



Monitoring Western Snowy Plovers in Golden Gate National Recreation Area

2014 Report

Natural Resource Report NPS/SFAN/NRR—2020/2065



ON THE COVER

Western Snowy Plover on Ocean Beach on May 16th, 2015.

Photograph by: Rebecca Acosta, NPS

Monitoring Western Snowy Plovers in Golden Gate National Recreation Area

2014 Report

Natural Resource Report NPS/SFAN/NRR—2020/2065

Rachel K. Townsend
Golden Gate National Parks Conservancy
Building 201 Fort Mason
San Francisco, CA 94123

William W. Merkle
Golden Gate National Recreation Area
Building 201 Fort Mason
San Francisco, CA 94123

January 2020

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Report Series is used to disseminate comprehensive information and analysis about natural resources and related topics concerning lands managed by the National Park Service. The series supports the advancement of science, informed decision-making, and the achievement of the National Park Service mission. The series also provides a forum for presenting more lengthy results that may not be accepted by publications with page limitations.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available in digital format from the [San Francisco Bay Area Inventory and Monitoring website](#) and the [Natural Resource Publications Management website](#). If you have difficulty accessing information in this publication, particularly if using assistive technology, please email irma@nps.gov.

Please cite this publication as:

Townsend, R. K., and W. W. Merkle. 2020. Monitoring western snowy plovers in Golden Gate National Recreation Area: 2014 report. Natural Resource Report NPS/SFAN/NRR—2020/2065. National Park Service, Fort Collins, Colorado.

Contents

	Page
Figures.....	iv
Tables.....	iv
Abstract.....	v
Acknowledgments.....	v
Introduction.....	1
Monitoring Objectives.....	3
Methods.....	4
Study Area.....	4
Monitoring History and Study Design	4
Field Methods.....	5
Results: Ocean Beach	8
Overwintering Population Size.....	8
Temporal and Spatial Distribution	8
People and Dogs	11
Results: Crissy Field	13
Overwintering Population Size.....	13
Temporal and Spatial Distribution	13
People and Dogs	14
Discussion	15
Literature Cited	17

Figures

	Page
Figure 1. Ocean Beach and Crissy Field wintering areas for snowy plovers at Golden Gate National Recreation Area, San Francisco, California.	2
Figure 2. Snowy plover census area at Crissy Field, San Francisco.....	5
Figure 3. Snowy plover census area at Ocean Beach, San Francisco. The Snowy Plover Protection Area extends from Stairwell 21 in the north to Sloat Blvd in the south (Sectors 4 - 12).....	7
Figure 4. Winter season average and maximum number of snowy plovers on Ocean Beach from 1994 through the 2014 season.....	8
Figure 5. Monthly average number of snowy plovers observed per survey at Ocean Beach for the survey years 1994-2013 combined in comparison with 2014 survey year.....	9
Figure 6. Percentage of snowy plovers observations 1994–2013 and in 2014 by sector on Ocean Beach. Note that Sector 1 is at the north end and Sector 14 at the south end of Ocean Beach.	10
Figure 7. The annual median number of people per hour in the Snowy Plover Protection Area at Ocean Beach (sectors 4-12) from 1994 to 2014 survey years.....	11
Figure 8. Median number of dogs per hour and percentage of dogs unleashed at the Ocean Beach Snowy Plover Protection Area, 1994-2014, including changing leash regulations.....	12
Figure 9. Winter season average and maximum snowy plover count on Crissy Field during the 2014 season.....	13
Figure 10. Monthly average number of snowy plovers observed per survey at Crissy Field for the survey years 1994-2013 combined in comparison with 2014 survey year.	14

Tables

	Page
Table 1. First and last dates snowy plovers were observed at Ocean Beach and snowy plover numbers seen on those dates, 1994-2014 survey years.	9

Abstract

This report summarizes results from the 2014 field season of Golden Gate National Recreation Area's western snowy plover (*Charadrius nivosus nivosus*) monitoring program. The goals of our monitoring program are to estimate trends in the overwintering snowy plover population size and distribution, as well as to track potential disturbance threats to snowy plovers. We censused Ocean Beach and Crissy Field for snowy plovers twice a week every other week from July 2, 2014 to June 1, 2015. Much higher than average numbers of snowy plovers were observed on Ocean Beach, with a maximum count of 74 and a winter season average count of 55. Fewer than average numbers of snowy plovers were observed on Crissy Field, with a maximum count of five and an average count of 1.5 snowy plovers per survey. Following recent use patterns at Ocean Beach, snowy plovers were primarily observed in the wider area of beach between Lawton and Lincoln streets. At Crissy Field, snowy plovers were only found in the Wildlife Protection Area to the east of the US Coast Guard pier. At Ocean Beach, maximum and winter season average snowy plover counts were both the second highest on record; only the 1994 season had higher counts, indicating a very good year for snowy plover numbers. Leash compliance rates at Ocean Beach remain low, with 74 percent of dogs observed unleashed in the Snowy Plover Protection Area. In contrast, just four percent of dogs were observed off leash in the Wildlife Protection Area at Crissy Field, where protective fencing, entrance gates, and signage were installed in 2009 monitoring year. Dog owners were often observed approaching the fenced Wildlife Protection Area, but turning back when reaching the fence without entering. Continuing low levels of compliance with leash regulations at Ocean Beach indicate a need to enhance outreach and enforcement actions related to off-leash dog walking.

Acknowledgments

The initial western snowy plover monitoring program at Golden Gate National Recreation Area (GOGA) was developed by Lynne Stenzel and Gary Page of Point Blue Conservation Science, and Daphne Hatch of GOGA. Monitoring was initiated in 1994, and through the persistence of GOGA staff, continues today. The authors thank the numerous interns and volunteers that have contributed thousands of hours assisting with the snowy plover monitoring program at GOGA. The National Park Service's San Francisco Bay Area Network Inventory and Monitoring Program provided support for updating our snowy plover monitoring protocol, published in 2014, and provide continuing data management support.

Introduction

Western snowy plovers (*Charadrius nivosus nivosus*) regularly occur in overwintering flocks at Ocean Beach and smaller flocks at Crissy Field in the Golden Gate National Recreation Area (GOGA), a unit of the National Park Service (Figure 1). Snowy plovers were undoubtedly much more common in San Francisco before widespread urban conversion of the vast dune complex that used to cover much of the area. For 2015, snowy plovers observed on Ocean Beach and Crissy Field represented over 1% of the snowy plovers recorded on the United Fish and Wildlife Service (USFWS) winter window survey counts conducted annually along the U.S. Pacific coast (USFWS 2018). These surveys occur at major snowy plover overwintering sites rangewide along the Pacific coast during a single week in January. Snowy plovers (*Charadrius nivosus*) are found along the Pacific coast from Washington to Baja California, within portions of the interior western and southwestern United States, the Gulf coast from Texas into Florida, interior portions of Mexico, and the Caribbean. The populations of snowy plovers that nest adjacent to tidal waters along the Pacific coast of North America (within 50 miles) from southern Washington to Baja California were listed as threatened under the Endangered Species Act by the USFWS in March 1993 (USFWS 2007). The populations of snowy plovers that nest in interior California have been classified by the State of California as a bird species of special concern, but have no federal designation (Shuford et al. 2008). Both the federally threatened, Pacific coast population and the non-federally listed, interior nesting snowy plover population winter along the Pacific coast from southern Washington to Baja California (Page et al. 1986, 1995).

Snowy plover populations have declined over the last century (USFWS 2007), as well as significant declines in breeding and wintering populations along the California coast from the late 1970's to 2000 (Page and Stenzel 1981, USFWS 2007). The reasons for decline and degree of threats vary by geographic area; however, the USFWS has identified the primary threat as habitat destruction and degradation (USFWS 2007). Habitat degradation is primarily caused by urban development, introduced beachgrass, expanding predator populations, and human disturbance.

Among the factors contributing to population declines of snowy plovers are heavy human use of beaches in or near urban areas and associated disturbance to roosting plovers by people and dogs (Burger 1986, Klein 1993, USFWS 1993, Page et al. 1995, Lafferty et al. 2006). When shorebirds are disturbed, they must spend more energy on vigilance and avoidance behaviors at the cost of opportunities for foraging and resting (Burger 1993, Hatch 1996). High visitation by people and dogs, particularly off-leash dogs, has been noted as a major source of disturbance to snowy plovers on Ocean Beach and Crissy Field (Hatch 1996, NPS 2006, Zlatunich 2007).

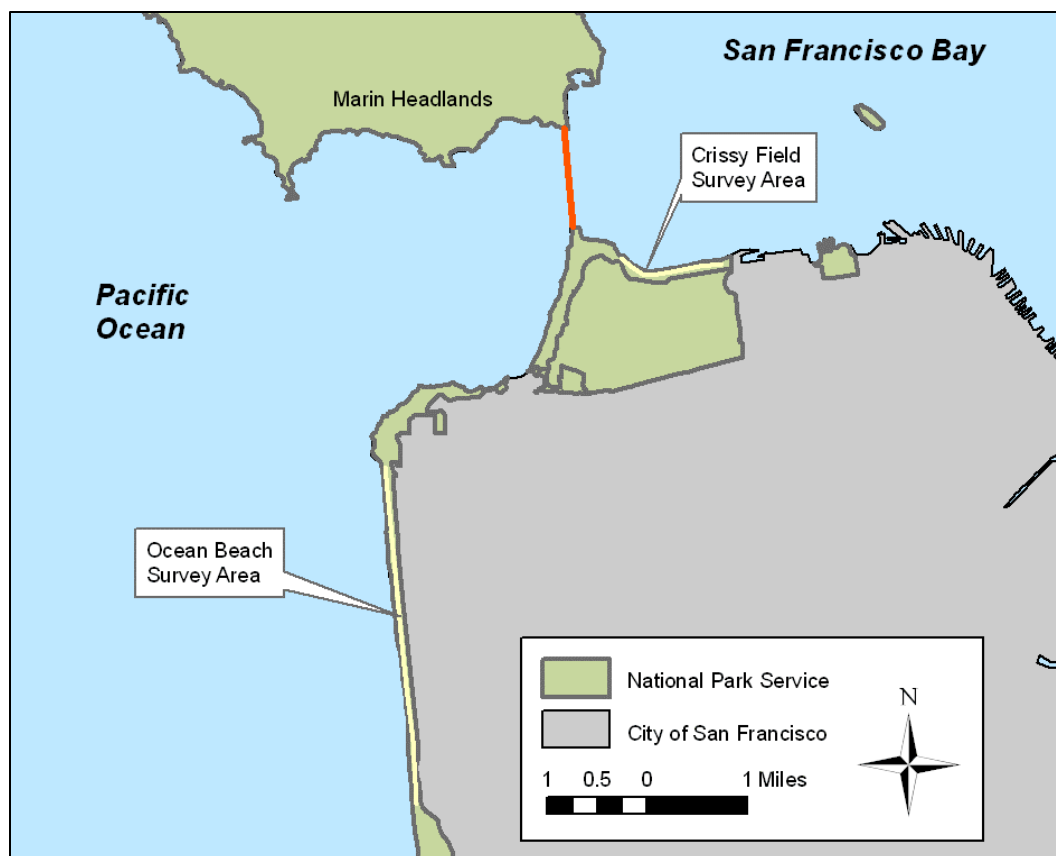


Figure 1. Ocean Beach and Crissy Field wintering areas for snowy plovers at Golden Gate National Recreation Area, San Francisco, California.

Regulations related to dog walking on the GOGA beaches have changed frequently over the past few decades, making it difficult to gain compliance with the current, seasonal regulations requiring pets to be on leash. For a complete summary of dog walking regulations at GOGA see (NPS 2016). The 1979 GOGA Pet Policy informally identified several areas of the park as suitable for off-leash dog-use under voice control, including Ocean Beach and Crissy Field. Under direction of a USFWS Biological Opinion for a sand movement project, the park started enforcing a dog on leash restriction to benefit snowy plovers during the 1996 monitoring season. Crissy Field, including the beach, was restored in 1999. Part of the beach at Crissy Field and nearshore waters were designated a Wildlife Protection Area (WPA) that restricted dog use.

Snowy plovers regularly started using the Crissy Field WPA beach for overwintering in 2004. In December 2004, leash restrictions at Ocean Beach and Crissy Field WPA were removed as part of a court ruling (U.S. District Court of Northern California 2005). In November of 2006, seasonal leash requirements were reinstated, and in September 2008, a final rule was issued by the NPS, which requires dogs to be on-leash in the Snowy Plover Protection Area at Ocean Beach and the Wildlife Protection Area of Crissy Field, except for the period from May 15 to July 1, when dogs can be off-leash in those areas (36 CFR 7.97).

Loss of habitat is also a factor contributing to the population decline of plovers (USFWS 2007). In particular, coastal erosion and the spread of European beach grass (*Ammophila arenaria*), which was introduced in an attempt to stabilize dunes, adversely impacts the snowy plover population at Ocean Beach (Stenzel et al. 1995; USFWS 2007). Sea-level rise and increased storm surge associated with climate change also threaten snowy plover habitat at both Ocean Beach and Crissy Field (Heberger et al. 2011). Beach and dune habitat at Crissy Field were restored in 1999, with snowy plovers starting to use this area in 2005. The Crissy Field WPA beach quickly accreted sand after its restoration, making a wider, sandy beach that may have served to attract snowy plovers. Currently, this beach is no longer accreting sand, and if the beach begins eroding, it may become less attractive to snowy plovers over time.

Monitoring Objectives

The specific monitoring objectives for the GOGA snowy plover monitoring program (Merkle et al. 2014) are to:

1. Determine trends in snowy plover winter season average population size at Ocean Beach and Crissy Field.
2. Determine trends in the spatial distribution of snowy plovers during the winter season at Ocean Beach and Crissy Field.

In addition to monitoring long-term population and distribution changes, GOGA also collects data to inform management decisions, under the following objectives:

1. Determine the phenology of snowy plover arrival and departure dates from Ocean Beach and Crissy Field.
2. Monitor number and distribution of people and dogs at Ocean Beach and Crissy Field.
3. Monitor compliance rates for seasonal restrictions requiring pets to be on-leash in the Snowy Plover Protection Area (SPPA) and Wildlife Protection Area (WPA) from July 1 through May 15.
4. Monitor the rates of dogs chasing snowy plovers or other shorebirds at Ocean Beach and Crissy Field.

In addition to meeting specific objectives, regular monitoring also allows for consistent observation of wildlife and interactions with recreational activities, as well as providing opportunities for public outreach related to protecting snowy plovers.

Methods

Study Area

Ocean Beach in San Francisco is the longest stretch of dune-backed beach between Point Reyes and Half Moon Bay on the outer California coast (Figure 1), providing important habitat for migratory and non-breeding shorebirds (Stenzel et al. 1995, GOGA 1998). From 1997 to 1999, approximately 100 acres of Crissy Field (Figure 1) were restored by enhancing and protecting coastal dunes, removing rubble from the beach, and construction of a 20-acre tidal marsh (Jones and Stokes Associates, Inc. 1996). A portion of the beach in the Crissy Field area was designated as a WPA, largely to benefit shorebirds and birds using the nearshore waters of the San Francisco Bay. The beach at the Crissy Field WPA provides important habitat along the highly modified San Francisco Bay shoreline. The GOGA snowy plover populations are accessible to a large urban population, providing viewing, education and outreach, and opportunities for engagement in stewardship. There are no recent or historical nesting records for snowy plovers on GOGA beaches, although they breed on nearby beaches within about 25 miles to the north at Point Reyes National Seashore and south of GOGA, and on salt ponds in South San Francisco Bay at Don Edwards San Francisco Bay National Wildlife Refuge.

Monitoring History and Study Design

From 1979 to 1985, Ocean Beach was surveyed irregularly for snowy plovers. During this time only a handful of plovers were observed, with annual maximum plover counts ranging from 4 to 16 (Page et al. 1986). From 1988 to 1994, Point Reyes Bird Observatory (PRBO, now known as Point Blue Conservation Science) volunteers conducted snowy plover counts on Ocean Beach from Lincoln Street to Noriega or Sloat Boulevard as part of coordinated efforts to count plovers along the California coast (Hatch 1996).

GOGA implemented a snowy plover monitoring program in December 1994 using a monitoring protocol developed by PRBO and NPS (Stenzel et al. 1995). Snowy plover monitoring has continued on Ocean Beach largely using the methods from this protocol through the present. In addition, based upon a study of disturbance using focal groups of snowy plovers, dogs were observed deliberately chasing snowy plovers, and inadvertently disturbing plovers or chasing other shorebirds during 111 surveys totaling approximately 40 hours of direct plover observation from 1994 to 1996 (Hatch 1996). People, aircraft, bulldozers, bicycles, and kite flying were also sources of disturbance to plovers. However, it was noted that snowy plovers seemed more likely to fly when disturbed by dogs as compared to disturbances by people where the plovers tended to walk or run away (Hatch 1996). This observation is consistent with findings at other beaches (Lafferty et al. 2006). Snowy plovers first regularly started using Crissy Field in 2005, and we added formal monitoring based on the Ocean Beach protocol in 2006. Western snowy plovers were identified as a Vital Sign for long term monitoring for the San Francisco Bay Area Network Inventory and Monitoring Program of the NPS (Adams, et. al 2006). As such, we updated and formalized all elements of the GOGA snowy plover monitoring program including monitoring objectives, field methods, data management and verification, data analysis and reporting, and field staff training, and put the protocol through a

rigorous protocol development and peer review process, culminating in the publication of the snowy plover monitoring protocol for Golden Gate National Recreation Area (Merkle et al. 2014).

Snowy plovers were first observed consistently using the Wildlife Protection Area at Crissy Field in January 2005 (NPS 2006, Zlatunich 2007). In September 2006, the snowy plover monitoring protocol from Ocean Beach was implemented at Crissy Field. Since that time, a small population of 1-9 plovers has been observed in this area during the overwintering season. Nearly all of the plover observations have been in Sector 2 of the monitoring area with a handful of observations in Sector 1 (Figure 2, NPS unpublished data).

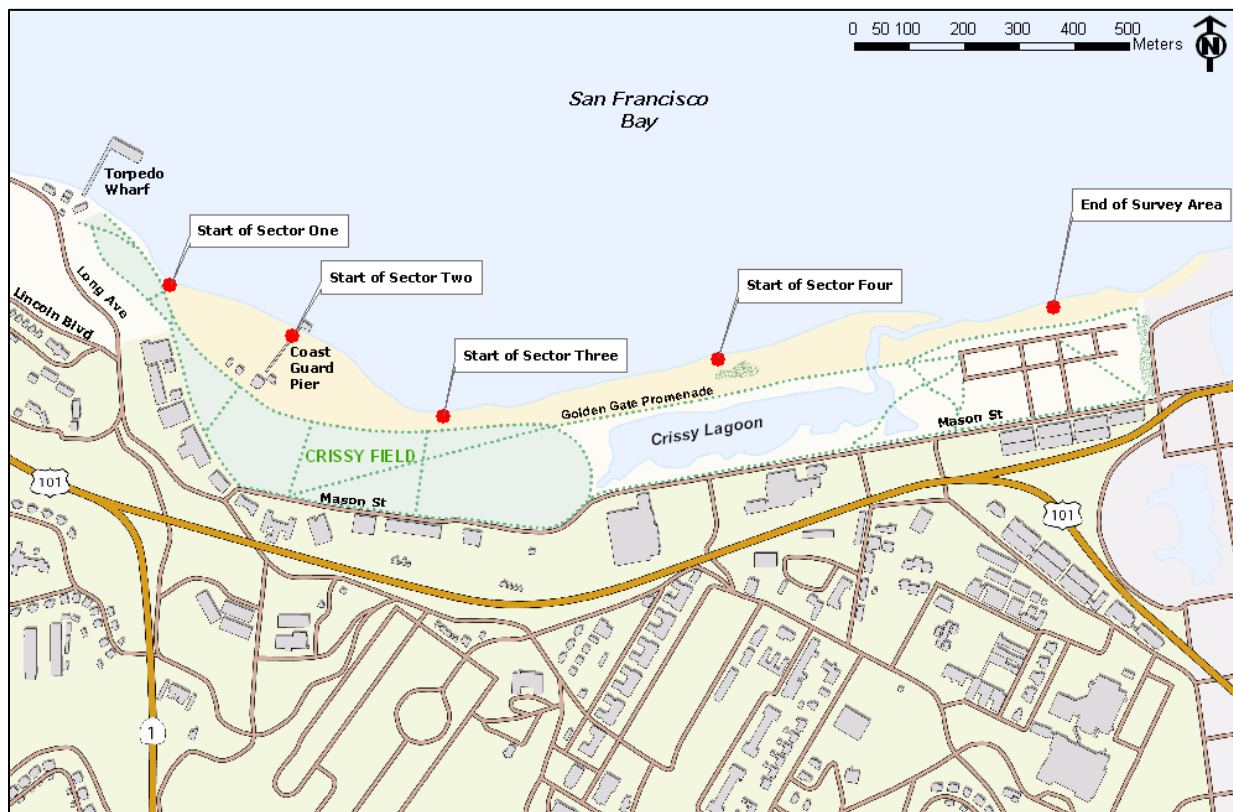


Figure 2. Snowy plover census area at Crissy Field, San Francisco.

Field Methods

All snowy plover surveys follow the guidance of our peer reviewed monitoring protocol (Merkle et al. 2014). To capture the full range of recreational use, the censuses are evenly split between weekday mornings and weekend afternoons. Weekday morning surveys occur when there are typically fewer people and dogs present. In contrast, weekend afternoon surveys have the potential for high numbers of people and dogs on the beaches, as well as the possibility of observing more disturbances to snowy plovers. However, recreational use of the beaches is often determined by weather, with high numbers of people coming out to the beaches on warm, sunny days, regardless of whether it is a weekend.

Snowy plovers regularly occur at Ocean Beach and Crissy Field during their non-breeding season, from July through mid-April or May (Page et al. 1986, NPS 2006). Field surveys for snowy plovers begin during the first week of July, before snowy plovers are likely to be present and continue through the end of the non-breeding season which is typically early May. Surveys are conducted until plovers are not observed in two consecutive surveys in different bi-weekly survey windows (e.g., no plovers observed on a Saturday survey and then no plovers observed on next Wednesday survey one and a half weeks later).

Observers walk the entire beach project area, which is an efficient way of accurately counting all plovers on the beach. By dividing the beach into sectors, snowy plover distribution, as well as people and dog use on different areas of the beach, can be tracked (Figures 2 and 3). Encounter rates can be calculated for people and dogs by recording time spent in each sector. Observers also record other potential threats and disturbance to snowy plovers by sector. Surveyors record the start and end time for each sector. Observations are made by slowly walking along the beach, stopping every 50–150 m and scanning about 100–200 m ahead to look for snowy plovers. If multiple surveyors are present, each one is responsible for one portion of the data and data sheets. One data sheet is used to keep track of the number of snowy plovers encountered, the time and sector they were encountered in, whether they were foraging, and the beach elevation zone and the substrate they were located in. Notes are taken on banded snowy plovers, including recording the unique color band combination when they can be observed. A separate data sheet is used to count potential disturbances, including the number of people, dogs (counted by whether they are on-leash, off-leash within 10 feet of their owner, roaming, or chasing shorebirds or plovers), equestrians, vehicles, predators, aircraft, kite flying, or other potential sources of disturbance. A third data sheet is used to count other shorebird species encountered. Data are stored on a Microsoft Access database specifically designed for this project. All data management and analysis follows procedures from the Merkle et al. (2014) monitoring protocol.

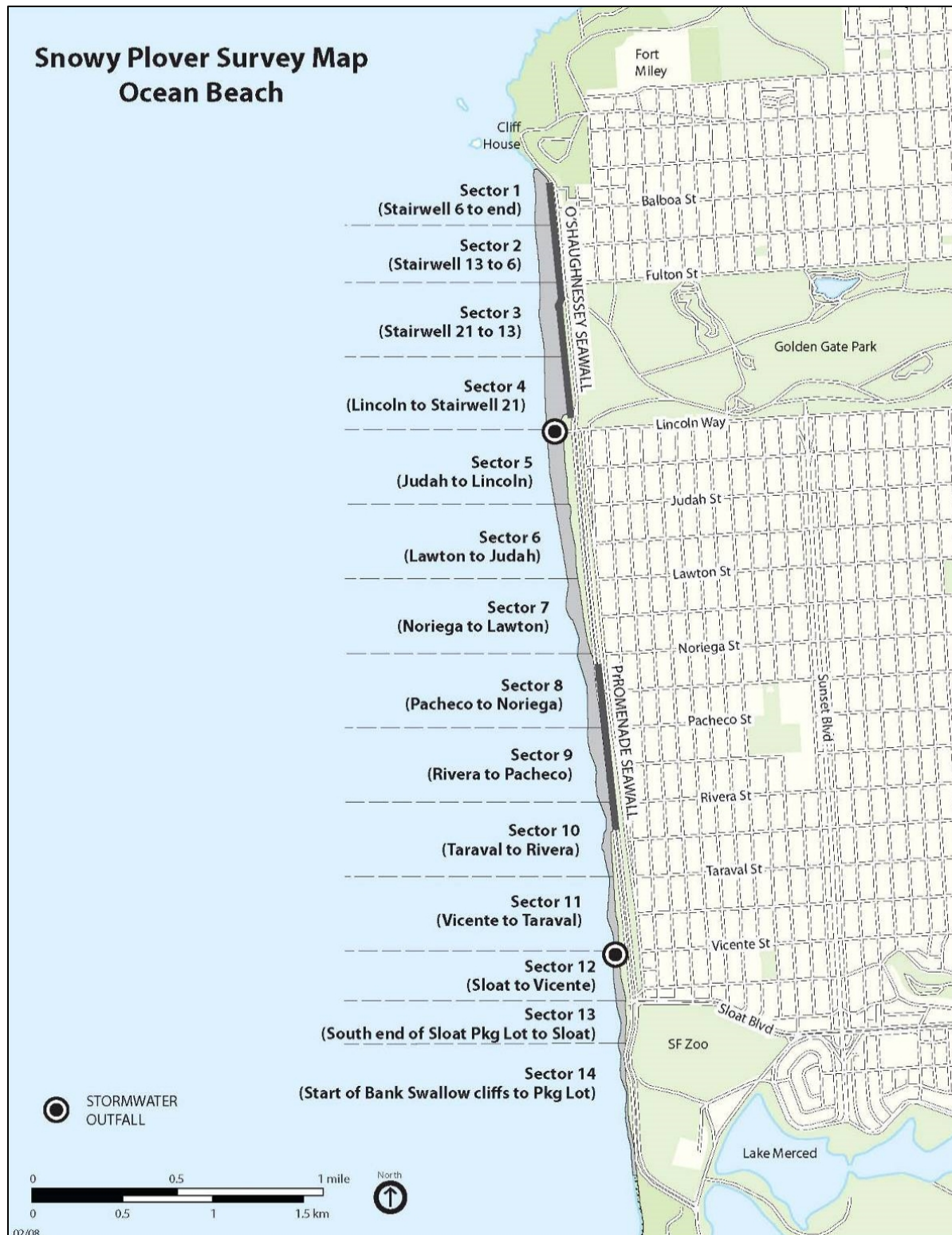


Figure 3. Snowy plover census area at Ocean Beach, San Francisco. The Snowy Plover Protection Area extends from Stairwell 21 in the north to Sloat Blvd in the south (Sectors 4 - 12).

Results: Ocean Beach

Overwintering Population Size

From July 2, 2014, to June 2, 2015, the survey team conducted 34 surveys on Ocean Beach. Higher than average numbers of snowy plovers were observed on Ocean Beach, with a maximum count of 74 plovers and winter season average count of 52 plovers (Figure 4). The winter season average count in 2014 was double the value in 2013, and both the winter season average and maximum plover count were the highest values observed since the first year of monitoring in 1994.

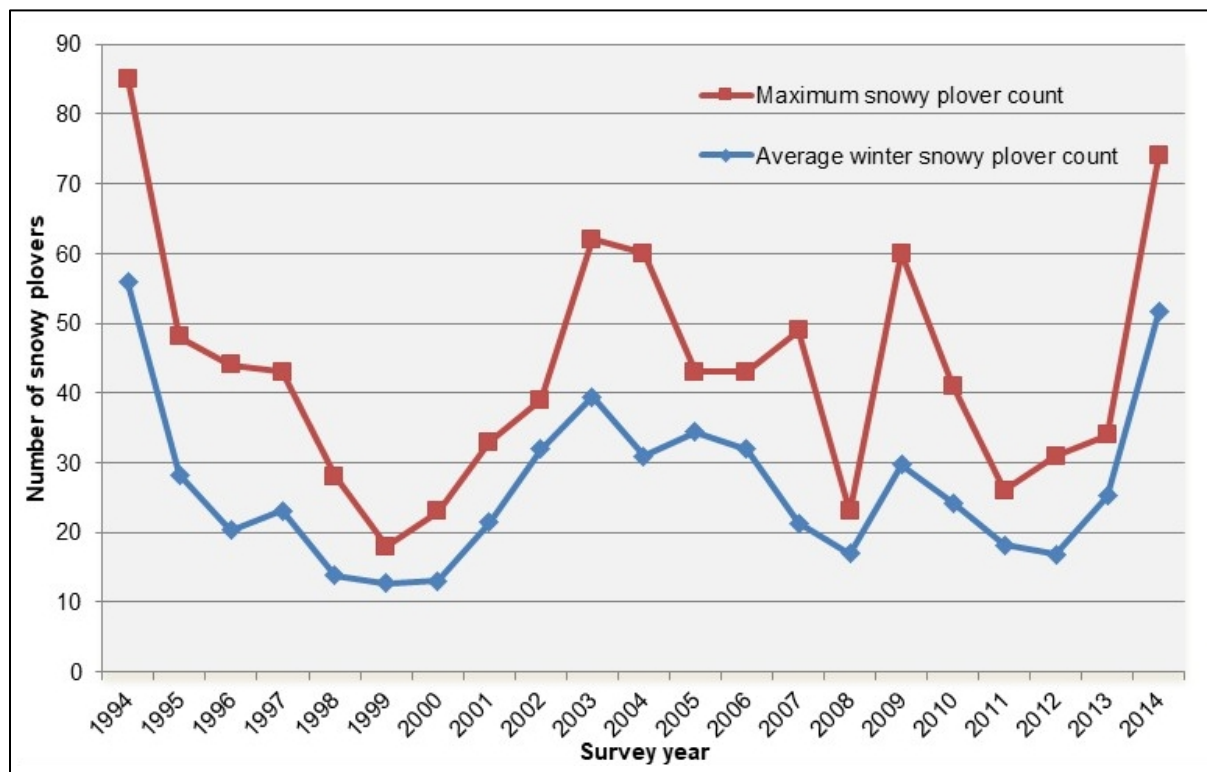


Figure 4. Winter season average and maximum number of snowy plovers on Ocean Beach from 1994 through the 2014 season.

Temporal and Spatial Distribution

Overwintering plovers tend to arrive on Ocean Beach starting in July, with numbers peaking in October or November, and remaining consistent through the winter before tapering off starting in February. By April or May, plover numbers usually drop to zero on Ocean Beach (Figure 5). During the 2014 season, plovers were present on Ocean Beach for a longer period of time than any other season since monitoring began (Table 1). Plovers were present on the first survey of the season, with two individuals observed on July 2, 2014 and were last observed during a survey on May 27, 2015.

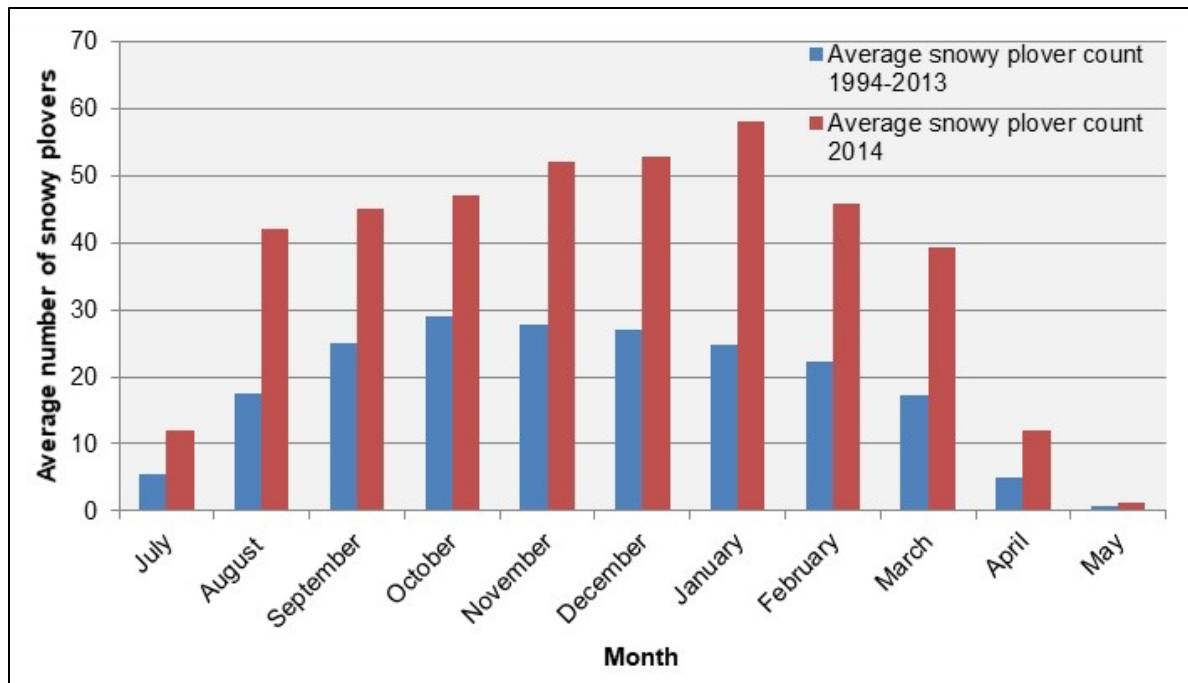


Figure 5. Monthly average number of snowy plovers observed per survey at Ocean Beach for the survey years 1994-2013 combined in comparison with 2014 survey year.

Table 1. First and last dates snowy plovers were observed at Ocean Beach and snowy plover numbers seen on those dates, 1994-2014 survey years.

Survey Year	First Survey	First Date Plovers Found	Last Date Plovers Found	Last Survey	First Plovers	Last Plovers	Number of Days Present
1994	1994-12-08	1994-12-08	1995-05-13	1995-05-13	69	2	157 days
1995	1995-07-19	1995-07-19	1996-04-20	1996-04-27	17	2	277 days
1996	1996-07-24	1996-07-24	1997-04-30	1997-05-14	15	2	281 days
1997	1997-07-03	1997-07-09	1998-05-13	1998-05-20	3	2	309 days
1998	1998-07-11	1998-07-11	1999-03-31	1999-04-28	1	7	264 days
1999	1999-07-21	1999-07-21	2000-04-26	2000-05-10	4	3	281 days
2000	2000-07-05	2000-07-09	2001-04-11	2001-04-11	2	9	277 days
2001	2001-07-12	2001-07-25	2002-03-30	2002-04-06	11	12	249 days
2002	2002-07-24	2002-07-24	2003-05-07	2003-05-21	8	2	288 days
2003	2003-07-30	2003-07-30	2004-04-28	2004-05-15	10	4	274 days
2004	2004-07-28	2004-07-28	2005-04-30	2005-05-25	16	4	277 days
2005	2005-08-10	2005-08-10	2006-04-19	2006-04-19	20	6	253 days
2006	2006-07-12	2006-07-26	2007-04-25	2007-05-12	13	2	274 days
2007	2007-07-07	2007-07-21	2008-05-06	2008-05-14	9	1	291 days
2008	2008-07-02	2008-07-09	2009-04-29	2009-05-20	1	2	295 days
2009	2009-07-01	2009-07-22	2010-05-05	2010-05-26	7	2	288 days

Table 1 (continued). First and last dates snowy plovers were observed at Ocean Beach and snowy plover numbers seen on those dates, 1994-2014 survey years.

Survey Year	First Survey	First Date Plovers Found	Last Date Plovers Found	Last Survey	First Plovers	Last Plovers	Number of Days Present
2010	2010-07-03	2010-08-04	2011-05-18	2011-05-31	10	1	288 days
2011	2011-07-20	2011-08-10	2012-05-09	2012-05-23	24	1	274 days
2012	2012-07-07	2012-07-07	2013-03-20	2013-04-03	1	21	257 days
2013	2013-07-08	2013-07-18	2014-05-04	2014-05-16	4	1	291 days
2014	2014-07-02	2014-07-02	2015-05-27	2015-06-03	2	1	330 days

Monthly average plover counts for 2014 exceeded long-term values from 1994-2013 for all months (Figure 5). The January 2015 average snowy plover count was more than twice the 1994-2013 January average plover count. Snowy plover numbers gradually increased throughout fall 2014 and peaked in January 2015 before declining as the spring breeding season approached. In contrast, average plover numbers peak in October for survey years 1994-2013. The majority of plover observations for 2014 were in sectors 5 and 6, with a combined total of 88% of all plover observations for the season (Figure 6). In comparison, for all snowy plover observations from 1994-2013, 23% were in sector 5, while most of the observations, 62%, were in sectors 8 and 9. This indicates snowy plovers were primarily using more northerly sections of the beach in 2014 compared to long-term use patterns.

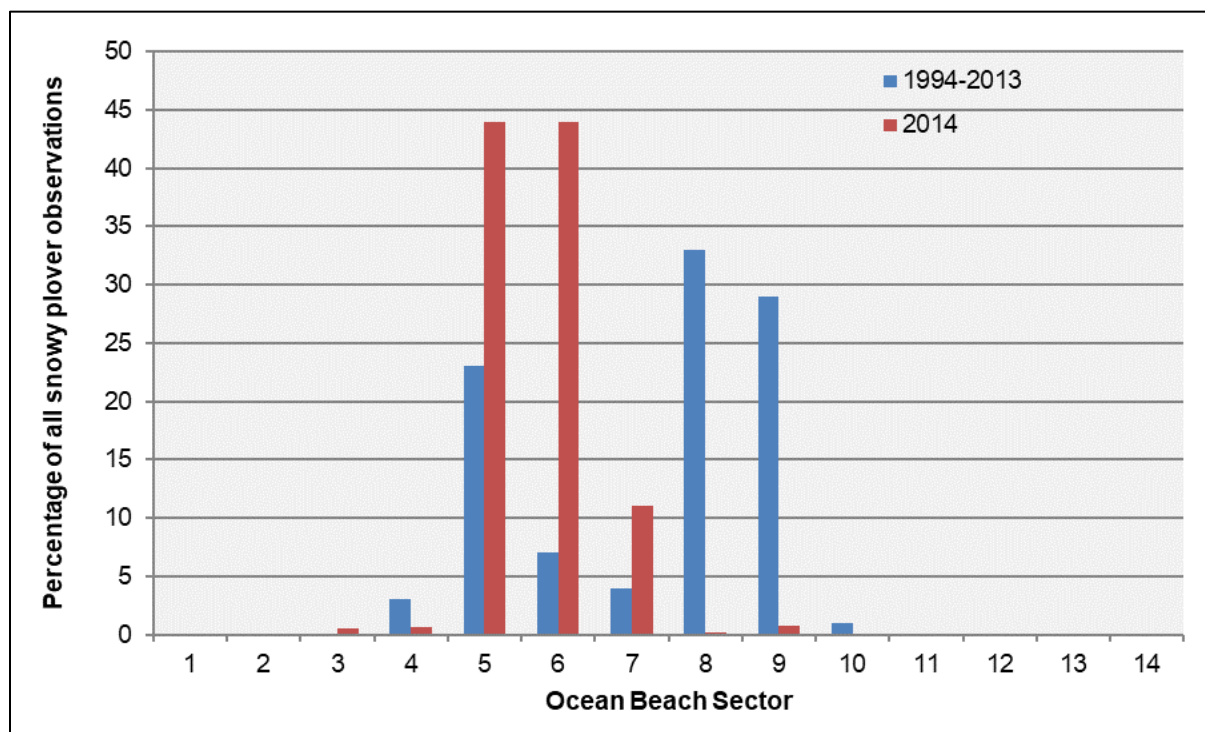


Figure 6. Percentage of snowy plovers observations 1994–2013 and in 2014 by sector on Ocean Beach. Note that Sector 1 is at the north end and Sector 14 at the south end of Ocean Beach.

People and Dogs

A median value of just over 70 people per hour was encountered in the SPPA on Ocean Beach in 2014. Higher rates of people have been observed since 2008 compared to most years prior to 2008; however there remains considerable variation in the number of people encountered across the full twenty-one years of surveys (Figure 7). Leash compliance rates remained low within the SPPA on Ocean Beach (Figure 8). A median of 13 dogs per hour were encountered, and of those an average of 74% were not leashed. This is a five percent decline from the previous season, but still significantly higher than the low of 57% of dogs observed unleashed in 2007.

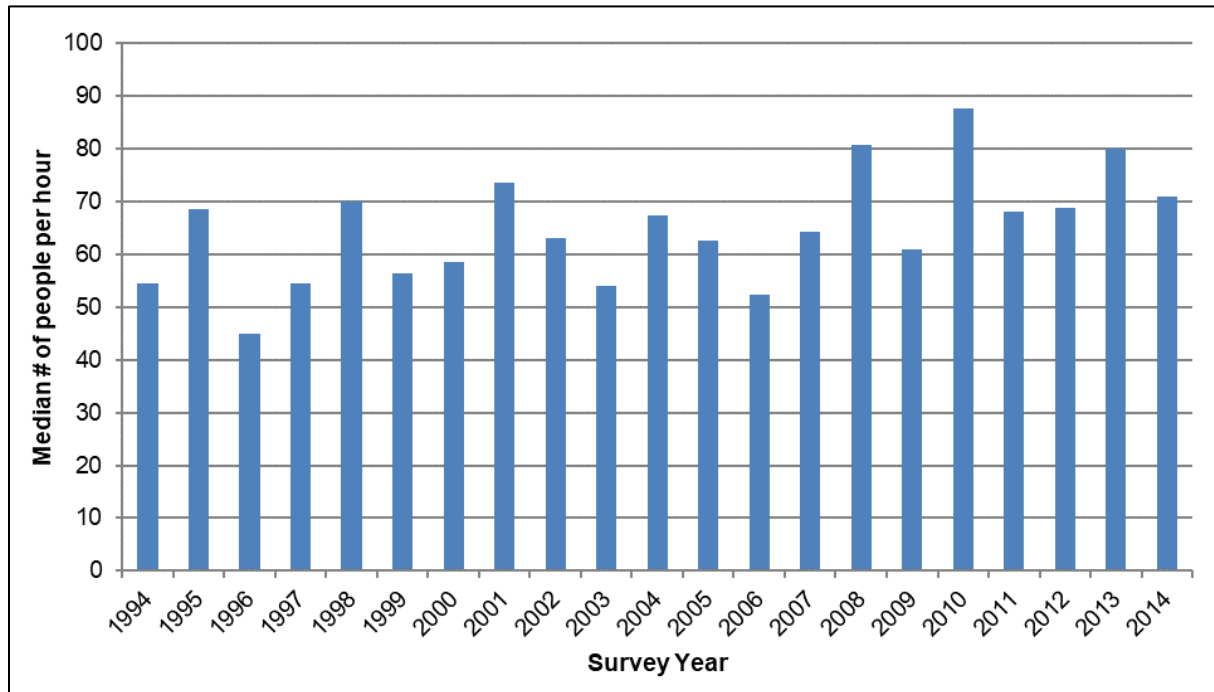


Figure 7. The annual median number of people per hour in the Snowy Plover Protection Area at Ocean Beach (sectors 4-12) from 1994 to 2014 survey years.

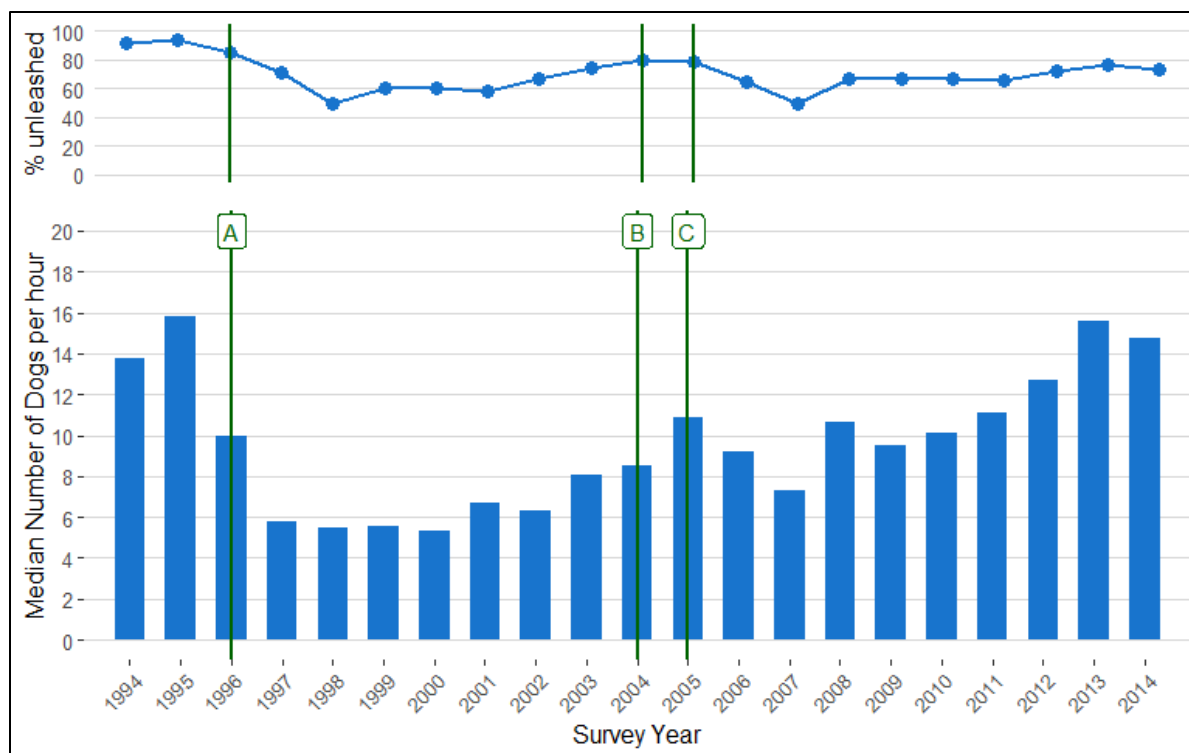


Figure 8. Median number of dogs per hour and percentage of dogs unleashed at the Ocean Beach Snowy Plover Protection Area, 1994-2014, including changing leash regulations, A-C: A indicates initial dogs on leash regulation for the SPPA at Ocean Beach starting in early calendar 1997; B indicates a court ruling in December 2004 invalidating dogs on leash regulations at Ocean Beach SPPA and Crissy Field WPA did not go through proper rulemaking; C indicates reinitiation of dogs on leash regulations in November 2006 at both Ocean Beach SPPA and Crissy Field WPA.

Results: Crissy Field

Overwintering Population Size

From August 06, 2014, to March 18, 2015, the survey team conducted 18 complete surveys on Crissy Field. Snowy plovers generally arrive later in the season and leave earlier from Crissy Field, than they do Ocean Beach, hence the site was surveyed less frequently. Fewer than average numbers of plovers were observed on Crissy Field (Figure 9). A maximum count of five individuals was recorded, and there was a winter season average of 1.5 plovers per survey. The highest maximum counts for snowy plovers were eight in both 2010 and 2011. The highest winter season average count was five snowy plovers per survey in 2011. Snowy plover numbers at Crissy Field WPA are considerably lower than those observed at Ocean Beach, which may be due to the smaller size of the beach area at Crissy, and possibly lower productivity of invertebrate food resources.

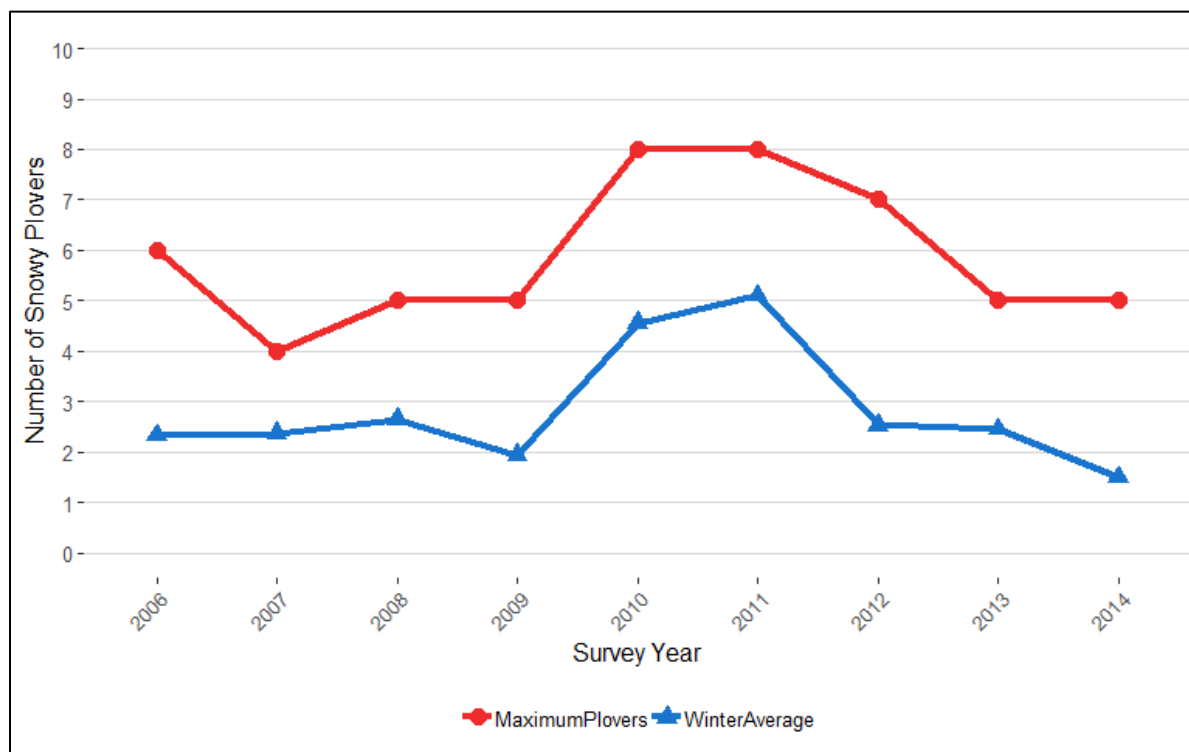


Figure 9. Winter season average and maximum snowy plover count on Crissy Field during the 2014 season.

Temporal and Spatial Distribution

Snowy plovers were not observed at the Crissy Field WPA until October 2014 and were last observed in January 2015 (Figure 10). 2014 was relatively rare in that snowy plovers were only present at Crissy for four months, whereas typically they arrive earlier in the late summer of fall and depart later in the spring. Snowy plovers were only observed in Sector 2, the Crissy WPA east of the US Coast Guard pier, during 2014 monitoring.

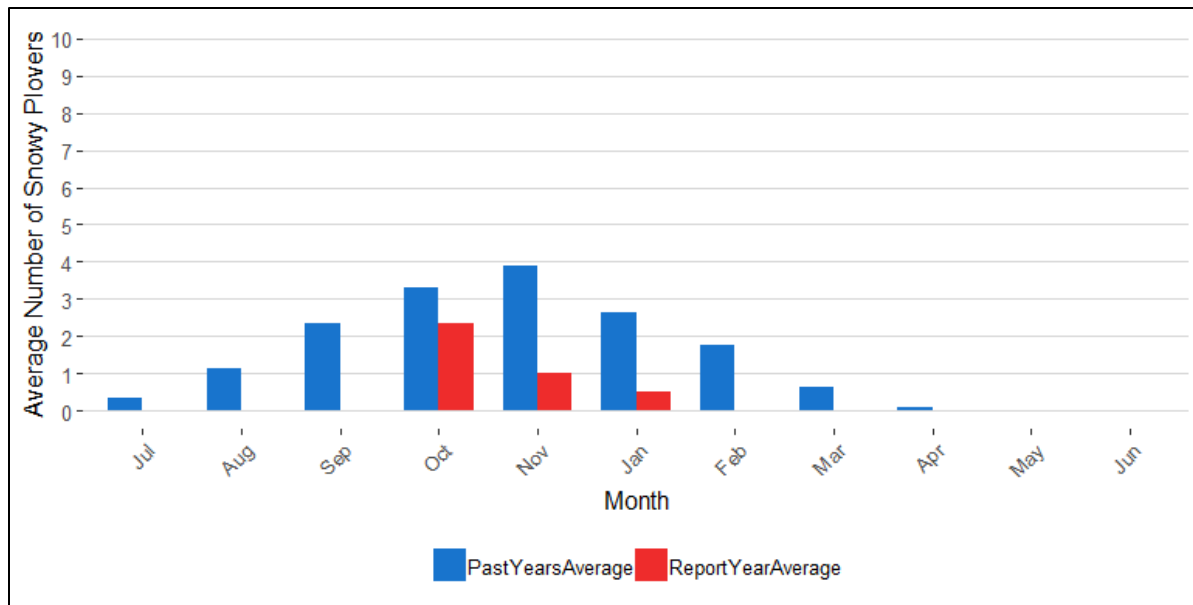


Figure 10. Monthly average number of snowy plovers observed per survey at Crissy Field for the survey years 1994-2013 combined in comparison with 2014 survey year.

People and Dogs

A median rate of around 73 people per hour was encountered in the Wildlife Protection Area in 2014 and a median rate of around 4 dogs per hour, with a median value of 0% of those dogs off-leash. Because observers are only in the WPA sectors for short period of time, our monitoring may not accurately reflect people and dog numbers in the WPA. However, since a gated fence was put in place at the eastern end of the WPA in 2009, monitors have observed many beach visitors and their dogs approaching the WPA fence from the east and turning back without entering.

Discussion

Snowy plover numbers on Ocean Beach have followed a cyclical pattern, with numbers recorded in 2014 that haven't been observed since the first year of monitoring in 1994. The higher than average overwintering numbers may be attributed to the high number of breeding adults at nearby breeding sites in Marin and Monterey counties in 2014 (Page et al. 2015). Plover numbers on Ocean Beach peaked in January 2015; however, numbers have historically peaked in October. Northern California was heading into the fourth year of drought in the winter of 2014. In fact, January 2015 was the driest January on record, with no rainfall recorded the entire month. The mild dry winters associated with the drought could be favorable to adult survival, partly explaining the higher than average number of plovers observed throughout the 2014 season, with average plover numbers not peaking until January when they have typically peaked in October. In fact, snowy plover numbers at Ocean Beach were generally increasing since 2012 during the drought years, providing some additional support for the idea that increased plover survivorship may be a factor in the increasing overwintering plover population.

Snowy Plovers are associated with wider stretches of beach and are most frequently detected roosting in open, sparsely vegetated habitats, which presumably facilitate early detection of danger posed by approaching avian predators (Brindock and Colwell 2011). From 1994-2013, Snowy Plovers were most often observed on Ocean Beach in sectors 8 and 9 where the beach was wide and open. In recent years, the beach has narrowed in those middle sectors and is currently wider further north. Subsequently, in 2014 the majority of plover observations were in sectors 5 and 6 (Figure 6). Data collected through the snowy plover monitoring program will be important for assessing potential impacts of pending proposals for erosion control measures and nourishment of Ocean Beach that are intended to protect City of San Francisco infrastructure. Analyzing snowy plover numbers and distribution in relation to regularly monitored beach transects may shed more light on this relationship at Ocean Beach. In contrast to the clear changes in plover distribution, the number of people per hour on Ocean Beach has fluctuated over the years, with slightly higher numbers observed in several years since 2008. This could be due to both San Francisco's growing population, as well as a high proportion of clear sunny days that draw people to the beach. Human distribution and their potential effects on plovers were not analyzed for this report, but will be considered for inclusion in a longer-term analysis.

Similar to many other popular beach areas, NPS has struggled to gain visitor compliance with leash regulations for dogs at Ocean Beach (Figure 8); high rates of dog use and changing regulations over time have made this difficult. Ocean Beach is also a challenging area to sign, as it is about four miles long with beach access nearly every two blocks. The rate of dogs per hour and percent off leash were highest in 1994 and 1995, but declined quickly with the start of leash regulations in 1997 (a) and remained in the 60 percent range until 2004. A court decision allowed unleashed dogs again in December 2004 (b), and off leash numbers spiked to 78% for the 2004 and 2005 seasons. When seasonal leash requirements were reinstated in November 2006 (c), the percent of off leash dogs declined to a low of 57% in 2007. Since then, the percentage of off leash dogs leveled off around 65% for four years and then increased to the 70 percent range in recent years. Compliance with leash

regulations increased in the two years immediately following implementation of these regulations when there was more attention on them, but then decreased after that. More outreach and a persistent enforcement effort by GOGA would likely increase compliance with leash regulations and thereby reduce disturbance of snowy plovers and other shorebirds on Ocean Beach.

Compared to Ocean Beach, Crissy Field supports a much smaller population of overwintering snowy plovers. The reasons for this are not clear, but the protected area at Ocean Beach is much larger than at Crissy Field and historic observations go further back in time. In 2011, numbers peaked at 5 individuals on average and have since declined. 2014 had lower than average numbers, with only 1.5 plovers observed per survey. There are also fewer dogs encountered on Crissy Field. Fencing and additional signage were installed on the border of the WPA in January 2010, which has led to a decrease in off leash dogs. Beach visitors and their dogs are often seen approaching the fence and turning back without entering the WPA. These low values could also in part be attributed to the small area of the WPA in contrast to the SPPA on Ocean Beach and the relatively short amount of time spent there while surveying.

Literature Cited

- Adams, D., S. Allen, J. Bjork, M. Coopridge, A. Fesnock, M. Koenen, T. Leatherman, S. O'Neil, D. Press, D. Schirokauer, B. Welch, and B. Witcher. 2006. San Francisco Bay Area Network Vital Signs Monitoring Plan. NPS/SFAN/NRR 2006/017. National Park Service, Fort Collins, Colorado.
- Burger J. 1986. The effect of human activity on shorebirds in two coastal bays in the northeastern United States. *Environ. Conserv.* 13: 123–130.
- Brindock, K. M., and M. A. Colwell. 2011. Habitat selection by Western Snowy Plovers during the nonbreeding season. *J. Wildlife Management* 75: 786–793.
- Hatch, D. A. 1996. Western snowy plover wintering population and interaction with human activity on Ocean Beach, San Francisco, Golden Gate National Recreation Area, 1988 through 1996. Unpublished Report. Golden Gate National Recreation Area, San Francisco, California.
- Heberger, M., H. Cooley, P. Herrera, P. H. Gleick, and E. Moore. 2011. Potential impacts of increased coastal flooding in California due to sea-level rise. *Climatic Change* 109 (Supplement 1: pp. 229–249).
- Klein, M. L. 1993. Waterbird behavioral responses to human disturbance. *Wildlife Soc. Bull.* 21: 31–39.
- Lafferty, K. D., D. Goodman, and C. P. Sandoval. 2006. Restoration of breeding by snowy plovers following protection from disturbance. *Biodiv. Conserv.* 15:2217–2230.
- Merkle, B., D. Press, R. Townsend, D. Adams, and M. Koenen. 2014. Snowy plover monitoring protocol for Golden Gate National Recreation Area: Version 2.4. Natural Resource Report NPS/SFAN/NRR—2014/896. National Park Service, Fort Collins, Colorado.
- National Park Service (NPS). 2006. Status report: Western snowy plovers and recent changes in human and dog use within the Snowy Plover Management Area at Ocean Beach and the Wildlife Protection Area at Crissy Field. Unpublished Report. Golden Gate National Recreation Area, San Francisco, California.
- National Park Service (NPS). 2016. Final Dog Management Plan / Environmental Impact Statement. Golden Gate National Recreation Area, San Francisco, California
- Page, G. W., and L. E. Stenzel. 1981. The breeding status of the snowy plover *Charadrius alexandrinus* in California, USA. *Western Birds* 12: 1–40.
- Page, G., F. C. Bidstrup, R. J. Ramer, and L. E. Stenzel. 1986. Distribution of wintering snowy plovers in California and adjacent states. *Western Birds* 17(4):145–170.

- Page, G. W., K. K. Neuman, J. C. Wariner, C. Eyster, J. Erbes, D. Dixon, A. Palkovic, and L. Stenzel. 2015. Nesting of the Snowy Plover in the Monterey Bay Area, California in 2014. Unpublished data.
- Page, G. W., M. A. Stern, and P. W. C. Paton. 1995. Differences in wintering areas of snowy plovers from inland breeding sites in western North America. *Condor* 97:258–262.
- Press, D. T. 2005. Data management plan for the San Francisco Bay Area Network Inventory and Monitoring Program. National Park Service Unpublished Report, San Francisco, California.
- Shuford, W.D., and T. Gardali, editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento, California.
- Stenzel, L. E., G. W. Page, and D. Hatch. 1995. Snowy plover monitoring program volunteer handbook (includes minor revisions made in 1999). Unpublished Report. Point Reyes Bird Observatory, Stinson Beach, California.
- United States Fish and Wildlife Service (USFWS). 1993. Determination of threatened status for the Pacific coast population of the western snowy plover, final rule. *Federal Register* 58(42): 12864–12874.
- United States Fish and Wildlife Service (USFWS). 1995. Proposed designation of critical habitat for the Pacific coast population of the western snowy plover, proposed rule. *Federal Register* 60(41): 11768–11809.
- United States Fish and Wildlife Service (USFWS). 2007. Recovery plan for the Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*). In two volumes. Sacramento, California. Xiv + 751 pages.
- United States Fish and Wildlife Service (USFWS). 2018. 2018 Pacific Coast Winter Window Survey. Unpublished report. 1 p. Available online: https://www.fws.gov/arcata/es/birds/wsp/documents/2018%20Pacific%20Coast%20Breeding%20Window%20Survey_LES_revised%2020190325_.pdf.
- Zlatunich, M. 2007. Western snowy plover monitoring at the Crissy Field Wildlife Protection Area of the Presidio of San Francisco and the Relative Impact of Human Disturbance 2006/2007. Golden Gate Audubon, San Francisco, California. 12pp.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 641/166719, January 2020

National Park Service
U.S. Department of the Interior



[Natural Resource Stewardship and Science](#)

1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525