowbanks	6/2/2005	PJR
SC-YB	Yellowbanks	3/25/2005	PJR
SM-CH	Cuyler Harbor	4/28/2005	DVR
SM-CH	Cuyler Harbor	1/20/2005	PJR
SM-CH	Cuyler Harbor	1/28/2006	DVR
SM-CW	Cardwell Point	1/24/2006	DVR
SM-SM	Simonton Beach	1/22/2005	PJR
SM-SM	Simonton Beach	1/27/2006	DVR
SM-SM	Simonton Beach	4/29/2005	DVR
SR-AC	Arlington Canyon	8/3/2005	DVR
SR-AC	Arlington Canyon	1/15/2006	DVR
SR-AC	Arlington Canyon	5/24/2005	DVR
SR-BE	Bee Rock East	5/29/2005	DVR

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SR-BW	Bee Rock West	5/29/2005	DVR
SR-BW	Bee Rock West	8/2/2005	DVR
SR-BW	Bee Rock West	1/12/2006	DVR
SR-CA	China Camp	8/3/2005	DVR
SR-CA	China Camp	5/26/2005	DVR
SR-CL	Cluster/China	1/11/2006	DVR
SR-MT	Mud Tank	1/16/2006	DVR
SR-SA	Sandy Point	8/2/2005	DVR
SR-SA	Sandy Point	5/30/2005	DVR
SR-SA	Sandy Point	1/12/2006	DVR
SR-SK	Skunk Point	8/4/2005	DVR
SR-SK	Skunk Point	1/13/2006	DVR
SR-SK	Skunk Point	5/25/2005	DVR
SR-SO	Soledad Beach	8/3/2005	DVR
SR-SO	Soledad Beach	5/25/2005	DVR
SR-SO	Soledad Beach	1/15/2006	DVR
SR-TE	Tecalote Canyon	8/3/2005	DVR
SR-TE	Tecalote Canyon	5/24/2005	DVR
SR-WC	Water Canyon	8/4/2005	DVR
SR-WC	Water Canyon	1/16/2006	DVR
SR-WC	Water Canyon	5/27/2005	DVR

Appendix B. List of Live Animals found on beach surveys 2002-2006

California Sealion	Great Blue Heron	Ruddy Duck
Elephant Seal	Glaucous Gull	Sanderling
Harbor Seal	Greater Yellowlegs	Say's Phoebe
Feral Pig	Gulls (generic)	Scoters (generic)
Gopher Snake	Glaucous-winged Gull	Semipalmated Plover
American Coot	Green-winged Teal	Shorebirds (generic)
American Kestrel	Heermann's Gull	Snowy Egret
American Oystercatcher	Hermit Thrush	Snowy Plover
American Pipit	House Finch	Sooty Shearwater
American Wigeon	Horned Lark	Song Sparrow
Bald Eagle	Island Scrub-Jay	Spotted Sandpiper
Barn Swallow	Killdeer	Surf Scoter
Black-bellied Plover	Killdeer	Terns, Royal/Caspian (generic)
Belted Kingfisher	Long-billed Curlew	Townsend's Warbler
Bewick's Wren	Least Sandpiper	Tundra Swan
Brown-headed Cowbird	Lesser Yellowlegs	Wandering Tattler
Black Oystercatcher	Loggerhead Shrike	Western Gull
Black Phoebe	Marbled Godwit	Western Meadowlark
Black Turnstone	Mallard	Western Sandpiper
Brandt's Cormorant	Northern Harrier	Whimbrel
Brown Pelican	Northern Pintail	Willet
Blue-winged Teal	Osprey	Yellow-rumped Warbler
Canada Goose	Pelagic Cormorant	
California Gull	Peregrine Falcon	
Common Loon	Pigeon Guillemot	
Common Raven	Ring-billed Gull	
Cormorants (generic)	Red-necked Phalarope	
Double-crested Cormorant	Rock Dove	
Ducks (generic)	Royal Tern	
Dunlin	Rock Wren	
Forster's Tern	Red-tailed Hawk	

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Appendix C. Human Activity 2002-2006.

(Activity codes: 1-Research, 2-Tidepooling/exploring, 3-Walking, 4-Exercising dog (or other type of pet: note in comments), 5-Sunbathing, 6-Fishing (including clamming or other extractive activity: note specific type in comments), 7-Kayaking, 8-Kite flying, 9-Other)

MonitorEventDate	BeachCode	HumanActivityCode	Number	Comments
2002	totals	5	26	
6/26/2002	SC-SC	3	3	boaters ashore
6/26/2002	SC-SC	7	2	kayakers from boat
6/26/2002	SC-SC	9	14	hikers playing on beach
8/30/2002	SC-SC	2, 3	5	
10/3/2002	SC-YB	3	2	came ashore in dinghy from anchored boat
2003	totals		72	
4/18/2003	SC-SC	8	2	
5/23/2003	SC-SC	3	2	Couple skiffed in from anchored sailboat. Observed taking mussels from point.
6/7/2003	SC-SC	4	6	
6/9/2003	SC-PH	5	4	Transportation day, three on beach, one snorkeling, waiting for boat, other people on pier.
7/7/2003	SC-PH	7	3	Kayakers land on beach
8/8/2003	SC-PH	3	3	
8/8/2003	SC-PH	5	12	
8/8/2003	SC-PH	9	1	Snorkeling
8/26/2003	SC-SC	2	1	
8/26/2003	SC-SC	3	6	
8/26/2003	SC-SC	5	6	and swimming
8/26/2003	SC-SC	7	17	Came ashore Came ashore
8/30/2003	SC-SC	2, 3	5	
9/4/2003	SC-PH	9	1	NPS Ranger on pier waiting for Island Packers.
11/19/2003	SR-SK	3	2	part of Eagle crew
12/31/2003	SC-CH	9	1	A surfer taking a breather on the beach.
2004	totals		128	
1/23/2004	SC-PH	9	1	Standing on pier
2/5/2004	SC-PH	9	1	Standing on pier waiting for boat
3/16/2004	SC-SC	3	4	campers
4/23/2004	SC-SC	3	7	People from IPCO boat
5/28/2004	SC-SC	3,7,9	7	Came in from small powerboat anchored in cove, with kayak and boogie boards
5/28/2004	SC-SC	3,9	25	Group of kids with adult leaders walked over from campground; swimming, picnickers
6/15/2004	SC-CB	9	14	High-school group
7/3/2004	SC-SC	3/7	1	Kayaked in from anchored sailboat.
7/3/2004	SC-SC	6	2	Surf fishing on beach. Observed one catch a halibut.
7/13/2004	SC-LB	3	2	Boaters
8/6/2004	SC-PH	2	3	Visitors from boat in harbor
8/6/2004	SC-PH	7	2	

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8/6/2004	SC-PH	9	17	IPCO orientation
8/21/2004	SC-CB	9	5	
8/29/2004	SC-CH	3	1	Surfer on beach getting back in water.
9/6/2004	SC-PH	3	7	
10/5/2004	SC-SC	3	7	
10/9/2004	SC-CH	5	1	one backpacker
10/10/2004	SC-PH	3	3	backpackers
10/12/2004	SC-CB	7	1	
10/14/2004	SC-WA	9	2	2 fishermen aboard anchored lobster boat.
12/4/2004	SC-PH	3	15	~15 people off of Island Packers, walking on pier, beach
2005	totals		44	
3/25/2005	SC-SC	3	6	
4/22/2005	SC-SC	7, 3	13	10 kayaks were on shore on north side of Smugglers.
5/5/2005	SC-PH	9	5	NPS/TNC personnel unloading/loading landing craft on beach/pier
5/27/2005	SR-WC	3	4	2 were sliding down sand dunes
6/2/2005	SC-SC	3	2	
7/15/2005	SC-LB	1	1	TNC staff.
7/25/2005	SC-SC	2	2	hut built of Arundo on beach (previously?) these two ashore from boat
8/3/2005	SR-CA	5	9	ranch family picnic/sandcastles
9/28/2005	SC-PH	3	2	