

**NESTING OF THE CALIFORNIA LEAST TERN AND  
WESTERN SNOWY PLOVER AT  
OCEANO DUNES STATE VEHICULAR RECREATION AREA,  
SAN LUIS OBISPO COUNTY, CALIFORNIA  
2013 SEASON**



**Prepared for  
California Department of Fish and Wildlife  
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**Prepared by  
California Department of Parks and Recreation  
Off-Highway Motor Vehicle Division  
Oceano Dunes District**

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**Attachments**

- U.S. Department of Agriculture Wildlife Services. Oceano Dunes State Vehicular Recreation Area 2013 Predator Management Report
- Ventana Wildlife Society. Avian Predator Management Project: Trapping and Relocation of Problem Avian Predators at Oceano Dunes State Vehicular Area in 2013
- Medical examination records: one first-year least tern and one snowy plover chick
- Necropsy examination results: one least tern juvenile, one first-year least tern, one snowy plover chick, one snowy plover juvenile, and two snowy plover adults

## SUMMARY

Staff of Oceano Dunes State Vehicular Recreation Area (Oceano Dunes SVRA, ODSVRA) and Point Blue Conservation Science (Point Blue) monitored breeding California least terns (*Sternula antillarum browni*) (least tern, tern) and western snowy plovers (*Charadrius nivosus nivosus*) (snowy plover, plover) at ODSVRA, San Luis Obispo County, California in 2013.

All least tern nests were inside a large seasonally fenced enclosure in the southern portion of the vehicle riding area. There was a minimum of 48 breeding pairs, an increase of 17.1% from 41 breeding pairs in 2012 and above the average of 39 pairs (range=20-55) from 2002-12. There were 57 known nesting attempts. Of the 52 nests with known location and fate, 45 hatched, for a nest hatching rate of 86.5%. Of the seven nests that failed, two were abandoned pre-term (prior to the expected hatch date), two were abandoned unknown if pre- or post-term, one was depredated by coyote (*Canis latrans*), one was depredated by opossum (*Didelphia virginiana*), and one failed due to an unknown cause. Eighty-five chicks hatched and 77 were color-banded to individual. Fifty-six of the 85 chicks (including four unbanded chicks) are known to have fledged (seen when 21 days old or older), for a chick fledging rate of 65.9% and 1.17 chicks fledged per pair. Predation of chicks or juveniles was documented for a minimum of one tern. The maximum known number of juveniles produced that may have survived to leave the site was 53.

There was a minimum of 163 breeding snowy plovers (92 males and 71 females), compared to 190 in 2012. Seventy-eight banded birds were documented as breeding, 67 of these were banded as chicks and fledged from ODSVRA from 2004-12. There were 178 known nesting attempts, 147 were in the southern riding area seasonal enclosure (Southern Enclosure), 23 in Oso Flaco, and eight from unknown locations (nesting known only by detection of brood). Of the 167 nests with known location and fate, 130 hatched, for a nest hatching rate of 77.8%. Thirty-seven nests failed, attributed to the following causes: abandoned pre-term (8); abandoned post-term (7); abandoned, suspected due to wind (17); unknown cause (3); unidentified predator (1); and gull (1). Of the 343 hatching chicks, 297 were color-banded to brood, and the fate of 46 unbanded chicks is known (25 fledged). Of the 343 chicks with known fate, 187 fledged for a high chick fledging rate of 54.5%. One chick fledged per breeding male is the estimated number needed to prevent the population from declining (assuming approximately 75% annual adult survival and 50% juvenile survival) (U.S. Fish and Wildlife Service 2007). In 2013, an estimated 2.03 juveniles fledged per male at ODSVRA. For the 12-year period 2002-13, average productivity was 1.37 juveniles fledged per breeding male.

## INTRODUCTION

Oceano Dunes SVRA, located in southern coastal San Luis Obispo County, California, is a popular park with high attendance and was visited by over 1.5 million people in 2012 for a variety of recreational opportunities, including driving vehicles on the beach and dunes.<sup>1</sup> In 2012, an estimated 251,917 street-legal vehicles and 150,611 off-highway vehicles were driven on the shoreline and dunes in the designated riding area of the park.<sup>2</sup>

Within ODSVRA there is extensive breeding habitat for two special-status ground-nesting birds, the state and federally endangered California least tern and the federally threatened Pacific Coast population of the western snowy plover. Monitoring of the least tern and snowy plover at ODSVRA during the breeding season began in 1991 and 1992, respectively. Least terns are present at ODSVRA only during the breeding season, migrating to wintering areas well south of California. The snowy plover population at the park is comprised partly of birds present year-round and partly of migrant birds present only during the breeding or wintering season.

This report summarizes the results of the 2013 nesting season for least terns and snowy plovers at ODSVRA. Maps in figures and appendices use digital satellite photos taken in 2007 by DigitalGlobe © 2008, unless otherwise noted.

State park staff conducts monitoring activities at ODSVRA under U.S. Fish and Wildlife Service (USFWS) permit 10(a)(1)(A) TE-815214-7, California Department of Fish and Wildlife (CDFW) Memorandum of Understanding (MOU), and CDFW Scientific Collecting Permits. Predator removal activities are conducted under USFWS Depredation Permit MB153500-0. Point Blue conducts monitoring and banding activities under USFWS permit 10(a)(1)(A) TE-807078-15, Federal U.S. Geological Survey Bird Banding Laboratory Banding Permit 09316, CDFW Scientific Collecting Permit SC-006691, and a CDFW Memorandum of Understanding.

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<sup>1</sup> ODSVRA 2012 Annual Attendance figures (source ODSVRA)

<sup>2</sup> ODSVRA 2012 Monthly Carrying Capacity Summaries (source ODSVRA)

## SITE DESCRIPTION

ODSVRA is part of the 18-mile-long Guadalupe-Nipomo Dunes complex. The Oceano Dunes District, California Department of Parks and Recreation, manages approximately 4,900 acres with approximately 9.1 miles of ocean shoreline on the western edge. On the northern border of the park is the city of Pismo Beach. Located to the east of the park are Phillips 66 Refinery (formerly ConocoPhillips Refinery), the cities of Grover Beach and Oceano, and private lands that consist of dunes, coastal scrub, and agricultural fields. The southern border of the park abuts the Guadalupe-Nipomo Dunes National Wildlife Refuge (NWR). Inside the park, dunes that are open to vehicles extend inland in some areas for over one mile. Eight numbered marker posts, located approximately 0.5 miles apart, are located along the coastal strand of the riding area to orient park visitors and staff. Street-legal vehicles are allowed throughout the riding area. Off-highway vehicles, as well as overnight camping, are allowed along the beach and dunes south of marker post 2 (approximately one mile south of Pier Avenue). In the southern portion of ODSVRA is Oso Flaco Lake area (Oso Flaco) with a shoreline of approximately 1.7 miles. Pedestrians are allowed at Oso Flaco but it is closed to camping, equestrian, dog, and vehicle use. The beach at Oso Flaco west of the foredunes is narrower than in the riding area.

The following are descriptions of sites and terms as used in this report (Figure 1, Figure 2).

ODSVRA: All areas that are administered by the Oceano Dunes District, including the Oceano Dunes SVRA, Pismo State Beach, Pismo Dunes Natural Preserve (Dunes Preserve), Pismo Lake, and Oso Flaco Lake area. Management of the Dunes Preserve and Pismo State Beach was transferred to the Oceano Dunes District in December 2004. The Pismo Lake property was acquired from the California Department of Fish and Wildlife in 2007 and is currently closed to the public. ODSVRA provided tern and plover monitoring for the Dunes Preserve prior to 2004 and continues to do so. Pedestrian and equestrian use is permitted in the Dunes Preserve, but vehicles and dogs are not allowed.

Riding area: The area within ODSVRA that is open to recreational vehicles. This area changes in size based on seasonal restrictions. Street-legal vehicles are allowed along approximately 5.3 miles of beach, from the Grand Avenue park entrance south to the southern boundary of the riding area (approximately 0.4 miles south of marker post 8). Off-highway vehicles are only allowed south of marker post 2.

Open riding area: The area within ODSVRA open to recreational vehicle use during the nesting season.

Southern Exclosure: A single contiguous area within the southern portion of the riding area that is fenced and closed to entry during the breeding season to protect nesting terns and plovers. The adjoining shoreline is also part of the Southern Exclosure and is closed to public entry during the nesting season. From 2001 to 2004, the amount of seasonally protected nesting habitat in the riding area periodically increased in size. Subsequent to 2004 there has been no increase in size of this protected area. The area of the Southern Exclosure (including the area at and above the high tide line on the closed shoreline) for 2013 was approximately 298 acres, compared to a range of 271-296 acres (and an average of 286 acres) between 2004 and 2012. Although the basic configuration of the Southern Exclosure has remained consistent since 2004, changes in dune topography and public safety issues impact the placement of the east fence, resulting in small variations in acreage from year to year. Individually identified areas (Figure 2) within the Southern Exclosure include the following:

*6 exclosure*: The area from marker post 6 to marker post 7, (approximately 0.5 miles of shoreline and approximately 60 acres), first incorporated into the Southern Exclosure for a full season in 2004. Vegetation within the exclosure is very sparse.

*7 enclosure:* The area from marker post 7 to the south side of 7.5 revegetation area (approximately 0.4 miles of shoreline and approximately 62 acres). Habitat includes extensive areas of bare sand, limited areas of vegetated hummocks, limited areas of organic surface debris (shells, driftwood, dried algal wrack), and moderate to heavy vegetation in the small 7.5 revegetation area located within the 7 enclosure.

*8 enclosure:* The area from the south side of the 7.5 revegetation area to the North Oso Flaco fencing south of marker post 8 (approximately 0.5 miles of shoreline and approximately 84 acres). Habitat includes extensive areas of bare sand, limited areas of vegetated hummocks, and limited areas of organic surface debris (shells, driftwood, and algal wrack).

*Boneyard enclosure:* The area east of the North Oso Flaco dunes. Habitat is primarily bare sand and active sand dunes. This inland area does not have a shoreline component and is approximately 92 acres. A portion of the west side (7.4 acres) has been closed year-round since 2005 due to the presence of a cultural resource area. This area has developed small vegetated hummocks. Straw bales, placed within the protected cultural area, to build up sand to cover and protect cultural resources, persist. The east fence is not maintained as predator fencing due to the rapidly shifting open sand dunes in the area. Instead, beginning in 2003, a two inch by four inch mesh interior fence (six foot tall predator fencing) has bisected Boneyard enclosure during the nesting season, resulting in 42 acres in the western portion (contiguous with 6, 7, and 8 enclosures) and 51 acres in the eastern portion.

Oso Flaco: The shoreline and dunes in ODSVRA located south of the riding area. The approximately 1.7 miles of beach length is narrow in width, and the dunes are typically heavily vegetated, relative to the riding area. The area is part of the Oso Flaco Lake area, open to pedestrian use but closed to vehicles. Beginning in 2006, an additional 0.4 miles of shoreline at the southern end of the park were included in the ODSVRA (a survey conducted by the Guadalupe-Nipomo Dunes NWR in 2005 determined this area was part of ODSVRA and not the NWR, as was previously thought). For purposes of discussion in this report, Oso Flaco is divided into North Oso Flaco and South Oso Flaco (Figure 2).

*North Oso Flaco:* The area extending south from 8 enclosure to the pedestrian boardwalk access trail to the Oso Flaco shoreline (approximately 0.5 miles of shoreline and approximately 68 acres). Beginning in 2002, the upper beach and dunes were closed to pedestrians during the nesting season with symbolic fencing. Since 2005, the North Oso Flaco area has been part of the seasonal enclosure and managed in a similar manner; predator fencing has replaced symbolic fencing and the shoreline has been closed to the public during the nesting season.

*South Oso Flaco:* Extends from the boardwalk to the ODSVRA southern boundary (approximately 1.2 miles shoreline length). Oso Flaco Lake drains through Oso Flaco Creek and the mouth of this creek is within the northern portion of South Oso Flaco. The shoreline is open to the public and symbolic fencing and signage have been used since 2002 to designate the seasonally closed upper beach and dune habitat. Snowy plover nests found in this area receive individual nest enclosures.

Pipeline revegetation area: Located adjacent to the east side of 8 enclosure. The area is heavily vegetated.

Arroyo Grande Creek: Seasonally flows into the Pacific Ocean approximately two miles north of the Southern Enclosure. The associated lagoon is variably located east of the area between marker post 1 and marker post 2. The upper creek area and lagoon are closed to vehicle use year-round to protect sensitive aquatic habitat. Pedestrian and equestrian entry is prohibited during the nesting season and permitted

during the nonbreeding season. Posts and signs delineate the closed area during the nonbreeding season; symbolic rope fence is added during the nesting season.

Carpenter Creek: Seasonally flows into the Pacific Ocean approximately 4.5 miles north of the Southern Exclosure. No vehicles are allowed in the area as it is approximately 0.4 miles north of the riding area. The area receives a high level of pedestrian use.

Pismo Creek lagoon: Seasonally flows into the Pacific Ocean approximately 4.8 miles north of the Southern Exclosure. Standing water persists all year, with low vegetated hummocks west of the lagoon and tall vegetated dunes and housing to the east. No vehicles are allowed in the area as it is approximately 0.75 miles north of the riding area. The area receives a high level of pedestrian use. Only a small portion of the lagoon is part of state park property.

## MONITORING AND MANAGEMENT ACTIONS

### MONITORING

Daily monitoring occurs from 1 March – 30 September. At a minimum, ODSVRA maintains three monitors during morning and early afternoon hours. As the season progresses, monitoring increases to include the late afternoon and early evening hours. Monitoring involves walking to assess or find new nests as well as scanning nests and broods from parked vehicles (a proven and effective blind). Monitoring occurs in a manner to minimize disturbance or adverse effects to adult birds, nests, and chicks.

#### **Open riding area**

Monitoring of the open riding area by vehicle occurs daily along defined transects, as any nests initiated or chicks in this area require immediate protection from recreational activities. Areas along transects with plover activity indicating potential nesting interest (scraping or copulating) are checked more thoroughly on foot and with increased frequency using binoculars or spotting scope. When staff finds chicks in the open riding area the area is closed to vehicles and chicks are slowly directed back into the protected Southern Enclosure. Staff continues to monitor chicks to confirm they do not move back into the open riding area.

#### **Breeding least terns and snowy plovers**

Finding and monitoring nests: The least tern and snowy plover management program attempts to find, monitor, and determine all tern and plover nest and chick fates. Staff checks most nests daily and conducts regular nest searches using binoculars and spotting scopes from parked vehicles outside of the seasonal fencing. Additional nest searches are conducted on foot. Staff maps nest locations using a Global Positioning System (GPS). Egg-laying dates provide estimates for least tern and snowy plover clutch hatching dates; for nests found at full clutch, floating the eggs (snowy plovers only) provides an estimate.

Nest substrates: Monitoring staff documents substrate of each nest with a known location in 6, 7 and 8 enclosures to assess the benefits of ongoing habitat enhancement activities.

#### Nest fates:

The following categorizes nest fates used in this report:

*Hatch:* Nest hatched at least one egg. Nesting attempts known only by detection of brood are referred to as “unknown location nests” and egg numbers from such nests are minimums derived from the number of chicks first observed.

*Abandoned pre-term:* Nest abandoned prior to the expected hatch date; causes may include, but are not limited to, disturbance or adult mortality.

*Abandoned, suspected due to wind:* Nest abandoned pre-term during periods of high wind, with eggs typically found almost or completely buried.

Beginning in 2010, the category of “abandoned, suspected due to wind” was added to nest fates. Prior to this, nests lost where wind may have been the cause were included in the broader category of “abandoned pre-term.” For the 2010 report, least tern nests in the abandoned pre-term category for the previous eight years were reviewed and a limited number were reassigned to the category of abandoned, suspected due to wind. Tables in this report include the reassigned tern nest fates for years prior to 2010.

*Abandoned post-term:* Nest abandoned after the expected hatch date, and includes nests with nonviable eggs.

*Abandoned, unknown if pre- or post-term:* Nest abandoned, but unknown if pre- or post-term.

*Depredated:* Nest lost to a predator. If possible, staff identifies the predator to species or group (mammalian, avian), or describes the nest as lost to an unidentified predator.

*Flooded:* Nest overwashed by tide, or flooded by a shifting creek or expanding lagoon.

*Failed to unknown cause:* Nests that disappeared before expected hatch date with cause of failure undetermined.

*Unknown fate:* Nests where eggs disappear around the estimated hatch date, but not enough evidence exists to determine whether they hatched or failed. To decrease disturbance to chicks, access to nests with nearby young tern and plover broods is limited, and may result in nests with unknown fate.

**Banding chicks:** In 2013, least tern chicks received a single size 1A blank aluminum band (covered with white over blue vinyl tape) on the right leg, and a size 1A numbered aluminum federal band on the left leg. Colored tape placed on the federal band creates color band combinations unique to each individual chick. Weighing chicks occurs immediately prior to banding, typically at one to three days old.

Banding of plover chicks was inconsistent prior to 2001. Since 2002, the goal has been to band all chicks to brood, with all chicks within one brood given the same color band combination. Since 2010, some ODSVRA band combinations on birds that may be alive have been reused due to the limited number of combinations available. Therefore, the age of adult plovers with certain ODSVRA band combinations is sometimes unknown. Some chicks are left unbanded in areas with nearby young tern and plover broods to reduce disturbance to chicks. The fates of the limited number of unbanded chicks are tracked with intense monitoring of broods. In some instances the associated male or sibling chicks may be color banded.

**Assignment of broods to nests:** Most chicks are banded at the nest. Chicks found outside of the immediate nest area can often be assigned to a specific hatched nest as one or both of the parents are color banded. For some broods with unbanded adults the brood location and age of chicks allow nest determination. However, circumstances can occur with several nearby nests hatching at the same time (chicks confirmed from distance with spotting scope) and banding at the nests is not possible. The resulting broods, with chicks the same age, may appear on the same section of shore and it is not possible to assign each brood to a specific nest. Such broods are referred to as “unassigned broods.”

**Chick monitoring:** Searching for broods occurs multiple times each week from vehicle surveys on the shoreline of the Southern Enclosure and Oso Flaco. Staff records band combinations, chick numbers, adults present, location and direction of movement, and any interaction or aggression with nearby broods.

**Fledging success:** At ODSVRA, juvenile terns can be widely dispersed over a large area. Monitoring efforts directed specifically for terns are needed in estimating the number of juveniles produced as well as identifying threats to survival. Tern chicks surviving to 21 days or older are considered fledged (21 days after the hatch date, which counts as day zero). Tracking of juvenile terns occurs on park property (in the Southern Enclosure, at Oso Flaco Lake, Pismo Creek lagoon, and roosting areas such as south of Pier Avenue) and at nearby sites.

The fledgling tern counting method varies among years as follows: single day high counts for 1991-97, and 2000-01; a single day high count at Oso Flaco Lake for 1998; count method for 1999 unknown; and three-week interval day count conducted from 2002-04 (chicks banded to site 2003-04). In 2005, chicks were color-banded to brood and from 2006-13 almost all chicks were color-banded to individual, resulting in more accurate documentation of fledge rate than previous methods. Earlier estimates prior to banding to individual may represent substantial undercounts or overcounts.

Plover chicks surviving to 28 days or older from the time of hatch are considered fledged (28 days after the hatch date, which counts as day zero). Prior to 2001, monitoring in Oso Flaco and Pismo Dunes Natural Preserve was intermittent, and fledgling information was not obtained.

Measures describing breeding success:

The following categorizes measures describing breeding success used in this report:

*Hatch rate:* Total number of hatching nests divided by total number of nests with known location and fate.

*Percentage chicks fledging:* Total number of chicks fledging divided by total number of chicks (includes chicks fledged from unknown location nests).

*Number of chicks fledging per nest:* Total number of chicks fledging divided by total number of nests.

*Productivity:* Number of least tern fledglings per breeding pair (consistent with the annual statewide California least tern report produced by CDFW). Number of snowy plover fledglings per breeding male (consistent with USFWS Pacific Coast western snowy plover recovery plan).

Banded adults: Documenting banded least terns and snowy plover adults provides detailed information on history of birds including: origins, age, breeding status, and movement between sites. Staff attempts to record all band combinations of adult least terns and snowy plovers.

Number of breeding adults: For least terns, the minimum number of breeding pairs equals the maximum number of concurrently active nests and broods. Banding chicks to brood in 2005 and to individual since 2006 provides for increased accuracy in counting the number of active broods on a given date. From 1991 to 2001, the estimated number of breeding pairs was not always reported or was based only on the number of concurrent nests. These reports were reviewed in 2005, looking at both nests and the limited brood information. For some years this resulted in identifying an increase in the minimum number of pairs and this revised information has been provided in annual reports since 2005.

Individually banded snowy plover adults provide the most accurate means to identify breeding population size but currently at ODSVRA too few adults are banded to rely solely on this method. A minimum number of breeding females is derived from the maximum number of nests active on the same day plus any additional nests hatching one day before or initiated one day after this date. A minimum number of breeding males is estimated from the highest same day count of active nests and broods (males typically raise the chicks; males with broods three weeks of age or older are not included if they could be associated with a new nest) and number of nests initiated the day after the high count. Beginning in 2009, numbers of color-banded adults confirmed breeding are compiled, and any number of this group that could not be accounted for on the same day high count, including nests or broods with unknown adults, are added to the same day high count for the appropriate sex.

ODSVRA also participates in the annual U.S. Pacific Coast snowy plover breeding season window survey coordinated by USFWS.

Least tern night roost: During the breeding season, terns may assemble in a night roost. Monitors record the night roost location and total numbers of individuals present as the terns arrive at dusk. Night-vision goggles are available and used for this task, but they have a limited range for distance viewing. There are occasions when terns are not seen, but are heard vocalizing as they arrive to roost after it is too dark to see. Counts are considered a minimum due to the inherent limited visibility of the night roost. It is typically too dark to distinguish between adults and juveniles.

Least tern use of freshwater lakes: Freshwater lakes can provide a source of prey fish in addition to the near-shore ocean. Periodically surveying nearby small freshwater lakes documents tern use and gives a better understanding of local food resources. An important component of this monitoring is to determine if lakes provide additional appropriately-sized fish to feed chicks (chicks require fish small enough that they can be swallowed whole). Observations of adults in flight provide information about the direction of foraging sources and, occasionally, fish size.

### **Wind speed monitoring**

Beginning in 2011, ODSVRA monitors wind speed from a tower (S1 tower) located approximately 375 feet east of 6 enclosure, with anemometers at two, seven and ten meters high. In 2010-11, a portable anemometer with data logger (from WindLog Rainwise, Inc.) was placed in the breeding habitat. Before 2010, wind speeds were periodically measured by hand-held weather gauges (Kestrel 2000 Weather Meter by Kestrel Meters).

### **Predator activity**

Monitoring predator activities: Park staff and contractors (Ventana Wildlife Society, U.S. Department of Agriculture (USDA) Wildlife Services, and Point Blue) collect information on predator presence at ODSVRA from February through September. From direct observation of mammalian and avian predators or their sign (e.g., tracks, scats, regurgitated pellets (castings), prey remains, depredated nests), monitors record species, type of sign, behavior, duration of observation, direction of travel, and characteristics that may identify an individual. Summarizing these observations by count of days detected, location of animal sighting or sign, and observation duration allows for comparison across years. For additional details, see section titled Predators and predator management on page 39.

Gull monitoring: Gulls may depredate snowy plover and least tern eggs, chicks, and juveniles. Gulls are of particular concern because they are a subsidized predator often responding to human activity. Conducting daily and more detailed weekly surveys during the nesting season, in addition to general predator monitoring, documents flock locations and numbers within the park.

### **Nonbreeding season monitoring of snowy plovers**

Beginning in 2009, more consistent weekly surveys for snowy plovers occurs during the months of October through February. During these surveys staff divides the shoreline into the following five sections, listed from north to south:

- 1) approximately 0.5 miles north of Pismo Pier to Grand Avenue (pedestrian use only, no vehicle use allowed);
- 2) Grand Avenue south to marker post 2 (street-legal vehicles and day use only, no camping);
- 3) marker post 2 south to marker post 6 (street-legal vehicles, off-highway vehicles, and camping allowed year-round);
- 4) marker post 6 south to the southern shoreline riding area boundary (shore and portion of upper beach closed to public use during 1 March to 30 September and open to all activities during the rest of the year); and

- 5) Oso Flaco (southern shoreline riding area boundary to ODSVRA's southern boundary with pedestrian use only and portion of shore and upper beach closed to pedestrian use 1 March to 30 September).

ODSVRA also participates in the annual U.S. Pacific Coast snowy plover winter window survey coordinated by USFWS.

**Investigation of least tern and snowy plover carcasses**

ODSVRA sends fresh carcasses of least terns or snowy plovers to an approved facility (the California Health and Food Safety Laboratory at the University of California, Davis) for necropsy. Fresh carcasses must be immediately refrigerated and then sent by overnight delivery service within one day to preserve the integrity of tissues to be tested to determine cause of death.

## MANAGEMENT ACTIONS

ODSVRA manages for least terns and snowy plovers to optimize breeding success and reduce the potential for take. To reduce visitor disturbance to breeding birds, ODSVRA installs fence, seasonally closes areas to visitors, and posts signage. Staff augments existing habitat with branches, woodchips, wrack (surf-cast kelp), plants and seed. An active predator management program reduces disturbance and depredation by mammalian and avian predators.

### **Informational signage and enforcement of regulations**

Interpretive panels at access points, and signs identifying closed areas, serve to increase public awareness of threats to nesting terns and plovers. The public can access a low wattage radio station with a repeated recording of park information, including information about protection of sensitive species. State Park rangers enforce park regulations enacted to protect terns and plovers.

### **Seasonal closure and fencing**

Every year from 1 March through 30 September, ODSVRA closes least tern and snowy plover breeding habitat to vehicle and pedestrian use with wire or symbolic fencing. The wire fencing, referred to as the seasonal enclosure (see details below), provides a higher level of protection when compared to symbolic fencing, composed of rope with signs to keep visitors from entering sensitive areas. When nesting occurs outside of the seasonal enclosure, staff chooses an alternative wire enclosure type with consideration for the species, topography, proximity to recreational activities, predator threats, and duration of disturbance to the area during enclosure construction. The seasonal enclosure and large single nest enclosures are collectively referred to as seasonal fencing in this report.

ODSVRA uses the following enclosure types:

Seasonal enclosure (Southern Enclosure and North Oso Flaco) protected area: ODSVRA fences this approximately 350-acre area during the nesting season to limit vehicle and human trespass into protected nesting and brood-rearing habitat. Wire fencing five feet high (bottom eight inches buried) with two inch by four inch mesh discourages coyote entry. Beginning in 2006, an additional layer of fence material was attached to overlap the top of the fence, increasing fence height above the surface to approximately six feet as a further deterrent to coyotes. Staff attaches bird barrier spikes to the wood posts in an effort to discourage perching by avian predators. Tall posts with large stop signs extend into the intertidal area at marker post 6 and the south end of North Oso Flaco. Rope with additional signage extends between the shoreline posts to clearly designate a closed shoreline to visitors.

Symbolic fencing (South Oso Flaco): Symbolically fencing approximately 1.2 miles of nesting and brood-rearing habitat in South Oso Flaco identifies the closure area (lower shore remains open to public). Nests in this area typically receive some type of individual nest enclosure.

Large single nest enclosure: Staff installs a minimum 200-foot diameter, circular single nest enclosure with height of five feet (bottom eight inches buried) around any least tern or snowy plover nest found in the open riding area. Single nest enclosures of differing sizes may also be used to protect snowy plover nests in areas where vehicles are not permitted (Oso Flaco, Southern Enclosure shoreline, Arroyo Grande Creek area, Pismo Creek area, and areas north of Grand Avenue).

10 foot by 10 foot, circular, and mini-enclosures: Staff selectively uses a small circular or two small square nest enclosure (made of two inch by four inch wire) around snowy plover nests inside or outside of seasonal fencing for protection from predators, including roosting gull flocks. Staff uses different enclosures based on a variety of factors including, but not limited to, weather, topography, predator threats, and proximity of young broods.

The 10 foot by 10 foot enclosure (used since 2003) and seven-foot diameter circular enclosure (used since 2012) are built with five-foot-high sides and the bottom eight inches buried when outside of the seasonal enclosure protected area. A 1/2 inch by 1/2 inch mesh net top is added when avian predation is a concern.

Mini-enclosures (used since 2010) are three feet by three feet by three feet with a wire mesh top, staked into the ground, and buried four to eight inches when appropriate. Of the three types, mini-enclosures take the least amount of time and staff to install.

Bumpout: A nest in the Southern Enclosure located within a minimum of 100 feet to the east or north fence requires temporary additional fencing extending into the open riding area to allow an adequate buffer between recreational activities and the nest. This type of extended fence is termed “bumpout.” Staff extends bumpouts when recreational activities continue to cause disturbance to nesting birds. ODSVRA maintains a safe vehicle corridor adjacent to the east fence and any bumpouts.

### **Habitat enhancement**

Following the nesting season, and for the five-month period October through February, camping, street-legal vehicles, and off-highway vehicles use portions of the Southern Enclosure. This recreational use results in large areas of flattened terrain and barren sand with very limited scattered natural debris and vegetation.

Staff place material in 6, 7, and 8 enclosures to offer more areas of disruptive cover for terns and plovers, providing shelter from wind and blowing sand, reducing exposure to predators, and augmenting potential nesting substrate. Beginning in February or March, and prior to nest initiation, natural materials such as driftwood, woodchips, and wrack are added to the enclosures, including to the shore, to enhance habitat features. No habitat enhancement occurs within 100 feet of the fence that borders the open riding area to discourage nesting near recreation that may cause disturbance to breeding birds.

Wrack and talitrids: Results from studies conducted by Drs. Jenny Dugan and Mark Page, researchers from the Marine Science Institute at the University of California Santa Barbara, suggest that the seven month seasonal closure (March through September) is not a sufficient period of time for invertebrates to effectively recover species diversity and abundance on the Southern Enclosure shoreline following five months of recreational vehicle use.

ODSVRA collects wrack in the open riding area and disperses it in the Southern Enclosure. Collection and distribution is done by hand and moved using a truck and trailer. In addition to providing cover, wrack on the shoreline provides a food resource supporting invertebrates, which in turn are prey for plover chicks, juveniles, and adults. Talitrids (commonly called beach hoppers) are collected from outside the vehicle use area north of Grand Avenue. Staff inoculates the wrack addition areas of the Southern Enclosure shoreline with talitrids in order to establish a breeding population, thus increasing the food resources available for plover chicks and juveniles during the breeding months.

Woodchips, branches and driftwood: Staff adds woodchips to supplement the existing assorted debris that snowy plovers often choose as nesting substrate. Woodchips are spread in patches of less than a quarter-acre in size in the 6, 7, and 8 enclosures in areas of barren sand and over thinning woodchip patches remaining from the previous year(s). OSDVRA heavy equipment assists in loading woodchips to be distributed.

Staff distributes cut branches and driftwood in patches from the mid-portion of 6 and 7 enclosures to the west fence and upper shoreline west of the enclosure. Staff collects the branches and driftwood from the enclosures at the end of each season and stores them for use in the following season.

Plants and seeds: Prior to expected rain, staff broadcasts seed and installs container plants grown on site, as available, in an effort to provide scattered plants in 6 and 7 exclosures. All seed for dispersal and container plants are collected from local foredune species. The seeding and planting is within 6 and 7 exclosures because these areas have the least amount of vegetative cover during the nesting season compared to other areas of the seasonal exclosure. Seed or plants are of foredune species such as sea rocket (*Cakile maritima*), beach bur (*Ambrosia chamissonis*), and sand verbena (*Abronia maritima*). Scattered plants, and the associated development of small hummocks, can benefit plovers and terns during the breeding season.

Least tern chick shelters: Staff places tern chick shelters in the 6 and 7 exclosures in areas of historical tern nesting and chick-rearing (192 were installed in April 2013). The shelters provide chicks and juveniles with cover from predators and the elements (sun, wind, wind-blown sand). These simple structures are two or three pieces of plywood attached together to form either an A-shape shelter (typically six inches high by 12 inches long by 11 inches wide), L-shape shelter (typically seven inches high by 19 inches long by 14 inches wide), T-shape shelter (12 inches by 12 inches flat roof with a center support partially buried in sand), or a double-T-shape shelter (16 inches by 22 inches flat roof with two supports eight inches deep and five inches apart buried in the sand).

### **Predator management**

In addition to preventative measures such as fencing, individual nest exclosures, and cover provided by habitat enhancement, ODSVRA park staff and contractors consistently monitor predator activity to assess impacts on breeding terns and plovers (as discussed in Monitoring). Staff removes animal carcasses (which attract scavengers) in or adjacent to nesting and brood-rearing habitat and harass predators to flush them from sensitive areas. When additional options for managing predators are needed, selective live-trapping and relocation of avian predators is conducted by Ventana Wildlife Society and selective live-trapping and relocation or lethal removal of mammalian and avian predators is conducted by USDA Wildlife Services. See section titled Predators and predator management on page 39 for additional information.

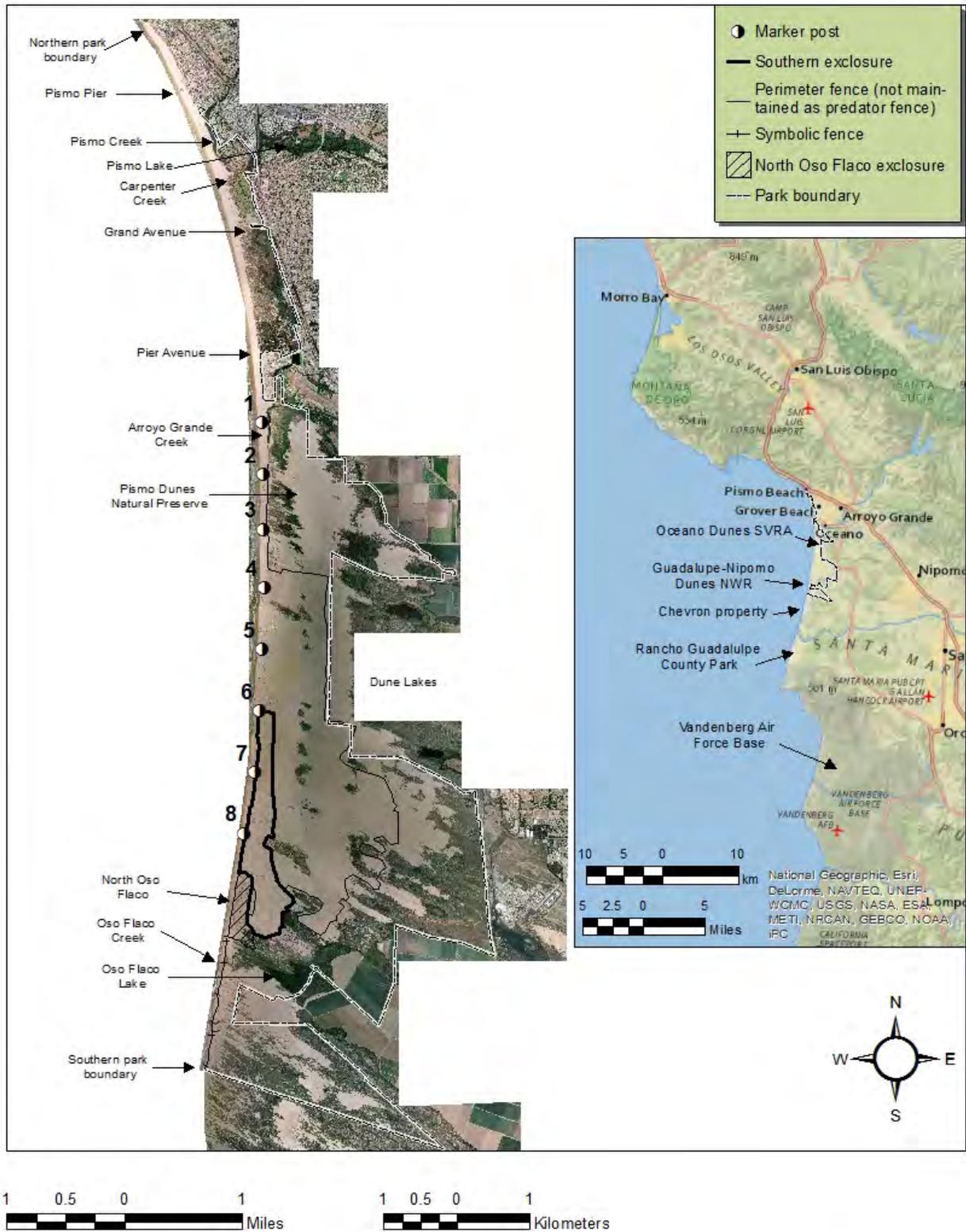
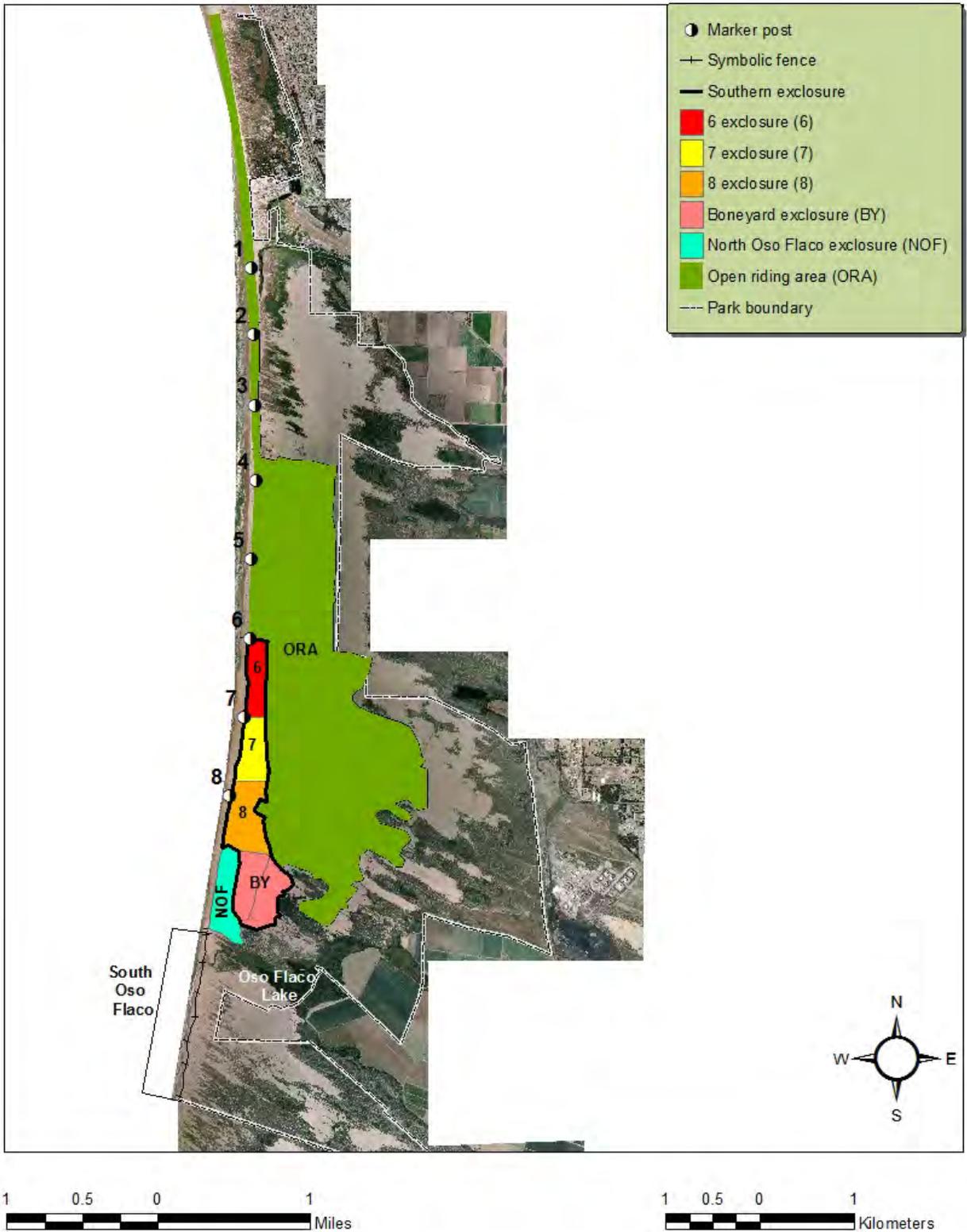


Figure 1. ODSVRA site map.



**Figure 2. ODSVRA Southern Enclosure and Oso Flaco seasonally protected areas for breeding California least terns and snowy plovers in 2013.**

## RESULTS AND DISCUSSION

### CALIFORNIA LEAST TERN

#### **Number of breeding pairs**

In 2013, least terns were first seen at ODSVRA on 7 May with eight flying over the enclosure, and from this date onward terns were seen or heard daily. Terns were last seen on 30 August with two adults and one juvenile at Oso Flaco Lake. During the previous 11 years, first sightings occurred between 8 April and 15 May (median=10 May) and last sightings occurred between 20 August and 28 September (median=6 September). There was a minimum of 48 breeding pairs in 2013, a 17.1% increase from a minimum of 41 breeding pairs in 2012, and above the average of 39.0 pairs (range=20-55) from 2002-12 (Table 1, Figure 3).

#### **Number, clutch size, and distribution of nests**

There were 57 nesting attempts documented, with the first nest initiated approximately 28 May and the last 13 July (Appendix A). During the eleven-year period 2002-12, there was an average of 47 nests per year (range=22-79) with initiation dates for first nests ranging from 26 May to 8 June (median=5 June). In 2013, a high count of 42 nests were active at the same time on 17 June. Of the 49 nests with known complete clutch size, six had one egg, 35 had two eggs, and eight had three eggs. The average number of eggs in completed clutches was 2.04. This compares to an average of 1.85 for 2002-12 (range=1.55-2.10), and statewide averages of 1.62, 1.75, 1.76, 1.82, 1.75, and 1.65 in 2007–12, respectively (Marschalek 2008, 2009, 2010, 2011, 2012; Frost 2013). Nests were located in 6 enclosure (39 nests), 7 enclosure (17 nests) and 8 enclosure (1). The one nest in 8 enclosure is the first for the combined 8 and Boneyard enclosures since 2009 (Figure 4).

#### **Clutch hatching rate**

For five of the 57 nests, the nest fate (hatch or fail) was unknown. Of the 52 nests with known fates, 86.5% hatched and 13.5% failed. This compares to an average clutch hatching rate of 80% (range=66-89%) during the period 2002-12 (Table 1). The hatching rate for known fate nests was 97.3% (36/37) in 6 enclosure, 57.1% (8/14) in 7 enclosure, and 100.0% (1/1) in 8 enclosure (Table 2). Causes of loss for seven nests known to fail were abandoned pre-term (2); abandoned, unknown if pre- or post-term (2); depredated by coyote (1); depredated by opossum (1); and unknown cause (1) (Table 3).

**Table 1. Nesting success of California least terns at ODSVRA from 1991-2013.**

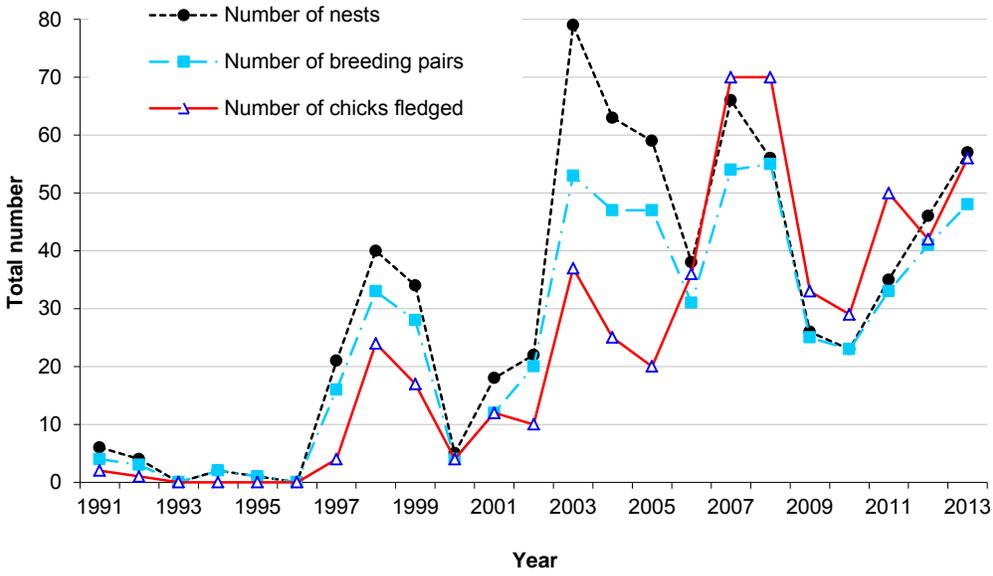
Percent nests hatched calculated using number of nests with known fate. Percent chicks fledged and juveniles fledged per nest may include fledges from unknown nest locations detected only by brood presence, but these are few. Chicks were banded to site in 2003 and 2004. In 2005, chicks were first banded to brood and from 2006-13, chicks were banded to individual.

Year	Estimated minimum no. breeding pairs	No. nests (no. known fate)	No. hatched nests	Percent known fate nests hatched	No. chicks	Percent chicks fledged	No. juveniles	Juveniles fledged per nest	Juveniles fledged per pair
1991	4	6 (6)	2	33	4	50	2	0.33	0.50
1992	3	4 (4)	1	25	2	50	1	0.25	0.33
1993	0	0 (0)	0	0	0	0	0	0.00	0.00
1994	2	2 (2)	0	0	0	0	0	0.00	0.00
1995	1	1 (1)	0	0	0	0	0	0.00	0.00
1996	0	0 (0)	0	0	0	0	0	0.00	0.00
1997	16	21 (10)	3	30	6	67	4	0.19	0.25
1998	33	40 (32)	26	81	40	60	24	0.60	0.73
1999	28	34 (30)	21	70	38	45	17	0.50	0.61
2000	4	5 (5)	4	80	8	50	4	0.80	1.00
2001	12	18 (18)	13	72	22	55	12	0.67	1.00
2002	20	22 (19)	15	79	27	37	10	0.45	0.50
2003	53	79 (77)	60	78	101	37	37	0.47	0.70
2004	47	63 (60)	44	73	69	36	25	0.40	0.53
2005	47	59 (59)	39	66	66	30	20	0.34	0.43
2006	31	38 (38)	28	74	45	80	36	0.95	1.16
2007	54	66 (66)	51	77	90	78	70	1.06	1.30
2008	55	56 (56)	50	89	99	71	70	1.25	1.27
2009	25	26 (26)	23	88	43	77	33	1.27	1.32
2010	23	23 (23)	20	87	35	83	29	1.26	1.26
2011	33	35 (35)	31	89	55	91	50	1.43	1.52
2012	41	46 (40)	33	83	52	81	42	0.91	1.02
2013	48	57 (52)	45	87	85	66	56	0.98	1.17

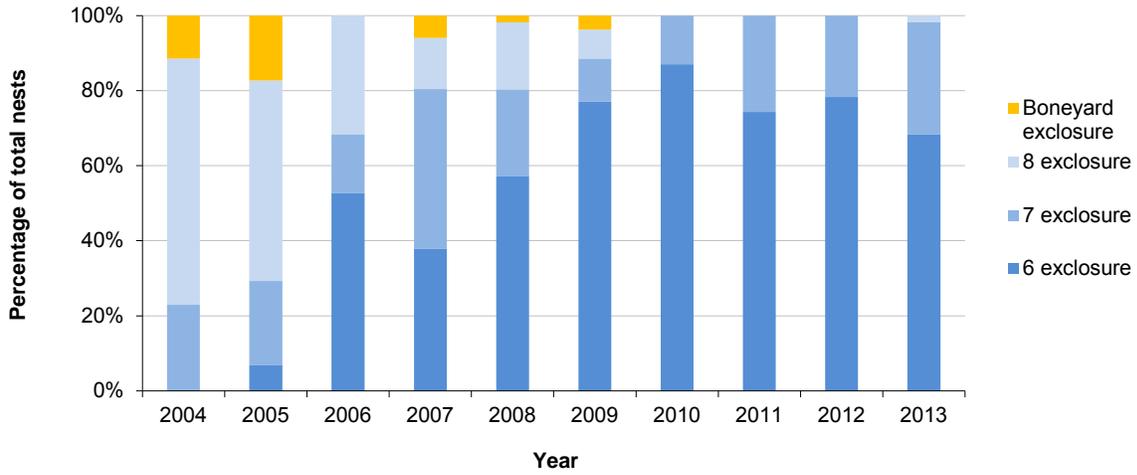
**Table 2. Nesting success of California least terns at different sites within the Southern Exclosure at ODSVRA in 2013.**

A total of four unbanded fledglings were seen in 6 exclosure on 28 July. These four unbanded fledglings were not assigned to specific nests and not included in this table.

Southern Exclosure	No. nests (no. known location and fate)	No. known eggs	No. nests hatching	Percent known fate nests hatching	No. chicks	No. chicks fledging	Percent chicks fledging
6 exclosure	39 (37)	74	36	97.3	65	45	69.2
7 exclosure	17 (14)	32	8	57.1	17	7	41.2
8 exclosure	1 (1)	3	1	100.0	3	0	0.0



**Figure 3. Number of California least tern nests, pairs, and fledglings at ODSVRA from 1991-2013.**



**Figure 4. Distribution of least tern nests as a percent of total nests at ODSVRA from 2004-13. 6 enclosure was first incorporated into the Southern Exclusion for a full season in 2004.**

**Table 3. Causes of California least tern nest loss at ODSVRA from 2002-13.**

Ab.=Abandoned

Year	Ab. pre-term	Ab. post-term	Ab., susp. wind	Ab., unknown if pre- or post-term	Failed, cause unknown	Coyote	Gull	Opossum	Unknown predator	Chick dies in egg at hatch	Total no. failed nests
2002	1	1				2					4
2003	6	3				1			2		12
2004	9	1				2			1		13
2005	7	3		4	4				1	1	20
2006	5	3		1					1		10
2007	1	4	4		6						15
2008	3	2					1				6
2009	1	1		1							3
2010		1			1			1			3
2011	2	2									4
2012	1	2		3	1						7
2013	2			2	1	1		1			7
<b>Total</b>	<b>38</b>	<b>23</b>	<b>4</b>	<b>11</b>	<b>13</b>	<b>6</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>1</b>	<b>104</b>
<b>2002-13</b>	<b>(36.5%)</b>	<b>(22.1%)</b>	<b>(3.8%)</b>	<b>(10.6%)</b>	<b>(12.5%)</b>	<b>(5.8%)</b>	<b>(1.0%)</b>	<b>(1.9%)</b>	<b>(4.8%)</b>	<b>(1.0%)</b>	

### Chick fledging rate and juveniles

Seventy-seven of the 85 known hatching chicks were banded with a unique color combination. Fifty-six of the 85 chicks were seen when 21 days old or older for a fledging rate of 65.9% (52 fledglings were banded and four were unbanded) (Appendix A). This compares to an average fledging rate of 80% (range=71-91%) during the previous seven years when most chicks were also banded to individual. For two-chick broods 43% (12/28) fledged both young. This compares to 53% (10/19) in 2012 and an average of 67% (range 54-86%) for 153 two-chick broods during the period 2006-11. In 2013, the number of fledglings produced per pair was 1.17. (Note that if the number of breeding pairs is underestimated, the number of chicks fledged per pair is an overestimate). This is 7.1% lower than the average for the previous seven years (mean=1.26, range=1.02-1.52) and well above recent averages for all of California (Table 1). Statewide, the reported number of least tern fledglings per pair (given in a range) was 0.35-0.52, 0.33-0.39, 0.29-0.37, 0.24-0.30, 0.29-0.35, 0.17-0.25, and 0.09-0.15 in 2006-12, respectively (Marschalek 2007, 2008, 2009, 2010, 2011, 2012; Frost 2013).

During the last four years, 2010-13, there have been five occurrences of a least tern chick moving east of the enclosure into the open riding area (two in 2010, by the same chick on the same day; one in 2011; and two in 2013). These chicks were monitored and directed back into the enclosure. On 29 June 2013, one chick of the two-chick LT1 brood moved less than seven feet east of 6 enclosure and was picked up and placed back in the enclosure with its sibling. Shortly after, two adults were seen attending both chicks. On 3 August 2013, two chicks ran into the open riding area less than six feet east of 6 enclosure. One chick ran back in on its own. The second chick (13-day-old W/A/W:W/B, LT49), was picked up and placed back inside 6 enclosure where it ran west within the enclosure. This chick was documented to fledge (Notes section).

Of the current or recent breeding sites in San Luis Obispo and Santa Barbara counties, only ODSVRA bands chicks. Marking least tern chicks with individual color band combinations has increased the ability to detect juveniles at ODSVRA and provides greater accuracy in documenting fledging rate. In the absence of such banding, one method used to estimate the number of juveniles produced at least tern sites in California is to add together high counts of juveniles that are seen on dates at intervals of three weeks or more (Marschalek 2007). This is based on the assumption that juveniles typically depart the colony

with their parents within two to three weeks of fledging (at 21 days old) and that any juveniles seen are not from other sites. For the six-year period 2006-11, the three-week count method at ODSVRA consistently underestimated the minimum known number of juveniles produced each year, identifying an average of 49.0% (range=38.0-66.7%) of the known minimum total number (Table 4). Three-week counts of juveniles were not conducted in 2012 and 2013.

**Table 4. Number of fledglings counted at ODSVRA from 2006-11 using two methods: three-week interval daytime counts and identification of individuals in the mostly color-banded population of juveniles.**

Chicks banded to individual for all years.

Year	Three-week interval daytime count	Identification of individuals in the mostly color-banded population of juveniles	Percent of documented juveniles identified by three-week interval daytime count
2006	17	36	47.2
2007	38	70	54.3
2008	30	70	42.9
2009	22	33	66.7
2010	13	29	44.8
2011	19	50	38.0
<b>Average for 2006-11</b>			49.0

Color banding chicks to brood in 2005 and to individual since 2006 has also provided information on juvenile length of stay at ODSVRA. In 2013, 19.2% (10/52) of the color-banded juveniles were documented remaining at ODSVRA for 21 days or longer post-fledging. Over the nine-year period 2005-13, 385 color-banded fledglings were tracked at ODSVRA with 34.5% remaining 21 days or longer (Table 5, Figure 5). This is in contrast to the premise of the three-week count that most fledglings depart the colony site prior to three weeks after fledging. Similar findings are reported from a two-year study of three least tern colony sites in the eastern United States which found that methods dependent upon counting non-individually identified fledglings tend to underestimate fledgling production and residency time as compared to information available from counting individually banded fledglings (Bailey and Servello 2008).

**Table 5. Number of days that color-banded California least tern juveniles hatched at ODSVRA continued to be seen on-site after reaching fledge age (21 days old) during the nine-year period, 2005-13.**

During this period, 385 color-banded fledglings (21 days old or older) were tracked at ODSVRA (sightings outside the park are not included). A minimal number of juveniles identified as becoming permanently unable to fly (e.g., broken wing) are included up to (but not including) the day first noted as injured. Numbers in parentheses are percentages of all banded fledglings for the year.

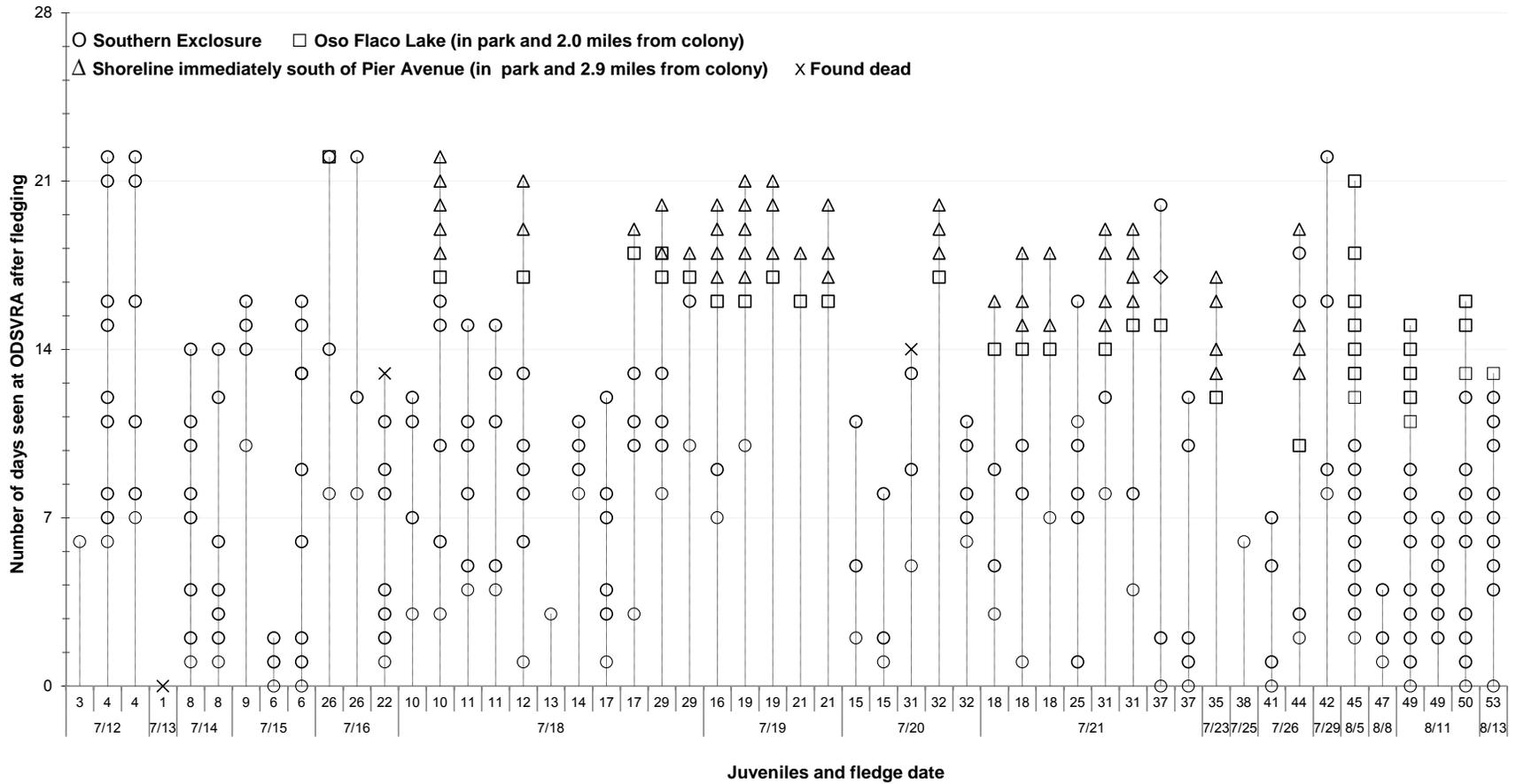
Year	0 - 6 days post-fledge	7 - 13 days post-fledge	14 - 20 days post-fledge	21 - 27 days post-fledge	28 - 34 days post-fledge
2005	0 (0%)	4 (20%)	2 (10%)	10 (50%)	4 (20%)
2006	4 (12%)	5 (15%)	9 (26%)	14 (41%)	2 (6%)
2007	12 (17%)	14 (20%)	17 (25%)	21 (30%)	5 (7%)
2008	14 (21%)	30 (44%)	15 (22%)	9 (13%)	0 (0%)
2009	3 (10%)	14 (48%)	8 (28%)	3 (10%)	1 (3%)
2010	3 (11%)	4 (14%)	12 (43%)	9 (32%)	0 (0%)
2011	2 (4%)	5 (10%)	9 (18%)	31 (63%)	2 (4%)
2012	4 (11%)	6 (17%)	14 (39%)	10 (28%)	2 (6%)
2013	6 (12%)	12 (23%)	24 (46%)	10 (19%)	0 (0%)
<b>TOTAL 2005-13</b>	48 (12%)	94 (24%)	110 (29%)	117 (30%)	16 (4%)

#### **Mortality (other than eggs)**

There was a minimum of seven documented tern mortalities (other than eggs) at ODSVRA during the 2013 breeding season (1 March to 30 September). A juvenile tern was seen taken by a peregrine falcon (*Falco peregrinus*). Documented mortality other than predation included one first-year adult tern, the intact carcasses of two chicks and one juvenile, the desiccated carcass of one juvenile, and the limited remains of one chick (for additional information see Notes section and the Mortality Table in Appendix G).

#### **Least tern use of nearby small freshwater lakes**

During the chick-rearing period, adult least terns are noted foraging over the ocean, but may also be seen at the following nearby small freshwater lakes: Pismo Lake, Oso Flaco Lake, Dune Lakes, and Cypress Ridge Lake. Of the freshwater sources noted, Oso Flaco Lake and Pismo Lake are located on State Park property. Pismo Lake was not actively monitored by staff from 2010-13 and tern use of this lake is suspected to be minimal. Oso Flaco Lake is more accessible to monitors and in 2013 there were 12 surveys (lasting an average of 70 minutes) conducted between 15 May and 21 August. The high count of least terns seen at Oso Flaco Lake on one day was 11 on 3 August. Over the season, a total of 4 individually banded juveniles and a minimum of 17 banded adults were seen at Oso Flaco Lake, including 14 adults identified as banded as chicks at ODSVRA. Adults were observed foraging and roosting, while juveniles were observed flying and roosting, but not foraging. Adults were also seen feeding juveniles at Oso Flaco Lake and carrying fish northwest towards the Southern Enclosure. Terns were observed flying over Dune Lakes, but no detailed information is available because these lakes are only visible from a distance. There were many observations of adult terns with small fish flying into the enclosure from the east (the direction of Dune Lakes). In 2007, monitors first documented terns foraging at Cypress Ridge Lake, located approximately 3.2 miles from the tern colony site. This lake had moderate levels of foraging documented in 2007-10, none in 2011, and minimal use in 2012 and 2013.



**Figure 5. Number of days California least tern juveniles that hatched at ODSVRA in 2013 continued to be seen on-site after reaching fledge age (21 days old).**

The horizontal axis provides the nest number from which each fledgling hatched and the date it fledged. All juveniles included in graph were color-banded to individual. Juveniles found dead are indicated with an “X.” The LT1 bird was last seen alive 12 July at 20 days old and its desiccated carcass was found in the enclosure on 29 July. Based on a wing chord of 133 millimeters, bird is considered to have survived to at least 21 days old and fledged.

### Banded adult least terns at ODSVRA

Recording color combinations is more difficult for adult least terns than snowy plovers as the behavior of the terns provides fewer opportunities for observations. In 2013, there were 42 banded adults documented at ODSVRA, based on observations with a spotting scope. Thirty-one of these birds were banded at this site as chicks from 2004-11. Origins of the remaining banded birds could not be determined as they either had only a federal aluminum band, one of the bands missing, color tape over a band missing, or color combination only partially read. (For birds with color combinations partially read, the appearance of the bands indicates most were banded at ODSVRA.) Breeding was documented for 18 of the 42 banded adults (13 banded at ODSVRA from 2006-11 and 5 with unknown origin) (Table D.1 in Appendix D). Over the last four years there has been one confirmed sighting of a banded tern from another site. This was an adult (S:A/O) seen 28 July to 11 August 2011 that was banded at the U.S. Navy North Island Maintenance and Training Facility in San Diego Bay.

### Night roost

During the breeding season, adult least terns not engaged in incubation or chick care may assemble in a communal night roost and are often joined by fledglings later in the breeding season. Reduced exposure to disturbance from predators is likely an important factor in the selection of a night roost location. There can be a high degree of site fidelity, both within a breeding season and between years, with birds continuing to roost in the same location. In 2013, the night roost continued in the same area of northern 6 enclosure used since 2004 (when 6 enclosure first became available as protected habitat for a complete season) (Figure C.2 in Appendix C). Counts at the night roost are minimums, as some or all birds would often arrive after it was too dark to count individuals. In 2013, there was a high count of 49 birds at the night roost on 5 June (Figure 6). This compares to night roost high counts of 95, 63, 37, 35, 52, and 62 in 2007-12, respectively. Both adults and juveniles were seen but it typically was too dark to distinguish plumage and age class.

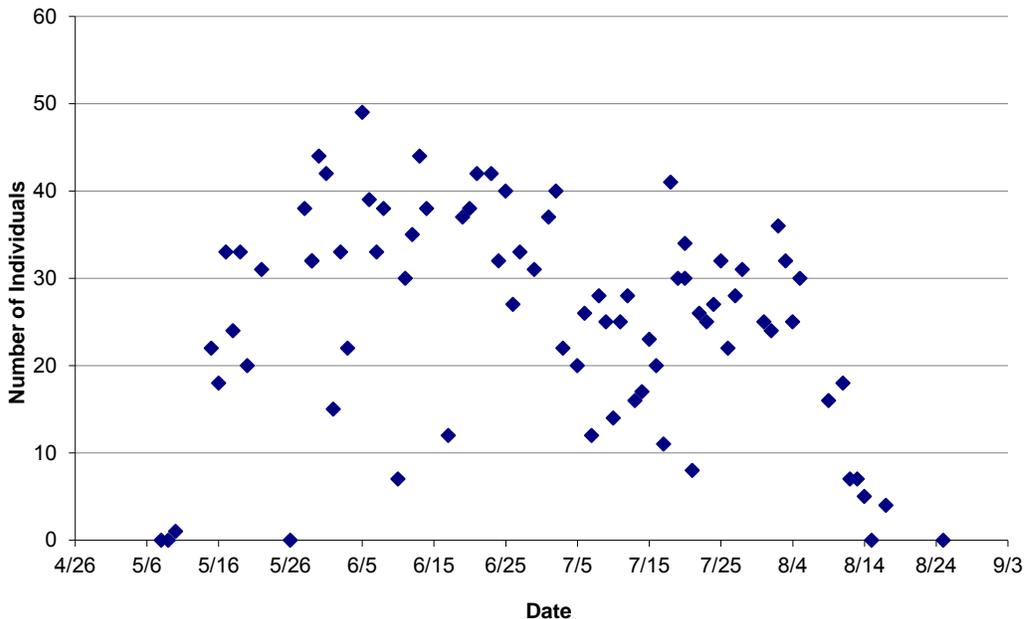


Figure 6. Number of California least terns counted at the ODSVRA 6 enclosure night roost in 2013.

**Importance of ODSVRA least tern breeding colony**

The ODSVRA least tern breeding colony has benefited from the increased level of protection and management actions provided since 2002. The colony is important in meeting statewide recovery goals as loss of breeding habitat has resulted in a fragmented population distribution and a limited number of remaining breeding sites (USFWS 1985, 2006). On a regional level, there are very few active breeding sites along the central coast of California and none remain between ODSVRA and San Francisco Bay. Within San Luis Obispo and Santa Barbara counties, there are four least tern colony sites with annual or intermittent use, all sites have management providing protective measures and monitoring. ODSVRA is the only site in San Luis Obispo County. Rancho Guadalupe Dunes County Park (RGDCP), Vandenberg Air Force Base (VAFB), and Coal Oil Point Reserve (COPR) are in Santa Barbara County and approximately 7, 22, and 85 miles south of the ODSVRA colony, respectively. For this regional population, ODSVRA has become an important source of productivity. During the period 2004-13, ODSVRA produced a minimum of 431 juvenile terns while RGDCP, VAFB, and COPR combined produced 148 juveniles (Table 6, Table 7).

**Table 6. California least tern reproductive success reported for current or recent breeding sites in San Luis Obispo and Santa Barbara counties from 2004-13.**

Note that chicks are not banded at RGDCP, VAFB, and COPR. Sources: RGDCP (pers. comm. managers), VAFB (pers. comm. Dan Robinette for all years), and COPR (pers. comm. managers).

ODSVRA=Oceano Dunes SVRA

RGDCP=Rancho Guadalupe Dunes County Park

VAFB=Vandenberg Air Force Base

COPR=Coal Oil Point Reserve

Year	Site	No. pairs	No. nests	No. nests hatching	No. chicks	No. juveniles	No. juveniles per total no. nest	No. juveniles per pair
<b>2004</b>	ODSVRA	47	63	44	69	25	0.40	0.53
	RGDCP	8	8	3	7	0	0.00	0.00
	VAFB <sup>1</sup>	1	1	0	0	0	0.00	0.00
	COPR	6	6	0	0	0	0.00	0.00
<b>2005</b>	ODSVRA	47	59	39	66	20	0.34	0.43
	RGDCP	4	4	0	0	0	0.00	0.00
	VAFB	44	44	18	32	1	0.02	0.02
	COPR	0	0	0	0	0	0.00	0.00
<b>2006</b>	ODSVRA	31	38	28	45	36	0.95	1.16
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB <sup>1</sup>	2	2	0	0	0	0.00	0.00
	COPR	5	5	4	7	7	1.40	1.40
<b>2007</b>	ODSVRA	54	66	51	90	70	1.06	1.30
	RGDCP	1	1	1	1	1	1.00	1.00
	VAFB	18	18	13	20	16	0.89	0.89
	COPR	4	6	2	4	0	0.00	0.00
<b>2008</b>	ODSVRA	55	56	50	99	70	1.25	1.27
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB	18	18	17	32-33	19	1.06	1.06
	COPR	1	1	0	0	0	0.00	0.00
<b>2009</b>	ODSVRA	25	26	23	43	33	1.27	1.32
	RGDCP	2-3	3	2	3	3	1.00	1.00-1.50
	VAFB	30	31	28	56	37	1.19	1.23
	COPR	0	0	0	0	0	0.00	0.00
<b>2010</b>	ODSVRA	23	23	20	35	29	1.26	1.26
	RGDCP	1	1	1	2	2	2.00	2.00
	VAFB	33	34	29	57	29	0.85	0.88
	COPR	0	0	0	0	0	0.00	0.00
<b>2011</b>	ODSVRA	33	35	31	55	50	1.43	1.52
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB	32	32	19	36	4	0.13	0.13
	COPR	1	1	0	0	0	0.00	0.00
<b>2012</b>	ODSVRA	41	46	33	52	42	0.91	1.02
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB	18	18	12	21	10	0.56	0.56
	COPR	0	0	0	0	0	0.00	0.00
<b>2013</b>	ODSVRA	48	57	45	85	56	0.98	1.17
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB	15	15	15	25	19	1.27	1.27
	COPR	0	0	0	0	0	0.00	0.00

<sup>1</sup> Minimum counts of adult terns at the VAFB colony site were 60 and 40 in 2004 and 2006, respectively, but nesting was limited.

**Table 7. Number of reported breeding least tern pairs and juveniles produced at ODSVRA and the combined sites of Rancho Guadalupe Dunes County Park (RGDCP), Vandenberg Air Force Base (VAFB), and Coal Oil Point Reserve (COPR) from 2004-13.**

During this period, almost all tern chicks were banded at ODSVRA and observation of color-banded individuals was an important means to document juvenile production. Banding does not occur at the other sites and other methods are used to estimate number of juveniles produced.

Year	ODSVRA		RGDCP, VAFB, and COPR combined	
	No. breeding pairs	No. juveniles	No. breeding pairs	No. juveniles
2004	47	25	15	0
2005	47	20	48	1
2006	31	36	7	7
2007	54	70	23	17
2008	55	70	19	19
2009	25	33	32-33	40
2010	23	29	34	31
2011	33	50	33	4
2012	41	42	18	10
2013	48	56	15	19
<b>Total juveniles produced</b>		431		148

## WESTERN SNOWY PLOVER

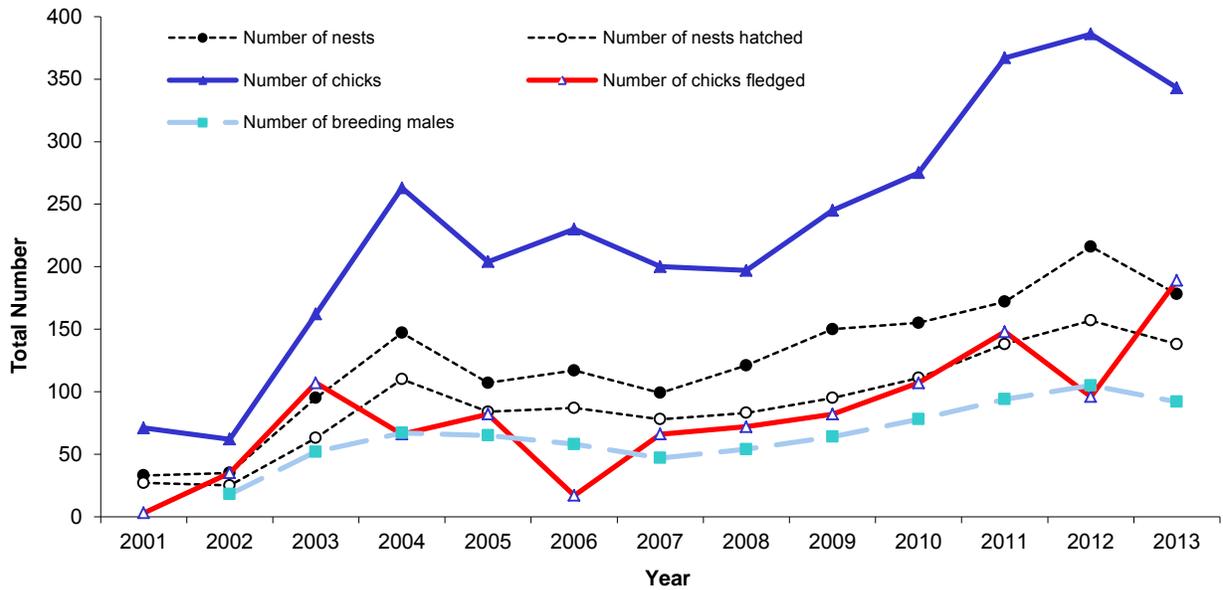
### Number of breeding adults

In the absence of a population of individually banded snowy plover adults, which provides the most accurate means to identify breeding population size, ODSVRA uses a method that includes examining the single day high count of concurrent nests (for females) and concurrent nests and broods (for males) (see Monitoring and Management Actions section for additional information on determining number of breeding adults). In 2013, there was a minimum of 163 breeding adults (71 females and 92 males). This is a decline of 14.2% from the minimum estimated number of 190 breeding adults in 2012 and compares to 95, 114, 137, and 160 adults for 2008-11, respectively. The decline in identified breeding adults may in part be due to a drop in productivity at ODSVRA in 2012 (only 96 of 386 chicks fledging) resulting in a drop in recruitment into the local breeding population in 2013 (Table 8, Table 11, Figure 7).

Beginning in 2005, USFWS has coordinated a rangewide window survey count of the U.S. Pacific Coast breeding population of the snowy plover between the last week of May and first week of June. In 2013, the survey at ODSVRA counted 94 adult plovers (47 males, 40 females, and seven of unknown sex), 58% of the minimum number documented by breeding activity. In eight of the nine years from 2005-13, the window survey count at ODSVRA was lower than the minimum number of breeding birds (54-84% of minimum number). It was higher (107%) than the minimum number in 2008 (Table 9) (CDPR 2012).

**Table 8. Number of snowy plover breeding adults, breeding males, fledglings, and chicks fledging per breeding male for the 12-year period, 2002-13.**

Year	Min. no. breeding adults	Min. no. breeding males	No. fledglings	No. fledglings per breeding male
2002	32	18	35	1.94
2003	84	52	107	2.06
2004	121	67	66	0.99
2005	116	65	82	1.26
2006	107	58	17	0.29
2007	79	47	66	1.40
2008	95	54	72	1.33
2009	114	66	81	1.23
2010	137	78	107	1.37
2011	160	94	152	1.62
2012	190	105	96	0.91
2013	163	92	187	2.03
Average for 12-year period 2002-13	117	66	89	1.37
Average for 5-year period 2009-13	153	87	125	1.43
Average for 3-year period 2011-13	171	97	145	1.52



**Figure 7. Number of snowy plover breeding males, nests, nests hatched, chicks, and chicks fledged at ODSVRA from 2001-13.**

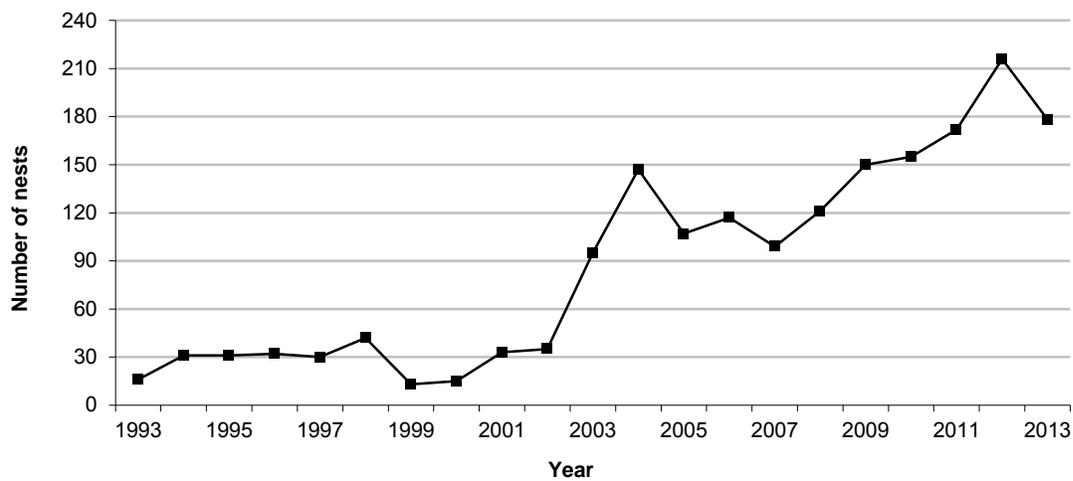
Prior to 2001, monitoring in Oso Flaco and Pismo Dunes Natural Preserve was intermittent and fledgling information was not obtained.

**Table 9. Number of adult snowy plovers counted on USFWS breeding season window surveys versus calculated minimum number of breeding adults at ODSVRA from 2005-13.**

Year	Minimum number of breeding adults	Breeding season window survey number	Breeding window number/ minimum number
2005	116	92	79%
2006	107	87	81%
2007	79	60	76%
2008	95	102	107%
2009	114	96	84%
2010	137	74	54%
2011	160	112	70%
2012	190	145	76%
2013	163	94	58%

### Number and distribution of nests

There were 178 known nesting attempts, including eight identified only by detection of brood (unknown nest location). Of the 170 nests from known locations, 147 (86.5%) were in the Southern Enclosure, seven (4.1%) in North Oso Flaco, and 16 (9.4%) in South Oso Flaco. More specifically for the Southern Enclosure, there were 66 nests in 6 enclosure, 47 in 7 enclosure, 24 in 8 enclosure, and 10 in Boneyard enclosure (Appendix C). The maximum number of known location nests active at one time was 69 on 22 June, with the highest number in 6 enclosure (28 nests, 40.6% of total active nests). (Table 10, Table 11, Table E.1 in Appendix E).



**Figure 8. Number of snowy plover nests at ODSVRA from 1993-2013.**

**Table 10. Snowy plover nest distribution and success at ODSVRA in 2013.**

Excludes eight nests known only from broods.

Year	No. nests (no. with known fate)	No. known eggs	No. nests hatching	Percent known fate nests hatching
6 exlosure	66 (64)	190	50	78.1
7 exlosure	47 (46)	134	38	82.6
8 exlosure	24 (24)	67	20	83.3
Boneyard exlosure	10 (10)	29	7	70.0
<b>TOTAL SOUTHERN EXCLOSURE</b>	<b>147 (144)</b>	<b>420</b>	<b>115</b>	<b>79.9</b>
North Oso Flaco	7 (7)	21	6	85.7
South Oso Flaco	16 (16)	45	9	56.3
<b>TOTAL OSO FLACO</b>	<b>23 (23)</b>	<b>66</b>	<b>15</b>	<b>65.2</b>

**Table 11. Nesting success of snowy plovers at ODSVRA from 2001-13.**

A more detailed table of nesting success for 2001-13 is included as Table E.1 in Appendix E.

For 2001: na=not available and the number of fledglings per nest is an estimate.

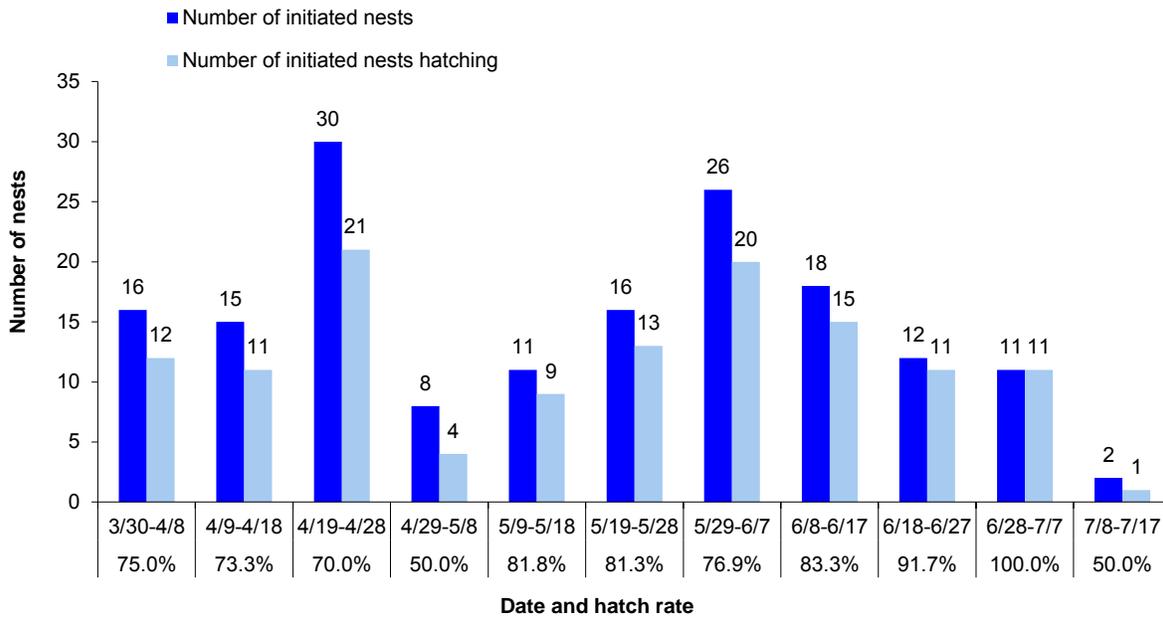
Year	No. nests (no. known location and fate)	No. eggs	Ave. clutch size (no. nests known location and complete clutch size)	No. nests hatching (no. known location)	Percent hatching	No. chicks (no. known fate)	No. known fate chicks fledged (percent fledged)	No. fledglings per nest
2001	33 (30)	na	na	27 (27)	90	71-74 (69)	2 (3)	0.06
2002	35 (35)	99	na	25 (25)	71	62 (62)	35 (56)	1.00
2003	95 (93)	254	na	63 (62)	67	162 (159)	108 (67)	1.14
2004	147 (140)	415	2.87 (141)	110 (105)	75	263 (263)	66 (25)	0.45
2005	107 (103)	290	2.86 (96)	84 (80)	78	204 (204)	82 (40)	0.77
2006	117 (114)	336	2.89 (115)	87 (87)	76	230 (230)	17 (7)	0.15
2007	99 (91)	290	2.93 (89)	78 (70)	77	200 (198)	66 (33)	0.67
2008	121 (119)	341	2.85 (116)	83 (81)	68	197 (197)	72 (37)	0.60
2009	150 (147)	418	2.85 (144)	95 (94)	64	245 (245)	81 (33)	0.54
2010	155 (150)	431	2.88 (146)	111 (109)	73	275 (275)	107 (39)	0.69
2011	172 (160)	487	2.88 (159)	138 (131)	82	365 (365)	152 (42)	0.88
2012	216 (203)	603	2.94 (200)	157 (152)	75	386 (386)	96 (25)	0.44
2013	178 (167)	502	2.93 (162)	138 (130)	78	343 (343)	187 (55)	1.05

#### Average clutch size, clutch loss and nest hatching rate

There were 178 identified nesting attempts, including eight known only by brood, initiated between 30 March – 10 July, and of these 138 hatched (Figure 8, Figure 9). For 162 nests with known complete clutch size (and excluding nesting attempts known only by brood) the average number of eggs was 2.93. This compares to an average of 2.89 eggs per clutch (range=2.85-2.94) for the nine-year period 2004-12 (Table 11). Excluding 11 nests (three with unknown fate and eight detected by brood only), the clutch hatching rate was 77.8% (130/167). This compares to 74.9% in 2012 and an average of 73.1% (range=64-82%) from 2002-11 (Table 10). The nest hatching rate in 2013 was higher in the Southern Enclosure (79.9%) than in Oso Flaco (65.2%), as has been the case in 10 of the previous 12 years (Table E.1 in Appendix E). Thirty-seven nests failed, with losses attributed to abandoned pre-term (8); abandoned post-term (7); abandoned, suspected due to wind (17); cause unknown (3); unidentified predator (1); and gull (1) (Table 12, Table 13). Of the 167 nests with known fate and location, 10.2% failed due to wind, the single largest cause of nest loss. This compares to a range of 0.6-8.7% (mean=4.8%) for the previous three years. Of the 17 nests that failed due to wind in 2013, nine were lost during the 10-day period 18 May to 27 May. For nine of these 10 days the daily maximum wind gust speed neared or exceeded 40 mph (wind speed measurement from the S1 tower wind monitoring station located approximately 375 feet east of 6 enclosure) (Table 6, Table E.1 and Figure E.1 in Appendix E).

**Table 12. Attributed causes of snowy plover nest loss at specific locations at ODSVRA in 2013.**

Area	Abandoned pre-term	Abandoned post-term	Abandoned, suspected wind	Failed, cause unknown	Unidentified predator	Gull
<b>Southern Enclosure</b>						
6 enclosure	2	1	10	1		
7 enclosure	2	2	3	1		
8 enclosure	1	1	1	0	1	
Boneyard enclosure		1	1	1		
<b>TOTAL SOUTHERN ENCLOSURE</b>	<b>5</b>	<b>5</b>	<b>15</b>	<b>3</b>	<b>1</b>	<b>0</b>
<b>Oso Flaco</b>						
North Oso Flaco		1				
South Oso Flaco	3	1	2			1
<b>TOTAL OSO FLACO</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>ODSVRA TOTAL</b>	<b>8</b>	<b>7</b>	<b>17</b>	<b>3</b>	<b>1</b>	<b>1</b>



**Figure 9. Number of known location and known fate snowy plover nests with known initiation date (n=165) initiated per 10-day period and number known to hatch at ODSVRA in 2013.**

**Table 13. Attributed causes of snowy plover nest loss in Southern Enclosure and Oso Flaco at ODSVRA from 2002-13.**

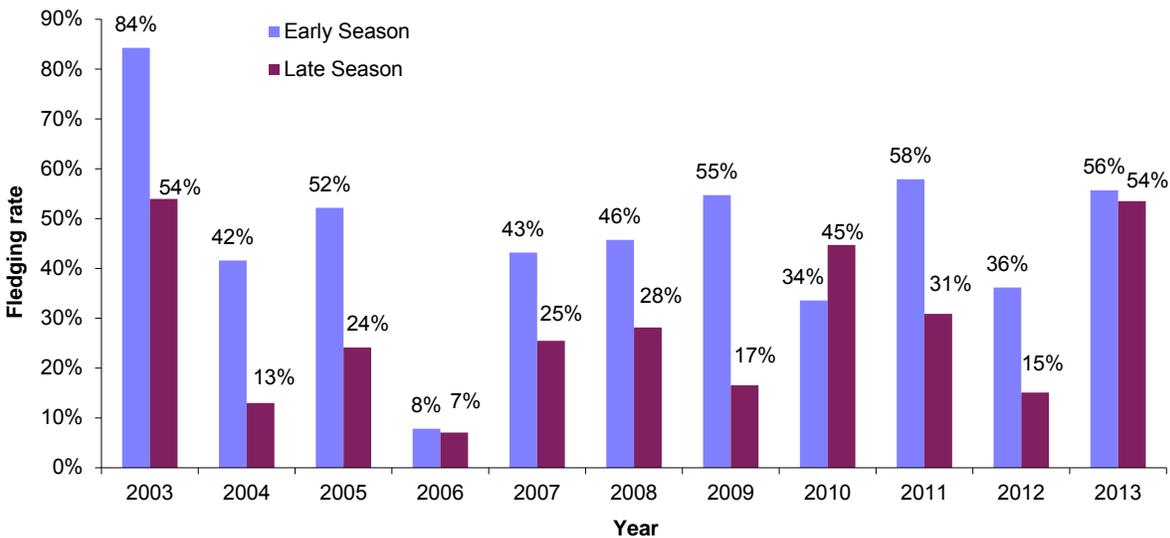
So. Excl. = Southern Enclosure. The percentage of total loss for each cause is shown for the 12-year period 2002-13. Prior to 2010, nests abandoned, suspected due to wind were included with nests abandoned pre-term; these causes of nest loss are shown separately for 2010-13.

Year	Area	Abandoned pre-term	Abandoned post-term	Abandoned, suspected wind	Abandoned unknown pre- or post-term	Failed, cause unknown	Unidentified predator	Avian predator	Gull	Corvid	Raven	Northern harrier	Coyote	Raccoon	Skunk	Flooded
2002	So. Excl.				6	1							1			
	Oso Flaco				2											
2003	So. Excl.	17	2				3				1					
	Oso Flaco	2				1	1				4					
2004	So. Excl.	12				7	2				2		1			
	Oso Flaco	4				2	3									1
2005	So. Excl.	9	3			7										
	Oso Flaco	2	1				1									
2006	So. Excl.	5	4			2	1		3				4			
	Oso Flaco				1		1		3							2
2007	So. Excl.	4	1			9					1					
	Oso Flaco	2				2					1		1			
2008	So. Excl.	10			3	7	4		1			1				1
	Oso Flaco	3			1		5									2
2009	So. Excl.	9	3			1	8	13	2			1				1
	Oso Flaco	4				2	2	4							1	1
2010	So. Excl.	3	2	11			4	6								2
	Oso Flaco	1		2				2						1	2	1
2011	So. Excl.	6	3	1	1	2	1	5		3						
	Oso Flaco						2			2				1	2	
2012	So. Excl.	11	1	6	3	3	3	5		3		5	1	1		1
	Oso Flaco	3	1	1												
2013	So. Excl.	5	5	15		3	1									
	Oso Flaco	3	2	2					1							
2002-13 Total failed nests	So. Excl.	91	24	33	13	42	27	29	6	6	4	7	7	1	0	5
	Oso Flaco	24	4	5	4	7	15	6	4	2	5	0	1	2	5	7
2002-13 Grand Total So. Excl. and Oso Flaco		115	28	38	17	49	42	35	10	8	9	7	8	3	5	12
		29.8%	7.3%	9.8%	4.4%	12.7%	10.9%	9.1%	2.6%	2.1%	2.3%	1.8%	2.1%	0.8%	1.3%	3.1%

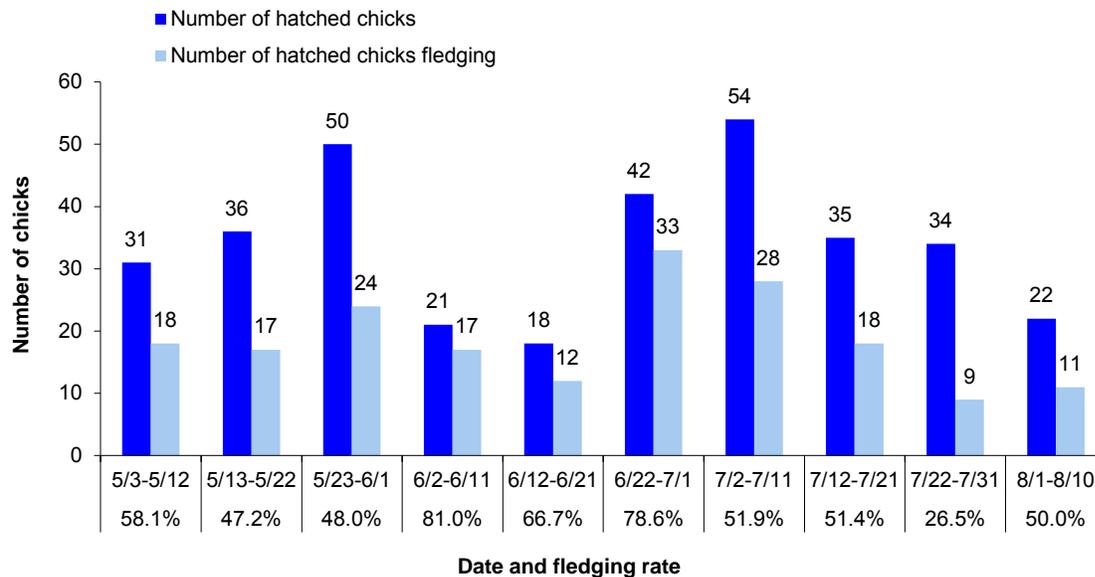
### Chick fledging rate

Of the 343 snowy plover chicks hatched, 293 were banded and the fate of 50 unbanded chicks is known (25 fledged) (Table 11, Appendix B). The primary reason chicks remained unbanded was their close proximity to young plover or tern broods and the need to avoid undue disturbance. In addition, a number of very young unbanded chicks were lost prior to any banding opportunity. Unbanded chicks were tracked by a combination of the following: chicks with a banded adult, with banded sibling(s), and a concentrated monitoring effort to locate all broods and determine number and size of chicks. In the absence of a high percentage of chicks being banded at ODSVRA, it would not be possible to obtain accurate chick survival and fledging rates. Between 25 May and 11 August, 20 unbanded broods (37 chicks) were observed on the shore and most to all were likely from known hatched nests whose chicks were not banded while at the nest. Ten of the 20 broods were subsequently banded. Although these broods could not be assigned to a specific nest and enclosure, all chicks were tracked and fledglings are included in totals. The chick fledging rate in 2013 was a high 54.5% (187/343). This compares to 24.9% in 2012 and an average rate of 37.9% (range=7-67%) for the ten-year period 2002-11 (Table 11, Table E.1 in Appendix E) (CDPR 2007, 2008, 2009, 2010, 2011, 2012).

In 2013, the fledge rate was high for both chicks hatched in the early season (56%) and late season (54%). This is in contrast to eight of the previous ten years when fledge rates for chicks hatched in the late season averaged 26 percentage points lower than for chicks hatched in the early season. See 2012 report for how early versus late season is determined (Figure 10, Figure 11).



**Figure 10. Fledging rate of chicks hatching in early season (prior to 20 June) and late season (20 June or later) at ODSVRA from 2003-13.**



**Figure 11. Number of snowy plover chicks hatching per 10-day period and number subsequently fledging at ODSVRA in 2013.**

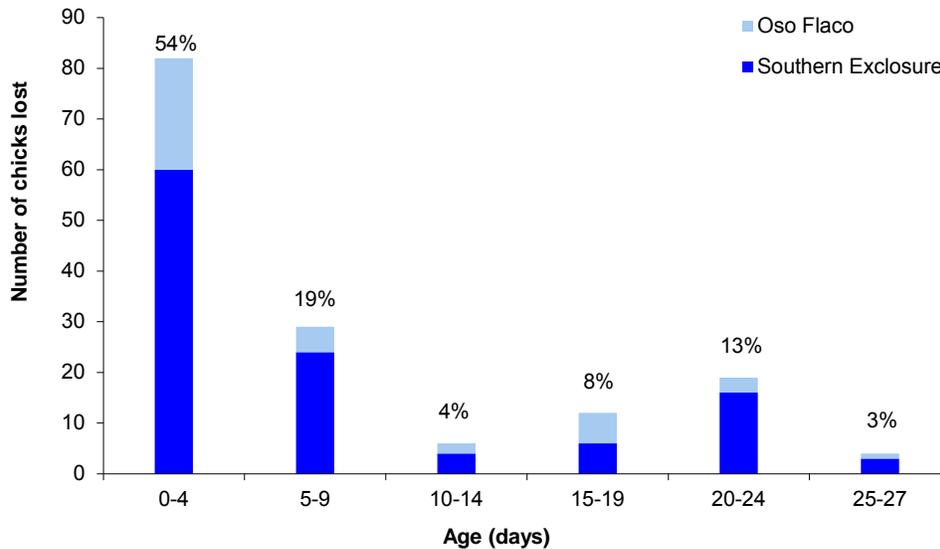
Includes all chicks with known fate (343). A hatch date was estimated based on chick size for broods that either originated from unknown location (16 chicks from eight broods) or were not assigned to a specific nest (35 chicks from 18 broods). For over 69% of these broods the estimated chick age when first seen ranged from 0-4 days old.

**Brood movement and age of chick loss**

At ODSVRA most snowy plover broods are initially led from the nest by the parent(s) to the nearest shore to forage, and the close proximity of quality shoreline habitat for raising chicks can benefit productivity, as mortality rates are typically highest for very young chicks. In 2009-13, the majority of broods (75%, 76%, 78%, 65%, and 74%, respectively) were not known to move beyond the individual beach section (6, 7, and 8 exclosures, North Oso Flaco, and South Oso Flaco) nearest to where they hatched. (Note that the disproportionate loss of very young chicks increases the observed proportion of broods remaining in the area where hatched, as the entire brood may be lost before movement outside of that area occurs.) For 177 of the 187 fledglings produced in 2013, 125 were from broods remaining in the same general shoreline area adjacent to where hatched (excluded are 10 fledglings from broods not assigned to a specific nest that were greater than two days old when first seen and prior potential movement unknown).

Sites south of ODSVRA and within the contiguous dune complex also manage and monitor snowy plovers. Only two banded broods from ODSVRA were seen being raised south of the park boundary, both on the adjoining Guadalupe-Nipomo Dunes NWR (four of the five chicks fledged).

Chick loss in 2013 was highest for very young chicks (0-4 days of age), accounting for 54% of total loss, which compares to 38%, 39%, 49%, and 51% in 2009-12, respectively (Figure 12) (CDPR 2012). For 211 chicks reaching 16 days of age in 2013, the fledge rate was 84%. This compares to 73% (111 chicks reaching 16 days of age), 76% (141 chicks), 80% (190 chicks), and 71% (136 chicks) in 2009, 2010, 2011, and 2012, respectively. This is lower than the results from a six-year (1977-82) study at Monterey Bay in Monterey County, California, that found at least 93% of the 124 chicks reaching 16 days of age fledged (Warriner et al. 1986).



**Figure 12. Loss of snowy plover chicks by age and location last seen in the Southern Exclosure and Oso Flaco at ODSVRA in 2013.**

Number and percentage of total chicks lost shown for each age group. There were 330 chicks included in the analysis, 152 of these were lost. Data excludes broods that could not clearly be identified and tracked individually. Three live chicks were removed from site by monitors (Notes section). These chicks are considered lost on the day they were removed.

**Productivity measured by number of fledglings produced per adult male**

Based on a population viability analysis in the USFWS Pacific Coast western snowy plover recovery plan, a rate of 1.0 fledglings produced per male is believed necessary to prevent population decline with 1.2 allowing for moderate population growth (assuming approximately 75% annual adult survival and 50% juvenile survival) (USFWS 2007). In 2013, the number of chicks fledging per male was 2.03, a high level of productivity which will promote population growth. During the 2002-13 period, the number of fledglings produced per male has exceeded 1.2 in nine of the 12 years (Table 8). (Note that if the number of breeding males is underestimated, the number of chicks fledged per male is an overestimate.)

**Mortality (other than eggs)**

There was a minimum of 13 documented snowy plover mortalities (other than eggs) at ODSVRA during the 2013 breeding season (1 March to 30 September). Four of these were the result of depredation of two chicks, one juvenile, and one adult. Predation was observed and/or documented by prey remains consisting of a large portion of an adult wing, feathers of a juvenile, legs with color bands of a chick, and carcass of a banded chick. Predators involved were peregrine falcon (2) and unidentified predator (2). Documented mortality other than predation included the intact, and often desiccated, carcasses of five chicks, one juvenile and four adults (for additional information see Predators and predator management section on page 39 and the Mortality Table in Appendix G).

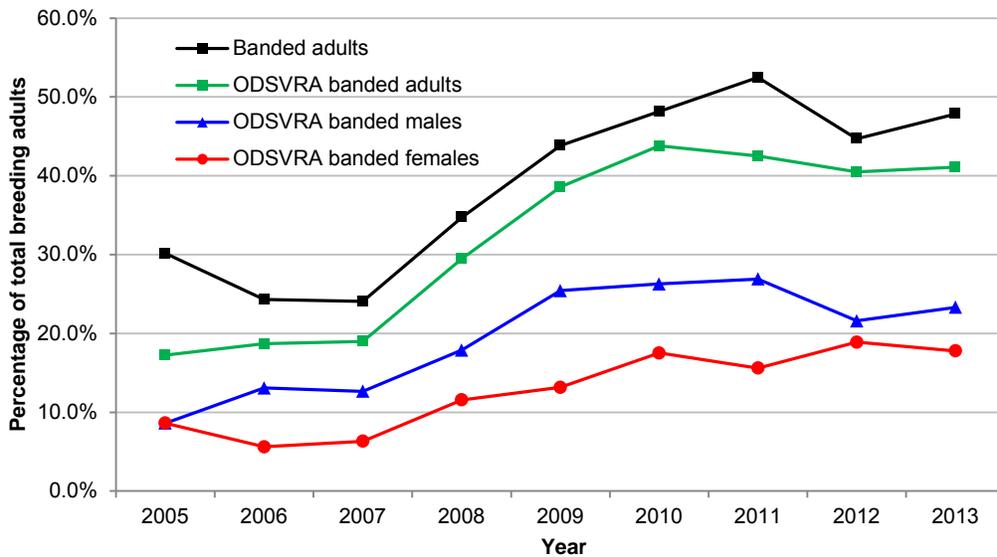
**Protection of nests with exclosures and symbolic fencing**

In 2013, there were 163 nests from known locations and with known fate receiving one or more types of seasonal wire fence protection in the Southern Exclosure and Oso Flaco. Four nests in South Oso Flaco protected only by symbolic rope fence failed before protective wire fencing could be installed; losses were attributed to abandoned pre-term (1); abandoned, suspected due to wind (1); depredated by gull (1); and unknown cause (1). The majority of nests with both location and fate known were within the predator

fencing of the large seasonal enclosure (116, 71%), four of these received additional mini-enclosures in areas of high predation or where large gull roosts formed and one received an additional bumpout to reduce recreational disturbance. Nests protected only by the seasonal enclosure had an 83% hatch rate, and nests in the seasonal enclosure with additional small enclosures had a 75% hatch rate (three hatched and one abandoned, suspected due to wind). In 2013, 10 foot by 10 foot enclosures were used on 16 nests (69% hatch rate), circulars were used on 13 nests (62% hatch rate), and mini-enclosures were used on 22 nests (91% hatch rate) (CDPR 2012) (Appendix B). See Table E.2 in Appendix E for more information on nest protection type for all known location nests.

**Banded snowy plovers breeding at ODSVRA in 2013**

The closest site north of ODSVRA where banding occurs is Monterey Bay in Monterey County (almost all chicks banded). To the south, banding has not occurred at the Guadalupe-Nipomo Dunes NWR for several years, but occurs annually at Vandenberg Air Force Base in Santa Barbara County (varying percentage of chicks banded), and at several sites in San Diego County. The majority (85.9%, 67/78) of banded birds breeding at ODSVRA in 2013 represent recruitment from chicks banded and fledged from ODSVRA from 2004-12. Seven breeding birds were banded as chicks (two in 2011 and five in 2012) at Vandenberg Air Force Base. An additional four breeding birds were missing one or more bands and were from unknown locations and years. (Table D.3 in Appendix D).

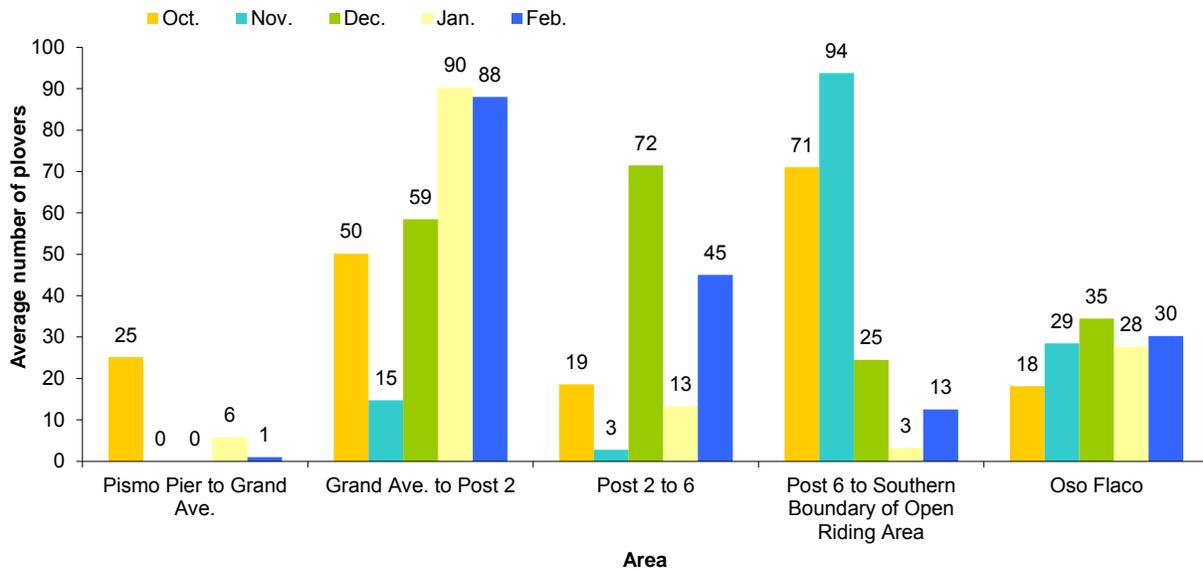


**Figure 13. Percentages over the total calculated breeding population at ODSVRA of all verified banded adults and the sum of males and females originally banded at ODSVRA breeding from 2005-13.**

All ODSVRA banded adults were banded on site when chicks.

### Snowy plover surveys at ODSVRA during the nonbreeding season

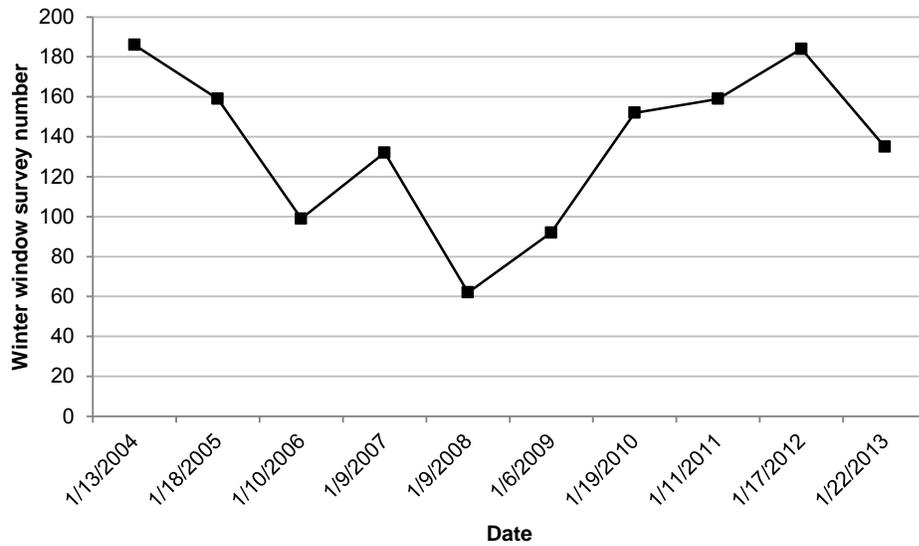
Surveys for wintering plovers (Pacific coast western snowy plovers joined by interior breeding birds) were conducted at near-weekly intervals (see Monitoring and Management Actions for survey details). Between October 2012 and February 2013, wintering plover counts at ODSVRA ranged from 77 to 237 (single day high count on 12 December 2012). The shore was divided into five beach sections and the monthly average number of plovers (from two to five weekly surveys) was obtained for each section. Of the five sections the beach, north of Grand Avenue had the lowest numbers. Grand Avenue to marker post 2 typically had high numbers, reaching an average of 90 birds in January and 88 birds in February. The section from marker post 6 to the southern boundary of the open riding area (the 6, 7, and 8 enclosure shoreline closed to the public entry during the breeding season) initially had high numbers of birds, with 71 in October and 94 in November; numbers declined to an average of three birds in January and 13 in February. In Oso Flaco the average monthly plover numbers remained fairly consistent, with a median of 29 birds (Figure 1, Figure 14).



**Figure 14. Monthly average number of snowy plovers observed during nonbreeding season surveys at ODSVRA from October 2012 to February 2013.**

Surveys conducted two to five times a month.

Beginning in 2004, ODSVRA has participated in a snowy plover winter season window survey organized by USFWS and conducted in January throughout the U.S. Pacific coast. Plovers present during this time include birds from both the Pacific coast breeding population and interior breeding birds wintering on the coast. In 2013, the survey at ODSVRA counted 135 adult plovers. This compares to an average winter window count of 136 (range=62-186) during the nine-year period from 2004-12 (Figure 15).



**Figure 15. Number of snowy plovers counted on USFWS winter window surveys from 2004-13.**

Ninety-five banded snowy plovers were recorded during surveys from 1 October 2012 to 28 February 2013. These birds were banded at the following locations: 71 from ODSVRA; seven from Vandenberg Air Force Base in Santa Barbara County; nine from the Monterey Bay area in Monterey County; five from Oregon; and three were missing one or more bands and were from unknown locations and years (Table D.2 in Appendix D).

## **FACTORS INFLUENCING LEAST TERN AND SNOWY PLOVER REPRODUCTIVE SUCCESS**

The following is a discussion of some of the factors that influence reproductive success of terns and plovers at ODSVRA. The adequacy of any single factor alone is not sufficient to achieve and sustain recovery goals.

### **Size of protected habitat**

Maintaining an adequate size of protected habitat at ODSVRA has been important in providing sufficient area for terns and plovers to roost, nest, and raise young. Protected breeding habitat of sufficient size allows nests and chicks to be dispersed which can reduce exposure and vulnerability to predators, as well as reduce adverse disturbance from human recreational activities. For plovers, it also improves opportunities for chicks to have access to adequate invertebrate food resources.

### **Quality of protected habitat**

During the March through September least tern and snowy plover nesting season, habitat within the seasonal Southern Enclosure is protected and closed to public entry. Following the nesting season, and for the five-month period October through February, the area is open to public use, including camping, street-legal vehicles, and off-highway vehicles. This recreational use results in large areas of flattened terrain and barren sand with very limited scattered natural debris and vegetation. Snowy plovers often nest in areas of available limited patchy cover and to offer more areas of disruptive cover the park staff places material in the 6, 7, and 8 enclosures. Materials added include surf-cast kelp (wrack), branches, driftwood, woodchips, and seeds of coastal foredune plants. See 2012 report for habitat enhancement analysis and results.

### **Predators and predator management**

Predators and predation can be an important factor limiting least tern and snowy plover reproductive success (Page et al. 1995; Thompson et al. 1997). Predators may impact terns and plovers directly by depredating eggs, chicks, juveniles, or adults. Indirect predator impacts, such as disturbance, can increase time spent by adults in vigilance or avoidance behavior, and may limit incubating and brooding behavior. Depredation of an adult tern or plover may result in egg abandonment or loss of dependent chicks. Predation can occur quickly, leaving little or no evidence, and it is likely that only a small percentage of events are documented during a season. There are many hours each day (including almost all night hours) when monitoring staff and/or predator management specialists are not present to observe predation. Even when monitors are present, there are limitations in the ability to detect predators, such as diurnal avian predators, that can travel quickly over large distances.

Species known to be predators of terns and plovers were documented by both number of days detected, as well as number of occurrences (mammalian) and sightings (avian). Number of days detected describes the total number of days predator presence was documented in the nesting area (Southern Enclosure and Oso Flaco) during the nesting season. Additional information was collected in order to estimate the extent of predator activity, both temporally and spatially, in the protected area. Occurrences and sightings were used for mammalian and avian predators, respectively, to reflect the difference in manner of detection; almost all mammalian predators were detected by tracks whereas almost all avian predators were detected by direct observation (with the notable exception of nocturnal owls). Both occurrences and sightings are used to better describe the extent of predator activity on a single day by categorizing presence separately for the different areas of the Southern Enclosure (6, 7, 8, and Boneyard enclosures) and Oso Flaco (North and South). In addition, observations of an individual remaining in one area longer than one hour are counted as multiple sightings (one sighting per hour or portion thereof) in order to account for possible additional impacts. Information was more limited for mammalian predators and does not include details such as number of individuals, behavior, or duration of presence. The date range for all observations discussed is from 1 March to 10 September.

Selective live-trapping and relocation of avian predators was conducted by Ventana Wildlife Society and selective live-trapping and lethal removal of both mammalian and avian predators was conducted by USDA Wildlife Services. Nine coyotes, one raccoon (*Procyon lotor*), two common ravens (*Corvus corax*) and one ring-billed gull (*Larus delawarensis*) were lethally removed. Three great horned owls (*Bubo virginianus*), one American kestrel (*Falco sparverius*), one northern harrier (*Circus cyaneus*), and four loggerhead shrikes (*Lanius ludovicianus*) were live-trapped and relocated (Table F.2 in Appendix F).

### **Documented Predation**

For least terns and snowy plovers known clutch loss to predation in 2013 was limited to four nests; two tern nests (one each to coyote and opossum) and two plover nests (one to gull and one to unidentified predator). From 2002-13, only 2.5% (14/556) of all tern nests were known to be lost to predators (eight mammalian, one avian, and five unidentified predator). During this same 12-year period, 7.9% (128/1621) of plover nests were documented lost to predation (15 mammalian, 70 avian, and 43 unidentified predator).

Documented predation, other than eggs, in 2013 included: one juvenile tern (taken by peregrine), two plover chicks (one taken by peregrine), one juvenile plover (peregrine), and one adult plover (unidentified avian predator). This compares to 18 documented losses in 2012 (three terns and 15 plovers).

### **Mammalian Predators**

#### ***Opossum***

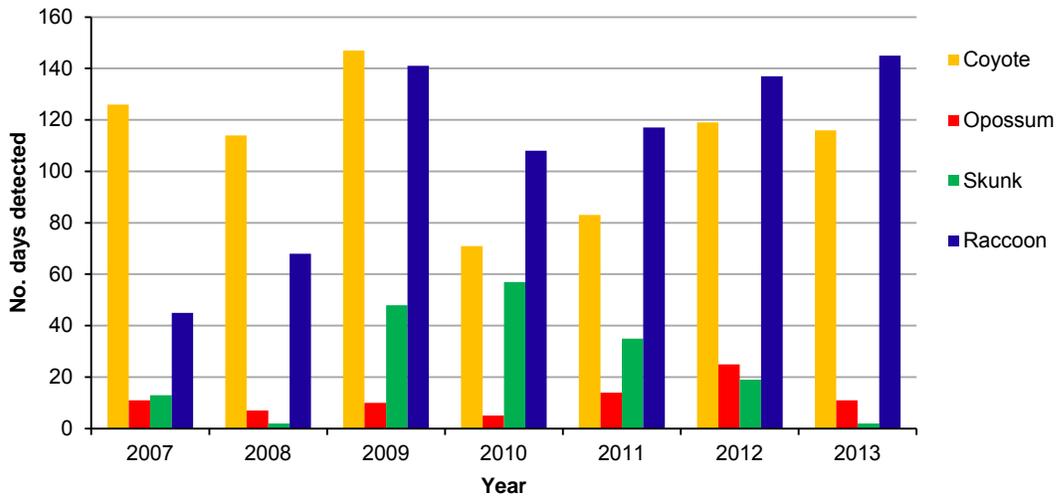
In 2013, one nest (tern) was depredated by an opossum. Opossum tracks in tern and plover chick-rearing habitat were documented on 11 days. From 2007-13, the number of day's opossum tracks were documented ranged from five to 25 days (Figure 16). During this period only two nest losses have been attributed to opossum.

#### ***Skunk***

Skunk (*Memphitis memphitis*) tracks were documented only twice in the Southern Enclosure and were not seen in Oso Flaco. Documented skunk activity in the Southern Enclosure and Oso Flaco ranged from 19 to 57 days for 2009-12 (Figure 16). From 2002-13, known nest loss to skunk was limited to five plover nests in Oso Flaco, occurring from 2009-11.

#### ***Raccoon***

Raccoon tracks were most commonly observed in Boneyard and 8 enclosures and slightly less frequently in 6 enclosure, 7 enclosure, and North and South Oso Flaco. Tracks and scat indicated that raccoons commonly traveled across the enclosure to forage in the intertidal zone on prey that included mole crabs (*Emerita analoga*), and raccoon tracks were common in some portions of the shore where plover chicks were present. Documented raccoon activity increased from 47 and 68 days in 2007 and 2008, respectively, to a range of 108 to 141 days for 2009-12 and 145 days in 2013 (Figure 16). From 2002-13, known nest loss to raccoons was limited to two plover nests in Oso Flaco, occurring in 2010 and 2011. In 2013, one raccoon was lethally removed.



**Figure 16. Number of days coyote, opossum, skunk, and raccoon were detected in the Southern Exclosure and Oso Flaco at ODSVRA from 2007-13.**

**Coyote**

In 2013, one nest (tern) was known to be depredated by a coyote. Live sightings of coyotes have rarely been documented inside the exclosure or along the shoreline during daytime hours. The lack of diurnal sightings, as well as timing of observed fresh tracks relative to windblown sand and tides, indicate that coyote activity is primarily nocturnal in these areas. As it is difficult to monitor the shoreline on foot due to potential disturbance to plover broods, predator tracks are documented opportunistically and counts represent a minimum level of activity. In addition, shoreline accessibility may vary between years making direct comparison difficult. In 2013, there were 49 occurrences of coyote documented inside the predator fencing of the Southern Exclosure and North Oso Flaco (Table 14). This compares to 19, 5, 10 and 92 occurrences in 2009-12, respectively. Coyotes can enter the predator fenced portion of the exclosure by digging under, climbing, or jumping over the fence, as well as entering through areas in disrepair. In 2013, fence maintenance became difficult due to periods of high wind and resulted in a less secure exclosure. Tracks indicated that most coyote activity inside the predator fence was in Boneyard and 8 exclosures with less activity observed in 6 and 7 exclosures.

In 2013, the number of days coyotes were detected in the Southern Exclosure and Oso Flaco was 116. This compares to 147, 71, 83 and 119 days in 2009-2012, respectively (Figure 16). There were 55 occurrences of coyote on the Southern Exclosure shore (outside of the predator fence). This compares to 24, 17, and 100 occurrences in 2010-12, respectively. On the North Oso Flaco shore there were 38 occurrences of coyote in 2013, compared to 23, 20, and 47 in 2010-12, respectively (Table 14). In 2013, documented presence of coyote tracks in South Oso Flaco increased (60 days detected) compared to 2012 (35 days). As part of coyote monitoring at ODSVRA, coyote scat encountered by monitoring staff and contractors was checked in the field for plastic or aluminum bands used for banding least terns and snowy plovers. No bands were found in coyote scat in 2013. During the 2012 breeding season, 11 bands (representing a minimum of one plover chick, two unknown age plovers, and one unknown age tern) were found in four coyote scats (CDPR 2012). In 2013, nine coyotes were removed in an effort to reduce the threat of predation in nesting and chick-rearing habitat. This compares to 11 removed in 2012, four in 2011, nine in 2010, and five in each year from 2007-09.

**Table 14. Coyote occurrence in the Southern Enclosure and Oso Flaco at ODSVRA from 2009-13.**  
Date range is from 1 March to 10 September (a 194-day period).

Year	Inside Southern Enclosure and North Oso Flaco predator fencing	6, 7, 8 enclosure shoreline	North Oso Flaco shoreline	South Oso Flaco	Total no. occurrences (Total no. days detected)
2009	19	99	94	95	307 (147)
2010	5	24	23	47	99 (71)
2011	10	17	20	55	102 (83)
2012	92	100	47	35	274 (119)
2013	49	55	38	60	202 (116)

## Avian Predators

### *Merlin, Cooper's hawk, and white-tailed kite*

The number of days merlin (*Falco columbarius*), Cooper's hawk (*Accipiter cooperii*) and white-tailed kite (*Elanus leucurus*) were documented in the Southern Enclosure and Oso Flaco was limited (range=1-7 days). On 22 April, a merlin was observed with sanderling prey in South Oso Flaco.

### *Loggerhead shrike*

In 2013, a minimum of five individual loggerhead shrikes were observed in or near sensitive plover breeding habitat in Oso Flaco and Boneyard enclosure over the course of five days. Four juvenile shrikes were trapped and relocated (1 July – 31 July).

### *American kestrel*

In 2013, there were 61 sightings of kestrels in the Southern Enclosure and Oso Flaco on 16 days and a minimum of five individuals were observed in flight and perch hunting within the nesting habitat. Forty-three of the 61 sightings were in 6, 7, or 8 enclosures. On several occasions, kestrels perched in the nesting area were flushed by monitors. One juvenile was trapped on 12 July and relocated.

### *Owl*

The majority of owl "sightings" are from detection of tracks with very few visual sightings. The level of owl activity, as evidenced by tracks, is difficult to estimate during daytime monitoring as there is limited entry into the nesting and chick-rearing areas to look for tracks. The tracks may extend only a short distance and can be quickly covered by windblown sand. In addition, accessibility to areas where tracks have often been noted previously (e.g., North Oso Flaco, 8 enclosure, 7.5 revegetation area) may vary between years making direct comparison difficult. In 2013, owl presence was detected on 50 days with 72 separate sightings, compared to 53 days with 89 separate sighting in 2012 (Figure 17, Table 15). Both 2012 and 2013 show an increase in sightings compared to 2010 and 2011, when owl presence was detected on 30 days (47 separate sightings) and 10 days (10 separate sightings), respectively. Three great horned owls were trapped and relocated between 7 May – 14 June in 2013. Owl presence continued to be detected within nesting and chick-rearing habitat after trapping, with the majority of tracks noted in 8 enclosure, Boneyard enclosure, and Oso Flaco.

### *Red-tailed hawk*

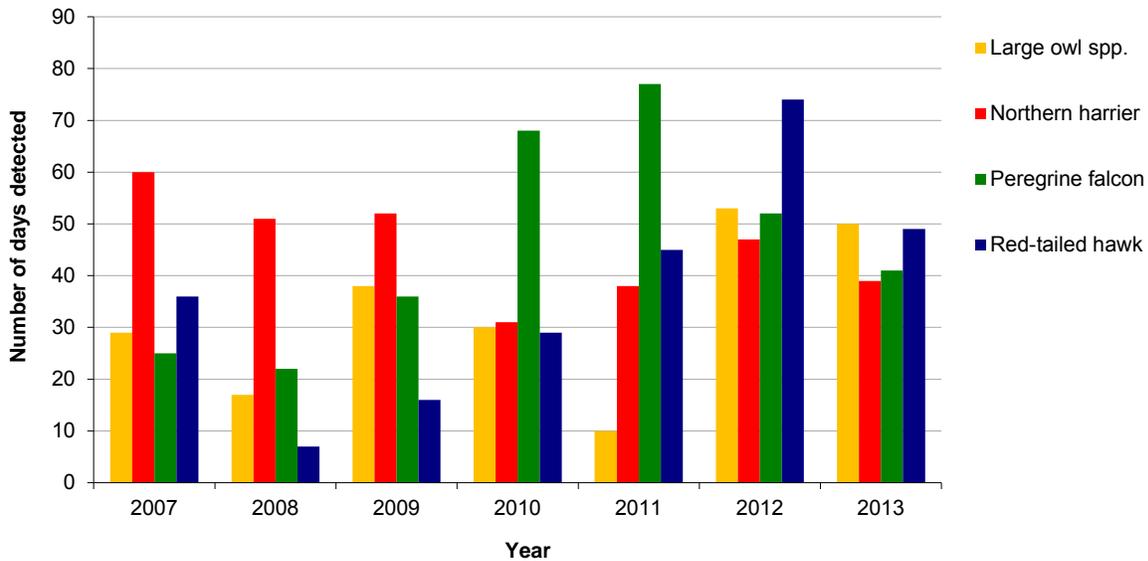
In 2013, red-tailed hawks (*Buteo jamaicensis*) were primarily observed perching in the North and South Oso Flaco foredunes and in 7.5 revegetation area. There were 85 sightings on 49 days (Figure 17, Table 15). On several occasions, red-tailed hawks perched in the nesting area were flushed by monitors. Based on concurrent sightings and age, there was a minimum of three individuals (two adults and one sub-adult) observed in or adjacent to the nesting area in 2013.

**Northern harrier**

There were 64 sightings of northern harriers on 39 days. This is a decrease from 132 sightings of northern harriers over 47 days in 2012 (Figure 17, Table 15). Based on age and sex, there was a minimum of four individuals (two adult males, one adult female, and one immature female) observed during this season. One adult male was trapped and relocated.

**Table 15. Sightings of large owl spp., northern harrier, peregrine falcon, red-tailed hawk and American kestrel in specific areas of the Southern Enclosure and Oso Flaco at ODSVRA in 2013.**  
Date range is from 1 March to 10 September (194-day period).

Location	Large owl spp.	Northern harrier	Peregrine falcon	Red-tailed hawk	American kestrel	Total
6 enclosure	2	5	28	0	14	49
7 enclosure	7	6	23	23	11	70
8 enclosure	20	12	19	10	18	79
Boneyard enclosure	15	10	2	6	2	35
North Oso Flaco	10	12	14	29	3	68
South Oso Flaco	18	19	14	17	13	81
<b>TOTAL</b>	<b>72</b>	<b>64</b>	<b>100</b>	<b>85</b>	<b>61</b>	<b>382</b>



**Figure 17. Number of days large owl spp., northern harrier, peregrine falcon, and red-tailed hawk were detected in the Southern Enclosure and Oso Flaco at ODSVRA in 2007-13.**  
Date range is from 1 March to 10 September (194-day period).

**Peregrine falcon**

In 2013, there were 100 sightings of peregrine falcon on 41 days. Peregrines were observed actively hunting, perching, and consuming prey in the Southern Enclosure and Oso Flaco (Table 16). On multiple occasions, peregrines perched in the nesting area for an extended period of time and when possible were flushed by monitors (sometimes requiring repeated efforts before the bird left the nesting area). On 3 August, a banded male peregrine falcon captured and ate a four-day-old snowy plover chick (PV:VB from SP166) on 8 enclosure shoreline and a 35-day-old least tern juvenile (W/G:W/B from LT31) inside 6 enclosure. On 17 August, a banded male peregrine falcon (assumed to be the same individual seen on 3

August) ate a small prey item on North Oso Flaco shoreline; feather remains identified the prey as a juvenile snowy plover (Appendix G). Several other depredated remains of snowy plovers and other shorebirds may have been peregrine kills but could not be confirmed. In 2013, there was a minimum of seven individual peregrine falcons identified at ODSVRA (two adult males [one banded], two adult females, one immature, one sub-adult, and one juvenile).

**Table 16. Sightings of peregrine falcon in specific areas of the Southern Enclosure and Oso Flaco at ODSVRA from 2008-13.**

Date range is from 1 March to 10 September (a 194-day period). One, three, and one peregrine falcons were trapped in 2009, 2010, and 2012 respectively; none were trapped in 2008, 2011 and 2013.

Location	2008	2009	2010	2011	2012	2013
6 enclosure	11	13	37	39	41	28
7 enclosure	11	13	29	45	37	23
8 enclosure	5	13	25	40	31	19
Boneyard enclosure	6	6	11	32	9	2
North Oso Flaco	4	9	24	37	27	14
South Oso Flaco	1	20	18	12	11	14
<b>Total no. sightings</b>	<b>38</b>	<b>74</b>	<b>144</b>	<b>205</b>	<b>156</b>	<b>100</b>
<b>No. days detected</b>	<b>22</b>	<b>36</b>	<b>68</b>	<b>77</b>	<b>52</b>	<b>41</b>

***Corvids (American crow and common raven)***

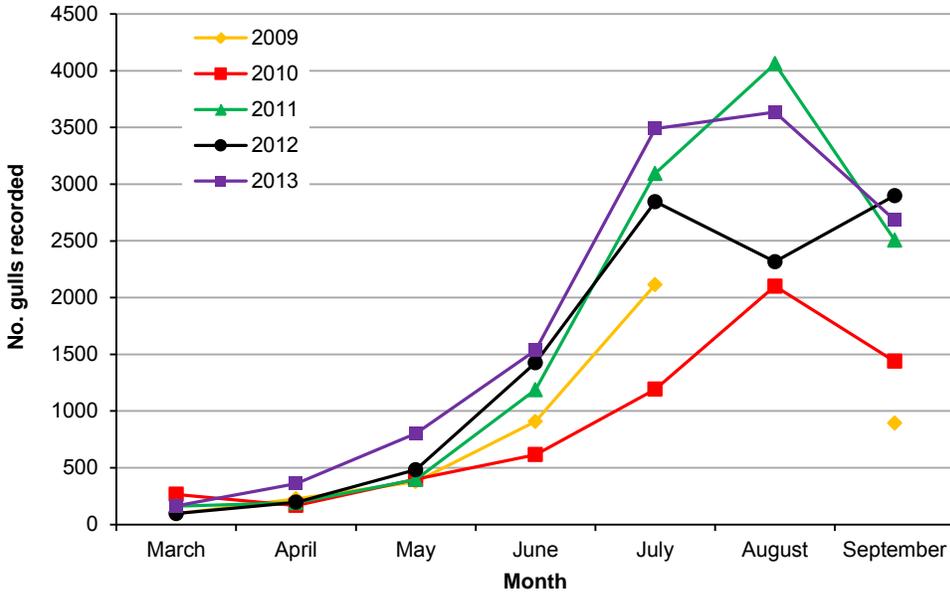
American crows (*Corvus brachyrhynchos*) and common ravens are efficient predators at many tern and plover nesting sites and can have pronounced impacts over a short period of time. In 2013, there were few detected sightings of crows or ravens flying over the Southern Enclosure or Oso Flaco (on a single occasion one crow landed in Boneyard enclosure) (Table F.1 in Appendix F). Crows were observed on three days compared to a range of one to 10 days from 2008-12. Ravens were observed on four days (four separate sightings) compared to 14 days (28 sightings) in 2012 and 13 days (18 sightings) in 2011. On 3 May, USDA Wildlife Services removed a pair of ravens from a nest site approximately two miles from the southern part of the contiguous Guadalupe-Nipomo Dunes complex. Located within the southern half of the dune complex, and 1.5 miles south of ODSVRA, is property belonging to the Chevron Corporation (former Guadalupe Oil Field). Prior to the removal of the ravens there were five snowy plover nests lost to raven at the Chevron site. After 3 May, no ravens were seen and no nests lost to raven until 5 June. On 5 June, ravens were again seen at the Chevron site and 10 nests were reported lost to raven on this date.

***Gulls***

Gulls are present year-round at ODSVRA with numbers fluctuating throughout the year. To document seasonal changes as well as long-term trends, daily surveys at specific locations and weekly surveys of the entire park are completed from March through September (see Monitoring and Management Actions section for more detail). In 2013, the number of gulls parkwide reached a maximum count of 4,254 in July (Figure 18). Within the Southern Enclosure and Oso Flaco during the tern and plover breeding season high counts of gulls were in July (1,730) and August (2,125).

In 2013, one nest (plover) was documented as depredated by a gull. No chicks or juveniles were documented taken, but on occasion adult plovers with broods were seen displaying near gulls. One ring-billed gull was removed after repeatedly chasing adult plovers with close-by broods over an extended period of time. No evidence of plover remains were found in the gull’s digestive tract. Gulls may at times pose a significant threat to snowy plover breeding success, especially individual gulls that key into adults with broods. Such gulls can become “specialists” searching for and preying on chicks over a wide area and depredation events can happen quickly and easily go undetected. In 2012, a gull pellet found on the 6 enclosure shore contained nine bands, representing a minimum of three unknown-age plovers taken by

gulls; none of these predation events were observed. In 2011, three gulls were documented taking a minimum of six chicks, three juveniles, one juvenile or adult, and five plovers of unknown age over the four-day period from 28 July to 31 July.



**Figure 18. Monthly average number of gulls at ODSVRA for March to September in 2009-13.**

Information not available for August 2009. Weekly surveys were conducted between 6 am and 1 pm. Weekly survey data were only included if the entire park was covered. The number of surveys per month ranged from one to five.

## RECOMMENDATIONS

### **Continue monitoring**

Monitoring is critical for effective protection of nesting terns and plovers. As problems and threats arise for adult birds, nests, and chicks, timely information from monitoring can help guide appropriate management actions and evaluate their effectiveness. Monitoring efforts at ODSVRA should have adequate funding, resources, and flexibility to address anticipated problems (e.g., nesting failure, causes of chick loss, predator pressure) as well as unanticipated problems. Specific recommendations for monitoring are the following:

### **Continue banding least tern and snowy plover chicks**

Continue banding least tern and snowy plover chicks to better understand chick behavior and factors promoting or threatening survival of chicks (e.g., feeding rates for tern chicks, foraging activity and movements of plover chicks, age and location of disappearance of different cohorts of chicks). Banding also provides a means to document fledging success. Without this information, the seasonal productivity of terns and plovers at ODSVRA would be unknown and management effectiveness could not be assessed. Additionally, bands provide an opportunity to gain insight into predator impacts on chicks and fledglings. Over time, banding of tern and plover chicks will provide information on natal site fidelity of terns and plovers fledged at ODSVRA, as well as migration to other sites.

### **Continue banding least tern chicks to individual**

Beginning in 2006, least tern chicks were banded to allow individual chicks to be identified. This was done, in part, by placing one or two different colors of tape on the federal band, creating a unique combination for each chick. Banding to individual provides the opportunity to gain additional information that otherwise may not be obtainable, including:

- 1) providing the most accurate means to count the number of juveniles produced;
- 2) identifying if different areas within the colony are having different fledging success during a season;
- 3) identifying if broods hatching more than one chick are fledging more than one chick;
- 4) tracking individual chick and juvenile movement within the ODSVRA colony;
- 5) providing information on the length of stay of individual juveniles at the colony site after fledging;
- 6) tracking recruitment of juveniles into ODSVRA's breeding population; and
- 7) tracking movement of individuals to other colonies in California.

Banding to individual provides valuable information to assist in developing and assessing site management actions directed toward the recovery of the least tern.

### **Continue option to band adult snowy plovers**

The occurrence of abandoned plover nests can raise concern about possible mortality of adult plovers. If elevated adult mortality rates occur or are suspected, it could prove beneficial to band certain adults. This would allow monitors to verify if mortality was taking place and possibly identify the causes.

### **Continue use of motion detector cameras for nest monitoring**

There are many hours each day when monitoring staff or predator management specialists are either not present or not in a position to observe nest predation. In addition, predators may leave little or no evidence behind or tracks may be quickly erased by windblown sand before nest fates can be investigated. Photo infrared digital cameras with passive motion detector triggers (Reconyx PC900) were purchased in the latter part of the 2010 season to help identify and document snowy plover nest predators. They were tested and, with permission from USFWS, placed near a small number of plover nests in 2010-12 by staff members permitted by USFWS for this activity. Experimenting with the cameras continued in 2013. One of the challenges has been adapting the cameras that are normally used on large mammals to be sensitive

enough to be triggered by movements of a small ground nesting bird. Because snowy plover movement was not triggering the cameras at certain settings, they were programmed to automatically take photos at regular intervals (one to five minutes) in addition to the motion detection setting. Stakes were used to position the cameras approximately eight to 12 inches above the ground to increase the camera's area of view. During the 2013 nesting season 14 snowy plover nests were selected for camera use (to date cameras have only been used on plover nests at this site but the permit does allow for cameras to be placed near least tern nests). No predation events were recorded. However, the nest cameras documented hatched and abandoned nest fates, nest fate dates, nest exchanges between male and female, and adult band combinations. It is recommended for 2014 to continue to use motion detector cameras for nest monitoring, continue to experiment with camera settings and placement, and train and permit additional monitoring staff as needed.

#### **Continue to use an anemometer with data logger to record daily wind speeds and direction**

A wind tower with wind speed and direction collected at two, seven and 10 meters above the ground has been located east of the 6 enclosure since June 2010. This station is intended to help record changes in wind speed and direction across a large area of the park and the Oso Flaco area and it has provided accurate data that matched the 2011 wind values collected from a smaller portable system owned by Parks (WindLog by RainWise Inc.). On-site information for daily average and high gust wind speeds aids in understanding the role of wind in egg loss. For 2014, it is recommended to continue gathering data using the wind tower.

#### **Continue to provide adequate-sized bumpouts and single nest enclosures to better protect least tern and snowy plover nests in or close to the open riding area**

Least tern and snowy plover nests inside the Southern Enclosure and located close to the north or east fence receive temporary additional fencing to create a buffer from recreational activities in the open riding area. These bumpouts connect to the fence adjacent to the nests and extend into the open riding area. Prior to 2010, only nests found within 75 feet of the Southern Enclosure fence were given a bumpout. Beginning in 2010, nests found within 100 feet of the Southern Enclosure fence bordering the open riding area received bumpouts. Nests inside the enclosure and more than 100 feet from the fence may also receive a bumpout if repeated disturbance from the open riding area is observed. Prior to 2012, nests found in the open riding area initially received an 82 foot radius circular single nest enclosure as per the previously existing protocol. It is our experience that these earlier identified minimums (75 feet and 82 feet) are not sufficient to adequately reduce disturbance from recreational activity and, in response to birds flushing from their nests, additional fence installation was often necessary to increase the size of the buffer.

In 2013, one least tern nest and one snowy plover nest were given bumpouts to increase the distance from the nest to the open riding area fence to a minimum of 100 feet. The least tern nest had all three eggs hatch and all three chicks reached fledge age. The snowy plover nest was abandoned, with wind suspected as the cause. There were no nests found in the open riding area in 2013.

For 2014, it is recommended to continue to install bumpouts for nests close to the Southern Enclosure fence to create a buffer of at least 100 feet between the nest and the open riding area. Nests in the open riding area should receive a single nest enclosure with a minimum radius of 100 feet. Nests will be monitored closely to assess the adequacy of protective fencing in reducing disturbance. If necessary, bumpouts or single nest enclosures may increase in size if disturbance to incubating birds is observed as a result of recreational activity. ODSVRA will continue to maintain a safe vehicle corridor adjacent to the north and east fence, any bumpouts, and single nest enclosures.

**Continue to position a large section of the shoreline enclosure fence further east (inland) to provide a wider functional shoreline habitat**

The shoreline west of the enclosure west fence is important snowy plover habitat for rearing chicks. Prior to 2011, the management practice has been to place the west fence as low as possible on the shoreline. This was to maximize the amount of nesting and potential brooding area inside the seasonal fence that is protected from coyotes. In 2011, two small experimental shoreline fence sections, located in 6 and 7 enclosures, were placed up to 100 feet further to the east and these areas appeared to have a broader and more functional shoreline when evaluated at the end of the season. In 2012 and 2013, the shoreline fence was moved 100 feet east for the southern half of 6 enclosure and for the majority of 7 enclosure (except for the 7.5 revegetation area) (Appendix C). The Southern Enclosure is seasonally open to off-highway vehicles during five months of the year between October and February. As a result of recreational activity during this time, the shoreline of the 6, 7, and 8 enclosures has almost no cover or topographic relief at the beginning of the breeding season and park staff distribute wood and wrack to provide some cover above and below the drift line. The shoreline is further altered with the installation of the west fence as it results in substantial deposition of fine wind-blown sand on the leeward (east) side of the fence. A fence set low on the shore can result in a very narrow swath of shore with cover (west of the fence) bordered by limited cover over the majority of a strip of habitat (approximately 100 to 180 feet wide) immediately east of the fence, with deposited sand burying any existing or introduced cover.

Moving the west fence 100 feet eastward improved shoreline habitat characteristics for chick-rearing by allowing for a wider area of shore with cover and wrack. There was more topography and cover created by increased debris, woodchips, and wrack as well as greater foraging opportunities with the increased area of habitat enhancement. There continued to be broad areas of mobile sand with little cover east of the west fence.

Adjusting the fence eastward allows for the following benefits to the overall management goals for snowy plover productivity:

- 1) allow access from the shoreline for monitoring staff to maintain a wider swath of shore with habitat enhancement materials (including wrack) throughout the breeding season;
- 2) reduced chance of high tides and surf washing up and removing a low-set fence and habitat enhancement material;
- 3) provide better conditions for pioneering plants to grow in a wider area between the high tide line and the west fence (wind-blown sand deposited leeward of the fence can adversely impact seedling survival);
- 4) may increase foraging opportunities for plovers;
- 5) may reduce vulnerability to predators by providing more space and cover for chicks; and
- 6) may reduce bouts of aggression between adults with broods by decreasing brood density and, therefore, may decrease the chance of chicks becoming separated from their brood or attacked by adults with other broods.

Data was compared for nests of 6 and 7 enclosures west of the west fence (shoreline) to nests within the enclosure fencing (inside enclosure). The following numbers exclude nests at the northern 6 enclosure shoreline and west of 7.5 revegetation area where the fence was not moved.

There was an increase in plover and tern nests on the shoreline in 2012 and 2013 compared to 2011, likely as a result of moving the west fence eastward. In 2012 and 2013, 14% and 13% of plover nests in 6 enclosure and 19% and 26% in 7 enclosure were on the shoreline, respectively; this compares to 12% and 5% in 2011. In 2013, 14% (8/56) of least tern nests in 6 and 7 enclosures were on the shoreline. This is similar to 2012 when all tern nests were in 6 and 7 enclosures with 16% (7/45) on the shoreline. No least tern nests were found on the shoreline for the eight-year period from 2005-11 when the shoreline portion of the enclosure was in a narrower configuration.

For known fate nests in 2013, the hatch rate for plover nests inside 6 and 7 exclosures was 82% compared to 68% for the shoreline. Six plover nests on the 6 and 7 exclosure shoreline failed, with losses attributed to abandoned post-term (1); abandoned, suspected due to wind (4); and cause unknown (1). The least tern hatch rate for known fate nests was 85% for nests inside the 6 and 7 exclosure and 100% for nests on the shoreline (of the total of eight shoreline nests, five could not be approached to determine fate because of the high density of nearby plover broods). In 2013, the overall snowy plover chick survival to fledging age (55%) was high and was comparable within all shoreline areas.

Moving the west fence eastward did not appear to move plover or tern nesting closer to the east fence or east of the exclosure into the open riding area. There was one nest found east of the exclosure in 2012 compared to two nests in 2011. No nests were found east of the exclosure in 2013. In 2012 and 2013, the number of bumpouts for nests found near the east fence has not increased compared to the previous two years. In 2012 and 2013 there were four and two nests, respectively, receiving a bumpout. This compares to two nests in 2010 and eight in 2011.

It is recommended for 2014 to repeat the shoreline configuration as was present in 2013, with a large portion of the 6 and 7 exclosure shoreline fence approximately 100 feet to the east of the typical shoreline fence location and continue to collect further information. The northern section of 6 exclosure would not be moved east to avoid potential impacts to nests on the shoreline from trespassers and to reduce the possibility of pushing nesting activity further to the east side and closer to the riding area in this narrow portion of north 6 exclosure. The shoreline fence should continue to be installed last (after all other fencing is installed) and as close to 1 March as possible to lessen the chance of storm-driven high surf damaging the fence.

**Continue to enhance habitat in the Southern Exclosure by distributing natural materials, seed, and plants and increase efficiency with the help of maintenance staff and heavy equipment**

Natural materials such as driftwood, woodchips, and wrack (surf-cast kelp) should be distributed in large amounts within the exclosures (including the shoreline) to enhance habitat features. Since 2002, wrack has been gathered by hand and placed in the exclosure. Approximately 252 cubic yards of wrack were distributed on the exclosure shoreline during the 2013 season as habitat enhancement. Greater efficiencies may be possible for this wrack distribution. Since 2008, OSDVRA monitoring staff has received assistance from available heavy equipment operators from park maintenance staff in loading woodchips to be distributed in the exclosure. A method using heavy equipment has not been found to collect and distribute large amounts of wrack from the open riding to the seasonal shoreline exclosure. Attempts in the past resulted in more sand than wrack being collected with the equipment compared to hand collection. In 2014, it is recommended that methods to better use heavy equipment for wrack collection should be further explored. The goal would be to have heavy equipment available throughout the season to assist in loading large piles of wrack collected in the open riding area, to then be distributed into the seasonal exclosure by permitted staff. This would increase staff efficiency and allow larger amounts of wrack to be dispersed on the shoreline, helping to maintain larger populations of invertebrate prey over a broader area for snowy plover chicks, fledglings, and adults. Broader distribution of wrack also provides shelter from wind and cover from predators. The use of heavy equipment needs to be balanced with other operational needs in the park.

Wrack and woodchip additions could also occur during the winter or prior to 1 March if materials and staff levels allow. Wrack collected from the riding area was experimentally distributed in a few large piles at the beginning of the 2011-13 seasons in areas east of the shoreline fence. These piles persisted to the end of the season helping to create temporary hummocks within the exclosure and, in some cases, provided a favorable area for plants to grow. As time permits, it is recommended to continue to place large wrack piles in the winter or at the beginning of the season in the area where the seasonal exclosure will be located.

The addition of quick-growing annual dune vegetation should continue to be evaluated as habitat enhancement. Planting in early spring, with sufficient late rains, may allow enough time for plant growth to provide topographic features that could benefit plovers and terns. Seeding of areas in the Southern Enclosure with sea rocket (*Cakile maritima*), beach bur (*Ambrosia chamissonis*), and other on-site available seed is recommended to continue in 2014. Planting of sea rocket or other appropriate available container stock (grown on-site) in test plots with areas of added materials (e.g., woody debris, wrack) should also continue to be evaluated in 2014. The seeding and planting would occur as soon as possible after the fence is installed on 1 March. Seeding or planting may be attempted prior to the fence installation in order to take advantage of rain events and moist sand. The goal of this planting is to provide areas of scattered vegetation for cover and to encourage the development of small hummocks.

**Continue to study the benefits of wrack addition to the Southern Enclosure shoreline and inoculation with wrack-associated invertebrates as a possible means to restore invertebrate species and biomass (these invertebrates are part of the prey base for snowy plover chicks, juveniles, and adults)**

In 2007-11, Drs. Jenifer Dugan and Mark Page, researchers from the Marine Science Institute at the University of California Santa Barbara, examined the responses of invertebrate numbers and diversity in areas where wrack was added to the shoreline throughout the breeding season. In 2012, sampling (by Dr. Dugan) was limited to only the beginning and end of the closure period. In 2013, park staff performed one series of invertebrate sampling at the end of the season, comprised of 10 transects in the Southern Enclosure and three transects in North Oso Flaco (as a control). Samples were provided to Dr. Dugan to be examined in her lab and findings added to the data set. Results of surveys since 2007 indicate that the seven month seasonal closure (March through September) is not a sufficient period of time for invertebrates to effectively and naturally recover species diversity and abundance on the Southern Enclosure shoreline. Preliminary analysis suggests that inoculating a large number of wrack-associated invertebrates into wrack over a wide area of the enclosure shoreline appeared to increase the estimated abundance of talitrids. If funding levels allow, experimental examination of wrack and invertebrate manipulation on the Southern Enclosure shore should continue in the 2014 season with the goal of identifying potential means to enhance the diversity and abundance of invertebrate species that are natural prey for plovers. If more extensive surveys are not available, park staff intends to continue the end of season sampling and to add a beginning of season sampling.

**Continue to look for an appropriate design to cover trash dumpsters**

The predator management strategy at ODSVRA includes methods to discourage attracting predators to the site. The large trash dumpsters (22 feet long, 20 cubic yard capacity) located near marker post 2 attracts a large number of gulls landing on and foraging in the dumpsters. Four to six dumpsters are present during the busy summer months. In 2012, an experimental cover was designed for one dumpster with fence material enclosed in an approximate 12 foot high metal frame with heavy 7.5 inch wide plastic strips hanging from the front of the frame. This design was intended to prohibit gulls from landing on the trash, allowed park visitors to easily discard their trash without lifting a lid, and allowed maintenance staff to lift the cover off and compact the trash with heavy equipment which is necessary before the dumpster can be pulled out and replaced each week. The cover was removed after periods of high winds quickly destroyed the plastic strips, making the cover ineffective. No covers were used in 2013. Daily surveys at the dumpster area resulted with the month of August having the highest daily average number of gulls (139) as well as the maximum number of gulls present at one time (445 on 16 August) (see section titled Predators and predator management on page 39 for more details). It is recommended for 2014 to cover the trash dumpsters in the marker post 2 area with lids designed to exclude gulls and meet the needs of the ODSVRA staff and visitors.

**Continue to maintain option to salvage and rescue eggs, chicks, juveniles, and adults under very limited circumstances**

In some circumstances the abandonment of least tern or snowy plover eggs and chicks can be directly attributed to human disturbance. The option to salvage such eggs and chicks to be raised in captivity by an approved facility and released in the wild is useful. Beginning in 2003, a limited number of abandoned but likely viable snowy plover eggs or chicks from ODSVRA were brought into captivity. Chicks were raised in a manner that they did not imprint on humans and were released into the wild when fledged. All fledglings were color-banded to individual to facilitate collecting information on movements, survival, and future reproductive success. Captive care should only be used selectively and not as a substitute for responding to the primary causes of elevated egg or chick abandonment rates.

### **Ongoing management actions that will continue in 2014**

The following are part of our ongoing management actions and monitoring procedures for which a specific recommendation is no longer necessary (see Monitoring and Management Actions section for more detail). Background information and justifications for these management actions have been discussed in detail in previous annual reports.

- Oso Flaco area protection will continue at the same monitoring and management level as set in 2005 (Site Description).
- The Arroyo Grande Creek protected area will be clearly delineated as a closed area around the Arroyo Grande Creek and lagoon by using posts and signs as practiced since 2006 (Site Description).
- Night vision equipment will continue to be used for monitoring the least tern night roost. The equipment has been used for monitoring since 2007.
- Continue monitoring least tern juveniles, night roost, and foraging activity at nearby freshwater lakes.
- Tern chick shelters will continue to be used.
- Continue option to use least tern chick fencing on the east side of the enclosure and a method to maintain the tern chick fencing will continue to be explored.
- Predator monitoring and management actions that have been in place since 2003 and 2004 will continue.
- Gull surveys will continue as they have since 2008.
- The Southern Enclosure protected area will include the use of increased fence height as practiced since 2006 and use of aprons as used since 2007 to improve the effectiveness of the perimeter fence in protecting the breeding terns and plovers.
- The Southern Enclosure and North Oso Flaco shoreline will continue to be protected, this includes maintaining the posts and rope at marker post 6 and Oso Flaco boardwalk intertidal zones to minimize trespass, which has been part of the management actions in these locations since 2008.
- Continue use of 10 foot by 10 foot single nest enclosures with net tops, circular enclosures with net tops, and mini-enclosures as needed to protect nests from avian predators. These small enclosures are not without risks to incubating adults and we will continue to closely monitor and evaluate their use.
- Surveys for plovers will continue during the nonbreeding season. These surveys have been conducted since the winter of 2009-10.
- Continue to document impacts and, when possible, reduce disturbance caused by low-flying aircraft over the Southern Enclosure and Oso Flaco.
- Continue to work to address water quality issues at Oso Flaco Lake.
- Efforts to retain skilled monitors will continue at ODSVRA.

## NOTES

### **Least tern chicks in open riding area**

In 2013, three least tern chicks from two to three broods were observed in the open riding area east of 6 enclosure. The two events both occurred while banding efforts were occurring inside 6 enclosure. These chicks were monitored and directed back into the enclosure.

On 29 June at 9:30 am, one chick of the two-chick LT1 brood moved into the open riding area less than seven feet east of 6 enclosure. Staff directed the chick back toward the enclosure. The chick crouched and was picked up and banded inside the enclosure with its sibling. Shortly after, two adults were seen attending both chicks.

On 3 August at 11:00 am, two least tern chicks moved into the open riding area less than six feet east of 6 enclosure. One chick moved back in on its own. The second chick (13-day-old W/A/W:W/B, LT49), was picked up and placed back inside 6 enclosure where it moved west within the enclosure. This chick was documented to fledge.

### **Snowy plover chicks in the open riding area**

In 2013, three snowy plover chicks from two broods were observed in the open riding area. In both cases, staff or contractors were not in the enclosure prior to or during the time the chicks were in the open riding area and no disturbance factor was apparent.

On 7 July at 12:40 pm, a 20-day-old chick from SP75 was observed moving up to 60 feet east of 6 enclosure into the open riding area. Staff controlled visitor traffic and directed the chick westward, where it was last seen adjacent to the enclosure fence. Staff continued to direct traffic and walked a broad area to confirm no chicks were in the open riding area or in the enclosure close to the east fence.

On 1 August at 11:40 am, two five-day-old chicks with two adults from SP152 were observed on the open riding area shore just north of the 6 enclosure. The brood was directed back into the enclosure and monitored for 30 minutes; the two chicks and two adults were seen moving together 300 to 400 feet south inside the enclosure.

### **Injured one-year-old least tern and carcass of a juvenile least tern (see attached medical record and necropsy reports for more detail)**

On 27 July at 12:30 pm, an unbanded one-year-old (hatched in 2012) least tern was seen dragging the left wing on the ground, the wing appeared broken and the bird was unable to fly. Bird was first seen at the 6 enclosure shore and moved east of the west fence into the fenced enclosure. Bird was next seen at 4:20 pm in the open riding area along the east side of 6 enclosure where it was picked up and transported to Pacific Wildlife Care in San Luis Obispo County to receive veterinary care. Medical record indicated “radiographs showed a fracture of the left coracoid” and also a “healed fracture of the proximal left radius.” The tern was thin, continued to lose weight, and died at Pacific Wildlife Care on 31 July. The necropsy report indicated the tern “had a bacterial infection in the lungs associated with pneumonia and attached bacteria in the intestine which is likely an attached/effacing *E. coli*.”

On 29 July, the wet intact carcass of a least tern juvenile, L:W/B from LT22, was found on the 6 enclosure shoreline close to the waterline. This juvenile was last seen alive and appeared well on 28 July at 33 days old. The carcass was sent to the CDFW Marine Wildlife Veterinary Care and Research Center in Santa Cruz County, and preliminary findings indicated the death was from “presumed trauma, but histology is pending to rule out unknown or other potential factors.”

**Carcasses of three snowy plover adults and one juvenile (if sent for necropsy, reports are attached)**

On 23 March, the carcass of an unbanded adult snowy plover was found partially buried in faint tire tracks in the open riding area midbeach between Grand and Pier Avenues. The necropsy results indicated the carcass was in “fair post-mortem condition” and had “gross lesions in the snowy plover suggestive of acute traumatic injury with evidence of a displaced thoracic vertebral fracture and extensive cranial trauma with hemorrhage.”

On 20 September, the carcass of an unbanded adult snowy plover was found partially buried in the open riding area 500 feet east of marker post 5. The necropsy report indicated that the plover was in “severe post-mortem autolysis with myiasis” and cause of death could not be determined.

On 18 October, the carcass of an unbanded adult snowy plover was found partially buried in the open riding area between marker post 6 and marker post 7, approximately 500 feet east of the shoreline. The carcass was in a severe state of decomposition with maggots present and was not sent for necropsy.

On 4 July, the intact carcass of a fledgling snowy plover, GA:BW from SP149, was found on the South Oso Flaco shoreline. The necropsy report indicated “evidence of a cutaneous puncture wound in the neck accompanied by hemorrhage in the surrounding feathers. This is presumed to be due to trauma, but the specific association with this trauma to the death is uncertain.” The fledgling was last seen alive on 1 July when 28 days old.

**Limited and selective efforts to rescue snowy plover chicks and potentially viable abandoned snowy plover eggs**

Monitoring activities are done with careful consideration to avoid adverse disturbance to broods and nests. This can include cancelling or postponing activities in a sensitive area when necessary. On rare occasions, when there is the possibility of disturbance impacts due to visitors, park management, or park monitoring efforts, the park may collect abandoned eggs or chicks. Examples of events in which park activities and management may be a factor (all can also occur naturally) include: abandoned eggs from a nest in the open riding area; abandoned eggs in a smaller enclosure, such as a mini-enclosure, and adult mortality is suspected; chick separated from brood and attacked by adult plover while monitoring from a vehicle in the general area; and protective two inch by four inch fencing (either of large seasonal enclosure or single nest enclosure) causing a significant increase in localized windblown sand deposition resulting in buried eggs (or even newly hatched chicks). The first consideration for collected potentially viable eggs would be to place them in nests with nonviable eggs that are being actively incubated (eggs are determined to be nonviable when they are incubated well past any expected hatch date). For chicks, efforts are made to reunite the chicks with their brood, if it is safe to do so. In some circumstances the chicks or eggs are transported to an approved facility to be raised in captivity and released into the wild. All captive care of eggs and chicks was done at Monterey Bay Aquarium, Monterey, Monterey County and any resulting fledglings were released at Moss Landing State Beach, Moss Landing, Monterey County. Temporary veterinary treatment of birds occasionally occurred at Pacific Wildlife Care, Morro Bay, San Luis Obispo County.

In 2013, there were 13 occasions where ODSVRA staff interceded to provide added care for snowy plover eggs or chicks. While park management or monitoring may have inadvertently been a contributing factor for some of the at-risk eggs or chicks, for several circumstances this was either not the case or very unlikely to be a factor. The events were in four general categories:

- 1) adult plover(s) attacking chick (four events);
- 2) chick with tar on body (one event);
- 3) abandoned chick at nest (one event); and
- 4) abandoned eggs (seven events).

Two abandoned chicks from two separate broods were successfully reunited with the parents. Five abandoned and potentially viable eggs were placed in nests with nonviable eggs, three of these eggs hatched, and two of the chicks fledged. Five chicks were taken to Monterey Bay Aquarium and all fledged. Of the eight eggs taken to Monterey Bay Aquarium, seven hatched, and six of the chicks fledged.

#### Adult plover(s) attacking chick

On the morning of 14 June, a seven-day-old SP65 chick was seen near the 6 enclosure west fence being aggressively attacked by a male with a nearby nest (SP120). The chick continued to be periodically attacked over a protracted period of time with no adult nearby or defending the chick. The chick was collected, placed in a heated brooder, and fed. After two and a half hours, the chick was placed with its two sibling chicks and the male parent brooded and attended all three chicks for the two hour time that the brood was monitored. The brood was seen with three chicks on 15 June, subsequently two chicks continued to be seen and both fledged.

On the afternoon of 26 June, a four-day-old chick from the two-chick SP88 brood was seen being aggressively attacked by two adult plovers on the 6 enclosure shore. The chick took cover and remained crouched for over an hour. The male parent, with one chick, remained at a distance and showed no indication it was aware of the crouched chick. The chick was collected, fed, and kept in a heated brooder overnight. The following morning the chick was placed with its sibling and both chicks were brooded by the male and then the brood moved together to the north and was still together after monitoring for one hour. The brood continued to be raised in the same general area on 6 enclosure shore and both chicks fledged.

On 21 June, an approximately one-week-old unbanded snowy plover chick from an unknown nest was observed unattended by any adult on the 8 enclosure shoreline. The chick was monitored from a distance for an extended period of time and was repeatedly and aggressively attacked by at least two adult snowy plovers in the area. The chick was transported to Monterey Bay Aquarium, fledged, and was released 13 August. Fledgling banded AP:BB.

On 7 August, a one-day-old unbanded snowy plover chick from SP172 was seen aggressively attacked by an adult snowy plover. The chick was not attended by an adult and was separated from the banded siblings. The chick crouched and continued to be aggressively attacked, with the chick repeatedly pecked at, bitten, picked up off the ground and slammed back down again. The chick was not seen moving after being attacked. The chick was collected and placed in a heated brooder and continued to have minimal movement after one hour. This chick was collected and transported to Monterey Bay Aquarium. Although the chick was slow to respond the following day, it recovered, fledged, and was released 16 September. Fledgling was banded AP:GG.

#### Chick with tar on body

On 27 May, an unbanded two-chick plover brood (approximately four days old) from unknown location nest SP146 was on the North Oso Flaco shoreline. One chick had substantial amounts of clumped tar on the feathers and skin of the breast and neck, as well as on the bill and foot. This chick was taken to Pacific Wildlife Care where over a two-day period it was stabilized and washed under veterinary care (see attached medical record). On 29 May, the healthy and clean chick was returned to ODSVRA and banded VG:BG. On 30 May, the goal was to reunite the plover chick with its brood but the proximity of other broods and increasing high winds made any attempt unsafe. The chick was transported to Monterey Bay Aquarium, fledged, and was released 8 July. The sibling chick, which had been banded on 27 May, remaining at ODSVRA also fledged.

#### Chick abandoned at nest

On 19 May, a recently hatched snowy plover nest (SP22) in 6 enclosure had one nearby mobile chick and a second chick 18 inches from the nest bowl three-quarters buried in sand, unable to move, and very cold to the touch. Weather conditions the previous afternoon had been high winds with substantial sand movement. Both chicks were returned to the nest bowl and the less mobile chick was not attended. This chick (now banded GG:GW) was transferred to Monterey Bay Aquarium, fledged, and was released 8 July.

#### Eggs abandoned

On 23 April, snowy plover nest SP15, within a 10 foot by 10 foot enclosure in South Oso Flaco, was observed for an extended period of time without an attending adult. The nest was determined to be abandoned pre-term, with adult mortality suspected as the cause, and the three eggs were collected that same day and transported to Monterey Bay Aquarium. Two eggs hatched 6 May and the third egg was not viable. The two chicks were banded AP:AW and AP:GY, both fledged and were released 11 June. The AP:AW juvenile plover was seen at ODSVRA on 31 July.

On 21 May, snowy plover nest SP29 had two chicks hatch and led away from the 10 foot by 10 foot nest enclosure on the North Oso Flaco shoreline. The remaining egg was found completely buried with a slight crack consistent with the early stages of the hatching process. The egg was monitored (by spotting scope from a distant vehicle) for an extended period of time without an attending adult and was determined to be abandoned. The egg was collected and transported to Monterey Bay Aquarium where it hatched on 23 May. The chick, banded AP:RR, fledged and was released 8 July.

On 19 June, snowy plover nest SP103 at the north side of 6 enclosure had two eggs buried within the mini-enclosure during high winds and an adult was incubating one egg a few inches outside the mini-enclosure. The mini-enclosure was removed, all eggs moved 1.5 feet from the encroaching sand and the adult returned to incubate eggs a short time later. On 21 June, three eggs were found buried at a depth of approximately eight inches after a period of high winds, two eggs were placed on the surface of sand (one egg was damaged while unburying and could not be salvaged). Eggs were observed from a distance for an extended period of time without an attending adult and the eggs were considered abandoned. The eggs were collected and transported to Monterey Bay Aquarium. Both eggs hatched, one on 5 July and one on 7 July, and both chicks fledged. Fledglings, banded AP:WR and AP:OW, were released 8 August.

On 4 August, snowy plover nest SP173 in Boneyard enclosure had one egg on the surface being incubated and two eggs completely buried (for a minimum of one day and possibly longer based on when winds occurred). The two eggs found buried were placed with the one egg in the nest bowl. On 8 August, one chick hatched and the two eggs that were previously buried both had faint to moderate cracks. Over the next two days, the two eggs were not attended by an adult and were determined to be abandoned. (No plover tracks at nest and marked eggs remaining in same position during this two-day period.) The eggs were collected in the late afternoon of 10 August, placed in a heated brooder, and transported to Monterey Bay Aquarium the following morning. Both eggs hatched 13 August, one of which died 17 August (see necropsy report). The remaining chick fledged, was banded AP:AW, and was released 16 September.

On 7 August, snowy plover nest SP176, within a mini-enclosure on 8 enclosure shoreline, had one chick being brooded near the nest and one egg that was not attended for several hours. The chick was placed with the egg in the nest and the egg was inconsistently incubated for a short period, after which the adult was seen with the chick moving out of sight of the nest. The abandoned egg (which had cracks) was collected and transported to Monterey Bay Aquarium, where it hatched 8 August. The chick fledged, was banded AP:AY, and was released 16 September.

On two occasions, the possibly viable eggs from an abandoned nest were placed in an active nest with a clutch of eggs determined to be nonviable. On 16 May, two abandoned eggs (one with a slight crack) from nest SP17 in 6 exclosure were placed in SP11, located on 7 exclosure shore and inside a circular exclosure. One of the nonviable eggs of the two-egg SP11 clutch (incubated for a minimum of 42 days) was removed so the combined clutch size would be three eggs. One egg from SP17 hatched and the chick fledged. On 13 June, three abandoned SP100 eggs inside a 10 foot by 10 foot exclosure in South Oso Flaco were placed in SP26, located on North Oso Flaco shore and inside a circular exclosure. All three nonviable SP26 eggs (incubated for a minimum of 56 days) were removed. Two of the SP100 eggs hatched and one chick fledged.

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## APPENDICES

### Appendix A. California least tern nests at ODSVRA in 2013.

Least tern chicks were banded with white over blue vinyl tape on a size 1A blank aluminum band on the right leg and a size 1A numbered aluminum federal band on the left. Color tape was placed on the federal band to create combinations unique to individual. Chicks were weighed immediately prior to banding, typically at one to three days old. Eight chicks from six known hatching nests were not banded. In addition, there were five nests with unknown fate (unknown if hatched or failed). A total of four unbanded fledglings were seen in 6 enclosure on 28 July. Evidence supports these four unbanded fledglings originated at ODSVRA. They were not assigned to specific nests. Information on adult pair is provided when known. Sex of adults is typically not known.

Location: 6 = 6 enclosure, 7 = 7 enclosure, 8 = 8 enclosure

Adult pair: U = unbanded

na = estimated date not available due to insufficient information

Nest	Location	Adult pair	Estimated initiation date	Nest fate	Estimated fate date	No. known eggs	No. chicks (No. fledge)	Chick band combination (chick weight in grams when banded)	Confirmed fledged	Notes
1	6	One adult banded	28-May	Hatch	22-Jun	2	2 (1)	W/A:W/B (24.3g) Y/A:W/B (26.3g)	W/A:W/B	On 29 June, 1 chick observed in open riding area was picked up and placed back in enclosure (see report Notes section). Both chicks last observed alive on 12 July at 20 days old. Carcass of W/A:W/B juvenile found inside the enclosure 29 July. Identified as surviving to fledge age (21 days or older for purpose of this report) based on wing chord measurement of 133 mm.
2	7		29-May	Depredated, opossum	31-May	1	0 (0)			
3	6	-:A/B	31-May	Hatch	21-Jun	2	1 (1)	Y:W/B (7.6g)	Y:W/B	One egg (abnormally light in weight) abandoned post-term.
4	6		31-May	Hatch	21-Jun	2	2 (2)	R:W/B (8.5g) W:W/B (10.0g)	R:W/B W:W/B	
5	6		1-Jun	Abandoned pre-term	3-Jun	1	0 (0)			One egg abandoned pre-term.
6	6	W:- U	1-Jun	Hatch	24-Jun	2	2 (2)	O:W/B (5.3g) G:W/B (6.1g)	O:W/B G:W/B	
7	6		1-Jun	Hatch	22-Jun	2	2 (0)	2 unbanded		Two unbanded chicks last observed 26 June at 4 days old.
8	6	U -:S	2-Jun	Hatch	23-Jun	2	2 (2)	A:W/B (8.4g) B:W/B (9.6g)	A:W/B B:W/B	

Appendix A. California least tern nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Estimated initiation date	Nest fate	Estimated fate date	No. known eggs	No. chicks (No. fledged)	Chick band combination (chick weight in grams when banded)	Confirmed fledged	Notes
9	6	Banded -:S	2-Jun	Hatch	24-Jun	2	2 (1)	V:W/B (7.3g) P:W/B (6.3g)	P:W/B	V:W/B chick last observed 29 June at 5 days old. Limited remains of V:W/B collected 3 August and assumed to have died prior to fledging.
10	6	U -:S	4-Jun	Hatch	27-Jun	3	3 (2)	B/Y:W/B (7.2g) A/Y:W/B (7.5g) G/Y:W/B (5.3g)	B/Y:W/B G/Y:W/B	A/Y:W/B chick last observed 28 June at one day old.
11	6	U	3-Jun	Hatch	27-Jun	2	2 (2)	B/W:W/B (6.3g) G/W:W/B (7.4g)	B/W:W/B G/W:W/B	
12	6		3-Jun	Hatch	27-Jun	2	2 (1)	O/W:W/B (7.2g) Y/W:W/B (6.7g)	O/W:W/B	Y/W:W/B chick last observed 30 June at 3 days old.
13	6		5-Jun	Hatch	27-Jun	2	2 (1)	K/W:W/B (6.5g) 1 unbanded	K/W:W/B	Unbanded chick last observed 29 June at 2 days old.
14	6		5-Jun	Hatch	27-Jun	2	1 (1)	R/W:W/B (6.0g)	R/W:W/B	One egg abandoned post-term.
15	7		6-Jun	Hatch	29-Jun	2	2 (2)	A/G:W/B (7.7g) B/G:W/B (9.3g)	A/G:W/B B/G:W/B	
16	6		6-Jun	Hatch	29-Jun	1	1 (1)	Y/B:W/B (10.2g)	Y/B:W/B	
17	6	W/B:R/Y -:S	2-Jun	Hatch	27-Jun	2	2 (2)	O/Y:W/B (9.6g) R/Y:W/B (8.3g)	O/Y:W/B R/Y:W/B	
18	6	U U	7-Jun	Hatch	30-Jun	3	3 (3)	O/B:W/B (6.1g) W/B:W/B (6.2g) W/R:W/B (7.1g)	O/B:W/B W/B:W/B W/R:W/B	On 8 June bumpout installed for nest due to observed vehicle disturbance.
19	6	-:W	1-Jun	Hatch	28-Jun	2	2 (2)	A/B:W/B (5.7g) G/B:W/B (5.5g)	A/B:- G/B:W/B	A/B:W/B chick lost right band when small. Fledged as A/B:-.
20	6		1-Jun	Hatch	27-Jun	1	1 (0)	R/B:W/B (12.8g)		R/B:W/B chick last observed 15 July at 18 days old.
21	6		7-Jun	Hatch	28-Jun	1	2 (2)	R/A:W/B (6.7g) O/A:W/B (6.3g)	R/A:W/B O/A:W/B	
22	6		4-Jun	Hatch	25-Jun	1	1 (1)	L:W/B (8.2g)	L:W/B	L:W/B juvenile found dead on 6 enclosure shoreline 29 July and was sent for necropsy (see report Notes section). L:W/B band combination reused for LT55 chick.
23	6		5-Jun	Hatch	28-Jun	2	2 (0)	2 unbanded		Both chicks last observed 30 June at 2 days old.

Appendix A. California least tern nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Estimated initiation date	Nest fate	Estimated fate date	No. known eggs	No. chicks (No. fledge)	Chick band combination (chick weight in grams when banded)	Confirmed fledged	Notes
24	7		9-Jun	Abandoned, unknown if pre- or post-term	29-Jun	2	0 (0)			Nest observed active during a 20-day period 9 June to 28 June. Two eggs (one with cracks) abandoned, unknown if pre- or post-term.
25	7		8-Jun	Hatch	30-Jun	2	2 (1)	Y/R:W/B (14.8g) 1 unbanded	Y/R:W/B	Unbanded chick last observed 1 July at 1 day old.
26	6	Banded U	4-Jun	Hatch	25-Jun	2	2 (2)	K:W/B (6.5g) A/W:W/B (6.4g)	K:W/B A/W:W/B	
27	6	U -:W/B	6-Jun	Hatch	27-Jun	2	1 (0)	G/A:W/B (9.1g)		G/A:W/B chick last observed 10 July at 13 days old.
28	7	One adult banded	na	Unknown	29-Jun	3	0 (0)			Nest observed active for a 21-day period 8 June to 28 June. Insufficient information to estimate initiation date.
29	6		6-Jun	Hatch	27-Jun	2	2 (2)	B/A:W/B (8.2g) W/Y:W/B (7.8g)	B/A:W/B W/Y:W/B	
30	7		na	Unknown	30-Jun	2	0 (0)			Nest observed active during a 20-day period 9 June to 28 June. Nest not checked 29-30 June. Nest not active 1 July. Insufficient information to estimate initiation date.
31	6		8-Jun	Hatch	29-Jun	3	3 (3)	W/G:W/B (10.5g) O/G:W/B (8.8g) R/G:W/B (6.0g)	W/G:W/B O/G:W/B R/G:W/B	On 3 August, W/G:W/B juvenile depredated by peregrine falcon at 35 days old.
32	6		8-Jun	Hatch	29-Jun	2	2 (2)	Y/G:W/B (8.2g) A/R:W/B (8.1g)	Y/G:W/B A/R:W/B	
33	7	R/W:W/B	9-Jun	Depredated, coyote	1-Jul	2	0 (0)			
34	7	-(band)	10-Jun	Hatch	1-Jul	3	3 (0)	R/O:W/B (9.2g) G/O:W/B (7.1g) B/O:W/B (5.4g)		Three chicks last observed 3 July at 2 days old.
35	7		11-Jun	Hatch	2-Jul	2	2 (1)	B/R:W/B (6.1g) A/O:W/B (7.6g)	A/O:W/B	B/R:W/B chick last observed 8 July at 6 days old.
36	7		11-Jun	Abandoned pre-term	19-Jun	2	0 (0)			
37	6		9-Jun	Hatch	30-Jun	2	2 (2)	G/R:W/B (8.1g) O/R:W/B (8.1g)	G/R:W/B O/R:W/B	

Appendix A. California least tern nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Estimated initiation date	Nest fate	Estimated fate date	No. known eggs	No. chicks (No. fledged)	Chick band combination (chick weight in grams when banded)	Confirmed fledged	Notes
38	6	Y/R:W/B	11-Jun	Hatch	4-Jul	2	2 (1)	W/R/W:W/B (6.5g) Y/B/Y:W/B (8.3g)	Y/B/Y:W/B	W/R/W:W/B chick last observed 24 July at approximately 20 days old.
39	7		na	Failed, unknown cause	18-Jun	1	0 (0)			Nest observed active during a 9-day period 9 June to 17 June. Insufficient information to estimate initiation date.
40	7		na	Unknown	4-Jul	1	0 (0)			Nest observed active during a 21-day period 12 June to 2 July. Insufficient information to estimate initiation date.
41	7	W/B:W	14-Jun	Hatch	5-Jul	2	2 (1)	Y/R/Y:W/B (5.4g) A/B/A:W/B (6.3g)	Y/R/Y:W/B	A/B/A:W/B chick last observed 5 July when less than 1 day old.
42	7	B/W:G/B B/W:L	17-Jun	Hatch	8-Jul	2	2 (1)	B/R/B:W/B (6.2g) B/W/B:W/B (6.8g)	B/R/B:W/B	B/W/B:W/B chick last observed 10 July at 2 days old.
43	8	One adult banded	10-Jun	Hatch	1-Jul	3	3 (0)	W/O:W/B (11.6g) Y/O:W/B (17.5g) W/B/W:W/B (16.8g)		W/O:W/B and Y/O:W/B chicks last observed 5 July at 4 days old. W/B/W:W/B chick last observed 10 July at 9 days old.
44	6		14-Jun	Hatch	5-Jul	1	1 (1)	A/R/A:W/B (6.7g)	A/R/A:W/B	
45	6	U U	23-Jun	Hatch	15-Jul	3	2 (1)	R/B/R:W/B (5.3g) R/W/R:W/B (6.7g)	R/W/R:W/B	One egg (cracks and taps) with unknown fate. R/B/R:W/B chick last observed 19 July at 4 days old.
46	6	U Banded	20-Jun	Hatch	11-Jul	1	1 (0)	G/R/G:W/B (7.7g)		G/R/G:W/B chick last observed 22 July at 11 days old.
47	7	U W/B:W/Y	27-Jun	Hatch	18-Jul	2	2 (1)	O/B/O:W/B (6.6g) O/A/O:W/B (5.7g)	O/B/O:W/B	O/A/O:W/B chick last observed 19 July at 1 day old.
48	6		22-Jun	Hatch	13-Jul	2	1 (0)	1 unbanded		One egg abandoned post-term. On 18 July the approximate 5-day-old chick last observed alive with no attending adult. On 19 July chick observed dead in same location.
49	6	U -:A	30-Jun	Hatch	21-Jul	3	3 (2)	A/W/A:W/B (7.0g) W/A/W:W/B (9.3g) B/Y/B:W/B (5.9g)	A/W/A:W/B W/A/W:W/B	On 3 August, the W/A/W:W/B chick was seen in the open riding area, picked up and placed back in the enclosure.
50	6	Banded B/W:Y/O	30-Jun	Hatch	21-Jul	2	2 (1)	Y/A/Y:W/B (6.5g) G/Y/G:W/B (8.9g)	G/Y/G:W/B	Y/A/Y:W/B chick last observed 26 July at 5 days old.

Appendix A. California least tern nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Estimated initiation date	Nest fate	Estimated fate date	No. known eggs	No. chicks (No. fledged)	Chick band combination (chick weight in grams when banded)	Confirmed fledged	Notes
51	7	One adult banded	29-Jun	Hatch	20-Jul	2	2 (0)	O/W/O:W/B (5.7g) G/W/G:W/B (5.1g)		Two chicks last observed 21 July at 1 day old.
52	6		na	Unknown	22-Jul	1	0 (0)			Nest observed active during a 16-day period 6 July to 21 July. Insufficient information to estimate initiation date.
53	6	U	2-Jul	Hatch	23-Jul	2	2 (1)	O/Y/O:W/B (6.4g) A/Y/A:W/B (9.0g)	A/Y/A:W/B	On 5 August O/Y/O:W/B chick (approximately 11 days old) appeared half as large as sibling and was last observed 7 August at 13 days old.
54	7		na	Abandoned, unknown if pre- or post-term	17-Jul	1	0 (0)			Nest observed active during a 6-day period 11 July to 16 July with inconsistent incubation. Insufficient information to estimate initiation date.
55	6		11-Jul	Hatch	1-Aug	1	1 (0)	L:W/B (5.6g)		Chick last observed 4 August at 3 days old. Chick lying with wings splayed, having difficulty moving. L:W/B re-used on this chick after being used on LT22 chick (found dead on 29 July).
56	6		na	Unknown	2-Aug	1	0 (0)			Nest observed active during a 20-day period 13 July to 1 August. Insufficient information to estimate initiation date. One egg abandoned, unknown if pre-term or post-term. Unable to walk to nest close to the date it was last seen active. Nest potentially had more than the one egg found abandoned later in the season.
57	6		13-Jul	Hatch	3-Aug	2	1 (0)	1 unbanded		One chick and one egg (with cracks) at nest 3 August. No adult observed attending the chick or egg after 3 August, suspected abandoned.

**Appendix B. Snow plover nests at ODSVRA in 2013.**

Split hatch noted for nests with eggs hatching on more than one day. Plover chicks were banded to brood.

Location: 6 = 6 enclosure, 7 = 7 enclosure, 8 = 8 enclosure, BY = Boneyard enclosure, NOF = North Oso Flaco, SOF = South Oso Flaco

Adult pair: M = male, F = female, U = unbanded

Nest protection type: see Management Actions for description of seasonal enclosure; symbolic fence; bumpout; 10'x10'; circular; and mini-enclosures.

na = estimated date not available due to insufficient information

\* Nests marked with an asterisk have more detailed information included in the report Notes section.

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
1	7	F=V:-WW M=U	30-Mar	Hatch	4-May	3	3	3 RR:RY	0	Seasonal enclosure	Split hatch.
2	BY	F=U M=VV:YY	31-Mar	Hatch	3-May	3	2	2 GA:OW	2	Seasonal enclosure	One egg (without cracks) abandoned post-term.
3	BY	F= M=	4-Apr	Failed, unknown cause	8-Apr	2	0		0	Seasonal enclosure	
4	8	F= M=	4-Apr	Abandoned, suspected wind	5-Apr	1	0		0	Seasonal enclosure	One egg buried during period of high winds.
5	6	F=VV:VG M=PV:BR	3-Apr	Hatch	4-May	3	3	3 BB:AB	2	Seasonal enclosure	
6	8	F= M=U	7-Apr	Hatch	11-May	2	2	2 GA:GW	2	Seasonal enclosure	On 4 June 1 chick observed favoring right leg, seen subsequently without limp.
7	6	F=PV:VY M=U	5-Apr	Hatch	7-May	3	3	3 BB:VB	2	Seasonal enclosure	
8	7	F=U M=U	5-Apr	Hatch	7-May	3	2	1 BB:VG 1 B:-VG	2	Seasonal enclosure	One egg (without cracks) abandoned post-term. Both chicks banded BB:VG on 7 May and 1 chick later lost 1 band from the left leg.
9	7	F=U M=U	7-Apr	Hatch	11-May	3	3	3 BB:BB	1	Seasonal enclosure	On 27 June 1 fledgling observed favoring left leg, seen subsequently without limp.
10	8	F= M=U	8-Apr	Hatch	12-May	3	3	3 GG:BG	1	Seasonal enclosure	
11*	7	F=U M=U	5-Apr	Abandoned post-term	16-May	3	0		0	Circular excl. with top Symbolic fence	Adults of SP11 continued to incubate clutch of 3 eggs determined to be nonviable. Potentially viable abandoned eggs from SP17 placed into SP11 (see report Notes section). (For purpose of report nest fate category for SP11 is abandoned post-term.)
12	6	F=U M=U	7-Apr	Hatch	11-May	3	2	2 GA:VG	1	Circular excl. with top Symbolic fence	Split hatch. One egg (without cracks) abandoned post-term.
13	8	F=VG:GW M=BB:YY	10-Apr	Hatch	15-May	3	3	3 GA:GB	1	Seasonal enclosure	
14	SOF	F=VG:VR M=U	2-Apr	Hatch	4-May	3	3	3 VG:BR	3	10'x10' excl. with top Symbolic fence	On 25 April camera installed at nest.

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
15*	SOF	F=U M=	1-Apr	Abandoned pre-term	21-Apr	3	0		0	10'x10' excl. with top Symbolic fence	On 18 April camera installed at nest. On 23 April 3 eggs determined to be abandoned in 10'x10' enclosure and transported to Monterey Bay Aquarium (see report Notes section).
16	6	F=U M=U	6-Apr	Hatch	8-May	3	2	2 BB:WB	1	Seasonal enclosure	One egg (without cracks) abandoned post-term.
17*	6	F=PV:WB M=U	11-Apr	Abandoned pre-term	13-May	3	0		0	Seasonal enclosure	One egg missing pre-term. On 16 May 2 eggs (1 with hatching cracks) determined to be abandoned were collected and placed in SP11 (see report Notes section).
18	8	F= M=PV:GY	2-Apr	Hatch	4-May	3	3	3 BB:GG	1	Seasonal enclosure	Split hatch. On 18 April 1 egg shallowly buried at nest and replaced on surface in nest bowl.
19	BY	F=NY:RB M=U	14-Apr	Hatch	14-May	3	3	1 VV:BG 2 unbanded	1	Seasonal enclosure	On 18 April camera installed at nest. On 14 May, nest camera confirmed 3 chicks hatched. Two of the 3 chicks not banded and not seen subsequently. VV:BG chick fledged.
20	7	F=VV:AA M=VG:YW	12-Apr	Hatch	14-May	3	3	2 BB:GB 1 unbanded	0	Circular excl. with top Symbolic fence	Split hatch. On 12 May eggs reentered in circular enclosure. On 15 May 1 chick in nest bowl with little movement, not dry, cold, and large yolk sac not retracted. This chick not banded and was not seen subsequently.
21	7	F= M=	15-Apr	Abandoned, suspected wind	5-May	3	0		0	Seasonal enclosure	Three eggs buried during period of high winds. Nest in area of high sand movement. On 17 April nest found with 1 egg 3 inches outside of nest bowl. Egg marked and returned to nest.
22*	6	F=U M=U	17-Apr	Hatch	19-May	3	2	1 GG:WG 1 GG:GW	0	Seasonal enclosure	One egg (without cracks) abandoned post-term. On 19 May 1 abandoned chick, banded GG:GW, was collected and transferred to Monterey Bay Aquarium (see report Notes section).
23	6	F=RR:PB M=U	14-Apr	Hatch	16-May	3	2	2 VV:BW	0	Seasonal enclosure	One egg abandoned post-term. Egg with inward punched hole crusted with sand and with unnatural weight distribution.
24	8	F=GA:PB M=VG:PR	12-Apr	Hatch	14-May	3	3	3 BB:AG	1	Seasonal enclosure	Split hatch. On 18 April camera installed at nest.
25	6	F=U M=U	18-Apr	Abandoned pre-term	7-May	3	0		0	Seasonal enclosure	

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
26*	NOF	F=NB:PG M=BB:VR	18-Apr	Abandoned post-term	13-Jun	3	0		0	Circular excl. with top Symbolic fence	On 22 April camera installed at nest. Adults of SP26 continued to incubate clutch of 3 eggs determined to be nonviable. Potentially viable eggs from SP100 placed into SP26 (see report Notes section). On 19 June, eggs recentered in circular enclosure. (For purpose of report nest fate category for SP26 is abandoned post-term.)
27	NOF	F=RR:OY M=U	17-Apr	Hatch	19-May	3	3	3 BB:BW	2	10'x10' excl. with top Symbolic fence	On 25 April camera installed at nest.
28	6	F=VG:OG M=U	18-Apr	Hatch	21-May	3	3	3 BB:GW	2	Seasonal enclosure	
29*	NOF	F=RR:VW M=VG:BG	19-Apr	Hatch	21-May	3	2	2 VV:GR	1	10'x10' excl. with top Symbolic fence	On 21 May 1 egg (with slight crack) found buried in 10'x10' enclosure and determined to be abandoned. Egg collected and transported to Monterey Bay Aquarium (see report Notes section).
30	6	F=U M=U	17-Apr	Hatch	17-May	3	3	3 BB:WG	2	Seasonal enclosure	Split hatch.
31	6	F=U M=U	20-Apr	Hatch	23-May	3	2	2 VV:BB	2	Seasonal enclosure	One egg (without cracks) abandoned post-term.
32	7	F=VV:VW M=U	21-Apr	Hatch	23-May	3	2	2 BB:BY	1	Seasonal enclosure	One egg with unknown fate.
33	7	F=GA:(?)Y M=RR:WR	21-Apr	Abandoned pre-term	22-Apr	1	0		0	Seasonal enclosure	
34	7	F=U M=U	17-Apr	Hatch	19-May	3	3	3 GG:AG	2	Seasonal enclosure	Split hatch.
35	6	F= M=	21-Apr	Abandoned, suspected wind	12-May	3	0		0	Seasonal enclosure	Three eggs buried during period of high winds. Nest in area of high sand movement.
36	6	F=U M=BB:OR	20-Apr	Hatch	23-May	3	1	1 GG:OB	1	Seasonal enclosure	One egg (without cracks) abandoned post-term. One egg with unknown fate showed cracks but egg or hatched chick not seen subsequently.
37	6	F=banded M=U	21-Apr	Hatch	23-May	3	3	2 BB:VR 1 unbanded	1	Seasonal enclosure	Split hatch. One chick not banded to avoid disturbing nearby young snowy plover broods. Unbanded chick last seen with brood 26 May at 2 days old.
38	7	F=VV:RB M=U	17-Apr	Hatch	19-May	3	3	3 VV:VB	2	Seasonal enclosure	

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
39	6	F=GG:VY M=U	21-Apr	Hatch	24-May	3	3	1 GA:VY 2 unbanded	0	Seasonal enclosure	On 24 May 2 dead chicks found coated with sand 18 inches from nest bowl during period of high winds. Male and female incubate remaining egg in nest bowl, but do not approach chicks. Chick carcasses collected.
40	7	F=U M=GG:AR	22-Apr	Hatch	24-May	3	2	1 BB:YB 1 B:--	1	Circular excl. with top Symbolic fence	Split hatch. One egg with unknown fate. On 26 May 1 chick had both legs widely splayed outward and was not mobile. Chick banded B:-- and not seen subsequently.
41	8	F=U M=U	23-Apr	Hatch	27-May	3	2	2 GG:GB	1	Seasonal enclosure	One egg with unknown fate showed cracks but egg or hatched chick not seen subsequently.
42	6	F=U M=banded	22-Apr	Hatch	22-May	3	2	2 unbanded	0	Seasonal enclosure	One egg with unknown fate.
43	6	F= M=	25-Apr	Abandoned, suspected wind	27-Apr	1	0		0	Symbolic fence	One egg buried during period of high winds.
44	6	F=GA:GR M=GG:BW	23-Apr	Abandoned, suspected wind	11-May	3	0		0	Circular excl. with top Symbolic fence	Three eggs buried during period of high winds.
45	7	F=U M=U	23-Apr	Hatch	25-May	3	2	2 VV:WG	0	Seasonal enclosure	One egg with unknown fate. On 15 September desiccated carcass of 1 small VV:WG chick found in 8 enclosure. This chick was last observed alive on 26 May when 1 day old.
46	BY	F=U M=V:BR	25-Apr	Hatch	28-May	3	1	1 VG:BW	1	Seasonal enclosure	Two eggs (without cracks) abandoned post-term.
47	7	F= M=U	27-Apr	Hatch	29-May	3	3	2 GG:BB 1 unbanded	2	Seasonal enclosure	Split hatch. One chick not banded to avoid disturbing nearby young snowy plover broods. One GG:BB chick and 1 unbanded chick fledged.
48	6	F=U M=U	26-Apr	Hatch	28-May	3	2	2 VG:BB	1	Seasonal enclosure	One egg (without cracks) abandoned post-term.
49	6	F=VV:AA M=RR:YY	21-Apr	Hatch	23-May	3	3	2 GG:BW 1 unbanded	0	Seasonal enclosure	On 23 May a dead cold chick, found 25% buried in sand 2 feet from nest bowl during period of high winds. Chick carcass collected.
50	6	F=U M=U	21-Apr	Hatch	24-May	3	2	2 VV:VG	1	Seasonal enclosure	One egg with unknown fate.
51	SOF	F= M=VG:VR	28-Apr	Abandoned, suspected wind	9-May	3	0		0	10'x10' excl. with top Symbolic fence	On 30 April camera installed at nest. Camera confirmed 3 eggs buried during period of high winds.
52	7	F=GG:WW M=U	30-Apr	Hatch	1-Jun	3	3	3 GG:VG	0	Seasonal enclosure	Split hatch.

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
53	7	F=U M=U	27-Apr	Hatch	29-May	3	2	2 VG:VG	2	Seasonal exclosure	On 6 May 1 egg in nest and 2 eggs found 2 inches buried near nest. One egg damaged beyond viability and was collected. Second egg unburied and placed in nest with third egg (this egg did hatch).
54	6	F=U M=U	22-Apr	Hatch	24-May	3	2	2 unbanded	0	Seasonal exclosure	Chicks not banded to avoid disturbing nearby young snowy plover broods. One egg with unknown fate.
55	7	F= M=	28-Apr	Hatch	30-May	3	2	2 VG:AY	1	Seasonal exclosure	One egg (without cracks) abandoned post-term.
56	7	F=U M=	30-Apr	Abandoned, suspected wind	19-May	3	0		0	Circular excl. with top Symbolic fence	Three eggs buried during period of high winds.
57	SOF	F=U M=banded	30-Apr	Abandoned, suspected wind	18-May	3	0		0	10'x10' excl. with top Symbolic fence	Three eggs buried during period of high winds.
58	8	F=banded M=U	21-Apr	Hatch	23-May	3	3	3 GG:GW	0	Seasonal exclosure	
59	BY	F= M=RR:OR	23-Apr	Hatch	25-May	3	3	2 GG:GG 1 unbanded	2	Seasonal exclosure	One GG:GG chick and 1 unbanded chick fledged.
60	6	F=GG:YG M=	25-Apr	Abandoned, suspected wind	24-May	3	0		0	Seasonal exclosure Bumpout	On 4 May 2 eggs buried 3 inches from nest bowl during period of moderate winds. Eggs unburied and placed in nest bowl with third egg. On 4 May bumpout extended to decrease possible vehicle disturbance. On 24 May 3 eggs buried during period of high winds.
61	6	F= M=	2-May	Abandoned, suspected wind	27-May	3	0		0	Seasonal exclosure	On 17 May 1 egg missing pre-term. Two eggs buried during period of high winds.
62	7	F= M=U	21-Apr	Hatch	23-May	3	2	2 GA:AB	2	Seasonal exclosure	One egg (without cracks) abandoned post-term. On 22 May 1 egg (without cracks) unburied and placed in nest bowl with other 2 eggs (both with hatching cracks).
63	6	F= M=	22-Apr	Abandoned, suspected wind	22-May	3	0		0	Seasonal exclosure	Three eggs buried during period of high winds. Nest in area of high sand movement.
64	BY	F=U M=U	26-Apr	Abandoned, suspected wind	22-May	3			0	Seasonal exclosure	Three eggs buried during period of high wind.
65*	6	F=RR:VB M=GG:WB	5-May	Hatch	6-Jun	3	3	3 GA:VB	2	Seasonal exclosure	Split hatch. On 14 June, 1 SP65 chick aggressively attacked by an adult male plover. Chick collected and later reunited with parent and brood of SP65 (see report Notes section).

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
66	NOF	F=VG:AW M=GG:AR	9-May	Hatch	10-Jun	3	3	3 VG:WB	3	Circular excl. with top Symbolic fence	Split hatch. On 25 May and 1 June eggs recentered in circular enclosure.
67	8	F=U M=W:-Y/G	29-Apr	Hatch	31-May	3	2	2 GA:BB	1	Seasonal enclosure	One egg with unknown fate.
68	7	F=banded M=RR:WR	7-May	Hatch	8-Jun	3	3	3 GG:WB	2	Seasonal enclosure	Split hatch.
69	7	F= M=	27-Apr	Abandoned, suspected wind	24-May	3	0		0	Seasonal enclosure	Three eggs buried during high winds.
70	7	F=U M=BB:RG	6-May	Abandoned pre-term	22-May	3	0		0	Circular excl. with top Symbolic fence	
71	6	F= M=	na	Abandoned, suspected wind	(20-May)	1	0		0	Seasonal enclosure	Minimum of 1 egg abandoned during period of high winds. Nest in area of high sand movement. Nest location known by multiple observation of incubating adult. To avoid disturbing young snowy plover broods nest not walked to. Insufficient information to estimate initiation date.
72	Unknown	F= M=U	13-Apr	Hatch	(15-May)	2	2	2 BB:VW	2		
73	7	F=PV:YB M=U	15-May	Hatch	16-Jun	3	2	1 GG:VB 1 unbanded	1	Seasonal enclosure	Split hatch. Unbanded chick observed with brood on 17 June, when 1 day old, not seen subsequently. One egg (without cracks) abandoned post-term.
74	6	F=U M=GG:BW	18-May	Abandoned, suspected wind	24-May	2	0		0	Circular excl. with top Symbolic fence	Two eggs buried during period of high winds.
75*	6	F=U M=VV:GB	16-May	Hatch	17-Jun	3	3	3 GG:YG	2	Seasonal enclosure	On 7 July 1 chick observed in open riding area and directed back to enclosure (see report Notes section).
76	6	F=VG:AR M=U	14-May	Hatch	15-Jun	3	2	2 GA:AW	0	Seasonal enclosure	One egg (without cracks) abandoned post-term.
77	6	F= M=	19-May	Failed, unknown cause	31-May	2	0		0	Seasonal enclosure	
78	7	F=RR:AR M=U	9-May	Hatch	10-Jun	3	3	3 VV:WB	3	Mini-enclosure Symbolic fence	Split hatch.
79	7	F= M=GA:YB	10-May	Hatch	11-Jun	3	3	3 GA:GG	2	Seasonal enclosure	
80	BY	F=NY:RB M=VG:RB	24-May	Hatch	25-Jun	3	2	1 GG:WY 1 unbanded	2	Seasonal enclosure	Split hatch. One chick not banded to avoid disturbing nearby young snowy plover broods. One egg (without cracks) abandoned post-term.

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
81	7	F=U M=U	21-May	Hatch	22-Jun	3	3	3 GG:GR	3	Seasonal enclosure	Split hatch.
82	6	F=U M=U	20-May	Hatch	21-Jun	3	3	3 GG:YB	3	Seasonal enclosure	Two 42-day-old juveniles were noticeably smaller than sibling.
83	SOF	F=VG:VR M=VG:AB	12-May	Abandoned post-term	23-Jun	2	0		0	10'x10' excl. with top Symbolic fence	Two eggs abandoned post-term after 40 days of incubation.
84	6	F=U M=U	10-May	Hatch	11-Jun	3	3	3 GG:AW	3	Seasonal enclosure	On 17 June 1 chick was observed favoring left leg slightly, seen subsequently without limp.
85	7	F=U M=GG:AY	26-May	Hatch	27-Jun	3	1	1 GG:OG	1	Seasonal enclosure	Two eggs abandoned post-term, 1 without cracks and second with a fully formed dead chick enclosed within a whitish membrane and inside a half open egg.
86	6	F=banded M=U	24-May	Hatch	25-Jun	2	1	1 unbanded	0	Seasonal enclosure	Chick not banded to avoid disturbing nearby snowy plover and least tern broods. One egg abandoned post-term.
87	8	F= M=U	26-May	Hatch	27-Jun	3	3	3 GA:WW	1	Seasonal enclosure	Split hatch.
88*	6	F=NB:OW M=GG:PR	23-May	Hatch	22-Jun	3	2	2 GA:BG	2	Seasonal enclosure	One egg (without cracks) abandoned post-term. On the afternoon of 26 June, 1 chick aggressively attacked by an adult plover and was collected. The following day, this chick was reunited with its parent and brood (see report Notes section).
89	7	F= M=	25-May	Abandoned post-term	1-Aug	3	0		0	Seasonal enclosure	Three egg clutch abandoned post-term after 64 days of incubation.
90	7	F= M=R::G/W	26-May	Hatch	27-Jun	3	3	3 GA:WG	2	Seasonal enclosure	
91	6	F=banded M=U	28-May	Hatch	29-Jun	3	3	3 unbanded	0	Seasonal enclosure	Split hatch.
92	7	F=U M=U	30-May	Hatch	1-Jul	3	3	2 BB:YW 1 unbanded	3	Seasonal enclosure	
93	6	F=VV:VW M=V::AY	29-May	Hatch	30-Jun	3	3	2 BB:YG 1 unbanded	0	Seasonal enclosure	Split hatch. Unbanded chick observed with brood 2 July, when 2 days old, not seen subsequently.
94	8	F= M=RR:WB	10-May	Hatch	11-Jun	3	1	1 GG:GY	0	Seasonal enclosure	On 11 June, 2 eggs had larger than normal "pip" holes with live chicks stuck within eggs. Both were abandoned post-term and died while inside the eggs.
95	6	F= M=	25-May	Hatch	26-Jun	2	1	1 unbanded	0	Mini-enclosure Symbolic fence	On 19 June nest reentered in mini-enclosure. Chick not banded to avoid disturbing nearby young snowy plover broods. One egg unknown fate.

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
96	7	F=U M=GA:AG	29-May	Hatch	30-Jun	3	3	3 BB:WY	3	Seasonal enclosure	Split hatch.
97	6	F=U M=U	31-May	Unknown	2-Jul	3	0		0	Seasonal enclosure	No evidence of hatch observed. On 4 July, nest bowl empty.
98	SOF	F=RR:OY M=GA:PY	30-May	Hatch	30-Jun	3	3	3 GG:BR	3	10'x10' excl. with top Symbolic fence	On 5 June, camera installed at nest.
99	SOF	F= M=U	23-May	Hatch	24-Jun	3	2	2 VV:AW	2	10'x10' excl. with top Symbolic fence	Split hatch. One egg missing pre-term and found buried 23 August.
100*	SOF	F=banded M=U	22-May	Abandoned pre-term	11-Jun	3	0		0	10'x10' excl. with top Symbolic fence	On 13 June clutch determined to be abandoned and 3 eggs collected and placed in SP26 nest (see report Notes section). On 4 June, nest camera installed at nest. Nest camera confirmed female not on nest after 6 June and male not on nest after 11 June.
101	SOF	F=U M=U	3-Jun	Hatch	5-Jul	3	3	3 GG:AY	3	10'x10' excl. with top Symbolic fence	
102	6	F=VV:AA M=U	2-Jun	Hatch	4-Jul	3	3	2 GA:WY 1 unbanded	3	Seasonal enclosure	
103*	6	F= M=	4-Jun	Abandoned, suspected wind	21-Jun	3	0		0	Mini-enclosure Seasonal enclosure	On 21 June, nest determined to be abandoned and 2 eggs were collected and transported to Monterey Bay Aquarium (see report Notes section).
104	6	F=U M=GG:VB	4-Jun	Hatch	6-Jul	3	3	3 BB:BR	1	Seasonal enclosure	Split hatch. One chick observed not walking or moving well on 18 July, seen subsequently moving normally.
105	8	F= M=PV:GY	7-Jun	Hatch	9-Jul	3	2	2 unbanded	1	Seasonal enclosure	One egg abandoned post-term.
106	7	F=U M=U	31-May	Hatch	2-Jul	3	3	3 GG:YW	2	Seasonal enclosure	
107	6	F=GG:YG M=RR:GG	3-Jun	Hatch	5-Jul	3	3	3 GA:AY	1	Seasonal enclosure	Split hatch.
108	6	F= M=	31-May	Hatch	2-Jul	3	3	3 unbanded	0	Seasonal enclosure	Chicks not banded to avoid disturbing nearby young snowy plover and least tern broods.
109	7	F=VG:OG M=U	5-Jun	Hatch	7-Jul	3	3	3 BB:OB	0	Seasonal enclosure	Split hatch.
110	7	F=U M=U	6-Jun	Hatch	8-Jul	3	2	2 unbanded	0	Seasonal enclosure	One egg abandoned post-term. Chicks not banded to avoid disturbing nearby young snowy plover broods.
111	6	F= M=	2-Jun	Unknown	3-Jul	3	0		0	Mini-enclosure Symbolic fence	On 20 June 3 eggs recentered in mini-enclosure. Two eggs abandoned and found buried within mini-enclosure on 8 September. One egg with unknown fate.

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
112	8	F=U M=U	7-Jun	Abandoned post-term	6-Aug	2	0		0	Mini-exclosure Symbolic fence	Two eggs abandoned post-term after 56 days of incubation.
113	8	F= M=U	4-Jun	Hatch	6-Jul	3	3	3 VV:YB	1	Seasonal exclosure	On 5 August intact carcass of large VV:YB chick (found within 18 inches of adult snowy plover wing) was collected from 8 exclosure shoreline. Chick last seen alive 29 July when 23 days old.
114	6	F=U M=	4-Jun	Hatch	6-Jul	3	1	1 unbanded	0	Seasonal exclosure	Two eggs with unknown fate. Unbanded chick observed at nest the morning of 6 July, not seen subsequently.
115	7	F=U M=	4-Jun	Hatch	6-Jul	2	2	2 unbanded	0	Mini-exclosure Symbolic fence	On 19 June 2 eggs recentered in mini-exclosure.
116	6	F= M=	10-Jun	Hatch	12-Jul	3	3	3 unbanded	0	Seasonal exclosure	Chicks not banded to avoid disturbing nearby young snowy plover and least tern broods.
117	SOF	F=U M=U	3-Jun	Hatch	5-Jul	3	3	3 BB:GY	0	10'x10' excl. with top Symbolic fence	
118	6	F= M=U	25-May	Hatch	30-Jun	3	3	3 unbanded	0	Mini-exclosure Seasonal exclosure	
119	7	F=U M=U	6-Jun	Hatch	7-Jul	3	3	3 BB:RB	0	Seasonal exclosure	
120	6	F=U M=RR:YY	8-Jun	Hatch	9-Jul	3	2	2 unbanded	2	Mini-exclosure Symbolic fence	Split hatch. One egg abandoned post-term. Chicks not banded to avoid disturbing nearby young snowy plover broods. On 3 September carcass of small, decomposed unbanded chick (nest origin unclear) found buried within mini-exclosure with 1 buried egg.
121	6	F=GG:GR M=U	5-Jun	Hatch	7-Jul	3	3	3 unbanded	2	Mini-exclosure Symbolic fence	Chicks not banded to avoid disturbing nearby young snowy plover broods.
122	8	F=U M=U	6-Jun	Hatch	8-Jul	3	2	1 VG:VW 1 unbanded	2	Mini-exclosure Symbolic fence	One egg abandoned post-term. Chick not banded to avoid disturbing nearby young snowy plover broods.
123	8	F=VV:VG M=PV:YB	13-May	Hatch	14-Jun	3	3	3 BB:WW	1	Seasonal exclosure	Split hatch.
124	8	F=U M=U	26-May	Hatch	27-Jun	3	2	2 GA:YW	2	Seasonal exclosure	One egg unknown fate.
125	SOF	F=U M=banded	12-Jun	Hatch	13-Jul	3	3	2 VG:YY 1 unbanded	0	10'x10' excl. with top Symbolic fence	
126	6	F=U M=GG:YG	13-Jun	Hatch	15-Jul	3	3	3 PV:BB	0	Seasonal exclosure	
127	7	F=V:-BR M=U	11-Jun	Hatch	12-Jul	3	3	2 VW:BB 1 unbanded	3	Seasonal exclosure	Split hatch. One chick not banded to avoid disturbing nearby young snowy plover broods.

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
128	8	F=U M=U	7-Jun	Hatch	9-Jul	3	2	2 unbanded	0	Seasonal enclosure	One egg unknown fate.
129	7	F=GG:WW M=U	9-Jun	Hatch	11-Jul	3	3	3 BB:AR	2	Mini-enclosure Symbolic fence	Split hatch.
130	6	F=U M=U	13-Jun	Abandoned post-term	7-Aug	3	0		0	Seasonal enclosure	Three eggs abandoned post-term after 51 days of incubation.
131	BY	F=RR:VV M=U	12-Jun	Hatch	14-Jul	3	3	3 GG:VR	3	Seasonal enclosure	
132	BY	F= M=	6-Jun	Abandoned post-term	15-Jul	3	0		0	Seasonal enclosure	One egg missing (assumed pre-term, nest monitored closely with no evidence of hatch). Two eggs abandoned post-term and later depredated by bobcat.
133	SOF	F=VG:GW M=U	7-Jun	Hatch	9-Jul	3	3	3 unbanded	0	10'x10' excl. with top Symbolic fence	Split hatch. On 26 June camera installed at nest. Camera confirmed split hatch.
134	SOF	F= M=V-:BR	16-Jun	Hatch	18-Jul	3	2	1 VG:BY 1 V-:BY	2	10'x10' excl. with top Symbolic fence	One egg abandoned post-term. Both chicks banded VG:BY on 18 July and 1 chick later lost the lower left band.
135	NOF	F=GA:RB M=VG:BG	17-Jun	Hatch	19-Jul	3	3	3 VG:GY	1	Circular excl. with top Symbolic fence	On 26 June camera installed at nest.
136	7	F= M=U	22-Jun	Hatch	24-Jul	3	3	3 BB:OG	0	Seasonal enclosure	
137	NOF	F=U M=U	16-Jun	Hatch	17-Jul	3	2	2 VV:WY	2	Circular excl. with top Symbolic fence	Split hatch. One egg (without cracks) abandoned post-term. On 26 June camera installed at nest. Camera confirmed split hatch.
138	NOF	F=VV:VG M=U	20-Jun	Hatch	22-Jul	3	3	3 BB:PB	2	Circular excl. with top Symbolic fence	On 23 June camera installed at nest. On night of 28 June, from 12:12 am to 4:30 am, camera recorded large chick periodically brooding under male while eggs were being incubated. Chick banded but unable to confirm bands from photos.
139	8	F= M=	9-Jun	Abandoned pre-term	5-Jul	2	0		0	Seasonal enclosure	One egg missing pre-term. On 4 July 1 egg at nest with cracks. On 16 July 1 egg with a small hole and a dried dead chick inside.
140	6	F=U M=U	21-Jun	Hatch	23-Jul	3	3	3 PG:BB	2	Seasonal enclosure	
141	SOF	F=U M=	16-Jun	Depredated, gull	2-Jul	3	0		0	Symbolic fence	All 3 eggs depredated by gull.
142	6	F=U M=U	22-Jun	Hatch	24-Jul	3	3	2 PG:GG 1 unbanded	1	Seasonal enclosure	Unbanded chick last seen with brood 8 August, when 15 days old.
143	6	F=U M=RR:OG	9-Jun	Hatch	11-Jul	3	3	3 VV:GY	0	Seasonal enclosure	

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
144	6	F=U M=BB:RY	11-Jun	Hatch	13-Jul	3	3	3 GG:PB	1	Seasonal enclosure	Split hatch.
145	6	F= M=	4-Jun	Abandoned, suspected wind	10-Jun	3	0		0	Seasonal enclosure	Three eggs buried by large encroaching sand bank during period of moderate wind.
146*	Unknown	F= M=U	26-Apr	Hatch	(23-May)	2	2	1 GG:WW 1 VG:BG	1		On 27 May unbanded chick with tar on body and was taken to Pacific Wildlife Care in San Luis Obispo County for veterinary treatment. On 29 May this chick was transported to Monterey Bay Aquarium (see report Notes section).
147	Unknown	F= M=U	28-Apr	Hatch	(30-May)	1	1	1 VG:AB	1		
148	Unknown	F= M=banded	13-Apr	Hatch	(15-May)	1	1	1 VG:AW	1		
149*	Unknown	F=U M=GG:PY	1-May	Hatch	(2-Jun)	2	2	2 GA:BW	2		On 4 July the intact carcass of a GA:BW fledgling found on South Oso Flaco shoreline (see report Notes section and necropsy attachment).
150	Unknown	F=RR:PB M=U	12-May	Hatch	(13-Jun)	2	2	2 GA:AG	2		
151	Unknown	F=U M=Y-:GO	17-May	Hatch	(18-Jun)	3	3	3 GA:WB	3		
152*	6	F=GG:VY M=U	25-Jun	Hatch	27-Jul	3	3	3 VG:OB	0	Mini-enclosure Seasonal enclosure	On 1 August 2 chicks observed in open riding area and directed to shoreline of enclosure (see report Notes section).
153	7	F=RR:VB M=U	17-Jun	Hatch	22-Jul	3	3	3 unbanded	0	Mini-enclosure Symbolic fence	
154	6	F=B-:PR M=U	10-Jun	Hatch	12-Jul	3	3	3 VV:BY	1	Seasonal enclosure	Split hatch.
155	6	F=RR:PB M=U	28-Jun	Hatch	30-Jul	3	3	3 unbanded	0	Mini-enclosure Buffer fencing Symbolic fence	On 20 July additional fencing installed around nest, extending from Southern Enclosure west fence toward shoreline, as "buffer fencing" after large group of roosting gulls surround the mini-enclosure of nest. Chicks not banded to avoid disturbing nearby young snowy plover broods.
156	8	F= M=	26-Jun	Depredated	7-Jul	3	0		0	Seasonal enclosure	Three eggs depredated by unknown predator.

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
157	8	F=U M=VG:PR	1-Jul	Hatch	2-Aug	3	3	3 PV:VG	2	Mini-exclosure Symbolic fence	On 2 August, 1 of 3 hatched chicks found cold and unable to move near nest and not being incubated. Chick was warmed and placed with brood in nest bowl and was observed incubated by adult. Chick (bands marked with black permanent ink) was observed favoring left leg on 4 August and not walking normally on 6 August, not seen subsequently.
158	7	F=banded M=U	30-Jun	Hatch	1-Aug	3	1	1 VG:GW	1	Mini-exclosure Seasonal exclosure	Two eggs (without cracks) abandoned post-term.
159	6	F=PV:VY M=BB:OR	21-Jun	Hatch	23-Jul	3	2	2 PV:GG	0	Seasonal exclosure	One egg (without cracks) abandoned post-term.
160	8	F=U M=RR:WB	24-Jun	Hatch	26-Jul	3	2	2 GG:PG	0	Mini-exclosure Symbolic fence	On 21 July, 3 eggs repositioned in nest bowl after being overwashed by tide 1.5 feet from nest. On 26 July 1 egg noted with 2 inward dented sites on side of egg (dents were not present previously). This egg was abandoned post-term.
161	6	F= M=U	18-Jun	Hatch	20-Jul	3	2	2 unbanded	0	Seasonal exclosure	One egg abandoned post-term. Chicks not banded to avoid disturbing nearby young snowy plover and least tern broods.
162	8	F=U M=U	20-Jun	Hatch	22-Jul	3	2	2 PG:BG	0	Seasonal exclosure	One egg abandoned post-term.
163	6	F=GA:GR M=GG:BW	22-Jun	Hatch	24-Jul	3	2	2 PG:GB	0	Mini-exclosure Symbolic fence	Split hatch. One egg (without cracks) abandoned post-term. On 25 July (nest hatch date) tracks indicate that a coyote had circled around and attempted to dig under the mini-exclosure.
164	7	F= M=	na	Failed, unknown cause	(15-Jul)	1			0	Symbolic fence	Nest location known by multiple observations of incubating adult. Unable to walk to nest due to close proximity of young snowy plover broods. Minimum of 1 egg. No evidence of hatch observed. Insufficient information to estimate initiation date.
165	6	F=VG:AR M=U	24-Jun	Hatch	26-Jul	3	3	3 BB:PG	1	Seasonal exclosure	Split hatch.
166	6	F=banded M=U	28-Jun	Hatch	30-Jul	3	3	3 PV:VB	1	Seasonal exclosure	Split hatch.
167	SOF	F= M=	10-Jul	Abandoned pre-term	12-Jul	1	0		0	Symbolic fence	One egg abandoned pre-term.
168	7	F=U M=U	10-Jun	Hatch	12-Jul	3	3	3 BB:WR	1	Seasonal exclosure	Split hatch.

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
169	7	F=U M=VV:VR	4-Jul	Hatch	5-Aug	2	2	1 GA:BY 1 unbanded	0	Mini-exclosure Symbolic fence	Split hatch. One chick not banded to avoid disturbing nearby young snowy plover broods.
170	6	F=banded M=U	9-Jul	Hatch	10-Aug	3	3	2 PV:BG 1 unbanded	2	Mini-exclosure Symbolic fence	Split hatch. Unbanded chick last seen with brood 12 August when 2 days old.
171	7	F=U M=	4-Jul	Hatch	5-Aug	3	2	2 VG:YB	0	Seasonal exclosure	Split hatch. One egg (without cracks) abandoned post-term.
172*	7	F= M=GG:AR	5-Jul	Hatch	6-Aug	3	3	2 GG:PW	1	Mini-exclosure Symbolic fence	On 7 August 1 unbanded chick not attended by parent aggressively and repeatedly attacked by adult snowy plover. Chick collected and transported to Monterey Bay Aquarium (see report Notes section).
173*	BY	F=VV:VY M=	7-Jul	Hatch	8-Aug	3	1	1 unbanded	0	Seasonal exclosure	One chick hatched from nest on 8 August and was not banded. Two remaining eggs (both with cracks) determined to be abandoned. Eggs collected 10 August and transported to Monterey Bay Aquarium (see report Notes section).
174	7	F= M=U	3-Jul	Hatch	4-Aug	3	2	2 GA:GY	1	Mini-exclosure Symbolic fence	One egg (without cracks) abandoned post-term.
175	SOF	F=VG:VR M=VG:AB	5-Jul	Hatch	7-Aug	3	1	1 VV:WW	1	10'x10' excl. with top Symbolic fence	One egg (without cracks) abandoned post-term. One egg unknown fate.
176*	8	F=U M=W-:Y/G	5-Jul	Hatch	6-Aug	3	1	1 VG:WW	1	Mini-exclosure Symbolic fence	One egg with unknown fate and went missing either pre- or post-term. On 7 August 1 egg (with cracks) within mini-exclosure determined to be abandoned and was collected and transported to Monterey Bay Aquarium (see report Notes section).
177	7		na	Unknown	na	2	0		0	Seasonal exclosure	On 7 September, 2 eggs found mostly buried. Insufficient information to estimate initiation and fate date.
178	Unknown	F= M=VG:VR	27-May	Hatch	(28-June)	3	3	3 unbanded	3		
<b>Insufficient information available to assign following broods to a specific nest. Most to all of these broods were likely from nests known to hatch and with chicks not banded at nest.</b>											
UNK 1	Unknown	F= M=U	19-Apr	Hatch	(21-May)	1	1	1 unbanded	0		
UNK 2	Unknown	F=U M=U	22-Apr	Hatch	(24-May)	2	2	2 VV:VV	2		
UNK 3	Unknown	F= M=	27-May	Hatch	(28-Jun)	0	1	1 unbanded	0		

Appendix B. Snowy plover nests at ODSVRA in 2013 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (estimated)	No. known eggs	No. chicks	No. chicks banded and combination	No. chicks fledged	Nest protection type	Notes
UNK 4	Unknown	F= M=VV:GG	30-May	Hatch	(1-Jul)	1	1	1 GG:VW	1		
UNK 5	Unknown	F= M=U	28-May	Hatch	(29-Jun)	1	1	1 GG:VY	1		
UNK 6	Unknown	F=U M=U	2-Jun	Hatch	(4-Jul)	0	3	3 GG:YY	1		
UNK 7	Unknown	F=U M=banded	2-Jun	Hatch	(4-Jul)	3	3	3 GA:YG	2		
UNK 8	Unknown	F= M=U	6-Jun	Hatch	(8-Jul)	2	2	2 GG:RB	1		
UNK 9	Unknown	F= M=U	28-May	Hatch	(29-Jun)	1	1	1 unbanded	0		
UNK 10	Unknown	F=U M=U	27-May	Hatch	(28-Jun)	2	2	2 unbanded	2		
UNK 11	Unknown	F=U M=U	30-May	Hatch	(1-Jul)	3	4	2 unbanded	2		Brood of 4 chicks found on 9 July with 1 of the chicks assumed to be from another unbanded brood. By 11 July the brood had 2 chicks.
UNK 12	Unknown	F=U M=GG:VB	11-Jun	Hatch	(13-Jul)	3	3	3 VV:OB	1		
UNK 13	Unknown	F= M=VV:YY	6-Jun	Hatch	(8-Jul)	1	1	1 unbanded	1		
UNK 14	Unknown	F=U M=U	16-Jun	Hatch	(18-Jul)	3	3	3 unbanded	2		
UNK 15	Unknown	F= M=U	14-Jun	Hatch	(16-Jul)	1	1	1 unbanded	1		
UNK 16	Unknown	F= M=U	2-Jun	Hatch	(4-Jul)	1	1	1 unbanded	1		
UNK 17	Unknown	F=RR:GW M=BB:YY	31-May	Hatch	(2-Jul)	2	2	2 unbanded	2		
UNK 18	Unknown	F= M=B-:G/Y	27-Jun	Hatch	(29-Jul)	1	1	1 VV:YG	1		
UNK 19	Unknown	F= M=U	2-Jul	Hatch	(3-Aug)	3	3	3 PG:VW	2		
UNK 20	Unknown	F= M=U	24-Jun	Hatch	(26-Jul)	1	1	1 VV:YW	1		

Appendix C. Maps of California least tern and snowy plover nest locations at ODSVRA in 2013.

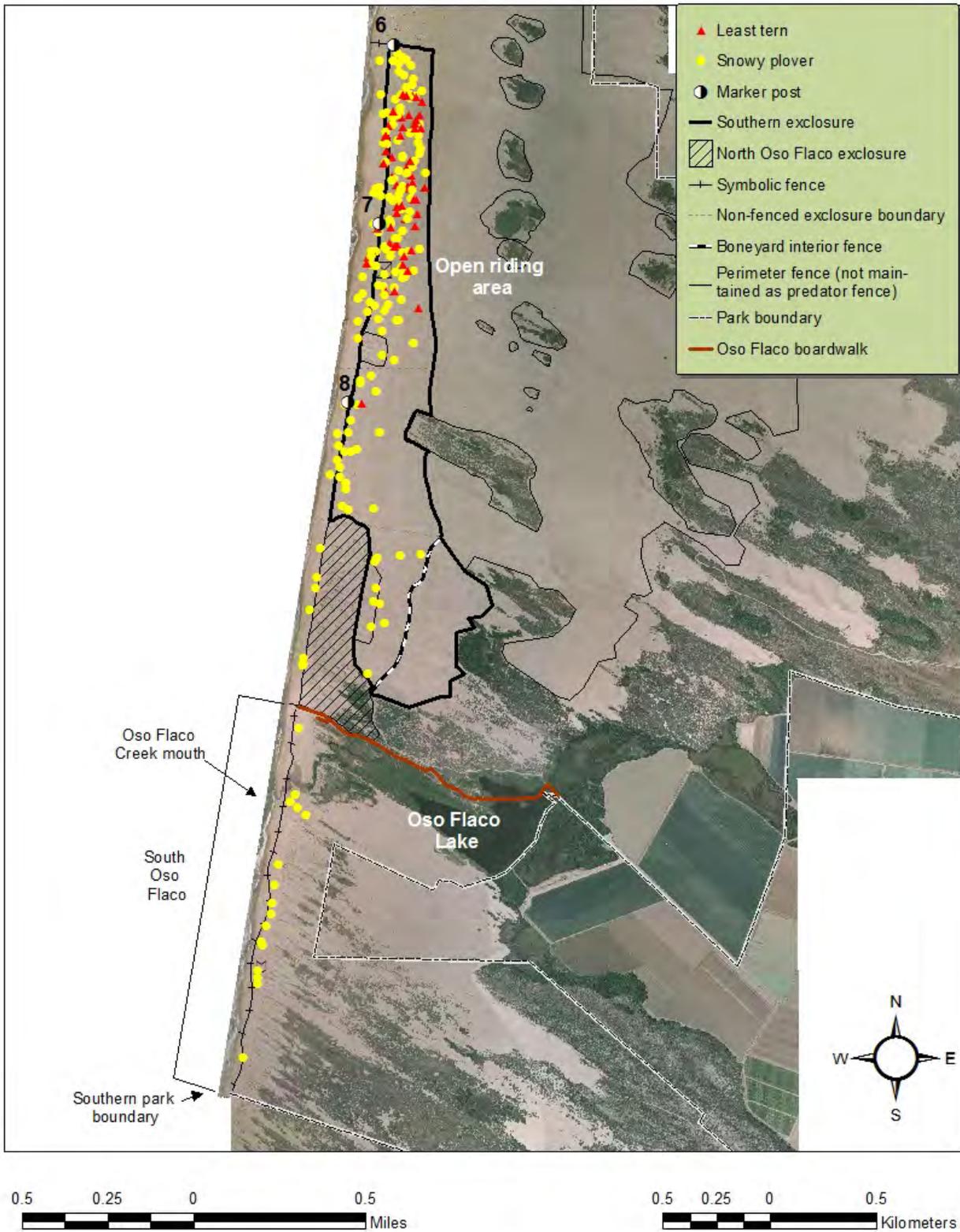


Figure C.1. All California least tern and snowy plover nest locations at ODSVRA in 2013.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2013 (continued).

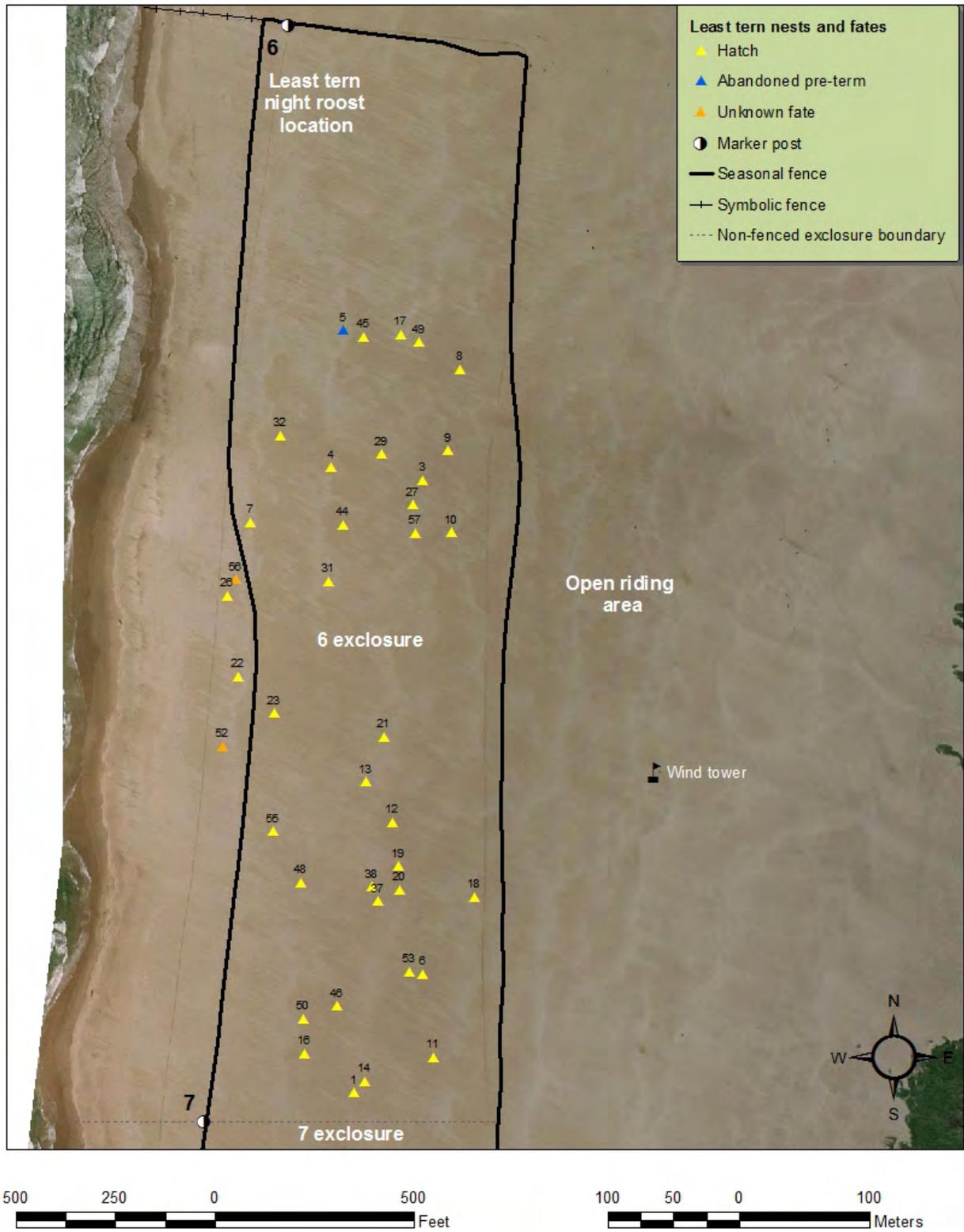


Figure C.2. California least tern nest locations at ODSVRA in 2013 (6 enclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2013 (continued).

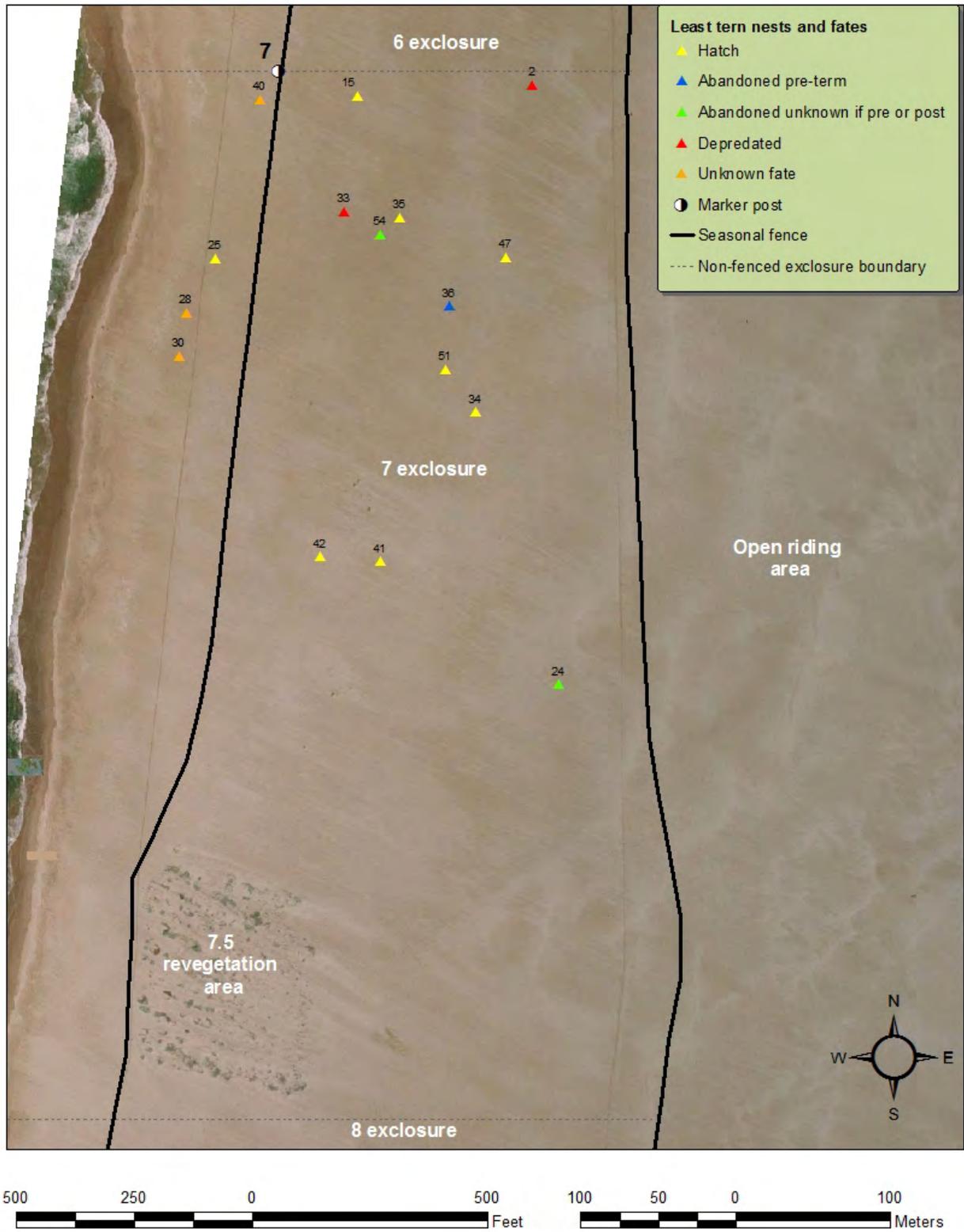


Figure C.3. California least tern nest locations at ODSVRA in 2013 (7 enclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2013 (continued).

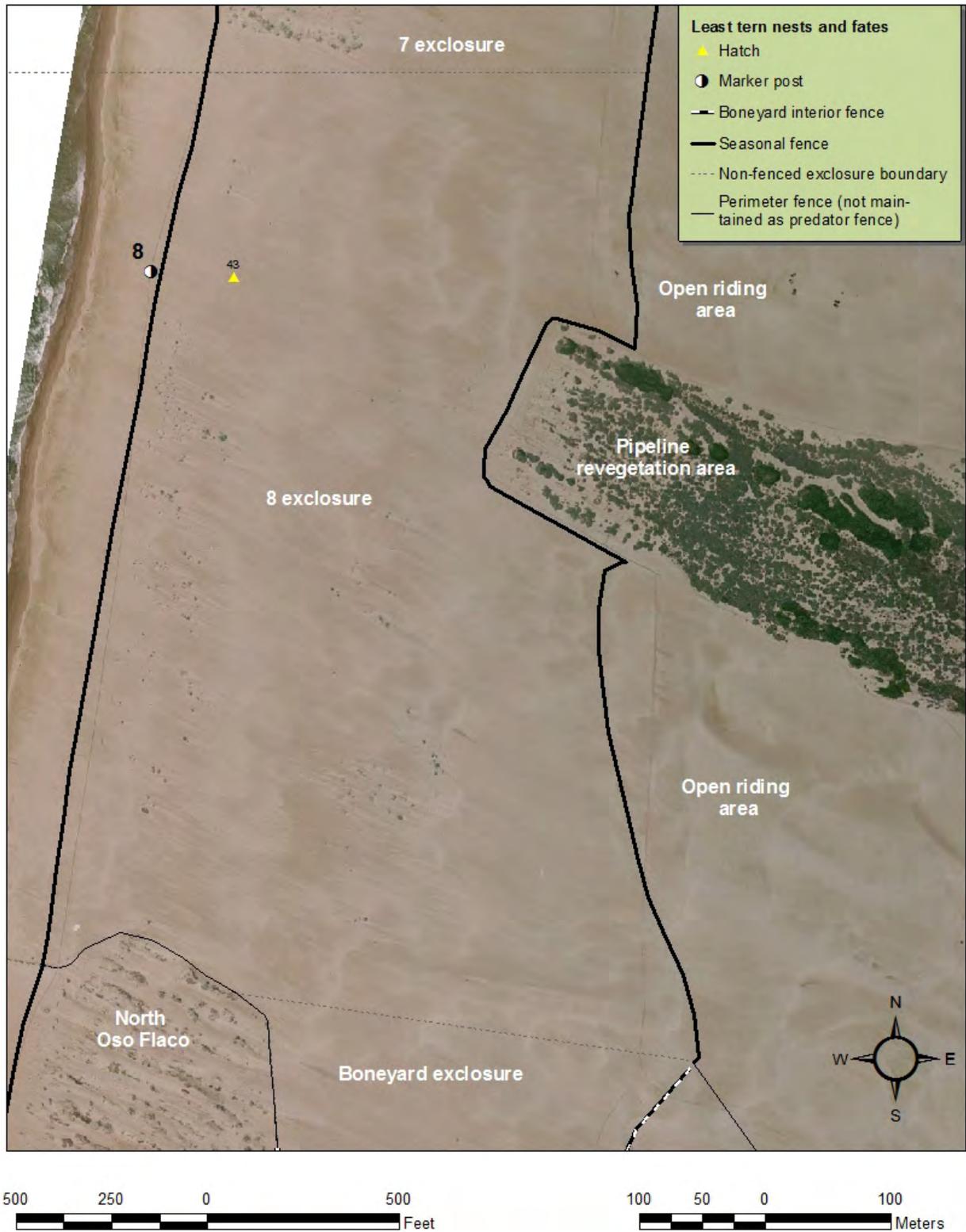


Figure C.4. California least tern nest locations at ODSVRA in 2013 (8 enclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2013 (continued).

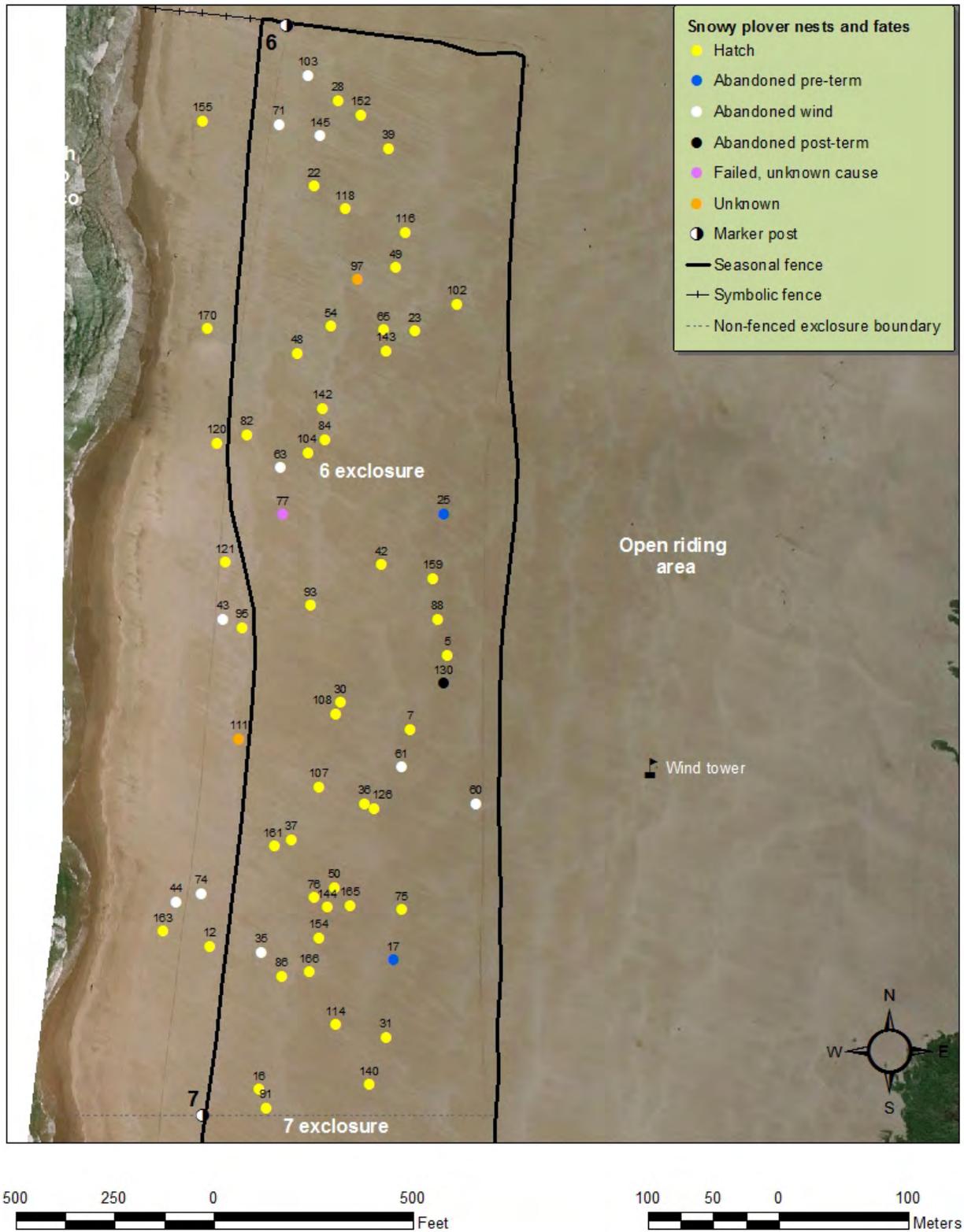


Figure C.5. Snowy plover nest locations at ODSVRA in 2013 (6 enclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2013 (continued).

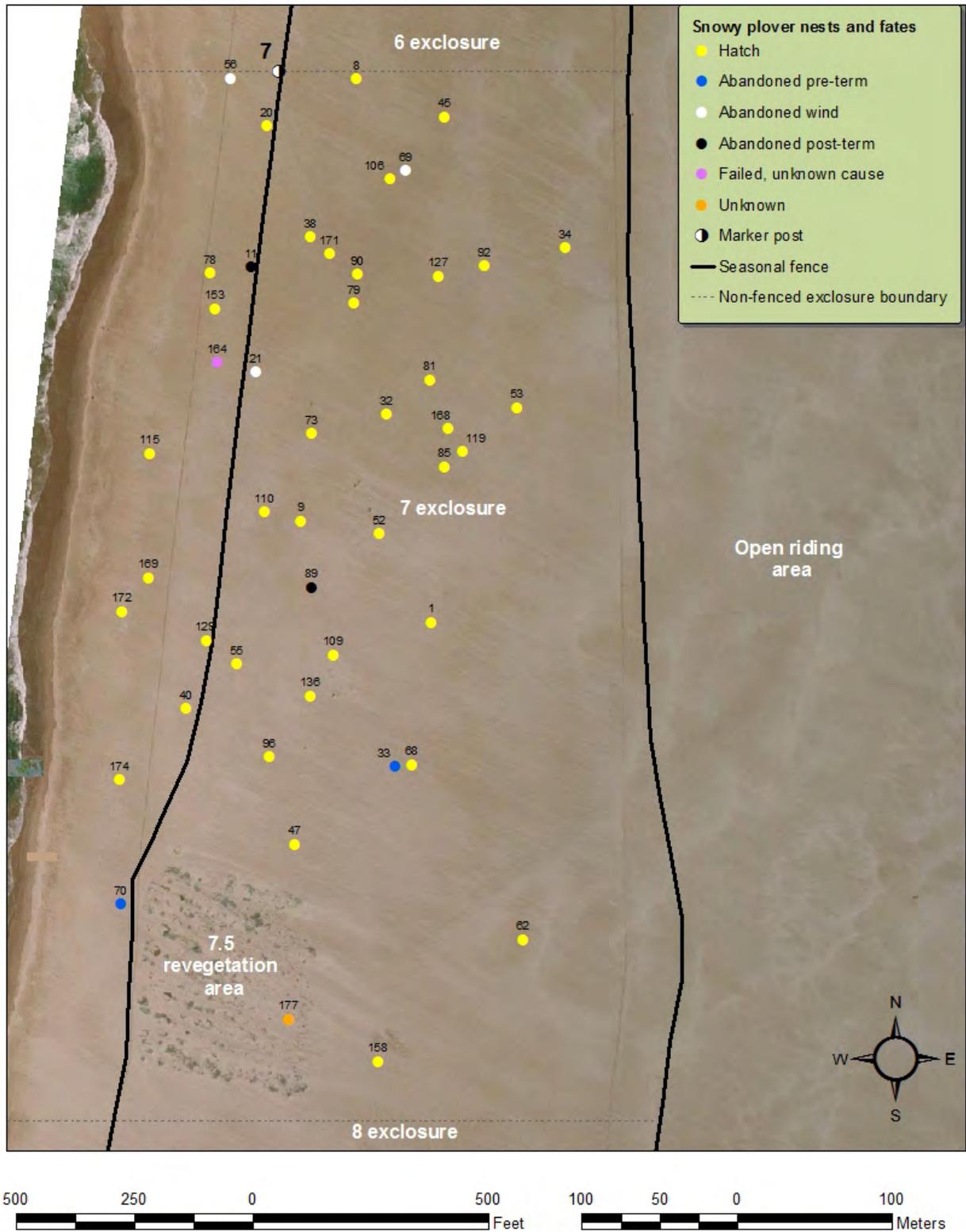
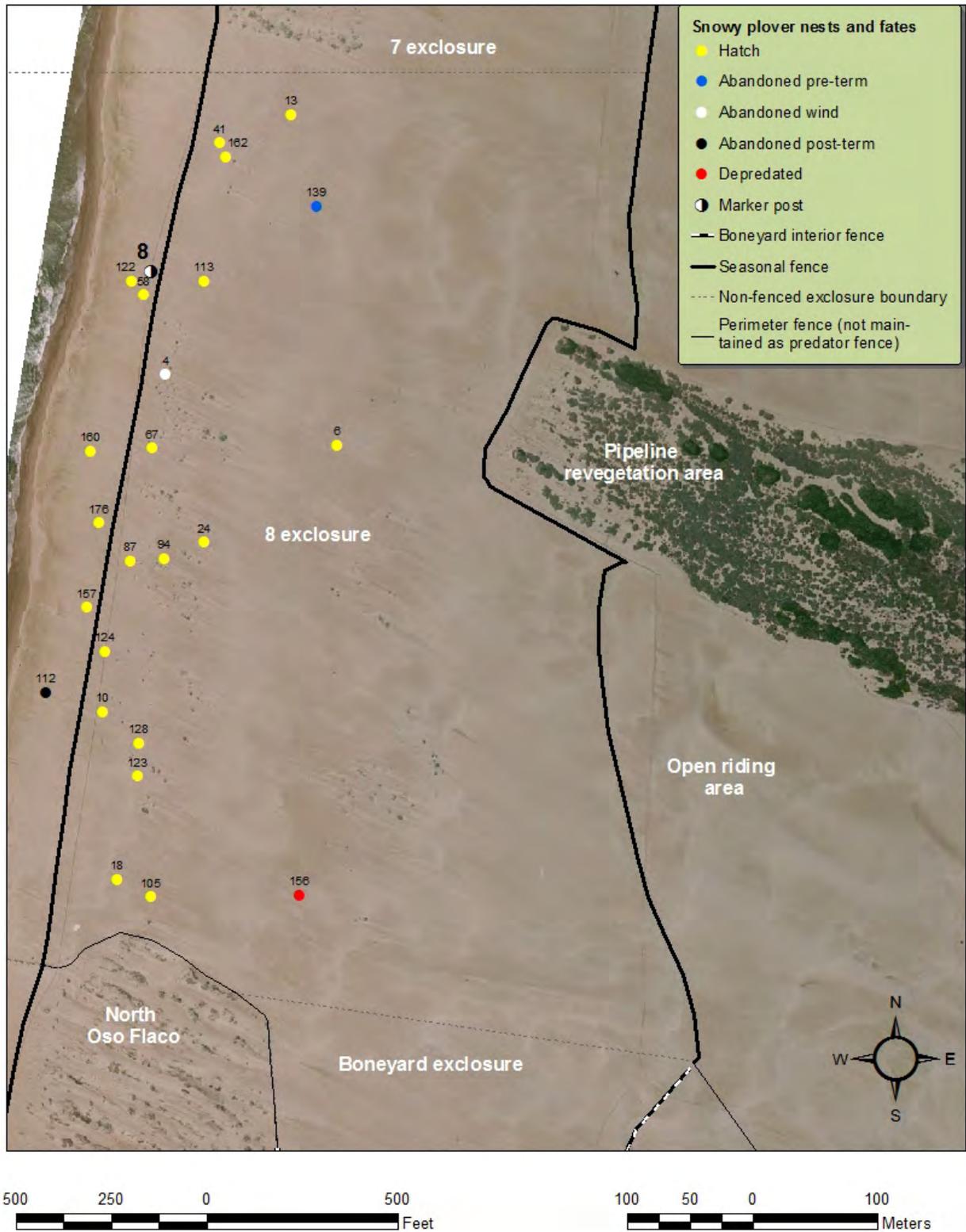


Figure C.6. Snowy plover nest locations at ODSVRA in 2013 (7 enclosure).

**Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2013 (continued).**



**Figure C.7. Snowy plover nest locations at ODSVRA in 2013 (8 enclosure).**

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2013 (continued).

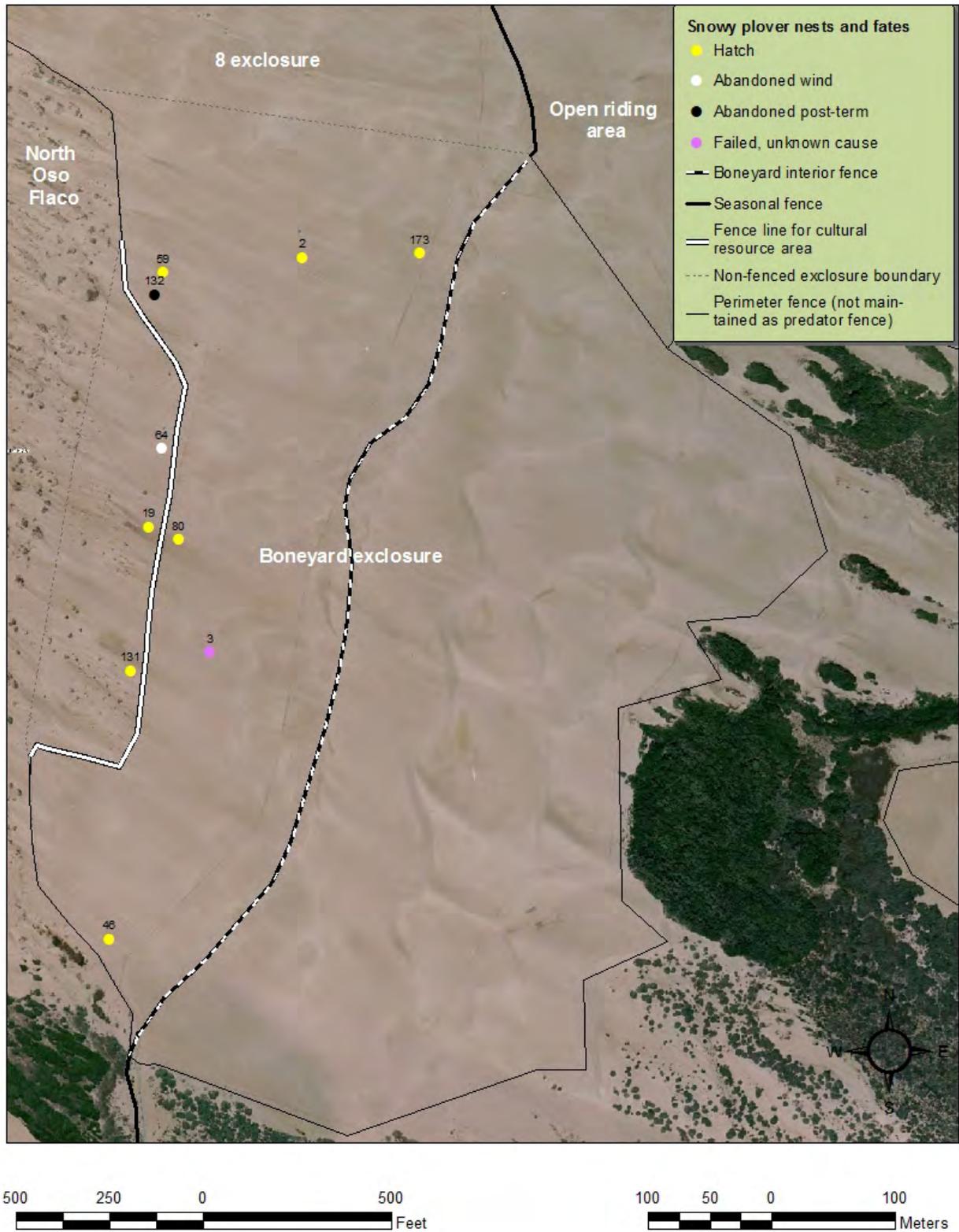
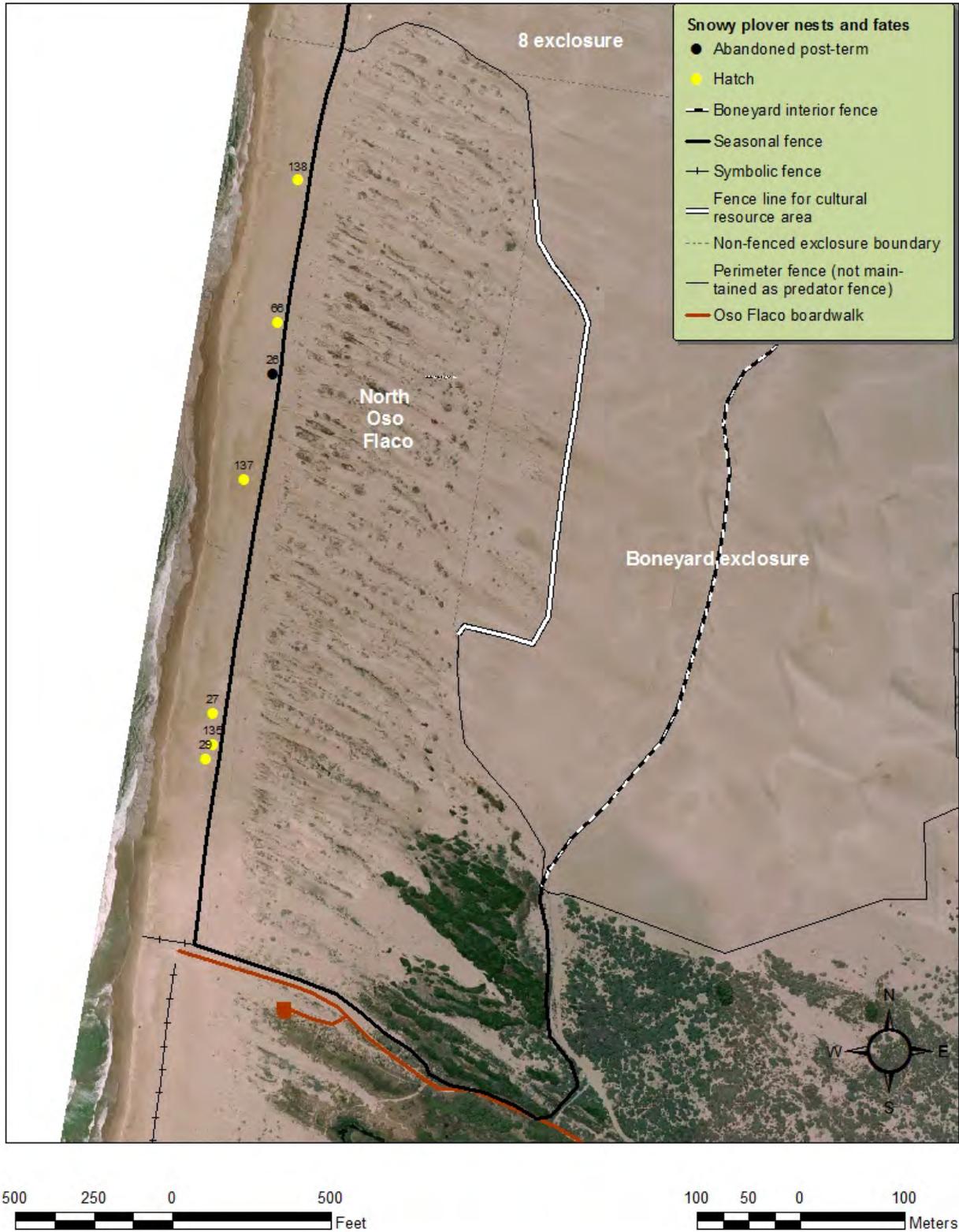


Figure C.8. Snowy plover nest locations at ODSVRA in 2013 (Boneyard enclosure).

**Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2013 (continued).**



**Figure C.9. Snowy plover nest locations at ODSVRA in 2013 (North Oso Flaco).**

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2013 (continued).

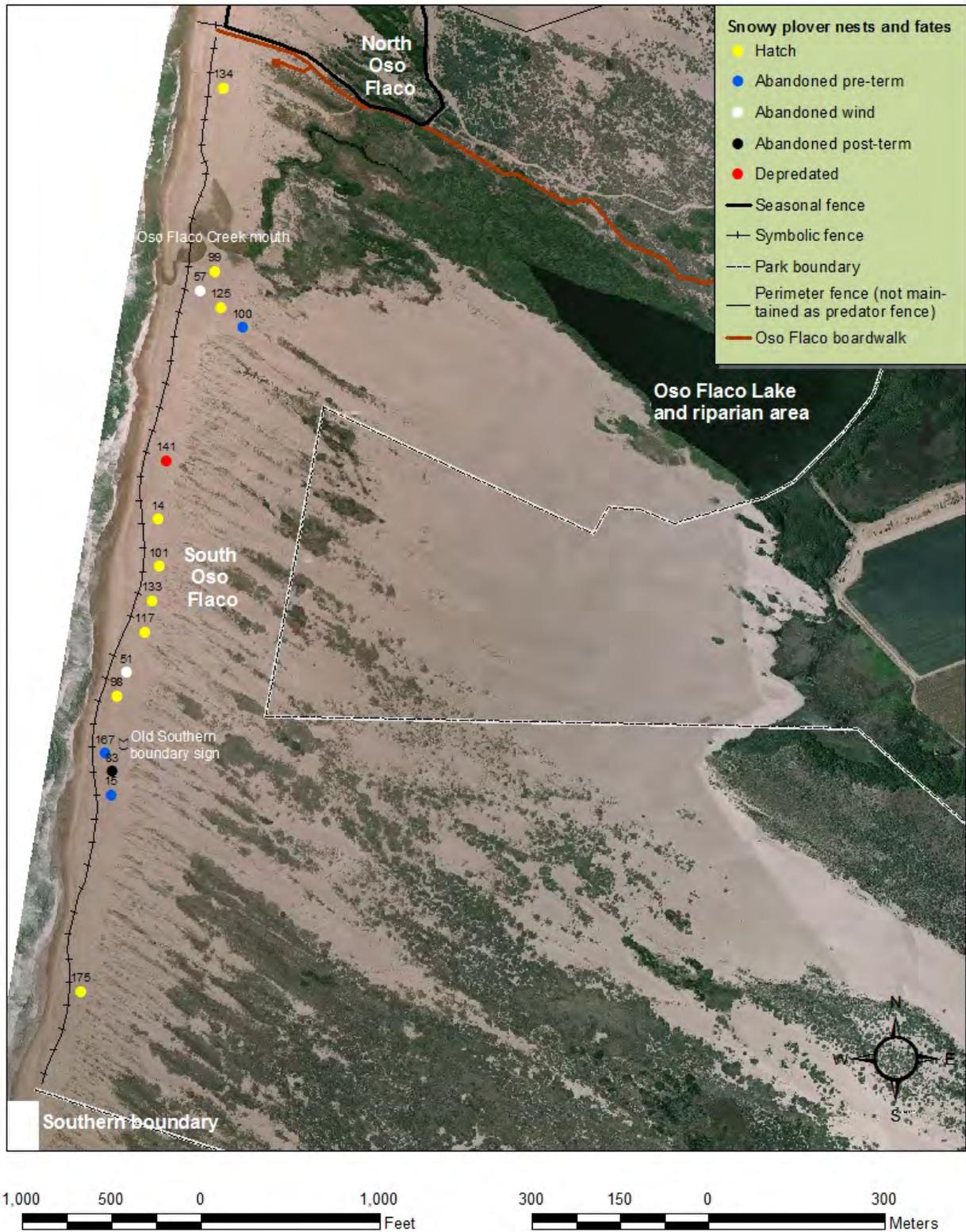


Figure C.10. Snowy plover nest locations at ODSVRA in 2013 (South Oso Flaco).

## Appendix D. Banded least terns and snowy plovers.

**Table D.1. Banded least terns recorded at ODSVRA in 2013.**

Juveniles fledged from ODSVRA in 2013 are not included. All birds from ODSVRA were banded as chicks. Additional color-banded birds were recorded but combinations not confirmed. A number of birds had a band on only one leg. These birds may have been banded on only one leg or have lost a band.

Band	Dates Seen	Origin and Year Banded	Notes
-:A	5/29, 6/5, 8/11, 8/23	ODSVRA 2006, 2008, or 2011	<b>LT49 breeding adult.</b> Y/G:A in 2006, G/Y:A in 2008, B/W:A in 2011.
-:A/B	5/30, 6/22	ODSVRA 2006, 2008, 2010, or 2011	<b>LT3 breeding adult.</b> Y/G:A/B in 2006, G/Y:A/B in 2008, W/B:A/B in 2010, B/W:A/B in 2011.
-:A/G	6/5, 8/7, 8/13, 8/19, 8/21, 8/26	ODSVRA 2006 or 2008	G band is broken (noted on 8/19, 8/26, 8/13). Y/G:A/G in 2006, G/Y:A/G in 2008.
-:A/W	7/8	ODSVRA 2006, 2008, 2010, or 2011	Y/G:A/W in 2006, G/Y:A/W in 2008, W/B:A/W in 2010, B/W:A/W in 2011.
-:G/O	8/4, 8.5, 8.6	ODSVRA 2008	G/Y:G/O in 2008.
-:S	5/22, 5/29, 5/30, 6/9, 6/26, 6/29.	unknown	<b>LT8, LT9, LT10, LT17 breeding adults (all nests hatched and fledged chicks).</b> Multiple sites band with only the federal band. Also may be any fledgling from 2004 when all banded G/Y:S. Minimum of four different adults.
-:W	5/19, 6/24	unknown	May be Y/G:W in 2006, G/Y:W in 2008, W/B:W in 2010.
? :W/A	8/6	likely ODSVRA 2006, 2008, 2010, or 2011	<b>LT25 breeding adult.</b> Y/G:W/A in 2006, G/Y:W/A in 2008, W/B:W/A in 2010, B/W:W/A in 2011.
-:W/B/W	5/15	ODSVRA 2008	G/Y:W/B/W in 2008.
-:W/(G or R)/W	7/1, 7/2	likely ODSVRA 2008 or 2011	<b>LT34 breeding adult.</b> G/Y:W/R/W in 2008, G/Y:W/G/W in 2008, B/W:W/R/W in 2011.
-:Y/O	5/30	ODSVRA 2006 or 2008	Y/G:Y/O in 2006, G/Y:Y/O in 2008.
? :O/G	8/4	likely ODSVRA 2006	Y/G:O/G in 2006.
-:W/B	6/18	ODSVRA 2006, 2009, 2010, or 2011	<b>LT27 breeding adult.</b> May be a fledgling from 2009 when all chicks banded with W/B on right leg. Also may be Y/G:W/B in 2006, W/B:W/B in 2010, B/W:W/B in 2011.
B/W:B/O	6/15, 7/31	ODSVRA 2011	
B/W:B/W	6/5	ODSVRA 2011	
B/W:B/Y	6/5, 6/15	ODSVRA 2011	
B/W:G/B	6/14, 6.15	ODSVRA 2011	<b>LT42 breeding adult.</b>
B/W:L	6/13, 6/14, 6/15, 6/24, 7/28, 8/11, 8/19	ODSVRA 2011	<b>LT42 breeding adult.</b> Identified as male based on copulation attempt on 13 June.
B/W:O/W	6/24, 7/28, 7/31	ODSVRA 2011	
B/W:O/Y	7/28	ODSVRA 2011	
B/W:P	6/24	ODSVRA 2011	
B/W:Y/O	8/13, 6/7, 6/15, 7/21, 8/18, 8/19, 8/23, 8/27	ODSVRA 2011	<b>LT50 breeding adult.</b>
B:W/B	5/22	ODSVRA 2009	
G/Y:-	5/19, 7/28, 8/4	ODSVRA 2004 or 2008	Left band appears to be faded plastic. A fledgling from 2004 or 2008 when all banded with G/Y on left leg.
O/A:W/B	5/29, 8/3, 8/4, 8/6, 8/8, 8/9	ODSVRA 2009	USGS left, tape over plastic right.

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.1. Banded least terns recorded at ODSVRA in 2013 (continued).**

<b>Band</b>	<b>Dates Seen</b>	<b>Origin and Year Banded</b>	<b>Notes</b>
R/W:W/B	7/1	ODSVRA 2009	<b>LT 33 breeding adult.</b>
S/Y:-	8/3, 8/8	ODSVRA 2005	Two S/Y:Y/G banded in 2005.
S:-	5/29, 5/30, 8/4, 8/5, 8/6, 8/7	unknown	Multiple sites band with only the federal band. Also may be a fledgling from 2003 when all banded S:G/Y.
S:(light/dark)	6/2	unknown	
V:W/B	5/29, 5/30, 7/27	ODSVRA 2009	
W/B:B/Y	6/15	ODSVRA 2010	
W/B:R/Y	6/3	ODSVRA 2010	<b>LT17 breeding adult.</b>
W/B:W	7/24	ODSVRA 2010	<b>LT41 breeding adult.</b>
W/B:W/G	6/24, 7/28, 7/30	ODSVRA 2010	
W/B:W/Y	6/7, 6/15, 7/1, 8/5, 8/6, 8/9	ODSVRA 2010	<b>LT47 breeding adult.</b>
W:-	6/24	unknown	<b>LT6 breeding adult.</b> May be W:G/Y in 2007, W:W/B in 2009.
Y/O:W/B	6/15	ODSVRA 2009	
Y/R:W/B	7/3, 7/6	ODSVRA 2009	<b>LT38 breeding adult.</b>
Y/W/Y:-	6/7	ODSVRA 2007	Y/W/Y:G/Y banded in 2007.

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.2. Banded snowy plovers with known origins seen at ODSVRA 1 October 2012 to 28 February 2013.**

All birds were banded as chicks unless otherwise noted. Chicks banded outside of San Luis Obispo County are noted in order from north to south. Some sites band to brood and can have more than one bird with the same combination.

ODSVRA=Oceano Dunes SVRA, VAFB=Vandenberg Air Force Base, SB=State Beach, NWR=National Wildlife Refuge

Band	Origin and Year Banded	County Banded	Dates Seen	Notes
GW:WG	Siltcoos, Oregon 2011	Lane	12/5	
--:SB	Dunes Overlook, Oregon 2012	Douglas	12/12, 2/27	Silver band above the joint.
A/G:B	South Spoils, Oregon 2012	Coos	10/5, 10/11	
RG:RW	Tahkenitch Creek, Oregon 2012	Douglas	11/21	Banded as an adult.
BR:WY	Tenmile, Oregon 2011	Coos - Douglas border	11/21, 12/5	Banded as an adult.
YB:GW	Fort Ord 2009	Monterey	10/2, 10/3, 10/4, 10/5, 12/17	Banded as an adult. Upper left band is above the joint.
GB:PP	Moss Landing SB 2009	Monterey	12/17, 2/6, 2/13	
WO:OW	Pajaro Spit 2012	Monterey	10/5, 11/7, 11/21, 1/22	
AY:AW	Reservation Road 2009	Monterey	10/5, 12/5, 2/6, 2/13	
BG:WA	Salinas River SB 2010	Monterey	10/4, 10/5, 1/17	
PR:GL	Salinas River NWR 2008	Monterey	12/5	
YP:OL	Salinas River NWR 2008	Monterey	12/5	
OL:GP	Salinas River NWR 2009	Monterey	12/5, 12/17, 2/27	
WA:BL	Salinas River NWR 2012	Monterey	10/2, 10/3, 10/5, 11/7, 12/5, 12/16, 12/17, 2/6, 2/13	
VG:BR	ODSVRA 2003		12/5	
VS:BR	ODSVRA 2003		10/3, 10/4	
VS:BR	ODSVRA 2003		10/3, 10/4	
GA:RB	ODSVRA 2004 or 2010		10/3, 12/5, 12/12	
GG:AB	ODSVRA 2007		10/2, 10/3, 10/6, 10/13	
PV:BR	ODSVRA 2007		10/2, 10/5, 12/12, 1/2, 1/17, 1/30, 2/6, 2/13	
RR:PB	ODSVRA 2007 or 2010		10/3, 10/13, 12/5, 12/12	
GA:RG	ODSVRA 2007 or 2012		10/4, 10/6, 10/10, 12/12, 12/17	
PV:AG	ODSVRA 2008		10/3, 11/7	
PV:GY	ODSVRA 2008		10/3, 1/30, 2/13, 2/27	
PV:WG	ODSVRA 2008		10/6, 11/7, 12/12, 1/2	
PV:WW	ODSVRA 2008		10/3, 10/4, 10/5, 10/11	
GG:VY	ODSVRA 2008 or 2011		10/2, 10/3, 10/5, 10/6, 10/10, 10/13, 10/16, 12/5, 12/17, 1/2, 1/17, 2/6, 2/13	
VV:VW	ODSVRA 2008 or 2011		10/3, 10/11, 12/12, 1/2, 1/30, 2/6, 2/13	

**Appendix D. Banded least terns and snowy plovers (continued.)**

**Table D.2. Banded snowy plovers with known origins seen at ODSVRA 1 October 2012 to 28 February 2013 (continued).**

Band	Origin and Year Banded	County Banded	Dates Seen	Notes
PV:VY	ODSVRA 2009		10/6, 11/21, 12/5, 12/16	
PV:YG	ODSVRA 2009		10/2, 10/5, 11/21, 12/17	
PV:YY	ODSVRA 2009		12/12	
VV:RB	ODSVRA 2009		10/3, 10/4, 10/5, 11/21, 1/17, 2/13	
RR:VW	ODSVRA 2009 or 2011		10/6, 11/14, 11/21, 12/5, 12/12, 1/30, 2/6, 2/13	
VG:VR	ODSVRA 2009 or 2011		12/5, 12/12, 1/2, 1/17, 1/30, 2/6, 2/13, 2/27	
VG:VR	ODSVRA 2009 or 2011		12/5, 12/12, 1/2, 1/17, 1/30, 2/6, 2/13, 2/27	
VV:VG	ODSVRA 2009 or 2011		10/4, 11/21, 1/2, 1/17, 2/6	
BB:OR	ODSVRA 2010		10/13, 12/5, 2/6, 2/13	
BB:YY	ODSVRA 2010		10/3, 10/4, 10/5, 10/6, 11/21, 1/2, 1/17, 1/30, 2/13, 2/27	
RR:BB	ODSVRA 2010		10/2, 11/21, 12/12, 2/13, 2/27	
RR:WR	ODSVRA 2010		10/5, 10/18, 11/14, 11/21, 2/6	
RR:WR	ODSVRA 2010		10/5, 10/18, 11/14, 11/21, 2/6	
RR:YR	ODSVRA 2010		10/4, 10/5, 10/6, 12/12, 2/6, 2/13	
BB:VR	ODSVRA 2011		10/2, 1/30, 2/13	
BB:YG	ODSVRA 2011		10/2, 10/13	
GA:PB	ODSVRA 2011		10/5, 10/6, 10/16, 11/14, 11/21, 1/2, 1/17, 1/22, 2/13, 2/27	
GA:PG	ODSVRA 2011		10/5, 10/6, 10/13, 11/21, 12/12, 1/2	
GA:RY	ODSVRA 2011		10/3, 10/10, 12/12, 1/2, 2/6, 2/13	
GG:YG	ODSVRA 2011		10/5, 11/7, 11/21, 12/5, 12/12	
PG:GR	ODSVRA 2011		10/5, 2/6, 2/13, 2/27	
RR:GG	ODSVRA 2011		10/5, 10/6, 10/11, 1/17, 2/13, 2/27	
RR:OB	ODSVRA 2011		10/3, 10/5, 10/13	
VG:AB	ODSVRA 2011		11/7, 11/14, 1/2, 2/6, 2/13, 2/27	
VG:AR	ODSVRA 2011		10/3, 10/6, 10/13, 12/17, 2/6, 2/13, 2/27	
VG:AY	ODSVRA 2011		10/2, 10/3, 10/4, 10/6	
VG:BG	ODSVRA 2011		10/18, 11/21, 12/5, 1/17, 1/30, 2/13	
VG:GW	ODSVRA 2011		10/4, 2/6, 2/13	
VG:GW	ODSVRA 2011		10/4, 2/6, 2/13	
VG:OG	ODSVRA 2011		10/6, 11/21, 12/5, 12/12, 1/17, 2/13, 2/27	
VG:OG	ODSVRA 2011		10/6, 11/21, 12/5, 12/12, 1/17, 2/13, 2/27	
VG:PR	ODSVRA 2011		10/16, 12/12, 1/30, 2/6, 2/27	
VG:PR	ODSVRA 2011		10/16, 12/12, 1/30, 2/6, 2/27	

**Appendix D. Banded least terns and snowy plovers (continued.)**

**Table D.2. Banded snowy plovers with known origins seen at ODSVRA 1 October 2012 to 28 February 2013 (continued).**

Band	Origin and Year Banded	County Banded	Dates Seen	Notes
VG:YW	ODSVRA 2011		10/2, 10/3, 10/4, 10/5, 10/16, 11/14, 11/21, 12/5, 12/17, 2/6, 2/13, 2/27	
VG:YW	ODSVRA 2011		10/2, 10/3, 10/4, 10/5, 10/16, 11/14, 11/21, 12/5, 12/17, 2/6, 2/13, 2/27	
VG:YY	ODSVRA 2011		10/3, 10/4, 10/13, 12/12, 12/16, 12/17, 1/17	
VG:YY	ODSVRA 2011		10/3, 10/4, 10/13, 12/12, 12/16, 12/17, 1/17	
VV:AA	ODSVRA 2011		10/4, 10/6, 12/5, 12/12, 1/2, 2/6, 2/13	
VV:VY	ODSVRA 2011		2/27	
VV:VY	ODSVRA 2011		2/27	
VV:YY	ODSVRA 2011		10/3, 10/4, 10/6, 1/2, 1/30, 2/6, 2/13, 2/27	
BB:BB	ODSVRA 2012		10/2, 10/6, 10/11, 10/13, 12/17, 2/20	
GA:GR	ODSVRA 2012		10/3, 10/6, 12/12, 1/17, 2/6, 2/13, 2/20, 2/27	
GA:WR	ODSVRA 2012		11/14, 11/21, 12/12	
GA:WW	ODSVRA 2012		10/18, 12/5, 2/6, 2/13, 2/20	
GG:BW	ODSVRA 2012		10/3, 10/5, 12/12, 2/6, 2/13, 2/27	
GG:PY	ODSVRA 2012		10/2, 10/3, 10/5, 10/13, 12/17, 2/20	
PG:AW	ODSVRA 2012		10/4, 10/5, 10/10	
PG:PW	ODSVRA 2012		11/21	
PG:RB	ODSVRA 2012		10/6	
PV:BW	ODSVRA 2012		10/4, 10/5, 10/11, 10/13, 10/16	
RR:AY	ODSVRA 2012		10/3, 10/6	
RR:GW	ODSVRA 2012		10/18	
VG:BY	ODSVRA 2012		10/2, 10/6, 11/7, 12/5, 1/2, 1/30, 2/13	
VG:YR	ODSVRA 2012		1/2, 1/17	
VG:YR	ODSVRA 2012		1/2, 1/17	
VV:GR	ODSVRA 2012		10/3, 10/6, 10/13, 10/16, 12/12, 12/17	
V-:AY	Unknown		11/21, 12/5, 1/2, 1/17, 1/22, 2/27	
V-:BR	Unknown		10/2, 2/6, 2/13, 2/27	
V-:WW	Unknown		1/17, 2/6, 2/27	
NR:RB	VAFB 2012	Santa Barbara	10/6, 10/16, 12/5	
NS:WW	VAFB 2012	Santa Barbara	11/21, 12/5	
NW:AG	VAFB 2012	Santa Barbara	10/3, 10/5, 10/6, 10/11, 11/7, 11/21, 12/17	
NY:RW	VAFB 2012	Santa Barbara	12/17	
R:G/W	VAFB 2012	Santa Barbara	10/4, 10/16, 12/5	

**Appendix D. Banded least terns and snowy plovers (continued.)**

**Table D.2. Banded snowy plovers with known origins seen at ODSVRA 1 October 2012 to 28 February 2013 (continued).**

<b>Band</b>	<b>Origin and Year Banded</b>	<b>County Banded</b>	<b>Dates Seen</b>	<b>Notes</b>
W:Y/G	VAFB 2012	Santa Barbara	10/16, 12/17, 2/6, 2/13	
W:Y/G	VAFB 2012	Santa Barbara	10/16, 12/17, 2/6, 2/13	

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.3. Banded snowy plovers with known origins seen at ODSVRA 1 March to 30 September 2013.**

Juveniles fledged from ODSVRA in 2013 are not included. All birds were banded as chicks unless otherwise noted. Chicks banded outside of San Luis Obispo County are noted in order north to south. Some sites band to brood and can have more than one bird with the same combination.

ODSVRA=Oceano Dunes SVRA, VAFB=Vandenberg Air Force Base, SB=State Beach, NWR=National Wildlife Refuge

Band	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
GW:WG		Siltcoos, Oregon 2011	Lane - Douglass border	8/12, 8/18, 9/2, 9/4, 9/6	Banded as an adult.
-:SB	F	Dunes Overlook, Oregon 2012	Douglas – Lane boundary	3/7, 3/9, 3/19, 3/20, 3/23, 4/10, 4/12, 4/15, 8/11, 8/27, 8/29, 8/30, 9/4, 9/9	Silver band above joint.
W/R:Y		Tenmile Creek, Oregon 2013	Coos - Douglas border	9/21	
G/A:Y		New River, Oregon 2013	Coos - Curry border	9/15	
RO:GW		Sunset SB 2012	Santa Cruz	4/6	
GB:PP	F	Moss Landing SB 2009	Monterey	3/7, 3/8, 3/12, 3/17, 3/21, 3/25, 3/29, 8/7, 8/13, 8/27, 8/29, 8/30, 9/3, 9/4	
YA:RW		Moss Landing SB 2013	Monterey	9/13, 9/17	
BA:AR		Salinas River SB 2013	Monterey	8/27, 8/29	
WO:WR		Salinas River SB 2013	Monterey	8/23	
AA:OG		Salinas River NWR 2013	Monterey	8/30	
OL:GP		Salinas River NWR 2009	Monterey	3/4	
WA:BL		Salinas River NWR 2012	Monterey	3/8, 3/16, 3/18, 4/1, 4/5	
YB:RR		Salinas River NWR 2010	Monterey	8/16	Banded as an adult.
BY:RR		Salinas River SB 2010 (Molera Potrero)	Monterey	7/13, 8/10, 8/21, 8/24	
OB:WW		Salinas River SB 2013 (Molera Potrero)	Monterey	7/17	
RP:WR		Salinas River SB 2006 (Molera-Potrero)	Monterey	7/12	
WG:RB		Salinas River SB 2013 (Molera Potrero)	Monterey	8/30	
AA:BB		Marina SB 2013	Monterey	7/15	
AR:BW		Marina SB 2013	Monterey	8/13	
BA:OG		Marina SB 2013	Monterey	7/9	
BG:GW		Marina SB 2013	Monterey	7/25	
RP:GL		Marina SB 2012	Monterey	8/12, 8/13	
GB:AW		Fort Ord 2013	Monterey	8/29, 9/6, 9/10, 9/20	

Appendix D. Banded least terns and snowy plovers (continued).

Table D.3. Banded snowy plovers with known origins seen at ODSVRA 1 March to 30 September 2013 (continued).

Band	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
AP:AW		Monterey Bay Aquarium 2013	Monterey	7/31	Bird from ODSVRA egg hatched and banded AP:AW at Monterey Bay Aquarium (see report Notes section).
B:-PR	F	ODSVRA 2010		6/15, 7/25, 8/9, 8/18	ODSVRA breeding female.
BB:AB		ODSVRA 2010 or 2013		8/2, 8/27	
BB:AR		ODSVRA 2010 or 2013		9/14	
BB:BB	M	ODSVRA 2012		3/4, 3/6, 3/11, 3/12, 3/17, 3/21, 3/22, 4/1, 4/22	
BB:BW		ODSVRA 2006, 2010 or 2013		8/13	
BB:BY		ODSVRA 2005, 2010, 2013		8/29, 8/31	
BB:GR		ODSVRA 2012		3/29	
BB:OO	M	ODSVRA 2010		5/19	
BB:OR	M	ODSVRA 2010		4/28, 5/5, 5/12, 5/14, 5/15, 6/14, 6/24, 6/27, 7/13, 7/17, 7/30, 8/5, 8/11, 8/13, 8/17, 9/3, 9/4, 9/6, 9/8, 9/9, 9/13, 9/14	ODSVRA breeding male
BB:RG	M	ODSVRA 2007		4/28, 5/7, 5/16	ODSVRA breeding male.
BB:RY	M	ODSVRA 2010		6/8, 6/15, 7/4, 8/11, 8/12, 8/22, 8/31	ODSVRA breeding male.
BB:VG		ODSVRA 2008, 2011 or 2013		9/6	
BB:VR	M	ODSVRA 2011		4/6, 5/2, 5/14, 5/16, 6/8	ODSVRA breeding male.
BB:WG		ODSVRA 2010 or 2013		7/10, 7/17	
BB:WR		ODSVRA 2010		9/13	
BB:WY		ODSVRA 2010		9/15	
BB:YY	M	ODSVRA 2010		3/5, 4/6, 5/15, 6/7, 7/7, 7/11, 7/26, 7/29, 7/30, 8/9, 8/29, 9/2, 9/3, 9/4, 9/9	ODSVRA breeding male.
GA:AG	M	ODSVRA 2012		5/8, 7/8, 7/22, 7/24, 7/29	ODSVRA breeding male.
GA:AR		ODSVRA 2011		8/8	
GA:AW		ODSVRA 2010		8/30	
GA:BW		ODSVRA 2013 or 2011		7/10	
GA:GR	F	ODSVRA 2012		3/1, 3/7, 3/12, 3/15, 3/16, 3/18, 4/3, 5/12, 6/8, 6/24, 7/8, 8/10, 8/12, 8/13, 8/29, 8/30, 9/6, 9/10	ODSVRA breeding female.
GA:PB	F	ODSVRA 2011		3/19, 3/23, 4/1, 4/22	ODSVRA breeding female.
GA:PY	M	ODSVRA 2010		5/1, 6/3, 6/5, 7/31	ODSVRA breeding male.
GA:RB	F	ODSVRA 2004 or 2010		6/18, 6/23, 7/24, 8/18, 8/31	ODSVRA breeding female.
GA:VG		ODSVRA 2013 or 2012		6/12	
GA:WB		ODSVRA 2012		3/18	
GA:YB	M	ODSVRA 2004		5/13, 6/10, 6/17, 6/25, 7/8	ODSVRA breeding male.

Appendix D. Banded least terns and snowy plovers (continued).

Table D.3. Banded snowy plovers with known origins seen at ODSVRA 1 March to 30 September 2013 (continued).

Band	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
GG:AR	M (2)	ODSVRA 2011		4/6, 4/19, 4/27, 5/1, 5/5, 5/8, 5/12, 5/13, 5/16, 5/20, 5/26, 6/8, 6/21, 6/22, 6/23, 6/24, 6/25, 7/17, 8/6, 8/18, 8/21, 8/27	ODSVRA breeding male (2 birds).
GG:AY	M	ODSVRA 2012		6/10, 6/11, 6/28, 7/10, 7/17, 8/2, 8/24	ODSVRA breeding male.
GG:BW	M	ODSVRA 2012		3/4, 3/7, 3/9, 3/11, 3/12, 3/15, 3/16, 3/18, 3/19, 3/21, 4/3, 5/4, 5/5, 5/8, 5/20, 6/12, 6/18, 6/24, 6/26, 7/27, 8/9, 8/14, 8/18, 8/22, 8/24, 8/26, 9/4	ODSVRA adult breeding male.
GG:BY		ODSVRA 2007		8/9, 8/27	
GG:GB		ODSVRA 2013 or 2011		7/14	
GG:GR	F	ODSVRA 2011		5/31, 6/10, 7/14	ODSVRA breeding female.
GG:PB	F	ODSVRA 2012 or 2013		4/21, 8/4, 8/9, 8/12, 8/13, 8/15, 8/29	
GG:PR	M	ODSVRA 2012		5/11, 6/11, 6/22, 6/24, 6/25, 6/26, 6/27	ODSVRA breeding male.
GG:PY	M	ODSVRA 2012		3/1, 3/10, 3/11, 3/13, 3/15, 3/17, 3/19, 3/21, 3/29, 4/1, 4/3, 4/4, 4/7, 4/8, 4/9, 4/11, 4/16, 4/18, 4/19, 5/7, 5/8, 6/16, 7/12, 7/25, 8/4, 8/6, 8/8, 8/11, 8/12, 8/13, 8/25, 8/27, 8/29, 8/30, 9/4, 9/9, 9/15	ODSVRA breeding male.
GG:RY		ODSVRA 2012		8/9	
GG:VB	M (2)	ODSVRA 2011		7/12, 7/22, 7/24, 7/29, 8/10, 8/15	ODSVRA breeding males (2 birds).
GG:VY	F	ODSVRA 2008 or 2011		3/21, 4/10, 4/21, 4/22, 4/24, 4/25, 5/26, 5/29, 6/21, 6/25, 7/29, 7/30, 7/31, 8/10, 8/11, 8/13, 9/11	ODSVRA breeding female.
GG:WB	M	ODSVRA 2011		4/26, 5/5, 5/24, 5/29, 6/4, 6/10, 6/12, 6/14, 6/15, 6/18, 6/23, 6/24, 6/26, 7/19, 8/4, 8/10, 8/22	ODSVRA breeding male.
GG:WW	F	ODSVRA 2012		6/2, 7/16	ODSVRA breeding female.
GG:YB		ODSVRA 2009 or 2013		8/18	
GG:YG	F and M	ODSVRA 2011 or 2013		5/3, 5/4, 5/31, 8/2, 8/6	ODSVRA breeding female and breeding male.
PG:BR		ODSVRA 2012		7/29, 7/30	
PG:GR	F	ODSVRA 2011		3/1, 3/7	
PG:OG		ODSVRA 2009		9/10	On 10 September, desiccated carcass of PG:OG adult male found on 7 enclosure shoreline.
PV:BR	M	ODSVRA 2007		3/23, 3/26, 3/28, 3/30, 3/31, 4/2, 4/4, 4/5, 4/6, 4/30, 5/1, 5/14, 5/26, 8/12, 8/17, 8/25, 8/27, 8/29, 9/2, 9/4	ODSVRA breeding male.
PV:BY		ODSVRA 2008		8/25	
PV:GY	M	ODSVRA 2008		3/23, 4/6, 4/15, 5/4, 5/6, 5/9, 5/12, 5/13, 5/14, 5/15, 6/2, 6/10, 6/22, 7/29, 8/9, 8/10, 8/13, 8/18, 8/25, 8/27	ODSVRA breeding male.
PV:VY	F	ODSVRA 2009		4/8, 4/29, 5/2, 5/3, 6/18, 6/24, 8/5, 8/11, 8/12, 8/13, 8/21, 8/27, 8/30, 9/2, 9/4, 9/9, 9/10, 9/13	ODSVRA breeding female.
PV:WB	F	ODSVRA 2007 or 2010		4/16, 4/17, 4/29, 8/17, 8/18, 8/22, 8/25, 8/27	ODSVRA breeding female.
PV:YB	F and M	ODSVRA 2012		4/15, 4/17, 5/12, 6/7, 6/8, 6/14, 6/15, 6/20, 6/21, 6/22, 6/28, 7/4	ODSVRA breeding female and breeding male.

Appendix D. Banded least terns and snowy plovers (continued).

Table D.3. Banded snowy plovers with known origins seen at ODSVRA 1 March to 30 September 2013 (continued).

Band	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
RR:AR	F	ODSVRA 2010		3/15, 6/10, 6/17	ODSVRA breeding female.
RR:BB		ODSVRA 2010		3/7	
RR:GG	M	ODSVRA 2011		4/29, 5/3, 5/8, 5/14, 5/15, 5/16, 5/31, 6/2, 6/15, 6/20, 6/25, 7/5, 7/22, 7/25, 8/5, 8/11, 8/16, 8/29, 9/3, 9/4, 9/6, 9/7, 9/8, 9/10, 9/15	ODSVRA breeding male.
RR:GW	F	ODSVRA 2012		5/19, 7/11, 8/9, 8/11	ODSVRA breeding female.
RR:OG	M	ODSVRA 2012		6/15, 6/17, 7/13, 7/19	ODSVRA breeding male.
RR:OR	M	ODSVRA 2010		3/26, 4/6, 6/2, 6/8, 6/22, 6/23, 8/3	ODSVRA breeding male.
RR:OY	F	ODSVRA 2010		3/19, 3/26, 3/28, 4/15, 4/19, 6/3, 7/27, 8/18, 8/24, 8/25	ODSVRA breeding female.
RR:PB	F	ODSVRA 2007 or 2010		3/18, 3/21, 3/22, 3/23, 3/28, 3/29, 4/2, 4/4, 4/6, 4/10, 4/12, 4/15, 4/16, 4/18, 4/19, 4/29, 5/18, 8/9, 8/12, 8/16, 8/22, 8/30, 8/31, 9/3, 9/4, 9/8, 9/10	ODSVRA breeding female.
RR:PY	M	ODSVRA 2007 or 2010		6/12	
RR:RB		ODSVRA 2012		8/13	
RR:RW	F	ODSVRA 2011		7/7, 8/16	
RR:VB	F	ODSVRA 2008 or 2010		6/10, 6/15, 6/17, 7/5, 7/9, 7/16, 7/17	ODSVRA breeding female.
RR:VW	F	ODSVRA 2009 or 2011		3/26, 3/28, 4/19, 8/10, 8/12, 8/18	ODSVRA breeding female.
RR:WB	M	ODSVRA 2011		5/16, 7/26, 7/27, 8/6, 8/8, 8/9	ODSVRA breeding male.
RR:WR	M	ODSVRA 2010		3/28, 4/21, 4/25, 4/29, 5/24, 6/9, 6/20, 7/6, 7/9, 8/3, 8/9, 8/12, 8/13, 8/25, 8/27, 9/4, 9/7, 9/8, 9/9, 9/10	ODSVRA breeding male
RR:YR	F	ODSVRA 2010		3/7, 3/8, 3/9, 3/10, 3/11, 3/13, 3/16, 3/20, 3/21, 3/22, 3/23, 3/25, 3/29, 3/31, 4/16, 8/13, 8/14, 8/16, 8/27, 8/30, 9/3, 9/5, 9/9, 9/12, 9/26	
RR:YY	M (2)	ODSVRA 2010		4/28, 5/6, 5/24, 5/26, 6/2, 6/10, 6/12, 6/14, 6/17, 6/24, 7/2, 7/10, 7/13, 7/19, 7/24, 7/29, 7/31, 8/4, 8/5, 8/8, 8/13	ODSVRA breeding males (2 birds).
VG:AB	M	ODSVRA 2011		3/20, 3/29, 4/22, 6/26, 8/7, 8/9, 8/10, 8/19, 9/3	ODSVRA breeding male.
VG:AR	F (2)	ODSVRA 2011		3/12, 6/18, 7/26, 8/9, 8/24, 8/26, 8/27, 8/30, 9/2, 9/4, 9/12, 9/21	ODSVRA breeding females (2).
VG:AW		ODSVRA 2011		3/18, 4/19, 4/22, 6/11, 8/10	ODSVRA breeding female.
VG:BB		OSDVRA 2011 or 2013		8/22	
VG:BG	M	ODSVRA 2011		3/26, 3/28, 4/19, 4/20, 4/22, 5/5, 6/17, 6/18, 8/11, 8/18, 8/22	ODSVRA breeding male.
VG:BY		ODSVRA 2012 or 2013		8/29	
VG:GW	F	ODSVRA 2011		4/6, 5/15, 5/29, 6/4, 6/24, 8/10, 8/13, 8/27, 8/29	ODSVRA breeding female.
VG:OG	F	ODSVRA 2011		3/12, 3/15, 3/16, 3/29, 4/1, 4/2, 4/16, 4/19, 4/23, 4/29, 5/24, 7/8, 7/11, 7/16, 7/25, 8/9, 8/12, 8/15, 8/16, 8/17, 8/27, 8/29, 9/2, 9/4, 9/8, 9/21	ODSVRA breeding female.
VG:PR	M	ODSVRA 2011		3/23, 4/1, 5/29, 6/8, 6/12, 6/14, 7/11, 7/12, 7/25, 7/31, 8/9, 8/10, 8/13, 8/19, 8/22, 8/26, 8/27, 9/2, 9/3	ODSVRA breeding male.
VG:RB	M	ODSVRA 2011		6/25	ODSVRA breeding male.

Appendix D. Banded least terns and snowy plovers (continued).

Table D.3. Banded snowy plovers with known origins seen at ODSVRA 1 March to 30 September 2013 (continued).

Band	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
VG:VR	F and M	ODSVRA 2009 or 2011		3/29, 4/10, 4/11, 4/15, 6/14, 8/10, 8/13, 8/15, 8/30, 9/2, 9/3, 9/4, 9/7	ODSVRA breeding female and male.
VG:YW	M	ODSVRA 2011		3/4, 3/6, 3/11, 3/12, 3/14, 3/18, 3/21, 3/22, 3/25, 3/31, 4/10, 4/21, 5/1, 5/4, 5/12, 5/20	ODSVRA breeding male. On 21 April bands removed from one bird with this combination.
VV:AA	F (2)	ODSVRA 2011		4/1, 6/2, 6/4, 6/8, 6/10, 7/7, 7/9, 7/12, 7/21, 7/27, 8/5, 8/27, 8/29, 8/30, 9/4, 9/6, 9/7, 9/8, 9/15	ODSVRA breeding females (2).
VV:BB		ODSVRA 2011 or 2013		7/17	
VV:BY	M	ODSVRA 2007		7/12	
VV:GB	M	ODSVRA 2009		6/15, 6/17	ODSVRA breeding male.
VV:GG	M	ODSVRA 2009		4/3, 4/4, 4/5, 4/6, 4/16, 4/17, 4/18, 4/27, 5/1, 6/15, 6/24, 7/5, 7/6	ODSVRA breeding male.
VV:GR	F	ODSVRA 2012		3/6, 3/13, 3/20, 4/4, 4/11, 4/20, 8/27	
VV:RB	F	ODSVRA 2009		3/1, 3/2, 3/4, 5/20, 8/6, 8/13, 8/15, 8/17	ODSVRA breeding female.
VV:VB		ODSVRA 2011		7/18	
VV:VG	F	ODSVRA 2009 or 2011		3/21, 3/28, 3/30, 4/1, 4/2, 4/4, 4/5, 4/7, 5/6, 5/13, 6/14, 9/15, 9/21	ODSVRA breeding female.
VV:VR	M	ODSVRA 2008		8/6, 8/7	ODSVRA breeding male.
VV:VW	F	ODSVRA 2008 or 2011		3/15, 4/10, 4/17, 4/23, 4/24, 4/25, 5/20, 6/28, 7/17, 8/8, 8/9, 8/11, 8/12, 8/16, 8/22, 8/27, 8/29	ODSVRA breeding female.
VV:VY	F	ODSVRA 2011		3/6, 5/2, 8/11, 8/27	ODSVRA breeding female.
VV:WG		ODSVRA 2012		8/17, 8/18	
VV:WW	F	ODSVRA 2011		5/9, 8/30	
VV:YY	M	ODSVRA 2011		3/20, 4/5, 4/13, 5/9, 5/12, 5/13, 5/14, 5/25, 7/31, 8/18, 9/1	ODSVRA breeding male.
B:GY	M	VAFB 2012	Santa Barbara	8/5, 8/6, 8/20	ODSVRA breeding male.
B:YG		VAFB 2013	Santa Barbara	8/20	
L:OG		VAFB 2013	Santa Barbara	8/20, 8/23	
NB:AR		VAFB 2013	Santa Barbara	8/9, 8/12	
NB:BW		VAFB 2013	Santa Barbara	7/25	
NB:OW	F	VAFB 2011	Santa Barbara	4/6, 6/24, 8/18, 8/25, 8/27	ODSVRA breeding female.
NB:PG	F	VAFB 2011	Santa Barbara	8/8, 8/12, 8/18	ODSVRA breeding female.
NO:AR		VAFB 2013	Santa Barbara	8/20, 8/27	
NO:BY		VAFB 2013	Santa Barbara	8/17	
NO:NR		VAFB 2004	Santa Barbara	8/8, 8/9, 8/15, 8/17	
NO:PY		VAFB 2013	Santa Barbara	9/1	
NR:GR		VAFB 2013	Santa Barbara	7/17	
NR:NR		VAFB 2013	Santa Barbara	6/26	
NR:PR		VAFB 2012	Santa Barbara	8/1, 8/12, 8/17, 8/29, 8/30, 8/31, 9/2, 9/3, 9/4, 9/9, 9/11, 9/14	

Appendix D. Banded least terns and snowy plovers (continued).

Table D.3. Banded snowy plovers with known origins seen at ODSVRA 1 March to 30 September 2013 (continued).

Band	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
NR:RB		VAFB 2012	Santa Barbara	3/11, 3/17, 3/19, 3/21, 3/22, 3/23, 3/29, 3/30, 4/12, 4/13	Silver showing above left red band.
NR:WY		VAFB 2013	Santa Barbara	7/8	
NR:YW		VAFB 2013	Santa Barbara	6/26	
NW:BG	F	VAFB 2012	Santa Barbara	6/20	
NW:NY		VAFB 2012	Santa Barbara	4/11, 4/12	
NW:OB		VAFB 2013	Santa Barbara	7/26, 8/9	
NW:RB		VAFB 2013	Santa Barbara	8/8, 8/10	
NW:YB		VAFB 2013	Santa Barbara	7/29, 8/15	
NW:YG		VAFB 2010	Santa Barbara	7/12, 7/28, 8/13, 8/22, 8/26, 8/27	
NW:YY		VAFB 2013	Santa Barbara	8/27	
NY:OB	F	VAFB 2012	Santa Barbara	4/6, 8/15	
NY:RB	F	VAFB 2012	Santa Barbara	4/6, 5/3, 6/25, 8/15, 8/18, 8/22, 9/2	ODSVRA breeding female.
P:W/O/W		VAFB 2013	Santa Barbara	8/22, 8/23, 8/27, 8/28, 8/30, 8/31, 9/2	
R:G/W	M	VAFB 2012	Santa Barbara	6/24, 6/27	ODSVRA breeding male.
R:W/B/W		VAFB 2013	Santa Barbara	8/27, 9/1, 9/10, 9/26	
W:Y/G	M	VAFB 2012	Santa Barbara	3/3, 3/6, 3/18, 3/19, 3/21, 4/6, 4/8, 4/11, 4/25, 5/13, 6/1, 6/6, 6/8, 6/23, 8/7, 8/9, 8/10, 8/26, 9/2, 9/15, 9/21	ODSVRA breeding male.
Y:GR	M	VAFB 2012	Santa Barbara	4/6, 5/14, 5/17, 6/7, 6/21, 6/22, 7/7, 7/10	ODSVRA breeding male.
-:B		unknown		3/29, 8/8, 8/18, 8/29, 8/29	
G:-VW		unknown		8/12, 8/16, 8/29, 8/30	
V:-AB	M	unknown		3/18, 4/27	
V:-AY	M	unknown		3/14, 4/1, 5/13, 5/16, 7/6, 8/11, 8/12, 8/13, 8/22, 9/2, 9/4	ODSVRA breeding male.
V:-BR	F and M	unknown		3/1, 4/19, 8/5, 8/6, 8/8, 8/9, 8/11, 8/12, 8/15, 8/16, 8/20, 8/22, 8/23, 8/26, 9/11	ODSVRA breeding female and breeding male.
V:-BY		unknown		9/10, 9/21	
V:-WW	F	unknown		4/3, 4/29, 5/6, 5/12, 5/13, 5/15, 5/16, 5/19	ODSVRA breeding female.

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.4. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 October 2012 to 28 February 2013.**

This is a partial list based on information received from Point Blue Conservation Science (pers. comm. F. Bidstrup), Morro Bay State Park (pers. comm. R. Orr) and from sightings by staff at ODSVRA at nearby sites.

ODSVRA is banding chicks to brood and some bands have been used multiple years so it is possible to have more than one bird with the same combination.

SB = State Beach, SP = State Park, NWR = National Wildlife Refuge

<b>Band Combination</b>	<b>Year Banded</b>	<b>Location Seen</b>	<b>County</b>	<b>Dates Seen</b>
BB:GR	2012	Monterey Bay	Monterey	12/1
GG:AR	2011	Monterey Bay	Monterey	12/1
GG:LY	2012	Monterey Bay	Monterey	12/1
V-:AB	unknown	Monterey Bay	Monterey	12/1
GG:PB	2012	San Simeon Beach SP	San Luis Obispo	2/20
GA:OB	2010	Villa Creek, Estero Bay	San Luis Obispo	11/20, 1/18, 1/20, 1/22
P:AG	2008	Villa Creek, Estero Bay	San Luis Obispo	10/17, 11/20, 1/18, 1/20, 1/22
BB:YB	2011	Arroyo Laguna	San Luis Obispo	11/20
GG:PB	2012	Arroyo Laguna	San Luis Obispo	11/20, 12/12, 12/14, 12/19
B:PR	2010	Morro Strand SB	San Luis Obispo	10/17, 10/18, 10/23, 10/29, 11/16, 1/22, 1/26
GA:VR	2009	Morro Strand SB	San Luis Obispo	10/17, 10/29, 11/2, 1/3, 2/20
GG:PB	2012	Morro Strand SB	San Luis Obispo	12/17
GG:YR	2012	Morro Strand SB	San Luis Obispo	10/17, 10/18, 10/23, 10/25, 11/1, 11/8, 1/26
PG:BR	2012	Morro Strand SB	San Luis Obispo	11/2, 11/20
PV:PW	2008	Morro Strand SB	San Luis Obispo	10/23
PV:W	2008	Morro Strand SB	San Luis Obispo	10/23, 10/29, 1/22, 2/20
RR:WW	2010	Morro Strand SB	San Luis Obispo	11/2
RR:YB	2011	Morro Strand SB	San Luis Obispo	10/17, 10/23
VG:VR	2009 or 2011	Morro Strand SB	San Luis Obispo	10/29, 10/31, 11/1, 11/2, 11/8
PG:BR	2012	Morro Bay Sandspit	San Luis Obispo	12/17, 2/20, 2/26
RR:WW	2010	Morro Bay Sandspit	San Luis Obispo	12/17
RR:YY	2010	Morro Bay Sandspit	San Luis Obispo	10/17
GA:RB	2004 or 2010	Guadalupe-Nipomo Dunes NWR	San Luis Obispo	1/22
RR:GW	2012	Guadalupe-Nipomo Dunes NWR	San Luis Obispo	1/22
RR:PB	2007 or 2010	Guadalupe-Nipomo Dunes NWR	San Luis Obispo	1/22
RR:WR	2010	Guadalupe-Nipomo Dunes NWR	San Luis Obispo	1/22
VG:GW	2011	Guadalupe-Nipomo Dunes NWR	San Luis Obispo	1/22
VV:VY	2011	Guadalupe-Nipomo Dunes NWR	San Luis Obispo	1/22
BB:RY	2010	Rancho Guadalupe Dunes County Park	Santa Barbara	12/29

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.4. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 October 2012 to 28 February 2013 (continued).**

<b>Band Combination</b>	<b>Year Banded</b>	<b>Location Seen</b>	<b>County</b>	<b>Dates Seen</b>
BB:WY	2010	Rancho Guadalupe Dunes County Park	Santa Barbara	2/2
GG:GG	2011	Coal Oil Point	Santa Barbara	10/6, 10/12, 1/19, 2/2, 2/16
RR:AR	2010	Coal Oil Point	Santa Barbara	12/8, 12/15, 2/16
VG:AR	2011	East Beach	Santa Barbara	10/3
VV:GW	2009	East Beach	Santa Barbara	10/3
RR:VB	2008 or 2010	Padaro Creek	Santa Barbara	2/14
RR:VB	2008 or 2010	Carpenteria SB	Santa Barbara	12/3
PG:AB	2012	Hollywood Beach	Ventura	11/25
RR:OR	2010	Hollywood Beach	Ventura	1/13
PV:YB	2012	Malibu Lagoon SB	Los Angeles	10/22, 2/24

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.5. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2013.**

This is a partial list based on information received from Point Blue Conservation Science (pers. comm. F. Bidstrup, R. Ball), Morro Bay State Park (pers. comm. R. Orr), Chevron property in Guadalupe-Nipomo Dunes complex (pers. comm. K. Paradis), Guadalupe-Nipomo Dunes National Wildlife Refuge (pers. comm. G. Greenwald), and from sightings by staff of ODSVRA at nearby sites. Note: ODSVRA is banding chicks to brood so it is possible to have more than one bird with the same combination.

Chevron = Chevron property in Guadalupe-Nipomo Dunes complex, Guadalupe NWR = Guadalupe-Nipomo Dunes National Wildlife Refuge, SB = State Beach, SP = State Park; VAFB = Vandenberg Air Force Base

J = juvenile, M = male, F = female.

Band	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
BB:GR	2012		Zmudowski SB	Monterey	4/24	
BB:BW	2013	J	San Corpofo Creek	San Luis Obispo	9/17	
GG:PB	2012		Arroyo Laguna Creek	San Luis Obispo	4/15, 9/17	
-:AG	unknown	F	Villa Creek	San Luis Obispo	6/22, 6/25, 6/27, 6/28, 6/29, 7/1, 7/2, 7/3, 7/4, 7/5, 7/6, 7/8, 7/10, 7/11, 7/12, 7/17, 7/18, 7/20, 7/23, 7/25, 7/26, 7/27, 7/30, 7/31, 8/1, 8/3, 8/6, 8/7, 8/8, 8/9, 8/19, 8/21, 8/23, 8/26, 8/28, 8/30, 9/3, 9/5, 9/10, 9/12, 9/17, 9/19	Villa Creek breeding female.
GA:AG	2013	J	Villa Creek	San Luis Obispo	9/19	
GA:GG	2013	J	Villa Creek	San Luis Obispo	8/26	
GG:YR	2012		Villa Creek	San Luis Obispo	3/11	
P-:AG	2008	F	Villa Creek	San Luis Obispo	3/12, 3/13, 3/15, 3/18, 3/19, 3/24, 5/7, 5/8, 5/9, 5/10, 5/13, 5/14, 5/15, 5/16, 5/17, 5/20, 5/21, 5/22, 5/23, 5/24, 5/28, 5/29, 5/30, 5/31, 6/1, 6/4, 6/5, 6/6, 6/10, 6/11, 6/12, 6/13, 6/14	Villa Creek breeding female.
PG:BR	2012		Villa Creek	San Luis Obispo	3/12	
BB:YB	2013	J	Morro Strand SB	San Luis Obispo	7/23, 7/26, 7/27	
GA:VB	2013	J	Morro Strand SB	San Luis Obispo	8/19	
GA:VR	2009	F	Morro Strand SB	San Luis Obispo	7/10, 7/11, 7/19	
GG:BR	2013	J	Morro Strand SB	San Luis Obispo	8/28, 9/17, 9/19	
GG:YR	2012	F	Morro Strand SB	San Luis Obispo	4/8, 8/30	
PG:BR	2012	F	Morro Strand SB	San Luis Obispo	4/3	
PV:W-	2008	M	Morro Strand SB	San Luis Obispo	5/16, 5/23, 5/24, 6/3, 6/6, 6/25, 6/29, 6/30, 7/1, 7/3, 7/4, 7/6, 7/11, 7/17, 7/19, 7/27, 8/7, 8/21, 9/5	Morro Strand SB breeding male.
VV:OB	2013	J	Morro Strand SB	San Luis Obispo	9/19	
VV:WB	2013	J	Morro Strand SB	San Luis Obispo	9/3, 9/5	
B-:PR	2010		Morro Bay Sandspit	San Luis Obispo	8/23, 9/12, 9/17, 9/19	
BB:BY	2005, 2010, or 2013		Morro Bay Sandspit	San Luis Obispo	8/26	
GA:AG	2013	J	Morro Bay Sandspit	San Luis Obispo	9/3, 9/5, 9/12	

Appendix D. Banded least terns and snowy plovers (continued).

Table D.5. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2013.

Band	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
GA:BW	2011 or 2013		Morro Bay Sandspit	San Luis Obispo	8/21	
GA:GW	2013	J	Morro Bay Sandspit	San Luis Obispo	8/1, 8/2	
GA:VB	2013	J	Morro Bay Sandspit	San Luis Obispo	8/23, 9/10	
GA:VR	2009	F	Morro Bay Sandspit	San Luis Obispo	3/7, 3/11, 3/12, 3/19, 3/25, 3/26, 3/27, 3/28, 3/29, 5/8, 5/15, 5/17, 5/20, 5/22, 5/23, 5/24, 6/4, 6/5, 6/6, 8/5, 8/8, 8/9, 8/21, 8/23, 8/26, 8/28, 8/30, 9/3, 9/5, 9/12, 9/17, 9/19	Morro Bay Sandspit breeding female.
GA:YW	2013	J	Morro Bay Sandspit	San Luis Obispo	9/12	
GG:AW	2013	J	Morro Bay Sandspit	San Luis Obispo	9/3, 9/5, 9/10, 9/17	
GG:GR	2013	J	Morro Bay Sandspit	San Luis Obispo	9/19	
GG:OW	2009	M	Morro Bay Sandspit	San Luis Obispo	8/28, 8/30	
GG:VW	2013	J	Morro Bay Sandspit	San Luis Obispo	9/3	
GG:WB	2013	J	Morro Bay Sandspit	San Luis Obispo	8/9, 8/23, 8/30, 9/3	
GG:YR	2012	F	Morro Bay Sandspit	San Luis Obispo	5/10, 5/17, 5/20, 5/21, 5/23, 5/24, 5/27, 6/4, 6/6, 6/10, 6/11, 7/1, 7/15, 7/16	Morro Bay Sandspit breeding female.
PV:W-	2008	M	Morro Bay Sandspit	San Luis Obispo	5/15, 6/11, 7/30, 8/6	
RR:WW	2010	M	Morro Bay Sandspit	San Luis Obispo	3/7, 3/11, 3/12, 3/20, 3/21, 3/28, 3/29, 4/2, 5/8, 5/10, 5/16, 5/17, 5/21, 5/27, 5/28, 6/4, 6/5, 6/6, 6/11, 6/13, 6/26, 6/28, 7/2, 7/4, 7/5, 7/10, 7/18, 7/19, 7/25, 8/6, 8/8, 8/9, 8/19, 8/28, 8/30, 9/3, 9/5, 9/10, 9/12, 9/17, 9/19	Morro Bay Sandspit breeding male.
RR:YR	2010	F	Morro Bay Sandspit	San Luis Obispo	6/7	
VG:BY	2012 or 2013		Morro Bay Sandspit	San Luis Obispo	9/19	
VG:VR	2009 or 2011	F	Morro Bay Sandspit	San Luis Obispo	8/23, 8/28, 8/30, 9/3, 9/5, 9/10, 9/12, 9/17, 9/19	
VV:GR	2012	F	Morro Bay Sandspit	San Luis Obispo	5/21, 5/28, 6/6, 6/7, 6/11, 6/28, 7/1, 7/3, 7/4, 7/5, 7/9, 7/11, 7/15	
VV:OB	2013	J	Morro Bay Sandspit	San Luis Obispo	9/10	
VV:OW	2009		Morro Bay Sandspit	San Luis Obispo	9/3	
GA:AG	2012		Guadalupe-Nipomo Dunes NWR	San Luis Obispo	5/3	
PG:YB	2009		Guadalupe-Nipomo Dunes NWR	San Luis Obispo	4/19, 5/1	
PV:WB	2007 or 2010		Guadalupe-Nipomo Dunes NWR	San Luis Obispo	7/29	
VV:AA	2011		Guadalupe-Nipomo Dunes NWR	San Luis Obispo	5/3	
VV:GG	2009		Guadalupe-Nipomo Dunes NWR	San Luis Obispo	4/19	
BB:BG	2009 or 2011		Chevron	San Luis Obispo	7/26, 8/2, 8/9, 8/16, 8/22, 8/23	

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.5. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2013.**

Band	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
BB:GY	2006	M	Chevron	San Luis Obispo	3/1, 3/18, 3/25, 4/1, 4/12, 4/19, 4/26, 5/17, 5/31, 6/7, 6/14, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/22, 8/23	Chevron breeding male.
BB:LY	2010	M	Chevron	San Luis Obispo	5/17, 5/31, 6/7, 6/14, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/22, 8/23	
BB:PB	2010	M	Chevron	San Luis Obispo	3/1	
BB:RW	2005	M	Chevron	San Luis Obispo	3/1, 5/17, 5/31, 6/7, 6/14, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/22, 8/23	
BB:RY	2010	M	Chevron	San Luis Obispo	3/1, 3/18, 3/25, 4/1, 4/12, 4/19, 4/26, 5/17, 5/31, 6/7, 6/14, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/22, 8/23	Chevron breeding male.
BB:YB	2011		Chevron	San Luis Obispo	3/1	
GA:RB	2004 or 2010	F (2)	Chevron	San Luis Obispo	3/18, 3/25, 4/1, 4/12, 4/19, 4/26, 5/17, 5/31, 6/7, 6/14, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/22, 8/23	Two birds.
GG:AG	2013	J	Chevron	San Luis Obispo	7/26, 8/2, 8/9, 8/16, 8/22, 8/23	
GG:LY	2012	M	Chevron	San Luis Obispo	7/31, 8/2	Chevron breeding male.
GG:OB	2013	J	Chevron	San Luis Obispo	7/26, 8/2, 8/16, 8/23	
GG:PY	2012	M	chevron	San Luis Obispo	6/7, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
GG:YB	2009	M	Chevron	San Luis Obispo	3/1	
GG:YG	2011	F	Chevron	San Luis Obispo	3/1	
GG:YY	2011	M	Chevron	San Luis Obispo	4/19, 4/26, 5/17, 5/31, 6/7, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
PG:BB	2005 or 2011	M	Chevron	San Luis Obispo	6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
PG:OB	2012		Chevron	San Luis Obispo	3/1	
PG:WB	2007	F	Chevron	San Luis Obispo	6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
PG:WG	2005		Chevron	San Luis Obispo	3/1	
PV:VG	2008	M	Chevron	San Luis Obispo	3/1	
PV:WG	2008	M	Chevron	San Luis Obispo	3/1, 5/17, 5/31, 6/7, 6/14, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
PV:WR	2012	M	Chevron	San Luis Obispo	3/25, 4/1, 4/12, 4/19, 4/26, 5/17, 5/31, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
PV:YB	2012		Chevron	San Luis Obispo	3/1	
PV:YG	2009	F	Chevron	San Luis Obispo	3/1	
RR:OY	2010	M	Chevron	San Luis Obispo	4/1, 4/12, 4/19, 4/26, 5/17, 5/31, 6/14, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
RR:RB	2012		Chevron	San Luis Obispo	3/1	
RR:WB	2011	M	Chevron	San Luis Obispo	7/26, 8/2, 8/9, 8/16, 8/23	

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.5. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2013.**

Band	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
RR:WG	2012	M	Chevron	San Luis Obispo	4/19, 4/26, 5/17, 5/31, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
RR:WR	2010	M	Chevron	San Luis Obispo	3/1, 3/18, 3/25, 4/1, 4/12, 4/19, 4/26, 5/17, 5/31, 6/14, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
RR:YB	2011	M	Chevron	San Luis Obispo	3/1	
RR:YY	2010	F	Chevron	San Luis Obispo	3/1	
V:BR	unknown		Chevron	San Luis Obispo	6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
VG:AB	2011		Chevron	San Luis Obispo	3/1	
VG:AY	2011	F	Chevron	San Luis Obispo	3/1, 7/26, 8/2, 8/9, 8/16, 8/23	
VG:BO	2011	F	Chevron	San Luis Obispo	3/1	
VG:BY	2012	J	Chevron	San Luis Obispo	3/1	
VG:OW	2011	M	Chevron	San Luis Obispo	3/1	
VG:PW	2012	J	Chevron	San Luis Obispo	3/1	
VG:VG	2008 or 2011	F	Chevron	San Luis Obispo	7/26, 8/2, 8/9, 8/16	
VG:VG	2008 or 2011	F	Chevron	San Luis Obispo	8/23	
VG:VW	2011	M	Chevron	San Luis Obispo	3/1	
VV:BY	2007	M	Chevron	San Luis Obispo	7/26, 8/2, 8/9, 8/16, 8/23	
VV:WG	2012	F	Chevron	San Luis Obispo	3/1, 3/18, 3/25, 4/1, 4/12, 4/19, 4/26, 5/17, 5/31, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
VV:YB	2012	M	Chevron	San Luis Obispo	4/26, 5/10, 5/17, 5/31, 6/21, 6/28, 7/3, 7/26, 8/2, 8/9, 8/16, 8/23	
GG:GG	2011		Coal Oil Point	Santa Barbara	3/2	
RR:AR	2010		Coal Oil Point	Santa Barbara	3/2, 7/26, 7/27, 7/28	
BB:VB	2009, 2010, or 2011		Devereux Slough	Santa Barbara	7/28	
GG:WY	2013	J	Jalama Beach	Santa Barbara	8/26, 8/29, 9/4, 9/20	
GG:YW	2013		Jalama Beach	Santa Barbara	9/20	
BB:AG	2013	J	VAFB	Santa Barbara	7/16	
BB:BY	2013	J	VAFB	Santa Barbara	7/31	
BB:WW	2010		VAFB	Santa Barbara	8/23	
BB:YW	2010 or 2013		VAFB	Santa Barbara	9/13	
GA:AG	2012	F	VAFB	Santa Barbara	8/15	
GA:AY	2012		VAFB	Santa Barbara	7/5	
GA:BW	2011	F	VAFB	Santa Barbara	5/8, 5/21	
GA:GW	2013		VAFB	Santa Barbara	7/24	

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.5. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2013.**

Band	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
GA:OR	2005	F	VAFB	Santa Barbara	4/4, 4/18, 4/23, 5/3, 5/7, 5/8, 5/9, 6/12, 6/14, 6/21, 7/8	VAFB breeding female.
GA:OW	2013	J	VAFB	Santa Barbara	7/5	
GA:VB	2008 or 2011	M	VAFB	Santa Barbara	6/12, 8/20, 8/22	
GA:VG	2012	F	VAFB	Santa Barbara	7/26, 8/15, 9/2	
GA:WB	2012	F	VAFB	Santa Barbara	8/2, 8/7	
GA:WB	2012	F	VAFB	Santa Barbara	3/20, 4/4, 4/23, 5/21, 6/4, 6/21, 6/27, 6/28, 7/3, 7/8, 7/16, 7/18, 7/26, 7/29, 9/16	VAFB breeding female.
GA:WB	2012		VAFB	Santa Barbara	9/16	
GA:YG	2013	J	VAFB	Santa Barbara	8/23, 8/27	
GG:BW	2012	F	VAFB	Santa Barbara	8/23	
GG:BW	2012	F	VAFB	Santa Barbara	3/11, 4/1, 4/5, 4/17, 4/22, 4/26, 4/29, 5/1, 5/2, 5/3	VAFB breeding female.
GG:GG	2013	J	VAFB	Santa Barbara	7/26	
GG:GW	2013	J	VAFB	Santa Barbara	7/18	
GG:PB	2012	F	VAFB	Santa Barbara	4/29, 5/3, 5/8, 5/13, 5/15, 5/17, 5/21, 5/31, 6/5, 6/24, 6/28, 7/3	VAFB breeding female.
GG:WB	2011 or 2013		VAFB	Santa Barbara	8/23, 9/3, 9/11	
GG:WB	2011 or 2013		VAFB	Santa Barbara	8/15	
GG:WW	2012	M	VAFB	Santa Barbara	6/3, 6/11, 6/26, 7/5, 7/22, 7/24, 7/26	VAFB breeding male.
GG:WW	2012	M	VAFB	Santa Barbara	6/14	
GG:YY	2011 or 2013		VAFB	Santa Barbara	9/11	
GG:YY	2011 or 2013		VAFB	Santa Barbara	9/16	
PG:BY	2004	M	VAFB	Santa Barbara	3/25	
PG:RR	2004	M	VAFB	Santa Barbara	5/6	
PG:YB	2009	M	VAFB	Santa Barbara	3/25	
RR:GW	2012	F	VAFB	Santa Barbara	3/11, 3/18, 3/25	
RR:LY	2010	M	VAFB	Santa Barbara	3/12, 3/19, 3/22, 3/25, 3/27, 4/1, 4/3, 4/5, 4/9, 4/12, 5/8, 5/10, 5/29, 6/3, 6/12, 6/14, 6/27, 6/28, 7/5, 7/18, 7/24, 7/26, 7/31, 9/2	VAFB breeding male.
RR:WW	2010	M	VAFB	Santa Barbara	3/25	
VG:AW	2011 or 2013		VAFB	Santa Barbara	7/22	
VG:VR		F	VAFB	Santa Barbara	3/19, 3/27, 4/1, 4/9, 4/11, 8/22, 8/26, 9/2, 9/12	
VV:AW	2013		VAFB	Santa Barbara	8/22, 8/29	
VV:BB	2013	J	VAFB	Santa Barbara	7/18	
VV:GB	2009		VAFB	Santa Barbara	8/7	

**Appendix D. Banded least terns and snowy plovers (continued).**

**Table D.5. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2013.**

Band	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
VV:GR	2013	J	VAFB	Santa Barbara	7/24	
VV:OA	2011	F	VAFB	Santa Barbara	4/10, 4/17, 4/22, 5/7, 5/8	VAFB breeding female.
VV:OA	2011	F	VAFB	Santa Barbara	8/13, 8/15, 8/19, 9/13, 9/16	
VV:OA	2011	F	VAFB	Santa Barbara	3/25, 4/5	
VV:VB	2011 or 2013		VAFB	Santa Barbara	7/29	
VV:VB	2013	J	VAFB	Santa Barbara	8/23	
GA:VG	2012		Jalama Beach	Santa Barbara	3/14, 9/20	
GA:AB	2013	J	San Clemente Island	Santa Barbara	8/5	
GA:AB	2013	J	West Cove Beach	Santa Barbara	8/5	
GG:WW	2012		San Buenaventura SB	Ventura	4/19	
BB:GW	2009		Hollywood Beach	Ventura	7/28	
GA:AG	2012 or 2013		Hollywood Beach	Ventura	9/27	
GG:AG	2013		Hollywood Beach	Ventura	9/27	
RR:OR	2010		Hollywood Beach	Ventura	9/27	
GG:AR	2011		Malibu Lagoon SB	Los Angeles	7/28	
BB:BW	2006 or 2010		Huntington Beach	Los Angeles	7/31	
VG:AY	2011		Bolsa Chica	Orange County	9/12, 9/17	
VV:BG	2009 or 2013		Balboa	San Diego	7/24	
VG:AY	2011		Cardiff SP	San Diego	9/9	
VV:VB	2011 or 2013		Cardiff SP	San Diego	8/9	
BB:GW	2009		Silver Strand SB	San Diego	7/31	
GG:AG	2013		Tijuana River Mouth	San Diego	7/31	
GG:VB	2011 or 2013		Tijuana River Mouth	San Diego	9/26	
GG:WW	2012 or 2013		Borderfield (Tijuana River Mouth)	San Diego	8/15	

## Appendix E. Addendums to snowy plover nesting success.

**Table E.1. Nesting success of snowy plovers at ODSVRA, 2001-13.**

For calculation of percent nests hatching, nests with unknown fate or detected only by the presence of brood are excluded. Beginning in 2006, an additional 0.4 mile of shoreline at the southern end of park has been monitored by ODSVRA (a survey conducted by the Guadalupe-Nipomo Dunes NWR in 2005 determined this area was part of ODSVRA and not the refuge, as was previously thought). Between 1998-2003, the amount of riding area seasonally closed increased; size has been relatively stable since 2004. Nests from unknown locations were detected as broods inside the seasonally protected habitat in Southern Enclosure or Oso Flaco. For corrections made to data presented in previous reports, see Appendix H in the 2009 report (CDPR 2009).

Year	Area	No. nests	No. nests with known fate and known location	No. nests hatching	% nests hatching	No. chicks	No. banded or known fate chicks	No. chicks fledged	% known fledged
2001	Arroyo Grande Creek	3	3	3	100	9	9	0	0
	Riding Area	26	25	22	88	65-68	54	1	2
	Oso Flaco	4	2	2	100	6	6	1	17
	<b>Total</b>	<b>33</b>	<b>30</b>	<b>27</b>	<b>90</b>	<b>71-74</b>	<b>69</b>	<b>2</b>	<b>3</b>
2002	Riding Area	33	33	25	76	62	62	35	56
	Oso Flaco	2	2	0	0	0	-	-	-
	<b>Total</b>	<b>35</b>	<b>35</b>	<b>25</b>	<b>71</b>	<b>62</b>	<b>62</b>	<b>35</b>	<b>56</b>
2003	Dune Preserve	1	1	1	100	3	3	0	0
	Riding Area	77	76	55	72	139	138	97	70
	Oso Flaco	13	13	5	38	11	11	7	64
	Pipeline Revegetation	3	3	2	67	4	4	2	50
	Unknown location	1	-	1	-	2	2	2	100
	<b>Total</b>	<b>95</b>	<b>93</b>	<b>63</b>	<b>67</b>	<b>162</b>	<b>159</b>	<b>108</b>	<b>67</b>
2004	Riding Area	114	112	87	78	208	205	59	29
	Oso Flaco	27	27	17	63	40	39	7	18
	Pipeline Revegetation	1	1	1	100	3	3	0	0
	Unknown location	5	-	5	-	12	12	0	0
	<b>Total</b>	<b>147</b>	<b>140</b>	<b>110</b>	<b>75</b>	<b>263</b>	<b>263</b>	<b>66</b>	<b>25</b>
2005	Riding Area	81	81	62	77	148	148	59	40
	Oso Flaco	22	22	18	82	49	49	23	47
	Unknown location	4	-	4	-	7	7	0	0
	<b>Total</b>	<b>107</b>	<b>103</b>	<b>84</b>	<b>78</b>	<b>204</b>	<b>204</b>	<b>82</b>	<b>40</b>
2006	Riding Area	88	85	65	76	173	173	8	5
	Oso Flaco	29	29	22	76	57	57	9	16
	<b>Total</b>	<b>117</b>	<b>114</b>	<b>87</b>	<b>76</b>	<b>230</b>	<b>230</b>	<b>17</b>	<b>7</b>
2007	Riding Area	76	76	61	80	159	157	58	37
	Oso Flaco	15	15	9	60	20	20	4	20
	Unknown location	8	-	8	-	21	21	4	19
	<b>Total</b>	<b>99</b>	<b>91</b>	<b>78</b>	<b>77</b>	<b>200</b>	<b>198</b>	<b>66</b>	<b>33</b>
2008	Riding Area	100	100	73	73	172	172	64	37
	Oso Flaco	19	19	8	42	19	19	5	26
	Unknown location	2	-	2	-	6	6	3	50
	<b>Total</b>	<b>121</b>	<b>119</b>	<b>83</b>	<b>68</b>	<b>197</b>	<b>197</b>	<b>72</b>	<b>37</b>
2009	Pismo Lagoon	1	1	0	0	0	-	-	-
	Riding Area	125	124	86	69	221	221	79	36
	Oso Flaco	23	22	8	36	22	22	2	9
	Unknown location	1	-	1	-	2	2	0	0
	<b>Total</b>	<b>150</b>	<b>147</b>	<b>95</b>	<b>64</b>	<b>245</b>	<b>245</b>	<b>81</b>	<b>33</b>
2010	Carpenter Creek	1	1	0	0	0	0	0	-
	Arroyo Grande Creek	3	3	0	0	0	0	0	-
	Riding Area	127	124	96	77	236	236	88	37
	Oso Flaco	22	22	13	59	33	33	15	45
	Unknown location	2	-	2	-	6	6	4	67
	<b>Total</b>	<b>155</b>	<b>150</b>	<b>111</b>	<b>73</b>	<b>275</b>	<b>275</b>	<b>107</b>	<b>39</b>
2011	Riding Area	142	137	115	84	305	305	130	43
	Oso Flaco	23	23	16	70	40	40	18	45
	Unknown location	7	-	7	-	20	20	4	20
	<b>Total</b>	<b>172</b>	<b>160</b>	<b>138</b>	<b>82</b>	<b>365</b>	<b>365</b>	<b>152</b>	<b>42</b>
2012	Riding Area	197	189	143	76	353	353	90	25
	Oso Flaco	14	14	9	64	21	21	4	19
	Unknown location	5	-	5	-	12	12	2	17
	<b>Total</b>	<b>216</b>	<b>203</b>	<b>157</b>	<b>75</b>	<b>386</b>	<b>386</b>	<b>96</b>	<b>25</b>
2013	Riding Area	147	144	115	80	288	288	147	51
	Oso Flaco	23	23	15	65	39	39	25	64
	Unknown location	8	-	8	-	16	16	15	94
	<b>Total</b>	<b>178</b>	<b>167</b>	<b>138</b>	<b>78</b>	<b>343</b>	<b>343</b>	<b>187</b>	<b>55</b>

**Appendix E. Addendums to snowy plover nesting success (continued).**

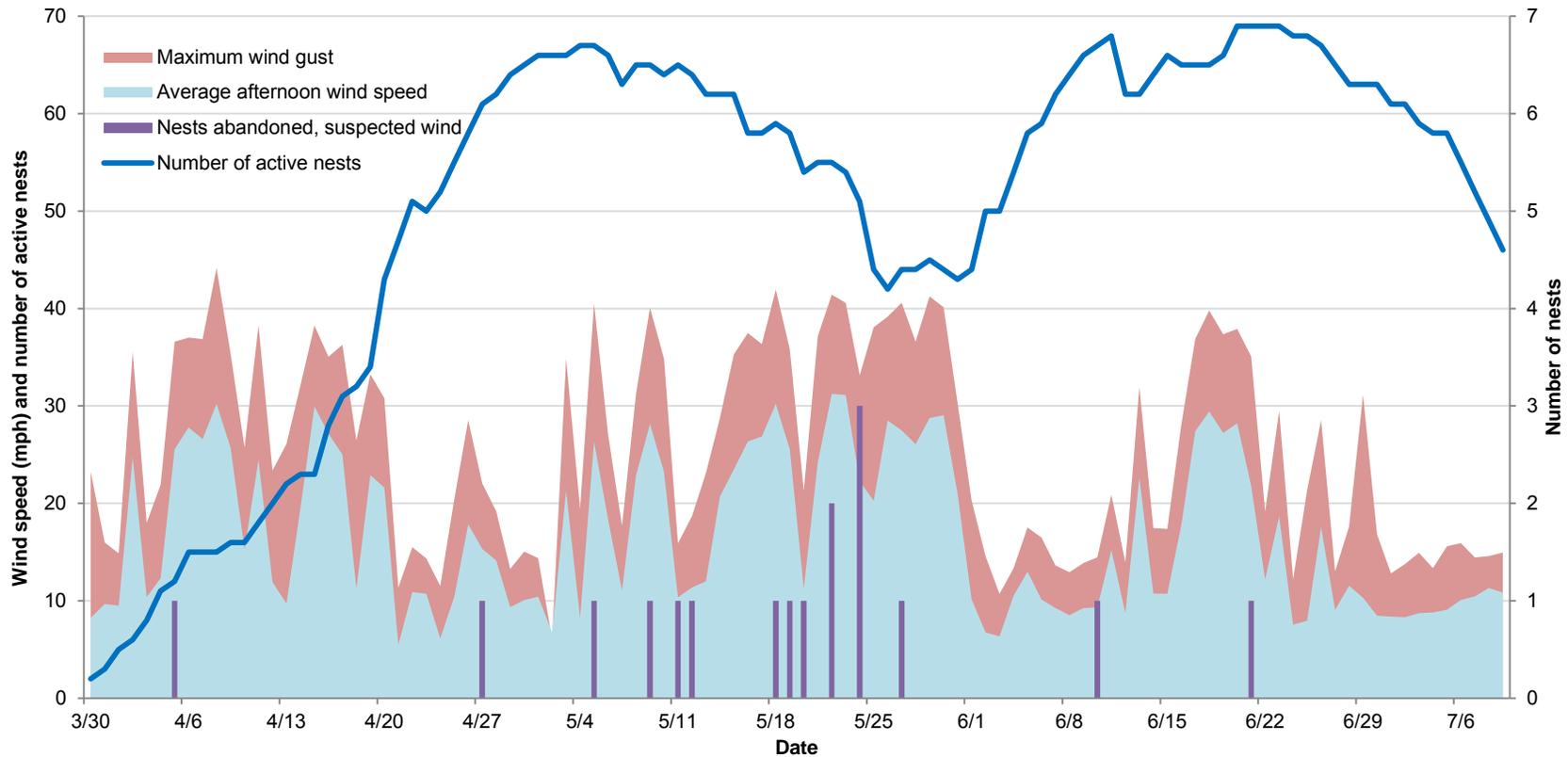
**Table E.2. Nest protection used at ODSVRA in 2013.**

Nest protection used at ODSVRA in 2013. Nests with unknown location and unknown fate nests are excluded. The large seasonal enclosure is the portion of 6, 7, 8, Boneyard enclosures, and North Oso Flaco that is protected with predator fencing (does not include the shoreline). Mini, circular and 10 foot by 10 foot enclosures (10x10) outside of the large seasonal enclosure (shoreline of 6, 7, 8 enclosures, North Oso Flaco and South Oso Flaco) were used in conjunction with symbolic fence.

un=unknown predator; gul=gull; pre=abandoned pre-term; pos=abandoned post-term; win=abandoned, suspected wind; unk=failed, cause unknown.

Area	Large seasonal enclosure					Symbolic fencing			
	No additional fencing	Bumpout	10x10	Circular	Mini	No additional fencing	10x10	Circular	Mini
<b>6 enclosure</b>	<b>50</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>6</b>
Nests hatched	41 (82%)				2 (67%)			1 (33%)	6 (100%)
Nests depredated									
Nests failed other causes	9 (2 pre, 1 pos, 5 w in, 1 unk)	1 (1 w in)			1 (1 w in)	1 (1 w in)		2 (2 w in)	
<b>7 enclosure</b>	<b>32</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>7</b>
Nests hatched	28 (88%)				1 (100%)			2 (40%)	7 (100%)
Nests depredated									
Nests failed other causes	4 (1 pre, 1 pos, 2 w in)					1 (1 unk)		4 (1 pre, 2 pos, 1 w in)	
<b>8 enclosure</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>
Nests hatched	16 (85%)								4 (80%)
Nests depredated	1 (1 un)								
Nests failed other causes	2 (1 pre, 1 w in)								1 (1 pos)
<b>Boneyard</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>				
Nests hatched	7 (70%)								
Nests depredated									
Nests failed other causes	3 (1 pos, 1 w in, 1 unk)								
<b>SOUTHERN ENCLOSURE TOTALS</b>	<b>111</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>18</b>
Nests hatched	92 (83%)				3 (75%)			3 (37%)	17 (94%)
Nests depredated	1 (1 un)								
Nests failed other causes	18 (4 pre, 3 pos, 9 w in, 2 unk)	1 (1 w in)			1 (1 w in)	2 (1 w in, 1 unk)		6 (1 pre, 2 pos, 3 w in)	1 (1 pos)
<b>North Oso Flaco</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>0</b>
Nests hatched							2 (100%)	5 (100%)	
Nests depredated									
Nests failed other causes									
<b>South Oso Flaco</b>						<b>2</b>	<b>14</b>	<b>0</b>	<b>0</b>
Nests hatched							9 (64%)		
Nests depredated						1 (1 gul)			
Nests failed other causes						1 (1 pre)	5 (2 pre, 1 pos, 2 w in)		
<b>OSO FLACO TOTALS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>16</b>	<b>5</b>	<b>0</b>
Nests hatched							11 (69%)	5 (100%)	
Nests depredated						1 (1 gul)			
Nests failed other causes						1 (1 pre)	5 (2 pre, 1 pos, 2 w in)		
<b>GRAND TOTAL</b>	<b>111</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>16</b>	<b>13</b>	<b>18</b>
Nests hatched	92 (83%)				3 (75%)		11 (69%)	8 (62%)	17 (94%)
Nests depredated	1 (1 un)					1 (1 gul)			
Nests failed other causes	18 (4 pre, 3 pos, 9 w in, 2 unk)	1 (1 w in)			1 (1 w in)	3 (1 pre, 1 w in, 1 unk)	5 (2 pre, 1 pos, 2 w in)	6 (1 pre, 2 pos, 3 w in)	1 (1 pos)

**Appendix E. Addendums to snowy plover nesting success (continued).**



**Figure E.1. Daily wind speed data (daily afternoon average and daily maximum wind gust) and snowy plover nest loss at ODSVRA from 30 March to 10 July 2013.**

The left y-axis corresponds to wind speed in miles per hour (mph) and total number of active nests. The right y-axis corresponds to number of nests lost with fate abandoned, suspected wind. Wind speed was collected at the S1 wind tower, located approximately 375 feet east of 6 enclosure since 2011, from an anemometer at 10 meters height. The daily afternoon average wind speed is calculated from the average of the hours 1:00 pm – 5:00 pm. The maximum wind gust represents the maximum wind speed for the entire day. Assigned nest loss dates were not always the same due to the following circumstances: in cases where birds could not be confirmed incubating due to poor visibility from airborne sand, a midpoint date for loss to wind was assigned between the last documented incubation date and the discovery of the buried nest.

**Appendix F. Predator summary tables and figures.**

**Table F.1. Summary of predators detected in the Southern Enclosure and Oso Flaco at ODSVRA in 2013.**

Observations from 1 March - 10 September (a 194-day period). Contracted predator management specialists were essentially done and observer presence in field by park staff was reduced after the first week of September (no remaining chicks). Max no. individ. = maximum number of different individuals identified during one day. This number was not typically determined for mammals or owls as these species are primarily nocturnal with occurrences detected by tracks.

Species	First date observed	Last date observed	No. days detected	Max no. individ.	Notes
<b>Mammals</b>					
Bobcat	30 Mar	5 Aug	11	-	Tracks primarily encountered in North Oso Flaco. Also noted in 7 and 8 enclosures and South Oso Flaco. One occurrence of bobcat scavenging a snowy plover nest 10 days after the nest was abandoned.
Coyote	4 Mar	10 Sep	116	-	Common on the Southern Enclosure shoreline and North and South Oso Flaco shoreline. Noted inside the predator fencing of the Southern Enclosure on 49 days. Nine coyotes were lethally removed this season.
Domestic dog	14 Mar	29 Aug	7	-	Documented by tracks and live sightings. Six occurrences on 6 enclosure shoreline and 1 occurrence on 7 enclosure shoreline.
Opossum	4 Mar	18 Aug	11	-	Majority of activity in 6, 7 and 8 enclosures. Occasionally occurring in South Oso Flaco, North Oso Flaco, and Boneyard enclosure. One least tern egg depredated at nest on 31 May.
Raccoon	6 Mar	10 Sep	145	-	Highest occurrences in Boneyard and 8 enclosures. Less frequently noted in 6 and 7 enclosures, North and South Oso Flaco. One raccoon was lethally removed this season.
Skunk	28 Jul	9 Sep	2	-	Activity noted in 6 and 7 enclosures and only detected on 2 days.
<b>Avian</b>					
Osprey	5 Mar	8 Sep	48	3	Although not documented as a predator of plovers and least terns, ospreys are included in this table due to their disturbance when perched for longer periods of time in sensitive areas. Primarily observed flying over 6, 7 and 8 enclosures and occasionally perching on the Southern Enclosure shore and fence. Also seen in North and South Oso Flaco.
Northern harrier	5 Mar	10 Sep	39	4	Typically observed flying over South Oso Flaco. Almost all observations in flight and/or hunting. Minimum of 4 individuals (based on age and sex characteristics) observed during this season: 1 immature female, 1 adult female and 2 adult males. One adult male was trapped and relocated. A second male was seen subsequent to this event.
Cooper's hawk	7 Aug	7 Aug	1	1	Observed once in South Oso Flaco.
Red-tailed hawk	5 Mar	9 Sep	49	3	Observed most often perched at north end of North Oso Flaco, 7.5 revegetation area and South Oso Flaco, also many observations in Boneyard and 8 enclosures. Minimum of 3 individuals (based on age characteristics) observed during this season: 2 adults and 1 sub-adult.
American kestrel	2 Jul	5 Sep	16	5	Seen in Southern Enclosure and North and South Oso Flaco. Observed in flight and perch hunting. Minimum of 5 individuals (based on age and sex characteristics) observed during this season. One juvenile female was trapped and relocated this season.
Merlin	4 Mar	22 Apr	5	2	Primarily observed on 6, 7 and 8 enclosure shoreline in flight and perching on shoreline fence. Observed once in flight over North Oso Flaco shore and in South Oso Flaco.

**Appendix F. Predator summary tables and figures (continued).**

**Table F.1. Summary of predators detected in the Southern Enclosure and Oso Flaco at ODSVRA in 2013 (continued).**

Species	First date observed	Last date observed	No. days detected	Max no. individ.	Notes
Peregrine falcon	9 Mar	10 Sep	41	7	Observed throughout the Southern Enclosure, North Oso Flaco and South Oso Flaco in flight and perching, sometimes over an extended time period. Multiple observations pursuing and/or consuming prey on the shoreline and inside the enclosure. One plover chick, one plover juvenile and one least tern chick were depredated by peregrine falcon. Minimum of 7 individuals (based on age and sex characteristics) observed during this season: 2 adult males (1 banded), 2 adult females, 1 immature, 1 sub-adult, and 1 juvenile.
Great horned owl	3 May	14 Jun	6	3	Observed perch hunting in Boneyard enclosure and North and South Oso Flaco. Three adult males were trapped and relocated this season.
Large owl spp.	19 Mar	10 Sep	45	-	Primarily identified by tracks. Most tracks believed to be from great horned owl. Primarily noted inside 8 enclosure, Boneyard, and North and South Oso Flaco. Less frequently noted in 6 and 7 enclosures.
Gull spp.	Present daily throughout season				The maximum number of gulls in the Southern Enclosure and Oso Flaco was recorded during the month of July. This includes birds in flight, foraging on shoreline, and roosting. One ring-billed gull was lethally removed this season.
Loggerhead shrike	1 Jul	31 Jul	5	5	Observed perch hunting in Boneyard enclosure and North and South Oso Flaco. Four juvenile loggerhead shrikes were trapped and relocated this season.
American crow	10 Jul	26 Aug	3	2	Observed flying over North Oso Flaco and Boneyard enclosure. One individual landed in Boneyard enclosure on 26 August.
Common raven	18 Apr	23 Jul	4	1	Observed in flight over South Oso Flaco and over 6, 7 and 8 enclosures. Also observed in flight over the open riding area and Dunes Preserve. Two adult ravens were lethally removed this season.
White-tailed kite	27 Jul	25 Aug	7	1	Primarily observed in flight or kiting in South Oso Flaco. Observed once over 8 enclosure.

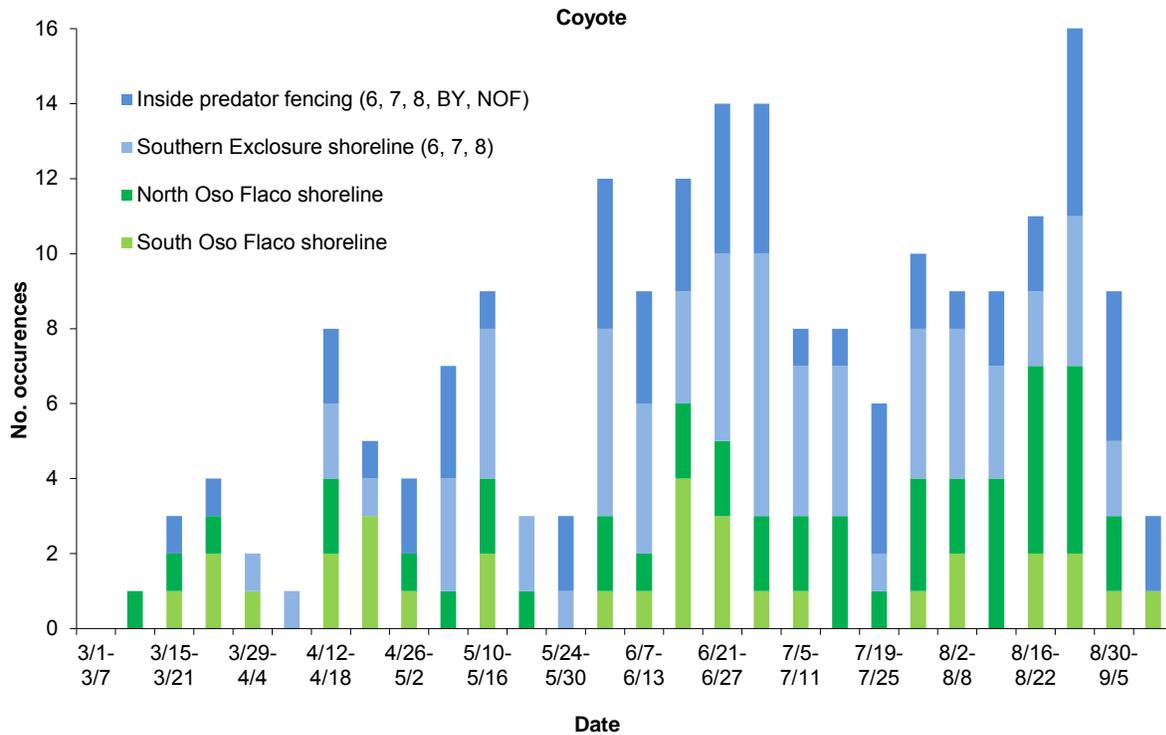
**Appendix F. Predator summary tables and figures (continued).**

**Table F.2. Mammalian and avian predators removed under predator management actions for least terns and snowy plovers at ODSVRA in 2013.**

Nine coyotes, two ravens, one raccoon, and one ring-billed gull were lethally removed. All other animals were live-trapped and relocated. All animals trapped or removed were within ODSVRA boundaries, with the exception of two ravens off-site and with the permission of the landowner.

Date	Species	Age/Sex	Location
<b>Mammals</b>			
9 May	coyote	male	Boneyard enclosure
16 May	coyote	female	South Oso Flaco
16 May	raccoon	male	South Oso Flaco
17 May	coyote	female	South Oso Flaco
22 May	coyote	female	South Oso Flaco
11 Jun	coyote	male	South Oso Flaco
11 Jun	coyote	female	South Oso Flaco
3 Jul	coyote	female	Maidenform revegetation area
19 Jul	coyote	female	South Oso Flaco
30 Jul	coyote	male	South Oso Flaco
<b>Avian</b>			
3 May	raven	male	Off-site
3 May	raven	female	Off-site
7 May	great horned owl	male	North Oso Flaco
26 May	ring-billed gull	-	6 enclosure shoreline
29 May	northern harrier	adult male	North Oso Flaco
5 Jun	great horned owl	male	South Oso Flaco
14 Jun	great horned owl	male	South Oso Flaco
1 Jul	loggerhead shrike	juvenile	North Oso Flaco
12 Jul	American kestrel	juvenile female	South Oso Flaco
22 Jul	loggerhead shrike	juvenile	North Oso Flaco
26 Jul	loggerhead shrike	juvenile	North Oso Flaco
31 Jul	loggerhead shrike	juvenile	South Oso Flaco

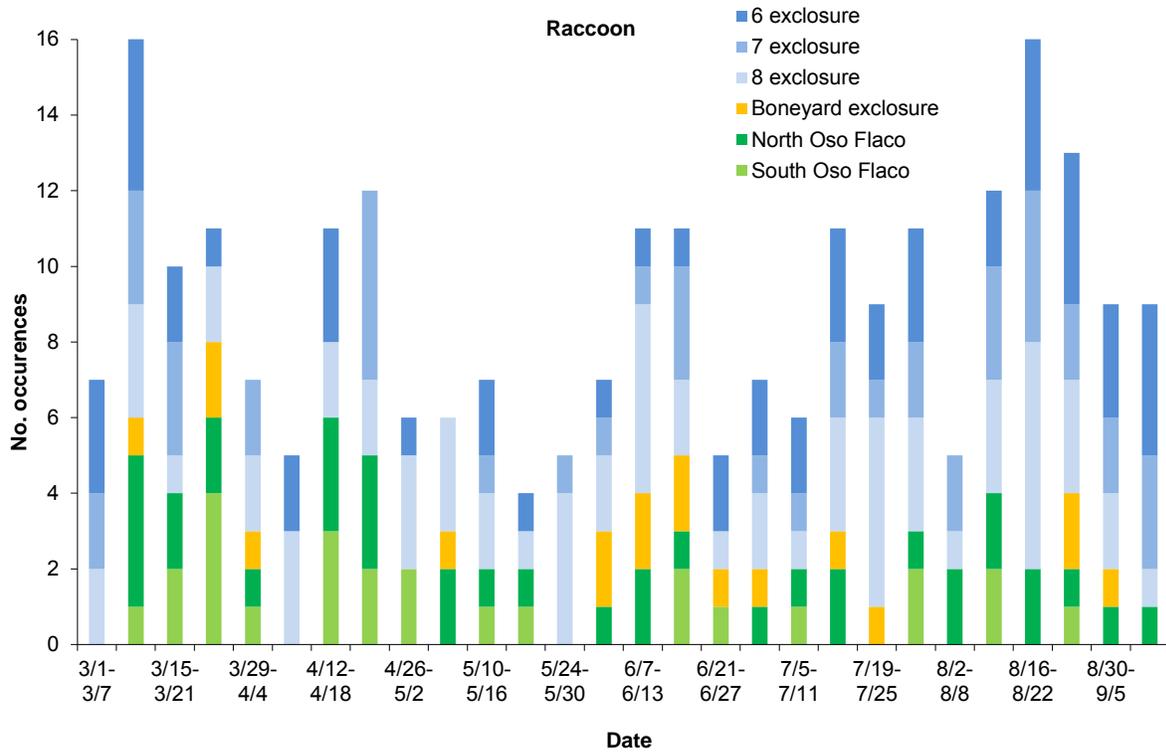
**Appendix F. Predator summary tables and figures (continued).**



**Figure F.1. Coyote occurrences documented in the Southern Enclosure and Oso Flaco at ODSVRA in 2013.**

Observations from 1 March - 10 September (a 194-day period). Coyote presence is documented for the Southern Enclosure shoreline (6, 7, and 8 enclosures), North Oso Flaco shoreline, South Oso Flaco shoreline, and inside the predator fencing of the Southern Enclosure (6, 7, 8, Boneyard, and North Oso Flaco) as separate occurrences. For the Southern Enclosure (6, 7, 8, and Boneyard enclosures) and North Oso Flaco, a distinction is made between the shoreline and inside the predator fencing of the enclosures because coyotes are typically excluded from the area protected by predator fencing.

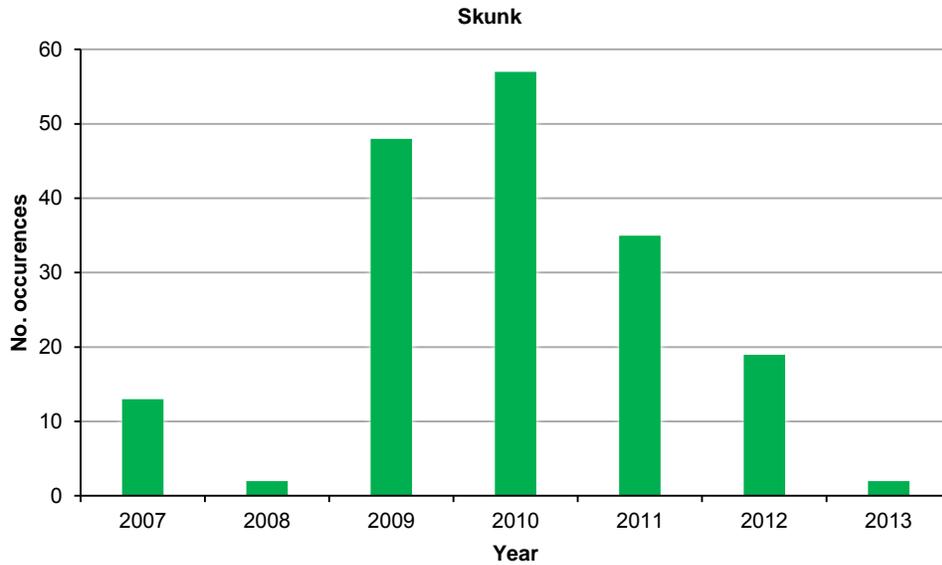
**Appendix F. Predator summary tables and figures (continued).**



**Figure F.2. Raccoon occurrences documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2013.**

Observations from 1 March - 10 September (a 194-day period). Raccoon presence is documented for each of the areas of the Southern Exclosure (6, 7, 8, and Boneyard exclosures), North Oso Flaco, and South Oso Flaco as separate occurrences. No distinction is made between the shoreline and inside the predator fencing of the exclosure since raccoons are able to climb over the predator fencing.

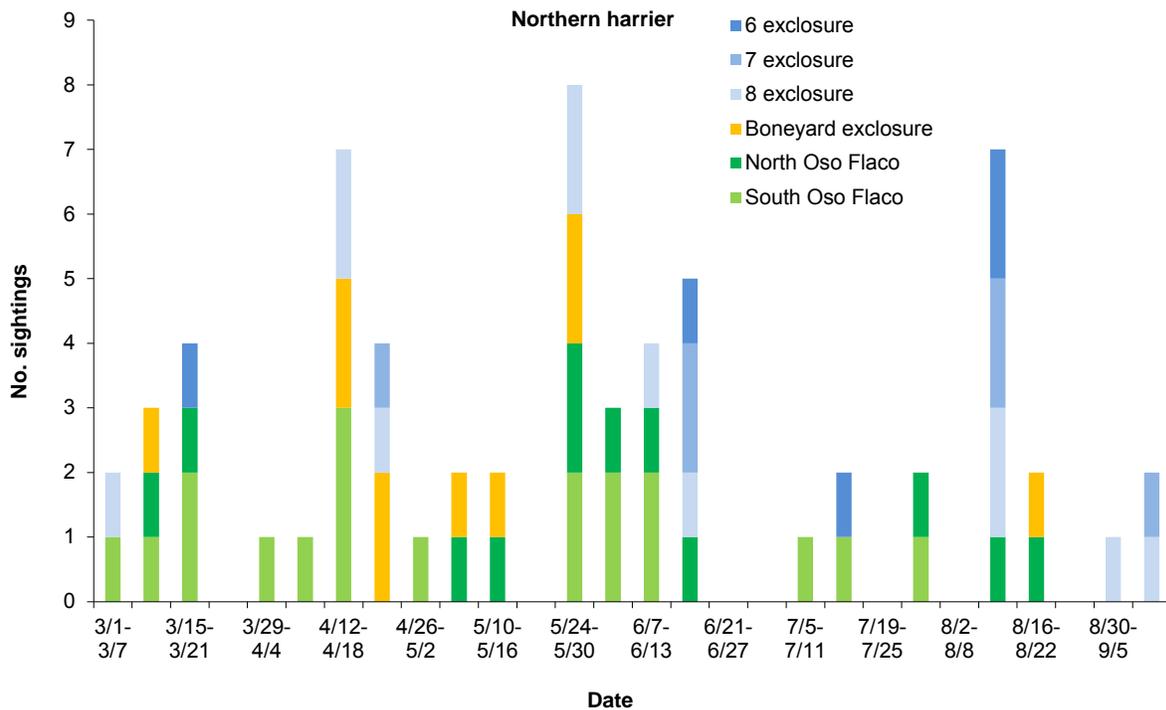
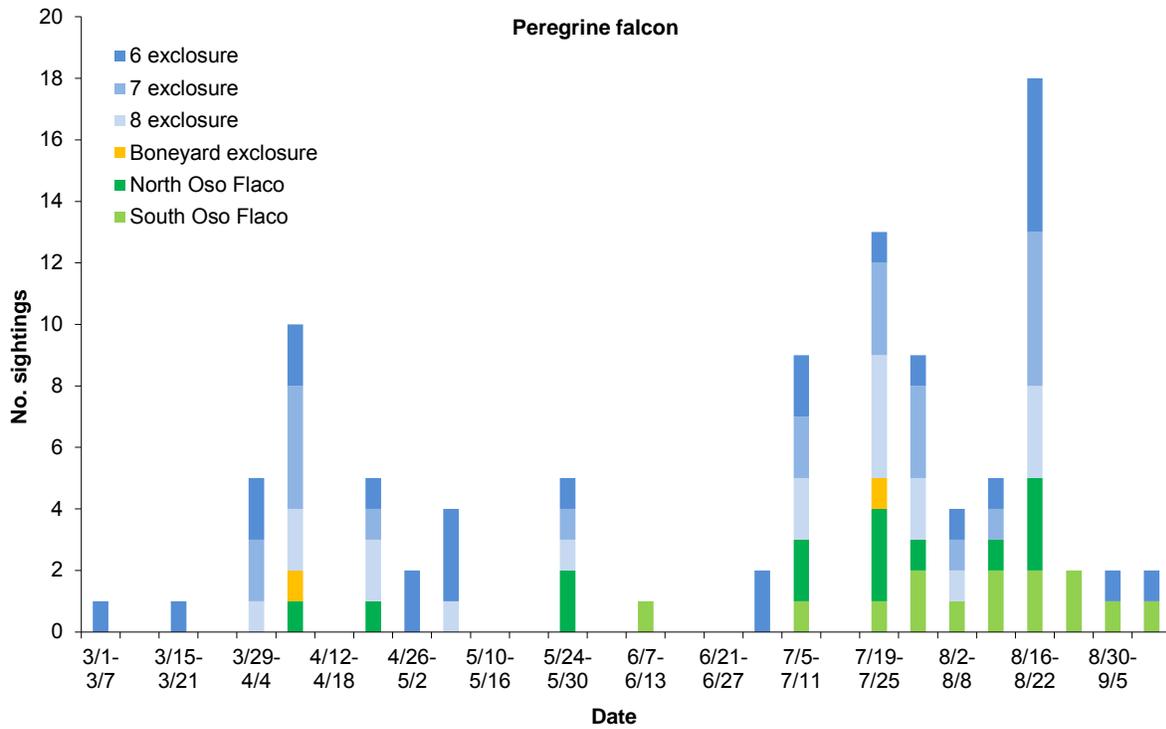
**Appendix F. Predator summary tables and figures (continued).**



**Figure F.3. Skunk occurrences documented in the Southern Exclosure and Oso Flaco at ODSVRA 2007- 2013.**

Observations from 1 March - 10 September (a 194-day period). Skunk presence is documented for each of the areas of the Southern Exclosure (6, 7, 8, and Boneyard exclosures), North Oso Flaco, and South Oso Flaco as separate occurrences. No distinction is made between the shoreline and inside the predator fencing of the exclosure since skunks are able to pass through predator fencing.

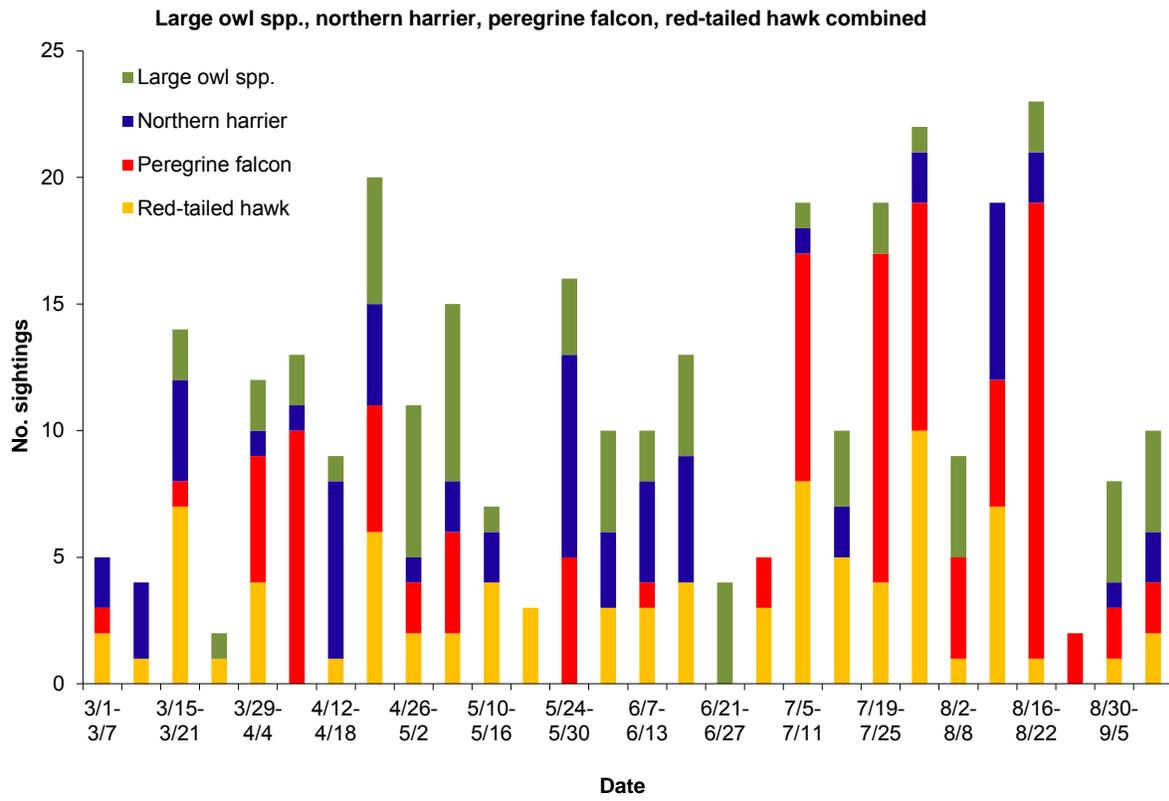
**Appendix F. Predator summary tables and figures (continued).**



**Figure F.4. Avian predator sightings documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2013.**

Observations from 1 March - 10 September (a 194-day period).

Appendix F. Predator summary tables and figures (continued).



**Figure F.4. Avian predator sightings documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2013 (continued).**

Observations from 1 March - 10 September (a 194-day period).

**Appendix G. Documented mortality of California least tern and snowy plover chicks, juveniles, and adults at ODSVRA.**

**Table G.1. Documented predation of least terns from 1 March to 30 September 2013.**

No. (age)	Predator	Location	Notes
1 (juvenile)	Peregrine falcon (banded adult male)	6 enclosure	On 3 August, a banded adult male peregrine falcon was observed catching and eating a 35-day-old juvenile (W/G:W/B, LT31) in 6 enclosure (identification confirmed with collected feather remains and lower leg with federal band).

**Table G.2. Documented predation of snowy plovers from 1 March to 30 September 2013.**

No. (age)	Predator	Location	Notes
1 (chick)	Peregrine falcon (banded adult male)	8 enclosure shoreline	On 3 August, a banded adult male peregrine falcon was observed capturing and eating a 4-day-old chick banded PV:VB from SP166. The remains of two banded legs were collected and confirmed the chick's origin.
1 (adult) 1 (chick)	Unknown avian	8 enclosure shoreline	On 5 August, an adult plover wing among a dispersed feather pile was found on the 8 enclosure shoreline. No mammalian predator tracks were present. The fresh intact carcass (bill damaged and possible crushed skull) of a large chick (VV:YB, SP113) was located 18 inches away. The 30-day-old sibling was seen alive the same day without an attending adult. The SP113 brood was last seen with two chicks on 30 July (chicks 24 days old).
1 (juvenile)	Peregrine falcon (banded adult male)	North Oso Flaco shoreline	On 17 August, a banded adult male peregrine falcon was observed eating a small prey item on North Oso Flaco shoreline. Feather remains were collected and identified as a juvenile snowy plover.

**Appendix G. Documented mortality of California least tern and snowy plover chicks, juveniles, and adults at ODSVRA.**

**Table G.3. Mortality, other than predation, of least terns from 1 March to 30 September 2013.**

See Notes section and attached necropsy reports for more detail. All remains not suitable for necropsy were saved to be provided to a designated depository.

No. (age)	Location	Notes
1 (chick)	6 enclosure	On 19 July, a chick from LT48 was observed dead at the nest. The chick was last observed alive when 5 days old on 18 July at the nest with no attending adult.
1 (one-year old)	6 enclosure	On 27 July, an unbanded one-year-old tern was picked up from the open riding area after being seen in 6 enclosure, dragging its left wing and unable to fly. The bird was taken to Pacific Wildlife Care in San Luis Obispo County the same day and received veterinary care until it died on 31 July. The carcass was sent for necropsy.
1 (juvenile)	6 shoreline	On 29 July, the wet carcass of a juvenile (L:W/B, LT22) was found on 6 enclosure shoreline. This juvenile was last observed alive and appeared well on 28 July at 33 days old. The carcass was sent to CDFW Marine Wildlife Veterinary Care Research Center, Santa Cruz, Santa Cruz County for necropsy.
1 (chick)	6 enclosure	On 3 August, the very limited remains of a banded tern, including one leg with violet tape over a federal band, were collected in 6 enclosure and identified as those of V:W/B (LT9). This bird was last seen alive when five days old on 29 June and is assumed to have died prior to fledging.
1 (juvenile)	6 enclosure	On 3 August, the intact decomposing carcass of a juvenile (W/A:W/B, LT1) was collected in 6 enclosure (first observed by spotting scope from outside the enclosure on 29 July). This tern was last observed alive on 12 July at 20 days old and identified as surviving to fledge age (21 days old or older for purpose of this report) based on a wing chord measurement of 133 millimeters.
1 (chick)	6 enclosure	On 5 August, the carcass of a small chick from LT55 was observed near the nest by spotting scope from outside the enclosure. This chick was last observed alive on 4 August at three days old with minimal adult attendance and difficulty moving.

**Table G.4. Mortality, other than predation, of snowy plovers from 1 March to 31 October 2013.**

See Notes section and attached necropsy reports for more detail. All remains not suitable for necropsy were saved to be provided to a designated depository.

No. (age)	Location	Notes
1 (adult female)	Between Grand and Pier Avenue	On 23 March, the carcass of an unbanded adult female was found partially buried in the vehicle riding area in faint tire tracks and was sent for necropsy.
2 (chicks)	6 enclosure	On 24 May, two chicks from SP39 were found dead and coated with sand 18 inches away from the nest. Both adults were seen incubating the remaining egg (well-pipped) but did not approach the chicks.
1 (chick)	6 enclosure	On 24 May, one chick from SP49 was found dead two feet from the nest bowl, one-quarter buried in sand and cold. Two normal chicks were present in the nest bowl and banded.
1 (juvenile)	South Oso Flaco	On 4 July, the carcass of a GA:BW juvenile from SP149 with a puncture wound in the neck was found on the shoreline and sent for necropsy.
1 (chick)	6 enclosure	On 3 September, the intact decomposed carcass of a small unbanded chick was found buried inside the mini-enclosure of SP120. The origins of the chick are unknown as the two chicks from SP120 both fledged and the remaining egg was found buried.
1 (adult male)	7 shoreline	On 10 September, the partially decomposed carcass of a PG:OG adult male was found mostly buried on the upper shoreline of 7 enclosure. This was banded as a chick at ODSVRA in 2009 and was last seen alive on 9 July 2012 with a brood at ODSVRA.
1 (chick)	8 enclosure	On 15 September, the desiccated carcass of one VV:WG chick from SP45 was found 90% buried in 8 enclosure. This chick was last seen alive on 26 May at one day old.
1 (adult)	ORA east of marker post 5	On 20 September, the carcass of an unbanded adult plover was found partially buried in the open riding area and was sent for necropsy.
1 (adult)	ORA between marker post 6 and 7	On 18 October, the carcass of an unbanded adult snowy plover was found partially buried in the sand. The carcass was severely decayed and was not sent for necropsy.

# Oceano Dunes State Vehicular Recreation Area

## 2013 Predator Management Report



### **Submitted To:**

Ronnie Glick  
Senior Environmental Scientist  
Oceano Dunes District  
340 James Way, Suite 270  
Pismo Beach, CA 93449

### **Submitted By:**

Kevin Estrada, Wildlife Specialist  
&  
Valerie Burton, Assistant District Supervisor  
&  
Eric Covington, District Supervisor  
San Luis District  
CA Wildlife Services Program

## **Introduction**

Prior to the 2013 California Least Tern (LETE) and Western Snowy Plover (SNPL) nesting season, USDA-APHIS-Wildlife Services entered into an agreement with Oceano Dunes State Vehicular Recreation Area (ODSVRA) to conduct predator management activities in the LETE and SNPL nesting areas. Wildlife Specialist (WS) Kevin Estrada was assigned to the ODSVRA project to monitor, or selectively remove, mammalian and avian predators for protection of nesting LETE and SNPL.

WS Specialist Kevin Estrada began working the ODSVRA project May 1<sup>st</sup>, 2013. Kevin underwent mandatory training (ATV training, firearms training, trapping, defensive driving, civil rights, safety in all aspects) used during the project.

## **Methods of Predator Management**

Many methods were used for LETE and SNPL protection throughout their nesting season. Methods include trapping, calling, shooting, spotlighting and surveying.

Daytime surveys were performed by either hiking or driving on the dunes and shoreline in an attempt to locate predators through track identification and binoculars or spotting scope. Predator management methods, such as removal and hazing were implemented when the safety of LETE and SNPL nesting was compromised. Wildlife Services stayed in communication with field monitors in order to stay up to date on their observations of predator activity. Surveys indicating the location of predators were conducted in Eucalyptus, Table Top, Pipeline Revegetation, Boy Scout Camp, Maidenform, Southern Enclosure, North and the South Oso Flaco areas (Appendix 1).

Trapping was an effective method of predator management. Trapping methods used were pole traps, E-Z Catch traps, cage traps and padded leg-hold traps. Pole traps were used for certain avian predators, cage traps for raccoons and padded leg-hold traps for coyotes and raccoons. A total of nine coyotes and one raccoon were removed by padded leg hold traps. One Loggerhead Shrike was trapped with an E-Z Catch trap and relocated.

The method of shooting was used to lethally remove one Ring-billed Gull and a pair of Common Ravens.

Calling was another option of predator management. This is most effective early in the morning or near sunset. This is the act of producing a sound that entices the predator to seek out the source of the noise. No predators were removed using this method.

## **Results of Predator Management Methods**

When predator management began in 2013 the SNPL nesting season was well under way and one of the main concerns was a pair of ravens that Paul Young (Ventana Wildlife Society, contractor with Park for live-trapping of raptors) had located at their nest site. The raven nest was offsite on Brown Road, approximately six miles from ODSVRA, but only two miles from Rancho Guadalupe Dunes and the Chevron site. Since ravens have been a serious predation problem in the past the removal of the pair of ravens was the first priority. The ravens were lethally removed on May 3<sup>rd</sup>.

Gulls on the shoreline were also a major concern because of predation of SNPL chicks in previous years. Extensive gull surveys and monitoring were conducted all season. On May 26<sup>th</sup> a Ring-billed Gull was observed harassing plovers on the shoreline, and when the behavior continued it was determined by Park staff that the gull should be removed. The gull was lethally removed on May 26<sup>th</sup>. A necropsy was performed but no SNPL remains, egg fragments or contents were found inside the gull.

Juvenile shrikes started showing up mid-July. WS Specialist Estrada assisted Paul Young with his trapping for shrikes and on July 22<sup>nd</sup> WS Specialist Estrada trapped a juvenile shrike at Boneyard Gate. The shrike was transferred to Paul Young and relocated to Santa Ynez.

American Kestrels were periodically seen in and around the enclosure. They would frequently perch on enclosure fences and inside the enclosures. WS Specialist Estrada often hazed kestrels with a bird whistler gun and assisted Paul Young with trapping efforts. The trapping efforts were unsuccessful.

Great Horned Owl tracks were regularly seen in and around all the enclosures and revegetation areas. WS Specialist Estrada spent several nights attempting to catch the owls with pole traps, but was unsuccessful.

Coyotes presented a serious predation threat to LETE and SNPL nesting success in 2013. The main concern was the predation problem from 2012 where SNPL and LETE bands were found in coyote scat recovered from the boardwalk in South Oso Flaco. Initial trapping efforts were focused in that area as well as targeting coyotes repeatedly coming onto the shoreline.

Nine coyotes were removed during the season (Table 1). Most of the coyotes were removed from the boardwalk and Oso Flaco Creek areas where coyotes traveled from the foredunes to the shoreline. Two coyotes were removed from the South Oso Flaco foredunes east of the old southern boundary, and one coyote was removed from Maidenform, an area near where a coyote dug into the enclosure.

Raccoons were hindering removal of coyotes for the protection of nesting LETE and SNPL. Raccoons exposed and interfered with the padded leg hold traps that were set for coyotes. One raccoon was removed from the boardwalk area with a padded leg hold trap (Table 1).

**Table 1: Predator Removal Summary**

Date	Species	Sex	Location
5/3/2013	Raven	Male	Brown Rd (6 miles from ODSVRA)
5/3/2013	Raven	Female	Brown Rd (6 miles from ODSVRA)
5/9/2013	Coyote	Male	Boneyard Gate
5/16/2013	Coyote	Female	Boardwalk
5/16/2013	Raccoon	Male	Boardwalk
5/17/2013	Coyote	Female	Boardwalk
5/22/2013	Coyote	Female	Boardwalk
5/26/2013	Ring-billed Gull		6 Shoreline
6/11/2013	Coyote	Male	South Oso Flaco
6/11/2013	Coyote	Female	South Oso Flaco
7/3/2013	Coyote	Female	Maidenform
7/19/2013	Coyote	Female	Oso Flaco Creek
7/22/2013	Shrike	Juvenile	Boneyard Gate
7/30/2013	Coyote	Male	Oso Flaco Creek

## **Recommendations**

WS recommends public education on the restriction of feeding wildlife.

WS recommends that all garbage containers have reinforced lids to prevent garbage consumption by wildlife.

WS recommends maintaining the height and strength of the perimeter fence surrounding the enclosures. Maintenance of fencing where sand has shifted to create low spots or places where mammalian predators can go over should be conducted on a regular basis to prevent predators from entering enclosures.

WS recommends that State Parks continue to enforce the leash law for pets on the beach, which is crucial during nesting season.

WS recommends removal of dead animal carcasses from the beach to eliminate alternate food sources that serve as a lure to scavenging predators such as coyotes.

WS recommends the removal of known LETE and SNPL predators, especially on the shoreline and in nesting areas, prior to predation.

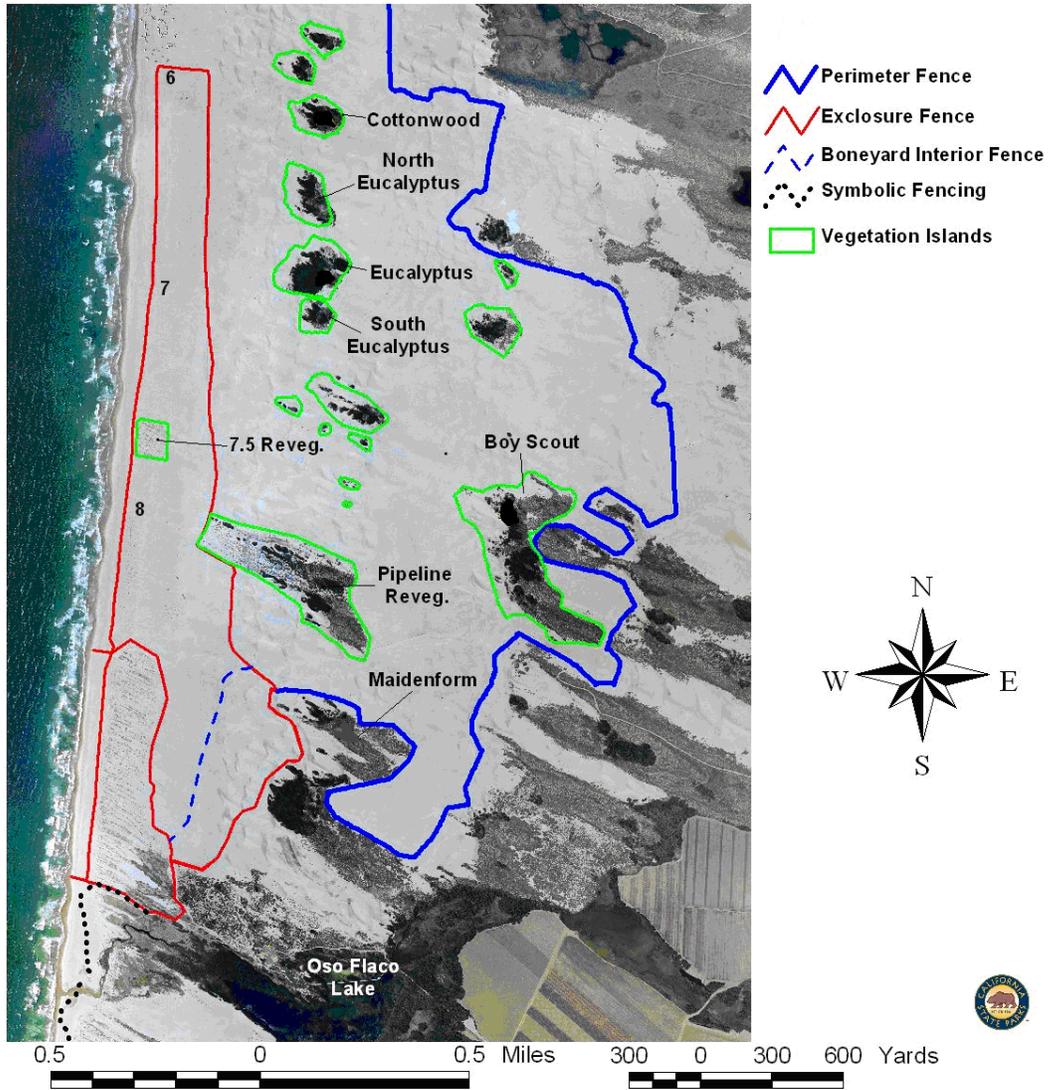
WS recommends the ODSVRA continuing to allow WS Specialist to get permitted to enter areas where predators are located and where damage is occurring, such as the shoreline and the South Oso Flaco Dunes. Having the ability to capture the predators where they are located without having to be escorted by ODSVRA staff increases WS efficiency in removing problem predators.

**Kevin Estrada, Wildlife Specialist**  
**San Luis District**  
**CA Wildlife Services**

**Valerie Burton, Assistant District Supervisor**  
**San Luis District**  
**CA Wildlife Services**

**Eric Covington, District Supervisor**  
**San Luis District**  
**CA Wildlife Services**

# Appendix 1: Map of ODSVRA SNPL and LETE Nesting Exclosures and Adjacent Areas



**Avian Predator Management Project:  
Trapping and Relocation of Problem Avian Predators  
At Oceano Dunes State Vehicular Recreation Area in 2013**

Department of Parks and Recreation-- Oceano Dunes District / Ventana Wildlife Society

Agreement Number – CO853003

**Submitted to:**

**Ronnie Glick  
Senior Environmental Scientist  
California Department of Parks and Recreation  
Oceano Dunes State Vehicular Recreation Area  
340 James Way, Suite 270  
Pismo Beach, CA 93449**

**Submitted by:**

**Paul Young  
Ventana Wildlife Society  
19045 Portola Drive, Suite F-1  
Salinas, CA 93908**

**15 October 2013**

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**Avian Predator Management Project:  
Trapping and Relocation of Problem Avian Predators at  
Oceano Dunes State Vehicular Recreation Area in 2013**

## **Introduction**

Oceano Dunes State Vehicular Recreation Area (ODSVRA) contains nesting habitat for California least terns (*Sternula antillarum browni*) and western snowy plovers (*Charadrius nivosus*) along approximately nine miles of coastline and 4,900 acres of coastal sand dunes in southern San Luis Obispo County, California. Contiguous nesting habitat continues to the south for approximately nine miles in the Guadalupe-Nipomo Dunes Complex. California least tern is listed on the federal and state level as an endangered species. Western snowy plover is listed on the federal level as a threatened species.

Due to human activities that alter the coastal environment, modern California coastal bird colonies are often limited to habitat “islands” consisting of native or partially-native habitat surrounded by areas of farmland, housing tracts, recreational areas, marinas, or other developed areas. This fragmentation of habitat has resulted in concentrations of rare or declining bird species in remnant natural areas that act as refuges. It also may result in concentrations or localizations of predators, because the prey they hunt is restricted to these small islands of habitat. In most predator-prey relationships, predator pressure is not severe enough to cause prey populations to decline. However, intense predation of adults or young at small, isolated breeding colonies can cause severe population declines. In response, many agencies have initiated programs to reduce predation pressure.

Avian predator translocation is a program initiated at ODSVRA to protect nesting terns and plovers. Because not every avian predator in the vicinity of nesting terns and plovers will prey on those species, avian predator removal and translocation is designed to selectively address certain individuals that are actually targeting, or are likely to target, terns or plovers. In 2001, before a predator management plan was in effect at ODSVRA, loggerhead shrikes (*Lanius ludovicianus*) were regularly observed hunting within the plover and tern nesting enclosure fencing, and the ODSVRA resource staff discovered at least seven snowy plover bands in loggerhead shrike castings (masses of undigested food parts). California Department of Parks and Recreation contracted with the UC Santa Cruz Predatory Bird Research Group in 2002 to monitor avian predator activities proximate to plover and tern nesting areas, evaluate the threat of avian predators to these nesting birds, determine which individual avian predators pose an unacceptable threat to the reproductive success of the terns and plovers, and capture, band, and relocate the predatory birds. For the last four years, Ventana Wildlife Society has replaced the UC Santa Cruz Predatory Bird Research Group as the fiscal agent for this project, with the objectives of monitoring avian predator activity, and live trapping, banding, and relocating avian predators. This report presents results of these activities for 2013.

## Methods

### Surveying, Monitoring, and Trapping

Surveying for raptors and other avian predator species (e.g., shrikes) at ODSVRA is a continual process throughout the tern and plover nesting season. Raptor populations are a combination of resident birds, transients, and later in the season, juvenile birds dispersing into ODSVRA from natal territories that are mostly outside the park's boundaries. Raptor movements within the park are dynamic, and areas need to be repeatedly surveyed throughout the breeding season to monitor the behavior of resident birds and recognize the arrival of new avian predators. Days that are not spent trapping are usually spent surveying or monitoring.

Surveys were conducted from February to September by Paul Young, Ventana Wildlife Society, the primary avian predator specialist at this site since 2002. Surveys consisted of moving slowly on foot or in a vehicle through a selected area, recording sightings of raptors and other predators, and searching for nocturnal avian predator tracks in the sand. In 2013, Young surveyed the following areas (Fig. 1): the north portion of the park from Arroyo Grande Creek (AG Creek) south to the Maidenform Revegetation Area (during 27 days); the Phillips 66 (formerly ConocoPhillips) refinery area beyond the park's eastern boundary (6 days); the Oso Flaco (OF) Area (25 days); the North Oso Flaco (NOF) Foredunes (16 days); and the South Oso Flaco (SOF) Foredunes (24 days). In addition, the Exclosure Shoreline Area was surveyed by vehicle during 25 days. The Dune Lakes Area, beyond the park's eastern boundary, was usually monitored for northern harrier (*Circus cyaneus*) activity at the same time the north portion of ODSVRA was surveyed. Because gaining access to the privately-owned Dune Lakes was difficult, this area was monitored from the Dune Lakes Overlook Area within the park's boundaries. The historical peregrine falcon (*Falco peregrinus*) nest site at Shell Beach, approximately 1.5 miles north of ODSVRA, was monitored during 17 days.

Because ODSVRA is not accessible by paved roads, a four-wheel drive vehicle was essential to trap and survey within the park. In 2008, Young was federally permitted to conduct supervised predator control activities within the plover and tern nesting areas that are closed to the public. This included the use of a vehicle along the shoreline area, which greatly facilitated monitoring, surveying, and trapping efforts.

Monitoring consisted of observing areas for extended periods with binoculars and a spotting scope from a single location, usually a parked vehicle or prominent observation point. Monitoring efforts usually occurred from the shoreline, focusing on gulls, or the Oso Flaco Area near the south end of the NOF Foredunes. The Oso Flaco Area is a sensitive area where avian predators, particularly shrikes, harriers, and kestrels (*Falco sparverius*), funnel through the NOF Foredunes and into the 8 Exclosure.

Observations of avian predators were gathered from surveys, monitoring, and the ODSVRA predator sighting logbook. This logbook contained observations from Young; Doug George, Point Blue Conservation Science; Kevin Estrada, United States Department of Agriculture Wildlife Services; and ODSVRA park staff. Young trained ODSVRA ecologists in raptor identification and behavior. Frequent field visits and meetings between Young and resource ecologists helped keep resource ecologists, contractors, and management involved and up to date with the latest avian predator sightings and concerns. Regular e-mail updates from Young of his sightings, activities, and concerns provided the primary flow of information regarding his daily activities. Observations of avian predators by ODSVRA resource ecologists greatly assisted with efforts to monitor raptor movements within the park. For example, if there was a sharp decline in the numbers of plover chicks observed on the shoreline, or if a

gull was observed to eat a plover chick, then Estrada and Young would increase monitoring of the Exclosure area shoreline to identify any gulls targeting terns or plovers.

Potential avian predators of terns and plovers, or their eggs and chicks, were identified and targeted for trapping and relocation. Young consulted with the Senior Environmental Scientist at ODSVRA, or his staff, before birds were removed. Young trapped raptors and shrikes using Bal-chatri traps, Dho-ghaza nets, bow-nets, or mist nets as appropriate for the targeted species. Young and Ventana Wildlife Society were not responsible for removing gulls, ravens (*Corvus corax*), or non-avian predators at ODSVRA, but contributed observations of these predators to collaborators, such as Wildlife Services. Ventana Wildlife Society and Young were fully permitted under state and federal laws to band and relocate avian predators at this site. Once birds were trapped, they were put into padded and darkened animal carriers, transported away from ODSVRA, and released as soon as possible. Sometimes birds were released the same day as trapped, and sometimes birds were released the day after they were trapped, far enough away from ODSVRA that they would be unlikely to return. Before these birds were translocated, they were fitted with an appropriate-sized USGS bird band (Table 1).

This report summarizes avian predator observations by species, including the number of birds trapped, a description of trapping attempts, and the number of trap days. A trap day is defined as any part of a day or night when traps were put out. The length of a trapping attempt, or the number of trap days devoted to a predator, varied with the magnitude of the threat posed by the avian predator, weather conditions, species targeted, and trapping success. Most observations of predators occurred during the morning and early afternoon hours, when Young and ODSVRA plover and tern ecologists were most likely in the field. In the mid-afternoon to evening hours, only one or two park ecologists were usually in the field engaged in predator watch or tern and plover monitoring. Therefore, there was an increased chance of missing an avian predator in mid-afternoon or later.

## Results and Discussion

Nine raptors or shrikes were trapped and relocated during 64 trap days at ODSVRA in 2013 (Table 1). Trapped birds included three adult male great horned owls (*Bubo virginianus*), one adult male northern harrier, one juvenile female American kestrel, and four juvenile loggerhead shrikes.

Avian predators were trapped throughout ODSVRA, but trapping efforts were focused mostly in the exclosure areas or at the revegetation areas immediately adjacent to the exclosure areas (Fig. 1, 2). One of the great horned owls was trapped at the south end of the NOF Foredunes Exclosure, and the other two were trapped at the SOF Foredunes. The northern harrier was trapped at the south end of the NOF Foredunes Exclosure. The American kestrel was trapped at the SOF Foredunes. Three of the loggerhead shrikes were trapped at the south end of the NOF Foredunes Exclosure, and the other was trapped at the SOF Foredunes.

The northern harrier, the American kestrel, and the four loggerhead shrikes were relocated the same day as they were trapped. The great horned owls were trapped during the evenings and relocated the next day.

More days were spent trapping great horned owls (21 days) and northern harriers (26 days) than any other species. Eleven days were spent attempting to trap American kestrels, whereas five days and one day were spent attempting to trap loggerhead shrikes and peregrine falcons, respectively. In addition, 23 days

were spent assisting Wildlife Services and resource ecologists in an effort to identify individual gulls that might be preying on plover or tern chicks on the enclosure shoreline.

No relocated birds were subsequently recaptured at ODSVRA in 2013. Of all the raptors that have been trapped, banded, and relocated from ODSVRA since 2002, only one has been recaptured. This occurred in 2009, when a banded adult male American kestrel was recaptured near the Phillips 66 refinery. This bird was originally trapped as an adult by Young near the refinery in 2008 and banded and released near San Jose, California. In 2010, Young recaptured a bird previously banded at another site. This bird, a juvenile female peregrine falcon, had been trapped, banded, and relocated by the USDA Wildlife Services earlier that summer near San Diego, California, where its presence constituted an unacceptable threat to a least tern colony.

## Gulls and Ravens

Problem gulls and ravens are primarily dealt with by Wildlife Services. However, predator management at ODSVRA is a team effort with ODSVRA resource ecologists, Point Blue Conservation Science, Ventana Wildlife Society, and Wildlife Services, all working together to protect plovers and terns. Young assisted in these efforts by notifying Wildlife Services of any common raven sightings or observations of gulls suspected as predators of terns and plovers on the enclosure shoreline.

Gulls at ODSVRA are a prominent concern during the plover and tern nesting season. Gulls have been observed killing and eating plover chicks at ODSVRA nearly every year since predator management became a part of the project. At ODSVRA, a single gull has been observed to eat four plover chicks from multiple broods in less than 30 minutes (Young, personal observation). Despite the fact that there are thousands of gulls at the park, relatively few gulls exploit plover chicks as a food source each year. In previous years, the removal of one to a few gulls, having been observed eating plover chicks, coincided with the stabilization of a precipitous decline in plover chick numbers on the shoreline. Gulls were usually not removed by Wildlife Services unless they were observed to catch, eat, or pursue a plover adult or chick.

Results in 2013 indicate that gulls might have been less of a problem for plovers and terns at ODSVRA than in other recent years. During the 2011 tern and plover nesting season at the ODSVRA, four gulls had to be removed by Wildlife Services. Plover remains and bands found inside of these gulls indicated that a minimum of 16 plovers had been consumed, some of them juveniles. In 2012, no gulls were removed or observed to catch and consume plover chicks. However, at the end of the 2012 season, Doug George found a gull casting on the enclosure shoreline that contained nine plover bands, providing strong evidence that gull predation on plovers occurred that year. In 2013, Young spent 23 days on the enclosure shoreline monitoring gull activity, but observed no indications that gulls were targeting terns or plovers. On 26 May, resource ecologists observed a ring-billed gull (*Larus delawarensis*) acting aggressively towards plovers. This gull was removed by Wildlife Services; no plover remains or bands were found inside this bird.

No plover or tern nests were known to be depredated by corvids at ODSVRA in 2013, although ravens were identified flying over ODSVRA during at least seven days. In 2012, three plover nests were depredated by corvids, and ravens were strongly suspected in each case.

On 25 April, Young discovered an active raven nest on a low cliff just east of Brown Road. This nest was approximately six miles from ODSVRA, but only two miles from Rancho Guadalupe Dunes and the Chevron site. This nest was monitored by Young and Kevin Estrada on 28 April, 30 April, and 1 May. Because these ravens posed a threat to plovers or terns, Estrada, with the permission of the landowner, removed the raven pair on 3 May.

## **American Kestrel**

One American kestrel was trapped at ODSVRA and relocated during the 2013 plover and tern nesting season. A juvenile female kestrel was trapped on 12 July as it perch-hunted at the SOF Foredues. Eleven days were spent attempting to trap kestrels.

In previous years, an effort was made to trap adult kestrels prior to their nesting at the Phillips 66 refinery approximately a mile and a half east of the 8 Enclosure. There have been no kestrel nests found within the park's boundaries, and the refinery provides the closest suitable nesting habitat for kestrels. The refinery provides many nooks and crannies among the building and refinery equipment for the cavity-nesting kestrels to choose from. In previous years, adult kestrels have been seen on many occasions foraging over ODSVRA foredues and then flying east towards the refinery, with prey to feed their young. On 28 July 2007, Doug George observed a female kestrel perched at the north end of the NOF Foredues with a medium-sized plover chick in its talons. Because kestrels are a well-known predator of plover and tern chicks, and one of the more challenging raptors to trap over the open dunes and beaches of the ODSVRA, the preemptive removal of adult kestrels near their nesting areas at the refinery, in February and March, has been a useful predator management technique at this site. However, fewer kestrels have been found at the refinery since 2010, and no attempts were made to preemptively remove kestrels from this area for the last three years. Prior to 2011, surveys sometimes revealed three or four pairs of kestrels at the refinery. In late 2010, the refinery management removed many of the old buildings and refinery structures at the south end of the refinery that had previously provided nesting sites for kestrels. Early surveys in February and March of 2013 documented only one pair of kestrels near the refinery.

Although the refinery provided the nearest suitable kestrel nesting habitat to ODSVRA, there were other suitable kestrel nesting habitats near the park. Along Highway 1, from Oso Flaco Lake Road near the town of Guadalupe, extending north to Pier Avenue, in the city of Oceano, large eucalyptus groves and various man-made structures also provide potential nesting sites for kestrels. Young has observed kestrels in these areas during the spring and summer months. On 20 June 2007, Young observed an adult male kestrel catch prey at the east end of the Pipeline Revegetation Area and fly with this item approximately a mile and a half east where it was lost to view in the eucalyptus groves north of the refinery. On 6 June 2008, park ecologists again observed a kestrel catch a small prey item from this same area at ODSVRA and immediately fly to the east where it was lost to view. These birds were likely delivering prey to nests in this area.

In 2013, kestrels were observed at ODSVRA on 27 days from 1 February to 1 September. Kestrels were observed during three days in February, four days in March, one day in April, one day in June, thirteen days in July, and five days in August. In February, all three kestrel sightings were at the Boy Scout Area at the eastern edge of the park. In March, April, and June, the six kestrel sightings were at the Boy Scout Area, the AG Creek Area, or the Dune Preserve Area. The AG Creek Area and the Dune Preserve Area are well to the north of the usual plover and tern nesting areas. In July and August, kestrel sightings at ODSVRA rose substantially with all of the 18 sightings of kestrels perched inside the enclosure area or

overflying the enclosure area. On many of these days in July and August, there were multiple kestrel sightings per day. On six occasions in July and August, there were two or three kestrels either perched close together or flying together. Most, if not all, of the kestrel sightings in July and August were of juveniles dispersing from natal territories to the east of ODSVRA. This conclusion is based on the timing of their arrival (July), a historical perspective of kestrel sightings during July at this site for the last 13 years, the observations of two or three kestrels perched together or flying together (juvenile sibling group dispersal), behavior as a group (playful and interactive), and plumage (Young, personal observation).

On 3 July, three juvenile kestrels (one male and two females) were observed by Young at the Boy Scout Area. Young spent several days looking for these juveniles at the refinery, but they were not seen there. A single pair of adult kestrels was seen perch-hunting just west of the refinery. On 10 July, a resource ecologist observed a juvenile kestrel perch-hunting from the foredunes at the SOF Foredunes Area. Young relocated to this area to trap and observed three juvenile kestrels (one male and two females) perched together in this area. On 11 July, a single juvenile female was observed by Young perch-hunting in this area, and on 12 July a juvenile female kestrel was trapped as it perch-hunted at the SOF Foredunes. This bird was banded and relocated the same day to the Cuyama Valley, Kern County. After this bird was trapped there were three observations of two kestrels perched together in the Enclosure Area or flying together over the Enclosure Area. On two of the occasions the juvenile kestrels were seen together, they were identified as a male and a female.

Juvenile kestrels were hazed or flushed from the enclosure area on four occasions. On 2 July, a juvenile kestrel was flushed from the east enclosure fencing just west of the Pipeline Revegetation Area. On 19 July, a juvenile male kestrel was flushed from the east fence of the 6 Enclosure. On 30 July, a juvenile male and female kestrel were observed perched on the west fence of the 6 Enclosure. These birds were hazed with a bird-whistler device two times before they flew out of the enclosure area. On 1 August, a juvenile kestrel was hazed with a bird-whistler device as it perched on the west fence of the 8 Enclosure. It re-perched to the south on the west NOF fencing. When hazed again, it flew southeast out of the enclosure area.

Hazing with a bird-whistler device was a technique used on many occasions in 2013 at ODSVRA to move an avian predator out of a sensitive area. A bird-whistler device is a small hand-held gun that when fired propels a loud, small whistling projectile approximately 75 yards. Bird-whistler devices are commonly used at landfills and vineyards to scare birds. They can be bought at farm supply stores without a permit. It has been the experience of predator management specialists and resource ecologists at ODSVRA that flushing and hazing an avian predator is a limited but important tool in certain situations. Hazing a perched avian predator at close range with a bird-whistler device does not permanently prevent the bird from returning to the enclosure areas (Young, personal observation). However, a bird-whistler device may at times effectively move an avian predator out of a sensitive area more quickly and safely than flushing by walking, or flushing with a vehicle. A bird-whistler device might move an avian predator out of a sensitive area more quickly because it is loud and the course of the projectile is dramatic. Hazing might also be safer, because it can be done from a vehicle at a distance. When flushing a potential predator by walking, there is a risk of disturbing a plover or tern, which could then be more easily targeted by the predator. These observations are site specific and are not necessarily applicable to other sites.

## Loggerhead Shrike

Four loggerhead shrikes were trapped at ODSVRA during the 2013 plover and tern nesting season, less than the nine shrikes trapped and relocated in 2012. In 2013, three juvenile shrikes were trapped at the south end of the NOF Foredunes Exclosure, and one juvenile shrike was trapped at the SOF Foredunes. All four shrikes were trapped in July. A total of five days were spent attempting to trap shrikes.

Loggerhead shrikes have been observed to prey upon least tern and snowy plover chicks at ODSVRA in previous years. Shrikes have also been strongly suspected in the deaths of several adult plovers killed in previous years inside small single nest exclosures with net tops.

Tern and plover chicks are especially vulnerable to attacks from diurnal avian predators such as shrikes, kestrels, and Red-tailed Hawks (*Buteo jamaicensis*) that might perch-hunt near the shoreline of the exclosure area. Shrikes are of particular concern because of their perch-hunting tactics. The typical plover chick defense response to an avian predator, after the predator is spotted, is to crouch and freeze. This response can be effective provided that the avian predator does not stay in the area for an extended period of time. The response is less effective with prolonged exposure to the predator. Perch-hunting can prolong this exposure. Unlike kestrels or red-tailed hawks, shrikes are exclusively perch-hunters, and have the smallest hunting territories of any of the avian predators found at ODSVRA. Because their territories are small, a shrike whose territory coincides with plover and tern territories can have relatively easy access to plover and tern chicks. These characteristics combined with their aggressive predatory nature and their slow and methodical hunting style, make them a species of considerable management concern at ODSVRA. Shrikes within ODSVRA, but far removed from the plover and tern nesting areas, were rarely trapped.

Surveys and monitoring early in the 2013 season at ODSVRA did not detect adult shrikes within the park's boundaries. Shrikes were observed on 6 days at ODSVRA in 2013, all during July.

Most of the shrike sightings were of birds perch-hunting at the NOF Foredunes Exclosure. Three of the four shrikes trapped at the ODSVRA were trapped inside the NOF Foredunes Exclosure. From an avian predator management standpoint, the NOF Foredunes are a particularly sensitive area because topographic conditions favor perch-hunting avian predators. These narrow, almost linear north-south elevated sand dunes provide a clear view of the Boneyard Exclosure Area, the 8 Exclosure Area, and the NOF Shoreline Area. A shrike perch-hunting from the fencing on the west side of the NOF Foredunes would be among the plover chicks on the shoreline in this area. In previous years at ODSVRA, shrikes have been observed to perch-hunt from the west fence in the NOF Foredunes Area, and then move north along this fence line into the 8, 7, and 6 exclosures, where the majority of plover and tern chicks are located.

One juvenile shrike was trapped at the SOF Foredunes Area as it perch-hunted from the foredunes near the shoreline. This bird was first observed by resource ecologists on 30 July and was trapped on 31 July. Before this bird was trapped, Young observed two shrikes perched together briefly in this area. Surveys in the SOF area and the areas to the east resulted in no additional shrike sightings.

On 9 July, Young observed a juvenile shrike at the Boyscout Area well to the east of the exclosure area. No attempt was made to trap this bird.

Three of the four juvenile shrikes were trapped on the same day that they were first seen. One juvenile shrike was trapped the day after it was first seen. All four shrikes were relocated the same day that they were trapped.

## Great Horned Owl

Three great horned owls were trapped during the 2013 plover and tern nesting season at ODSVRA. One male great horned owl was trapped at the NOF Foredues on 7 May, and two male great horned owls were trapped at the SOF Foredues on 5 June and 14 June. A total of 21 days were spent attempting to trap great horned owls at ODSVRA in 2013.

Great horned owls are common residents at the park. Although great horned owl predation on incubating plovers and terns at night has been documented at other sites, it has rarely been documented at ODSVRA. Relatively little is known about great horned owl predation on plover and tern chicks on the shoreline or inside the nesting exclosures.

Great horned owl activity at ODSVRA is monitored by regular surveys of all the revegetation areas surrounding the plover and tern nesting habitat. In 2013, The Pipeline, Maidenform, Eucalyptus, and Tabletop revegetation areas were surveyed for large owl tracks left in the sand during 27 days. Other areas surveyed included the Oso Flaco Area (25 days), the NOF Foredues (16 days), and the SOF Foredues (25 days). In addition to those surveys conducted by Young, careful attention was paid to large owl tracks observed by resource ecologists and Doug George inside the 6, 7, and 8 exclosures, which were generally off limits during the active portion of the tern and plover nesting season. When large owl tracks were observed inside the exclosure area, they were reported over the resource radio immediately so all interested parties were aware of them. Heavily vegetated areas surrounding the exclosure area were sometimes walked during the day with the intent of flushing any roosting owls from the willow thickets in these areas. Because predatory behavior of great horned owls is not easily observed at night, the decision to trap a great horned owl was influenced by the regularity and abundance of owl activity in a particular area, as indicated by track sign, and the proximity of this track sign to the concentrations of nesting plovers and terns or their chicks.

During the 2013 plover and tern nesting season at ODSVRA, large owl tracks were observed during 50 days either inside the exclosure areas or in, or around, adjacent revegetation areas. In comparison, large owl tracks were observed in these areas during 75 days in 2012, 15 days in 2011, and 42 days in 2010. These observations do not include the Dune Preserve Area or those areas to the north which are somewhat removed from the usual plover and tern nesting areas. There were no large owl tracks found at any plover or tern nests at ODSVRA in 2013. Large owl tracks were observed during five days in March, nine days in April, seven days in May, 12 days in June, nine days in July, and eight days in August. Large owl tracks were observed in the Pipeline Revegetation Area (11 days), the Eucalyptus Revegetation Area (one day), the NOF Foredues (four days), the SOF Foredues (16 days), the Boneyard Exclosure (10 days), the 8 Exclosure (14 days), and the 7 Exclosure (five days). These observations are limited to the days that large owl tracks were observed and not the number of large owl tracks that were seen in each area during each day.

In 2013, surveys of suitable great horned owl nesting habitat at ODSVRA, including historical nesting areas, revealed no active nests. However, great horned owls hunting near the exclosure areas might be associated with an active nest somewhere. Therefore, a strong effort was made to confirm that a targeted owl was roosting in the Eucalyptus, Pipeline, or Maidenform revegetation areas before it was trapped, in order to avoid trapping a great horned owl that was incubating eggs or caring for young. A great horned owl that was roosting in these revegetation areas during the day would not likely be attached to an active nest site away from these areas because both the adult male and female owls would be expected to roost near their active nest site during the day. Highly territorial and abundant at ODSVRA, great horned owls are the avian species most likely to quickly reoccupy a vacant territory (Young, personal observation).

Therefore, the timing of the removal of this species is important so as to provide adequate protection for the plovers and terns without trapping great horned owls in unnecessary numbers.

At dusk on 3 May, Young observed a great horned owl perch-hunting at the south end of the NOF Foredues Exclosure. This bird continued to the north until darkness obscured it. Young saw this bird again on 6 May in the same area and trapped the bird on 7 May at the south end of the NOF Foredues Exclosure. This bird was banded and released the next day at the Wind Wolves Preserve in Kern County at dusk.

In 2013, there were a greater number of large owl tracks observed in the SOF Foredues Area (16 days) than in any of the other sensitive areas that were routinely surveyed. In 2012, large owl tracks were observed in the SOF Foredues Area during only six days. The SOF shoreline is an area that is open to the public and the plover nesting habitat here is only protected by symbolic fencing that runs north and south at the high-tide line. Plover nests in this area are protected from mammalian and avian predators by 10X10 plover nesting exclosures with net tops. Unfortunately, these nesting exclosures can be used as perches by great horned owls at night. Owl predation of plovers at or adjacent to small exclosures has been documented. Because there were many plover nests in the SOF Foredues Area this year, and large owl tracks were commonly observed in the vicinity of the mini-exclosures, great horned owl activity in this area became a matter of concern.

On 5 June, Young observed a great horned owl perched at dusk at the SOF Foredues. A male great horned owl was trapped on 6 June as it perch-hunted the shore side of the SOF Foredues. This bird was banded and released at dusk the next day along Cerro Noroeste Road in Kern County.

After this owl was trapped, there were additional large owl tracks seen in the SOF Foredues. Consequently, another male great horned owl was trapped on 14 June as it perch-hunted in the foredues along the shoreline. This bird was banded and released at dusk the next day along Cerro Noroeste Road in Kern County. After this bird was trapped, large owl tracks were observed in the SOF Foredues on only one other day (19 August).

On 19 June, Young observed a great horned owl at dusk perched on the south perimeter fencing of the Pipeline Revegetation Area. The west end of the Pipeline Revegetation Area extends into the 8 Exclosure and provides a natural access into the 8 Exclosure. The large owl tracks observed in the 8 Exclosure this year (14 days) were probably made by an owl moving from the Pipeline Revegetation Area west into the 8 Exclosure. Twelve days were spent attempting to trap this great horned owl, but these efforts were unsuccessful. A great horned owl was seen at dusk on three of these trapping nights.

## **Peregrine Falcon**

No peregrine falcons were trapped at ODSVRA during the 2013 plover and tern nesting season. One day was spent attempting to trap peregrine falcons.

Peregrine falcons are a common local resident at ODSVRA. There is a peregrine falcon nest site on a sea cliff in the Shell Beach area approximately three miles to the north of the park. There is also a peregrine falcon nest site near Avila Bay to the north, and a nest site near the small town of Edna to the northeast.

To the south, there is a peregrine nest site at Point Sal, and another near the Lions Head area further south on Vandenberg Air Force Base. All of the adults associated with these nests could possibly be seen at ODSVRA. However, the adults from the Shell Beach nest site are the closest and are probably seen most often. Peregrine falcon observations each year during the plover and tern nesting season at ODSVRA usually include a mix of resident adults, transient adults, sub-adults, immatures, and juveniles.

From a predator management standpoint, it is important to monitor the active/inactive status of the Shell Beach nest site to avoid trapping a problem adult peregrine falcon at ODSVRA that might be attached to an active nest site here. Peregrine falcons at the Shell Beach nest site can be closely observed, and head markings and plumage characteristics noted, so these individuals might be recognized when they are seen at ODSVRA.

In 2013, the Shell Beach nest site was active for the first time since 2009, although peregrines of both sexes and different ages were seen roosting at night near the nest cavity in 2010-2012. Young surveyed the Shell Beach site during 17 days from February to June in 2013 and documented the fledging of three peregrine falcons. The pair was present in February and appeared to be the same individuals as birds observed last year, based on plumage characteristics. On 6 March, Young observed the pair copulating near the nest cliff, and an incubation exchange was seen on 10 March. Chicks were observed on 28 April, and three juveniles were observed perching and flying near the nest on 7 June. Neither of the adults associated with this nest site are banded. Adult peregrine falcons seen at this nest site have been observed flying south towards ODSVRA on many occasions and can reach the park after only several minutes of flying.

Peregrine falcons were observed during 56 days at ODSVRA in 2013, fewer than in 2012 (76 days), 2011 (86 days), and 2010 (85 days). In 2013, peregrine falcons were seen in March (12 days), April (eight days), May (nine days), June (one day), July (13 days), and August (13 days). There was sometimes more than one peregrine falcon sighting on these days.

It was sometimes a challenge to determine the age and sex of peregrine falcons observed at ODSVRA. The factors that contributed to this challenge were visibility (distance, heat shimmer, and fog), the mobility of the falcon (flying or perched), the plumage gradient between peregrines of different ages (adult, sub-adult, immature, or juvenile), the sex of the bird (size), and the experience of the observer in the field. Male peregrines are a third smaller than females, but their plumages can be similar. Determining the relative size of a single peregrine at a distance is difficult. The challenge of identifying individual peregrine falcons was simplified by photographing these birds when possible and then comparing plumage characteristics and head markings. The photographs, taken with cameras affixed to spotting scopes by resource ecologists and emailed to Young, helped to inventory individual birds and help keep track of individual peregrine falcons that were regularly seen in or around the enclosure area. This was important because peregrine falcons have been the raptor most likely to prey upon adult snowy plovers and least terns at ODSVRA over the last 10 years, and they are afforded considerable legal protection by regulating authorities. If a peregrine falcon were to become a problem bird, and threaten the breeding success of plovers and terns at this site, then it would be necessary to know exactly which individual peregrine falcon needed to be live-trapped.

Despite the challenges of determining peregrine falcon ages and sex, most identifications were reliable enough to include in a breakdown of age and sex-specific peregrine falcon sightings at ODSVRA in 2013. Adult peregrine falcons were observed during 27 days. They were observed in March (eight days), April (seven days), May (two days), June (one day), July (one day), and August (eight days). Adult male peregrine falcons were seen during at least 13 days. Adult female peregrine falcons were seen during at least seven days. Most of the adult male peregrine sightings were of a bird with plumage characteristics and head markings similar to the adult male associated with the Shell Beach nest site. Near the end of the

season, on 1, 3, and 17 August, there were sightings of a banded adult male peregrine. All but one of the adult female peregrine falcon sightings were of a bird with plumage characteristics and head markings different from the adult female associated with the Shell Beach nest site. All of the adult female peregrine falcons that were observed at ODSVRA were seen between 3 March and 9 April. On 5 April, an adult female peregrine with plumage characteristics and head markings similar to the adult female associated with the Shell Beach nest site was observed bathing at AG Creek. Another adult female peregrine with plumage characteristics and head markings similar to the adult female seen most often at ODSVRA was seen bathing here at the same time. Earlier in the day, an adult male peregrine was observed perched in the 7 Exclosure. All three of these peregrine falcons seen on 5 April were identified according to their age and sex by Young.

Sub-adult peregrine falcons were observed during at least two days (22 and 30 July) at ODSVRA.

Immature peregrine falcons were observed during at least three days (23 April, 1 May, and 2 May) at ODSVRA.

Juvenile peregrine falcons were observed during at least six days (2, 6, 11, 12, 21 July, and 21 August).

Peregrine falcons of unknown age or sex were observed during 25 days. These birds were usually seen flying through or near the exclosure areas.

At least seven different peregrine falcons were seen from 1 March to 1 September at ODSVRA during the 2013 plover and tern nesting season. This is a conservative number and includes at least two adult males, two adult females, one sub-adult, one immature, and one juvenile.

Peregrine Falcons were observed catching or consuming birds at ODSVRA on 16 occasions in 2013, less than the 23 observations of such behavior in 2012. Observations in 2013 included two sanderlings (*Calidris alba*), one ring-billed gull, two Heermann's gulls (*Larus heermanni*), one unidentified gull, two snowy plovers, one least tern, two whimbrels (*Numenius phaeopus*), one western sandpiper (*Calidris mauri*), two unidentified small shorebirds, one unidentified larger bird, and one unidentified small bird.

Adult peregrine falcons were associated with 13 of the predation events, whereas sub-adult peregrines were associated with two events, and a juvenile peregrine was associated with one event. Adult male peregrines were associated with five of these predation events, and four of these were associated with a banded male. Adult Female peregrines were associated with four of these events, and adult peregrines of unknown sex were associated with the remaining four.

In 2013, peregrine falcons were observed eating prey near the shoreline north of the 6 Exclosure on five occasions. Peregrine falcons were observed consuming prey inside the 6 Exclosure or the 6 Exclosure Shoreline (twice), the 7 Exclosure or the 7 Exclosure Shoreline (three times), the 8 Exclosure or the 8 Exclosure Shoreline (three times), the NOF Foredunes Shoreline (twice), and the SOF Area (once).

In addition to these real time observations of peregrine falcons eating prey, there were bird carcasses or feather piles of many species found by resource ecologists in the field throughout the season at ODSVRA. Most of these carcasses were gulls and appeared to be depredated by an avian predator. Many of these carcasses identified as avian depredations were probably peregrine falcon kills.

During the 2013 plover and tern nesting season at ODSVRA, at least one least tern and at least two snowy plovers were killed and consumed by peregrine falcons. All three of these birds were killed by a banded adult male peregrine falcon (black visual identification band on left leg, and a silver USGS band on the right leg). This bird was positively identified by its bands during three days at ODSVRA. It was first seen

on 1 August as it perched in the 6 Exclosure. On 3 August, this bird caught an older juvenile least tern and ate it inside the 6 Exclosure. After it had consumed this bird, it flew to the south and killed and ate a five-day-old plover chick on the 8 Exclosure Shoreline. Prey remains with the plover and tern bands were recovered later at both sites. Young attempted to trap this bird with trap sets on the shoreline as it perched in the 6 Exclosure, the 7 Shoreline, and later as it perched on the SOF Shoreline, where it flew after consuming the plover chick on the 8 Shoreline. This banded adult male peregrine falcon was again seen on 17 August when it ate a small unidentified shorebird, possibly a snowy plover, on the NOF Shoreline. Thereafter, it flew to the north, landed several times, and was hazed with a bird-whistler device as it flew to the south. This bird was re-sighted on the NOF Shoreline eating another small shorebird. Prey remains were collected and identified by Doug George as a juvenile snowy plover.

On 3 April, Doug George observed an adult female peregrine falcon eating a whimbrel on the 7 Exclosure Shoreline. He collected the prey remains, and while doing so, discovered a small feather pile nearby with avian predator tracks consistent with the peregrine falcon track sign he had just seen at the whimbrel kill. These feather remains were later identified by George to be from an adult snowy plover. This plover was most likely killed by a peregrine falcon.

Efforts by resource ecologists to read the VID (with two large symbols, such as V over 9 or X over 8, repeated 4 times per band) band on the left leg of this bird were unsuccessful. No male peregrine falcons that have been trapped at ODSVRA have been fitted with VID bands. It is rare now to encounter a peregrine falcon with a silver USGS band on the west coast and even less common to encounter one with both a silver USGS band and a VID band (Young, personal observation). Each day after this peregrine was seen at ODSVRA, it was observed flying south. Paul Young contacted Samantha Kaisersatt, biological scientist at Vandenberg Air Force Base, to inquire if their avian predator management team had banded the adult peregrine falcons associated with the historical Lions Head peregrine falcon nest site at the north end of the base. Kaisersatt indicated that both adults at this site were banded with USGS and VID bands. In addition, two female young fledged from this nest in 2013, and they were banded as well. At the time the young were banded, the avian predator management team sifted through the substrate comprising the floor of the nest cavity and plover bands were found.

Last year, on 31 July, an adult or sub-adult peregrine falcon, with a blue or black band on its left leg, killed a juvenile least tern at ODSVRA and ate it in the 6 Exclosure. It might be that this is the same bird seen in late July and August of this year. When the banded adults at Lions Head are incubating eggs or caring for young, they might be anchored more firmly to the nest area. After the young have fledged and are hunting on their own, the adults might be free to range more widely.

Peregrine falcons were flushed from sensitive plover and tern nesting areas by resource ecologists or Young during seven days. Peregrine falcons were hazed with a bird-whistler device during an additional seven days. Peregrine falcons of a variety of ages were flushed or hazed, including adults (during eight days), sub-adults (two days), immatures (two days), and juveniles (three days). Often, a bird had to be flushed or hazed repeatedly before it would leave a sensitive area. Flushing or hazing a raptor can disturb the nesting plovers and terns. Therefore, flushing a raptor requires coordination with the entire resource staff in order to prevent plovers and terns from suspending incubation duties, chicks from running into the open riding area, and chicks becoming separated from the attending adults. Resource staff also monitored peregrines after they were flushed or hazed to see if they re-perched in another sensitive location in the large exclosure area.

Hazing avian predators with a bird-whistler device at ODSVRA did not prevent an avian predator from returning to the exclosure areas (Young, personal observation). However, it did move avian predators out of some sensitive areas more quickly and safely than flushing on foot or using a vehicle. Hazing an avian predator might make that individual more difficult to trap in the future, so flushing and hazing was

considered cautiously with input from the predator management team, the resource staff, and Doug George.

## **Northern Harrier**

One adult male northern harrier was trapped and relocated at ODSVRA during the 2013 plover and tern nesting season. This bird was trapped at the south end of the NOF Foredunes Exclosure. A total of 26 days were spent attempting to trap harriers.

Harriers were observed during at least 61 days at ODSVRA in 2013, compared to 53 days in 2012. In 2013, harriers were observed in March (16 days), April (14 days), May (10 days), June (10 days), July (six days), and August (five days). Often there were multiple sightings of harriers on a single day. These sightings were of both sexes and all age classes. Adult harriers are easily identified according to sex by differing plumage characteristics. Immature harriers have the general plumage characteristics of juvenile harriers but are not as richly colored; they were seen at ODSVRA before July. Juvenile male and female harriers, seen after they had fledged in July, have the same plumages, but juvenile male harriers are a third smaller. Juvenile harrier sightings were not categorized according to the sex of the bird.

Adult female harriers were observed during at least 30 days at ODSVRA in 2013. They were seen in March (nine days), April (12 days), May (three days), June (five days), and July (one day). Female harriers of unknown age were seen during nine days.

Adult male harriers were observed at ODSVRA during at least 14 days. Adult male harriers were observed in March (two days), April (three days), May (six days), and June (three days).

Immature harriers were seen at ODSVRA during at least six days. All of these sightings were in March.

Juvenile harriers were seen at ODSVRA during at least nine days, including five days in July and four days in August.

There were two sightings by resource ecologists of harriers that were not specific as to the age or sex of the bird.

Most of the harrier sightings at ODSVRA in 2013 were of adult females. Most of these sightings were of an adult female harrier hunting the revegetation areas east of the exclosure areas, or the Dune Preserve Area and the AG Creek Area. Adult female harriers were observed during only nine days for the months of May, June, July, and August, which were the months plover and tern chicks were present. Adult male harriers have been a problem bird at this site in previous years. After an adult male harrier was trapped on 29 May 2013, adult male harriers were seen during just four days in the remainder of the season. Immature harriers were only seen in March. Juvenile harriers have been a problem at this site in previous years and were watched closely. Most of the juvenile harrier sightings were of birds in the SOF Area.

In 2008-2010, most of the plover nests lost to avian depredation were believed to be the result of depredation events involving an adult male harrier. In 2008, Doug George was able to investigate a freshly depredated plover nest in the Boneyard Exclosure Area after an adult male harrier was seen to immediately leave this area. The egg contents were still wet in the sand, and tracks consistent in shape and size to a male harrier were found at the nest site. On 10 June 2009, resource ecologists observed an

adult male harrier landing at an active plover nest in the 8 Exclosure and eating all three plover eggs there. Eggshell fragments were at the nest site and egg contents were clumped into the sand beneath the nest bowl.

In 2011, an adult male harrier was not observed to depredate a plover nest, and harrier tracks were not found at a depredated plover nest. Nevertheless, an adult male harrier was suspected in the loss of some plover nests at ODSVRA that year. Of the 10 plover nests lost to avian depredation in 2011, five were lost to corvids (probably a raven) and five were lost to an unknown avian predator. Of the nests that were lost to an unknown avian predator, eggshell fragments were sometimes found at the nest site, and the egg contents were found clumped into the sand beneath the nest bowl. The spillage of the egg contents was similar to those depredation events attributed to an adult male harrier in 2008 and 2009. It is possible that the size and shape of the harrier beak is the cause of this spillage. A snowy plover nest depredation by ravens usually resulted in less spillage, with the eggs usually carried a short distance from the nest before being consumed. Avian predator tracks at a depredated plover nest might not provide additional evidence of predator identity, because these tracks are over-tracked within minutes as the adult plovers investigate their depredated nest and carry off any remaining egg shell fragments. At ODSVRA in 2011, all of the plover nests lost to an unknown avian predator were lost in June, and an adult male harrier was observed during 15 days of that month.

In 2012, an adult male harrier was trapped at the Oso Flaco Lake Area on 6 April. Another adult male harrier, between 28 April and 12 May in 2012, was observed to land at plover nests inside the 6 and 7 exclosures and consume eggs or eat small chicks on at least four occasions. Five plover nests were lost to a depredation event involving an adult male harrier, and an adult male harrier was strongly suspected in the loss of an additional five nests. This unbanded adult male harrier was lethally removed by Wildlife Services on 12 May.

Most of the harrier trapping days at ODSVRA in 2013 were spent attempting to trap an adult female harrier in March and April. Of the 26 days spent trapping harriers, 15 were spent attempting to trap an adult female at AG Creek and eight were spent attempting to trap an adult female harrier at the south end of the NOF Foredunes Exclosure. It was strongly suspected that the adult female harrier seen at AG Creek was the same bird seen this year at the Dune Lakes Area, and possibly the same bird that likely nested in this area last year. The Dune Lakes Area is an area to the east of the park that contains many small lakes and marshy areas, and harriers have nested here in previous years. The Dune Lakes Area is private property and off limits to trapping, although Young monitored from the Park's eastern boundary on 9 days. On 8 March and 13 March, Young observed an adult female harrier in this area. On 22 March and 23 March, Young observed an adult female and an adult male together here. On 26 April, an adult male harrier was seen here, and on 10 May an adult male was seen transferring a small prey item to an adult female. After the adult male harrier was trapped on 29 May, the Dune Lakes Area was monitored by Young on 7, 11, and 17 June. On 7 June no harrier activity was observed and on 11 and 17 June, an adult female was seen in this area.

In May at ODSVRA, adult male harriers were seen during five days. Adult male harriers were seen on three consecutive days on 27-29 May. On 28 and 29 May, an adult male harrier was observed several times each morning hunting low through the exclosure area. On 29 May, Young trapped an adult male harrier at the south end of the NOF Foredunes Exclosure. This bird was relocated to the Shasta Valley Wildlife Area in Siskiyou County on the same day it was trapped. After the adult male harrier was trapped, there were only four sightings of an adult male harrier for the months of May, June, July, and August. On 31 May, Young observed an adult male harrier carrying a small dark prey item south through the NOF Foredunes and across the Oso Flaco Creek. It is possible this bird was carrying this prey item to a nest site to the south of ODSVRA.

During the 2013 season at ODSVRA, there were no least tern nests depredated by an avian predator and only one plover nest depredated by an avian predator (gull).

## **Red-tailed Hawk**

No red-tailed hawks were trapped at ODSVRA during the 2013 plover and tern nesting season. No days were spent attempting to trap red-tailed hawks.

Red-tailed hawks are a common local resident at ODSVRA. There were at least two active red-tailed hawk nests located between the refinery and the eastern boundary of the park. On 29 April, Young found an active red-tailed hawk nest in the incubation stage within the park's boundaries in the Oso Flaco Lake Area. On 16 May, a red-tailed hawk was seen in the nest, but a visit on 17 June revealed that the nest had been abandoned with no detection of the adults. This nest belonged to the resident pair of red-tailed hawks that are most commonly seen perched in the Eucalyptus, Pipeline, Maidenform, and 7.5 Revegetation areas, and in the SOF Area. This is the second straight year this resident pair has had a nesting failure. No juvenile red-tailed hawks were seen in association with these adults at ODSVRA in 2013.

There is also a resident pair of red-tailed hawks that probably nests to the east of AG Creek. A juvenile red-tailed hawk was seen near Ag Creek later in the season.

Red-tailed hawks have not been observed to take adult plovers or terns or their chicks at ODSVRA over the last 10 years. They have been observed to depredate plover nests and kill plover and tern chicks at other sites (D. George, personal communication). Red-tailed hawks were the most commonly observed raptor at ODSVRA. Most of these sightings were of a resident pair of adults that were seen almost daily hunting the heavily vegetated areas east of the plover and tern nesting areas. In past years, there were sometimes immature or sub-adult red-tailed hawks seen at ODSVRA earlier in the season. These birds were usually driven off by the resident adults as the season progressed. This year, there were no sightings of sub-adult red-tailed hawks and just one sighting of an immature red-tailed hawk at ODSVRA. The resident pair of red-tailed hawks have not been trapped, because they have not been seen to take plover chicks on the shoreline or tern chicks inside the exclosures, and they drive off other red-tailed hawks that compete for this territory, and might target plover and tern chicks.

During 2013, one of the likely resident pairs of adult red-tailed hawks were observed perched in the NOF Foredunes (30 days), the 7.5 Revegetation Area (21 days), the SOF Foredunes (12 days), and the west end of the Pipeline Revegetation Area (seven days).

In 2013, one of the resident pairs of adult red-tailed hawks were observed perched in one of these sensitive areas in March (10 days), April (six days), May (five days), June (five days), July (15 days), and August (eight days).

It was necessary to flush one of the resident adult red-tailed hawks as it perch-hunted in the NOF Foredunes during seven days, and the 7.5 Revegetation Area during nine days. An adult red-tailed hawk was hazed by Young with a bird-whistler device on one occasion as it perched in the 7.5 Revegetation Area.

## Merlin

No merlins (*Falco columbarius*) were trapped and no trapping efforts were made at ODSVRA during the 2013 plover and tern nesting season.

Merlins are small, highly migratory falcons that spend the fall and winter months in California and migrate out of ODSVRA by approximately mid-April to their nesting grounds to the north. Merlins and peregrine falcons are the diurnal raptor most likely to take adult snowy plovers at ODSVRA. Merlins have usually migrated north before the plover chicks have hatched and are almost always gone before the least terns arrive to begin nesting.

In 2004-2006 at ODSVRA, merlins were seen to catch and consume an adult plover once each year. Merlins have not been documented to prey upon snowy plovers since then at ODSVRA, but an adult female merlin was observed eating a small shorebird in 2011 that might have been a snowy plover. Merlins were seen during at least eight days in 2013, compared to three days in 2012. In 2013, they were seen during one day in February, two days in March, and five days in April. These sightings included an adult male, an immature male, and a female of unknown age. On 22 April, a resource ecologist observed a merlin catching a sanderling on the SOF Shoreline and flying to the east over the foredunes and out of view. On 5 April, an immature male merlin was observed perched on the west fence of the 7 Enclosure by resource ecologists. Young attempted to flush this bird to the north on foot, then later hazed it with the bird-whistler device before it later flew to the north out of view.

## Other Raptors

Red-shouldered hawks (*Buteo lineatus*) were seen regularly at the campgrounds near Pier Avenue and probably nested in this area. They were also seen near AG Creek. A juvenile red-shouldered hawk was seen here later in the season.

Cooper's hawks (*Accipiter cooperii*) were observed during five days at ODSVRA and were usually just passing through or hunting the more heavily vegetated portions of the park. These sightings were of birds in the Mid-ramps Area, the AG Creek Area, the Dune Preserve Area, the Maidenform Revegetation Area, and the SOF Area.

Sharp-shinned hawks (*A. striatus*) were not seen at ODSVRA in 2013. There were two sightings of this species last year.

Ospreys (*Pandion haliaetus*) were regularly seen at ODSVRA. These fish-eating raptors were occasionally flushed by resource ecologists when their presence constituted a disturbance to the plovers and terns.

Golden eagles (*Aquila chrysaetos*) were not seen at ODSVRA during the 2013 season. A golden eagle was seen one day last year.

American bald eagles (*Haliaeetus leucocephalus*) were seen on one day. On 25 July, an immature or sub-adult bald eagle was seen flying over the 7 and 6 enclosures and then disappearing to the northeast.

Burrowing owls (*Athene cunicularia*) were not seen at ODSVRA this season. Burrowing owls were seen during one day last year.

Barn owls (*Tyto alba*) were not seen at ODSVRA in 2013. Several dead barn owls were recovered by resource ecologists. Large owl tracks observed at ODSVRA that were distinctly different from great horned owl tracks may have been barn owl tracks. Last year, two barn owls were trapped and relocated at ODSVRA.

White-tailed kites (*Elanus leucurus*) were observed at ODSVRA during 18 days. They were seen during eight days in July and 10 days in August. They were most often seen in the SOF Area or the AG Creek Area. Last year they were seen during eight days.

Prairie Falcons (*Falco mexicanus*) were not seen at ODSVRA in 2013. A prairie falcon was seen during one day last year.

## Recommendations

Ventana Wildlife Society encourages ODSVRA management to continue the practice of depositing wood chips and other substrates into the 6, 7, and 8 enclosures early in the season. This substrate probably makes it harder for avian predators to locate incubating plovers and terns and their chicks. In addition, the manufactured tern shelters and the larger pieces of wood can provide a hiding place for tern and plover chicks should an avian predator suddenly appear. The process of depositing wrack on the enclosure shoreline, while designed to create an invertebrate food supply for the plovers, also provides cover from predators for the tern and plover chicks.

In 2012, a large portion of the west fence on the 6 and 7 enclosure shoreline was moved 100 feet to the east to increase the size of the shoreline area and allow natural wrack deposition to increase on the shoreline habitat. This probably provided more available food resources for the plovers, but also created a larger, more complicated topography on the shoreline that was more difficult for mammalian and avian predators to hunt thoroughly. It is recommended that the west fence stay in its present location and not be moved to the west where it would functionally create a narrower shoreline with less food and cover.

It is also important to maintain the current size of the fenced tern and plover nesting enclosures. One of the most basic advantages nesting terns and plovers enjoy at ODSVRA is the considerable size of the enclosure Area. If the enclosure area were to be reduced in size, the nesting terns and plovers would be more concentrated and probably more easily discovered, and then targeted, by mammalian or avian predators.

It is also recommended that State Parks purchase several bird-whistler devices and train several resource ecologists in their use. Hazing with a bird-whistler device will not permanently keep an avian predator from returning to the large enclosure area, but it can move an avian predator temporarily out of a sensitive area faster and more safely than flushing on foot or in a vehicle. Often, an avian predator is found perched in a sensitive area when the avian predator specialist is not on site. A bird-whistler device might temporarily move an avian predator out of an area when trapping is not an option.

## **Acknowledgements**

We thank Ronnie Glick and all the ODSVRA resource ecologists for their invaluable assistance with this project. It was a very satisfying year. In addition, we thank Doug George (Point Blue Conservation Science), Kevin Estrada, and Eric Covington (both USDA Wildlife Services). Thanks also to the California Department of Fish and Wildlife (CDFW) in Sacramento (Randi Logsdon, Carie Battistone, and Lyann Comrack), and Richard Callas (CDFW Shasta Valley Wildlife Area), and Bob Stafford (CDFW, San Luis Obispo), for making the permit and relocation aspect of this project proceed as smoothly as possible. Thanks also to Dave Clendenen and the Wind Wolves Preserve.

Table 1. Avian predators trapped at Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California, and relocated in 2013. Banding sites at the recreation area include North Oso Flaco (NOF) and South Oso Flaco (SOF). Relocation sites include Windwolves Preserve (WP) in Kern County, Cuyama Valley (CV) in Kern County, Shasta Valley Wildlife Area (SV) in Siskiyou County, Cerro Noroeste Road (CN) in Kern County, and Santa Ynez Valley (SY) in Santa Barbara County.

Date	Species	Age	Sex	Banding		Release			Band Number
				Site	Banding Zone/UTM	Date	Site	Release Zone/UTM	
05/07/13	Great Horned Owl	U	M	NOF	10/716147-3879513	05/08/13	WP	11/302417-3881460	0928-11975
05/29/13	Northern Harrier	AHY	M	NOF	10/716147-3879513	05/29/13	SV	10/542651-4616877	1004-10602
06/05/13	Great Horned Owl	U	M	SOF	10/715814-3878827	06/06/13	CN	11/285880-3862108	0928-11976
06/14/13	Great Horned Owl	U	M	SOF	10/715814-3878827	06/15/13	CN	11/285880-3862108	0928-11977
07/01/13	Loggerhead Shrike	HY	U	NOF	10/716147-3879513	07/01/13	SY	10/770038-3833787	8101-08423
07/12/13	American Kestrel	HY	F	SOF	10/715814-3878827	07/12/13	CV	11/287476-3882015	1593-52104
07/22/13	Loggerhead Shrike	HY	U	NOF	10/716147-3879513	07/22/13	SY	10/766238-3838134	8101-08424
07/26/13	Loggerhead Shrike	HY	U	NOF	10/716147-3879513	07/26/13	SY	10/764486-3844507	8101-08425
07/31/13	Loggerhead Shrike	HY	U	SOF	10/715814-3878827	07/31/13	CV	11/287476-3882015	8101-08426

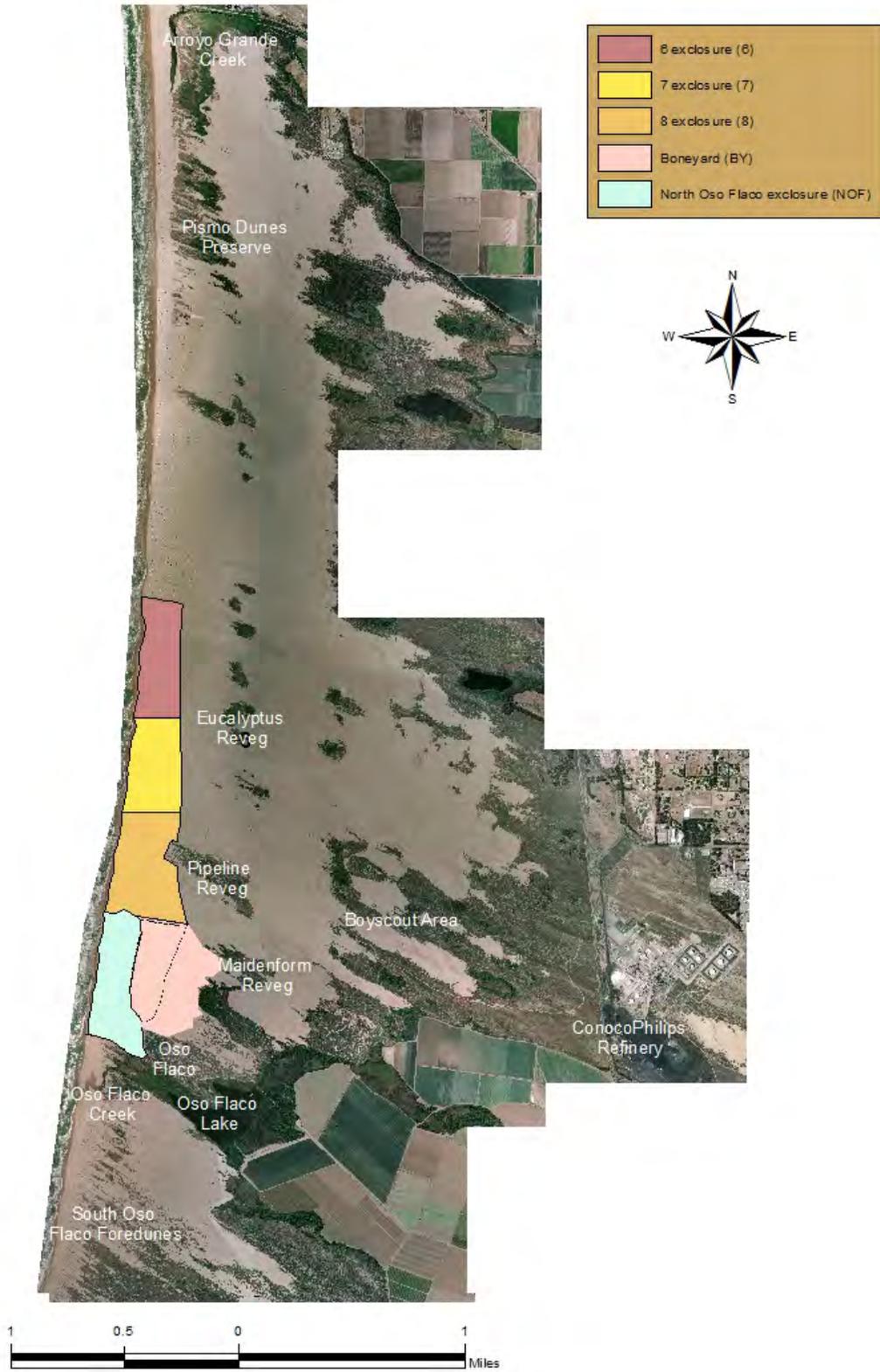


Figure 1. ODSVRA location reference map. Reveg = Revegetation Area

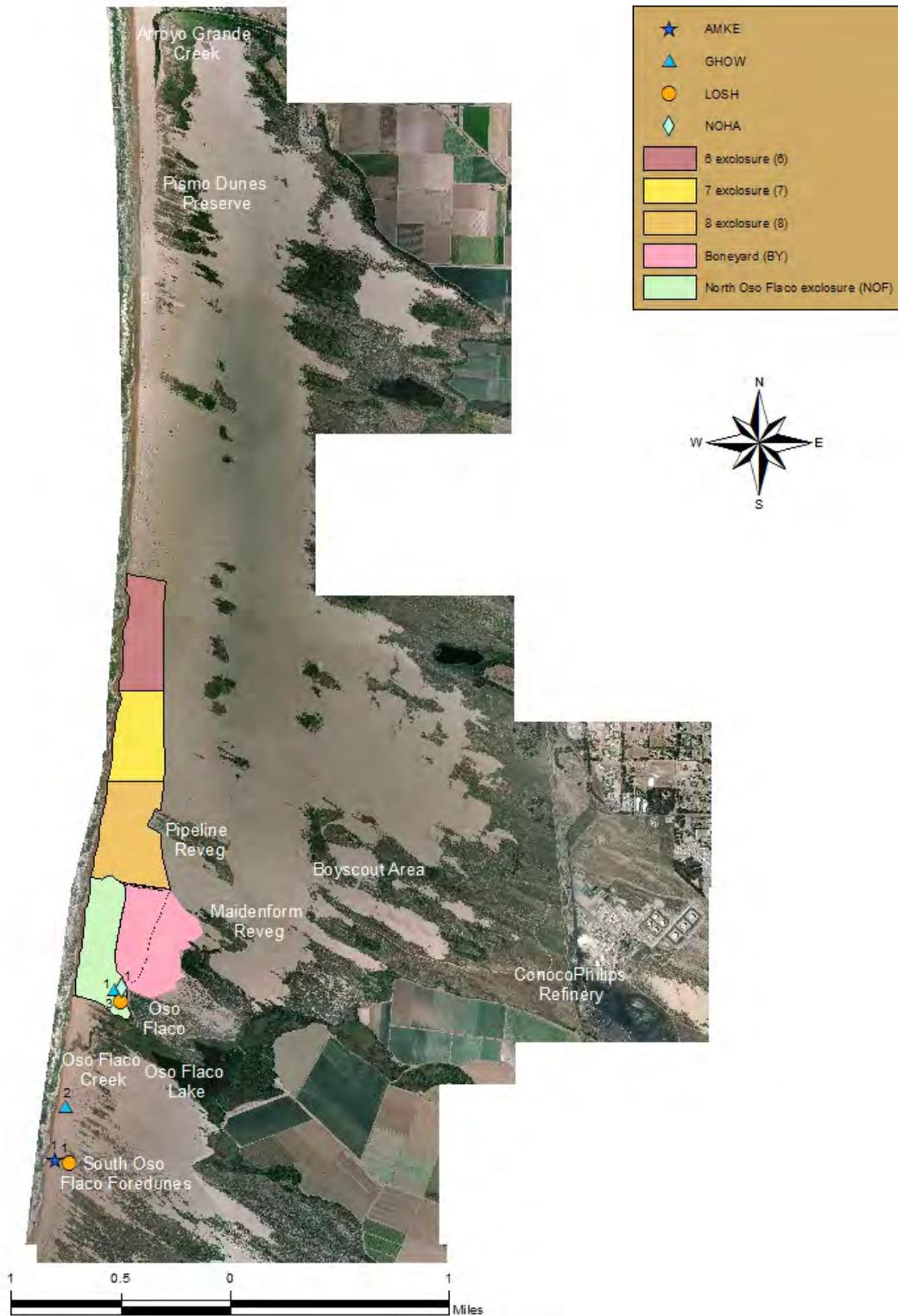


Figure 2. Avian predator trapping locations. AMKE = American kestrel; GHOW = great horned owl; LOSH = loggerhead shrike; NOHA = northern harrier; Reveg = Revegetation Area.



## Rescuer Contact Information

<b>Organization Name</b>	ODSVRA	<b>Phone</b>	
<b>Address</b>	Oceano CA	<b>Alt. phone</b>	
<b>Notes</b>		<b>Email</b>	

## Prescriptions

<b>Dose</b>	<b>Prescription</b>	<b>Start date</b>	<b>End date</b>
0.03 ml	Sucralfate 100mg/ml PO TID (100mg/kg)	7/30/2013	
0.02 ml	Meloxicam 1.6mg/ml PO BID (1mg/kg)	7/27/2013	7/31/2013

**13-753****Species** Plover, Snowy**Conservation status**

Admit date

Last update May 29, 2013 at 10:19 am

**Identity**

<b>Band</b>		<b>Name</b>
<b>Keywords</b>	Contaminated-petroleum	
<b>Master problem</b>		

**Intake**

<b>Location found</b>	928 Pacific Blvd., Oceano CA
<b>Date found</b>	May 27, 2013
<b>Observations</b>	Tarred
<b>What fed</b>	bugs from sand
<b>Notes</b>	

**Initial Exam / Treatment**

<b>Dehydration</b>	Mild	<b>Admit weight</b>	9.30 gm
<b>Gender</b>	Unknown	<b>Admit age</b>	Downy
<b>Admit mentation</b>	BAR	<b>Admit BCS</b>	Reasonable

**Head / mouth** : Small amt oil on bill.**Wings / arms** : Small amt oil on R carpus.**Feet** : Weathered oil on toes R foot.**Feathers / skin** : Weathered oil ventral surface neck on R side.**Initial treatment** : Heat, offered food (ate readily), sucralfate, oral 5% dextrose**Medical Record**

<b>Date</b>	<b>Treatment</b>
5/29 9:16 AM	<b>BW = 10.10gm</b> BAR. Eating well. Very mobile. Gained a little more weight. Feathers on head little more fluffed up today. Small bare spot on neck where thickest oil had been. OK for site return. SR
5/28 7:26 PM	<b>BW = 9.80gm</b> In afternoon, post-wash. SR
5/28 1:03 PM	BAR and active in am. Eating lots of beach bugs and meal worms. Washed-pre-treated w/methyl soyate, used water-pik w/dilute detergent solution to remove oil, rinsed w/water-pik. Placed into enclosure w/towel over sand under heat lamp w/space heater to move air. BAR when placed into enclosure. Fluffed up quickly on body. Preening and eating. SR

**Disposition**

<b>Disposition</b>	Released	<b>Enclosure</b>
<b>Transfer type</b>		<b>Enclosure history</b>
<b>Release type</b>	Returned	<b>Holding at</b>
<b>Disposition date</b>	May 29, 2013	<b>Criminal activity?</b>
<b>Disposition location</b>	Oceano CA	<b>Carcass saved?</b>

**Rescuer Contact Information**

<b>Organization</b>	ODSVRA	<b>Phone</b>	(805) 473-7220
<b>Name</b>	Oceano Dunes Ranger Station	<b>Alt. phone</b>	
<b>Address</b>	928 Pacific Blvd. Oceano CA, 93445	<b>Email</b>	

**Notes**

**Prescriptions**

Dose	Prescription	Start date	End date
------	--------------	------------	----------

Avian Necropsy Form  
California Department of Fish and Wildlife, MWVCRC

Created on: 10/7/2013 11:15

MWVCRC# 13-0931 Species Least Tern  
UCD Path # OWCN Intake #  
Band # (L) Lt. Green, (R) White/Blu Other #

Necropsy Date 7/30/2013 Necropsy By: H. Nevins

Collector Alison Fox Collection Date 7/29/2013 Coll. location Oceano Dunes

Admit Date Death Date 7/29/2013 Euthanasia? No Radiograph? No Abnormal? NA Photo? Yes

History Hatched 6/24/13 (nest 022-13, excl. 6), fledged 7/15/13, last seen 7/27/13 in enclosure @33 days old (A. Fox), found dead 07:37 7/29/13 at high tide near enclosure [fence]. Contact: Amber, OceanoDunes, 805-365-5186

Clinical N/A

Human Interaction? None evident

OILED?

Oil Extent

1) Where oiled?

Notes:

No

COC filled out?

2) Where oiled?

EXTERNAL EXAM

Carcass condition Previously frozen? No

Scavenged? No Where scavenged:

External parasites? No Notes:

Plumage: Juvenile Morph (e.g. Fulmars):

Molt: Body: Wing: Head: Tail:

Morphometrics: Culmen: 19.4 Nares: 11.8 Width at anterior nares: 1.2 Depth at gony 4.4

Tarsus: 15.5 Flattened wing chord: 153 Curved wing chord: 151

Common murrelets only

Supraorbital width

Interorbital width

SOR Score:

INTERNAL EXAM

Body Mass 45 Mass Description: Actual Wet

Subjective Body Condition: Good Age: Hatch Year

Subcutis fat depth (mm): 1 Pectoralis muscle weight: Even with keel

Internal fat: Liver wt: Spleen wt: Heart wt:

Pericardial fat: Other wt:

Sex Male Gonad size: 2 x 1 DLF Bursa: Prominent Thymus: Prominent

Oviduct?: Size: 5 x 5

Crop content: Proventriculus content: Empty Ventriculus content: Empty

Small Int. content: mucus Cecum/Colon content: Cloaca content: empty

Internal Parasites?: No Number?: Description:

GROSS FINDINGS:

COD Trauma (presumed)

External: three areas of reddened skin on upperwing (bilateral) at wrist on right and elbow on left.; liver - dark; lungs - slightly reddened, wet, congested, adematous; heart - pale. Presumed trauma, but histology is pending to rule out unknown/other potential factors.

Disposition: Saved Histo Collected Yes Cytology Collected? No Label Protocol Other



**California Animal Health & Food Safety  
Laboratory System**

PO Box 1770  
Davis, CA 95617  
(530) 752-8700

**FINAL REPORT**

*This report supersedes all  
previous reports for this case*

**CAHFS Case #:** D1309003  
**Referral #:**  
**Date Collected:** 08/03/2013  
**Date Received:** 08/03/2013  
**Case Coordinator:** Leslie Woods, DVM,  
PhD, DACVP  
**Electronically Signed and Authorized  
By:** Woods, Leslie on 9/2/2013  
1:01:10PM

**Email To:**  
OCEANO DUNES SVRA  
[ronnie.glick@parks.ca.gov](mailto:ronnie.glick@parks.ca.gov)

**Collection Site:**  
OCEANO DUNES SVRA  
340 JAMES WAY, SUITE 270  
PISMO BEACH, CA 93449

**Specimens Received:** 1 Carcass;

**Case Contacts**

Report To	Pacific Wildlife Care	805-772-9494	PO Box 1134 , CA
Submitter	OCEANO DUNES SVRA	805-773-7180	340 JAMES WAY, SUITE 270 PISMO BEACH, CA 93449

**Specimen Details**

ID	ID Type	Taxonomy	Gender	Age
D1309003-01	CAHFS Internal ID	Least Tern		

**Laboratory Findings/Diagnosis**

1. Presumptive attaching/effacing E. coli (small intestine)
2. Interstitial pneumonia, multifocal, heterophilic
3. Bacterial penetration of koilin (gizzard)
4. Bursal lymphocellular necrosis with histiocytosis.

**Ancillary test results:**

- a. Negative for West Nile virus by IHC.
- b. Negative for Salmonella by PCR.
- c. Mixed flora
- d. Negative for circovirus by in situ hybridization.

**Case Summary**

09-02-13. Circovirus was not detected by in situ hybridization. This completes testing on this case.

08-07-13. This bird had a bacterial infection in the lungs associated with pneumonia and attached bacteria in the intestine which is likely an attaching / effacing E.coli. We were unable to grow out any significant bacteria from the lungs as it was overgrown with mixed flora and coliforms. In addition, there was bursal lymphoid necrosis. Viral infection (such as with circovirus) or nutritional stress or stress caused by other factors may cause this. A final report will follow when all testing is complete.

**Clinical History**

1st year unbanded California Least tern walking but unable to fly with droopy wing on 7/27/13. About 4 pm brought to local rehabilitation center (Pacific Wildlife Care) and was under vets care. Break in wing, It wing, appeared to vet to be not new; tern would not eat, was tube fed and was not standing well per vet. Vet's opinion was it may have been struck by vehicle. Died around 5 pm on 7/31/13 and placed in refrigerator. Check for cause of death and for any other internal problems it may have had.

**Gross Observations**

This female juvenile California least tern is submitted in good postmortem condition. This bird is thin. The oropharynx is unremarkable. The lumen of the trachea is wet. The thyroids are bilaterally symmetrical and normal size. The lungs are pink and slightly wet. The spleen is tiny. The kidneys are granular brown. The liver is unremarkable. The ovary is inactive

and the oviduct is very thin. The skin is stripped off the wings and no break is grossly evident (radiograph more sensitive). Contents of the intestines is creamy tan. The gizzard is empty.

### Bacteriology

#### Test Specific Comments

##### Salmonella PCR and Confirmation Culture

- \* There is a greater than 90% correlation between Salmonella culture and PCR test results. Cases in which the PCR result is positive but an isolate isn't recovered may be due to low numbers of organisms, competition with other bacteria (particularly Proteus), or non-viable Salmonella in the sample. PCR is a very good tool for ruling out Salmonella negative samples with a rapid turnaround time.

#### BACTERIAL AEROBIC CULTURE

Animal/Source	Specimen	Specimen Type	Results
D1309003-01	CA Least Tern	Liver Swab	Mixed flora Sm#
D1309003-01	CA Least Tern	Lung Swab	Mixed Coliforms Lg# Mixed flora

#### Salmonella PCR and Confirmation Culture

Animal/Source	Specimen	Specimen Type	Results
D1309003-01	CA Least Tern	Feces	No salmonella detected

### Biotechnology

#### Avian Influenza matrix gene qRT-PCR

Animal/Source	Specimen	Specimen Type	Results
D1309003-01	CA Least Tern	Oropharyngeal Swab	Not Detected

### Histology

Brain, heart, liver, kidneys, lungs, spleen, intestines, proventriculus, gizzard, thyroid gland, thymus, peripheral nerve, skeletal muscle, ovary, adrenal gland, kidneys, bursa, trachea and bifurcation, heart, feathered skin, esophagus, lungs, proventriculus, gizzard, brain, intestines are examined. In the gizzard and esophagus, there are multiple colonies of bacteria (monomorphic population of cocci/diplococci) which penetrate the koilin and the epithelium with no associated inflammation. In the intestine, there are massive numbers of bacteria (cocci/bacilli) that are adherent to enterocytes causing some scalloping (presumptive attaching effacing E. coli). In the lungs, heterophils and macrophages are present within the capillary network and in air capillaries, sometimes associated with bacterial colonies. In the bursa, there is lymphocellular necrosis and histiocytosis with macrophages with light brown cytoplasmic pigment.

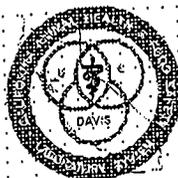
#### Generic Circovirus - University of Georgia

Animal/Source	Specimen	Specimen Type	Results
D1309003-01	block T03	Tissue Block	Negative

### Immunohistochemistry

#### West Nile Virus immunohistochemistry

Animal/Source	Specimen	Specimen Type	Results
D1309003-01	block T03	Tissue Block	Negative
D1309003-01	block T04	Tissue Block	Negative



California Animal Health & Food Safety  
 Laboratory System  
 18830 Road 112  
 Tulare, CA 93274-9042  
 (559) 688-7543

**FINAL REPORT**

*This report supersedes all previous reports for this case*

CAHFS Case #: T1302519  
 Referral #: SPCA #1592  
 Date Collected: 08/17/2013  
 Date Received: 08/21/2013  
 Case Coordinator: Richard P. Chin,  
 DVM, MPVM,  
 Electronically Signed and Authorized  
 By: Chin, Richard P. on 8/30/2013  
 5:07:25PM

Fax To:  
 MURRAY, MICHAEL  
 831-644-7597

Collection Site:  
 MONTEREY BAY AQUARIUM - AVIARY  
 886 CANNERY ROW  
 MONTEREY, CA 93940

Specimens Received: 1 Carcass;

Comments: carrier: FedEx

**Case Contacts**

Bill To	MONTEREY BAY AQUARIUM	831-644-7507	886 CANNERY ROW MONTEREY, CA 93940
Submitter	MURRAY, MICHAEL	831-644-7507	886 CANNERY ROW MONTEREY, CA 93940

**Specimen Details**

ID	ID Type	Taxonomy	Gender	Age
SPCA# 1592	Tag	Snowy Plover	Unknown	Neo Natal

**Laboratory Findings/Diagnosis**

1. Cause of death undetermined.
2. Proteus spp. isolated from liver.

**Case Summary**

\*\*\* 8/30/13: Final Report. The cause of death of this bird was undetermined. Proteus spp. was isolated from the liver, but there were no microscopic lesions in the liver. Proteus bacteria can infect the egg and lead to embryo or neonatal mortality.

**Clinical History**

Abandoned egg on beach. Had already pipped. Abnormal embryonic position with right leg over head. Assisted hatch. After hatching, chick was ataxic, torticollis, and clenched feet. Torticollis resolved spontaneously. Clenched feet responded to sandal-like splint x 48 hrs. The torticollis returned after 24 more hours. Bird died spontaneously. Snowy Plover submitted for necropsy.

**Gross Observations**

One neonatal (approximately 3-days old) snowy plover was submitted dead for examination. The carcass weighed 6g and was severely autolyzed, especially the intestines. The liver was orange (due to yolk absorption), but of normal size and shape. There were no other lesions seen.

**Bacteriology**

**BACTERIAL AEROBIC CULTURE**

Animal/Source	Specimen	Specimen Type	Results
SPCA# 1592	1	Liver Tissue	Proteus spp.

**SALMONELLA CULTURE - AVIAN**

Animal/Source	Specimen	Specimen Type	Results
SPCA# 1592	1	Intestinal Contents	No Salmonella sp. detected

Final Version 1

Accession # T1302519

August 30, 2013

Histology

Sections of heart, trachea, lungs, liver, kidney, esophagus, crop, proventriculus, gizzard, intestines, pancreas, spinal column and brain were examined. All other tissues were unremarkable.



**California Animal Health & Food Safety  
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PO Box 1770  
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**FINAL REPORT**

*This report supersedes all  
previous reports for this case*

**CAHFS Case #:** D1307717  
**Referral #:**  
**Date Collected:** 07/06/2013  
**Date Received:** 07/06/2013  
**Case Coordinator:** Mark L. Anderson,  
DVM, PhD  
**Electronically Signed and Authorized  
By:** Anderson, Mark L. on 7/11/2013  
7:47:44AM

**Email To:**  
OCEANO DUNES SVRA  
[ronnie.glick@parks.ca.gov](mailto:ronnie.glick@parks.ca.gov)

**Collection Site:**  
OCEANO DUNES SVRA  
340 JAMES WAY, SUITE 270  
PISMO BEACH, CA 93449

**Specimens Received:** 1 Carcass;

**Comments:** 1-carcass

**Case Contacts**

Submitter OCEANO DUNES SVRA 805-773-7180 340 JAMES WAY, SUITE 270 PISMO BEACH, CA 93449

**Specimen Details**

ID	ID Type	Taxonomy	Gender	Age
GA:BW sp149	Unknown	Snowy Plover		Juvenile

**Laboratory Findings/Diagnosis**

Juvenile male Snowy Plover

1. Rostral cervical cutaneous puncture wound with hemorrhage, presumptive acute traumatic etiology.
2. Ventral distal cervical region: perforation of skin and crop/esophagus with exposure of the thoracic inlet; significance uncertain.
3. Histologic examinations: No remarkable histologic lesions identified.
4. Ancillary microbiology and toxicology tests unremarkable.

**Case Summary**

7/11/2013:

All tests are now completed. The cause of death for this Snowy Plover is uncertain. There is evidence of a cutaneous puncture wound in the neck accompanied by hemorrhage in the surrounding feathers. This is presumed to be due to trauma, but the specific association with this trauma to the death is uncertain. The various ancillary tests did not reveal evidence of an infectious process. The histologic changes seen are nonspecific and likely insignificant.

7/8/2013:

On gross examination, there is evidence of external hemorrhage and a puncture in the rostral cervical region. In the distal ventral cervical region that the large perforation which I believe was referred to in the submission form is of uncertain significance at this stage. Another report will be forthcoming.

**Clinical History**

Banded 2013 season Juvenile GA:BW. Found in wet sand in South Oso Flaco (west of S016W). Bird over-washed by tide, upper keel/neck has small hole, blood stained feathers around hole. Bird not in rigor when found, odor not strong.

**Gross Observations**

Received was a juvenile male Snowy Plover. Externally, there is red-tinged fluid (interpreted as blood) adherent to the feathers of the left side of the neck with a small (less than 1 mm in diameter) puncture wound through the skin on the rostral dorsal portion of the neck. Underneath the skin, there is mild hemorrhage and no evidence of cervical vertebral fractures of muscle trauma. In the ventral neck, the skin over the crop and thoracic inlet is removed and the thoracic inlet exposed. There is no evidence of hemorrhage in the adjacent tissues surrounding this lesion and whether this represents a post-mortem or ante-mortem event cannot be established. Dissection of the head and removal of the brain reveals no

remarkable gross lesions. Examination of the cervical vertebral column reveals no remarkable gross lesions. Internally, the bird is unremarkable. The esophagus is empty. The proventriculus contains a small amount of yellow fluid. The ventriculus contains yellow fibrous content. The small intestine contains abundant yellow fluid content and the colon contains a mixture of urates and brown soft fecal material. The kidneys are normal size, but there are urates in the ureters. The spleen is small and unremarkable. The liver is unremarkable. The lungs are moderately congested, but otherwise unremarkable with no evidence of consolidation. The trachea and air sacs are grossly unremarkable.

### Bacteriology

#### Test Specific Comments

##### Salmonella PCR and Confirmation Culture

- \* There is a greater than 90% correlation between Salmonella culture and PCR test results. Cases in which the PCR result is positive but an isolate isn't recovered may be due to low numbers of organisms, competition with other bacteria (particularly Proteus), or non-viable Salmonella in the sample. PCR is a very good tool for ruling out Salmonella negative samples with a rapid turnaround time.

#### BACTERIAL AEROBIC CULTURE

Animal/Source	Specimen	Specimen Type	Results
GA:BW sp149	GA:BW sp149	Lung Swab	No growth after 48 hours
GA:BW sp149	GA:BW sp149	Liver Swab	No growth after 48 hours

#### Salmonella PCR and Confirmation Culture

Animal/Source	Specimen	Specimen Type	Results
GA:BW sp149	GA:BW sp149	Intestinal Tissue	No salmonella detected

### Biotechnology

#### Avian Influenza matrix gene qRT-PCR

Animal/Source	Specimen	Specimen Type	Results
GA:BW sp149	GA:BW sp149	Oropharyngeal Swab	Not Detected

#### West Nile Virus (avian) qRT PCR

Animal/Source	Specimen	Specimen Type	Results
GA:BW sp149	GA:BW sp149	Kidney Tissue	Negative

### Histology

Histologic examinations were performed on samples of brain, trachea, lung, heart, liver, kidney, spleen, thymus, skeletal muscle, esophagus, proventriculus, ventriculus, small intestine and colon. The tissues are in fairly good post-mortem condition. No remarkable histologic lesion was identified in the brain. In the sections of lung, the parenchyma is congested and there is minimal heterophilic infiltration focally in the interstitium adjacent pulmonary veins with patchy fibrillar to homogeneous eosinophilic material within the parabronchi. In the sections of heart and liver, there are no remarkable histologic lesions. In the kidney, there is minimal focal lymphocytic interstitial infiltrate. The spleen and thymus are histologically unremarkable. The sections of the digestive tract have moderately severe post-mortem autolysis. There are no remarkable histologic lesions identified. A cross section of a cestode is noted in the lumen of the small intestine.

### Toxicology

Reporting Limit (Rep. Limit): The lowest routinely quantified concentration of an analyte in a sample. The analyte may be detected, but not quantified, at concentrations below the reporting limit. Sample volumes less than requested might result in reporting limits that are higher than those listed.

The submitted liver contained a slightly low concentration of iron. The other listed heavy metals, including selenium are in acceptable, non-toxic concentrations for birds.

#### HEAVY METAL SCREEN

Animal/Source	Specimen	Specimen Type
GA:BW sp149	GA:BW sp149	Liver Tissue

Analyte	Result	Units	Rep. Limit	Units	Ref. Range
Lead	Not Detected	PPM	1.000	PPM	
Manganese	3.5	PPM	0.040	PPM	
Iron	53	PPM	0.200	PPM	
Mercury	Not Detected	PPM	1.000	PPM	
Arsenic	Not Detected	PPM	1	PPM	
Molybdenum	0.69	PPM	0.400	PPM	
Zinc	27	PPM	0.100	PPM	
Copper	5.4	PPM	0.100	PPM	
Cadmium	1.1	ppm	0.300	ppm	

SELENIUM - TISSUE/OTHER						
Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit	Ref. Range
GA:BW sp149	GA:BW sp149	Liver Tissue	1.9	ppm	0.02	



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**FINAL REPORT**

*This report supersedes all  
previous reports for this case*

**CAHFS Case #:** D1303279  
**Referral #:**  
**Date Collected:**  
**Date Received:** 03/26/2013  
**Case Coordinator:** Mark L. Anderson,  
DVM, PhD  
**Electronically Signed and Authorized  
By:** Anderson, Mark L. on 3/29/2013  
8:23:53AM

**Email To:**  
OCEANO DUNES SVRA  
[rglick@parks.ca.gov](mailto:rglick@parks.ca.gov)

**Collection Site:**  
Pismo State Beach  
PISMO BEACH

**Specimens Received:** 1 Carcass;

**Comments:** 1 carcass

**Case Contacts**

Submitter OCEANO DUNES SVRA 805-773-7180 340 JAMES WAY, SUITE 270 PISMO BEACH, CA 93449

**Specimen Details**

ID	ID Type	Taxonomy	Gender	Age
3/23/13	Unknown	Snowy Plover		

**Laboratory Findings/Diagnosis**

Male Snowy Plover found dead on beach:  
Presumptive acute traumatic injuries:

1. Head, periocular, ocular and intracranial hemorrhages.
2. Thoracic vertebral fracture with displacement and intracoelomic hemorrhage.
3. Histopathology:
  - a. Pulmonary congestion and hemorrhage.
  - b. Minimal heterophilic myositis.
  - c. Kidney: focal lymphonodular pelvic infiltrate.

**Case Summary**

3/29/13:  
All tests are now completed and the results remain the same as previously reported.

3/28/2013:  
Histologic examinations are minimal and nonspecific. A final will be sent when the rest of the tests are completed.

3/26/2013:  
The gross lesions in the Snowy Plover are suggestive of acute traumatic injury with evidence of a displaced thoracic vertebral fracture and extensive cranial trauma with hemorrhage.

**Clinical History**

Western snowy plover found dead at Pismo State Beach on 3/23/13 near midramps. Bird found in old tire tracks and partially buried. Please perform full necropsy to determine cause of death.

**Gross Observations**

Examined was a male Snowy plover that was in a fair post-mortem condition. The body appears to be dorsal ventrally flattened. Dissection of the head reveals extensive hemorrhage within and surrounding the left orbital fossa. Additional hemorrhages are noted in the subcutaneous tissues surrounding the right orbit. Internally the coelomic cavity contains dark red fluid compatible with hemorrhage. There is a vertebral fracture with displacement at the thoracic vertebra 7 surrounded by hemorrhage. The lungs have multifocal areas of apparent hemorrhage. The heart is grossly unremarkable.

The liver has loose adherent hemorrhage on the surface and is grossly unremarkable. The kidneys are surrounded by extensive hemorrhage. The testes are surrounded by hemorrhage. The spleen is small and surrounded by hemorrhage. In the digestive tract, the esophagus, proventriculus and ventriculus are empty. The intestinal tract is grossly unremarkable other than loose non-adherent hemorrhage on the serosal surfaces. Dissection of the brain reveals extensive foci up to 3 mm of hemorrhage in the frontal lobe on the right side.

**Bacteriology**

**Test Specific Comments**

**Salmonella PCR and Confirmation Culture**

- \* There is a greater than 90% correlation between Salmonella culture and PCR test results. Cases in which the PCR result is positive but an isolate isn't recovered may be due to low numbers of organisms, competition with other bacteria (particularly Proteus), or non-viable Salmonella in the sample. PCR is a very good tool for ruling out Salmonella negative samples with a rapid turnaround time.

**BACTERIAL AEROBIC CULTURE**

Animal/Source	Specimen	Specimen Type	Results
3/23/13	3/23/13	Lung Tissue	No growth after 48 hours
3/23/13	3/23/13	Liver Tissue	No growth after 48 hours

**Salmonella PCR and Confirmation Culture**

Animal/Source	Specimen	Specimen Type	Results
3/23/13	3/23/13	Intestinal Contents	No salmonella detected

**Biotechnology**

**Avian Influenza matrix gene qRT-PCR**

Animal/Source	Specimen	Specimen Type	Results
3/23/13	3/23/13	Oropharyngeal Swab	Negative

**Histology**

Histologic examinations were performed on samples of brain, trachea, lung, heart, liver, kidney, spleen, testes, skeletal muscle, esophagus, proventriculus, ventriculus, small intestine, pancreas and colon. The tissues are in good post-mortem condition. Histologic changes will be summarized. In the lung, there is widespread pulmonary congestion with focal accumulation of red blood cells within airspaces without evidence of inflammation. In the section of spleen, there are occasional lymphoid follicles in the white pulp. In the sections of kidney, there are rare lymphoid aggregates in the interstitium adjacent to pelvis. The remainder of the kidney is histologically unremarkable. In the section of skeletal muscle, there is a single focus of perivascular heterophilic infiltrate. The rest of the skeletal muscle is histologically unremarkable.

**Toxicology**

Reporting Limit (Rep. Limit): The lowest routinely quantified concentration of an analyte in a sample. The analyte may be detected, but not quantified, at concentrations below the reporting limit. Sample volumes less than requested might result in reporting limits that are higher than those listed.

The submitted liver had the listed metals in non-toxic concentrations for birds.

**HEAVY METAL SCREEN**

Animal/Source	Specimen	Specimen Type				
3/23/13	3/23/13	Liver Tissue				
Analyte	Result	Units	Rep. Limit	Units	Ref. Range	
Lead	Not Detected	PPM	1	PPM		
Manganese	3.6	PPM	0.040	PPM		

Iron	170	PPM	0.200	PPM
Mercury	1.2	PPM	1.000	PPM
Arsenic	Not Detected	PPM	1	PPM
Molybdenum	1.0	PPM	0.400	PPM
Zinc	39	PPM	0.100	PPM
Copper	6.8	PPM	0.100	PPM
Cadmium	4.1	ppm	0.300	ppm



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**FINAL REPORT**

*This report supersedes all  
previous reports for this case*

**CAHFS Case #:** D1311254  
**Referral #:**  
**Date Collected:**  
**Date Received:** 09/21/2013  
**Case Coordinator:** Mark L. Anderson,  
DVM, PhD  
**Electronically Signed and Authorized  
By:** Anderson, Mark L. on 9/24/2013  
4:25:56PM

**Email To:**  
OCEANO DUNES SVRA  
[ronnie.glick@parks.ca.gov](mailto:ronnie.glick@parks.ca.gov)

**Collection Site:**  
OCEANO DUNES SVRA  
  
PISMO BEACH CA  
93449  
County: SAN LUIS

**Specimens Received:** 1 Carcass;

**Case Contacts**

Bill To , client relations  
Submitter OCEANO DUNES SVRA 805-773-7180 340 JAMES WAY, SUITE 270 PISMO BEACH, CA 93449

**Specimen Details**

ID	ID Type	Taxonomy	Gender	Age
D1311254-01	CAHFS Internal ID	Snowy Plover		

**Laboratory Findings/Diagnosis**

Snowy plover submitted: Severe post-mortem autolysis with myiasis, no further tests

**Case Summary**

9/24/13:  
The post mortem condition precludes further testing on this bird.

**Clinical History**

Western snowy plover found 9/20/13 in the open riding area of Oceana Dunes SVRA, 500 ft east of post 5. Carcass found slightly buried and body appeared flattened. Unbanded bird. No found in tire tracks.

**Gross Observations**

Received was a Snowy plover carcass that was severely autolyzed condition. When received the bird is flattened dorsal ventrally. The caudal portion of the coelomic cavity is opened and covered with caked sand. Within the thoracic portion of the coelomic cavity there are large numbers of maggots ranging in size from 4 x 1 mm to up to 1.25 x 4 mm in size, with small amount of brown fluid and fragments of tissue. No gross lesions could be identified. No attempt was made to do bacterial cultures because of the condition of the carcass. The carcass was put in the freezer pending notification of the submitter.