



Beach Watch

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2006





The Gulf of the Farallones National Marine Sanctuary protects an area of 948 square nautical miles (1,255 square miles) off the northern and central California coast. The Gulf of the Farallones also manages the northern 1,040 square nautical miles (1,377 square miles) of the Monterey Bay National Marine Sanctuary. These waters, located just a few miles from San Francisco, are part of an internationally significant marine ecosystem. Encompassing a diversity of highly productive marine habitats, the sanctuaries support an abundance of species.

Our Vision

The Beach Watch program is a public-private partnership of the Gulf of the Farallones National Marine Sanctuary and the Farallones Marine Sanctuary Association to study and protect the sandy shoreline of the Sanctuary. Since 1993, volunteers have regularly monitored Sanctuary beaches documenting wildlife, oil spills and seasonal changes along the shore.

This past year has been an exciting and eventful year for this innovative program. For the first time, Beach Watch volunteers have been able to enter their own data online. Having data immediately available and accessible will assist natural resource managers when responding to environmental disasters such as oil spills. The data also alerts the Sanctuary to unusual events that require further in-depth investigations such as wildlife die-offs and possible signs of global climate change. Our future goal is to post this near real-time data on the internet for access by scientists, natural resource managers and the public.

In this annual report, you will learn about some of the findings from last year's data including the documentation of a decrease in oiled wildlife and tarballs since the removal of oil from the sunken vessel *S. S. Jacob Luckenbach*. There are also two guest articles by the National Park Service. The Golden Gate National Recreation Area is using Beach Watch data to examine the use of park beaches by shorebirds. The data will help the park determine appropriate management strategies to balance human use with wildlife needs. The second article focuses on Snowy Plovers, a threatened species in the Sanctuary. Through collaboration and data sharing with Point Reyes National Seashore and PRBO Conservation Science, the article illustrates the distribution of Snowy Plovers along beaches during different seasons and reveals data findings on the long-term monitoring of Snowy Plover reproductive success.

Over the next two years we plan to combine the shoreline survey data from Beach Watch with other Sanctuary ecosystem monitoring programs, such as pelagic habitat and oceanographic observation data. Combining the findings from these different observing and monitoring programs as well as from regional partnerships will give us a holistic view of the health and trends of the Sanctuary's ecosystems. The Beach Watch data, in combination with other research findings, will become increasingly important and vital in the coming years in helping the Sanctuary and other natural resource agencies respond to management issues affecting coastal and ocean wildlife.

We want to thank all the wonderful volunteers who have dedicated endless hours to the Beach Watch program. We owe the success of the program to their hard work and commitment!



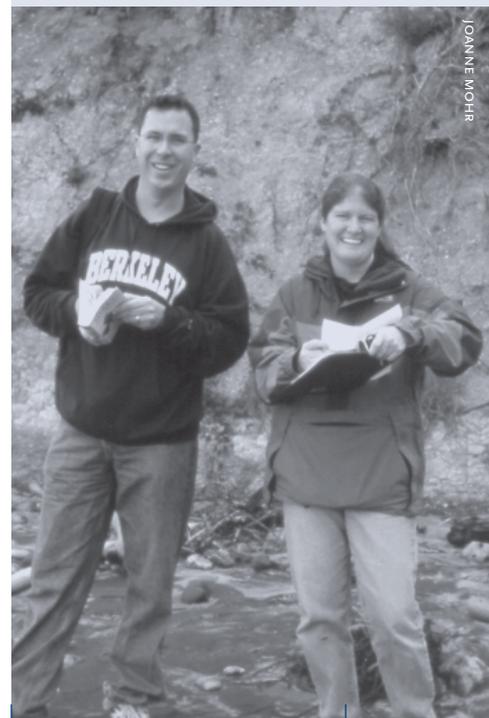
Maria Brown
Superintendent
Gulf of the Farallones National
Marine Sanctuary



Linda Hunter
Executive Director
Farallones Marine Sanctuary
Association

Volunteers Jacquie Hilterman and Patrick
Westfall on a survey of Cove Beach
(Beach 5-09) at Año Nuevo State Reserve.

The Farallones
Marine Sanctuary
Association's
mission
is to protect the
unique ocean
environment
beyond the
Golden Gate, in
partnership with
the Gulf of the
Farallones
National Marine
Sanctuary, through
education,
outreach and
stewardship.



JOANNE MOHR

A dead Red Phalarope documented on Seadrift (Beach 2-14).



Highlights from the Year

The Beach Watch dataset continues to expand under the cadre of dedicated citizen-scientists who monitor the coast of the Gulf of the Farallones and northern Monterey Bay National Marine Sanctuaries. The database now consists of 8,632 surveys, representing over 18,400 kilometers of shoreline surveyed since the program began in 1993. Forty-two beach segments between Bodega Head, Sonoma County and Año Nuevo State Reserve, San Mateo County, are surveyed by trained volunteers who collect data on live and dead vertebrates, tarballs and oiled wildlife and human activities. Along with the Sanctuary's other long-term monitoring programs, these assessments are designed to provide an overview of ecosystem health and status to Sanctuary management.

In 2006, our volunteer retention rate was 95%, an impressive reminder of our volunteers' dedication to environmental pro-

tection. Ninety-seven Beach Watch volunteers spent over 6,800 hours traveling to and surveying their beach segments. The Beach Watch program was fortunate to have several interns and office volunteers whose invaluable assistance kept the data and photographic processing up to date.

During the October 2005 – September 2006 data season, 28 beach segments were monitored every two weeks and 14 beach segments were monitored every four weeks. In this annual report, data were analyzed from 40 of these beaches from October 1993 – September 2006 (Table 2). Since the numbers of surveys and kilometers vary each year, the numbers of dead and live wildlife are quantified as encounter rates (i.e. number of dead animals found per kilometer surveyed). For example, 0.001 birds/km represents 1 bird found per 100 kilometers surveyed. This standardization enables

Dead Cassin's and Rhinoceros Auklets, 1993 - 2006

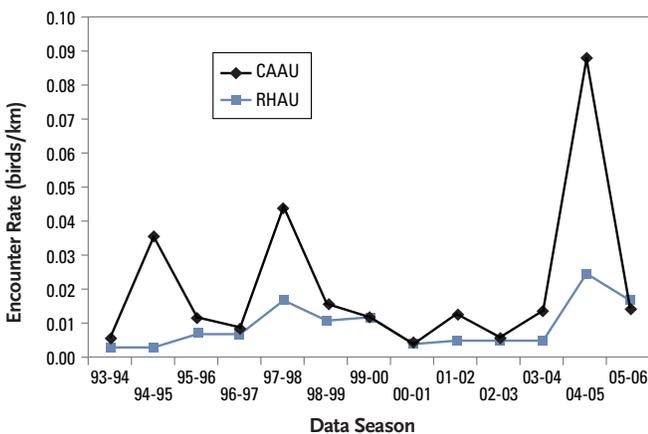


FIGURE 1. Encounter rates for dead Cassin's Auklets (CAAU) and Rhinoceros Auklets (RHAU) found on 40 beaches, October 1993 - September 2006.

Oiled Birds, 1993 - 2006

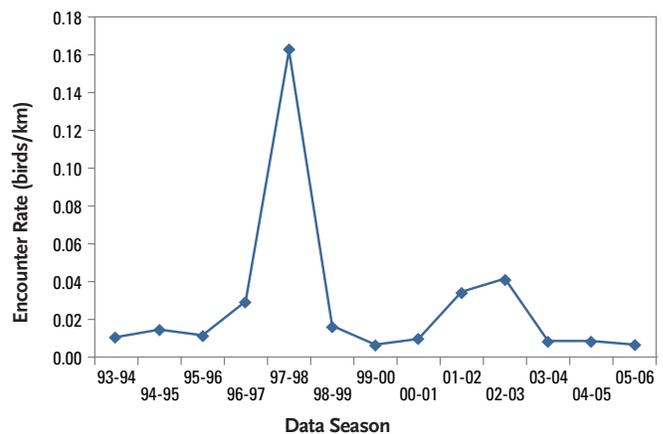


FIGURE 2. Encounter rates for oiled birds found on 40 beaches, October 1993 - September 2006, showing an increase during 1997-1998, which coincided with the Point Reyes Tarball Incident and the 1997-1998 El Niño event.

comparisons between the years and between beaches and regions.

NOTABLE FINDINGS

Through consistent monthly surveys by experienced volunteers unusual sightings and events are detected. In 2004/2005, Beach Watch surveyors documented high numbers of dead seabirds on beaches. This unusual mortality event affected alcid and cormorant species, especially Cassin’s Auklets (*Ptychoramphus aleuticus*) (Beach Watch 2006).

Species that were most affected in the 2004/2005 mortality event exhibited a decreased encounter rate in 2005/2006. From October 2004 – September 2005, Cassin’s Auklets showed an unprecedented high encounter rate of 0.088 dead birds/km, which decreased to 0.014/km this data season (Figure 1). Similarly, Beach Watch documented a lower rate of dead Rhinoceros Auklets (*Cerorhinca monocerata*), 0.016 birds/km (Figure 1); however the 2005/2006 rate was still double the historical encounter rate of 0.008 birds/km (Table 3). Dead Rhinoceros Auklets were also documented in high numbers in the Pacific Northwest during spring 2006 in Oregon and Washington (COASST 2006).

Beach Watch surveyors documented two unusual bird mortality events during the October 2005 – September 2006 data season. In December 2005 and January 2006, surveyors recorded high numbers of dead Red Phalaropes (*Phalaropus fulicarius*). The historical dead encounter rate for this species is 0.002 birds/km, which increased to 0.014 birds/km (Table 3). During this same time frame, thousands of live Red Phalaropes were seen on the coast of California, from Monterey to Del Norte Counties (Rich Stallcup, pers.comm.). Beach Watch recorded 0.013 live Red Phalaropes per kilometer, whereas the historical encounter rate is only 0.004 birds/km. Red Phalaropes are a common migrant offshore, but usually only a few are seen on the coast (Stallcup 1990). The number of dead birds is often correlated with the abundance of live birds (Lyday et al. *In press*).

In a single, localized event, 49 dead Ruddy Ducks were documented on 1/3/06 at Point Reyes Beach A (Beach 1-14). This followed a major storm during which Abbotts Lagoon breached the sandbar and opened to the ocean, an irregular occurrence. All of the ducks that the survey team found were freshly dead and were near the open lagoon. Before this instance, Beach Watch had only documented five dead Ruddy Ducks in thirteen years of surveys.

Notable dead marine mammal findings included two large baleen whales. The skull and parts of an adult minke whale were found on the 11/5/05 survey of Bolinas Beach (Beach 2-13). A female humpback whale was documented on Point Reyes Beach B (Beach 1-15) on 8/20/06.

Oiled Species	
Red-throated Loon	American Coot
Pacific Loon	Sanderling
Common Loon	Red Phalarope
Eared Grebe	Mew Gull
Western Grebe	California Gull
Clark’s Grebe	Herring Gull
Northern Fulmar	Western Gull
Pink-footed Shearwater	Glaucous-winged Gull
Buller’s Shearwater	Black-legged Kittiwake
Sooty Shearwater	Common Murre
Short-tailed Shearwater	Pigeon Guillemot
Brown Pelican	Ancient Murrelet
Brandt’s Cormorant	Cassin’s Auklet
Pelagic Cormorant	Rhinoceros Auklet
Surf Scoter	Horned Puffin
Black Scoter	

TABLE 1.
Oiled birds identified to species encountered on 40 beaches October 1993 - September 2006. Species listed in taxonomic order.

OILING

The Gulf of the Farallones National Marine Sanctuary has a high risk of oil and/or other hazardous material spills due to weather conditions, proximity to busy maritime ports and harbors in San Francisco Bay, and the presence of major vessel traffic lanes in the Sanctuary. The Beach Watch program began in response to the constant threat of oil spills within the Sanctuary. Beach Watch volunteers are often the first to report oiled wildlife or tarballs, and learn through training to collect and preserve oil samples as evidence.

In the thirteen years of Beach Watch, 31 species of birds have been recorded as oiled (Table 1). Common Murres had the highest oiled encounter rate of all species, 0.017 birds found per kilometer, although this represents less than 7% of the dead Common Murres documented. In 1998, the greatest oiling event on seabirds documented by Beach Watch was attributed to the “Point Reyes Tarball Event”; 0.162 oiled birds/km were recorded that year (Figure 2). This oiling event was later attributed to the S.S. *Jacob Luckenbach*, a sunken vessel outside the Golden Gate that has been releasing oil for over 15 years.

I wanted to get involved with Beach Watch because I wanted to give back to nature but I still get back more than I give. —ALLAN SCHREIBER, VOLUNTEER AND FMSA BOARD MEMBER

Since 1996, the Beach Watch program has counted tarballs (small patties of oil) found on beaches as an indicator of oil pollution. In the last few years, the Gulf of the Farallones has not experienced any major oil events. This, in addition to the 2002 clean-up of the S.S. *Jacob Luckenbach*, has led to a decrease in the number of tarballs documented during Beach Watch surveys. From October 2005 – September 2006, 36 out of 40 beaches showed a decrease in the number of tarballs found per kilometer surveyed (Figure 3).

Reduction of oil pollution continues to be a priority of the Gulf of the Farallones National Marine Sanctuary. In 2006, Beach Watch surveyors participated in Safe Seas, a major oil spill response drill that involved multiple resource trustee and response agencies. Continuing education and certification classes are offered to staff and volunteers to improve their knowledge and refresh their skills. In the event of a major spill, the Beach Watch program will provide important baseline information that can be used for natural resource damage assessments.

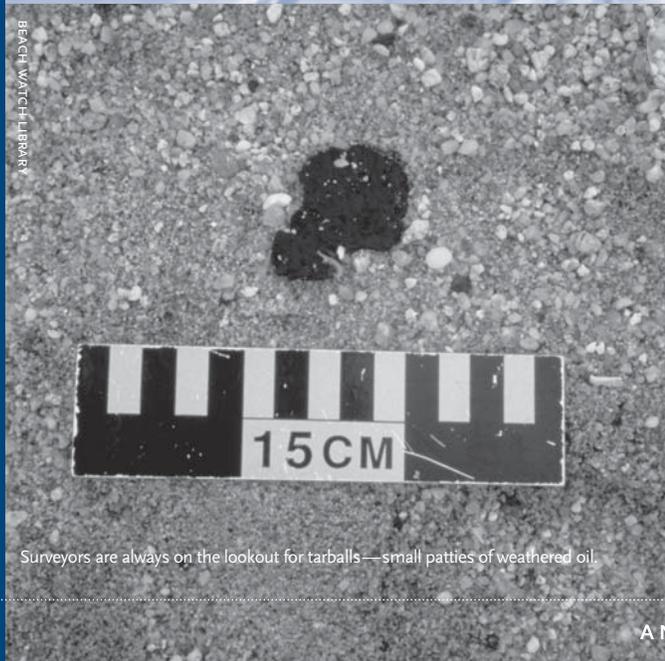
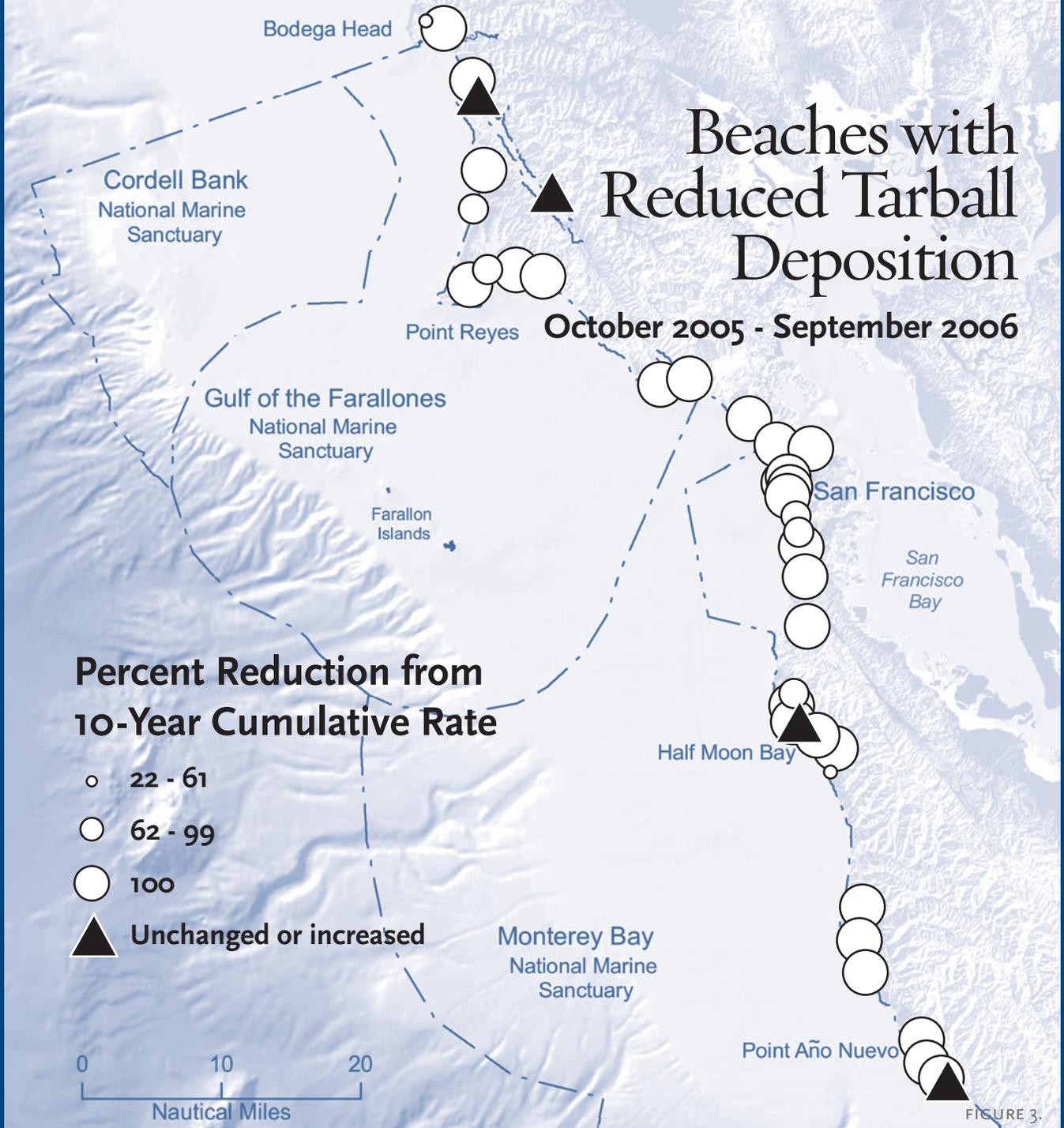
Selected Beaches for Analysis, Cumulative Statistics

Beach ID	Beach Name	Beach Size (km)	Total Kms Surveyed	Dead Bird Encounter Rate	Dead Mammal Encounter Rate	Oiled Bird Encounter Rate	Historic Tarball Rate (1996-2005)	Current Tarball Rate (2005-2006)
1-06	Doran Beach*	3.7	1010.91	1.434	0.117	0.028	0.144	0.113
1-07	Pinnacle Gulch	1.8	207.63	0.795	0.255	0.005	0.005	0.000
1-10	Dillon Beach*	2.9	717.89	0.992	0.053	0.008	0.006	0.000
1-14	Point Reyes Beach A*	5.3	1413.77	1.658	0.115	0.041	2.040	0.000
1-15	Point Reyes Beach B*	4.9	1277.63	1.341	0.106	0.052	1.509	0.019
2-03	Drakes Beach West*	4.5	1104.84	0.463	0.115	0.014	2.140	0.000
2-04	Drakes Beach East*	2.3	440.75	1.207	0.157	0.029	4.121	0.051
2-05	Limantour Beach West*	4.3	1284.32	0.857	0.089	0.041	69.652	0.227
2-06	Limantour Beach East*	2.6	485.45	1.234	0.091	0.029	4.695	0.000
2-13	Bolinas Beach	4.5	474.98	0.345	0.154	0.008	0.007	0.000
2-19	Muir Beach*	0.6	168.87	2.315	0.195	0.195	1.157	0.000
2-23	Rodeo Beach*	0.7	207.59	3.454	0.236	0.010	0.463	0.000
2-30	Kirby Cove*	0.3	47.37	1.267	0.127	0.063	5.058	0.000
3-02	Baker Beach*	1.2	297.30	0.457	0.054	0.010	0.382	0.000
3-04	China Beach*	0.2	27.95	0.966	0.072	0.036	22.128	0.000
3-06	Lands End	0.1	15.58	0.257	0.321	0.000	2.080	0.000
3-08	Ocean Beach North	1.6	115.20	1.085	0.078	0.026	0.438	0.000
3-09	Ocean Beach Central*	3.2	693.28	1.266	0.177	0.014	8.327	0.825
3-10	Ocean Beach South*	0.8	152.02	0.684	0.112	0.020	0.342	0.057
3-11	Thornton Beach North*	2.6	453.34	0.655	0.148	0.007	0.542	0.000
3-12	Thornton Beach South*	3.9	837.21	0.779	0.162	0.006	0.939	0.000
3-15	Sharp Park	1.4	288.05	0.792	0.250	0.010	2.631	0.000
3-27	South Montara Beach*	1.3	272.10	0.775	0.070	0.037	1.120	0.033
3-31	Fitzgerald Marine Reserve, Weinke Way*	1.3	177.97	0.017	0.039	0.006	0.392	0.000
3-32	Fitzgerald Marine Reserve, Entrance*	0.9	125.24	0.048	0.048	0.016	13.827	0.000
3-33	Fitzgerald Marine Reserve, Distillery*	1.4	189.07	0.074	0.069	0.021	0.032	0.256
3-34	Fitzgerald Marine Reserve, Frenchman's Reef*	1.2	169.80	0.188	0.088	0.024	5.214	0.000
3-35	Pillar Point/Maverick's	0.4	41.42	1.376	0.435	0.121	30.370	20.577
4-03	Half Moon Bay, Naples Beach	1.1	174.68	2.485	0.252	0.034	0.037	0.000
4-05	Half Moon Bay, Frances Beach*	1.6	237.12	5.310	0.283	0.025	0.116	0.051
4-14	Pomponio Headlands	2.3	343.92	1.265	0.140	0.012	3.926	0.000
4-17	Pescadero Beach*	1.0	286.95	1.282	0.230	0.045	0.100	0.000
4-20	Pebble Beach	2.6	369.85	0.303	0.111	0.038	3.383	0.000
5-03	Gazos Creek*	2.2	543.73	0.958	0.283	0.042	1.192	0.000
5-06	North Point	2.0	297.60	0.309	0.729	0.020	0.004	0.000
5-09	Cove Beach	0.8	92.24	1.301	0.618	0.087	0.012	0.000
5-10	Bradley Beach*	1.7	240.63	0.927	0.623	0.021	0.005	0.076
6-01	Bolinas Lagoon, Dipsea Road	1.8	120.60	0.133	0.008	0.000	0.021	0.000
7-01	Brazil Beach*	4.1	509.43	0.616	0.088	0.004	0.000	0.000
7-06	Tomasini Creek Beach	4.6	850.91	0.260	0.005	0.000	0.000	0.000

TABLE 2. 40 beaches analyzed October 1993 - September 2006.

Beach 1-16 (Point Reyes C) and Beach 2-14 (Seadrift) were also surveyed but were not included in these analyses due to data gaps.

Encounter rate is number found per kilometer surveyed. Asterisk* denotes beaches surveyed every 2 weeks.



BEACH WATCH LIBRARY

Surveyors are always on the lookout for tarballs—small patties of weathered oil.

The oil and feather samples collected by Beach Watch volunteers have been of great value to DFG-OSPR in documenting both baseline coastal conditions and the extent and impacts of oil releases in these areas. The cadre of trained volunteers provides information we would be unable to acquire without their assistance.

—KATHLEEN JENNINGS, DEPARTMENT OF FISH AND GAME OFFICE OF SPILL PREVENTION AND RESPONSE (DFG-OSPR)

Dead Species Table

Common Name	Species Sum (1993-2005)	Encounter Rate (1993-2005)	Species Sum (2005-2006)	Encounter Rate (2005-2006)
Red-throated Loon	74	0.005	8	0.005
Pacific Loon	245	0.016	5	0.003
Common Loon	96	0.006	5	0.003
Yellow-billed Loon	1	<0.001	0	0
Loon (unidentified)	18	0.001	3	0.002
Pied-billed Grebe	2	<0.001	0	0
Horned Grebe	44	0.003	3	0.002
Red-necked Grebe	9	<0.001	0	0
Eared Grebe	23	0.002	6	0.003
Eared or Horned Grebe	24	0.002	0	0
Western Grebe	618	0.041	21	0.012
Clark's Grebe	119	0.008	6	0.003
Western or Clark's Grebe	542	0.036	11	0.006
Grebe (unidentified)	55	0.004	1	<0.001
Black-footed Albatross	7	<0.001	1	<0.001
Laysan Albatross	1	<0.001	0	0
Northern Fulmar	2659	0.177	315	0.181
Pink-footed Shearwater	9	<0.001	1	<0.001
Flesh-footed Shearwater	1	<0.001	0	0
Buller's Shearwater	10	<0.001	2	<0.001
Sooty Shearwater	248	0.017	15	0.009
Short-tailed Shearwater	57	0.004	3	0.002
Sooty or Short-tailed Shearwater	21	0.001	0	0
Manx Shearwater	2	<0.001	0	0
Black-vented Shearwater	8	<0.001	0	0
Fork-tailed Storm-Petrel	23	0.002	2	0.001
Leach's Storm-Petrel	3	<0.001	0	0
Ashy Storm-Petrel	11	<0.001	1	<0.001
American White Pelican	1	<0.001	0	0
Brown Pelican	204	0.014	16	0.009
Brandt's Cormorant	893	0.059	84	0.048
Double-crested Cormorant	72	0.005	9	0.005
Pelagic Cormorant	165	0.011	25	0.014
Cormorant (unidentified)	81	0.005	10	0.006
Great Blue Heron	1	<0.001	1	<0.001
Great Egret	1	<0.001	0	0
Snowy Egret	1	<0.001	0	0
Black-crowned Night-Heron	5	<0.001	0	0
Turkey Vulture	7	<0.001	0	0
Greater White-fronted Goose	3	<0.001	0	0
Ross's Goose	2	<0.001	0	0
Canada Goose	1	<0.001	2	0.001
Brant	6	<0.001	1	<0.001
Tundra Swan	2	<0.001	0	0
Gadwall	2	<0.001	0	0
American Wigeon	1	<0.001	1	<0.001
Mallard	6	<0.001	1	<0.001
Northern Pintail	3	<0.001	1	<0.001
American Green-winged Teal	12	<0.001	1	<0.001
Greater Scaup	19	0.001	2	0.001
Lesser Scaup	2	<0.001	0	0
King Eider	1	<0.001	0	0
Surf Scoter	496	0.033	7	0.004
White-winged Scoter	57	0.004	1	<0.001

Common Name	Species Sum (1993-2005)	Encounter Rate (1993-2005)	Species Sum (2005-2006)	Encounter Rate (2005-2006)
Black Scoter	7	<0.001	0	0
Scoter (unidentified)	14	<0.001	0	0
Long-tailed Duck	1	<0.001	0	0
Bufflehead	28	0.002	3	0.002
Common Merganser	1	<0.001	0	0
Red-breasted Merganser	2	<0.001	1	<0.001
Ruddy Duck	5	<0.001	49	0.028
Osprey	1	<0.001	0	0
Northern Harrier	1	<0.001	0	0
Sharp-shinned Hawk	1	<0.001	0	0
Cooper's Hawk	0	0	1	<0.001
Red-tailed Hawk	16	0.001	1	<0.001
Peregrine Falcon	4	<0.001	0	0
Raptor (unidentified)	3	<0.001	1	<0.001
Red Junglefowl	13	<0.001	1	<0.001
Virginia Rail	2	<0.001	0	0
American Coot	26	0.002	8	0.005
Black-bellied Plover	6	<0.001	0	0
Snowy Plover	1	<0.001	0	0
Black Oystercatcher	3	<0.001	0	0
Willet	49	0.003	6	0.003
Whimbrel	4	<0.001	0	0
Marbled Godwit	39	0.003	2	0.001
Black Turnstone	4	<0.001	0	0
Surfbird	1	<0.001	0	0
Sanderling	12	<0.001	0	0
Western Sandpiper	1	<0.001	0	0
Least Sandpiper	1	<0.001	0	0
Dunlin	1	<0.001	1	<0.001
Red-necked Phalarope	8	<0.001	2	0.001
Red Phalarope	30	0.002	24	0.014
Large Shorebird (unidentified)	19	0.001	0	0
Pomarine Jaeger	2	<0.001	0	0
Parasitic Jaeger	1	<0.001	0	0
Laughing Gull	1	<0.001	0	0
Bonaparte's Gull	8	<0.001	4	0.002
Heermann's Gull	156	0.01	18	0.01
Mew Gull	37	0.002	3	0.002
Ring-billed Gull	63	0.004	5	0.003
California Gull	166	0.011	14	0.008
Herring Gull	91	0.006	10	0.006
Herring x Glaucous-winged Gull Hybrid	0	0	1	<0.001
Thayer's Gull	4	<0.001	0	0
Western Gull	1869	0.124	215	0.124
Western X Glaucous-winged Gull Hybrid	88	0.006	5	0.003
Glaucous-winged Gull	856	0.057	38	0.022
Glaucous Gull	4	<0.001	0	0
Sabine's Gull	1	<0.001	0	0
Black-legged Kittiwake	56	0.004	0	0
Gull (unidentified)	304	0.02	19	0.011
Caspian Tern	10	<0.001	0	0
Elegant Tern	7	<0.001	0	0
Common Tern	1	<0.001	0	0
Arctic Tern	1	<0.001	0	0

TABLE 3. Dead species encountered on 40 beaches, comparing historical years (1993-2005) with the 2005-2006 dataseason. Species listed in taxonomic order. Encounter rate is number found per kilometer surveyed. Beach Watch also collects data on dead terrestrial mammals, reptiles, amphibians and fish not included in this table.

Common Name	Species Sum (1993-2005)	Encounter Rate (1993-2005)	Species Sum (2005-2006)	Encounter Rate (2005-2006)
Forster's Tern	0	0	1	<0.001
Common Murre	3682	0.245	408	0.234
Pigeon Guillemot	232	0.015	32	0.018
Marbled Murrelet	12	<0.001	0	0
Xantus's Murrelet	4	<0.001	1	<0.001
Craveri's Murrelet	1	<0.001	0	0
Ancient Murrelet	12	<0.001	0	0
Cassin's Auklet	332	0.022	25	0.014
Parakeet Auklet	2	<0.001	0	0
Rhinoceros Auklet	127	0.008	27	0.016
Horned Puffin	7	<0.001	3	0.002
Tufted Puffin	4	<0.001	4	0.002
Alcid (unidentified)	48	0.003	3	0.002
Rock Dove	59	0.004	3	0.002
Band-tailed Pigeon	1	<0.001	0	0
Barn Owl	11	<0.001	0	0
Great Horned Owl	2	<0.001	0	0
Long-eared Owl	1	<0.001	0	0
Northern Flicker	1	<0.001	0	0
Pacific-slope Flycatcher	1	<0.001	0	0
Western Scrub-jay	1	<0.001	0	0
Clark's Nutcracker	1	<0.001	0	0
American Crow	5	<0.001	0	0
Common Raven	30	0.002	4	0.002
American Crow or Common Raven	3	<0.001	0	0
Bank Swallow	1	<0.001	0	0
Hermit Thrush	0	0	1	<0.001
Song Sparrow	1	<0.001	0	0
Red-winged Blackbird	3	<0.001	0	0
Non-marine bird (unidentified)	2	<0.001	0	0
Marine Bird (unidentified)	41	0.003	2	0.001
Unidentified Bird (marine/non-marine)	177	0.012	11	0.006
Northern Fur Seal	7	<0.001	1	<0.001
Guadalupe Fur Seal	3	<0.001	0	0
Steller Sea Lion	34	0.002	1	<0.001
California Sea Lion	947	0.063	86	0.049
Otariid (unidentified)	131	0.009	20	0.011
Harbor Seal	318	0.021	37	0.021
Northern Elephant Seal	344	0.023	12	0.007
Phocid (unidentified)	12	<0.001	1	<0.001
Pinniped (unidentified)	77	0.005	14	0.008
Sea Otter	33	0.002	4	0.002
Gray Whale	9	<0.001	0	0
Minke Whale	1	<0.001	1	<0.001
Humpback Whale	2	<0.001	1	<0.001
Sperm Whale	1	<0.001	0	0
Pygmy Sperm Whale	1	<0.001	0	0
Bottlenose Dolphin	2	<0.001	0	0
Striped Dolphin	1	<0.001	0	0
Common Dolphin (sp.)	1	<0.001	0	0
Pacific White-sided Dolphin	5	<0.001	0	0
Risso's Dolphin	1	<0.001	0	0
Harbor Porpoise	46	0.003	7	0.004
Dall's Porpoise	3	<0.001	0	0
Cetacean (unidentified)	17	0.001	2	0.001
Marine Mammal (unidentified)	24	0.002	3	0.002



Common Name	Encounter Rate (2005-2006)
Western Gull	29.938
Sanderling	21.509
Brown Pelican	17.928
Heermann's Gull	13.536
Marbled Godwit	12.259
California Gull	9.506
Willet	7.767
Surf Scoter	7.208
Brandt's Cormorant	6.676
Least Sandpiper	4.834
Dunlin	4.832
Harbor Seal	4.805
Glaucous-winged Gull	4.255
Western Sandpiper	3.585
Double-crested Cormorant	3.303
Snowy Plover	2.684
Ring-billed Gull	2.188
Common Raven	1.979
Northern Elephant Seal	1.957
Mew Gull	1.931
Brewer's Blackbird	1.707
Black-bellied Plover	1.343
Elegant Tern	1.155
Caspian Tern	1.148
Bufflehead	1.141

TABLE 4.
Top 25 most frequently encountered live animals identified to species on 40 beaches, October 2005 - September 2006. Encounter rate is number found per kilometer surveyed. Full live species table available.

Unusual Sightings

Interesting Live Sightings October 2005 – September 2006

Common Name	Beach(es)	Date(s)
Ring-necked Duck	Brazil Beach (7-01)	2/19/06
Harlequin Duck	Drakes West (2-03)	6/18/06
		7/15/06
	9/24/06	
	Thornton South (3-12)	2/20/06
Barrow's Goldeneye	Bolinas Lagoon Dipsea Road (6-01)	1/21/06
Baird's Sandpiper	Half Moon Bay - Naples (4-03)	8/13/06
	Gazos Creek (5-03)	9/19/06
Pectoral Sandpiper	Brazil Beach (7-01)	10/1/05
Common Snipe	Brazil Beach (7-01)	10/1/05
		11/26/05
		12/8/05
Ancient Murrelet	Drakes East (2-04)	5/14/06
Horned Puffin**	Bradley Beach (5-10)	2/17/06
Rock Wren	Drakes West (2-03)	12/11/05
Humpback Whale	Pt. Reyes B (1-15)	9/17/06

TABLE 5.
Species listed in taxonomic order
** This bird was taken by surveyors to International Bird Rescue and successfully rehabilitated.

Uncommon Dead Specimens October 2005 – September 2006

Common Name	Beach(es)	Date
Black-footed Albatross	Dillon Beach (1-10)	3/18/06
Red-breasted Merganser	Bradley Beach (5-10)	4/2/06
Cooper's Hawk*	Doran Beach (1-06)	11/6/05
Dunlin	Brazil Beach (7-01)	1/6/06
Forster's Tern*	Half Moon Bay - Frances (4-05)	11/5/05
Xantus's Murrelet	Ocean Beach South (3-09)	12/24/05
Hermit Thrush*	Doran Beach (1-06)	4/23/06
Minke Whale	Bolinas Beach (2-13)	11/5/05
Humpback Whale	Pt. Reyes B (1-15)	8/20/06
Long-tailed Weasel*	Pt. Reyes A (1-14)	8/25/06

TABLE 6.
Species listed in taxonomic order
* New dead species for Beach Watch

Below left: On Brazil Beach (Beach 7-01) at Tomales Bay, surveyors encountered a Common Snipe on several surveys.

Below right: The team at Point Reyes Beach B (Beach 1-15) were awed by the sight of this humpback whale washed up dead.



COURTESY LYN TONGER



RICHARD FERRIS

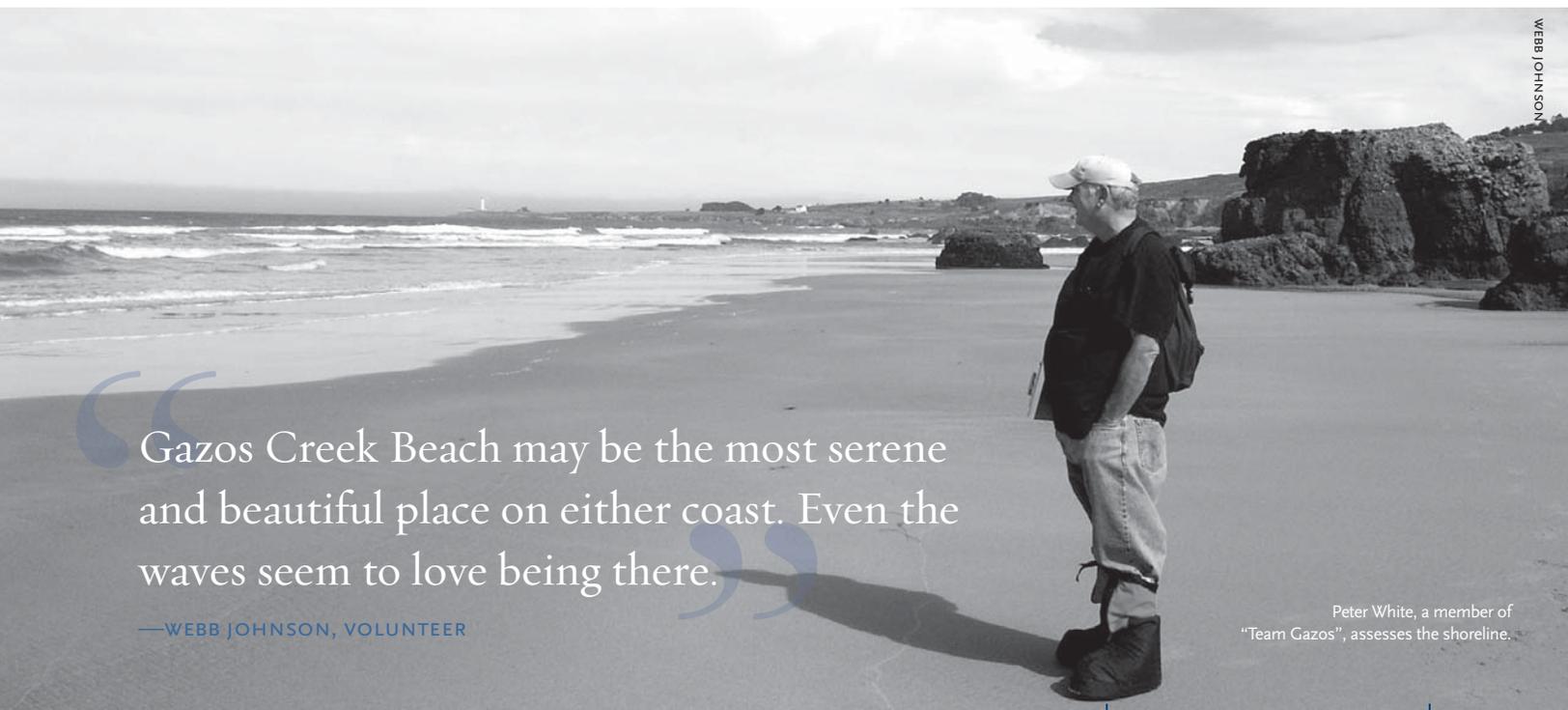
Federally Listed Species Found Dead

Common Name	Species Sum (1993-2005)	Encounter Rate (1993-2005)	Species Sum (2005-2006)	Encounter Rate (2005-2006)	Federal Conservation Status
Black-footed Albatross	7	<0.001	1	<0.001	Species of Concern
Ashy Storm-Petrel	11	<0.001	1	<0.001	Species of Concern
Brown Pelican	204	0.014	16	0.009	Endangered
Peregrine Falcon	4	<0.001	0	0	Species of Concern
Western Snowy Plover	1	<0.001	0	0	Threatened
Black Oystercatcher	3	<0.001	0	0	Species of Concern
Whimbrel	4	<0.001	0	0	Species of Concern
Marbled Godwit	39	0.003	2	0.001	Species of Concern
Black Turnstone	4	<0.001	0	0	Species of Concern
Elegant Tern	7	<0.001	0	0	Species of Concern
Marbled Murrelet	12	<0.001	0	0	Threatened
Xantus's Murrelet	4	<0.001	1	<0.001	Species of Concern
Cassin's Auklet	332	0.022	25	0.014	Species of Concern
Guadalupe Fur Seal	3	<0.001	0	0	Threatened
Steller Sea Lion	34	0.002	1	<0.001	Threatened
California Sea Otter	33	0.002	4	0.002	Threatened
Humpback Whale	2	<0.001	1	<0.001	Endangered
Sperm Whale	1	<0.001	0	0	Endangered
Leatherback Turtle	2	<0.001	0	0	Endangered

TABLE 7. Federally listed species encountered on 40 beaches, comparing historical years (1993-2005) with the 2005-2006 dataseason. Species listed in taxonomic order. Threatened and endangered species updated from USFWS 8/2007. Species of concern updated from USFWS 2002.



Black-footed Albatross are the most common albatross sighted in the Sanctuary.



Gazos Creek Beach may be the most serene and beautiful place on either coast. Even the waves seem to love being there.

—WEBB JOHNSON, VOLUNTEER

Peter White, a member of "Team Gazos", assesses the shoreline.



Willetts are one of the most commonly documented shorebirds on GGNRA beaches.

Shorebirds on Golden Gate National Recreation Area Beaches

BY TOM FLANAGAN

The National Park Service (NPS) is developing a dog management plan for Golden Gate National Recreation Area (GGNRA) and is using Beach Watch data to aid in its planning efforts. In accordance with the National Environmental Policy Act (NEPA), the NPS is preparing an environmental impact statement (EIS) that will examine the impacts of a range of alternatives for dog management at GGNRA. The NPS will analyze impacts on numerous and varied topics in the EIS, relying on available scientific data to determine how dog management alternatives would affect GGNRA's resources. Among the many topics to be addressed in the dog management plan/EIS are shorebirds on GGNRA's beaches.

In addition to the expertise of GGNRA staff and the park's data sets, the NPS used Beach Watch data to help document the park's shorebird resource. The NPS used data collected by Beach Watch surveyors to assist in describing the distribution of shorebirds on GGNRA beaches. Specifically, the NPS analyzed Beach Watch data as part of an effort to:

- examine seasonal variation in shorebird abundance and highlight months of low and high shorebird abundance;
- differentiate, relative to other GGNRA beaches, beaches of low and high shorebird abundance;
- examine patterns of shorebird species richness; and
- ascertain the relative abundance of individual shorebird species.

For this analysis, the NPS obtained Beach Watch live bird-count data from over 1500 surveys spanning the years 1993-2006 for segments of eight GGNRA beaches: Muir Beach (Beach 2-19), Rodeo Beach (Beach 2-23), Baker Beach (Beach 3-02), China Beach (Beach 3-04), Ocean Beach North (Beach 3-08), Ocean Beach Central (Beach 3-09), Ocean Beach South (Beach 3-10), and Thornton Beach North (Beach 3-11).

RESULTS

The NPS compiled occurrences of live shorebird species, both individually and collectively, by month for each beach. Because the number of surveys per beach and length of beach segments surveyed vary, the NPS described shorebird abundance in terms of encounter rate (birds/km), a standardized measure calculated by dividing number of individuals observed by kilometers of beach surveyed. The NPS described shorebird species richness by calculating the number of different species observed, by month, at each beach.

Results of the analysis illustrate the distinct seasonal patterns of shorebird abundance at GGNRA beaches (Figure 4). Encounter rates were lowest during the summer months, a time that many shorebirds are at their northern breeding grounds. June was the month of lowest shorebird abundance across all eight GGNRA beaches examined by the NPS. No beach demonstrated an encounter rate greater than 3 birds/km for the month. For six of the eight beaches, the number of shorebirds observed on the beach during June constituted less than one percent of the total number, across all months, of shorebirds observed at that beach. In addition to June, May and July were also months of consistently lower encounter rates across the eight beaches.

	Muir Beach	Rodeo Beach	Baker Beach	China Beach	Ocean Beach N	Ocean Beach C	Ocean Beach S	Thornton Beach N
Sanderling	0.60	2.18	11.73	25.64	18.20	71.48	60.79	20.37
Willet	0.45	0.44	2.61	19.28	8.35	12.19	35.67	13.69
Marbled Godwit	0.51	0.23	1.44	5.56	4.93	7.15	6.52	4.02
Whimbrel	0.17	0.14	0.24	3.56	0.04	0.98	0.41	0.10

TABLE 8. Cumulative encounter rates (birds/km) for commonly observed shorebird species at eight GGNRA beaches, 1993-2006.

Encounter rates were greatest during the fall and spring migrations and over-wintering months. Shorebirds are most abundant at GGNRA beaches in April, November, and December, although there is some variation between beaches in terms of months of high encounter rates. November commonly has the highest abundance, with three of the eight beaches, Rodeo Beach, China Beach, and Thornton Beach North, exhibiting their greatest encounter rate in that month.

Relative to other GGNRA beaches, Muir Beach, Rodeo Beach, and Baker Beach demonstrate the lowest encounter rate of shorebirds. Ocean Beach Central, Ocean Beach South, and China Beach demonstrate the greatest encounter rate of shorebirds. Analysis revealed a substantial difference in shorebird encounter rate between beaches of low and high relative abundance. For example, Muir Beach's total encounter rate is 3 birds/km compared to Ocean Beach South's 105 birds/km.

Shorebird Encounter Rates by Month

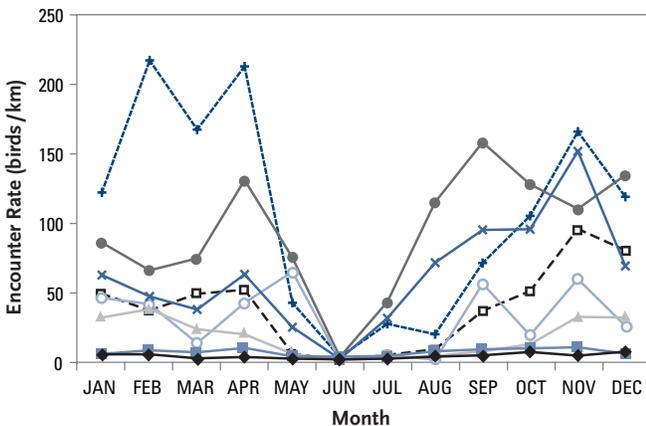


FIGURE 4. Encounter rates for live shorebirds by month at eight GGNRA beaches, 1993-2006.

Shorebird Species Richness by Month

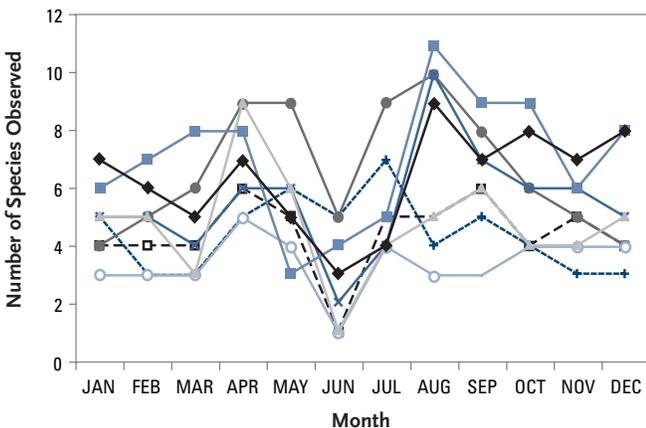


FIGURE 5. Shorebird species richness by month at eight GGNRA beaches, 1993-2006.

Such variation is likely a function of the habitat at the beach sites or other factors. Whereas Ocean Beach is a long, wide beach that provides an excellent foraging substrate, Muir Beach has coarser grained sands not as suitable for foraging.

The NPS described species richness on each of the eight beaches by calculating the number of shorebird species observed, by month (Figure 5). In some respects, patterns of species richness follow those for species abundance. For example, at all eight examined GGNRA beaches, June had the lowest encounter rate; for five of these eight beaches, June also had the lowest species richness. Ocean Beach Central is among the beaches of greatest abundance and greatest species richness. However, the measure of species richness can provide a picture different than that of abundance. For example, August, while not a month of particularly high encounter rates, is the month of greatest species richness for four of the eight beaches examined by NPS. Although Rodeo Beach is a beach of low relative abundance, it is a beach that demonstrates particularly great relative species richness, possibly owing to the cliffs on the beach's edge and the lagoon that exits out the beach or other factors.

Beach Watch data indicate 22 different observed shorebird species on the eight GGNRA beaches examined by NPS. Across the eight beaches, four species stand out as having the greatest encounter rates: Sanderlings, Willets, Marbled Godwits, and Whimbrels (Table 8). For seven of the eight beaches, Sanderlings demonstrated the greatest encounter rate. Willets had the second highest encounter rate on six of the eight beaches.

CONCLUSION

The development of GGNRA's dog management plan/EIS demands a rigorous and scientific analysis of the impact of dog management alternatives on a wide spectrum of resources. Shorebirds represent one such resource. The sound data collection methods and long-term nature of the dataset provided by Beach Watch were invaluable to this project. Data from Beach Watch have helped the NPS more accurately describe the shorebird resource at GGNRA, which in turn will aid the NPS in protecting park resources for future generations.

Tom Flanagan is an Environmental Protection Specialist with the NPS Environmental Quality Division. He can be reached at Thomas_Flanagan@nps.gov. Special thanks to Daphne Hatch and Bill Merkle of GGNRA, and to Richard Podolsky and Jules Evans. All provided essential input during the development of the data analysis framework.

- ◆ Muir Beach
- Rodeo Beach
- ▲ Baker Beach
- ✕ China Beach
- Ocean Beach N
- Ocean Beach C
- ✚ Ocean Beach S
- ◻ Thornton Beach N

Snowy Plovers, a threatened species, have been documented on 30 Beach Watch segments.

A Focus on the Western Snowy Plover

BY SHANNON LYDAY, KATE PETERLEIN, AND JESSICA TAYLOR

SNOWY PLOVERS IN THE SANCTUARY

During a Beach Watch survey, volunteers identify and count live birds and marine mammals that pass within 90 meters (300 feet) landward and seaward of the beach. This live count is useful as an index and trend in abundance and distribution. Live bird and mammal counts reveal changes in beach usage over time. The data also provides known locations of species protected under the Endangered Species Act, such as the Western Snowy Plover (*Charadrius alexandrinus nivosus*).

The Western Snowy Plover was listed as threatened by the Fish and Wildlife Service in 1993. The Pacific Coast population is threatened due to disturbance, habitat loss, and predation (Fish and Wildlife Service, 1993). This locally breeding plover is found on sandy beaches and dry mudflats, and on saline or alkaline inland flats. Unlike many birds, plover chicks are precocial, following the adult male parent around for a month after hatching. On the California coast the breeding season is long enough (March-September) for some females to triple brood, and for males to double brood.

The Snowy Plover is a small, tan and white shorebird that blends in with its surroundings and sits in divets in the sand, making these plovers difficult to see. Beach Watch volunteers are trained to carefully search the beach for these birds with their binoculars. In addition to counting them, surveyors also note if they see colored bands on the legs. These banding reports are provided to researchers, which allow them to identify and track individual birds.

Out of the 40 selected beaches for analysis, Beach Watch volunteers have identified Snowy Plovers on 30 beach segments (Table 9). The beach that has the highest encounter rate of Snowy Plovers (number per kilometer surveyed) is Half Moon Bay, Frances (Beach 4-05). From October 1993 – September 2006, this Half Moon Bay State Beach had an encounter rate of 13.99 birds per kilometer surveyed. Other beach segments that have Snowy Plover encounter rates greater than 2.0

birds/km are Dillon Beach, Point Reyes Beach A & B, Liman-tour Beach West, Ocean Beach Central, Pescadero Beach and Gazos Creek Beach (Table 9).

Surveyors recorded the highest numbers of Snowy Plovers at the end of the breeding season (September) and over the winter. The highest encounter rate was documented in December, with 3.17 Snowy Plovers sighted per kilometer surveyed (Figure 5). In the winter, coastal populations are augmented by inland populations, when Snowy Plovers use beaches for foraging and roosting (Fish and Wildlife Service, 1993).

SNOWY PLOVER MONITORING AT POINT REYES NATIONAL SEASHORE

Since 1995, Point Reyes National Seashore (PORE) and PRBO Conservation Science (PRBO) have been implementing a re-

Live Snowy Plovers by Month

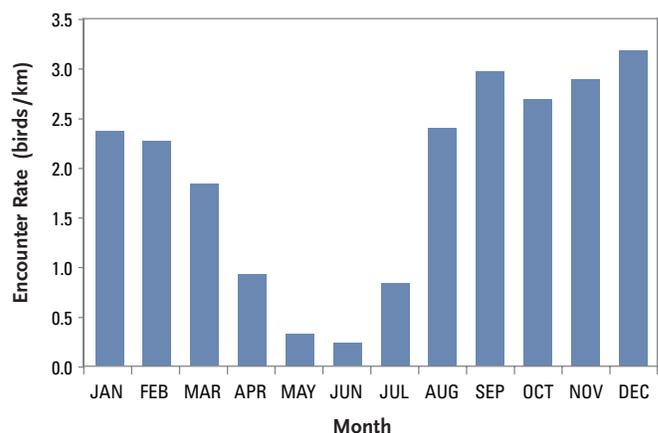


FIGURE 6. Encounter rates for live Snowy Plovers by month at 30 beaches, October 1993 – September 2006.

covery project for the breeding Western Snowy Plover population within the PORE. Because Snowy Plovers are sensitive to changes in dune habitat, they are considered an indicator of the health of the coastal ecosystem. Western Snowy Plovers will reside, nest and rear young only in habitats with certain characteristics. Snowy Plovers nest on flat, unstable, open areas – preferably dune-backed beaches and spits. The beaches and spits need to be sparsely covered with vegetation to allow chicks protected access to the shore. Non-native vegetation narrows their beach habitat, resulting in greater exposure to predators and disturbance from visitors.

PRBO has been collaborating with PORE to monitor Snowy Plovers on Point Reyes beaches intensively for 16 years, including 1977, 1986 to 1989, and 1995 to the present. Each year Snowy Plovers are monitored during the breeding season. Every week, PRBO biologists systematically search Point Reyes Beach and Limantour Spit for nests and watch potential nesting adults from concealed positions. Nests are checked frequently to determine the hatching date, and once hatched chicks are monitored for another 28 days, at which time they are considered fledged. PRBO and PORE have experimented with a variety of management measures to help the plovers reproduce successfully, including erecting exclosures (protective fencing against predators) around nests, creating seasonal closures to humans and dogs around nesting habitat, restoring dune habitat by removing invasive plants, and educating park visitors.

During the 2006 plover nesting season at PORE, an estimated 23 of 24 nests were protected with exclosures and 51 eggs hatched out of 69 laid (74% hatching success). Of the 51 chicks that hatched, 23 fledged, yielding a 45% fledging rate. More than one chick fledged per male, which indicates that the Snowy Plover population was potentially self-sustaining. An estimated 30-32 breeding birds nested in PORE in 2006. Also, plovers nested in the restored coastal dunes at Abbotts Lagoon.

The success of the nesting season was attributed to the effectiveness of the exclosures, the restoring of dune habitat and the education of the public by docents. Since March 2004, plovers have begun to nest in the restored dune area at Abbotts Lagoon. This is the first time plovers have used these back dunes since monitoring began in 1972. Normally, plover nesting activity has been restricted to a narrow strip of sand between the sea wall formed by non-native beach grass and the high tide line. Plovers are now using the restored area for chick rearing as well. Male plovers have been seen moving chicks to this area from as far as a mile and a half away. Education is key to protecting plovers because disturbance by human-related activities results in alteration of Snowy Plover activities, generally from energy conserving and foraging behaviors to vigilance and predator avoidance. During the breeding season, disturbance causes adults to move away from nests and chicks, and increases potential for predation of chicks and eggs by ravens and other predators.

In the near future, PORE will continue the protection, restora-

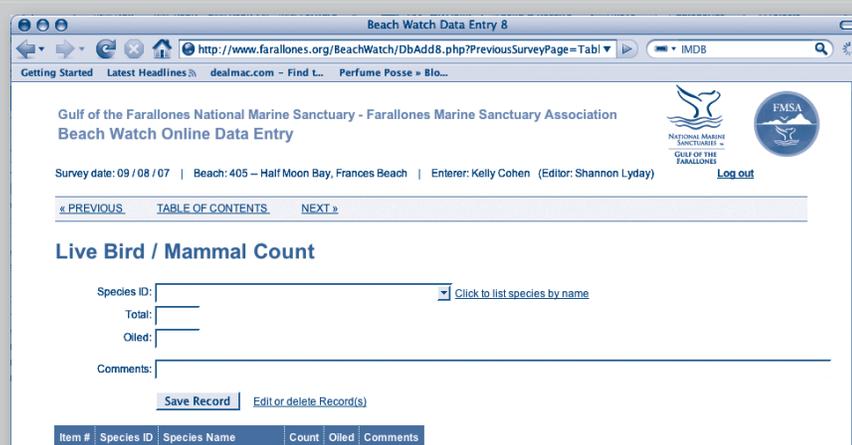
tion and education programs until the population is sustained at the US Fish and Wildlife Service recovery plan target number of 64 breeding birds for Point Reyes beaches and one chick produced per male during the breeding season. A major component of continuing this effort will be restoring over 300 acres of coastal dune habitat on Point Reyes Beach.

As a biologist with PRBO Conservation Science, Kate Peterlein has spent the last seven seasons managing the recovery project for Western Snowy Plover within Point Reyes National Seashore. Jessica Taylor is an Interpretive Ranger with Point Reyes National Seashore, and has assisted in monitoring and protection for the past two years. For further information please contact Shannon Lyday at slyday@farallones.org.

Beaches with Snowy Plover Sightings

Beach ID	Beach Name	Encounter Rate (1993-2006)
1-06	Doran Beach	0.920
1-07	Pinnacle Gulch	0.173
1-10	Dillon Beach	7.647
1-14	Point Reyes Beach A	3.440
1-15	Point Reyes Beach B	2.814
2-03	Drakes Beach West	0.021
2-04	Drakes Beach East	1.257
2-05	Limantour Beach West	4.693
2-06	Limantour Beach East	0.148
2-13	Bolinas Beach	0.046
2-23	Rodeo Beach	0.005
3-02	Baker Beach	0.003
3-08	Ocean Beach North	0.051
3-09	Ocean Beach Central	4.737
3-10	Ocean Beach South	0.033
3-12	Thornton Beach South	0.001
3-15	Sharp Park	0.087
3-27	South Montara Beach	0.011
3-31	Fitzgerald Marine Reserve, Weinke Way	0.011
3-32	Fitzgerald Marine Reserve, Entrance	0.032
3-33	Fitzgerald Marine Reserve, Distillery	0.434
3-34	Fitzgerald Marine Reserve, Frenchman's Reef	0.035
4-03	Half Moon Bay, Naples Beach	0.292
4-05	Half Moon Bay, Frances Beach	13.992
4-17	Pescadero Beach	2.053
4-20	Pebble Beach	0.008
5-03	Gazos Creek	3.621
5-06	North Point	0.252
7-01	Brazil Beach	0.923
7-06	Tomasini Creek Beach	0.002

TABLE 9. Live Snowy Plovers encountered on 30 out of 40 beaches analyzed October 1993 - September 2006. Encounter rate is number found per kilometer surveyed.



New Technology for Coastal Assessment

Continuing education classes allow us to improve the reliability of the Beach Watch dataset by refreshing volunteers' skills in data collection and documentation. In April 2007, Beach Watch surveyors attended "Advanced Training" classes to introduce two exciting new developments for the Beach Watch program, Digital Photo Documentation and Online Data Entry.

Beach Watch surveyors use photos to document beach profiles, oil/tarball deposition, Sanctuary violations and any unusual occurrences. Photos also serve to cross-check dead specimen identification and demographics. This spring staff completed the conversion from data collection using slide film to digital images and provided each survey team with a digital camera. Upgrading to digital imagery will enable us to expand data sharing with partner organizations, research facilities and resource managers. Digital photography will decrease data processing time and costs, allowing for quicker access to verified data. Staff continue to work with the NOAA National Climate Data Center to digitize archived photographic slides. Eventually the entire historic photo database will be available through the NOAA Data Library.

The new Beach Watch online data entry system allows surveyors to enter their data online. This immediate download of Beach Watch data makes the data available more rapidly and streamlines the process for utilizing data. Instead of several months to input, process, and analyze data from the 70 monthly surveys, this newly upgraded system allows for access to real-time data. This enables Sanctuary research staff to detect any unusual events, either natural or human induced.

These advancements were made possible thanks to funding from the Resource Legacy Foundation and the Tanklage Family Foundation. Thank you to Jim Ferlin and David Klotz who programmed the online data entry system.

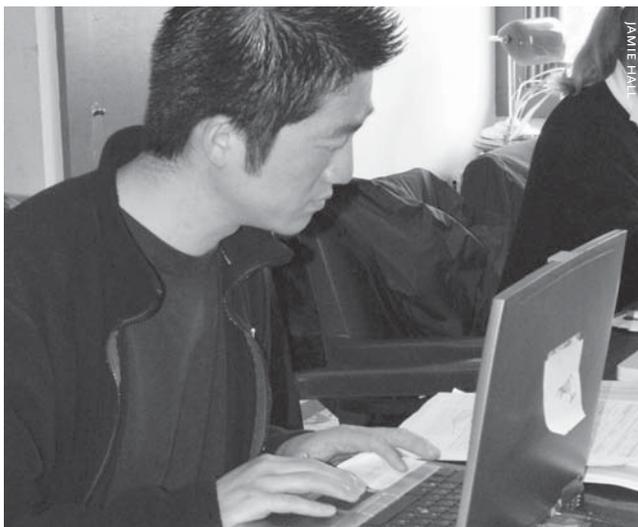
Top left: Dru Devlin assists volunteer Joan McCune during Advanced Training.

Bottom left: Lee Huo practices entering data into the new online system.

Bottom right: Sally Sorenson recording data on a survey of Bolinas Beach (Beach 2-13).

“This data entry system is impressive. Great job!”

—DAVE FICHTNER,
VOLUNTEER



Volunteers

Seadrift (Beach 2-14) surveyors Sue Torres and Dianne Sheridan during a blustery Beach Watch survey.

During the 2005-2006 data season, 6,853 volunteer survey hours were contributed and 73,026 miles were driven to monitor beaches. A total of 8,184 hours were donated to the Beach Watch program in 2006, including survey hours, enrichment and training classes, and interns and office volunteers.

Surveyor Effort October 2005 - September 2006

Surveyor	Hours*	Kilometers Surveyed	Surveyor	Hours*	Kilometers Surveyed	Surveyor	Hours*	Kilometers Surveyed
Tamae Agnoli•	24.3	21.6	Dave Fichtner	68.8	24.6	Carrie Miller	55.0	40.0
Bill Aiken•	8.8	0.3	Marguerite Finney	76.8	44.4	Joanne Mohr	34.0	4.6
James Aliberti	56.8	41.6	Mary Follis	72.3	37.7	Jack Mona	25.0	0.9
Lewis Ames	9.5	6.4	Kathleen Fortmann	79.3	47.3	Sara Montabon	52.3	19.1
Colette Armao•	152.3	37.7	Richard Fortmann	79.3	47.3	Jennifer Newman	28.3	19.1
Bill Baxley	32.0	26.8	Ken Frazier	70.5	5.2	Pat O'Connell	28.0	26.9
Frank Beering•	36.0	1.1	Ellen Gartside•	24.3	16.6	Beth Perry•	24.8	35.1
Gordon Bennett•	51.5	26.9	Julie Geldner	39.8	8.2	George Peterson	48.3	15.9
Kathryn Blake	61.0	21.2	Brenda Goeden•	67.5	46.8	Mary Jean Pramik	2.3	0.2
Walt Bodley	11.8	9.4	Frances Gulland	2.0	0.5	Laura Raden•	38.3	2.7
Jacqueline Bower•	34.0	19.0	Jamie Hall•	98.3	50.8	Lin Renner	98.3	61.7
Doug Campbell	52.5	12.0	Lisa Hansen	50.0	19.6	Dominique Richard	77.8	50.4
Mary Cantini	74.8	28.0	Lou Helmuth•	59.0	44.1	Jan Roletto•	24.5	7.7
Kate Carolan•	51.0	16.1	Jacquie Hilterman	23.5	4.0	Christina Ruiz•	23.8	13.2
Beth Cataldo	98.0	56.8	Vladimir Hrycenko	52.0	28.8	Sharon Salisbury	33.3	7.9
Rick Clark	114.5	67.7	Lee Huo	67.0	21.8	Brad Schleder•	39.5	13.0
Pat Coffey•	105.4	48.0	Amanda Jobbins	39.5	15.6	Allan Schreiber	93.2	62.8
Kelly Cohen	45.8	19.0	Linn Johnson	55.8	13.5	Dianne Sheridan	59.5	37.0
Gene Corning	123.3	63.6	Carla Kania	83.3	46.3	Marjorie Siegel•	71.8	39.4
Judith Corning	117.0	58.3	Marie Kazan-Komarek•	27.3	15.4	Branner Solano	32.0	32.5
Madeleine Cornu Catero	98.8	22.7	Linda King	17.5	5.0	Keary Sorenson	211.3	68.6
Michelle Covey	7.8	4.5	Irina Kogan	3.8	3.9	Sally Sorenson	154.3	47.9
Arlene Davis•	38.3	7.8	Joan Lamphier	39.5	24.6	Julie Starobin	27.8	25.6
Peter De Jung•	90.5	55.9	Sandy Lelich•	21.8	13.6	Nancy Strachan-West	17.0	18.2
Meg DeLano	65.8	20.9	Sarah Lenz	47.0	45.9	David Stubbe	59.5	20.7
Stephanie De Moe	66.0	4.8	Christer Lewenhaupt	56.3	32.5	Jan Talbert	65.5	29.6
Dru Devlin•	30.0	17.4	Lily Lew	41.3	7.7	Sandy Thomas•	61.0	53.0
James De Vry•	25.0	15.6	Pam LoPinto	9.8	8.2	Jason Thompson	85.3	31.3
Connie Diernisse•	85.0	23.0	Shannon Lyday	127.5	43.7	Gary Thorp	123.0	81.3
Bob Dinneen•	22.5	7.2	Larry Lynch	32.5	5.4	Lura Thorp	92.3	60.1
Molly Dinneen•	28.0	5.6	Cindy Marconi	50.0	37.0	Gwendolyn Toney	45.8	28.7
Jesse Ellinger	19.0	20.8	Anne McCamman	73.3	28.2	Sue Torres	65.0	40.7
Don Engler	33.0	6.0	Judy McCarthy	58.0	44.9	Greg Troutman	54.8	22.3
Richard Ferris	289.8	151.9	Susan McCarthy•	25.0	14.0	Mary Von Tolksdorf•	143.8	55.9
			Susan McComb•	37.8	44.3	Andy Voropaeff•	18.8	17.9
			Joan McCune	12.5	7.4	Peter White	83.5	24.6
			Pat Merrill	62.8	37.0	Bob Wilson•	55.8	17.9

TABLE 10.

* includes survey hours, prep time and drive time
• 10 or more years as a Beach Watch surveyor

FARALLONES MARINE SANCTUARY ASSOCIATION STAFF

Executive Director Linda Hunter
Development Associate Susanna Beck
Education Manager Amy Dean
Research Associate Dru Devlin
Data Manager Jamie Hall
Education Specialist Sara Heintzelman
Visitor Center Manager Justin Holl
Beach Watch Manager Shannon Lyday
Volunteer Program Coordinator Joanne Mohr
Financial Specialist Adrian Skaj
Visitor Center Naturalist Peter Winch

GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY STAFF

Superintendent Maria Brown
Deputy Superintendent Brian Johnson
Network and Web Manager Igor Barinov
Program Specialist Kelley Higgason
Resource Protection Specialist Irina Kogan
Education and Outreach Coordinator Carol Preston
Program Specialist Sarah Ratzesberger
GIS Specialist Tim Reed
Resource Protection Specialist Karen Reyna
Research Coordinator Jan Roletto
Public Relations Specialist Mary Jane Schramm
Bolinás Lagoon Restoration Coordinator Sage Tezak
Education Specialist Christy Walker

PARTNERS

Aquarium of the Bay
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NOAA Restoration Center
Point Reyes National Seashore
PRBO Conservation Science
San Francisco County
San Mateo County
Sonoma County
The Marine Mammal Center
U.S. Fish and Wildlife - San Francisco National
Wildlife Refuge Complex
U.S. Coast Guard



“I am honored to be a part of this organization and feel that the work done there is vital to the health of the oceans.”

—BEACH WATCH VOLUNTEER

Carla Kania pauses to count a flock of shorebirds on a survey of Brazil Beach (Beach 7-01).

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ANNUAL REPORT CONTRIBUTORS

Beach Watch Team

Dru Devlin
 Jamie Hall
 Jim Ferlin
 Shannon Lyday
 Joanne Mohr
 Jan Roletto
 Rich Stallcup

Editor

Shannon Lyday

Illustrator

Jamie Hall

Maps

Tim Reed

Design

Edi Berton Design

Analysis

Shannon Lyday



CONTACT

Farallones Marine Sanctuary Association (FMSA)

The Presidio
 PO Box 29386
 San Francisco, CA 94129
 415.561.6625
www.farallones.org

Gulf of the Farallones National Marine Sanctuary

991 Marine Drive
 The Presidio
 San Francisco, CA 94129
 415.561.6622
<http://farallones.noaa.gov>

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Beach Watch Program Goals

- Provide a baseline dataset on the presence of live and beach-cast marine organisms
- Assist Sanctuary management in the early detection of natural and human-caused environmental events
- Develop a network of volunteer expert surveyors who can respond during an oil spill
- Educate the public about the coastal environment and how they can make a difference in protecting their beaches



JASON THOMPSON

Farallones Marine Sanctuary Association (FMSA)
The Presidio
PO Box 29386
San Francisco, CA 94129
www.farallones.org



To contribute to the Farallones Marine Sanctuary Association's education and volunteer programs, please visit www.farallones.org.

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