

**NESTING OF THE CALIFORNIA LEAST TERN AND
WESTERN SNOWY PLOVER AT
OCEANO DUNES STATE VEHICULAR RECREATION AREA,
SAN LUIS OBISPO COUNTY, CALIFORNIA
2014 SEASON**



**Prepared for
California Department of Fish and Wildlife
United States Fish and Wildlife Service**

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

November 2014

TABLE OF CONTENTS

SUMMARY	1
INTRODUCTION	2
SITE DESCRIPTION	3
MONITORING AND MANAGEMENT ACTIONS	6
MONITORING	6
MANAGEMENT ACTIONS	11
RESULTS AND DISCUSSION	16
CALIFORNIA LEAST TERN.....	16
WESTERN SNOWY PLOVER.....	27
FACTORS INFLUENCING LEAST TERN AND SNOWY PLOVER REPRODUCTIVE SUCCESS	41
RECOMMENDATIONS	50
NOTES	56
LITERATURE CITED	62
APPENDICES	64
APPENDIX A. CALIFORNIA LEAST TERN NESTS AT ODSVRA IN 2014.	64
APPENDIX B. SNOWY PLOVER NESTS AT ODSVRA IN 2014.	68
APPENDIX C. MAPS OF ALL CALIFORNIA LEAST TERN AND SNOWY PLOVER NEST LOCATIONS AT ODSVRA IN 2014.	86
APPENDIX D. BANDED LEAST TERNS AND SNOWY PLOVERS.....	95
APPENDIX E. ADDENDUMS TO SNOWY PLOVER NESTING SUCCESS.....	115
APPENDIX F. PREDATOR SUMMARY TABLES AND FIGURES.....	119
APPENDIX G. DOCUMENTED MORTALITY OF CALIFORNIA LEAST TERN AND SNOWY PLOVER CHICKS, JUVENILES, AND ADULTS AT ODSVRA.....	128

List of Tables

Table 1. Nesting success of California least terns at ODSVRA from 1991-2014.	17
Table 2. Causes of California least tern nest loss at ODSVRA from 2002-14.	19
Table 3. 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 10-year period, 2005-14.....	20
Table 4. California least tern reproductive success reported for current or recent breeding sites in San Luis Obispo and Santa Barbara counties from 2004-14.....	25
Table 5. 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 2004-14.....	26
Table 6. Number of snowy plover breeding adults, breeding males, fledglings, and chicks fledging per breeding male for the 13-year period 2002-14.....	27
Table 7. Number of adult snowy plovers counted on USFWS breeding season window surveys versus calculated minimum number of breeding adults at ODSVRA from 2005-14.....	28
Table 8. Snowy plover nest distribution and success at ODSVRA in 2014.	29
Table 9. Nesting success of snowy plovers at ODSVRA from 2001-14.	30
Table 10. Attributed causes of snowy plover nest loss at specific locations at ODSVRA in 2014.	31
Table 11. Attributed causes of snowy plover nest loss in Southern Enclosure and Oso Flaco at ODSVRA from 2002-14.....	32
Table 12. Coyote occurrence in the Southern Enclosure and Oso Flaco at ODSVRA from 2009-14.....	44

Table 13. Sightings of merlin, American kestrel, large owl spp., red-tailed hawk, northern harrier, and peregrine falcon in specific areas of the Southern Enclosure and Oso Flaco at ODSVRA in 2014. .	46
Table 14. Sightings of peregrine falcon in specific areas of the Southern Enclosure and Oso Flaco at ODSVRA from 2008-14.	47
Table D.1. Banded least terns recorded at ODSVRA in 2014.	95
Table D.2. Banded snowy plovers with known origins seen at ODSVRA 1 October 2013 to 28 February 2014.	97
Table D.3. Banded snowy plovers with known origins seen at ODSVRA 1 March to 30 September 2014.	101
Table D.4. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 October 2013 to 28 February 2014.	108
Table D.5. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2014.	110
Table E.1. Nesting success of snowy plovers at ODSVRA, 2001-14.	115
Table E.2. Nest protection used at ODSVRA in 2014.	117
Table F.1. Summary of predators detected in the Southern Enclosure and Oso Flaco at ODSVRA in 2014.	119
Table F.2. Mammalian and avian predators removed under predator management actions for least terns and snowy plovers at ODSVRA in 2014.	121
Table G.1. Documented predation of least terns from 1 March to 30 September 2014.	128
Table G.2. Documented predation of snowy plovers from 1 March to 30 September 2014.	128
Table G.3. Mortality, other than documented predation, of least terns from 1 March to 30 September 2014.	129
Table G.4. Mortality, other than documented predation, of snowy plovers from 1 March to 31 October 2014.	130

List of Figures

Figure 1. ODSVRA site map.	14
Figure 2. ODSVRA Southern Enclosure and Oso Flaco seasonally protected areas for breeding California least terns and snowy plovers in 2014.	15
Figure 3. Number of California least tern nests, pairs, and fledglings at ODSVRA from 1991-2014.	18
Figure 4. Distribution of least tern nests as a percent of total nests at ODSVRA from 2004-14.	18
Figure 5. Number of days California least tern juveniles that hatched at ODSVRA in 2014 continued to be seen on-site after reaching fledge age (21 days old).	22
Figure 6. Number of California least terns counted at the ODSVRA 6 enclosure night roost in 2014.	23
Figure 7. Number of snowy plover breeding males, nests, nests hatched, chicks, and chicks fledged at ODSVRA from 2001-14.	28
Figure 8. Number of snowy plover nests at ODSVRA from 1993-2014.	29
Figure 9. Number of known location and known fate snowy plover nests with known initiation date (n=231) initiated per 10-day period and number known to hatch at ODSVRA in 2014.	31
Figure 10. Fledging rate of chicks hatching in early season (prior to 20 June) and late season (20 June or later) at ODSVRA from 2003-14.	33
Figure 11. Number of snowy plover chicks hatching per 10-day period and number subsequently fledging at ODSVRA in 2014.	34
Figure 12. Chick survival and fledge rate from 16 April to 5 September at ODSVRA in 2014.	35

Figure 13. Loss of snowy plover chicks by age and location last seen in the Southern Exclosure and Oso Flaco at ODSVRA in 2014.....	36
Figure 14. 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 2005-14...	38
Figure 15. Monthly average number of snowy plovers observed during nonbreeding season surveys at ODSVRA from October 2013 to February 2014.	39
Figure 16. Number of snowy plovers counted on USFWS winter window surveys from 2004-14.	39
Figure 17. Number of days coyote, opossum, skunk, and raccoon were detected in the Southern Exclosure and Oso Flaco at ODSVRA from 2007-14.	43
Figure 18. Number of days large owl spp., northern harrier, peregrine falcon and red-tailed hawk were detected in the Southern Exclosure and Oso Flaco at ODSVRA in 2007-14.....	46
Figure 19. Monthly average number of gulls at ODSVRA for March to September in 2009-14.	49
Figure C.1. All California least tern and snowy plover nest locations at ODSVRA in 2014.	86
Figure C.2. California least tern nest locations at ODSVRA in 2014 (6 exclosure).....	87
Figure C.3. California least tern nest locations at ODSVRA in 2014 (7 exclosure).....	88
Figure C.4. Snowy plover nest locations at ODSVRA in 2014 (6 exclosure).	89
Figure C.5. Snowy plover nest locations at ODSVRA in 2014 (7 exclosure).	90
Figure C.6. Snowy plover nest locations at ODSVRA in 2014 (8 exclosure).	91
Figure C.7. Snowy plover nest locations at ODSVRA in 2014 (Boneyard exclosure).....	92
Figure C.8. Snowy plover nest locations at ODSVRA in 2014 (North Oso Flaco).....	93
Figure C.9. Snowy plover nest locations at ODSVRA in 2014 (South Oso Flaco).....	94
Figure E.1. Daily wind speed data (daily afternoon average and daily maximum wind gust) and snowy plover nest loss attributed to wind at ODSVRA from 14 March to 9 August 2014.....	118
Figure F.1. Coyote occurrences documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2014.....	122
Figure F.2. Raccoon occurrences documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2014.....	123
Figure F.3. Skunk occurrences documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2014.....	124
Figure F.4. Avian predator sightings documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2014.....	125

Attachments

- U.S. Department of Agriculture Wildlife Services. Oceano Dunes State Vehicular Recreation Area 2014 Predator Management Report
- Ventana Wildlife Society. Avian Predator Management Project: Trapping and Relocation of Problem Avian Predators at Oceano Dunes State Vehicular Area in 2014
- Medical examination record: one least tern juvenile
- Necropsy examination results: three least tern juveniles, three snowy plover adults, one snowy plover (adult or juvenile), and one snowy plover chick

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 2014.

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 47 breeding pairs, similar to the 48 breeding pairs in 2013, and above the average of 40 pairs (range=20-55) from 2002-13. There were 49 known nesting attempts. Of the 46 nests with known location and fate, 42 hatched, for a nest hatching rate of 91.3%. Of the four nests that failed, one was abandoned pre-term (prior to the expected hatch date); one was abandoned post-term; one was abandoned, unknown if pre- or post-term; and one failed due to an unknown cause. Seventy-six chicks hatched and 50 were color-banded to individual. Fifty-eight of the 76 chicks (including 16 unbanded chicks) are known to have fledged (seen when 21 days old or older), for a chick fledging rate of 76.3% and 1.23 chicks fledged per pair. Predation was documented for a minimum of two terns (juveniles or adults). The maximum number of juveniles produced that may have survived to leave the site was 52 (six either known dead or last seen with nonsurvivable severe injury).

There was a minimum of 226 breeding snowy plovers (120 males and 106 females), compared to 163 in 2013. One hundred and sixteen banded birds were documented as breeding, 101 of these were banded as chicks and fledged from ODSVRA. There were 262 known nesting attempts, 201 were in the southern riding area seasonal enclosure (Southern Enclosure), 44 in Oso Flaco, one in the open riding area, and 16 from unknown locations (nesting known only by detection of brood). Of the 239 nests with known location and fate, 206 hatched for a nest hatching rate of 86.2%. Thirty-three nests failed, attributed to the following causes: abandoned pre-term (19); abandoned post-term (1); abandoned unknown pre- or post- (5); abandoned, suspected due to wind (1); flooded (2); unknown cause (2); unidentified predator (1); coyote (*Canis latrans*) (1); and unidentified avian (1). Of the 547 hatching chicks, 423 were color-banded to brood (157 fledged) and the fate of the 124 unbanded chicks is known (39 fledged). A total of 196 chicks fledged for a fledging rate of 35.8%. Survival was lower for chicks hatching in the early season compared to late season. In particular, of the initial 40% (220/547) of the total number of chicks produced, only 17.7% (39/220) fledged. This compares to a 48.0% (157/327) fledging rate for subsequent hatching chicks. For the initial 40% of chicks, 62.4% (53/85) of the broods lost all chicks. This compares to 32.8% (45/137) for subsequent broods. One chick fledged per breeding male is the estimated number needed to prevent the population of snowy plover from declining (assuming approximately 75% annual adult survival and 50% juvenile survival) (U.S. Fish and Wildlife Service 2007). In 2014, an estimated 1.63 juveniles fledged per male at ODSVRA. For the 13-year period 2002-14, average productivity was 1.39 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 1.6 million people in 2013 for a variety of recreational opportunities, including driving vehicles on the beach and dunes.¹ In 2013, an estimated 264,042 street-legal vehicles and 142,376 off-highway vehicles were driven on the shoreline and dunes in the designated riding area of the park.²

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 2014 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.

¹ ODSVRA 2013 Annual Attendance figures (source ODSVRA)

² ODSVRA 2013 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 2014 was approximately 287 acres, compared to a range of 271-298 acres (and an average of 287 acres) between 2004 and 2013. 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 55 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 59 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 82 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 91 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 49 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 63 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 2014, least tern chicks received a single size 1A blank aluminum band (covered with green over yellow 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 2006-14 most 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 known location and fate 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 can provide 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, 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 41.

Gull monitoring: Gulls may depredate snowy plover and least tern eggs, chicks, and juveniles. Gulls are of particular concern because they can be a subsidized predator attracted to food resources associated with 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 enclosure, circular enclosure, and mini-enclosure: 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-exlosures (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-exlosures take the least amount of time and staff to install.

Bumpout: A nest in the Southern Enclosure located less than 100 feet from 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. Nests on the shoreline that are close to the west fence may be enclosed by two-inch by four-inch mesh fencing extending from the Southern Enclosure fence; this type of single nest enclosure is also given the term bumpout.

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 exclosures to the west fence and upper shoreline west of the exclosure. Staff collects the branches and driftwood from the exclosures at the end of each season and stores them for use in the following season.

Plants and seeds: Prior to expected rain, staff may broadcast seed and install 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/or 7 exclosures in areas of historical tern nesting and chick-rearing (26 were placed on 6 exclosure shoreline in April 2014). The shelters provide chicks and juveniles with cover from predators and the elements (sun, wind, windblown sand). These simple structures are two or three pieces of plywood attached together to form an A-shape shelter (typically six inches high by 12 inches long by 11 inches wide).

Predator management

In addition to preventative measures such as fencing, individual nest exclosures, and cover provided by habitat enhancement, ODSVRA park staff and contractors 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 41 for additional information.

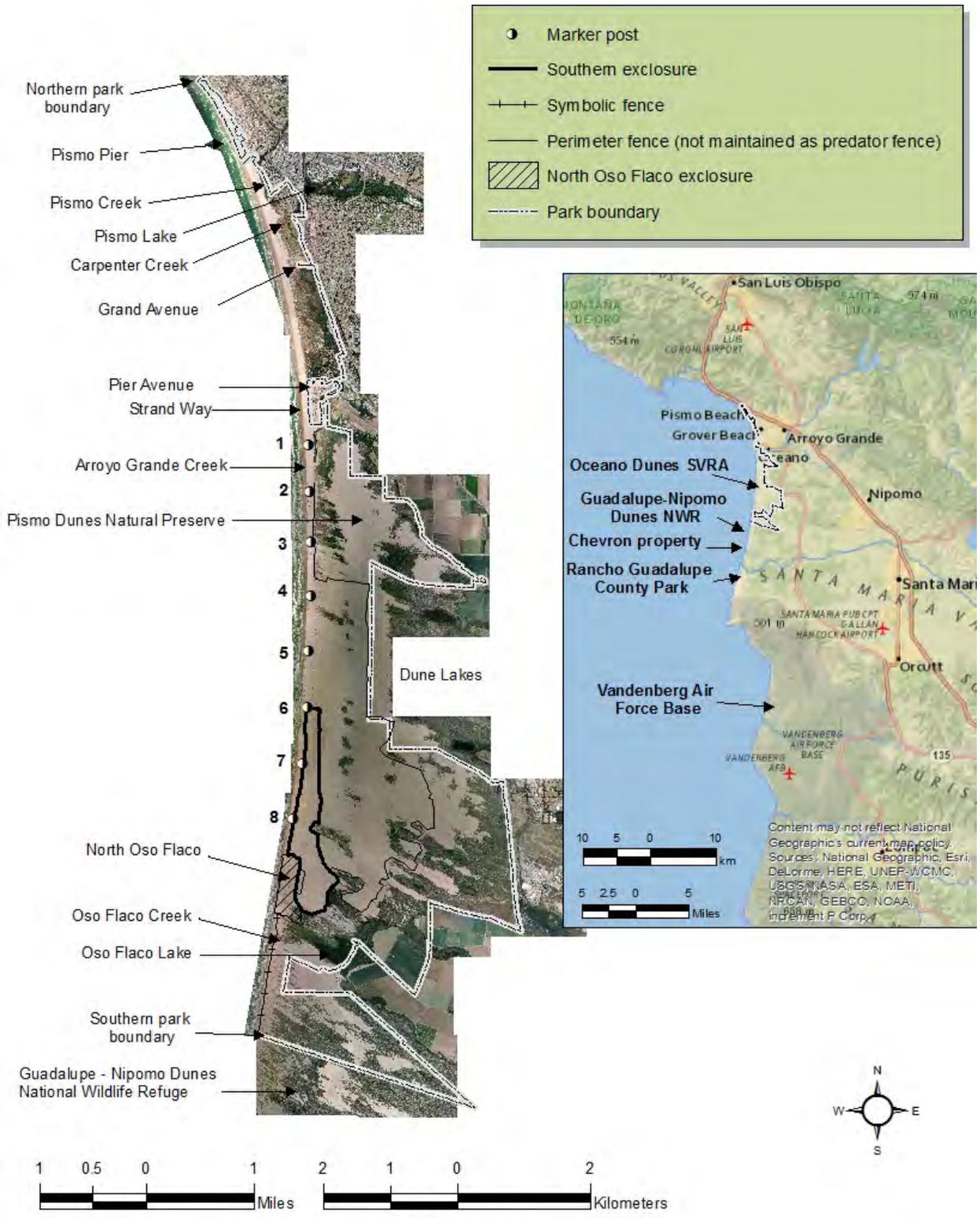


Figure 1. ODSVRA site map.

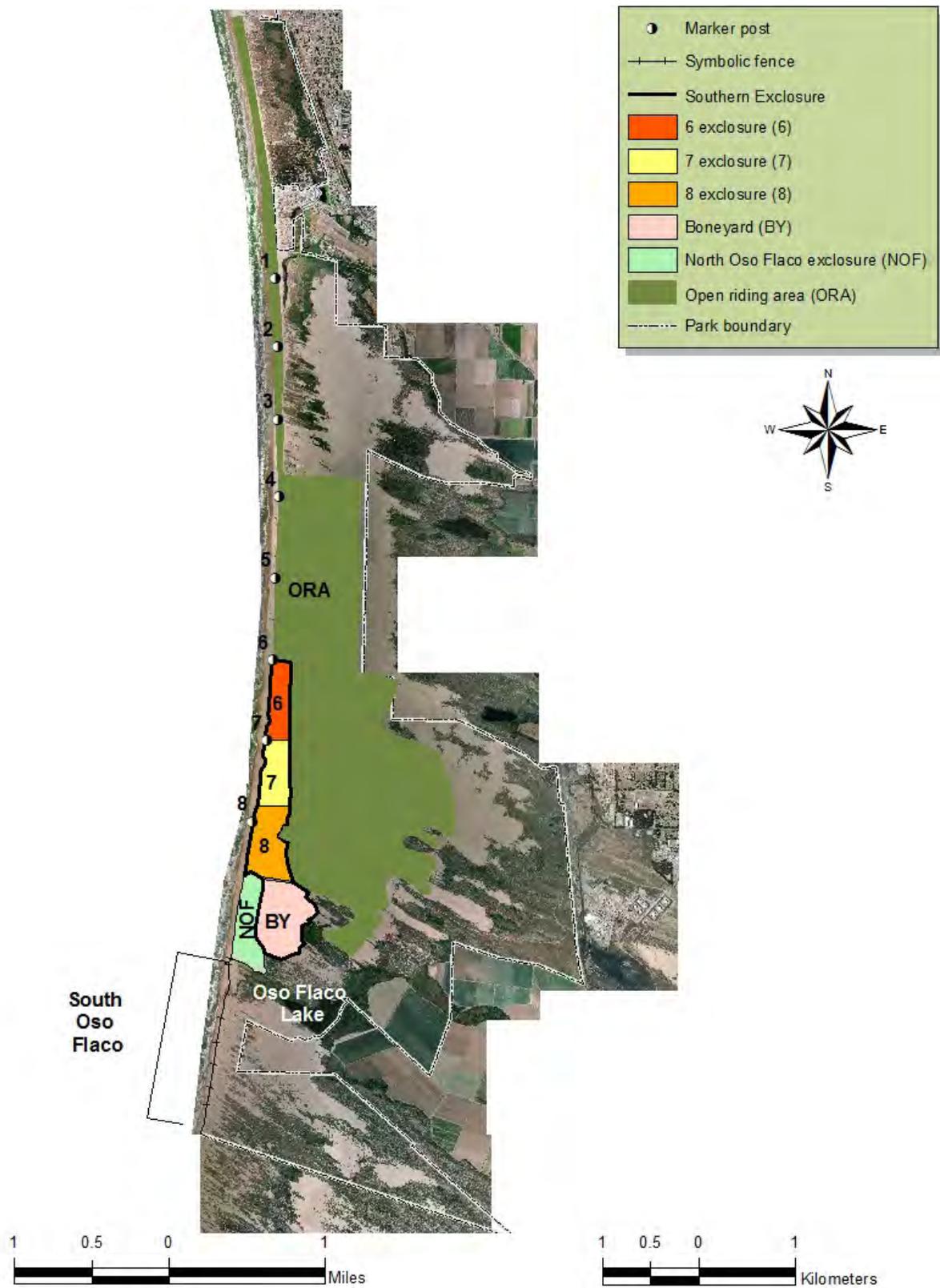


Figure 2. ODSVRA Southern Exclosure and Oso Flaco seasonally protected areas for breeding California least terns and snowy plovers in 2014.

RESULTS AND DISCUSSION

CALIFORNIA LEAST TERN

Number of breeding pairs

In 2014, least terns were first seen at ODSVRA on 1 May with nine flying over the exclosure, and from this date onward terns were seen or heard daily. Terns were last seen on 10 August with two adults at Oso Flaco Lake, ten days before the earliest departure date for the last 12 years. During the previous 12 years, first sightings occurred between 8 April and 15 May (median=10 May) and last sightings occurred between 20 August and 28 September (median=7 September). There was a minimum of 47 breeding pairs, similar to 2013 (48 pairs), and above the average of 39.8 pairs (range=20-55) from 2002-13 (Table 1, Figure 3).

Number, clutch size, and distribution of nests

There were 49 nesting attempts documented, with the first nest initiated approximately 16 May and the last 20 June (Appendix A). During the twelve-year period 2002-13, there was an average of 47.5 nests per year (range=22-79) with initiation dates for first nests ranging from 26 May to 8 June (median=3 June). In 2014, a maximum of 45 nests were active at the same time from 4 June to 11 June. Of the 41 nests with known complete clutch size, four had one egg, 34 had two eggs, and three had three eggs. The average number of eggs in completed clutches was 1.98. This compares to an average of 1.88 for 2002-13 (range=1.55-2.10), and reported statewide averages of 1.62, 1.75, 1.76, 1.82, 1.75, and 1.65 in 2007-12, respectively (Marschalek 2008-12; Frost 2013). Nests were located in 6 exclosure (37 nests) and 7 exclosure (12 nests) (Figure 4).

Clutch hatching rate

For three of the 49 nests, the nest fate (hatch or fail) was unknown. Forty-two of 46 (91.3%) nests with known fate hatched. This compares to an average hatching rate of 81% (range=66-89%) during the period 2002-13 (Table 1). The hatching rate for known fate nests was 91.7% (33/36) in 6 exclosure and 90.0% (9/10) in 7 exclosure. Sixty chicks hatched from a minimum of 71 eggs in 6 exclosure and 16 chicks hatched from a minimum of 24 eggs in 7 exclosure. Causes of loss for four nests known to fail were abandoned pre-term (1); abandoned post-term (1); abandoned, unknown if pre- or post-term (1); and failed, unknown cause (1) (Table 2).

Table 1. Nesting success of California least terns at ODSVRA from 1991-2014.

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 2006-14, 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
2014	47	49 (46)	42	91	76	76	58	1.18	1.23

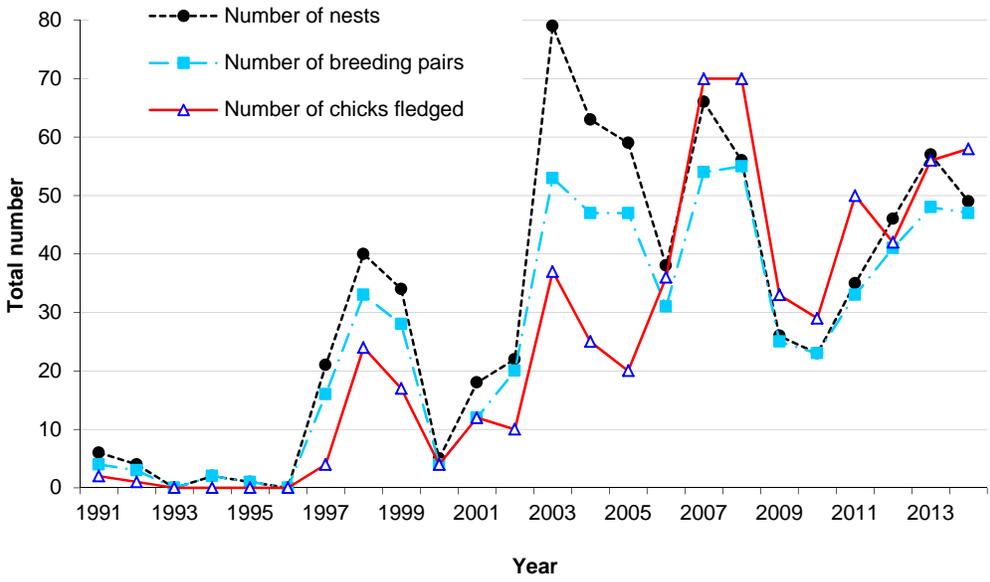


Figure 3. Number of California least tern nests, pairs, and fledglings at ODSVRA from 1991-2014.

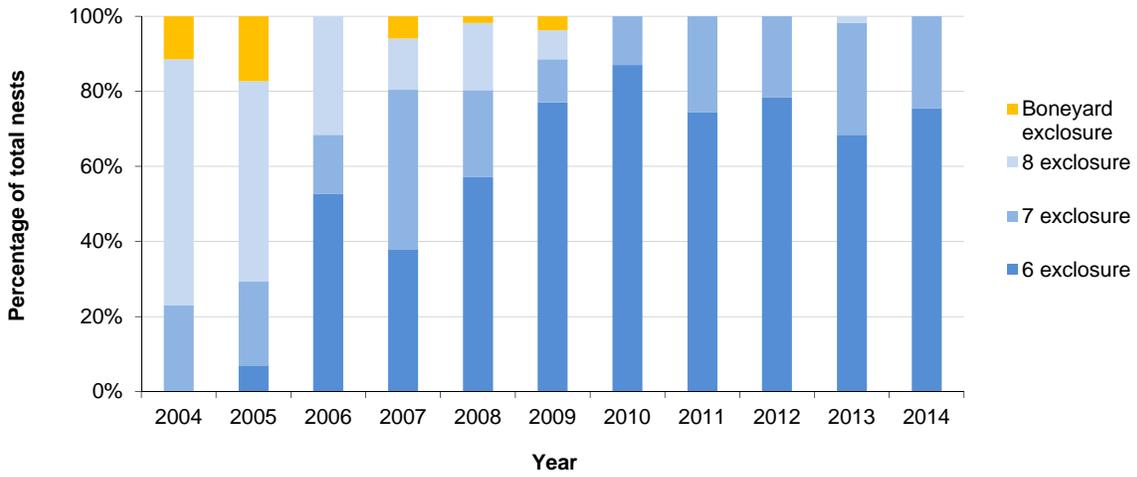


Figure 4. Distribution of least tern nests as a percent of total nests at ODSVRA from 2004-14. 6 enclosure was first incorporated into the Southern Exclosure for a full season in 2004.

Table 2. Causes of California least tern nest loss at ODSVRA from 2002-14.

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
2014	1	1		1	1						4
Total 2002-14	39 (36.1%)	24 (22.2%)	4 (3.7%)	12 (11.1%)	14 (13.0%)	6 (5.6%)	1 (0.9%)	2 (1.9%)	5 (4.6%)	1 (0.9%)	108

Chick fledging rate and juveniles

Fifty of the 76 known hatching chicks were banded with a unique color combination. Fifty-eight of the 76 chicks were seen when 21 days old or older for a fledging rate of 76.3% (42 fledglings were banded and 16 were unbanded) (Appendix A). This compares to an average fledging rate of 78% (range=66-91%) during the previous eight years when most chicks were banded to individual. For two-chick broods, 59% (13/22) fledged both young. This compares to 43% (12/28) in 2013 and an average of 59% (range 53-80%) for 187 two-chick broods during the period 2006-12. In 2014, the number of fledglings produced per pair was 1.23. (Note that if the number of breeding pairs is underestimated, the number of chicks fledged per pair is an overestimate). This is close to the eight-year average of 1.25 for 2006-13 (range=1.02-1.52) and well above recent averages for all of California (Table 1). Estimated statewide fledgling rates for each year are reported as a range and averaged 0.25-0.33 fledglings per pair for the seven-year period 2006-12 (highest estimates in 2006 with range=0.35-0.52) (Marschalek 2007-12; Frost 2013).

During the last five years, 2010-14, 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. No least tern chicks were seen moving east of the enclosure into the open riding area in 2014.

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 than the three-week count method³. 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

³ High counts of juveniles that are seen on dates at intervals of three weeks are added together (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.

average of 49.0% (range=38.0-66.7%) of the known minimum total number (see CDPR 2011 for greater details). ODSVRA relies on color band resighting data to derive a more accurate fledge rate and did not conduct three-week counts in 2012-14.

Color banding chicks to brood in 2005 and to individual since 2006 has also provided information on juvenile length of stay at ODSVRA. In 2014, 38.1% (16/42) of the color-banded juveniles were documented remaining at ODSVRA for 21 days or longer post-fledging. Over the 10-year period 2005-14, 427 color-banded fledglings were tracked at ODSVRA with 34.9% remaining 21 days or longer (Table 3, Figure 5).

Table 3. 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 10-year period, 2005-14.

During this period, 427 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%)
2014	2 (5%)	6 (14%)	18 (43%)	15 (36%)	1 (2%)
TOTAL 2005-14	50 (12%)	100 (23%)	128 (30%)	132 (31%)	17 (4%)

Mortality (other than eggs)

There was a minimum of nine documented tern mortalities (other than eggs) at ODSVRA during the 2014 breeding season (1 March to 30 September). Two terns (juvenile or adult) were seen taken by peregrine falcons (*Falco peregrinus*). Mortality, other than documented predation events, included two juveniles observed with a broken wing and assumed to not survive; the intact carcasses of two juveniles found lying 16 inches and three feet east of the western fence; the decomposed carcass of one juvenile; the decomposed carcass of one adult; and an injured juvenile found one foot east of 6 enclosure that was euthanized after receiving veterinary care for a broken left wing and left leg (see Notes section and 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 2010-14 and tern use of this lake is

suspected to be minimal. Oso Flaco Lake is more accessible to monitors and in 2014 there were seven surveys (lasting an average of 64 minutes) conducted between 9 July and 10 August with an average of 12 birds seen (high count of 30 on 29 July). Over the season, a total of eight individually banded juveniles and a minimum of 28 banded adults were seen at Oso Flaco Lake, including 27 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 or 2014, and minimal use in 2012-13.

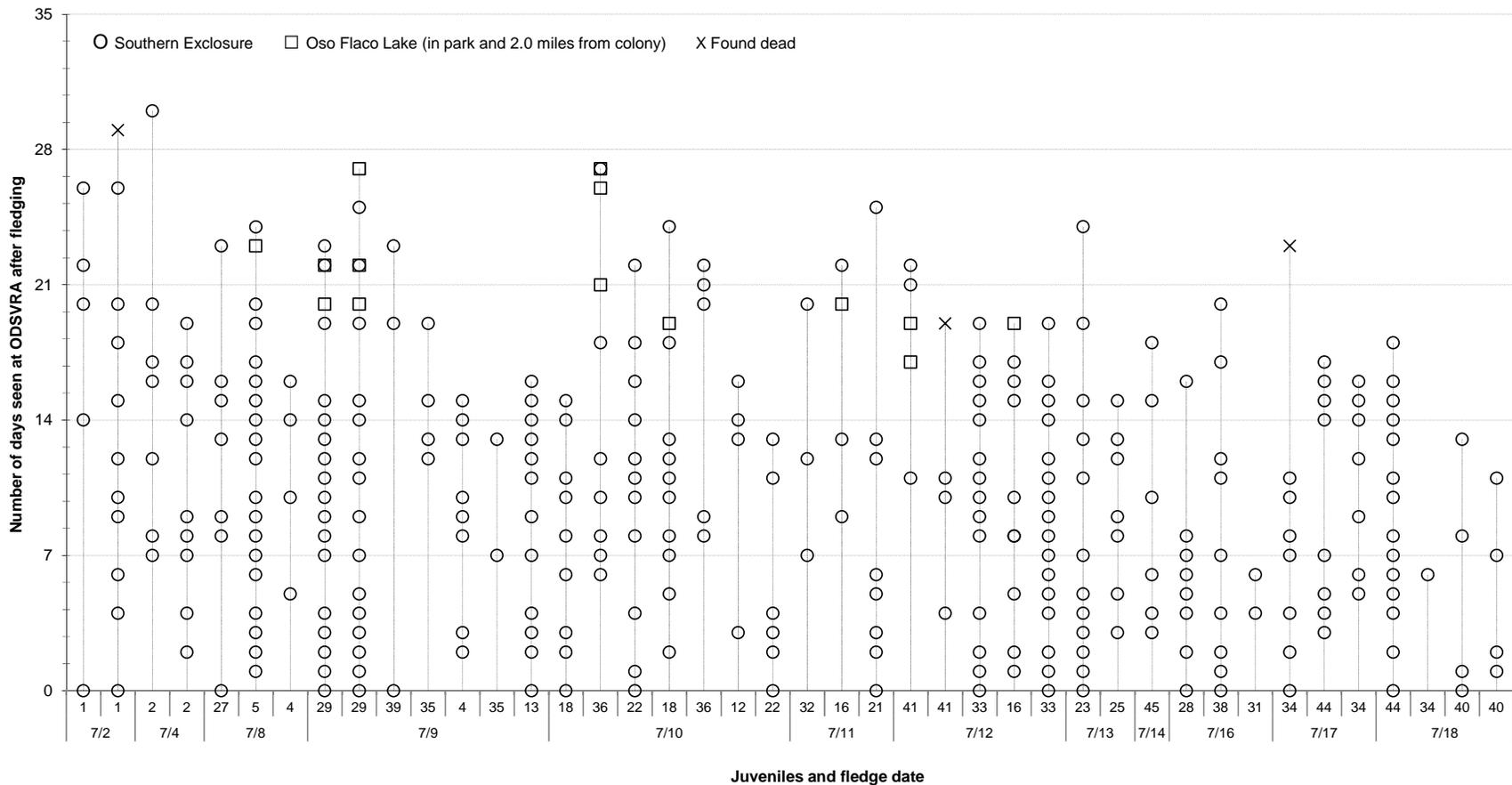


Figure 5. Number of days California least tern juveniles that hatched at ODSVRA in 2014 continued to be seen on-site after reaching fledge age (21 days old).

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.” In addition to the three juveniles found dead, the B/Y:G/Y (LT25) juvenile removed from the park with a broken left wing and left leg and the R/B:G/Y (LT36) juvenile last seen with a broken right wing on 30 July are either known or considered dead (see report Notes section).

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 2014, there was a minimum of 53 banded adults documented at ODSVRA, based on observations with a spotting scope. Fifty-one of these birds were identified as banded at this site as chicks (banding began in 2003). Origins of two banded birds could not be determined as they only had a federal aluminum band without tape. Breeding was documented for 14 of the 53 banded adults (12 banded at ODSVRA from 2006-12 and two with unknown origin) (Table D.1 in Appendix D). Over the last five 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 2014, the night roost primarily continued in the same area of northern 6 enclosure used since 2004 but was also seen in an area of southern 6 enclosure (6 enclosure first became available as protected habitat for a complete season in 2004) (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 2014, there was a high count of 63 birds at the night roost on 24 May (Figure 6). This compares to an average night roost high count of 56 (range=35-95) from 2007-13. Both adults and juveniles were seen but it typically was too dark to distinguish plumage and age class.

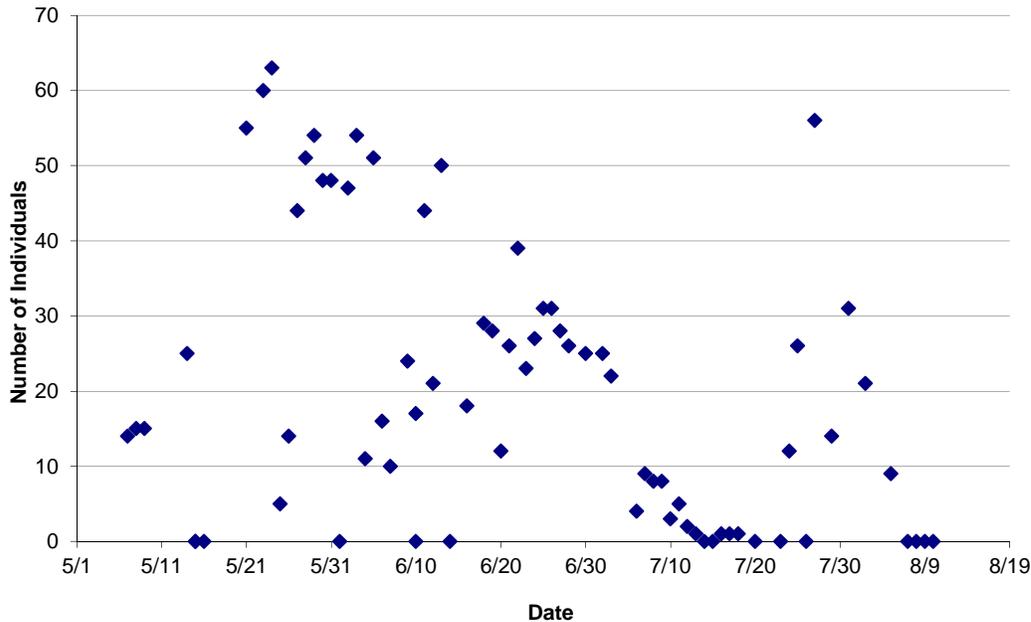


Figure 6. Number of California least terns counted at the ODSVRA 6 enclosure night roost in 2014.

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 2004-14, ODSVRA produced a minimum of 489 juvenile terns while RGDCP, VAFB, and COPR combined produced 168 juveniles (Table 4, Table 5).

Table 4. California least tern reproductive success reported for current or recent breeding sites in San Luis Obispo and Santa Barbara counties from 2004-14.

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
2004	ODSVRA	47	63	44	69	25	0.40	0.53
	RGDCP	8	8	3	7	0	0.00	0.00
	VAFB ¹	1	1	0	0	0	0.00	0.00
	COPR	6	6	0	0	0	0.00	0.00
2005	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
2006	ODSVRA	31	38	28	45	36	0.95	1.16
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB ¹	2	2	0	0	0	0.00	0.00
	COPR	5	5	4	7	7	1.40	1.40
2007	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
2008	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
2009	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
2010	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
2011	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
2012	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
2013	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
2014	ODSVRA	47	49	42	76	58	1.18	1.23
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB	17	21	15	30	20	0.95	1.18
	COPR	0	0	0	0	0	0.00	0.00

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

Table 5. 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 2004-14.

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
2014	47	58	17	20
Total juveniles produced		489		168

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 2014, there was a minimum of 226 breeding adults (106 females and 120 males). This is an increase of 38.7% from the minimum estimated number of 163 breeding adults in 2013 and compares to a range of 95-190 adults for 2008-12. The average minimum number of breeding adults for the last five years (2010-14) is 175, increasing to 193 for the last three years (Table 6, Figure 7).

Beginning in 2005, the 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 2014, the survey at ODSVRA counted 180 adult plovers (86 males, 75 females, and 19 of unknown sex), 80% of the minimum number documented by known breeding activity. In nine of the ten years from 2005-14, the window survey count at ODSVRA was lower than the minimum number of breeding birds (54-86% of minimum number). It was higher (107%) than the minimum number in 2008 (Table 7) (CDPR 2012).

Table 6. Number of snowy plover breeding adults, breeding males, fledglings, and chicks fledging per breeding male for the 13-year period 2002-14.

Year	Min. no. breeding adults	Min. no. breeding males	No. fledglings	No. fledglings per breeding male ¹
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
2014	226	120	196	1.63
Average for 13-year period 2002-14	125	70	97	1.39
Average for 5-year period 2010-14	175	98	148	1.51
Average for 3-year period 2012-14	193	106	160	1.52

¹Number of fledglings per breeding male will be overestimated if the number of breeding males is undercounted.

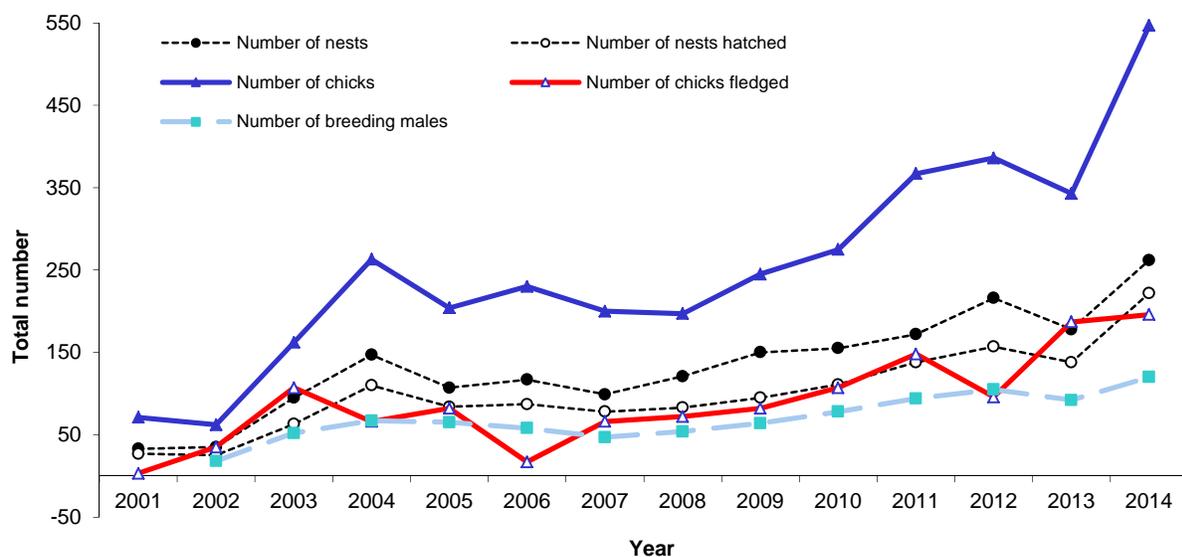


Figure 7. Number of snowy plover breeding males, nests, nests hatched, chicks, and chicks fledged at ODSVRA from 2001-14.

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

Table 7. Number of adult snowy plovers counted on USFWS breeding season window surveys versus calculated minimum number of breeding adults at ODSVRA from 2005-14.

Year	Calculated minimum number of breeding adults	Summer breeding window survey numbers	Breeding window numbers/ calculated minimum numbers
2005	116	92	79%
2006	107	87	81%
2007	79	60	76%
2008	95	102	107%
2009	114	98	86%
2010	137	74	54%
2011	160	112	70%
2012	190	145	76%
2013	163	94	58%
2014	226	180	80%

Number and distribution of nests

There were 262 known nesting attempts, including 16 identified only by detection of brood (unknown nest location), initiated between 15 March – 7 July. In 2014, there was a high number of nests (46) initiated in March compared to the previous 10 years (average=4.5, range=0-14). Of the 246 nests from known locations, 201 (81.7%) were in the Southern Enclosure, one (0.4%) in the open riding area, 21 (8.5%) in North Oso Flaco, and 23 (9.3%) in South Oso Flaco. More specifically for the Southern Enclosure, there were 89 nests in 6 enclosure, 68 in 7 enclosure, 33 in 8 enclosure, and 11 in Boneyard enclosure (Appendix C). The maximum number of known location nests active at one time was 98 on 7 June, with the highest number in 6 enclosure (35 nests). (Table 8, Table 9, Table E.1 in Appendix E).

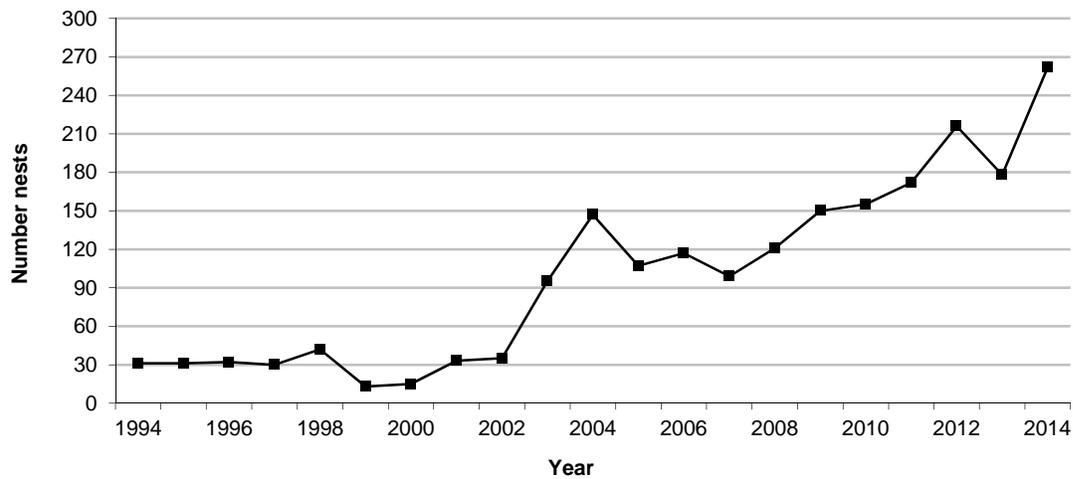


Figure 8. Number of snowy plover nests at ODSVRA from 1993-2014.

Table 8. Snowy plover nest distribution and success at ODSVRA in 2014.

Excludes 16 nests known only from detection of broods.

Location	No. nests (no. with known fate)	No. eggs laid	No. nests hatching	Percent known fate nests hatching
6 enclosure	89 (85)	251	80	94.1
7 enclosure	68 (66)	187	56	84.8
8 enclosure	33 (32)	93	27	84.4
BY enclosure	11 (11)	32	10	90.9
TOTAL SOUTHERN ENCLOSURE	201 (194)	563	173	89.2
North Oso Flaco	21 (21)	62	18	85.7
South Oso Flaco	23 (23)	67	15	65.2
TOTAL OSO FLACO	44 (44)	129	33	75.0
Open riding area	1 (1)	1	0	0.0

Table 9. Nesting success of snowy plovers at ODSVRA from 2001-14.

Number of eggs from nests with unknown location is a minimum number derived from number of chicks seen. A more detailed table of nesting success for 2001-14 is included as Table E.1 in Appendix E. Percent hatching is calculated using known location hatched nests divided by total known location and fate nests.

na=not available

Year	No. nests (no. known location and fate)	Min. 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)	90.0	71-74 (69)	2 (2.9)	0.06
2002	35 (35)	99	na	25 (25)	71.4	62 (62)	35 (56.5)	1.00
2003	95 (93)	254	na	63 (62)	66.7	162 (159)	108 (66.7)	1.14
2004	147 (140)	415	2.87 (141)	110 (105)	75.0	263 (263)	66 (25.1)	0.45
2005	107 (103)	290	2.86 (96)	84 (80)	77.7	204 (204)	82 (40.2)	0.77
2006	117 (114)	336	2.89 (115)	87 (87)	76.3	230 (230)	17 (7.4)	0.15
2007	99 (91)	290	2.93 (89)	78 (70)	76.9	200 (198)	66 (33.0)	0.67
2008	121 (119)	341	2.85 (116)	83 (81)	68.1	197 (197)	72 (36.5)	0.60
2009	150 (147)	418	2.85 (144)	95 (94)	63.9	245 (245)	81 (33.1)	0.54
2010	155 (150)	431	2.88 (146)	111 (109)	72.7	275 (275)	107 (38.9)	0.69
2011	172 (160)	487	2.88 (159)	138 (131)	81.9	365 (365)	152 (41.6)	0.88
2012	216 (203)	603	2.94 (200)	157 (152)	74.9	386 (386)	96 (25.0)	0.44
2013	178 (167)	502	2.93 (162)	138 (130)	77.8	343 (343)	190 (55.4)	1.07
2014	262 (239)	725	2.83 (241)	222 (206)	86.2	547 (547)	196 (35.8)	0.75

Average clutch size, clutch loss and nest hatching rate

There were 262 identified nesting attempts, including 16 known only by brood, and of these 222 hatched (Table 8, Figure 8, Figure 9). For 241 nests with known complete clutch size (and excluding nesting attempts known only by brood and one nest with six eggs⁴) the average number of eggs was 2.83. This compares to an average of 2.89 eggs per clutch (range=2.85-2.94) for the ten-year period 2004-13 (Table 9). Excluding 23 nests (seven with unknown fate and 16 detected by brood only), the clutch hatching rate was 86.2% (206/239). This compares to an average of 73.6% (range=63.9-81.9 %) from 2002-13 (Table 8). The nest hatching rate in 2014 was higher in the Southern Enclosure (89.2%) than in Oso Flaco (75.0%), as has been the case in 11 of the previous 13 years. Thirty-three nests were known to fail, with losses attributed to abandoned pre-term (19); abandoned unknown pre- or post-term (5); abandoned post-term (1); abandoned, suspected due to wind (1); cause unknown (2); flooded (2); unidentified predator (1); avian predator (1); and coyote (1) (Table 10, Table 11, Table E.1 and Figure E.1 in Appendix E).

⁴ Two females may have laid a clutch in the same nest. Two of the six eggs hatched.

Table 10. Attributed causes of snowy plover nest loss at specific locations at ODSVRA in 2014.

Area	Abandoned pre-term	Abandoned post-term	Abandoned, suspected wind	Abandoned unknown pre- or post-term	Failed, cause unknown	Unidentified predator	Avian predator	Coyote	Flooded
Southern Enclosure									
6 enclosure	3	1	0	0	1	0	0	0	0
7 enclosure	6	0	0	3	1	0	0	0	0
8 enclosure	3	0	0	1	0	0	0	0	1
Boneyard enclosure	1	0	0	0	0	0	0	0	0
TOTAL SOUTHERN ENCLOSURE	13	1	0	4	2	0	0	0	1
Oso Flaco									
North Oso Flaco	1	0	1	0	0	1	0	0	0
South Oso Flaco	5	0	0	1	0	0	0	1	1
TOTAL OSO FLACO	6	0	1	1	0	1	0	1	1
Open Riding Area	0	0	0	0	0	0	1	0	0
ODSVRA TOTAL	19	1	1	5	2	1	1	1	2

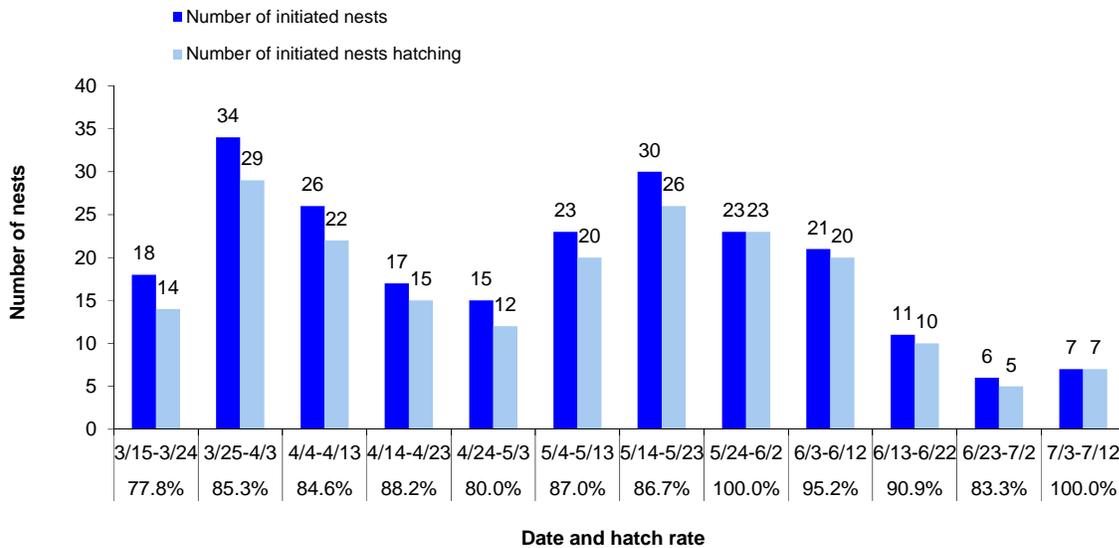


Figure 9. Number of known location and known fate snowy plover nests with known initiation date (n=231) initiated per 10-day period and number known to hatch at ODSVRA in 2014.

Table 11. Attributed causes of snowy plover nest loss in Southern Enclosure and Oso Flaco at ODSVRA from 2002-14.

So. Excl. = Southern Enclosure. The percentage of total loss for each cause is shown for the 13-year period 2002-14. Prior to 2010, nest abandonment suspected due to wind was included with nests abandoned pre-term; these causes of nest loss are shown separately for 2010-14.

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						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				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							
2014	So. Excl.	13	1		4	2										1
	Oso Flaco	6		1	1		1						1			1
2002-14 Total failed nests	So. Excl.	104	22	33	17	44	27	29	6	6	4	7	7	1	0	6
	Oso Flaco	30	4	6	5	7	16	6	4	2	5	0	2	2	5	8
2002-14 Grand Total So. Excl. and Oso Flaco		134	26	39	22	51	43	35	10	8	9	7	9	3	5	14
		31.9%	6.2%	9.3%	5.2%	12.1%	10.2%	8.3%	2.4%	1.9%	2.1%	1.7%	2.1%	0.7%	1.2%	3.3%

Chick fledging rate

Of the 547 snowy plover chicks hatched, 423 were banded and the fate of 124 unbanded chicks is known (39 fledged) (Table 9, 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 23 June and 17 July, four unbanded broods (eight 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. One of the four broods was 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 fledging rate for banded chicks was 37.1% (157/423) and 31.5% (39/124) for unbanded chicks. The fledging rate for all chicks combined was 35.8% (196/547). This compares to 54.5% in 2013 and an average rate of 36.7% (range=7-67%) for the 11-year period 2002-12 (Table 9, Table E.1 in Appendix E) (CDPR 2007-13).

In 10 of 12 years during the period 2003-14, the fledging rate of chicks hatching in the early season (prior to 20 June) has been higher, by an average of 21 percentage points, than chicks hatching in the late season (20 June or later). (See 2012 report for how early versus late season was determined.) In 2014, the late season had a higher chick fledging rate (43%) compared to the early season (32%). Most striking was the very poor survival of the initial 40% of the total number of chicks produced, with only 39 of 220 chicks fledging (17.7% fledge rate). This was in sharp contrast to subsequent chick survival, with 157 of 327 chicks fledging (48.0% fledge rate) (Figure 10, Figure 11, Figure 12).

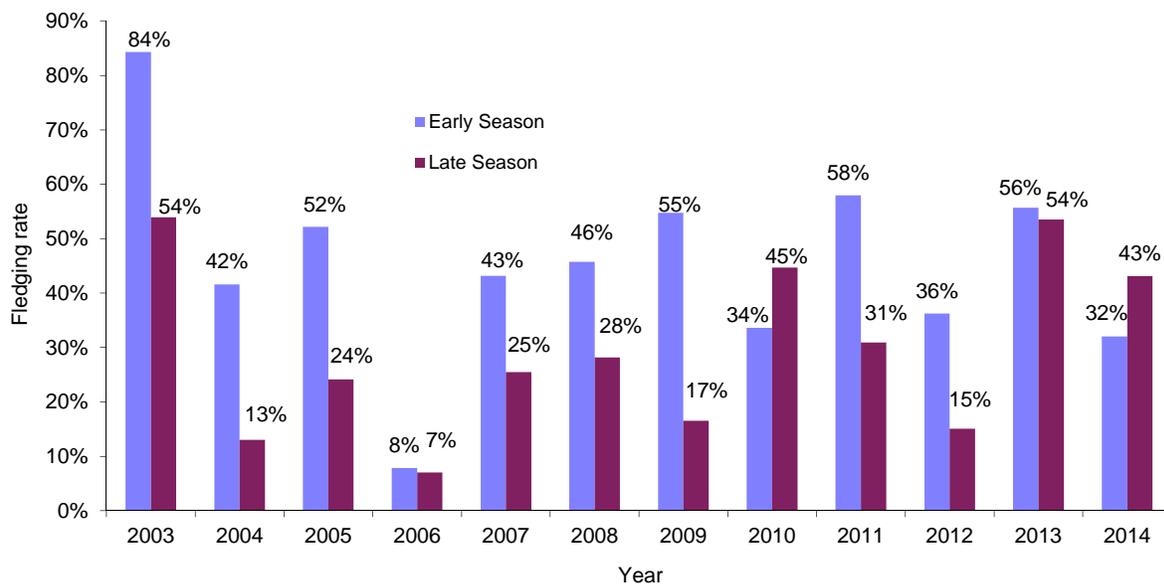


Figure 10. Fledging rate of chicks hatching in early season (prior to 20 June) and late season (20 June or later) at ODSVRA from 2003-14.

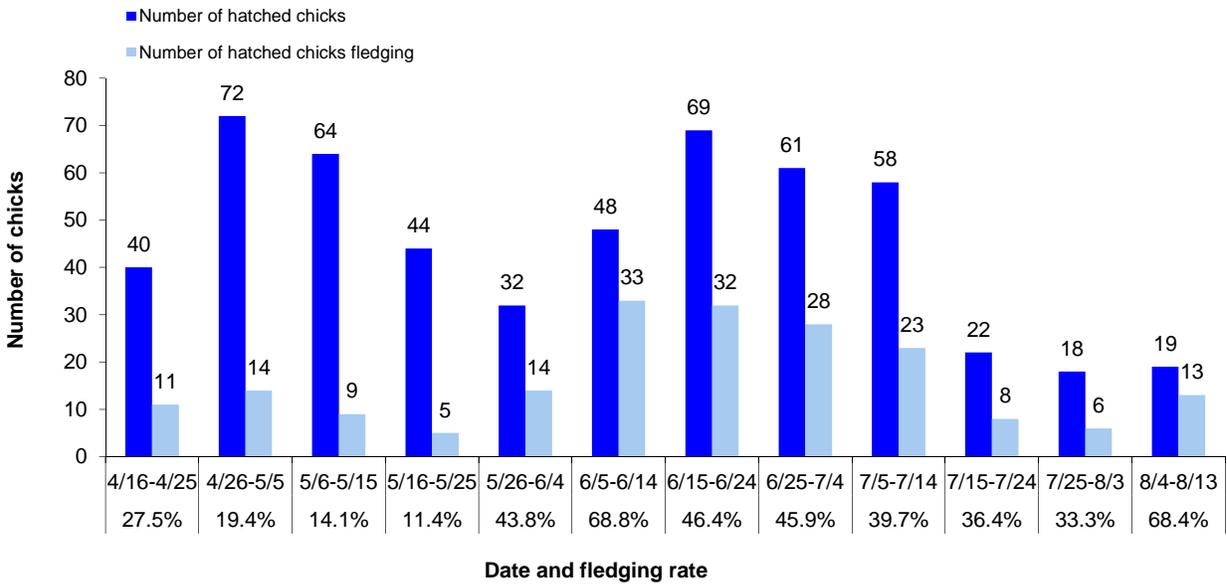


Figure 11. Number of snowy plover chicks hatching per 10-day period and number subsequently fledging at ODSVRA in 2014.

Includes all chicks with known fate (547). For broods that either originated from unknown location (33 chicks from 16 broods) or were not assigned to a specific nest (8 chicks from 4 broods) a hatch date was estimated based on chick size. For over 84% of these broods the estimated chick age when first seen ranged from 0-4 days old.

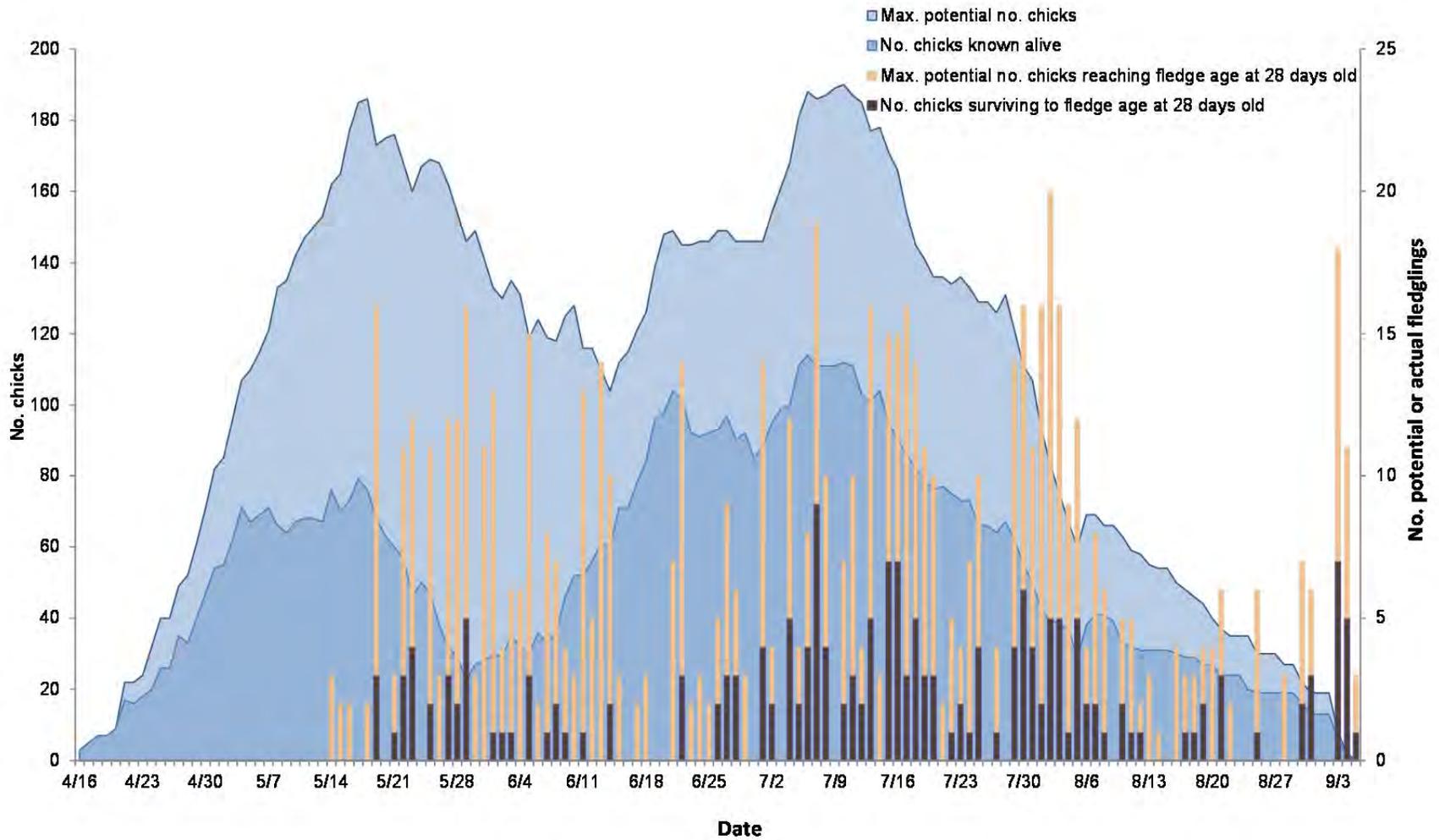


Figure 12. Chick survival and fledge rate from 16 April to 5 September at ODSVRA in 2014.

Includes all chicks with known fate (547). Number chicks known alive calculated using date of last sighting during regular surveys of all chicks. No. = number.

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 2009-14, the majority of tracked broods (range=65-78%) 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.) In 2014, 115 of 159 fledglings were from broods remaining in the same general shoreline area adjacent to where hatched (excluded are 37 fledglings from unbanded broods and 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 three banded broods from ODSVRA were seen being raised south of the park boundary, all on the adjoining Guadalupe-Nipomo Dunes NWR (five of the nine chicks fledged).

Of 440 carefully tracked chicks (423 banded and 17 unbanded chicks with banded siblings) from known location nests, chick loss in 2014 was highest for very young chicks (0-4 days of age), accounting for 52% of total loss, which compares to 38%, 39%, 49%, 51% and 54% in 2009-13, respectively (Figure 13) (CDPR 2013). For 200 chicks reaching 16 days of age in 2014, the fledge rate was 79%. This is similar to the average of 78% for the previous five years (range=71-89%) and 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).

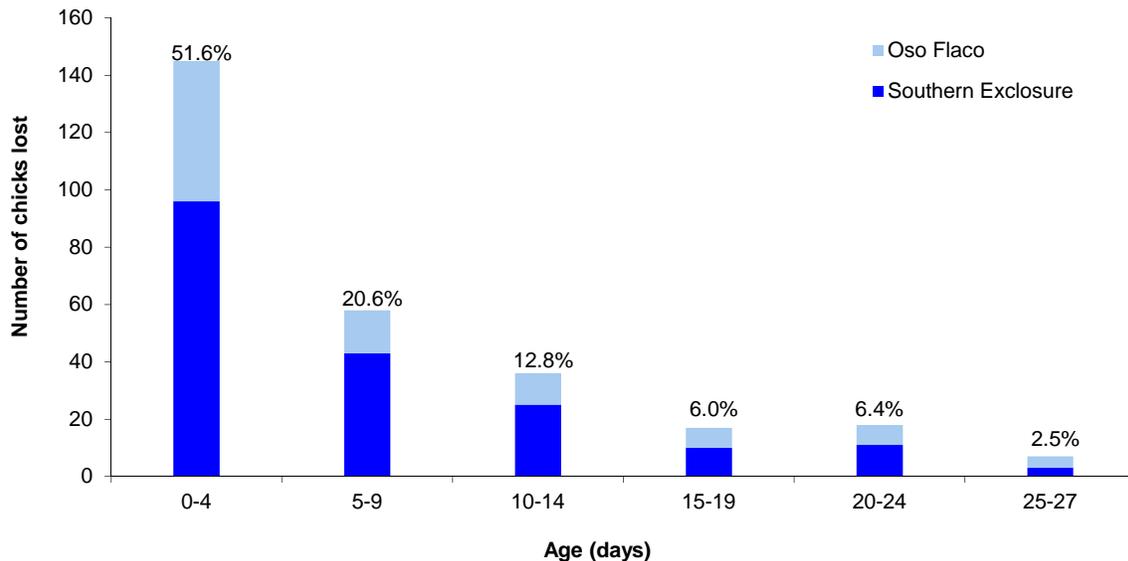


Figure 13. Loss of snowy plover chicks by age and location last seen in the Southern Exclosure and Oso Flaco at ODSVRA in 2014.

Number and percentage of total chicks lost shown for each age group. There were 440 chicks included in the analysis; 281 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 2014, the number of chicks fledging per male was 1.63, a level of productivity which will promote population growth. During the 2002-14 period, the number of fledglings produced per male has exceeded 1.2 in ten of the 13 years (Table 6). (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 27 documented snowy plover mortalities (other than eggs) at ODSVRA during the 2014 breeding season (1 March to 30 September). Eight of these were the result of depredation of five chicks, one adult, and two of unknown age (either large chick or fledgling). Predators involved were peregrine falcon (3), California gull (*Larus californicus*) (4), and unidentified predator (1). Documented mortality other than predation included 17 chicks and two adults. Two of these chicks were killed by the aggressive behavior of an adult plover associated with a nearby nest and one chick was assumed dead after observations of aggressive behavior from adult plovers and terns (for additional information see Predators and predator management section on page 41, Notes section, and the Mortality Table in Appendix G). In addition, one banded adult plover was depredated by a peregrine falcon on 28 February and is not included in Appendix G.

Protection of nests with enclosures and symbolic fencing

Of the 239 nests from known location and with known fate, 192 received some form of wire mesh fencing. Eighty percent (153/192) of these were within the large seasonal enclosure predator fencing installed at the beginning of the season in 6, 7, 8, and Boneyard enclosures and North Oso Flaco. These nests had a 92% hatch rate.

For the 6, 7, and 8 enclosures and North Oso Flaco, there were an additional sixty-two nests established on the shoreline outside of the seasonal fencing. This shoreline is closed to public use during the nesting season. Eighteen nests were protected by individual circular enclosures (14 hatched), two had a mini-enclosure (both hatched), and one received a bumpout (abandoned pre-term). Forty-one nests were protected only by a symbolic rope fence that provides no predator protection but is designed to prevent/reduce vehicle and pedestrian trespass. These nests did not receive individual wire fence protection due to a combination of the following factors: avoiding disturbance of nearby broods, nest abandonment concerns due to adult mortality, and a continuing high hatch rate without the use of wire fencing. Of these nests 90 % (37/41) hatched.

In South Oso Flaco there were 23 nests, all within symbolic rope fencing (visitor pedestrian use allowed outside of symbolic fencing). Five nests failed before planned circular enclosures could be installed and one nest did not receive any wire enclosure due to concerns of windblown sand potentially burying eggs (nest hatched). Seventeen nest received circular enclosures and 82% hatched.

The one nest in the open riding area was within a bumpout enclosure and was depredated by an unknown avian predator.

Banded snowy plovers breeding at ODSVRA in 2014

In California 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 great majority (87.1%, 101/116) of banded birds breeding at ODSVRA in 2014 represent recruitment from

chicks banded and fledged from ODSVRA. Twelve breeding birds were banded as chicks from 2008 to 2013 at Vandenberg Air Force Base. One was banded as a chick in 2010 at Salinas River State Beach in Monterey County. An additional two breeding birds were missing one or more bands and were from unknown locations. (Table D.3 in Appendix D).

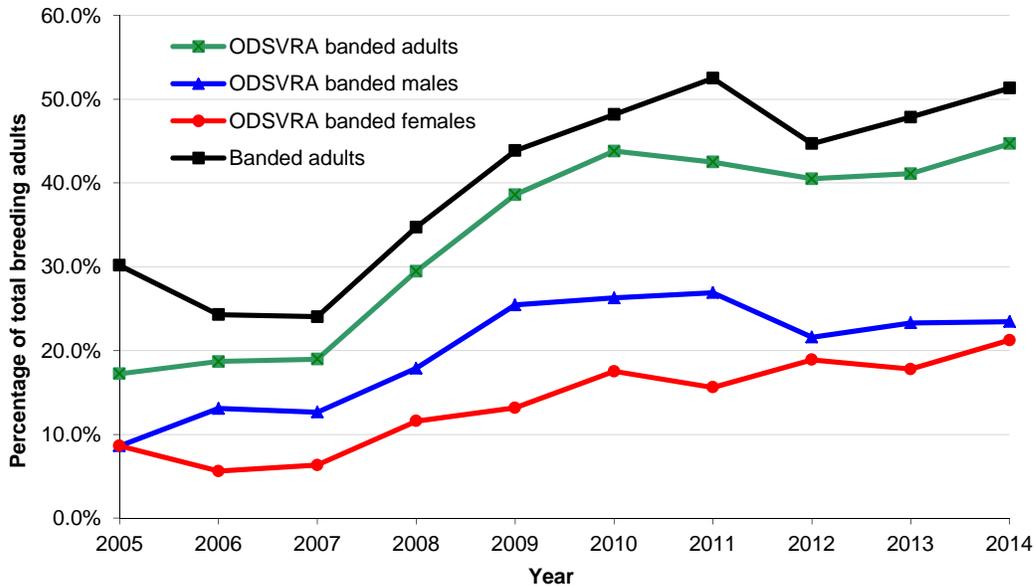


Figure 14. Percentages over the total calculated breeding population at ODSVRA of all verified banded adults and the sum of males and females originally banded at ODSVRA breeding from 2005-14.

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 two to five times a month (see Monitoring and Management Actions for survey details). Between October 2013 and February 2014, wintering plover counts at ODSVRA ranged from 175 to 368 (single day high count on 23 October 2013). 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 very few birds throughout the October to February period. Grand Avenue to marker post 2, while only having an average of five birds in October, increased to 87 in November and reached an average of 210 birds in both December and January. The section from marker post 6 to the southern boundary of the open riding area (shoreline of 6, 7, and 8 exclosures are closed to public entry during the breeding season) declined after an initial high number of birds, averaging 125 in October. In Oso Flaco the average monthly number of plovers was 63 in October and ranged from 19-32 in the months November-February (Figure 1, Figure 15).

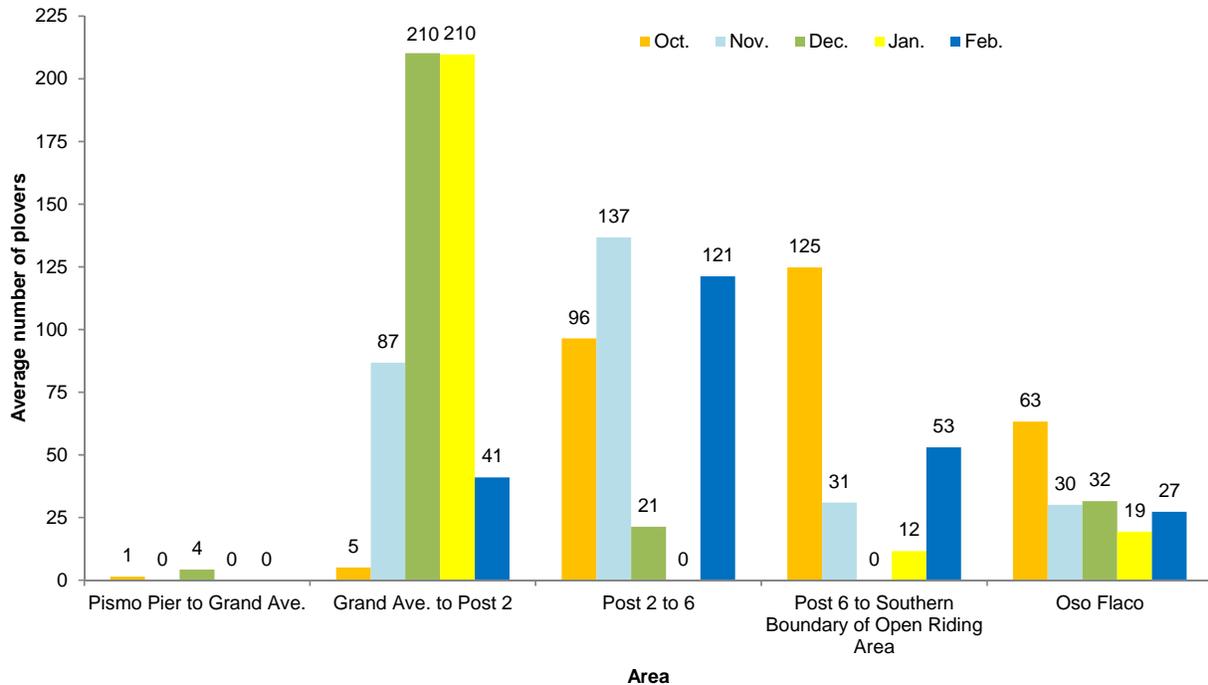


Figure 15. Monthly average number of snowy plovers observed during nonbreeding season surveys at ODSVRA from October 2013 to February 2014.
Surveys conducted two to five times a month.

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 2014, the survey at ODSVRA counted 261 adult plovers. This compares to an average winter window count of 136 (range=62-186) during the ten-year period 2004-13 (Figure 9).

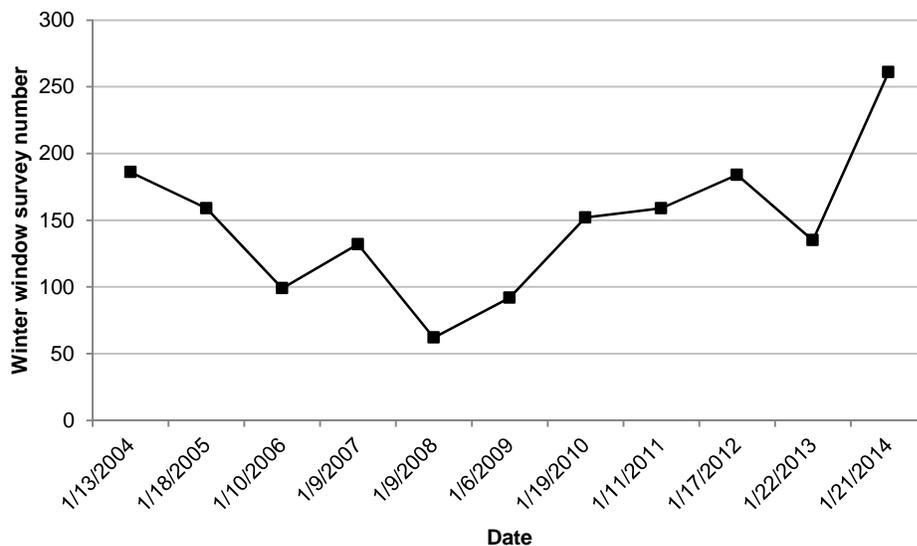


Figure 16. Number of snowy plovers counted on USFWS winter window surveys from 2004-14.

One hundred and eleven banded snowy plovers were recorded during surveys from 1 October 2013 to 28 February 2014. These birds were banded at the following locations (all in California with one exception): 80 from ODSVRA; 18 from Vandenberg Air Force Base in Santa Barbara County; eight from the Monterey Bay area in Monterey County; one from Humboldt County; one from Oregon; and three were missing one or more bands and were from unknown locations (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. Presence of predators may result in a brood becoming scattered and the loss of any chick failing to reunite with the adult. Depredation of an adult tern or plover may result in egg abandonment or loss of dependent chicks.

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 with the exception of one event of a peregrine falcon depredating an adult plover on 28 February. (Note that the number of recorded occurrences or sightings for the first two weeks of March may be biased lower, with less time during this period spent on predator surveys and more time spent on habitat enhancement and fencing projects.)

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. Trapping efforts began in February and continued through the beginning of September. Four coyotes, two raccoons (*Procyon lotor*), and two California gulls were lethally removed. Five great horned owls (*Bubo virginianus*), one American kestrel (*Falco sparverius*), one northern harrier (*Circus cyaneus*), one loggerhead shrike (*Lanius ludovicianus*), and one peregrine falcon were live-trapped and relocated (Table F.2 in Appendix F).

Documented Predation

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. Despite limited documentation of predation events and detection bias, predators of particular concern identified during the 2014 season included peregrine falcon, great horned owl, gull spp., and coyote.

For least terns and snowy plovers known clutch loss to predation in 2014 was limited to three plover nests, one each to coyote, unidentified avian predator, and unidentified predator. From 2002-14, 2.3% (14/605) of all tern nests were known to be lost to predators (eight mammalian, one avian, and five unidentified predator). During this same 13-year period, 7.0% (131/1883) of plover nests were documented lost to predation (16 mammalian, 71 avian, and 44 unidentified predator).

Ten documented predation events, other than eggs, in 2014 included: two juvenile or adult terns (peregrine falcon), six plover chicks (three by peregrine and three by California gull), one adult plover (unidentified avian predator), and one plover of unknown age (California gull) (Appendix G). This compares to five documented losses in 2013 (one tern and four plovers). Suspected, but not documented, was the loss of several breeding adult plovers resulting in the abandonment of nests pre-term and with undisturbed eggs remaining on the surface.

Mammalian Predators

Opossum

Opossums (*Didelphis virginiana*) were not considered a significant predator at ODSVRA in 2014. Tracks were documented on three days in the Southern Enclosure and Oso Flaco. Documented opossum activity averaged 12 days per season (range=5-25) from 2007-13 (Figure 17). From 2007-14, known nest loss to opossum was limited to two tern nests, occurring in 2010 and 2013.

Skunk

Skunks (*Memphitis memphitis*) were not considered a significant predator at ODSVRA in 2014. Tracks were documented on 21 days in the Southern Enclosure and Oso Flaco. Documented skunk activity in the Southern Enclosure and Oso Flaco ranged from 2-57 days (average=25) for 2007-13 (Figure 17). From 2007-14, known nest loss to skunk was limited to five plover nests in Oso Flaco, occurring from 2009-11.

Raccoon

Two raccoons were caught in traps intended for coyote and were euthanized. Tracks were documented on 108 days throughout Southern Enclosure and 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*). Documented raccoon activity averaged 109 days (range=45-145) for 2007-13 (Figure

17). From 2002-14, known nest loss to raccoons was limited to two plover nests in Oso Flaco, occurring in 2010 and 2011.

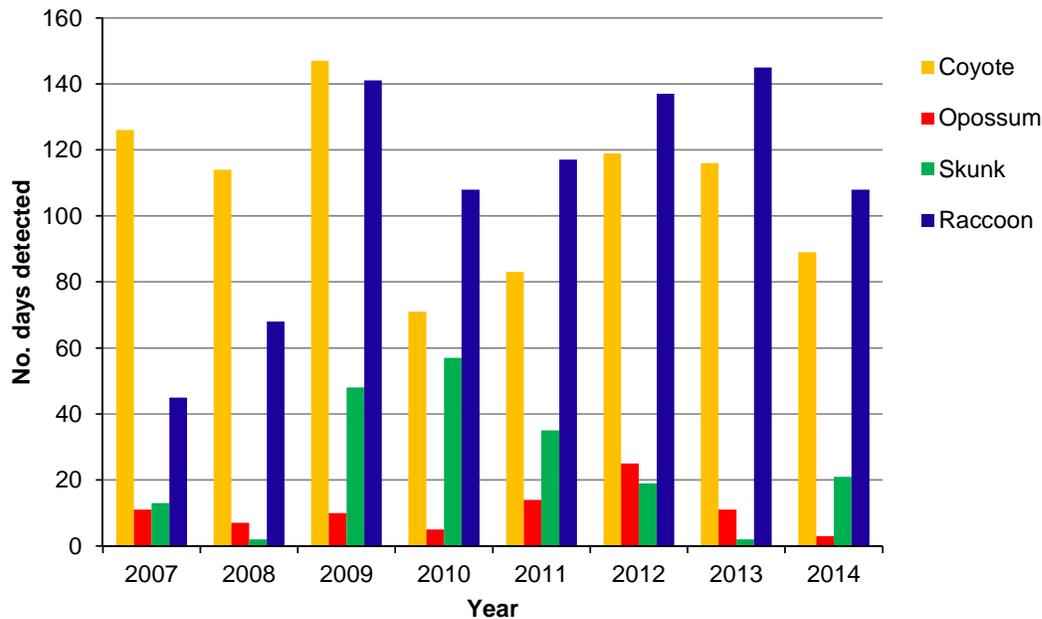


Figure 17. Number of days coyote, opossum, skunk, and raccoon were detected in the Southern Exclosure and Oso Flaco at ODSVRA from 2007-14.

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.

Four coyotes were removed in an effort to reduce the threat of predation and disturbance due to coyote presence documented within sensitive shoreline chick-rearing habitat. This compares to nine removed in 2013, 11 in 2012, four in 2011, nine in 2010, and five in each year from 2007-09. As part of 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 2013-14. Four coyote scats found in 2012 contained a total of 11 bands (representing a minimum of one plover chick, two unknown age plovers, and one unknown age tern) (CDPR 2012).

In the combined Southern Exclosure and Oso Flaco areas, coyote presence was recorded on 89 days (this includes 20 days inside the predator fenced portion of the Southern Exclosure and North Oso Flaco). For comparison, coyote presence was documented an average of 116 days (range=71-147) during the previous seven-year period from 2007-13. There were a total of 223 recorded coyote occurrences in distinct areas in 2014. This compares to an average of 197 (range=99-307) for the previous five years (2009-13). One hundred and fifty-three occurrences were recorded on the Southern Exclosure and North Oso Flaco shoreline this season, compared with an average of 103 (range =37-193) for the last five years (Table 12, Appendix F.1). It should be noted that 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.

One active plover nest (eggs with pre-hatch cracks) and one abandoned plover nest, both located in South Oso Flaco, were known depredated by coyote in 2014. From 2007-13, coyote depredation of nests has been limited to two plover nests, occurring in 2007 and 2012.

Table 12. Coyote occurrence in the Southern Exclosure and Oso Flaco at ODSVRA from 2009-14.

Date range is from 1 March to 10 September (a 194-day period).

Year	Inside Southern Exclosure and North Oso Flaco predator fencing	6, 7, 8 exclosure 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)
2014	28	115	38	42	223 (89)

Avian Predators

Loggerhead shrike

One loggerhead shrike was live-trapped at South Oso Flaco on 13 February and relocated. Shrikes have been documented to prey on snowy plover chicks and suspected of taking least tern chicks in past years at ODSVRA. No loggerhead shrikes were observed in or near sensitive tern or plover breeding habitat in the Southern Exclosure or Oso Flaco during this season.

Merlin

From 6 March-April 30, merlins (*Falco columbarius*) were documented actively hunting shorebirds in the Southern Exclosure and Oso Flaco and may have been responsible for some adult plover loss. Their presence coincided with several plover nests being abandoned pre-term with adult mortality suspected as the cause. On several occasions, merlins hunting or perching in the nesting area were flushed by monitors and on 9 April, a female merlin was observed with unidentified small shorebird prey on 6 exclosure shoreline. Merlins were documented on 11 days (45 sightings) in the Southern Exclosure and Oso Flaco and a minimum of two individuals were observed hunting small shorebirds over the Southern Exclosure shoreline (Table 13). No merlins were seen after 30 April through the end of the season. For the seven-year period from 2007-13, recorded merlin activity averaged six days (range=0-10) with most activity occurring in March and April. Merlins were documented taking adult plovers once each year from 2004-06 at ODSVRA, and an adult female merlin was observed eating a small shorebird that may have been a plover in 2011.

American kestrel

One adult male was trapped on 26 February and relocated. American kestrels were not suspected of causing significant losses at ODSVRA this year. There were 23 documented sightings of kestrels in the Southern Exclosure and Oso Flaco on 12 days. On 9 April, a female kestrel perched on 8 exclosure fence was hazed away from the nesting exclosure. The majority of these sightings occurred during juvenile dispersal in July and August and likely represents juveniles passing through the area.

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 exclosure, 7.5 revegetation area) may vary between years making direct comparison difficult.

Five great horned owls were trapped and relocated between 25 March and 4 June in 2014 after being observed moving into 8 exclosure and North Oso Flaco during evening hours. Owls were suspected of causing some plover adult and chick loss due to presence of tracks in sensitive nesting and chick-rearing habitat throughout the season. On 31 March, a great horned owl was suspected of causing adult mortality at an exclosed plover nest on 8 exclosure shoreline that was determined abandoned on 3 April (see Notes section). Owl presence was detected on 25 days with 43 separate sightings this season with most tracks occurring in Boneyard, 8 exclosure (including shoreline), and Oso Flaco (including shoreline) (Table 13, Figure 18). In the seven-year period from 2007-13, owl activity was documented on an average of 32 days (range=10-53).

Red-tailed hawk

Red-tailed hawks (*Buteo jamaicensis*) were primarily observed perching in the North and South Oso Flaco foredunes and in the 7.5 revegetation area. Red-tailed hawks have not been known to depredate plover or tern nests, chicks, or adults at ODSVRA but their sustained presence represents a disturbance

factor to broods and incubating adults nearby. On several occasions, red-tailed hawks perched in the nesting area were flushed by monitors. Red-tailed hawk presence was documented on 55 days (100 sightings) (Table 13, Figure 18). From 2007-13, activity was recorded on an average of 37 days (range=7-74). Based on concurrent sightings and age, there was a minimum of two individuals (one adult and one immature) observed in or adjacent to the nesting area.

Northern harrier

Northern harriers have been documented as nest predators at ODSVRA in past years, but were not suspected of having significant impacts this season. There were 60 sightings of northern harriers on 25 days. In the seven-year period from 2007-13, activity was recorded on an average of 45 days (range=31-60) (Figure 18, Table 13). Based on age and sex, there was a minimum of four individuals (one adult male, one adult female, one sub-adult male and one immature female) observed during this season. On 17 May, an adult male harrier was observed eating eggs at an abandoned plover nest. One adult male was trapped and relocated on 18 May.

Table 13. Sightings of merlin, American kestrel, large owl spp., red-tailed hawk, northern harrier, and peregrine falcon in specific areas of the Southern Enclosure and Oso Flaco at ODSVRA in 2014.

Date range is from 1 March to 10 September (194-day period).

Location	Merlin	American kestrel	Large owl spp.	Red-tailed hawk	Northern harrier	Peregrine falcon	Total
6 enclosure	13	3	0	2	9	75	102
7 enclosure	14	7	3	17	15	85	141
8 enclosure	12	6	20	11	15	67	131
Boneyard enclosure	1	3	6	2	3	11	26
North Oso Flaco	4	2	10	45	12	69	142
South Oso Flaco	1	2	4	23	6	55	91
TOTAL	45	23	43	100	60	362	633

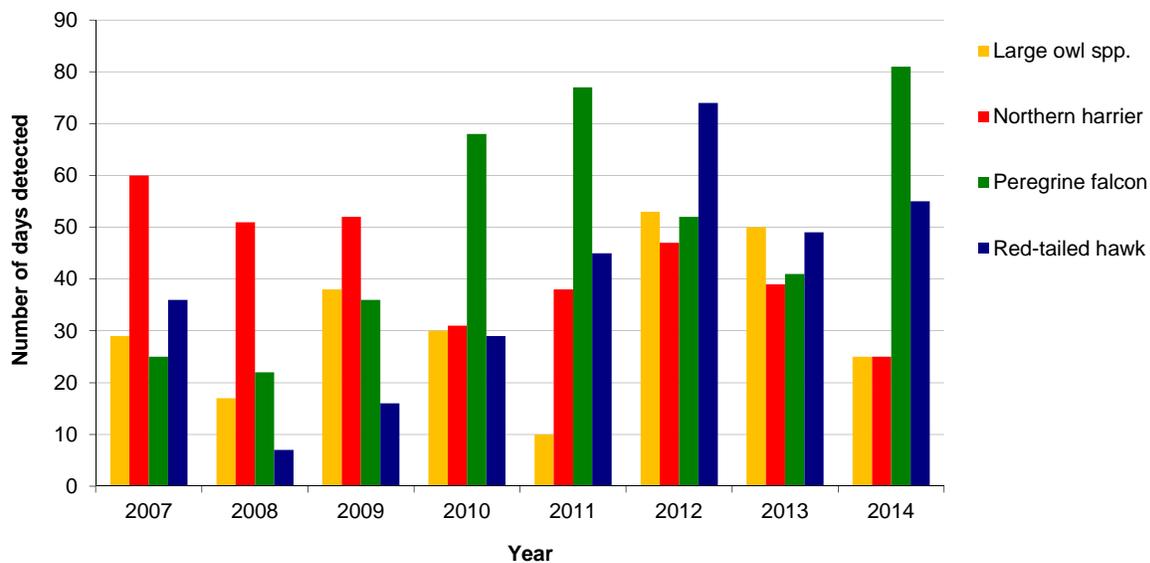


Figure 18. Number of days large owl spp., northern harrier, peregrine falcon and red-tailed hawk were detected in the Southern Enclosure and Oso Flaco at ODSVRA in 2007-14.

Date range is from 1 March to 10 September (194-day period).

Peregrine falcon

On 24 June, a sub-adult male peregrine falcon was observed eating two small to medium-sized plover chicks in 8 enclosure. The falcon was live-trapped and later regurgitated a pellet containing two pink bands and two green bands of the type used to color-band plovers at ODSVRA. On 26 June, the peregrine was banded with a silver USGS metal band (colored with blue ink) before being relocated approximately 360 miles away at the Sacramento River National Wildlife Refuge. On 17 July, this individual was confirmed to have returned to Oceano Dunes SVRA. On 7 August, it was observed killing and eating a least tern (juvenile or adult) in 7 enclosure and a plover chick in 8 enclosure. Trapping efforts targeting this individual were unsuccessful for the remainder of the season (Appendix G).

On 29 July, a peregrine falcon (unknown age or sex) was observed eating a least tern (juvenile or adult) in 6 enclosure.

Peregrines were commonly observed actively hunting, perching, and consuming prey in the Southern Enclosure and Oso Flaco. Peregrines hunting on the enclosure shoreline, even when not focused on plovers and terns, cause disturbance that limits foraging time for plover chicks while increasing the risk of broods being separated or moved. Peregrines perched in the nesting area for an extended period of time were flushed by monitors on 34 days in 2014 (sometimes requiring repeated efforts before the bird left the nesting area). Hazing peregrines out of sensitive areas provides a temporary solution but does not appear to deter individual falcons from returning to ODSVRA.

In 2014, there were 362 sightings of peregrine falcon on 81 days. This represents a 262% increase in sightings from the previous year (100 sightings on 41 days) and a 202% increase from the average of 120 (range=38-205) sightings from 2008-13 (Table 14). The average number of days peregrines were recorded during the period 2008-13 was 49 (range=22-77). There was a minimum of seven individual peregrine falcons identified at ODSVRA this season; one adult male, one adult female, three sub-adults (one female [VID band “17D”], one unbanded, and one male [later banded with USGS metal band]), one immature, and one juvenile. The sub-adult female with VID band “17D” was banded as a nestling in 2013 in southern California.

On 28 February, an adult female peregrine falcon was documented killing a banded (possibly BB:PB) adult plover at ODSVRA. Because this event occurred prior to the start of this report’s standard monitoring period (March 1-September 10) for predator activity, it was excluded from Table 13, Table 14, Figure 18 and Appendix G.

Table 14. Sightings of peregrine falcon in specific areas of the Southern Enclosure and Oso Flaco at ODSVRA from 2008-14.

Date range is from 1 March to 10 September (a 194-day period). One, three, one, and one peregrine falcons were trapped in 2009, 2010, 2012, and 2014 respectively; none were trapped in 2008, 2011 and 2013.

Location	2008	2009	2010	2011	2012	2013	2014
6 enclosure	11	13	37	39	41	28	75
7 enclosure	11	13	29	45	37	23	85
8 enclosure	5	13	25	40	31	19	67
Boneyard enclosure	6	6	11	32	9	2	11
North Oso Flaco	4	9	24	37	27	14	69
South Oso Flaco	1	20	18	12	11	14	55
Total no. sightings	38	74	144	205	156	100	362
No. days detected	22	36	68	77	52	41	81

Corvids (American crow and common raven)

American crows (*Corvus brachyrhynchos*) and common ravens (*Corvus corax*) are efficient predators at many tern and plover nesting sites and can have pronounced impacts over a short period of time. Neither crows nor ravens were suspected of having significant impacts on the nesting colony at ODSVRA this season. There were 26 sightings of American crows over nine days this season with crows flushed from sensitive areas on four of these days. There were 13 sightings of common ravens over four days and ravens were flushed from sensitive areas on two days. During the seven-year period 2007-13, crows were seen annually on an average of four days (range=0-10) and ravens on six days (range=2-14) (Table F.1 in Appendix F).

Gulls

On 24 June, a sub-adult California gull was documented taking a minimum of one plover chick and one plover of unknown age and was lethally removed. On 3 August, an adult California gull was observed taking a minimum of one large plover chick and one plover of unconfirmed age (large chick or young fledge) and was lethally removed (Appendix G). These events represent a minimum number of plover chicks lost to gulls this season.

Gulls can pose a significant threat to snowy plover breeding success at ODSVRA, especially individual gulls that key in on 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 eight of the 11 years from 2004-14, gulls have been documented taking plover chicks. In 2013, no plovers were documented depredated by gulls. In 2012, a gull pellet found on 6 enclosure shoreline 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 a four-day period from 28-31 July.

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 2014, the parkwide monthly average peaked at 4,227 gulls in July (Figure 3) and there was a maximum count of 5,082 on 6 August. Large flocks congregate on the Southern Enclosure and Oso Flaco shoreline as park activity increases in the open riding area and maximum counts of 3,015 and 3,663 gulls occurred on 9 July and 6 August, respectively, within these areas.

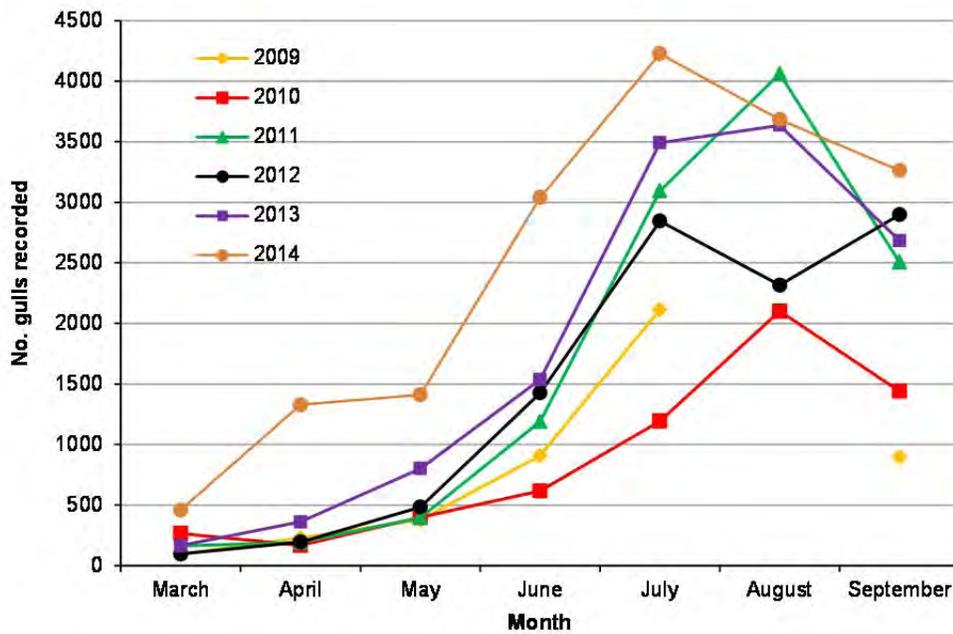


Figure 19. Monthly average number of gulls at ODSVRA for March to September in 2009-14. Information not available for August 2009. Weekly surveys were conducted between 6 am and 1 pm. Weekly survey data were only included if the entire park was covered. The number of surveys per month ranged from one 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 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 2014, one least tern nest and four snowy plover nests 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 (LT6) failed of unknown cause; two of the plover nests (SP68 and SP176) hatched a total of six chicks and one chick fledged; and two of the plover nests (SP15 and SP142) were abandoned pre-term and the eggs were taken to Monterey Bay Aquarium (see Notes section). There was one snowy plover nest (SP17) found in the open riding area in 2014. The one egg nest was depredated by an unknown avian predator.

For 2015, 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 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 2012-14, 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 distributes 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 windblown 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 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 (windblown 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 exclosures west of the west fence (shoreline) to nests within the exclosure fencing (inside exclosure). The following numbers exclude five plover nests at the northern 6 exclosure 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 2012-14 compared to 2011, likely as a result of moving the west fence eastward. In 2012-14, 13-16% of plover nests in 6 exclosure and 18-19% in 7 exclosure were on the shoreline, respectively; this compares to 12% and 5% in 2011. In 2014, 29% (14/49) of least tern nests in 6 and 7 exclosures were on the shoreline. This is an increase from 2013 and 2012 when 14% (8/56) and 16% (7/45) of tern nests in 6 and 7 exclosures were on the shoreline. No least tern nests were found on the shoreline for the seven-year period from 2005-11 when the shoreline portion of the exclosure was in a narrower configuration.

For known fate nests in 2014, the hatch rate for plover nests inside 6 and 7 exclosures was 90% and was similar to the shoreline (92%). Two plover nests on the 6 and 7 exclosure shoreline were known to fail and both were abandoned pre-term. The least tern hatch rate for known fate nests was 89% for nests inside the 6 and 7 exclosure and 100% for nests on the shoreline (of the total of 14 shoreline nests, three could not be approached to determine fate because of the high density of nearby plover broods). In 2014, the overall snowy plover chick survival to fledging age (36%) was good 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 and one nest was found east of the exclosure in 2014. In 2012-14, the number of bumpouts for nests found near the east fence has not increased compared to the previous two years. In 2012-14 there were four, two, and five nests, respectively, receiving a bumpout. This compares to two nests in 2010 and eight in 2011.

It is recommended for 2015 to repeat the shoreline configuration as was present in 2014, 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 enclosure. Approximately 325 cubic yards of wrack were distributed on the enclosure shoreline during the 2014 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 enclosure. 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 enclosure. Attempts in the past resulted in more sand than wrack being collected with the equipment compared to hand collection. In 2015, 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 from the open riding area, to then be placed in the seasonal enclosure to be distributed 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. Prior to the 2014 season during the winter months, a limited amount of wrack was placed in a few large piles as well as spread thinly in a few areas (600-1,000 square feet). These wrack areas persisted to the end of the season helping to create temporary hummocks within the enclosure and, in most 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 enclosure 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 2015. 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 2015. 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, a study was initiated by Drs. Jenifer Dugan and Mark Page, researchers from the Marine Science Institute at the University of California Santa Barbara (UCSB), examining the responses of invertebrate numbers and diversity in areas where wrack was added to the Southern Enclosure shoreline throughout the breeding season. Preliminary findings from the five-year study (2007-11) indicated that the seven-month seasonal closure (March-September) is not a sufficient period of time for invertebrates to effectively and naturally recover species diversity and abundance on the Southern Enclosure shoreline following five months of recreational use. In 2012, invertebrate sampling (by Dr. Dugan) was more limited, with one series of transects at the beginning of the season and repeated once at the end of the season. In 2013-14, park staff, following the same methodology, 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 sent to Dr. Dugan at UCSB for analysis and findings added to the data set.

Preliminary analysis suggests that inoculating a large number of wrack-associated invertebrates (talitrids) into wrack over a wide area of the enclosure shoreline increases the estimated abundance of talitrids. From 2012-14, park staff has inoculated wrack added to the shoreline with invertebrates following protocols developed by UCSB. If funding levels allow, experimental examination of wrack and invertebrate manipulation on the Southern Enclosure shore should continue in the 2015 season with the goal of identifying potential means to enhance the diversity and abundance of invertebrate species that are natural prey for plovers. Park staff should continue the end of season sampling, add a beginning of season sampling, and should continue to explore further ways to assess shoreline ecosystem health and responses to management actions.

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 attract 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. A dumpster cover design that could fit the needs of ODSVRA was not discovered and no covers were used in 2013-14. Daily surveys at the dumpster area resulted with the month of June having the highest daily average number of gulls (93) as well as the maximum number of gulls present at one time (550 on 30 June) (see section titled Predators and predator management on page 41 for more details). It is recommended for 2015 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 2015

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.
- Continue use of motion detector cameras for nest monitoring and train and permit additional monitoring staff as needed.
- Continue to use an anemometer with data logger from a wind tower to record daily wind speeds and direction.
- Continue option to use tern chick shelters.
- 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

One snowy plover nest in the open riding area

In 2014, one of 246 snowy plover nesting attempts from known locations was in the open riding area. On 28 March, one egg of SP17 was found approximately 100 feet east of 7 enclosure in an area where a banded pair (V:YG female and R:W/B/W male) was seen scraping the previous day. A bumpout nest enclosure attached to the Southern Enclosure fencing, with minimum radius of approximately 100 feet to buffer the nest from the open riding area, was installed the same day the nest was found. A plover returned to the nest after the bumpout was installed. The following morning, the banded pair was seen in the open riding area away from the nest enclosure and the nest bowl was empty, overtracked by plover tracks, and no buried egg found. Nest fate considered to be depredated, likely by an avian predator. The nest area was monitored closely for additional nesting behavior until 1 April when the bumpout enclosure was removed.

Snowy plover chicks in the open riding area

In 2014, four snowy plover chicks from three broods were observed in the open riding area. In all 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 10 May at 4:08 pm, one small unbanded chick with male banded NO:WB was found on the shoreline of the open riding area 0.25 miles north of milepost marker 6. This was a brood from an unknown nest and was assigned to SP129. Staff controlled visitor traffic and monitored the brood. While directing the brood south towards the enclosure, the brood moved past flocks of shorebirds and monitoring staff was careful to not move the brood into the shorebird flocks. However, at one point, a whimbrel (*Numenius phaeopus*) moved toward the chick, picked it up, and dropped it when the adult chased the whimbrel. The brood continued south and the adult led the chick inside the north end of 6 enclosure at 7:00 pm. On 15 May, the associated NO:WB male attempted to brood a dead chick on 6 enclosure shoreline, and the intact carcass was later collected. The chick was last seen alive on 14 May at approximately four days old.

On 28 June, a 13-day-old chick from SP138 nest was observed on the shoreline in the open riding area 50 feet north of 6 enclosure. On 4 July, a 19-day-old chick from this brood was just north of 6 enclosure. On both occasions the banded chick and the associated unbanded adult were directed back into the enclosure and monitored for an extended period of time. Only one chick of this three-chick-brood had been seen since 26 June. The chick continued to be raised at the north end of 6 enclosure and fledged on 13 July. The juvenile was last seen on-site on 7 August at 53 days old.

Between 19 August to 2 September, two chicks from SP246 nest (two-egg nest with both eggs hatching) were observed on the shoreline in the open riding area just north of 6 enclosure on five different days, when 13-27 days old. On each occasion the brood was directed back into the enclosure and monitored closely. On 3 September, the two chicks were 28 days old and recorded as fledged, but were noted to be obviously smaller in size and less developed than normal 28-day-old chicks. The large chicks/juveniles were seen just north of 6 enclosure and directed back into the enclosure on 10 additional days between 3 September and 19 September. Both fledges were seen taking short jumps and weak flights by 15 September at 40 days old. Both appeared fully developed juvenile size and likely flight capable when they were last seen on 20 September.

Injured juvenile least tern within open riding area, two injured juvenile least terns within enclosure, and carcasses of one adult and three juvenile least terns within enclosure. (see attached medical record and necropsy reports for more detail)

On 31 July, a 39-day-old juvenile least tern, banded B/Y:G/Y from least tern nest LT25, was found in the open riding area one foot east of the 6 enclosure fence with a broken left wing and left leg and did not

move when approached on foot. This bird had been seen three days earlier without any injuries. It was taken to Pacific Wildlife Care 31 July and was examined by Dr. Shannon Riggs, DVM. Dr. Riggs determined the open fracture of the left wing with bone exposed and the severe soft tissue trauma of the wing would not be salvageable and the bird would not be flight capable or releasable. It was also noted that the left leg fracture could potentially heal with treatment. After attempts to find a facility to house a least tern juvenile failed, the bird was euthanized on 1 August. As requested by CDFW, the frozen carcass was sent for necropsy on 26 August, which noted that in addition to the broken wing and leg, the tern was poorly fleshed with scant fat deposits and there were no significant lesions in the visceral organs.

Two additional least tern juveniles were observed with wing injuries moving within 6 enclosure. On 28 July, an unbanded juvenile least tern was observed with the right wing dragging on the ground. On 30 July to 2 August, a juvenile at 41-44 days old banded R/B:G/Y from LT36, was observed dragging its right wing. This bird appeared normal at 29-30 days old on 18 and 19 July. Both birds were not flight capable after injury and although carcasses of these birds were not later found, it is assumed they did not survive to leave the site.

On 14 September, the carcass of an unbanded adult least tern was found within 6 enclosure two feet east of the western fence. The decomposed carcass was found lying on its back with the top mandible of the bill broken, but the body was otherwise intact.

On 31 July, two intact least tern juvenile carcasses were found within nine feet of each other just east of the west fence of 6 enclosure. One carcass, banded R:G/Y from LT1, was found sixteen inches east of the fence lying on ventral surface with wings extended. This bird was last seen alive and behaving normally on 28 July at 47 days old. The other carcass, banded R/Y:G/Y from LT41, was found lying on its back three feet east of the west fence. This bird was last seen alive and behaving normally on 23 July at 32 days old. Both carcasses were sent for necropsy and findings indicated the birds were in moderate to advanced decomposed state, one demonstrated some hemorrhaging from the left orbital area and the other had hemorrhaging from the neck area.

On 9 August, the decomposed carcass of a juvenile least tern, banded G/O:G/Y from nest LT34, was found within 6 enclosure approximately 150 feet east of the western enclosure fence. It was found on its ventral surface with open cavities and was missing its right wing. The left wing measured 154 mm. This juvenile was last observed alive on 28 July at 32 days old.

This year, as noted above, there were seven recorded incidents of severe injury (three juveniles) or intact carcasses found (three juveniles and one adult) for least terns that were not documented as known depredation events. During the previous three years, there was a total of eight such incidents: four in 2013 (one one-year-old bird with wing injury, three juvenile carcasses); two in 2012 (one adult and one juvenile with leg injuries); and two in 2011 (one juvenile with leg injury, one older chick/fledgling with wing injury). There was an additional incidence of a juvenile least tern in 2011 seen being tumbled in the wave swash zone. This bird was picked up, allowed to dry, and released the same day and was subsequently seen flying and behaving normally.

Injured adult male and injured juvenile snowy plovers

On 14, 17 and 18 June, an adult male snowy plover, banded GG:AG, was observed on the 6 and 7 enclosure shoreline limping on the right leg with foot curled under and toes pointing backward, but able to fly, walk, and forage. The bird was captured 18 June and the bands moved freely and no foreign object was attached. It was taken to Pacific Wildlife Care in Morro Bay the same day and was examined by Dr. Shannon Riggs, DVM. Dr. Riggs reported the right leg flexion appeared weak, a thick callous had developed on the dorsal surface which was not inflamed or ulcerated, appeared to be an older injury, and the bird was bearing weight on the dorsal surface of the right foot and could walk relatively normal. The

plover was cared for overnight at Pacific Wildlife Care and examined the following day by Dr. Susan Choy, DVM at Bear Valley Animal Clinic in Los Osos. Dr. Choy had similar findings and said the wound on the right leg was permanent and not correctable and the bird could potentially mate with the injuries. The plover was recommended for release back to the wild by both veterinarians (pers. comm. S. Choy, pers. comm. S. Riggs). The bands were removed from the right leg as a precautionary measure and it was released onto the 7 enclosure shoreline on 19 June. The plover was last seen 22 June on the 6 enclosure shoreline.

On 17 September, a juvenile snowy plover banded PG:RG from SP250 observed limping on the left leg was captured and taken to Pacific Wildlife Care. Dr. Riggs examined the plover and determined the left leg was fractured high on the upper leg segment (bands not involved in injury) and the bone was protruding from skin slightly. The wound was older and healing (estimated about 7- 10 days old), and not repairable by surgery or other means. The plover was transferred to Monterey Bay Aquarium on 18 September as a potential candidate for their shorebird exhibit. Dr. Mike Murray, Director of Veterinary Services at Monterey Bay Aquarium, reviewed the condition of the plover and concluded that “based upon the nature of the injury, an open fracture of the tibiotarsus, the high likelihood of ascending bacterial osteomyelitis associated with the fracture, the very small distal fragment, and the lack of viable treatment options,” the bird “is not a candidate for amputation, because its life history is heavily pedestrian, and the bird would not be able to forage and move about normally.” The condition of the plover did not improve and was euthanized approximately 25 September (pers. comm. A. Greenebaum).

Carcasses of three snowy plover adults, one adult or juvenile, and 17 chicks (if sent for necropsy, reports are attached)

On 6 December 2013, an unbanded adult snowy plover carcass was found in the riding area west of 7.5 revegetation area. The carcass was between fresh tire tracks with entrails protruding from the cloaca and fresh blood was covered with sand on the top left portion of the head. The necropsy report notes that the carcass was of a female plover in good nutrition with good pectoral muscles, and the body was slightly flattened. The report indicates the cause of death is presumed to be from trauma, as evidenced by pulmonary hemorrhaging, ventral abdominal skin tear, evisceration of intestines with detachment from stomach, liver tear, displaced heart, and fractured skull with most of brain missing.

On 13 May, an adult male plover carcass banded GG:VW was observed in the bill of a gull (unknown species) in the open riding area near marker post 4 at 9:25 am. The carcass was recovered (missing an eye, entrails protruding from cloaca, and possible puncture wound on neck). Necropsy report indicates the cause of death was undetermined; it was likely dead prior to the gull picking up the carcass as the skin wound appears to be postmortem, and hemorrhages in the tissues and lungs along with the protruding gastrointestinal tract would be most consistent with trauma. This individual was last seen at 6:22 am of the same day foraging on the shoreline in the open riding area at marker post 5.

On 29 September, an adult female plover carcass banded GA:GR was found within a few inches of fencing on the northern 6 enclosure shoreline. The carcass was found lying on the ventral surface and the right eye was missing with dried blood around it. It was last seen alive on-site 26 September. The necropsy indicated that the carcass was in a moderate state of postmortem decomposition, no significant lesions were detected, and the cause of death was undetermined. The bird hatched from ODSVRA in 2012 and was confirmed as a breeding female at ODSVRA in 2013 and 2014.

On 18 October, a dead banded snowy plover (juvenile or adult) was found in the riding area near marker post 7. The fresh carcass was found in tire tracks shortly after a group of vehicles was seen traveling at high speed through the area. The bird was banded PV:B and the second band on the right leg was lost before or during the incident. The necropsy report indicates that the injuries to this bird are consistent with trauma.

Seventeen dead snowy plover chicks from 14 broods were found during the 2014 season within the Southern Exclosure and Oso Flaco. Chick carcasses were either observed dead or collected at the following locations: near nest within 6 exclosure (1), 6 exclosure shoreline (8), 7 exclosure shoreline (4), North Oso Flaco shoreline (3), and South Oso Flaco shoreline (1). Eight chicks from five broods were not collected at the time they were first seen due to proximity of other young plover broods; three of these carcasses were recovered in September. See Appendix G for additional details regarding the chick carcasses.

Snowy plover chicks aggressively attacked and killed by adult terns and/or plovers

On 19 May, three chicks from the SP84 brood were observed being pecked repeatedly and aggressively by the incubating adult from a nearby nest (SP118) on North Oso Flaco shoreline. One unbanded chick and one chick banded GG:YW from the brood (three to four days old) were observed motionless and assumed dead after the attack. The third chick from the SP84 brood was led away by the associated adults (BB:WY male and PV:VB female). On 21 May, this chick with BB:WY male, was seen alive but lying on its side and unable to stand, and was seen dead later the same day. The carcasses of all three chicks were not immediately recovered due to proximity of other young plover broods. On 12 September, the intact desiccated carcass of one small unbanded chick was recovered from the location where two chicks were initially seen and concluded to be dead.

On 13 June, a small unbanded chick from SP153 was observed near nest location unattended by adults and being attacked repeatedly by adult least terns and plovers in the area. It was concluded to be dead after being observed motionless and unattended for thirty minutes (no chicks from this three-chick brood were known to fledge). The carcass was not recovered due to proximity of plover and tern broods.

Snowy plover in flight striking exclosure fencing

On 4 September, a juvenile snowy plover was observed attempting to fly over the west fence of 7 exclosure towards the west. The plover took off from the ground close to the fence, did not gain enough altitude, collided with the fence and fell to the ground. Shortly afterwards, it was seen running west of the fenceline and then flying away normally.

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 exclosure, such as a circular exclosure, 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 exclosure or single nest exclosure) 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, per USFWS directions, 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 2014, there were 11 occasions where ODSVRA staff interceded to provide added care for snowy plover chicks or eggs, as park management or monitoring may have inadvertently been a contributing factor for some of the at-risk eggs or chicks:

- 1) abandoned chicks at nest (one event);
- 2) chick picked up by park visitor (one event); and
- 3) abandoned eggs (nine events).

Four chicks were taken to Monterey Bay Aquarium and one fledged. Of the 26 eggs taken to Monterey Bay Aquarium, 16 hatched, and 15 of the chicks fledged.

Chicks abandoned at nest

Snowy plover nest SP13 within a circular exclosure in North Oso Flaco had inconsistent incubation for five days prior to hatch (16-20 April) and adult mortality of the male was suspected. On 20 April, two hatched chicks were outside of the circular exclosure with multiple human tracks from trespassers in the immediate area and within six feet of a chick. Both of the chicks were banded and placed in the nest with the remaining egg. On 21 April, the third egg hatched and the three chicks were observed to be inconsistently attended by the female adult (banded GA:RB). After the two banded chicks were immobile and not being attended by the female for an extended period of time and the third chick continued to have inadequate care (over approximately 80 minutes), all three chicks were collected and transferred to Monterey Bay Aquarium. The two banded chicks died four days later and it was noted these chicks were active but not eating well or gaining weight. The third chick, banded AP:YA, fledged and was released 28 May.

Chick picked up by park visitor

On the afternoon of 3 August, a small one- to two-day-old unbanded snowy plover chick was picked up by a park visitor from an unknown location and given to park staff. The chick was placed in a brooder, monitored overnight, and transported to Monterey Bay Aquarium on the morning of 4 August. Monterey Bay Aquarium reported that the chick was not eating well on its own and not gaining weight. The chick was found dead on 9 August and the necropsy report indicated that the cause of death was undetermined.

Eggs abandoned

On 31 March, large owl tracks within the bumpout exclosure of snowy plover nest SP20 on the 8 exclosure shoreline were found near some white downy feathers at northwest perimeter fence indicating possible escape attempt of an attending adult. The male (banded GG:PB) was seen incubating inconsistently on 31 March and 1 April. On 3 April, the nest was determined to be abandoned pre-term, with adult mortality of the female suspected, and the two eggs were transported to Monterey Bay Aquarium. Neither egg hatched; one egg pipped but was in the wrong position to hatch and the other did not appear to develop properly.

On 17 April, a circular exclosure was installed at the three-egg snowy plover nest SP57 on the 7 exclosure shoreline. The nest was monitored from a long distance and a male (banded GG:AR) did not return until approximately 17 minutes after the circular installation. The circular exclosure was removed that same day and the banded male was seen inconsistently incubating or nearby the nest 17-19 April. The female was not seen incubating after 13 April. On April 20, the three eggs were found 25-75% buried and the nest was determined to be abandoned with adult mortality of the female suspected. The three eggs were collected 21 April and transported to Monterey Bay Aquarium. One egg hatched 14 May, one egg was not viable, and one egg broke at Monterey Bay Aquarium and was euthanized. The one chick was banded AW:OG, and the fledgling was released 17 June.

On 24 April and 5 May, snowy plover nest SP81 within a circular in South Oso Flaco had all three eggs partially to fully buried. On both dates, the eggs were placed on the surface and the female was incubating

the nest the following day. This nest was initially within 50 feet of symbolic fencing with public access to the west. The bird was observed to be sensitive to park visitors and vehicles and the symbolic fence was moved westward on three days as tides allowed (26 April, 30 April, and 6 May) to buffer the nest from human disturbance. On 11 May, the three eggs were found 50-70% buried. The eggs were determined to be abandoned pre-term and were collected 13 May and transported to Monterey Bay Aquarium. All three eggs hatched 23-25 May, the chicks were banded AP:AA, AP:BA, and AP:GA, and all three fledged and were released 30 June.

On 24 April, snowy plover nest SP15 with three eggs in 6 enclosure, approximately 60 feet from the open riding area fence and with a bumpout (providing a minimum of 100 feet from the nest to the open riding area fence), had all three eggs with cracks. On 26 April, only one egg was found at the nest and the egg was cold. On 27 April, three eggs with cracks were on the surface of the sand and slightly scattered and the abandoned eggs were collected and transported to Monterey Bay Aquarium. One egg hatched and the other two eggs made no progress and were likely not viable. The chick, banded AP:WA, fledged and was released 2 June.

On 27 April, snowy plover nest SP52 within a circular on the 7 enclosure shoreline had three eggs found buried. The eggs were placed on the surface and 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. Three eggs hatched 12-13 May with one hatching in an incorrect position and needing assistance. This chick was euthanized 19 May because it was too weak and unable to stand. The two remaining chicks, banded RO:WG and AB:OA, both fledged and were released 17 June.

On 12 May, snowy plover nest SP91 within a circular enclosure on the North Oso Flaco shoreline had two eggs buried and one egg on the surface of the sand with no bird seen incubating the nest. The nest was determined to be abandoned suspected due to wind and the three eggs were collected 13 May and transported to Monterey Bay Aquarium. The three eggs hatched 26 May and the three chicks, banded AP:BG, AP:RA, and AP:OA, fledged and were released 30 June.

On 29 May, snowy plover nest SP118 within a circular on North Oso Flaco shoreline had no bird on nest and three eggs (two with slight cracks) were determined to be abandoned. The eggs were collected 31 May and transported to Monterey Bay Aquarium. All three hatched 3-4 June and the chicks, banded AP:GR, AP:OG, and AP:OR, fledged and were released 11 July.

On 29 May, snowy plover nest SP142 with three eggs in 6 enclosure, approximately 65 feet from the open riding area fence and with a bumpout (providing a minimum of 100 feet from the nest to the open riding area fence), had three eggs 25-35% buried by sand and wet from dew. The nest was determined to be abandoned pre-term on 30 May and all three eggs were collected and transported to Monterey Bay Aquarium. All of the eggs were fertile but nonviable and appeared to have died early in the stages of egg development.

On 1 June, snowy plover nest SP122 within a circular in South Oso Flaco had three eggs 30-50% buried and no bird had been seen on the nest since 30 May. The nest was determined to be abandoned, pre-term and all three eggs were collected and transported to Monterey Bay Aquarium. Two of the eggs hatched 8 and 10 June and one of the eggs was nonviable and not fertile. The two chicks banded AP:BR and AP:RB fledged and were released 18 July.

LITERATURE CITED

- CDPR. 2013. Nesting of the California least tern and western snowy plover at the Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California 2013 Season. Unpublished Report, CDPR, Off-Highway Motor Vehicular Recreation Division.
- CDPR. 2012. Nesting of the California least tern and western snowy plover at the Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California 2012 Season. Unpublished Report, CDPR, Off-Highway Motor Vehicular Recreation Division.
- CDPR. 2011. Nesting of the California least tern and western snowy plover at the Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California 2011 Season. Unpublished Report, CDPR, Off-Highway Motor Vehicular Recreation Division.
- CDPR. 2010. Nesting of the California least tern and western snowy plover at the Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California 2010 Season. Unpublished Report, CDPR, Off-Highway Motor Vehicular Recreation Division.
- CDPR. 2009. Nesting of the California least tern and western snowy plover at the Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California 2009 Season. Unpublished Report, CDPR, Off-Highway Motor Vehicular Recreation Division.
- CDPR. 2008. Nesting of the California least tern and western snowy plover at the Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California 2008 Season. Unpublished Report, CDPR, Off-Highway Motor Vehicular Recreation Division.
- CDPR. 2007. Nesting of the California least tern and western snowy plover at the Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California 2007 Season. Unpublished Report, CDPR, Off-Highway Motor Vehicular Recreation Division.
- Frost, N. 2013. California least tern breeding survey, 2012 season. California Department of Fish and Wildlife, Wildlife Branch, Nongame Wildlife Program Report, 2013-01. Sacramento, CA.
- Marschalek, D.A. 2012. California least tern breeding survey, 2011 season. California Department of Fish and Game. Sacramento, CA.
- Marschalek, D.A. 2011. California least tern breeding survey, 2010 season. California Department of Fish and Game. Sacramento, CA.
- Marschalek, D.A. 2010. California least tern breeding survey, 2009 season. California Department of Fish and Game. Sacramento, CA.
- Marschalek, D.A. 2009. California least tern breeding survey, 2008 season. California Department of Fish and Game. Sacramento, CA.
- Marschalek, D.A. 2008. California least tern breeding survey, 2007 season. California Department of Fish and Game. Sacramento, CA.
- Marschalek, D.A. 2007. California least tern breeding survey, 2006 season. California Department of Fish and Game. Sacramento, CA.
- Page, G.A., J.S. and J.C. Warriner, and P.W.C. Paton. 1995. Snowy Plover (*Charadrius alexandrinus*). In The Birds of North America, No. 154, (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington DC.
- Thompson, B.C., J.A. Jackson, J. Burger, L.A. Hill, E.M. Kiroch, and J.L. Atwood. 1997. Least Tern (*Sterna antillarum*). In The Birds of North America, No. 290, (A. Poole and F. Gill, eds.). The

Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

USFWS. 2007. Recovery Plan for the Pacific Coast Population of the western Snowy Plover (*Charadrius alexandrinus nivosus*). In two volumes. Sacramento, CA. xiv+751pp.

USFWS. 2006. Five-Year Review Summary and Evaluation for the California Least Tern (*Sterna antillarum browni*). USFWS, Carlsbad, CA. September 2006.

USFWS. 1985. Recovery Plan for the California Least Tern (*Sterna antillarum browni*). USFWS, Portland, OR. 112 pp.

Warriner, J.S., J.C. Warriner, G.W. Page and L.E. Stenzel. 1986. Mating system and reproductive success of a small population of polygamous snowy plovers. *Wilson Bulletin* 98(1):15-37.

APPENDICES

Appendix A. California least tern nests at ODSVRA in 2014.

Least tern chicks were banded with green over yellow 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 zero to three days old. Twenty five chicks from fifteen known hatching nests were not banded. In addition, there were three nests with unknown fate (unknown if hatched or failed). A total of 14 unbanded fledglings were seen concurrently in 6 and 7 enclosure on 12 July. Additionally, two unbanded fledglings that would not have been old enough to count on 12 July were seen on 20 July and 6 August. Evidence supports these 16 unbanded fledglings originated at ODSVRA. They were not assigned to specific nests. Information on adult pair is provided when known. Sex of banded adults is typically not known. In No. chicks (No. fledged) column, “unk” for unknown fledge number used when not possible to assign unbanded fledglings to a specific nest.

Location: 6 = 6 enclosure, 7 = 7 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. fledged)	Chick band combination (chick weight in grams when banded)	Confirmed fledged	Notes
1	6	One banded adult	16 May	Hatch	11 Jun	2	2 (2)	R:G/Y (9.2 g) A:G/Y (9.1 g)	R:G/Y A:G/Y	On 31 July, the intact carcass of the R:G/Y juvenile was found 16 inches east of the Southern Enclosure western fence.(see necropsy report and Notes section). The R:G/Y fledge was last seen alive on 28 July at 47 days old.
2	6	B/W:B/O	18 May	Hatch	10 Jun	3	2 (2)	W:G/Y (5.7 g) G:G/Y (6.5 g)	W:G/Y G:G/Y	On 12 August, W:G/Y (63 days old) was seen off-site at McGrath Lake, Ventura County, foraging and roosting in a flock of about 30 adults and 16 other fledges. This fledgling was last seen at ODSVRA on 23 July at 43 days old.
3	7	-(S)? (B:W/B)?	22 May	Hatch	17 Jun	2	1 (unk)	U		
4	6	U	22 May	Hatch	17 Jun	2	2 (2)	N:G/Y (5.5 g) R/W:G/Y (7.0 g)	N:G/Y R/W:G/Y	
5	6	U	22 May	Hatch	17 Jun	2	2 (1)	K:G/Y (8.3 g) G/W:G/Y (8.5 g)	G/W:G/Y	K:G/Y chick last observed alive on 4 July at 17 days old. The G/W:G/Y chick was initially banded L:G/Y but lost both bands and was re-banded G/W:G/Y. The L:G/Y band combination was reused on one chick from LT33.

Appendix A. California least tern nests at ODSVRA in 2014 (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
6	6		25 May	Failed, unknown cause	29 May	2	0			On 27 May, this two-egg nest 75 feet west of east fence received a bumpout to increase distance of nest from open riding area to over 100 feet. Bird seen attending nest on 25, 27, and 28 May. No adult attendance after 28 May. Unable to locate nest or eggs when walked to on 31 May.
7	6		23 May	Hatch	18 Jun	2	2 (unk)	U U		Two chicks with this nest last observed on 22 June at 4 days old.
8	6		20 May	Hatch	17 Jun	2	2 (unk)	U U		Two chicks with this nest last observed on 22 June at 5 days old.
9	7	U B/W:L	23 May	Hatch	19 Jun	2	2 (unk)	U U		Two chicks with this nest last observed on 2 July at 13 days old.
10	7		25 May	Unknown	21 Jun	2	0			Nest last seen incubated on 20 June.
11	6		25 May	Hatch	20 Jun	2	1 (unk)	U		Chick with this nest last observed on 20 June at hatch.
12	6	Banded B/W:B/R	24 May	Hatch	20 Jun	2	2 (1)	W/A:G/Y (8.1 g) W/O:G/Y (9.3 g)	W/O:G/Y	
13	7	One banded adult	23 May	Hatch	18 Jun	2	2 (1)	W/G:G/Y (9.1 g) W/Y:G/Y (10.8 g)	W/Y:G/Y	W/G:G/Y chick last observed on 18 June at hatch.
14	6		25 May	Hatch	20 Jun	2	1 (unk)	U		Chick with this nest last observed on 2 July at 12 days old.
15	7		na	Abandoned pre-term	5 Jun	2	0			Nest found at 2 eggs on 1 June and was seen being incubated. Unable to confirm incubation 2 June through 4 June. On 5 June, 2 eggs were found 40 and 50 percent silted in and no tern tracks were present.
16	6	U W/B:R/Y	25 May	Hatch	21 Jun	2	2 (2)	W/B:G/Y (5.7 g) W/R:G/Y (8.0 g)	W/B:G/Y W/R:G/Y	
17	6		25 May	Hatch	19 Jun	1	1 (unk)	U		One chick with this nest last observed on 20 June at 1 day old.
18	6		24 May	Hatch	19 Jun	2	2 (2)	P:G/Y (5.6 g) A/B:G/Y (9.1 g)	P:G/Y A/B:G/Y	
19	6		24 May	Hatch	20 Jun	2	2 (unk)	U U		Two chicks with this nest last observed on 20 June at hatch.
20	7		26 May	Hatch	21 Jun	≥2	2 (unk)	U U		Two chicks with this nest last observed on 25 June at 4 days old.

Appendix A. California least tern nests at ODSVRA in 2014 (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
21	6		25 May	Hatch	21 Jun	2	2 (1)	W/B:G/Y (5.5 g) Y/B:G/Y (6.9 g)	Y/B:G/Y	One of two nests with a chick banded W/B:G/Y. Only able to confirm one W/B:G/Y chick fledged from LT16.
22	6		24 May	Hatch	19 Jun	2	2 (2)	Y:G/Y (6.8 g) B/W:G/Y (7.1 g)	Y:G/Y B/W:G/Y	
23	6	(O)?:B/W Banded	25 May	Hatch	22 Jun	2	2 (1)	B/G:- (5.1 g) B/O:- (5.1 g)	B/O:-	Both chicks were originally banded with G/Y on the right leg but bands slipped off. B/G:- chick last observed being brooded at the nest on 23 June at 1 day old.
24	6		29 May	Unknown	24 Jun	2	0			Nest incubated for 23 days from 1-23 June. Nest not incubated after 23 June.
25	6		27 May	Hatch	22 Jun	1	1 (1)	B/Y:G/Y (6.9 g)	B/Y:G/Y	On 31 July, the B/Y:G/Y juvenile with broken left wing and left leg found sitting in the open riding area just east of 6 enclosure at 39 days old (see report Notes section). This bird was last seen 28 July without any injuries.
26	6		24 May	Hatch	19 Jun	2	2 (unk)	U U		Two chicks with this nest last observed on 20 June at 1 day old.
27	6	?:W/B	22 May	Hatch	17 Jun	2	1 (1)	B:G/Y (5.6 g)	B:G/Y	
28	6	B/R:B/W G/Y:B/W	30 May	Hatch	25 Jun	2	2 (1)	G/Y:G/Y (5.2 g) O/Y:G/Y (4.7 g)	G/Y:G/Y	O/Y:G/Y juvenile last observed alive on 11 July at 16 days old.
29	6		23 May	Hatch	18 Jun	2	2 (2)	O/W:G/Y (7.2 g) A/W:G/Y (8.2 g)	O/W:G/Y A/W:G/Y	
30	6	U	27 May	Abandoned unknown if pre- or post-term	26 Jun	2	0			Nest not observed incubated after 25 June. Two eggs 25 percent silted into the sand and no tern tracks on 26 June and 29 June.
31	7		30 May	Hatch	25 Jun	2	2 (1)	Y/R:G/Y (5.3 g) G/A:G/Y (5.8 g)	Y/R:G/Y	G/A:G/Y chick last observed alive on 9 July at 14 days old.
32	7		25 May	Hatch	20 Jun	2	1 (1)	O/B:G/Y (9.0 g)	O/B:G/Y	Unknown fate for second egg.
33	6	S:- U	26 May	Hatch	21 Jun	2	2 (2)	L:G/Y (6.9 g) Y/W:G/Y (6.9 g)	L:G/Y Y/W:G/Y	
34	6	U U	31 May	Hatch	26 Jun	3	3 (3)	G/O:G/Y (8.9 g) O/G:G/Y (7.9 g) O/A:G/Y (5.7 g)	G/O:G/Y O/G:G/Y O/A:G/Y	G/O:G/Y juvenile found dead on 9 August inside 6 enclosure (see report Notes section). This juvenile was last observed alive on 28 July at 32 days old.
35	6	U	23 May	Hatch	18 Jun	2	2 (2)	V:G/Y (6.3 g) O:G/Y (6.4 g)	V:G/Y O:G/Y	

Appendix A. California least tern nests at ODSVRA in 2014 (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
36	7	U	24 May	Hatch	19 Jun	2	2 (2)	R/B:G/Y (10.6 g) B/A:G/Y (11.3 g)	R/B:G/Y B/A:G/Y	R/B:G/Y juvenile observed dragging its right wing at 41-44 days old from 30 July to 2 August. On 18 and 19 July this bird was observed appearing normal (see report Notes section).
37	6	W/B:(O)?/Y W/B:W/G	29 May	Hatch	24 Jun	2	2 (unk)	U U		Two chicks with this nest last observed on 26 June at 2 days old.
38	6	U	30 May	Hatch	25 Jun	2	2 (1)	Y/G:G/Y (6.6 g) Y/O:G/Y (8.1 g)	Y/O:G/Y	Y/G:G/Y chick last observed on 25 June at hatch.
39	6	U	23 May	Hatch	18 Jun	1	1 (1)	B/R:G/Y (19.8 g)	B/R:G/Y	
40	7	U B/R:W/B	4 Jun	Hatch	30 Jun	3	2 (2)	R/A:G/Y (5.3 g) A/R:G/Y (7.6 g)	R/A:G/Y A/R:G/Y	
41	7	U	26 May	Hatch	21 Jun	2	2 (2)	G/B:G/Y (7.7 g) R/Y:G/Y (14.5 g)	G/B:G/Y R/Y:G/Y	On 31 July, the intact carcass of the R/Y:G/Y juvenile was found lying on its back 3 feet east of the Southern Enclosure western fence line (see Necropsy and report Notes section). This bird was last observed alive on 23 July at 32 days old.
42	7		31 May	Unknown	23 Jun	≥1	0			Incubating adult observed from 5-22 June. No adult seen incubating after 22 June. Unable to confirm egg number due to close proximity to plover and tern broods.
43	6	One banded adult	na	Abandoned post-term	22 Jul	1	0			Nest observed incubated for 44 days from 8 June to 21 July prior to abandonment.
44	6		31 May	Hatch	27 Jun	2	2 (2)	A/O:G/Y (8.8 g) G/R:G/Y (12.1 g)	A/O:G/Y G/R:G/Y	
45	6	One banded adult	28 May	Hatch	23 Jun	2	2 (1)	A/Y:G/Y (6.1 g) Y/A:G/Y (6.2 g)	A/Y:G/Y	Y/A:G/Y chick last observed on 28 June at 5 days old.
46	6	One banded adult	23 May	Hatch	18 Jun	2	2 (unk)	U U		Two chicks with this nest last observed on 25 June at 7 days old.
47	6		5 Jun	Hatch	1 Jul	≥2	2 (unk)	U U		Two chicks with this nest last observed on 5 July at 4 days old.
48	6		19 Jun	Hatch	15 Jul	≥2	2 (unk)	U U		Two chicks with this nest last observed 16 July at 1 day old.
49	6	U	20 Jun	Hatch	16 Jul	≥1	1 (unk)	U		

Appendix B. Snow plover nests at ODSVRA in 2014.

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

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 (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
1	6	F=U M=U	18-Mar	Hatch	20-Apr	3	3 (1)	3 BB:VW	Seasonal enclosure	Split hatch.
2	6	F=VV:VG M=PV:BR	15-Mar	Hatch	16-Apr	3	3 (0)	3 BB:GB	Seasonal enclosure	
3	7	F=U M=U	18-Mar	Abandoned pre-term	3-Apr	1	0 (0)		Seasonal enclosure	
4	6	F= M=U	18-Mar	Hatch	20-Apr	3	2 (1)	2 BB:OY	Seasonal enclosure	Split hatch. One egg (without cracks) abandoned post-term.
5	7	F=NB:OW M=U	18-Mar	Hatch	23-Apr	2	2 (1)	2 GA:AW	Seasonal enclosure	
6	7	F=RR:VB M=U	18-Mar	Hatch	20-Apr	3	2 (0)	2 BB:YR	Seasonal enclosure	One egg (without cracks) abandoned post-term.
7	8	F=U M=BB:YY	16-Mar	Hatch	17-Apr	3	2 (0)	2 PG:BY	Seasonal enclosure	One egg (without cracks) abandoned post-term.
8	6	F=U M=V-:AY	16-Mar	Hatch	17-Apr	3	2 (0)	2 BB:OB	Seasonal enclosure	Split hatch. One egg (with cracks at pointed end) abandoned post-term.
9	8	F= M=	18-Mar	Abandoned pre-term	4-Apr	3	0 (0)		Seasonal enclosure	
10	8	F=U M=W-:Y/G	22-Mar	Hatch	25-Apr	3	2 (1)	2 PG:RY	Seasonal enclosure	One egg (without cracks) abandoned post-term.
11	8	F= M=U	25-Mar	Overwash by tide	31-Mar	2	0 (0)		Symbolic fence	
12	NOF	F=NY:RB M=U	23-Mar	Hatch	24-Apr	3	3 (1)	3 VV:BW	Circular excl. with top Symbolic fence	On 27 March, camera installed.
13*	NOF	F=GA:RB M=	19-Mar	Hatch	20-Apr	3	3 (0)	3 BB:GR	Circular excl. with top Symbolic fence	Split hatch. On 21 April, 3 chicks determined to be abandoned were transported to Monterey Bay Aquarium (see report Notes section).
14	6	F=banded M=U	27-Mar	Hatch	30-Apr	3	2 (0)	2 GA:YY	Seasonal enclosure	One egg abandoned post-term.
15*	6	F=U M=	22-Mar	Abandoned pre-term	26-Apr	3	0 (0)		Bumpout Seasonal enclosure	On 27 April, 3 eggs all with cracks, were found slightly scattered without a nest bowl or tracks. Eggs determined to be abandoned and transported to Monterey Bay Aquarium (see report Notes section).

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
16	6	F=banded M=U	25-Mar	Hatch	27-Apr	3	3 (2)	3 VG:OB	Seasonal exclosure	On 27 April, 1 of 3 chicks found cold, partially buried and immobile near nest. Chick was warmed in brooder and placed with brood in nest bowl and was observed incubated by adult. Chick (bands marked with black permanent ink) was observed with brood on 28 April, not seen subsequently.
17*	ORA	F=V:-YG M=R:W/B/W	28-Mar	Depredated, avian	29-Mar	1	0 (0)		Bumpout	One egg depredated by unknown avian predator (see report Notes section).
18	6	F=VV:AA M=U	23-Mar	Hatch	25-Apr	3	3 (2)	3 GG:GW	Seasonal exclosure	On 25 April, 1 of 3 chicks observed with atypical behavior of moving head from side to side and with limited mobility. Chick (bands marked with black permanent ink) was observed with brood 28 April, not seen subsequently.
19	6	F=banded M=U	27-Mar	Hatch	29-Apr	3	3 (0)	2 VO:BB 1 unbanded	Seasonal exclosure	Split hatch.
20*	8	F= M=GG:PB	26-Mar	Abandoned pre-term	3-Apr	2	0 (0)		Bumpout Symbolic fence	On 31 March, large avian tracks in bumpout exclosure. On 3 April, nest determined to be abandoned and 2 eggs were transported to Monterey Bay Aquarium (see report Notes section).
21	7	F=U M=U	29-Mar	Hatch	4-May	3	3 (0)	3 RR:OB	Seasonal exclosure	
22	6	F=RR:PB M=U	25-Mar	Hatch	28-Apr	3	2 (0)	2 BB:RR	Seasonal exclosure	One egg (without cracks) abandoned post-term.
23	BY	F=U M=U	26-Mar	Hatch	28-Apr	3	1 (0)	1 RR:RY	Seasonal exclosure	Two eggs (without cracks) abandoned post-term.
24	SOF	F= M=	30-Mar	Abandoned pre-term	11-Apr	3	0 (0)		Symbolic fence	
25	6	F=U M=	30-Mar	Hatch	3-May	3	2 (0)	2 PG:YY	Seasonal exclosure	One egg with unknown fate showed cracks but egg or hatched chick not seen subsequently.
26	7	F=VG:GW M=U	26-Mar	Hatch	27-Apr	3	3 (0)	3 GG:VG	Seasonal exclosure	
27	6	F=U M=	23-Mar	Hatch	24-Apr	3	3 (0)	3 BB:VB	Seasonal exclosure	
28	6	F=U M=VV:BB	30-Mar	Hatch	7-May	3	1 (0)	1 PV:PB	Seasonal exclosure	Two eggs (without cracks) abandoned post-term.
29	6	F= M=BY:RR	24-Mar	Abandoned pre-term	19-Apr	3	0 (0)		Seasonal exclosure	

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
30	6	F=U M=U	26-Mar	Hatch	29-Apr	3	3 (0)	3 BB:VG	Seasonal enclosure	On 14 September, the intact desiccated carcass of a small BB:VG chick was collected from 6 enclosure shoreline. Chick last seen alive 3 May when 4 days old.
31	6	F= M=U	29-Mar	Hatch	30-Apr	3	3 (0)	3 BB:YW	Seasonal enclosure	On 11 September, the intact desiccated carcass of a small BB:YW chick was collected from 7 enclosure shoreline. Chick last seen alive on 4 May when 4 days old.
32	6	F=U M=U	31-Mar	Hatch	2-May	3	3 (0)	3 BB:OW	Seasonal enclosure	Split hatch.
33	6	F=U M=U	30-Mar	Hatch	1-May	3	3 (2)	3 BB:AY	Seasonal enclosure	
34	6	F=U M=U	29-Mar	Hatch	1-May	3	3 (1)	3 BB:RW	Circular excl. with top Symbolic fence	
35	7	F=U M=U	29-Mar	Hatch	30-Apr	2	2 (2)	2 BB:PR	Seasonal enclosure	Split hatch.
36	8	F=U M=U	3-Apr	Hatch	6-May	3	3 (1)	3 VG:BB	Seasonal enclosure	
37	8	F=VV:VW M=	25-Mar	Abandoned pre-term	22-Apr	3	0 (0)		Seasonal enclosure	
38	NOF	F=RR:VW M=BB:VR	30-Mar	Hatch	1-May	3	3 (0)	3 PG:YB	Circular excl. with top Symbolic fence	On 30 April, eggs recentered in circular enclosure.
39	NOF	F=GA:GR M=U	26-Mar	Hatch	27-Apr	3	3 (0)	3 GG:WG	Circular excl. with top Symbolic fence	On 23 April, eggs recentered in circular enclosure.
40	7	F=U M=U	28-Mar	Hatch	29-Apr	3	3 (2)	3 BB:GG	Seasonal enclosure	
41	7	F=U M=U	1-Apr	Hatch	3-May	3	3 (0)	3 BB:PY	Seasonal enclosure	
42	7	F= M=VV:WY	3-Apr	Hatch	7-May	3	3 (0)	1 G:-WR 1 GA:WR 1 unbanded	Seasonal enclosure	Split hatch. One of the 3 chicks not banded and not seen subsequently. One chick originally banded GA:WR lost aqua band from left leg.
43	7	F=VG:OG M=U	29-Mar	Hatch	30-Apr	3	2 (2)	1 RR:YB 1 RR:-	Symbolic fence	On 7 April, camera installed. On 30 April, nest camera confirmed 2 chicks hatched. One egg (without cracks) abandoned post-term. On 1 May, 1 chick had small wound on right leg and was banded RR:-.
44	7	F= M=U	4-Apr	Hatch	7-May	3	2 (1)	2 VG:GY	Symbolic fence	Split hatch. One egg (without cracks) abandoned post-term.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
45	7	F=U M=U	2-Apr	Hatch	4-May	3	3 (0)	3 RR:AB	Symbolic fence	On 15 May, the desiccated carcass of a small RR:AB chick with an open cavity on the right side of the body and head was collected from the 7 enclosure shoreline. All 3 chicks from this brood were last seen on 8 May when 4 days old.
46	SOF	F=RR:OY M=U	20-Mar	Hatch	21-Apr	2	2 (0)	2 BB:VY	Circular excl. with top Symbolic fence	
47	SOF	F=GA:WB M=PG:VW	6-Apr	Hatch	8-May	3	3 (1)	3 GA:GB	Circular excl. with top Symbolic fence	On 8 April, symbolic fence moved west to decrease possible pedestrian disturbance.
48	SOF	F=VG:VR M=VG:AB	19-Mar	Hatch	20-Apr	3	3 (1)	3 BB:OG	Circular excl. with top Symbolic fence	Split hatch.
49	SOF	F=VV:WG M=GA:PY	6-Apr	Hatch	10-May	3	3 (1)	3 VG:BR	Circular excl. with top Symbolic fence	On 8 April, symbolic fence moved west to decrease possible pedestrian disturbance. On 1 May eggs recentered in circular.
50	7	F=BB:? M=U	3-Apr	Hatch	7-May	3	3 (0)	3 unbanded	Seasonal enclosure	
51	6	F=PV:WB M=BB:AR	4-Apr	Hatch	7-May	3	2 (0)	2 unbanded	Symbolic fence	Split hatch. One egg with unknown fate. Chicks not banded to avoid disturbing nearby young snowy plover broods.
52*	7	F=U M=GG:AY	8-Apr	Abandoned pre-term	26-Apr	3	0 (0)		Circular excl. with top Symbolic fence	On 27 April, nest determined to be abandoned and 3 eggs were transported to Monterey Bay Aquarium (see report Notes section).
53	7	F=GG:WW M=VV:VR	4-Apr	Hatch	8-May	3	2 (1)	2 GG:BY	Seasonal enclosure	On 5 May, 1 egg missing pre-term.
54	8	F=NO:WY M=U	9-Apr	Hatch	13-May	3	3 (0)	2 PV:YW 1 unbanded	Circular excl. with top Symbolic fence	On 21 April, camera installed. On 13 and 14 May, nest camera confirmed 3 chicks hatched. Split hatch. One of the 3 chicks not banded and last seen with brood 17 May at 3 days old.
55	BY	F=U M=V-:BR	10-Apr	Hatch	12-May	3	3 (1)	3 GA:VW	Seasonal enclosure	
56	BY	F=VG:AW M=U	10-Apr	Hatch	14-May	3	3 (1)	3 RR:PW	Seasonal enclosure	

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
57*	7	F=BB:BW M=GG:AR	9-Apr	Abandoned pre-term	19-Apr	3	0 (0)		Circular excl. with top Symbolic fence	On 17 April, circular excl. installed over nest and a bird did not return for long period after installation. Banded male GG:AR returned to nest, but female was not seen and circular was removed. Banded female BB:BW with nest not resighted after 13 April. On 21 April nest determined to be abandoned and 3 eggs were transported to Monterey Bay Aquarium (see report Notes section).
58	SOF	F=U M=	11-Apr	Hatch	16-May	3	3 (0)	3 GG:VW	Symbolic fence	
59	6	F=U M=VV:GG	12-Apr	Hatch	17-May	3	3 (0)	3 GG:AG	Symbolic fence	
60	6	F=U M=GG:BR	7-Apr	Hatch	9-May	3	2 (0)	2 PG:GB	Symbolic fence	One egg (without cracks) abandoned post-term.
61	6	F=NO:AG M=U	5-Apr	Hatch	7-May	3	2 (0)	2 PG:VW	Seasonal enclosure	One egg (without cracks) abandoned post-term.
62	6	F=G-VW M=U	8-Apr	Hatch	10-May	3	3 (0)	3 unbanded	Seasonal enclosure	Split hatch. Chicks not banded to avoid disturbing nearby young snowy plover broods.
63	6	F=U M=GG:WB	14-Apr	Hatch	16-May	3	3 (0)	3 RR:AY	Seasonal enclosure	On 14 September, the intact desiccated carcass of 1 small RR:AY chick found on 6 enclosure shoreline. All three chicks last seen alive on 23 May when 7 days old (no chicks known to fledge).
64	7	F=PG:GG M=U	12-Apr	Hatch	15-May	3	2 (0)	2 RR:RW	Seasonal enclosure	One egg (without cracks) abandoned post-term.
65	8	F=U M=U	8-Apr	Hatch	10-May	3	3 (0)	3 PV:BB	Seasonal enclosure	On 10 May, 1 of the 3 chicks was hypothermic and warmed in brooder. Chick banded with a black dot on pink band and reunited with its parent and brood. Chick not seen subsequently.
66	6	F=GG:GR M=U	30-Mar	Hatch	1-May	3	3 (0)	3 GA:AB	Seasonal enclosure	Split hatch.
67	8	F=GG:VY M=PV:YB	10-Apr	Hatch	14-May	3	3 (0)	3 GA:BR	Seasonal enclosure	

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
68	6	F=U M=RR:YY	13-Apr	Hatch	15-May	3	3 (0)	3 GG:GY	Bumpout Seasonal enclosure	Split hatch. On 16 May, 1 separated chick placed in brooder. Chick reunited with its parent and brood. On 14 September, the intact desiccated carcass of 1 small GG:GY chick found on 6 enclosure shoreline. All 3 chicks from this brood last seen on 19 May at 3 and 4 days old (no chicks known to fledge).
69	6	F=U M=U	11-Apr	Hatch	13-May	3	3 (0)	2 GG:BY 1 GG:YB	Seasonal enclosure	
70	6	F=U M=U	1-Apr	Hatch	3-May	3	3 (0)	3 RR:BG	Circular excl. with top Symbolic fence	On 14 September, the intact desiccated carcass of 1 small RR:BG chick found on 6 enclosure shoreline. All 3 chicks from this brood were last seen on 8 May at 5 days old (no chicks known to fledge).
71	7	F=U M=BB:PG	16-Apr	Hatch	19-May	3	2 (0)	1 RR:PY 1 unbanded	Seasonal enclosure	Split hatch. One egg (without cracks) abandoned post-term. One of the 2 chicks not banded and not seen subsequently.
72	7	F=VG:BR M=U	16-Apr	Abandoned pre-term	20-Apr	1	0 (0)		Seasonal enclosure	
73	7	F=-:A(P)? M=U	2-Apr	Hatch	4-May	3	3 (1)	3 BB:PW	Seasonal enclosure	
74	7	F=V-:YG M=R:W/B/W	3-Apr	Hatch	5-May	3	2 (0)	2 RR:BY	Seasonal enclosure	Split hatch. One egg (without cracks) abandoned post-term. On 13 September, the intact desiccated carcass of a small RR:BY chick was found on 7 enclosure shoreline. Both chicks from this brood were last seen on 6 May at time of hatch (no chicks known to fledge).
75	SOF	F=GG:WY M=BB:PB	11-Apr	Overwash by tide	21-Apr	3	0 (0)		Circular excl. with top Symbolic fence	
76	BY	F=VG:VR M=RR:OR	16-Apr	Hatch	18-May	3	3 (0)	3 VV:WB	Seasonal enclosure	
77	6	F=BB:WY M=VG:VG	17-Apr	Hatch	19-May	3	3 (0)	2 VV:BR 1 unbanded	Seasonal enclosure	Split hatch. One chick not banded to avoid disturbing nearby young snowy plover broods. On 10 September, the intact desiccated carcass of a small VV:BR chick was found on 7 enclosure shoreline. All three chicks from this brood last seen on 23 May when two to four days old (no chicks known to fledge).

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
78	7	F=U M=	12-Apr	Abandoned, unknown if pre- or post-term	17-May	3	0 (0)		Seasonal enclosure	
79	7	F=PV:VG M=	14-Apr	Hatch	16-May	3	2 (0)	2 PG:AY	Seasonal enclosure	One egg (without cracks) abandoned post-term.
80	SOF	F= M=	na	Abandoned pre-term	na	2	0 (0)		Symbolic fence	Est. nest initiation and fate date not known. Assigned abandoned pre-term as location of nest in area that would have been seen if incubating for 28 days.
81*	SOF	F=VV:WW M=VV:BY	19-Apr	Abandoned pre-term	11-May	3	0 (0)		Circular excl. with top Symbolic fence	On 13 May, 3 eggs found buried in circular and determined to be abandoned. Eggs were transported to Monterey Bay Aquarium (see report Notes section).
82	6	F=BB:YW M=BB:BY	15-Apr	Hatch	17-May	3	3 (1)	3 GA:GG	Seasonal enclosure	One chick fledging from shore near open riding area was obviously smaller in size and less developed than a normal 28-day-old chick.
83	7	F=U M=NO:GB	13-Apr	Hatch	15-May	3	3 (0)	3 GG:BG	Seasonal enclosure	
84*	6	F=PV:VB M=BB:WY	13-Apr	Hatch	15-May	3	3 (0)	2 GG:YW 1 unbanded	Seasonal enclosure	Split hatch. On 19 May, 2 chicks were considered killed by adult aggression. On 21 May, third chick observed dead in same area (see report Notes section).
85	8	F=GA:BW M=VG:WB	9-Apr	Hatch	11-May	3	2 (2)	2 GA:PW	Seasonal enclosure	One egg (without cracks) abandoned post-term.
86	NOF	F=banded M=U	25-Apr	Hatch	27-May	3	2 (0)	2 VV:YG	Circular excl. with top Symbolic fence	On 29 April, camera installed. On 27 May nest camera confirmed 2 chicks hatched. On 11, 12, 20 and 23 May, eggs moved closer to center of circular enclosure. One egg (without cracks) abandoned post-term.
87	6	F=VG:BR M=VV:GB	24-Apr	Hatch	26-May	3	3 (0)	3 PG:BB	Seasonal enclosure	Split hatch.
88	7	F=U M=U	15-Apr	Hatch	17-May	2	2 (1)	2 RR:YW	Seasonal enclosure	
89	Unknown	F=U M=U	22-Mar	Hatch	(24-Apr)	2	2 (2)	2 VG:RW		
90	6	F=banded M=GG:VB	22-Apr	Hatch	24-May	3	3 (0)	3 PG:BG	Seasonal enclosure	On 25 May, 1 of 3 chicks was smaller and with thinner legs. Chick banded with black dot on pink band. Chick last seen on 28 May at 4 days old.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
91*	NOF	F=VV:WY M=	24-Apr	Abandoned, suspected wind	12-May	3	0 (0)		Circular excl. with top Symbolic fence	On 12 May, 1 egg on surface of sand and 2 eggs found buried. Nest determined to be abandoned and 3 eggs were transported to Monterey Bay Aquarium (see report Notes section).
92	Unknown	F=PV:? M=U	24-Mar	Hatch	(25-Apr)	3	3 (1)	3 BB:VR		
93	6	F=NO:GB M=GG:PW	21-Apr	Hatch	25-May	3	3 (0)	3 PV:BG	Seasonal enclosure	
94	8	F= M=U	27-Apr	Hatch	30-May	3	2 (0)	2 PG:VB	Seasonal enclosure	Split hatch. On 14 May, 1 egg missing. On 17 May, all 3 eggs present in nest bowl. One egg (with cracks) abandoned post-term. On 10 August, remaining egg collected with visible remains of dead chick inside.
95	SOF	F=banded M=U	23-Apr	Hatch	25-May	3	2 (0)	2 GA:RG	Circular excl. with top Symbolic fence	Split hatch. On 9 May, symbolic fence moved west to reduce pedestrian disturbance. One egg (without cracks) abandoned post-term.
96	Unknown	F=GG:VY M=U	28-Mar	Hatch	(29-Apr)	3	3 (1)	3 GA:BY		
97	8	F=NO:BY M=GG:PB	23-Apr	Hatch	25-May	3	3 (1)	3 GG:PG	Seasonal enclosure	
98	7	F= M=		Abandoned, unknown if pre- or post-term		3	0 (0)		Seasonal enclosure	On 1 May, 3 eggs found 50-60% silted in. Insufficient information to estimate initiation and fate date.
99	7	F= M=	3-Apr	Hatch	5-May	3	3 (1)	3 BB:PG	Seasonal enclosure	
100	7	F=NO:WY M=U	30-Apr	Hatch	4-Jun	3	2 (2)	2 GA:OG	Symbolic fence	On 1 May, camera installed. On 4 June, nest camera confirmed 2 chicks hatched.
101	6	F=U M=RR:OG	27-Apr	Hatch	29-May	3	3 (2)	3 PV:GG	Seasonal enclosure	On 19 June, a large, possibly already dead chick banded PV:GG observed picked up and dropped by gull. Chick carcass collected.
102	7	F=GA:GG M=GA:OW	27-Apr	Hatch	29-May	3	3 (3)	3 PV:AB	Seasonal enclosure	Split hatch.
103	7	F=banded M=GA:GY	12-Apr	Hatch	14-May	3	3 (0)	3 RR:WY	Seasonal enclosure	
104	BY	F=GG:WY M=BB:PB	30-Apr	Hatch	1-Jun	2	1 (0)	1 RR:RB	Seasonal enclosure	One egg abandoned post-term.
105	7	F=NB:OW M=U	4-May	Hatch	8-Jun	3	1 (1)	1 GA:RW	Seasonal enclosure	Two eggs (1 with inward dent and 1 without cracks) abandoned post-term.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
106	8	F= M=	1-May	Hatch	2-Jun	3	3 (0)	3 VG:PB	Seasonal enclosure	Split hatch.
107	8	F=U M=GA:YW	23-Apr	Hatch	25-May	3	2 (0)	2 VV:WG	Symbolic fence	One egg (without cracks) abandoned post-term.
108	6	F=U M=	na	Failed, unknown cause	9-May	1	0 (0)		Seasonal enclosure	Nest location known by multiple observations of incubating adult. Minimum of 1 egg. No evidence of hatch observed. Insufficient information to estimate initiation date.
109	SOF	F= M=banded	na	Abandoned pre-term	11-May	3	0 (0)		Symbolic fence	Three eggs abandoned pre-term and later depredated by coyote. Insufficient information to estimate initiation date.
110	NOF	F=U M=	4-May	Depredated	5-Jun	3	0 (0)		Symbolic fence	All 3 eggs depredated by unknown species.
111	7	F=U M=GG:AY	4-May	Abandoned pre-term	13-May	2	0 (0)		Seasonal enclosure	Two eggs abandoned pre-term and later depredated by northern harrier on 17 May.
112	7	F=RR:OY M=BB:YY	5-May	Hatch	6-Jun	3	3 (2)	3 GG:OG	Symbolic fence	
113	7	F= M=	25-Apr	Failed, unknown cause	17-May	3	0 (0)		Seasonal enclosure	
114	NOF	F=U M=GG:AY	28-Apr	Hatch	30-May	3	3 (0)	3 VV:WA	Circular excl. with top Symbolic fence	On 24 May, camera installed. On 30 May, nest camera confirmed 3 chicks hatched.
115	SOF	F=VG:VR M=U	2-May	Hatch	3-Jun	3	2 (2)	2 PG:VG	Circular excl. with top Symbolic fence	One egg abandoned post-term. On 22 July, 1 juvenile observed favoring right leg on Guadalupe-Nipomo Dunes National Wildlife Refuge.
116	6	F=U M=BB:BB	2-May	Hatch	3-Jun	3	2 (2)	2 GA:WY	Symbolic fence	One egg (without cracks) abandoned post-term.
117	SOF	F=GA:YW M=U	6-May	Hatch	9-Jun	3	1 (1)	1 VG:YB	Circular excl. with top Symbolic fence	Two eggs abandoned post-term.
118*	NOF	F=U M=U	25-Apr	Abandoned pre-term	28-May	3	0 (0)		Circular excl. with top Symbolic fence	On 31 May, nest determined to be abandoned in circular enclosure and 3 eggs (2 with slight cracks) were transported to Monterey Bay Aquarium (see report Notes section).
119	7	F=U M=U	11-May	Hatch	14-Jun	3	1 (1)	1 PG:GY	Seasonal enclosure	Two eggs (without cracks) abandoned post-term.
120	6	F=U M=U	11-May	Hatch	12-Jun	3	3 (1)	3 VV:OG	Seasonal enclosure	Split hatch.
121	7	F=U M=U	11-May	Hatch	13-Jun	3	2 (2)	2 VV:AW	Seasonal enclosure	One egg (with cracks) abandoned post-term.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
122*	SOF	F=banded M=U	6-May	Abandoned pre-term	29-May	3	0 (0)		Circular excl. with top Symbolic fence	On 13 May, camera installed. On 2 June, nest determined to be abandoned in circular enclosure and 3 eggs were transported to Monterey Bay Aquarium (see report Notes section). Nest camera confirmed last day of incubation on 29 May.
123	7	F=U M=GG:AY	6-May	Hatch	7-Jun	3	2 (2)	2 PG:YG	Symbolic fence	On 21 May, 1 egg buried at nest. Egg replaced on surface in nest bowl and marked. Marked egg (without cracks) abandoned post-term.
124	7	F=GG:BB M=BB:WY	5-May	Hatch	6-Jun	3	3 (2)	1 unbanded	Seasonal enclosure	Three chicks not banded to avoid disturbing nearby young snowy plover broods.
125	7	F=VV:VW M=U	5-May	Hatch	6-Jun	2	1 (1)	1 unbanded	Seasonal enclosure	One egg abandoned post-term. Chick not banded to avoid disturbing nearby young snowy plover broods.
126	8	F=U M=GG:YG	22-Apr	Hatch	24-May	3	2 (0)	2 PV:VB	Symbolic fence	One egg with unknown fate showed cracks and tapping but egg or hatched chick not seen subsequently.
127	7	F=U M=banded	21-Apr	Hatch	23-May	2	2 (0)	2 GA:GW	Seasonal enclosure	Split hatch.
128	Unknown	F= M=Y-:GO	2-Apr	Hatch	(4-May)	2	2 (0)	2 unbanded		Chicks not banded to avoid disturbing nearby young snowy plover broods.
129*	Unknown	F= M=NO:WB	8-Apr	Hatch	(10-May)	1	1 (0)	1 unbanded		On 10 May, 1 small chick with a banded male from an unknown nest found in the open riding area 0.25 miles north of marker post 6. On 15 May, one unbanded chick with NO:WB male was found dead on 6 enclosure shoreline. This chick was last seen alive on 14 May at 4 days old (see report Notes section).
130	6	F=U M=U	23-Apr	Hatch	25-May	3	3 (2)	3 VV:GY	Seasonal enclosure	
131	7	F=U M=U	6-May	Hatch	7-Jun	3	3 (3)	3 PG:AG	Seasonal enclosure	Split hatch.
132	6	F=GG:GG M=GA:WB	8-May	Hatch	9-Jun	3	3 (2)	3 PG:AB	Seasonal enclosure	
133	7	F=U M=GG:AY	14-May	Hatch	15-Jun	3	3 (2)	3 PV:BW	Seasonal enclosure	
134	8	F=U M=U	8-May	Hatch	9-Jun	3	2 (2)	2 GA:VY	Symbolic fence	One egg (without cracks) abandoned post-term.
135	NOF	F=VV:WY M=GG:AG	14-May	Hatch	17-Jun	3	3 (3)	3 VV:AR	Symbolic fence	Split hatch.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
136	6	F=U M=V-:AY	9-May	Hatch	10-Jun	3	3 (2)	3 GG:OB	Seasonal enclosure	
137	7	F= M=U	16-May	Hatch	17-Jun	2	2 (2)	2 PG:OB	Seasonal enclosure	Split hatch.
138*	6	F=RR:PB M=U	14-May	Hatch	15-Jun	3	3 (1)	3 GG:BR	Seasonal enclosure	On 28 June (13 days of age) and 4 July (19 days of age), 1 chick observed in open riding area and directed back to enclosure (see report Notes section).
139	6	F=VV:BG M=U	8-May	Hatch	9-Jun	2	2 (2)	2 GG:RW	Seasonal enclosure	
140	6	F=U M=VV:WB	9-May	Hatch	10-Jun	3	3 (2)	3 GG:OW	Seasonal enclosure	
141	BY	F=U M=U	15-May	Hatch	16-Jun	3	3 (0)	3 PG:GW	Seasonal enclosure	
142*	6	F=U M=GG:BR	20-May	Abandoned pre-term	28-May	3	0 (0)		Bumpout Seasonal enclosure	On 30 May, nest determined to be abandoned and 3 eggs were transported to Monterey Bay Aquarium (see report Notes section).
143	6	F=U M=VV:VW	11-May	Hatch	12-Jun	3	3 (0)	3 VV:OB	Seasonal enclosure	
144	6	F=U M=	18-May	Hatch	19-Jun	3	3 (0)	3 PV:AW	Seasonal enclosure	
145	SOF	F=U M=U	16-May	Hatch	17-Jun	3	3 (3)	3 VO:BW	Circular excl. with top Symbolic fence	
146	8	F=U M=W-:Y/G	19-May	Hatch	21-Jun	3	3 (1)	3 VG:PG	Seasonal enclosure	Split hatch.
147	BY	F=RR:VW M=BB:VR	19-May	Hatch	20-Jun	3	2 (2)	2 GG:RY	Seasonal enclosure	One egg (without cracks) abandoned post-term.
148	BY	F= M=	15-May	Abandoned pre-term	24-May	3	0 (0)		Seasonal enclosure	
149	6	F=GG:VY M=BB:WB	21-May	Hatch	24-Jun	2	1 (1)	1 GG:OR	Seasonal enclosure	One egg (without cracks) abandoned post-term.
150	8	F=GA:VR M=U	8-May	Hatch	9-Jun	3	2 (2)	2 GG:WR	Symbolic fence	One egg unknown fate.
151	8	F=B-:Y/G M=RR:WB	13-May	Hatch	14-Jun	3	3 (1)	3 unbanded	Seasonal enclosure	Split hatch.
152	SOF	F=U M=VV:BY	20-May	Hatch	22-Jun	3	2 (1)	2 PG:WG	Circular excl. with top Symbolic fence	One egg abandoned post-term.
153	6	F=VG:GW M=U	12-May	Hatch	13-Jun	3	3 (0)	3 unbanded	Seasonal enclosure	Chicks not banded to avoid disturbing nearby young snowy plover broods.
154	NOF	F=U M=U	17-May	Hatch	18-Jun	3	3 (2)	2 GG:PW	Circular excl. with top Symbolic fence	
155	6	F= M=	18-May	Hatch	19-Jun	3	3 (0)	3 unbanded	Seasonal enclosure	

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
156	6	F=U M=U	20-May	Hatch	22-Jun	3	2 (1)	2 unbanded	Symbolic fence	One egg unknown fate. Chicks not banded to avoid disturbing nearby young snowy plover broods.
157	NOF	F=U M=U	20-May	Hatch	26-Jun	3	3 (1)	3 GG:BG	Symbolic fence	
158	7	F=VG:AR M=U	15-May	Hatch	17-Jun	2	2 (2)	2 unbanded	Symbolic fence	Chicks not banded to avoid disturbing nearby young snowy plover broods.
159	6	F=U M=VV:BB	15-May	Hatch	16-Jun	3	3 (2)	3 PG:BW	Seasonal enclosure	Split hatch.
160	6	F=U M=U	2-May	Hatch	3-Jun	3	3 (0)	3 unbanded	Seasonal enclosure	Chicks not banded to avoid disturbing nearby young snowy plover broods.
161	7	F=PV:VY M=GA:AG	13-May	Hatch	14-Jun	3	2 (2)	2 unbanded	Symbolic fence	One egg with unknown fate. Chicks not banded to avoid disturbing nearby young snowy plover broods.
162	BY	F=VG:AW M=U	25-May	Hatch	26-Jun	3	3 (0)	3 BB:VG	Seasonal enclosure	
163	7	F=NB:PG M=GA:GY	25-May	Hatch	26-Jun	3	3 (2)	3 GG:AG	Seasonal enclosure	Split hatch.
164	SOF	F=U M=VV:YW	22-May	Hatch	23-Jun	3	2 (0)	2 PV:OB	Circular excl. with top Symbolic fence	One egg abandoned post-term.
165	8	F= M=U	14-May	Hatch	15-Jun	1	1 (0)	1 unbanded	Seasonal enclosure	
166	6	F=U M=U	23-May	Hatch	24-Jun	3	3 (0)	3 unbanded	Symbolic fence	Chicks not banded to avoid disturbing nearby young snowy plover broods.
167	6	F=PV:WB M=U	19-May	Hatch	20-Jun	3	3 (1)	3 unbanded	Seasonal enclosure	Split hatch. Chicks not banded to avoid disturbing nearby young snowy plover broods.
168	8	F= M=	14-May	Unknown	12-Jun	3	0 (0)		Seasonal enclosure	Two eggs unknown fate. One egg (with cracks) abandoned unknown pre- or post-term.
169	7	F= M=	17-May	Unknown	18-Jun	3	0 (0)		Seasonal enclosure	Two eggs unknown fate. One egg abandoned unknown pre- or post-term.
170	NOF	F=U M=U	30-May	Hatch	1-Jul	3	3 (2)	3 BB:VB	Circular excl. with top Symbolic fence	On 6 June, camera installed at nest. On 1 July nest camera confirmed 3 chicks hatched. On 8 August, 1 fledgling favoring right leg, seen subsequently without limp.
171	6	F=U M=U	25-May	Hatch	26-Jun	3	3 (2)	3 unbanded	Symbolic fence	Split hatch. Chicks not banded to avoid disturbing nearby young snowy plover broods.
172	BY	F=VG:VR M=RR:OR	31-May	Hatch	3-Jul	3	3 (2)	3 GG:WG	Seasonal enclosure	
173	7	F=GG:? M=	18-May	Hatch	19-Jun	3	1 (0)	1 unbanded	Seasonal enclosure	Two eggs unknown fate.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
174	6	F=U M=BB:AG	28-May	Hatch	29-Jun	1	1 (0)	1 BB:VY	Seasonal enclosure	
175	6	F= M=U	27-May	Hatch	28-Jun	3	2 (1)	2 GG:VW	Seasonal enclosure	Split hatch. One egg abandoned post-term.
176	6	F=VG:OG M=U	19-May	Hatch	20-Jun	3	3 (1)	3 PG:VR	Bumpout Seasonal enclosure	
177	7	F=BB:WW M=BB:YW	18-May	Hatch	19-Jun	3	3 (2)	3 unbanded	Symbolic fence	Chicks not banded to avoid disturbing nearby young snowy plover broods.
178	Unknown	F= M=GG:AR	29-Apr	Hatch	(31-May)	3	3 (3)	3 unbanded		
179	8	F=U M=U	19-May	Hatch	20-Jun	3	2 (1)	2 unbanded	Seasonal enclosure	Split hatch. One egg unknown fate.
180	6	F=U M=U	29-May	Hatch	30-Jun	3	3 (1)	3 GA:OW	Seasonal enclosure	Split hatch.
181	Unknown	F= M=U	3-Jun	Hatch	(5-Jul)	1	1 (0)	1 unbanded		
182	7	F=PV:VG M=U	29-May	Hatch	30-Jun	3	3 (1)	3 BB:GB	Seasonal enclosure	Split hatch.
183	7	F=GG:YG M=BB:PG	4-Jun	Hatch	6-Jul	3	3 (2)	3 PV:BB	Seasonal enclosure	
184	6	F=NO:WY M=Y-:GO	4-Jun	Hatch	6-Jul	3	2 (2)	2 PV:PW	Seasonal enclosure	One unusually elongate egg (without cracks) abandoned post-term.
185	7	F=U M=U	31-May	Hatch	2-Jul	3	3 (2)	3 GG:VG	Seasonal enclosure	
186	6	F=U? M=U	1-Jun	Hatch	3-Jul	6	2 (0)	2 GG:GY	Seasonal enclosure	On 11 June, 3 eggs in nest bowl. On 3 July, 4 eggs and 2 chicks present. Four eggs (without cracks) abandoned post-term.
187	6	F=U M=GG:BR	2-Jun	Hatch	4-Jul	3	3 (0)	3 unbanded	Symbolic fence	
188	7	F=U M=U	5-Jun	Hatch	7-Jul	3	3 (0)	3 PV:PB	Seasonal enclosure	
189	7	F=GG:VY M=BB:GW	31-May	Hatch	2-Jul	1	1 (0)	1 PV:VG	Seasonal enclosure	
190	8	F= M=	na	Abandoned, unknown if pre- or post-term	18-Jun	3	0 (0)		Seasonal enclosure	Nest observed active during a 16-day period 1 June to 17 June, with inconsistent incubation prior to abandonment. Insufficient information to estimate initiation date.
191	6	F=banded M=	19-May	Hatch	20-Jun	3	2 (0)	2 unbanded	Seasonal enclosure	One egg with unknown fate.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
192	6	F=PG:GG M=	na	Abandoned post-term	9-Aug	3	0 (0)		Symbolic fence	Three eggs abandoned post-term after minimum of 64 days of incubation. Insufficient information to estimate initiation date.
193	8	F=banded M=GA:BG	24-May	Hatch	25-Jun	3	2 (2)	2 unbanded	Symbolic fence	One egg abandoned post-term. Chicks not banded to avoid disturbing nearby young snowy plover broods.
194	7	F=U M=VV:VR	3-Jun	Hatch	5-Jul	3	3 (0)	3 unbanded	Symbolic fence	
195	7	F=U M=GA:GB	2-Jun	Hatch	4-Jul	3	3 (1)	3 unbanded	Symbolic fence	
196	6	F=NO:GB M=U	4-Jun	Hatch	6-Jul	3	2 (0)	2 unbanded	Seasonal exclosure	One egg abandoned post-term. Chicks not banded to avoid disturbing nearby young snowy plover broods.
197	6	F=banded M=U	30-May	Hatch	1-Jul	3	3 (2)	3 unbanded	Seasonal exclosure	
198	SOF	F=GA:WB M=VG:AB	na	Abandoned, unknown if pre- or post-term	15-Jun	3	0 (0)		Symbolic fence	Nest observed active during a 5-day period 10 June to 15 June, with inconsistent incubation prior to abandonment. Insufficient information to estimate initiation date. Three abandoned eggs later depredated by coyote on 16 June.
199	NOF	F=GA:GR M=U	6-Jun	Hatch	8-Jul	2	1 (1)	1 VG:PW	Symbolic fence	One egg (without cracks) abandoned post-term.
200	6	F=VV:AW M=GG:WB	3-Jun	Hatch	5-Jul	3	2 (2)	2 PG:PB	Seasonal exclosure	One egg (without cracks) abandoned post-term.
201	7	F=V-:BR M=U	30-May	Hatch	1-Jul	1	1 (0)	1 GA:BR	Seasonal exclosure	
202	7	F=U M=U	4-Jun	Hatch	6-Jul	3	2 (0)	2 PV:PG	Seasonal exclosure	Split hatch. One egg (without cracks) abandoned post-term.
203	7	F= M=	2-Jun	Hatch	4-Jul	3	3 (1)	3 BB:OB	Seasonal exclosure	
204	6	F=U M=U	2-Jun	Hatch	4-Jul	3	2 (0)	2 unbanded	Symbolic fence	One egg unknown fate. Chicks not banded to avoid disturbing nearby young snowy plover and least tern broods.
205	6	F=U M=U	3-Jun	Hatch	5-Jul	3	3 (0)	3 unbanded	Seasonal exclosure	Chicks not banded to avoid disturbing nearby young snowy plover and least tern broods.
206	7	F=U M=U	2-Jun	Hatch	4-Jul	3	3 (0)	3 unbanded	Symbolic fence	Chicks not banded to avoid disturbing nearby young snowy plover broods.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
207	6	F= M=	na	Unknown	17-Jun	1	0 (0)		Seasonal enclosure	To avoid disturbing young snowy plover broods, nest not walked to when active and egg number unknown. One egg abandoned unknown pre- or post-term. Insufficient information to estimate initiation date.
208	7	F=NY:RB M=NO:GB	5-Jun	Hatch	7-Jul	3	1 (0)	1 VV:RG	Seasonal enclosure	Two eggs (without cracks) abandoned post-term.
209	Unknown	F= M=U	11-May	Hatch	(12-Jun)	2	2 (2)	2 GG:RG		
210	6	F= M=	na	Unknown	27-Jun	0	0 (0)		Seasonal enclosure	Nest location known by multiple observations of incubating adult. To avoid disturbing young snowy plover and least tern broods, nest not walked to and egg number unknown. Insufficient information to estimate initiation date.
211	6	F=BB:WY M=VG:VG	2-Jun	Hatch	4-Jul	3	3 (1)	3 PG:GB	Seasonal enclosure	Split hatch.
212	6	F=U M=U	18-May	Hatch	19-Jun	3	3 (1)	3 PV:VR	Seasonal enclosure	Split hatch.
213	SOF	F=U M=U	3-Jun	Hatch	5-Jul	3	3 (2)	3 BB:GR	Circular excl. with top Symbolic fence	
214	6	F=PV:VB M=BB:WY	31-May	Hatch	2-Jul	3	3 (2)	3 unbanded	Symbolic fence	Chicks not banded to avoid disturbing nearby young snowy plover broods.
215	NOF	F=NB:OW M=U	14-Jun	Hatch	16-Jul	3	1 (0)	1 VV:OW	Symbolic fence	Two eggs (without cracks) abandoned post-term.
216	8	F=NO:BY M=PV:YB	6-Jun	Hatch	8-Jul	3	3 (2)	3 PG:BB	Seasonal enclosure	
217	NOF	F=U M=U	7-Jun	Hatch	9-Jul	3	3 (0)	3 unbanded	Symbolic fence	Split hatch.
218	6	F=U M=NO:WB	19-May	Hatch	20-Jun	3	3 (1)	2 VG:PY 1 unbanded	Seasonal enclosure	Split hatch. Unbanded chick last seen with brood 27 June, when 6 days old.
219	6	F=banded M=banded	20-Jun	Unknown	27-Jul	1	0 (0)		Seasonal enclosure	On 21 June, 1 abnormally small egg at nest. To avoid disturbing young snowy plover broods, nest not walked to again. One abnormally small egg abandoned post-term.
220	6	F=U M=GG:VB	13-Jun	Hatch	15-Jul	2	1 (1)	1 PG:PY	Seasonal enclosure	One egg (without cracks) abandoned post-term.
221	8	F=banded M=U	30-May	Hatch	2-Jul	3	2 (2)	2 VV:WB	Seasonal enclosure	Split hatch. One egg (without cracks) abandoned post-term.
222	NOF	F=GG:WY M=BB:PB	9-Jun	Hatch	11-Jul	3	3 (1)	3 PG:AW	Symbolic fence	

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
223	NOF	F=U M=U	9-Jun	Hatch	11-Jul	3	2 (0)	2 PG:WB	Circular excl. with top Symbolic fence	One egg (without cracks) abandoned post-term.
224	NOF	F=U M=V:-BR	6-Jun	Hatch	8-Jul	3	3 (2)	PG:PG	Circular excl. with top Symbolic fence	
225	8	F=U M=GG:PB	7-Jun	Hatch	9-Jul	3	3 (2)	2 PV:VW 1 unbanded	Seasonal exclosure	Split hatch. One PV:VW chick and 1 unbanded chick fledged.
226	Unknown	F= M=PV:BR	18-May	Hatch	(20-Jun)	2	2 (2)	2 GA:OY		
227	BY	F=U M=	23-Jun	Hatch	25-Jul	3	2 (0)	2 VG:WR	Seasonal exclosure	One egg (without cracks) abandoned post-term.
228	7	F= M=U	19-Jun	Hatch	21-Jul	3	2 (1)	2 PV:WY	Symbolic fence	One egg (without cracks) abandoned post-term.
229	7	F=U M=GA:Y-	7-Jun	Hatch	8-Jul	2	2 (2)	2 PG:AR	Seasonal exclosure	Split hatch.
230	6	F=VV:AA M=U	17-Jun	Hatch	19-Jul	2	1 (0)	1 unbanded	Seasonal exclosure	One egg unknown fate.
231	6	F=G:-VW M=U	20-Jun	Hatch	22-Jul	2	2 (2)	2 PG:YW	Seasonal exclosure	Two chicks fledging from shore near open riding area and were obviously smaller in size and less developed than normal 28-day-old chicks.
232	8	F=NS:WW M=	21-Jun	Hatch	23-Jul	2	2 (0)	2 PG:OW	Symbolic fence	
233	8	F=BB:WG M=GA:YW	20-Jun	Hatch	22-Jul	3	2 (0)	2 VV:RW	Symbolic fence	Split hatch. One egg (without cracks) abandoned post-term.
234	6	F=VV:VW M=U	10-Jun	Hatch	12-Jul	3	3 (2)	3 PG:PW	Seasonal exclosure	Split hatch. On 22 to 24 August, 1 PG:PW juvenile observed favoring right leg.
235	7	F=GA:YG M=U	12-Jun	Hatch	14-Jul	3	2 (0)	2 PG:RB	Symbolic fence	One egg (without cracks) abandoned post-term.
236	8	F= M=U	14-Jun	Hatch	16-Jul	2	2 (0)	2 PV:RB	Seasonal exclosure	
237	8	F=U M=GG:YG	17-Jun	Hatch	19-Jul	3	3 (0)	3 VG:OW	Seasonal exclosure	
238	6	F=U M=U	29-Jun	Hatch	31-Jul	3	3 (0)	3 unbanded	Mini-exclosure Buffer fence Symbolic fence	On 24 July, mini-exclosure and additional fencing installed around nest, as "buffer fencing" after large group of roosting gulls surround the nest. Nest considered hatched 31 July, day after final observation of a bird on the nest. On 14 September, no eggs within mini and substrate unchanged. Nest not walked to earlier to avoid disturbing nearby young snowy plover broods.
239	NOF	F=U M=GG:AY	25-Jun	Hatch	27-Jul	3	3 (0)	2 PG:WW 1 unbanded	Circular excl. with top Symbolic fence	Split hatch.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
240	SOF	F=U? M=banded	3-Jun	Depredated, coyote	3-Jul	3	0 (0)		Symbolic fence	On 2 July, 2 of the 3 eggs had cracks. The initiation date was estimated based on a potential hatch date of 5 July.
241	SOF	F=GA:WB M=VG:AB	21-Jun	Hatch	23-Jul	3	3 (3)	2 GA:YR 1 unbanded	Circular excl. with top Symbolic fence	Split hatch.
242	7	F=banded M=U	1-Jul	Hatch	2-Aug	3	3 (3)	3 unbanded	Seasonal enclosure	Split hatch. Chicks not banded to avoid disturbing nearby young snowy plover broods
243	SOF	F=U M=U	5-Jul	Hatch	6-Aug	3	3 (2)	3 PG:WY	Circular excl. with top Symbolic fence	
244	6	F=U M=BB:RY	30-Jun	Hatch	1-Aug	3	3 (0)	2 VV:WR 1 unbanded	Seasonal enclosure	Split hatch.
245	Unknown	F= M=GA:PY	4-Jun	Hatch	(6-Jul)	2	2 (1)	2 PV:PY		
246*	6	F=RR:PB M=BB:BY	5-Jul	Hatch	6-Aug	2	2 (2)	2 PV:RW	Seasonal enclosure	Between 19 August to 2 September, chicks observed in open riding area and directed back into enclosure on 5 different days (see report Notes section). Two chicks fledging from shore near open riding area and were obviously smaller in size and less developed than normal 28-day-old chicks.
247	NOF	F=GA:BW M=U	6-Jul	Hatch	7-Aug	3	3 (3)	3 PG:GR	Mini-enclosure Symbolic fence	
248	6	F=U M=U	6-Jul	Hatch	7-Aug	3	3 (2)	3 unbanded	Seasonal enclosure	Chicks not banded to avoid disturbing nearby young snowy plover broods.
249	7	F= M=	na	Abandoned pre-term	15-Jul	3	0 (0)		Symbolic fence	
250*	6	F=banded M=U	1-Jul	Hatch	2-Aug	2	2 (2)	2 PG:RG	Seasonal enclosure	On 17 September, 1 PG:RG juvenile with an injured left leg was taken to Pacific Wildlife Care in San Luis Obispo County for veterinary treatment. On 19 September this juvenile was transported to Monterey Bay Aquarium (see report Notes section).
251	6	F=GG:VY M=	7-Jul	Hatch	8-Aug	2	2 (1)	2 VV:YR	Seasonal enclosure	
252	8	F=VV:BG M=U	18-Jun	Hatch	20-Jul	3	2 (1)	2 PV:AR	Seasonal enclosure	One egg (without cracks) abandoned post-term.
253	SOF	F=VG:VR M=U	4-Jul	Hatch	5-Aug	3	3 (2)	2 PG:BR 1 unbanded	Circular excl. with top Symbolic fence	Split hatch. Unbanded chick last seen with brood 9 August, when 3 days old.

Appendix B. Snowy plover nests at ODSVRA in 2014 (continued).

Nest	Location	Adult Pair	Est. Initiation Date	Nest Fate	Fate date (est.)	No. known eggs	No. chicks (No. fledged)	No. chicks banded and combination	Protection Type	Notes
254	7	F=U M=	1-Jul	Unknown	2-Aug	3	0 (0)		Seasonal exclosure	On 31 July, 1 of the 3 eggs had cracks and fate unknown. The initiation date was estimated based on a potential hatch date of 2 August. Two eggs abandoned and found buried on 16 September.
255	Unknown	F=VV:GR M=VG:WB	12-Jun	Hatch	(14-Jul)	2	2 (1)	2 unbanded		Chicks not banded to avoid disturbing nearby young snowy
256	Unknown	F= M=U	15-Jun	Hatch	(17-Jul)	1	1 (0)	1 unbanded		Chick not banded to avoid disturbing nearby young snowy plover broods.
257	Unknown	F=U M=	4-Jun	Hatch	(6-Jul)	2	2 (0)	2 unbanded		Chicks not banded to avoid disturbing nearby young snowy plover broods.
258	Unknown	F=U M=VV:GG	5-Jun	Hatch	(7-Jul)	2	2 (1)	2 unbanded		
259	Unknown	F= M=U	26-Jun	Hatch	(28-Jul)	2	2 (1)	2 unbanded		
260	Unknown	F= M=U	5-Jul	Hatch	(6-Aug)	3	3 (1)	2 unbanded	Seasonal exclosure	
261	6	F= M=	na	Unknown	na	2	0 (0)		Symbolic fence	On 15 September, 2 eggs found on surface of sand. Insufficient information to estimate initiation and fate date.
262	7	F= M=	na	Abandoned, unknown if pre- or post-term	na	3	0 (0)		Seasonal exclosure	On 17 September, 3 eggs found on surface of sand. Insufficient information to estimate initiation and fate date.
Insufficient information available to assign the following broods to a specific nest. Most to all of these broods were likely from nests with an assigned number, known to hatch and with chicks not banded at nest.										
Unk 1	Unknown	F=VV:GR M=	20-May	Hatch	(21-Jun)	2	2 (0)	2 PV:GW		
Unk 2	Unknown	F=GG:WW M=	21-May	Hatch	(22-Jun)	1	1 (0)	1 unbanded		
Unk 3	Unknown	F=U M=U	7-Jun	Hatch	(9-Jul)	2	2 (0)	2 unbanded		
Unk 4	Unknown	F= M=U	28-May	Hatch	(29-Jun)	3	3 (0)	3 unbanded		

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2014.

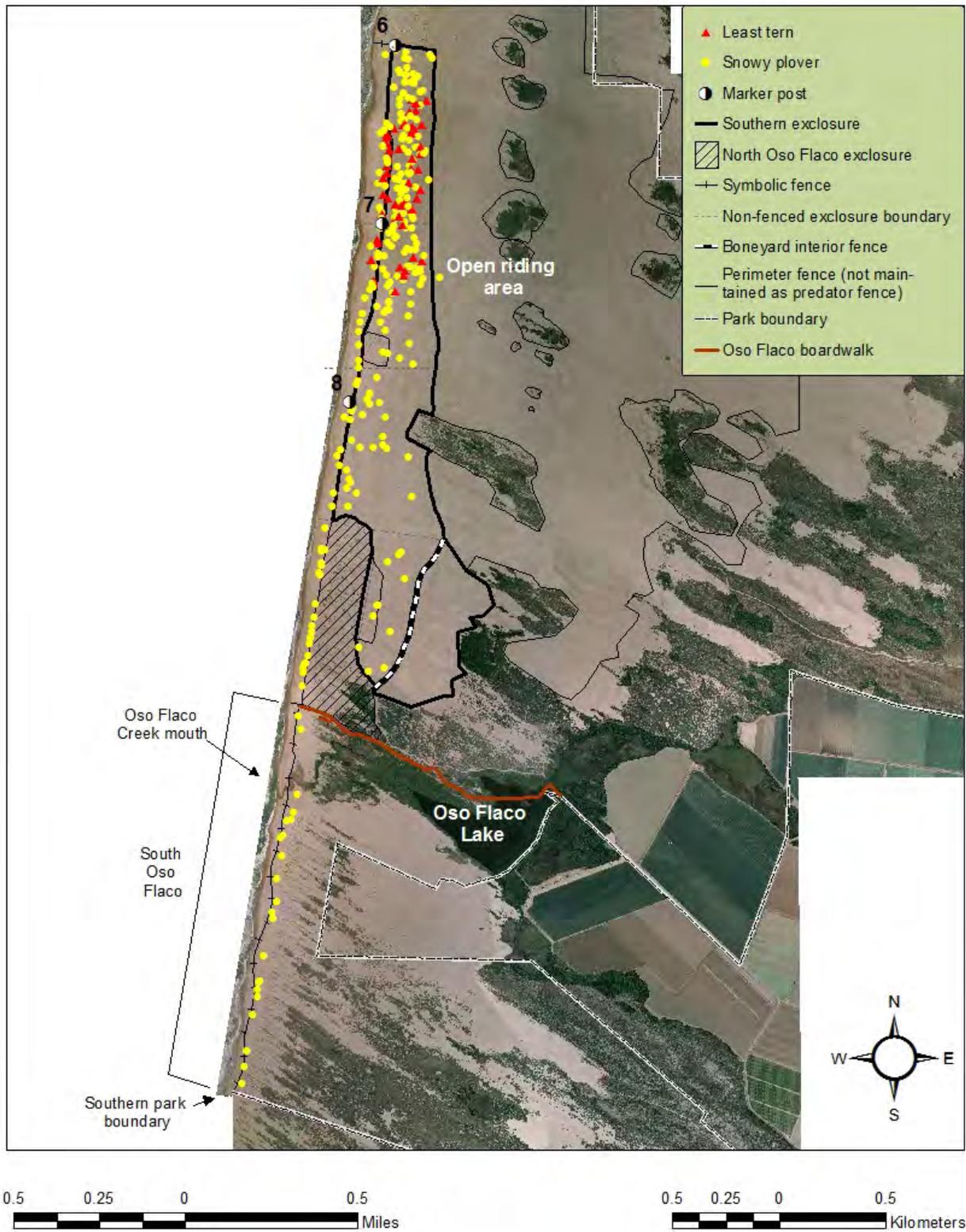


Figure C.1. All California least tern and snowy plover nest locations at ODSVRA in 2014.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2014 (continued).

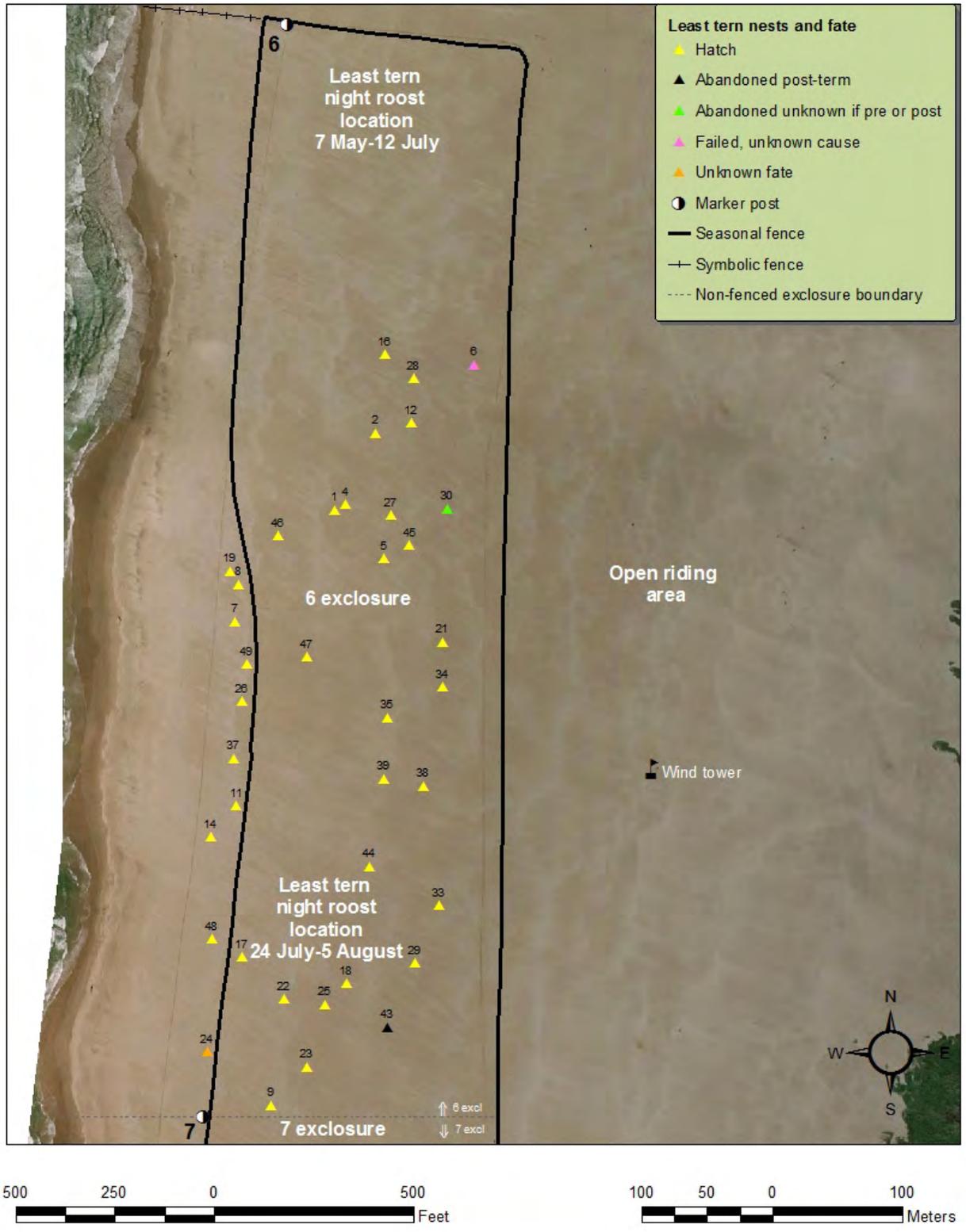


Figure C.2. California least tern nest locations at ODSVRA in 2014 (6 enclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2014 (continued).

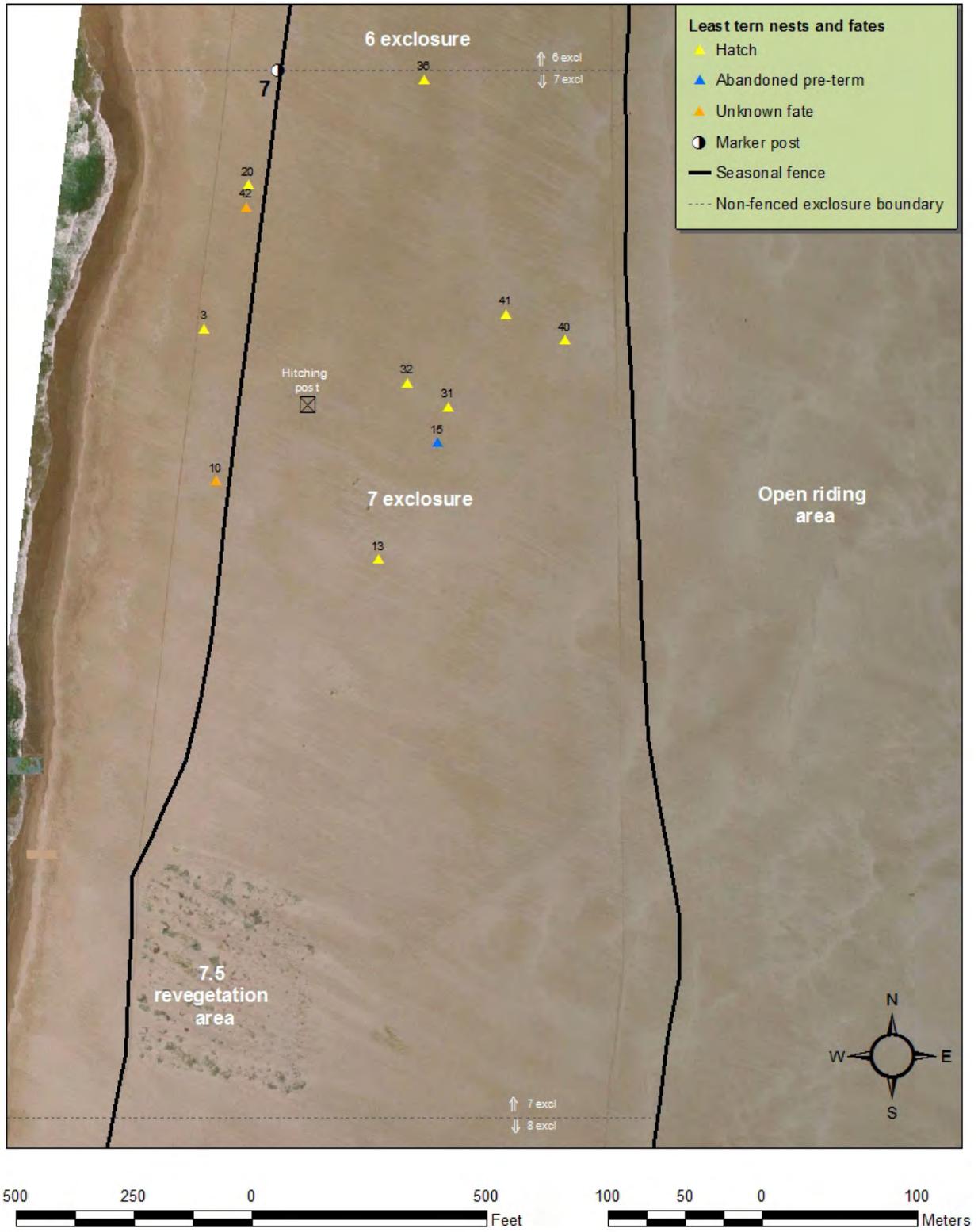


Figure C.3. California least tern nest locations at ODSVRA in 2014 (7 exclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2014 (continued).

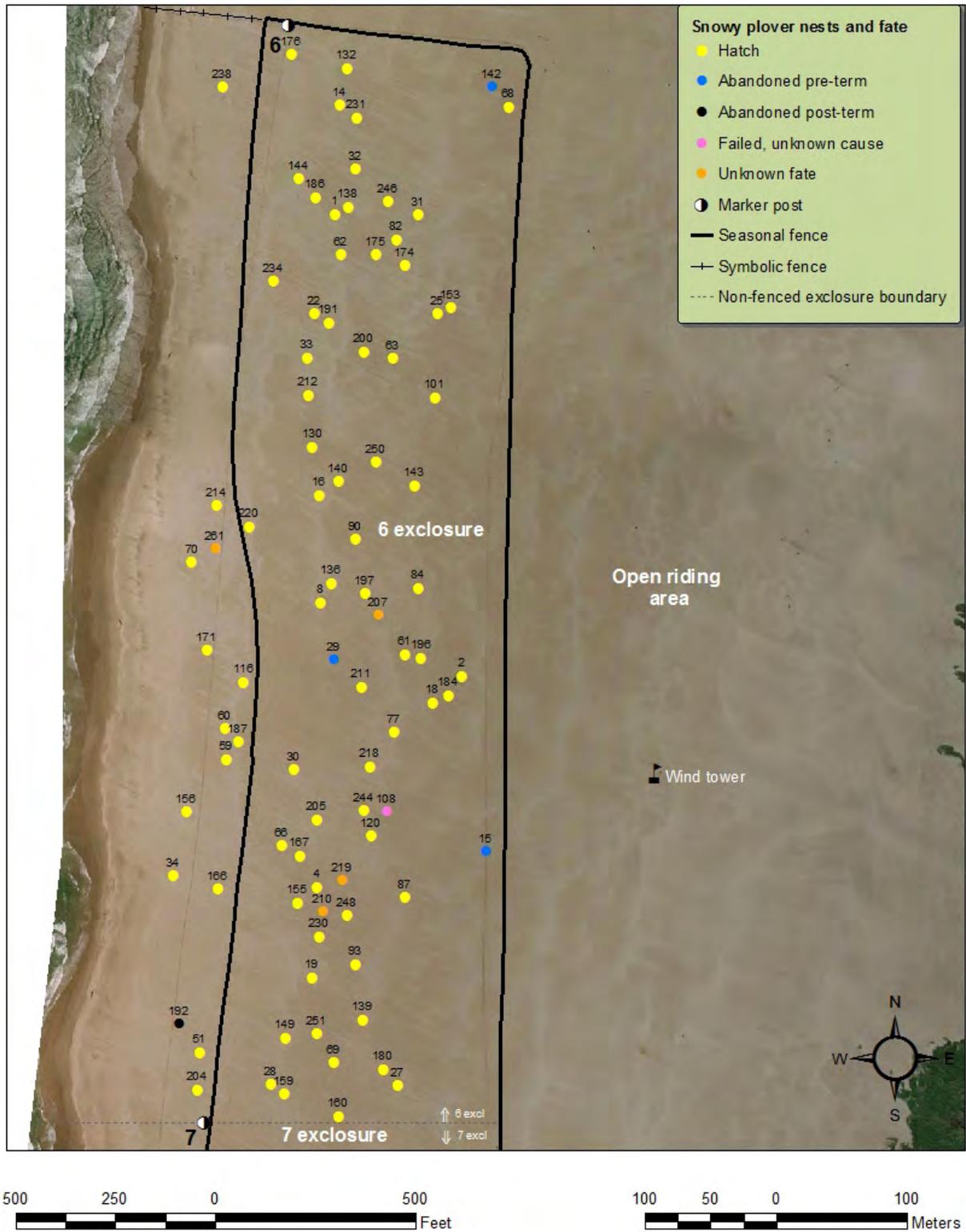


Figure C.4. Snowy plover nest locations at ODSVRA in 2014 (6 enclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2014 (continued).

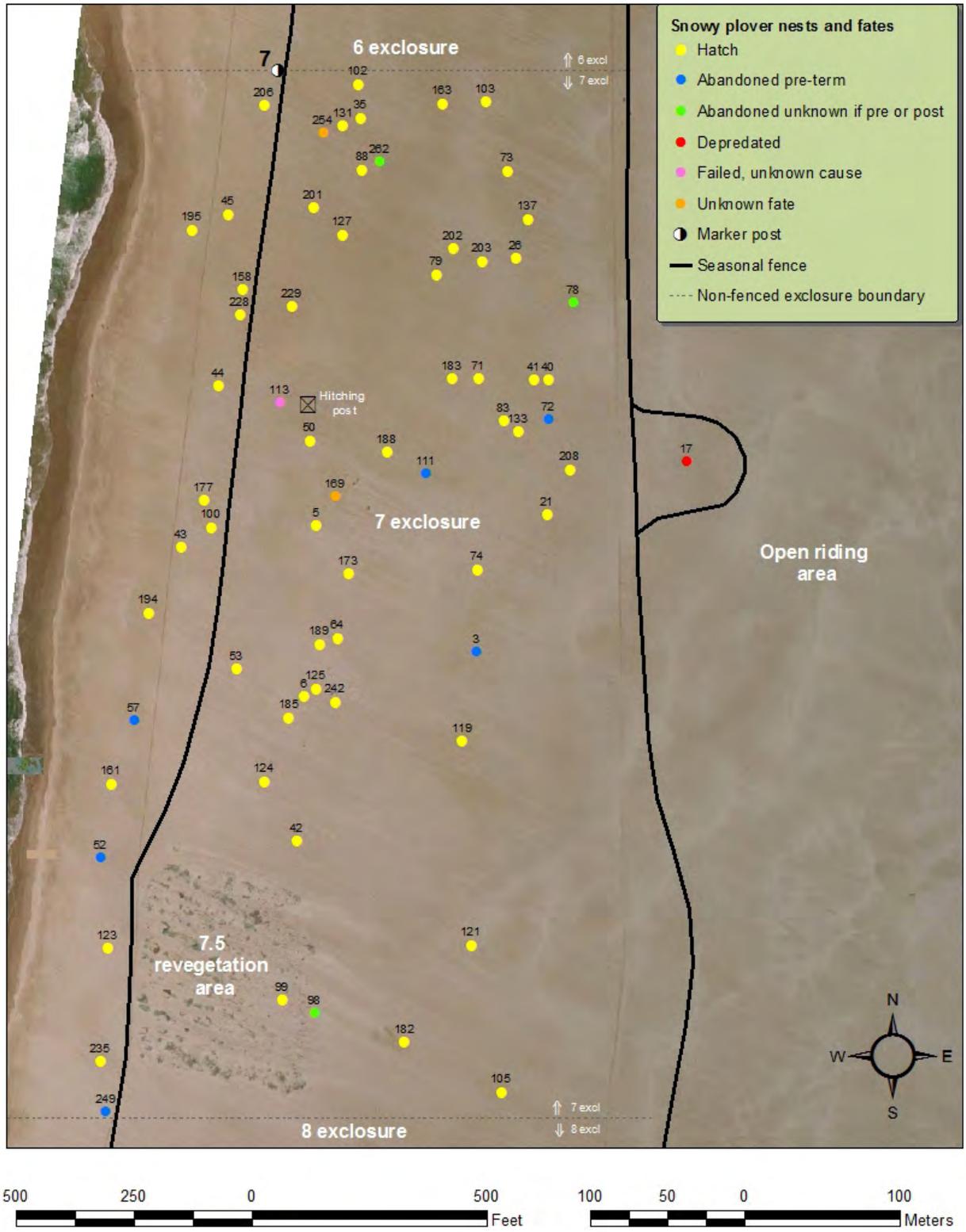


Figure C.5. Snowy plover nest locations at ODSVRA in 2014 (7 exclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2014 (continued).

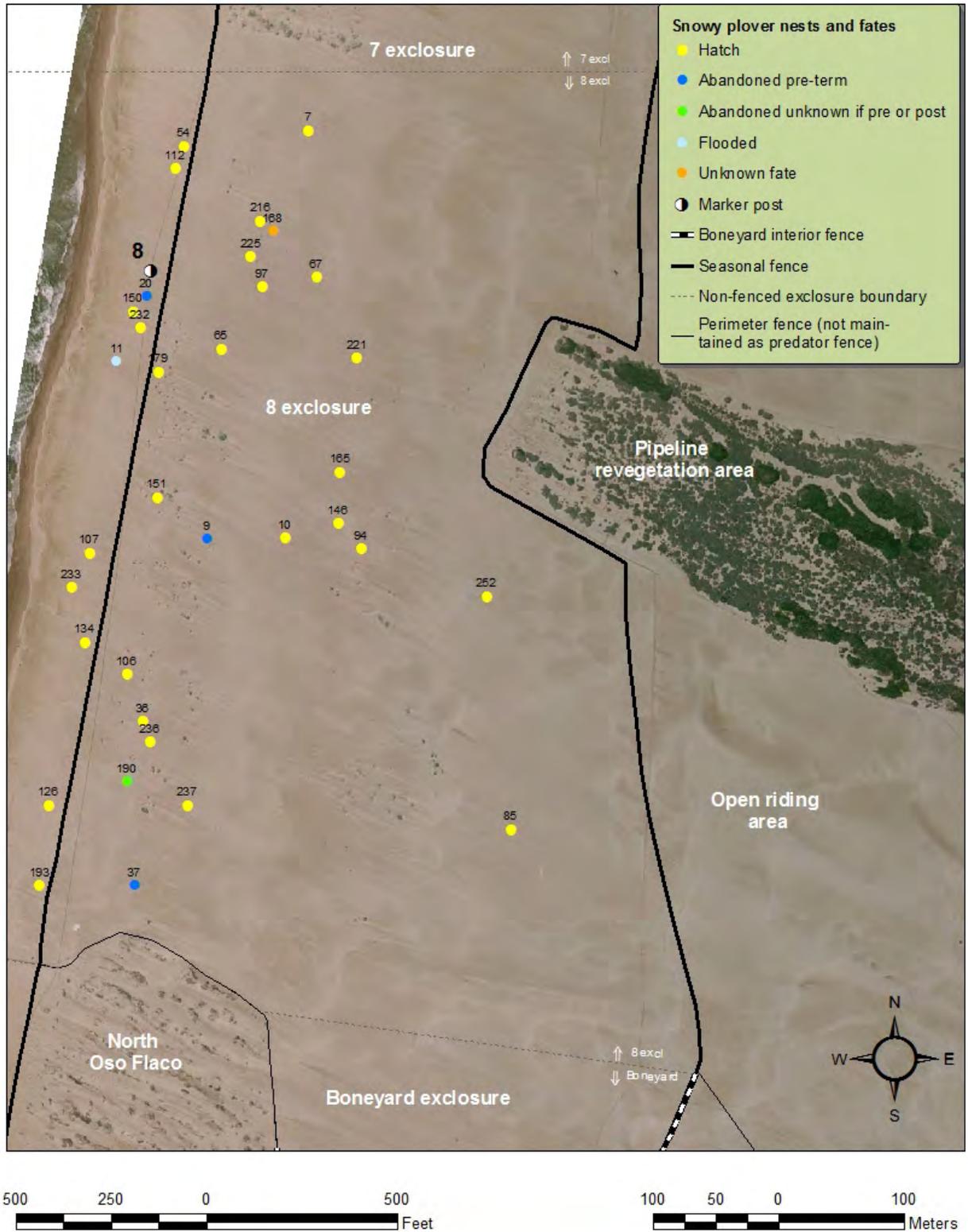


Figure C.6. Snowy plover nest locations at ODSVRA in 2014 (8 enclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2014 (continued).

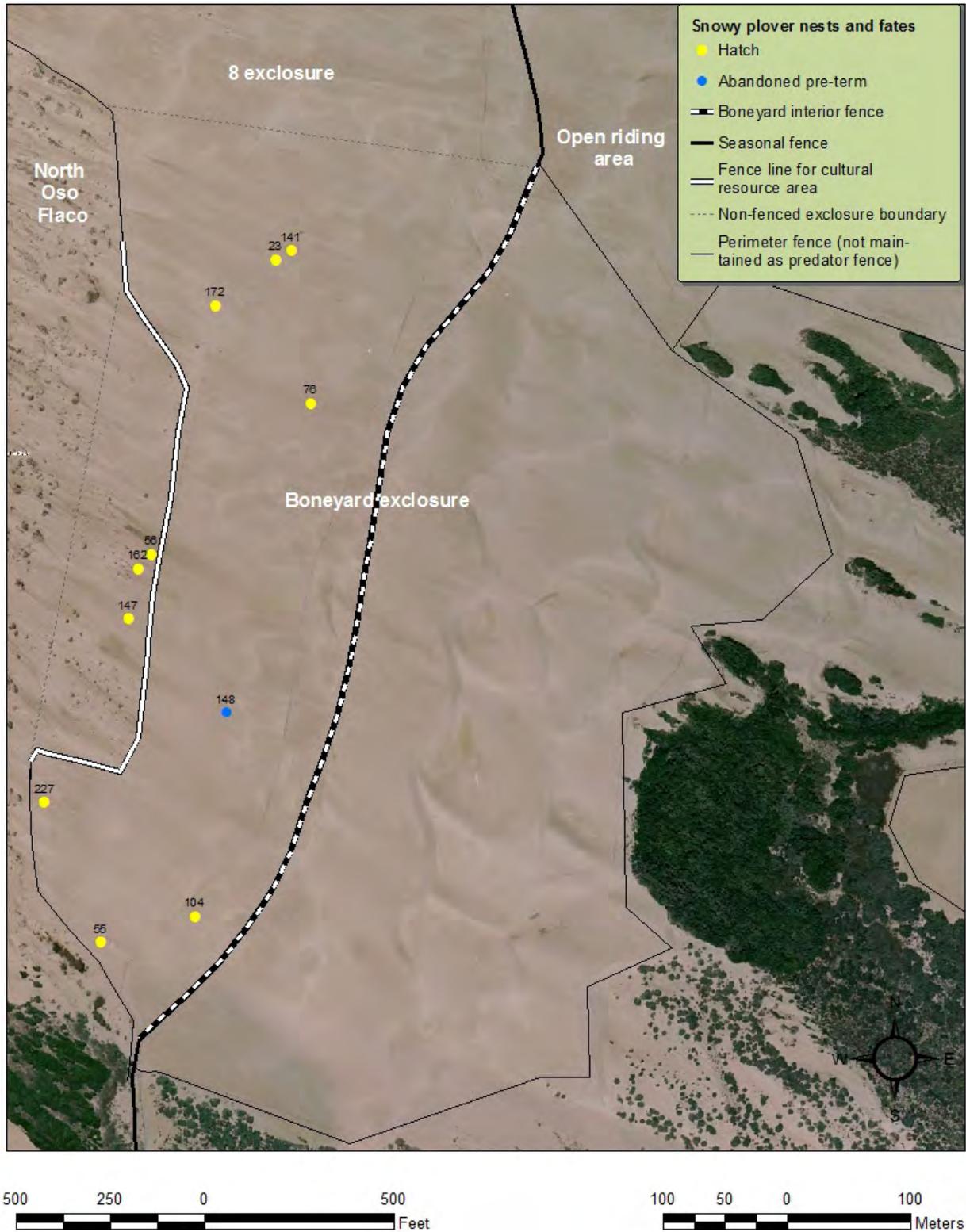


Figure C.7. Snowy plover nest locations at ODSVRA in 2014 (Boneyard enclosure).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2014 (continued).

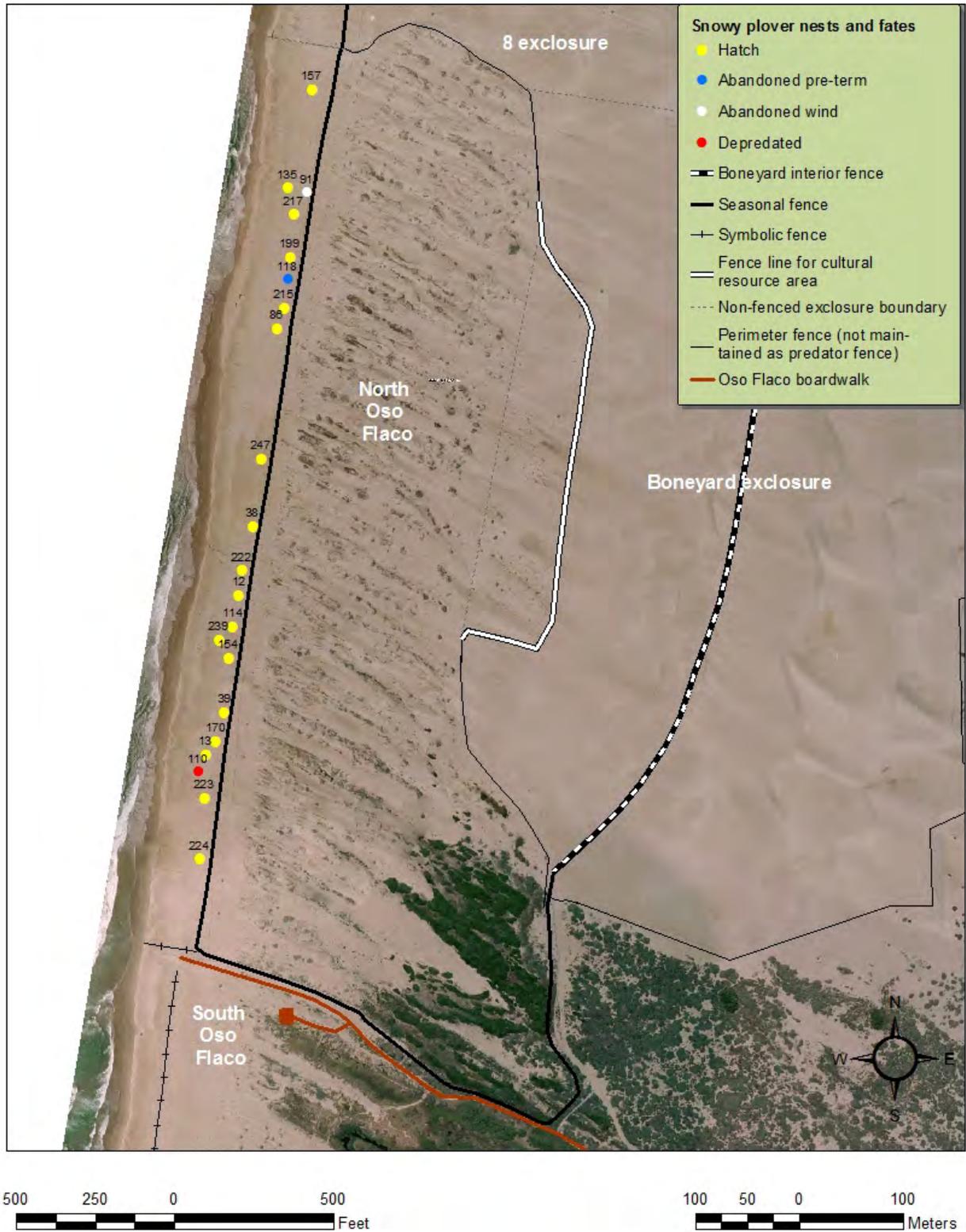


Figure C.8. Snowy plover nest locations at ODSVRA in 2014 (North Oso Flaco).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2014 (continued).

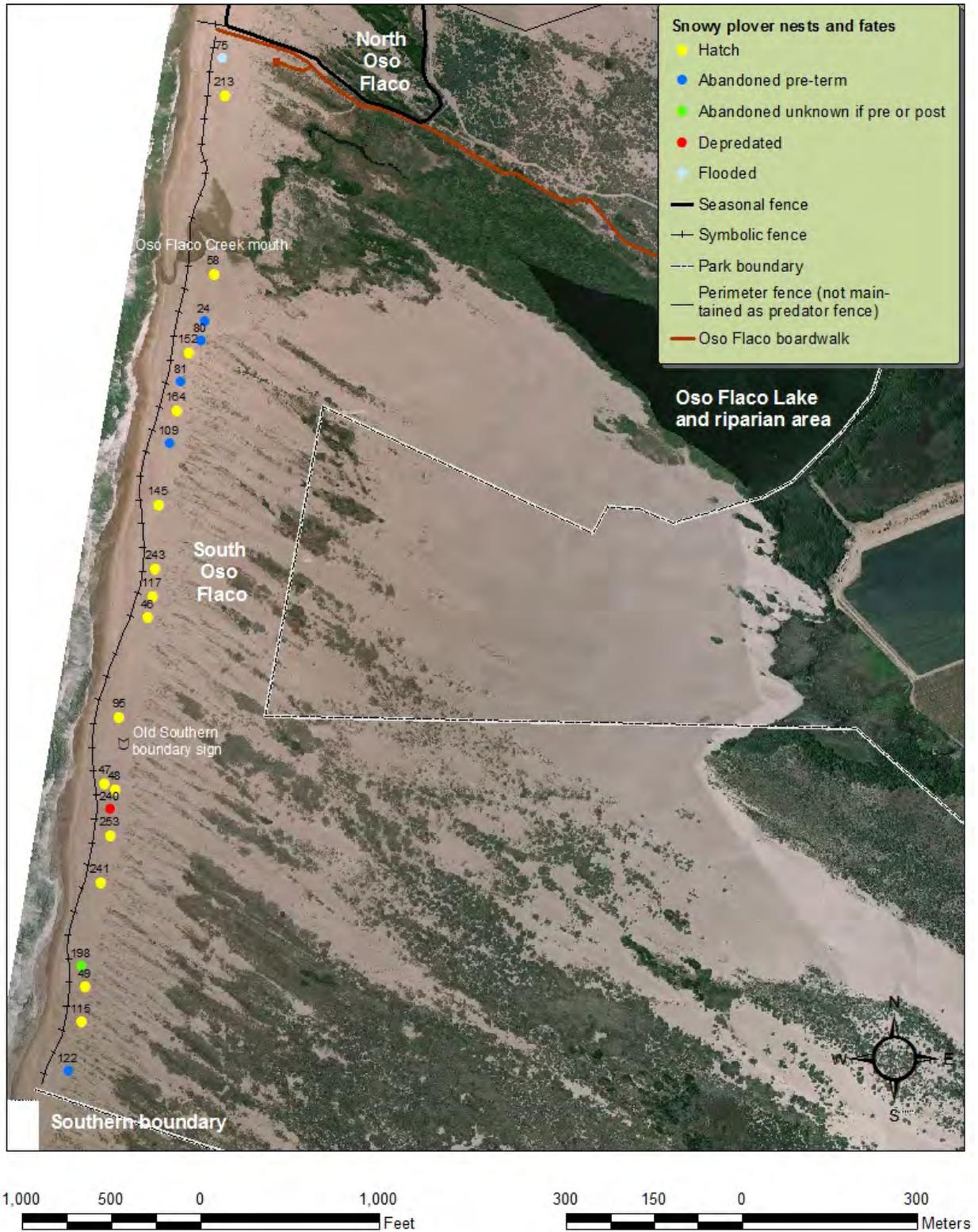


Figure C.9. Snowy plover nest locations at ODSVRA in 2014 (South Oso Flaco).

Appendix D. Banded least terns and snowy plovers.

Table D.1. Banded least terns recorded at ODSVRA in 2014.

Juveniles fledged from ODSVRA in 2014 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. All possible band combinations of known fledges are listed for incomplete band combinations.

Band	Dates Seen	Origin and Year Banded	Notes
(R)?:B/W	7/8	ODSVRA 2012	R:B/W banded in 2012.
-:A/B	6/14, 7/15, 7/27	ODSVRA 2006, 2008, 2010, or 2011	Y/G:A/B in 2006, G/Y:A/B in 2008, W/B:A/B in 2010, B/W:A/B in 2011.
-:G/O	7/29	ODSVRA 2008	G/Y:G/O banded in 2008.
-:G/Y	7/16	ODSVRA 2007, 2008, or 2011	-:G/Y banded in 2007. Also may be B/W:G/Y in 2011, G/Y:G/Y in 2008, or any fledgling in 2007 that lost a band on the left leg.
-:W/A/W	6/8, 7/16, 7/29, 7/31	ODSVRA 2008	G/Y:W/A/W banded in 2008.
-:W/B	5/24, 6/17	ODSVRA 2006, 2009, 2010, or 2011	LT27 breeding adult. 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.
-(S)?	5/21	unknown	LT3 breeding adult. Multiple sites may band with only the federal band. Also may be any fledgling from 2004 when all banded G/Y:S or any fledgling that lost the left band and tape on a metal band.
A/O:B/W	6/30, 7/15, 7/25, 7/29	ODSVRA 2012	
A/Y:B/W	7/16, 7/29	ODSVRA 2012	
B/R:B/W	7/16, 7/22, 8/1	ODSVRA 2012	LT28 breeding adult.
B/R:W/B	6/30	ODSVRA 2009	LT40 breeding adult.
B/W:B/O	6/21	ODSVRA 2011	LT2 breeding adult.
B/W:B/R	6/21	ODSVRA 2011	LT12 breeding adult.
B/W:G/B	6/11, 7/20	ODSVRA 2011	
B/W:G/O	7/29	ODSVRA 2011	
B/W:L	5/28, 6/17	ODSVRA 2011	LT9 breeding adult.
B/W:O/W	7/16	ODSVRA 2011	
B/W:O/Y	5/28, 7/20, 7/22, 7/23	ODSVRA 2011	
B/W:P	6/13, 6/21	ODSVRA 2011	
B/W:W/B	7/15, 7/22	ODSVRA 2009 or 2011	
B/W:W/R	6/25	ODSVRA 2011	
B/W:Y/O	7/8, 7/13	ODSVRA 2011	
B/W:Y/R	7/9	ODSVRA 2011	
B:W/B	7/13, 7/15	ODSVRA 2009	LT3 breeding adult.
B/W:B/R	6/21	ODSVRA 2011	LT12 breeding adult.
G/W:B/W	6/30, 7/2, 7/15, 7/24, 7/30, 7/31	ODSVRA 2012	
G/Y:B/W	5/28, 6/29, 7/16, 7/20, 8/1	ODSVRA 2008 or 2012	LT28 breeding adult.

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

Table D.1. Banded least terns recorded at ODSVRA in 2014 (continued).

Band	Dates Seen	Origin and Year Banded	Notes
G/Y:G/Y	7/30	ODSVRA 2008	
G:B/W	6/12, 7/20, 7/22, 7/29, 7/31	ODSVRA 2012	
O:B/W	6/25, 7/16, 7/20, 7/22, 7/24, 8/1	ODSVRA 2012	LT23 breeding adult.
O/G:B/W	7/2, 7/13, 7/15, 7/22	ODSVRA 2012	
R/W:G/Y	7/30	ODSVRA 2007	
R/W:W/B	6/13, 7/14, 7/15, 7/16, 7/24, 7/29	ODSVRA 2009	
R:W/B	6/11	ODSVRA 2009	
S:-	6/21, 6/23, 7/16, 7/29	Unknown	LT33 breeding adult. Multiple sites may band in this way. Also may be an ODSVRA bird from 2003 when all chicks banded S:G/Y or a fledgling that lost a band on the right leg and tape on a metal band.
V:B/W	7/16, 7/20, 7/21, 7/22, 7/25, 7/31, 8/3, 8/5	ODSVRA 2012	
V:W/B	7/16, 7/23	ODSVRA 2009	
W/A:B/W	7/13, 7/28, 7/29, 7/31, 8/1	ODSVRA 2012	
W/B:W/Y	7/13	ODSVRA 2009	
W/B:B/W	7/22, 7/29	ODSVRA 2010 or 2012	
W/B:B/Y	7/28	ODSVRA 2010	
W/B:G/Y	7/13	ODSVRA 2007	
W/B:R/Y	6/21, 7/22, 7/31	ODSVRA 2010	LT16 breeding adult.
W/B:W	5/21	ODSVRA 2010	
W/B:W/G	6/24, 8/1, 8/3	ODSVRA 2010	LT37 breeding adult.
W/B:W/Y	7/15, 7/23, 7/29	ODSVRA 2010	
W/R:B/W	7/16	ODSVRA 2012	
Y/B:B/W	6/12, 6/13	ODSVRA 2012	
Y/G:B/W	7/20, 8/1	ODSVRA 2006 or 2012	
Y/O:W/B	7/23, 7/24, 7/29, 8/1	ODSVRA 2009	
Y/W/Y:-	6/13, 7/20, 7/29, 7/31	ODSVRA 2007	Y/W/Y:G/Y banded in 2007.
Y/W:B/W	7/6, 7/15, 7/20, 7/22, 7/29	ODSVRA 2012	
Y:B/W	8/10	ODSVRA 2012	

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

Table D.2. Banded snowy plovers with known origins seen at ODSVRA 1 October 2013 to 28 February 2014.

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. At ODSVRA, the same combination may be on birds hatched in different years. ODSVRA=Oceano Dunes SVRA, SLO=San Luis Obispo, VAFB=Vandenberg Air Force Base, SB=State Beach, NWR=National Wildlife Refuge

Band Combination	Origin and Year Banded	County Banded	Dates Seen	Notes
--:V	Unknown		10/2, 10/16	
V-:AY	Unknown		10/1, 10/2, 10/30, 11/5, 11/6	
V-:BR	Unknown		10/12, 10/16, 10/30, 10/31, 11/27, 12/12, 12/18, 1/29	
--:SB	Dunes Overlook 2012	Douglas - Lane Boundary, OR	11/7, 11/21, 11/22, 12/18, 2/5	Silver band above the joint.
WW:GB	South Spit 2011	Humboldt, CA	12/4	Rebanded as a first year adult male.
GB:AW	Fort Ord 2013	Monterey, CA	10/2, 10/6, 10/23, 10/25, 10/30, 10/31, 12/4, 12/18	
GB:PP	Moss Landing SB 2009	Monterey	10/2, 10/22, 11/7, 11/27	
YA:RW	Moss Landing SB 2013	Monterey	10/2	
GL:AR	Pajaro Spit 2009	Monterey	10/8, 10/10, 10/12, 10/16, 10/23, 12/4, 12/9, 12/12, 12/16, 2/5	
YP:OL	Salinas SB 2008	Monterey	10/24, 10/26, 11/6, 11/7	
OL:GP	Salinas River NWR 2009	Monterey	10/6, 11/1, 11/6, 11/21, 12/12	
WA:BL	Salinas River NWR 2013	Monterey	2/5, 2/12	
OG:WW	Marina SB 2013	Monterey	10/7, 10/10, 12/12, 12/16, 12/18, 1/29	
BB:AB	ODSVRA 2010 or 2013	SLO, CA	10/14, 10/16, 11/5, 11/12, 12/18, 1/29	
BB:AR	ODSVRA 2010 or 2013	SLO	10/4, 10/12, 10/21, 10/27, 12/12, 12/18, 2/5	
BB:BW	ODSVRA 2006, 2010, or 2013	SLO	10/5, 10/7, 11/1, 11/12	
BB:BY	ODSVRA 2005, 2010, or 2013	SLO	10/2, 10/20, 10/23, 10/28, 10/29, 10/30, 11/1, 11/6, 12/18	
BB:OG	ODSVRA 2010	SLO	10/30	
BB:OR	ODSVRA 2010	SLO	10/7, 10/13, 10/30, 11/21, 11/22	
BB:PB	ODSVRA 2010 or 2013	SLO	10/2, 10/3, 10/6, 10/7, 10/10, 10/23, 10/26, 10/30, 11/5, 11/7, 11/21, 12/12, 12/16, 12/17, 2/5, 2/12	
BB:PG	ODSVRA 2013	SLO	10/4, 10/23, 10/25, 12/11, 12/18, 1/21	
BB:VB	ODSVRA 2009, 2010, 2011, or 2013	SLO	10/4, 10/6, 10/7, 10/10, 10/21, 10/23, 10/30, 11/6	
BB:VR	ODSVRA 2011 or 2013	SLO	11/6, 11/27, 12/18	
BB:WR	ODSVRA 2010 or 2013	SLO	10/2, 10/3, 10/10	
BB:WW	ODSVRA 2010 or 2013	SLO	10/1, 10/4, 10/6, 10/12, 10/16, 10/23, 11/5, 11/6, 11/12, 12/4, 2/12	
BB:WY	ODSVRA 2010 or 2013	SLO	10/2, 10/3, 10/7, 10/10, 10/13, 10/16, 10/22, 10/23, 10/30, 11/5, 11/6, 11/21, 12/18, 1/29, 2/5	

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

Table D.2. Banded snowy plovers with known origins seen at ODSVRA 1 October 2013 to 28 February 2014 (continued).

Band Combination	Origin and Year Banded	County Banded	Dates Seen	Notes
BB:YG	ODSVRA 2011	SLO	10/23, 12/4	
BB:YW	ODSVRA 2010 or 2013	SLO	10/2, 10/3, 10/12, 10/23, 10/24, 11/5, 11/6, 12/4, 2/5	2 birds.
BB:YY	ODSVRA 2010	SLO	10/13, 10/23, 10/24, 10/25, 12/12	
G:VW	ODSVRA 2013	SLO	10/22, 10/26, 12/4, 12/12, 12/18	
GA:AY	ODSVRA 2012 or 2013	SLO	10/4, 10/27, 12/4, 12/18	
GA:BB	ODSVRA 2010 or 2013	SLO	10/24, 10/30, 11/6	
GA:BW	ODSVRA 2011 or 2013	SLO	10/4, 10/6, 10/10, 12/18, 2/12	
GA:GG	ODSVRA 2004, 2011, or 2013	SLO	10/3, 10/10, 11/5, 12/18, 1/29	
GA:GR	ODSVRA 2012	SLO	10/20, 10/23, 11/7, 11/21, 1/29	
GA:GY	ODSVRA 2012 or 2013	SLO	10/1, 10/4, 10/6, 10/23, 12/18	
GA:RB	ODSVRA 2004 or 2010	SLO	10/1, 10/7, 10/23, 12/18, 1/21	
GA:VB	ODSVRA 2008, 2011, or 2013	SLO	10/2, 10/4, 10/5, 10/6, 10/22, 10/26, 10/28, 11/5, 12/4, 2/12	
GA:YG	ODSVRA 2011 or 2013	SLO	10/16, 10/30	
GA:YW	ODSVRA 2010 or 2013	SLO	12/11	
GG:BR	ODSVRA 2013	SLO	10/2, 10/7, 10/10, 10/16, 10/25, 11/1, 11/7, 11/27, 12/12, 12/18, 1/29	
GG:BW	ODSVRA 2012	SLO	10/2, 10/22, 10/23, 11/6, 11/12, 11/27, 12/4, 12/12, 12/18	
GG:PB	ODSVRA 2012 or 2013	SLO	10/4, 10/6, 10/16, 10/23, 10/30, 12/16, 2/12	
GG:PW	ODSVRA 2013	SLO	10/6, 10/10, 10/16, 11/6, 12/18, 2/5	
GG:PY	ODSVRA 2012	SLO	10/7, 10/22, 10/23, 11/21	
GG:VB	ODSVRA 2011 or 2013	SLO	10/5	
GG:VW	ODSVRA 2008 or 2013	SLO	10/2, 11/6, 12/16, 2/5	
GG:VY	ODSVRA 2008, 2011, or 2013	SLO	10/10, 10/16, 10/22, 10/23, 10/30, 11/6, 11/21, 2/5	
GG:WW	ODSVRA 2012 or 2013	SLO	11/6	
GG:WY	ODSVRA 2012 or 2013	SLO	10/10	
GG:YG	ODSVRA 2011 or 2013	SLO	10/2, 10/30, 12/18, 1/21	
PG:BB	ODSVRA 2005, 2011 or 2013	SLO	12/12	
PG:BR	ODSVRA 2012	SLO	10/22	
PG:GG	ODSVRA 2012 or 2013	SLO	10/30, 11/5, 11/6, 12/11, 2/12	
PG:VW	ODSVRA 2011 or 2013	SLO	10/23, 10/30, 11/5, 11/6, 11/27, 12/4, 12/12, 12/17, 12/18, 1/21, 1/29, 2/12	
PV:BG	ODSVRA 2011 or 2013	SLO	10/10, 10/23, 10/30, 11/7, 11/27, 1/29, 2/5	

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

Table D.2. Banded snowy plovers with known origins seen at ODSVRA 1 October 2013 to 28 February 2014 (continued).

Band Combination	Origin and Year Banded	County Banded	Dates Seen	Notes
PV:BR	ODSVRA 2007	SLO	11/5, 11/27, 12/18, 1/29, 2/5	
PV:GY	ODSVRA 2008	SLO	10/6, 10/10, 10/23, 10/25, 11/6, 12/18, 2/5	Tape is peeling on yellow band.
PV:VB	ODSVRA 2013	SLO	10/3, 10/5, 10/30, 11/27, 1/29	
PV:VG	ODSVRA 2013	SLO	10/6, 10/7, 10/10, 10/25, 11/21, 12/16, 12/18, 2/5	
PV:VY	ODSVRA 2009	SLO	10/7, 10/10, 10/23, 11/6, 11/12, 12/12, 12/16, 12/17, 12/18	
PV:WB	ODSVRA 2007 or 2010	SLO	10/2, 10/30	
RR:GG	ODSVRA 2011	SLO	10/3, 10/7, 10/16, 10/20, 10/23, 10/30, 11/12, 12/4, 12/12, 12/18	
RR:R	ODSVRA unknown	SLO	10/4, 10/5, 10/6, 10/16, 10/20, 10/23, 12/18	
RR:VW	ODSVRA 2009 or 2011	SLO	10/2, 10/10, 10/30, 11/5, 12/18	
RR:WR	ODSVRA 2010	SLO	10/2	
RR:YR	ODSVRA 2010	SLO	10/7, 10/8, 10/20, 10/22, 10/23, 10/27, 10/28, 11/5	
V:BY	ODSVRA 2013	SLO	10/2, 10/3	
VG:AB	ODSVRA 2011 or 2013	SLO	10/10, 11/5, 11/6, 12/18, 1/21	
VG:AR	ODSVRA 2011	SLO	10/16, 10/23, 11/21, 11/27, 1/29, 2/5	
VG:BB	ODSVRA 2011 or 2013	SLO	10/3, 10/4	
VG:BG	ODSVRA 2011	SLO	10/2, 10/30, 12/18, 1/21	
VG:BY	ODSVRA 2012 or 2013	SLO	10/3, 10/6, 10/23, 12/12, 12/16, 12/18, 2/5	
VG:GW	ODSVRA 2011 or 2013	SLO	10/30, 12/4, 12/18	
VG:GY	ODSVRA 2013	SLO	10/22	
VG:OG	ODSVRA 2011	SLO	10/7, 10/10, 10/16, 10/23, 10/24, 10/31, 12/12, 12/18	
VG:PR	ODSVRA 2011	SLO	10/3, 10/7, 10/10, 11/27, 12/18	
VG:VR	ODSVRA 2009 or 2011	SLO	11/6, 1/21	
VG:WW	ODSVRA 2011 or 2013	SLO	10/3, 12/18, 2/5	
VV:AA	ODSVRA 2011	SLO	10/2, 10/7, 10/12, 10/23, 10/30, 11/7, 12/4, 12/12	
VV:BG	ODSVRA 2013	SLO	10/2, 10/10, 10/12, 10/20, 10/27, 10/30, 11/1, 11/6, 11/12, 12/18, 2/5	
VV:BY	ODSVRA 2007 or 2013	SLO	10/3, 10/10, 10/30, 11/1, 12/18	
VV:GR	ODSVRA 2012 or 2013	SLO	10/2, 10/7, 10/10, 10/20, 10/22, 10/23, 10/28, 11/21, 11/22, 12/12, 12/18	
VV:VB	ODSVRA 2011 or 2013	SLO	10/10, 10/26, 11/6, 12/17, 1/21	
VV:VG	ODSVRA 2009, 2011 or 2013	SLO	12/18	
VV:VW	ODSVRA 2008, 2011 or 2013	SLO	10/2, 10/6, 10/23, 10/30, 11/1, 11/6, 12/18	

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

Table D.2. Banded snowy plovers with known origins seen at ODSVRA 1 October 2013 to 28 February 2014 (continued).

Band Combination	Origin and Year Banded	County Banded	Dates Seen	Notes
VV:VY	ODSVRA 2008 or 2011	SLO	12/18	
VV:WW	ODSVRA 2011 or 2013	SLO	10/3, 10/23, 10/28, 12/4, 12/17, 12/18, 1/29	
VV:WY	ODSVRA 2012 or 2013	SLO	10/3, 10/6, 10/12, 10/16, 10/25, 10/30, 11/5, 12/17, 1/29, 2/5, 2/12	
VV:YG	ODSVRA 2013	SLO	10/7, 10/10, 10/23, 12/18	
VV:YW	ODSVRA 2011 or 2013	SLO	10/10, 10/16, 11/27, 12/17, 12/18, 1/21, 1/29	
VV:YY	ODSVRA 2011	SLO	10/23, 11/6, 11/21, 12/17, 12/18, 2/12	
B:Y/G	VAFB 2013	Santa Barbara, CA	10/30	
NB:OW	VAFB 2011	Santa Barbara	10/4, 10/25, 11/1, 11/6, 12/4, 12/18, 1/29	
NB:PG	VAFB 2011	Santa Barbara	10/10, 2/12	
NB:WG	VAFB 2011	Santa Barbara	11/21	
NO:AG	VAFB 2013	Santa Barbara	10/22, 11/21, 12/16, 12/18, 2/5	Metal exposed above orange band.
NO:GB	VAFB 2013	Santa Barbara	10/16	

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 2014.

Juveniles fledged from ODSVRA in 2014 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, SLO=San Luis Obispo, VAFB=Vandenberg Air Force Base, SB=State Beach, NWR=National Wildlife Refuge

J=Juvenile, F=Female, M=Male

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
-:SB		Dunes Overlook 2012	Douglas - Lane Boundary, OR	8/6, 8/21	Silver band is above the joint.
AW:RG	J	Pajaro Spit 2014	Monterey, CA	8/19, 8/26, 9/2, 9/29, 9/30	
AG:GA	J	Moss Landing Salt Ponds 2014	Monterey	8/22, 8/23, 9/2, 9/25, 9/29, 9/30	
BA:BR		Salinas River SB 2013	Monterey	4/20	
BY:RR	M	Salinas River SB 2010	Monterey	3/31, 4/1, 4/8, 4/9, 4/11, 4/13, 4/16, 7/30	ODSVRA breeding male.
OW:WG		Salinas River S.B. 2013	Monterey	9/25, 9/26	
RO:OY	J	Salinas River S.B. 2014	Monterey	8/25, 9/5, 9/6, 9/7, 9/25, 9/26, 9/30	
YP:OL		Salinas NWR 2008	Monterey	9/7, 9/25, 9/26, 9/30	All sightings as YP:OA.
OY:RB	J	Reservation Road 2014	Monterey	9/2, 9/4, 9/15, 9/25, 9/26	
BB:AG	M	ODSVRA 2010 or 2013	SLO, CA	5/20, 5/21, 6/10, 6/17, 6/29, 7/4	ODSVRA breeding male.
BB:AR	M	ODSVRA 2010 or 2013	SLO	5/4, 5/14, 5/15, 5/18	ODSVRA breeding male.
BB:BB	M	ODSVRA 2012 or 2013	SLO	5/5, 5/6	
BB:BB	M	ODSVRA 2012 or 2013	SLO	5/14, 5/19, 5/25, 5/26, 6/3, 6/7, 6/9, 6/10, 6/12, 6/24, 6/27, 7/2, 7/16	ODSVRA breeding male.
BB:BR	M	ODSVRA 2010 or 2013	SLO	6/20	
BB:BW	F	ODSVRA 2006 or 2010	SLO	4/13	ODSVRA breeding female.
BB:BY	M	ODSVRA 2005, 2010, or 2013	SLO	3/31, 3/24, 4/22, 4/26, 4/30, 5/1, 5/4, 5/6, 5/12, 5/13, 5/14, 5/18, 5/26, 6/1, 6/3, 6/11, 6/14, 6/26, 6/29, 7/8, 7/13, 7/16, 7/18, 7/23, 8/9, 8/10, 8/12, 8/14, 8/16, 8/17, 8/18, 8/20, 8/22, 8/23, 8/24, 8/25, 8/26, 8/27, 8/29, 9/1, 9/2, 9/7, 9/12, 9/14, 9/17, 9/19, 9/20	ODSVRA breeding male.
BB:GG		ODSVRA 2013	SLO	4/20	
BB:GR		ODSVRA 2012	SLO	8/14, 8/20	
BB:GW	M	ODSVRA 2009 or 2013	SLO	6/7, 6/9, 7/27, 8/6	ODSVRA breeding male.
BB:PB	M	ODSVRA 2010 or 2013	SLO	4/28, 6/23, 7/20, 7/22, 7/27, 8/5, 8/8, 8/25, 8/27, 9/25, 9/26, 9/27	ODSVRA breeding male.
BB:PG	M	ODSVRA 2013	SLO	5/7, 5/8, 5/20, 5/25, 5/28, 7/8, 7/10, 7/20, 7/27, 8/5, 8/30, 9/2, 9/13, 9/25	ODSVRA breeding male.
BB:RY	M	ODSVRA 2010	SLO	6/30, 7/16, 8/9, 8/10, 8/16, 9/7, 9/14	ODSVRA breeding male.
BB:VB		ODSVRA unknown year	SLO	9/2	
BB:VR	M	ODSVRA 2011 or 2013	SLO	4/14, 5/7, 6/1, 6/23, 8/15, 8/22, 8/24, 8/25, 9/26, 9/27	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 2014 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
BB:WB	M	ODSVRA 2010 or 2013	SLO	5/12, 6/13, 6/25, 6/30, 7/2, 7/7, 7/9, 7/13, 7/18, 7/22, 7/24	ODSVRA breeding male.
BB:WG	F	ODSVRA 2010 or 2013	SLO	4/13, 6/9, 6/30, 7/15, 7/22	ODSVRA breeding female.
BB:WW	F	ODSVRA 2010 or 2013	SLO	6/18, 6/23, 7/2, 7/6, 7/8, 7/16, 8/14, 8/17, 8/19, 8/27, 8/30, 8/31, 9/12	ODSVRA breeding female.
BB:WY	F and M	ODSVRA 2010 or 2013	SLO	3/9, 3/23, 3/21, 3/24, 4/16, 4/20, 5/20, 5/23, 5/25, 6/2, 6/3, 6/9, 6/11, 6/15, 6/17, 6/18, 6/29, 6/30, 7/2, 7/4, 7/5, 7/8, 7/9, 7/11, 7/15, 7/16, 7/20, 7/21, 7/22, 7/23, 7/25, 7/27, 7/28, 8/3, 8/5, 8/7, 8/12, 8/13, 8/16, 8/17, 8/18, 8/21, 8/23, 8/30, 8/31, 9/1, 9/2, 9/7, 9/12, 9/15, 9/24, 9/26, 9/30	ODSVRA breeding female and male.
BB:YG	F	ODSVRA 2011	SLO	3/24	
BB:YW	F and M	ODSVRA 2010 or 2013	SLO	3/23, 4/15, 4/17, 4/19, 4/20, 4/22, 5/1, 5/18, 5/21, 5/25, 6/10, 6/11, 6/23, 7/2, 7/4, 7/6, 7/9, 7/11, 7/12, 7/14, 7/16, 7/18, 7/22, 7/25, 7/27, 7/30, 8/5, 8/6, 8/12, 8/14, 8/15, 8/16, 8/17, 8/18, 8/19, 8/21, 8/25, 9/11, 9/13, 9/25	ODSVRA breeding female and male.
BB:YY	M	ODSVRA 2010	SLO	6/2, 6/7, 6/9, 6/15, 6/16, 6/28, 6/30, 7/21, 8/7, 8/13, 8/17, 8/18, 8/19, 8/21, 9/2, 9/4	ODSVRA breeding male.
G:-VW	F	ODSVRA 2013	SLO	3/4, 3/10, 3/25, 5/13, 5/14, 5/25, 6/9, 7/1, 7/22, 7/23	ODSVRA breeding female.
GA:AG	M	ODSVRA 2012 or 2013	SLO	5/5, 6/15, 6/18, 6/23, 7/11, 7/14, 7/15	ODSVRA breeding male.
GA:BG	M	ODSVRA 2011 or 2013	SLO	6/14, 6/26, 6/28, 6/29, 7/1, 7/2, 7/4, 7/5, 7/7, 7/10, 7/15, 7/20, 7/22	ODSVRA breeding male.
GA:BW	F	ODSVRA 2011 or 2013	SLO	3/23, 4/8, 7/4, 7/17, 8/27, 9/25, 9/26, 9/27	ODSVRA breeding female.
GA:GB	M	ODSVRA 2012 or 2013	SLO	5/5, 5/22, 6/17, 7/6, 7/9, 7/14, 7/16, 7/17, 7/18, 7/22, 7/25, 7/27, 7/28, 8/1, 8/5	ODSVRA breeding male.
GA:GG	F	ODSVRA 2011 or 2013	SLO	4/13, 7/15, 7/22, 7/23, 7/27, 9/25	ODSVRA breeding female.
GA:GR	F	ODSVRA 2012	SLO	4/23, 5/29, 6/7, 7/9, 7/10, 7/20, 8/7, 8/12, 8/16, 8/19, 8/25, 9/8, 9/26	ODSVRA breeding female. On 29 September, fresh carcass of GA:GR adult female found on 6 enclosure shoreline.
GA:GW	M	ODSVRA 2013	SLO	5/19, 6/15	
GA:GY	M	ODSVRA 2012 or 2013	SLO	4/19, 4/23, 4/29, 4/30, 5/5, 5/6, 5/15, 6/4, 7/2, 7/23, 7/25, 7/27, 8/7, 8/14, 8/15, 8/18, 8/22, 8/27, 9/13, 9/20	ODSVRA breeding male.
GA:OW	M	ODSVRA 2013	SLO	4/1, 4/6, 4/8, 4/9, 5/5, 6/4, 6/7, 6/8, 6/11, 6/13, 6/16, 6/25, 6/27, 7/4, 7/6, 7/7, 7/9, 7/15, 8/6	ODSVRA breeding male.
GA:PY	M	ODSVRA 2010	SLO	7/10, 7/16	ODSVRA breeding male.
GA:RB	F	ODSVRA 2010	SLO	8/27, 8/31	ODSVRA breeding female.
GA:VR	F	ODSVRA 2009	SLO	6/9, 6/10, 6/11, 6/13, 6/14, 6/28, 7/20, 7/22	ODSVRA breeding female.
GA:WB	F and M	ODSVRA 2012 or 2013	SLO	4/30, 5/3, 5/4, 5/5, 5/7, 5/14, 5/15, 5/18, 5/21, 5/26, 5/28, 6/2, 7/4, 7/9, 7/23	ODSVRA breeding female and male.
GA:WY		ODSVRA 2013	SLO	7/28, 9/7	

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 2014 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
GA:Y-	M	ODSVRA unknown year	SLO	7/20	ODSVRA breeding male.
GA:YG	F	ODSVRA 2011 or 2013	SLO	7/5, 8/19, 8/31	ODSVRA breeding female.
GA:YW	F and M	ODSVRA 2010 or 2013	SLO	3/10, 3/23, 4/6, 4/25, 5/5, 5/6, 5/12, 5/13, 5/23, 5/25, 7/2, 7/6, 7/8, 7/9, 7/16, 7/24, 8/17, 8/19, 8/29, 9/25, 9/26, 9/27	ODSVRA breeding female and male.
GG:-	F	ODSVRA 2013	SLO	6/22	Originally banded GG:AG at ODSVRA in 2013. On 18 June, bands removed from right leg.
GG:AG	M	ODSVRA 2013	SLO	6/8, 6/10, 6/11, 6/15, 6/17, 6/18, 7/5, 7/15, 7/20, 9/27	ODSVRA breeding male. (On 18 June, bands removed from right leg of female with this combination, now GG:-.)
GG:AR	M	ODSVRA 2011	SLO	5/15, 6/1, 6/7, 6/8, 6/9, 6/10, 6/13, 6/14, 6/15, 6/22, 6/23, 6/24, 6/28, 7/8, 7/9, 7/16	ODSVRA breeding male.
GG:AY	M (3)	ODSVRA 2012 or 2013	SLO	4/8, 4/20, 5/5, 5/7, 5/18, 5/19, 5/31, 6/1, 6/27, 6/30, 7/4, 7/6, 7/11, 7/13, 7/14, 7/27, 7/30, 8/2, 8/10, 8/14, 8/29, 8/31, 9/25, 9/26	ODSVRA breeding males (3).
GG:BB	F	ODSVRA 2005, 2010, or 2013	SLO	4/16, 4/29, 6/2, 6/7, 6/11, 6/14, 6/15, 6/26, 7/4, 7/12, 8/9	ODSVRA breeding female.
GG:BR	M	ODSVRA 2013	SLO	3/10, 3/11, 3/21, 4/12, 4/18, 4/20, 4/30, 5/6, 5/13, 5/14, 5/15, 5/18, 5/20, 6/27, 6/30, 8/15, 8/18	ODSVRA breeding male.
GG:BW	M	ODSVRA 2012	SLO	3/21, 3/23	
GG:GG	F	ODSVRA 2011 or 2013	SLO	4/13, 4/14, 4/17, 4/29, 4/30, 5/3, 5/4, 5/5, 5/7, 6/9, 7/8, 7/22, 8/6, 8/13, 8/14, 8/17, 8/18, 8/25, 9/2, 9/3, 9/5, 9/7, 9/25, 9/26, 9/29	ODSVRA breeding female.
GG:GR	F	ODSVRA 2011 or 2013	SLO	5/5, 5/18, 7/12	ODSVRA breeding female.
GG:OG		ODSVRA 2013	SLO	7/15, 7/20, 7/24, 9/26, 9/27	
GG:PB	M	ODSVRA 2012 or 2013	SLO	3/31, 4/3, 4/14, 5/18, 7/14, 7/15, 7/27, 7/30, 8/1, 8/5, 8/6, 8/13, 8/16, 8/17, 8/25, 9/2, 9/25	ODSVRA breeding male.
GG:PW	M	ODSVRA 2013	SLO	3/23, 3/27, 5/11, 5/18, 5/20, 7/27, 8/15, 8/17, 8/21, 8/22, 9/11, 9/12, 9/13, 9/25, 9/26, 9/27	ODSVRA breeding male.
GG:VB	M	ODSVRA 2011 or 2013	SLO	4/16, 4/30, 5/28, 6/10, 7/15, 8/11	ODSVRA breeding male.
GG:VW	M	ODSVRA 2013	SLO	3/13, 3/21, 3/23, 4/22, 5/1, 5/6, 5/13, 6/10	
GG:VY	F (2)	ODSVRA 2008, 2011 or 2013	SLO	5/1, 5/5, 5/12, 6/2, 6/30, 8/9, 8/10, 8/11, 8/21, 8/22, 8/23, 8/24, 8/26, 8/31, 9/4, 9/25, 9/26	ODSVRA breeding females (2).
GG:WB	M	ODSVRA 2011 or 2013	SLO	4/9, 4/12, 4/17, 4/20, 4/30, 5/4, 5/6, 5/13, 5/14, 5/18, 5/19, 5/26, 6/30, 7/15, 7/25, 7/30, 8/7, 8/10	ODSVRA breeding male.
GG:WW	F	ODSVRA 2012 or 2013	SLO	5/15, 5/17, 6/23	ODSVRA breeding female.
GG:WY	F	ODSVRA 2012 or 2013	SLO	3/21, 3/23, 3/24, 4/8, 4/28, 5/16, 7/11, 7/16, 9/25, 9/27	ODSVRA breeding female.
GG:YG	F and M	ODSVRA 2011 or 2013	SLO	3/9, 5/7, 5/19, 5/28, 6/1, 7/8, 7/10, 7/16, 7/20, 8/2, 8/18, 8/19	ODSVRA breeding female and male.
GG:YY		ODSVRA 2011 or 2013	SLO	6/27	

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 2014 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
PG:AG		ODSVRA 2012	SLO	7/20, 7/24	
PG:GG	F	ODSVRA 2012 or 2013	SLO	3/27, 3/29, 5/15, 5/20, 6/23, 7/19, 8/13, 8/14, 8/18, 8/21, 9/13	ODSVRA breeding female.
PG:VW	M	ODSVRA 2011 or 2013	SLO	3/24, 6/13, 6/15, 7/31, 8/2, 8/11, 9/27	ODSVRA breeding male.
PG:WY		ODSVRA 2011	SLO	9/25, 9/27	
PG:YW		ODSVRA 2012	SLO	9/25, 9/26, 9/27	
PV:BG		ODSVRA 2011 or 2013	SLO	8/11	
PV:BR	M	ODSVRA 2007	SLO	3/17, 4/14, 4/30, 5/2, 5/6, 6/4, 6/23, 6/24, 7/1, 7/10, 7/12, 7/31, 8/5, 8/13, 8/15, 8/17, 8/18, 8/20, 8/25, 9/25, 9/26	ODSVRA breeding male.
PV:VB	F	ODSVRA 2013	SLO	7/6, 7/8, 7/11, 7/12, 7/13, 7/14	ODSVRA breeding female.
PV:VG	F	ODSVRA 2013	SLO	3/30, 7/1, 9/30	ODSVRA breeding female.
PV:VY	F	ODSVRA 2009	SLO	5/5, 6/15, 6/23, 7/7, 7/8, 7/14, 8/5, 8/14, 8/17, 9/2, 9/4, 9/7	ODSVRA breeding female.
PV:WB	F	ODSVRA 2007 or 2010	SLO	6/22, 6/24, 8/11, 9/25, 9/26, 9/27	ODSVRA breeding female.
PV:YB	M	ODSVRA 2007 or 2012	SLO	5/19, 7/8, 7/16, 7/25	ODSVRA breeding male.
RR:OG	M	ODSVRA 2012	SLO	4/29, 5/13, 5/14, 5/20, 5/26, 6/3, 6/24, 6/25, 6/26	ODSVRA breeding male.
RR:OR	M	ODSVRA 2010	SLO	3/31, 4/14, 5/23, 5/24, 7/3, 7/16, 7/20, 7/21, 7/30, 8/1, 8/4	ODSVRA breeding male.
RR:OY	F	ODSVRA 2010	SLO	3/19, 4/8, 6/7, 6/9, 6/14, 6/16, 6/30, 7/20	ODSVRA breeding female.
RR:PB	F	ODSVRA 2007 or 2010	SLO	3/4, 3/9, 3/10, 3/11, 3/12, 3/16, 3/19, 3/21, 3/24, 3/27, 3/31, 6/16, 6/20, 6/22, 6/24, 6/29, 7/8, 7/28	ODSVRA breeding female.
RR:R-		ODSVRA unknown year	SLO	6/1	
RR:VB	F	ODSVRA 2008 or 2010	SLO	4/20	ODSVRA breeding female.
RR:VW	F	ODSVRA 2009 or 2011	SLO	5/5, 6/20, 6/23, 7/1, 7/31, 9/26	ODSVRA breeding female.
RR:WB	M	ODSVRA 2011	SLO	6/28, 6/30, 7/1, 7/14, 7/18, 7/20	ODSVRA breeding male.
RR:YR	F	ODSVRA 2010	SLO	3/12, 3/23, 7/23, 8/7, 8/12, 8/13, 8/15, 8/17, 8/18, 8/19, 8/21, 9/13, 9/25	
RR:YY	M	ODSVRA 2010	SLO	4/28, 5/23, 6/14, 7/2, 7/3	ODSVRA breeding male.
V:-BR	F and M	ODSVRA unknown year	SLO	7/1, 7/8, 7/20, 8/5, 8/19, 9/30	ODSVRA breeding female and male.
V:-VW		ODSVRA unknown year	SLO	8/12, 8/15, 8/18, 8/20, 8/22, 9/29, 9/30	
VG:AB	M	ODSVRA 2011 or 2013	SLO	3/19, 5/2, 6/9, 6/13, 6/15, 6/16, 7/14, 7/24, 8/1, 8/8, 8/12, 8/15, 8/20, 8/22	ODSVRA breeding male.
VG:AR	F	ODSVRA 2011	SLO	5/1, 6/13, 6/18, 6/29, 7/8, 7/9, 7/16, 7/23, 7/25, 7/27, 9/25	ODSVRA breeding female.
VG:AW	F	ODSVRA 2011 or 2013	SLO	5/14, 6/25, 6/28	ODSVRA breeding female.

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 2014 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
VG:AY	F	ODSVRA 2011 or 2013	SLO	4/7	
VG:BB		ODSVRA 2011 or 2013	SLO	5/7	
VG:BR	F	ODSVRA 2003 or 2013	SLO	3/31, 4/24, 7/3, 7/22, 8/6, 8/19, 9/11, 9/14	ODSVRA breeding female.
VG:GW	F	ODSVRA 2011 or 2013	SLO	3/19, 6/14, 6/17, 6/23, 6/30, 7/2, 7/30, 8/1, 8/13, 8/14, 8/22, 8/31, 9/25, 9/27	ODSVRA breeding female.
VG:OG	F	ODSVRA 2011	SLO	5/3, 5/12, 5/13, 6/20, 6/25, 6/27, 7/8, 7/13, 7/15, 7/16, 8/6, 8/14, 8/15, 8/18, 8/21, 8/23	ODSVRA breeding female.
VG:OW		ODSVRA 2011	SLO	5/5	
VG:VG	M	ODSVRA 2008, 2011, or 2013	SLO	4/16, 5/13, 5/19, 5/20, 7/9, 8/13	ODSVRA breeding male.
VG:VR	F (2)	ODSVRA 2009 or 2011	SLO	3/19, 3/31, 4/8, 4/14, 7/7, 7/10, 7/13, 7/14, 7/16, 7/30, 8/22, 9/27	ODSVRA breeding females (2).
VG:WB	M	ODSVRA 2012 or 2013	SLO	5/14, 5/27, 6/1, 6/2, 6/8, 6/9, 6/10, 6/26, 7/21, 7/22, 8/11, 8/13, 8/18, 8/19, 8/29, 9/25, 9/27	ODSVRA breeding male.
VG:WW	F	ODSVRA 2011 or 2013	SLO	3/21	
VV:AA	F	ODSVRA 2011	SLO	4/16, 5/1, 5/7, 5/14, 5/27, 7/19, 7/20, 7/22, 8/12, 8/15, 8/17, 8/18, 8/21, 8/23, 9/11	ODSVRA breeding female.
VV:AW	F	ODSVRA 2013	SLO	5/7, 5/18, 6/4	ODSVRA breeding female.
VV:BB	M	ODSVRA 2011 or 2013	SLO	5/14, 5/15, 6/1, 6/2, 6/17, 7/7, 7/16, 8/20, 8/24	ODSVRA breeding male.
VV:BG	F	ODSVRA 2009 or 2013	SLO	6/9, 8/5, 8/12, 8/14	ODSVRA breeding female.
VV:BY	M	ODSVRA 2007 or 2013	SLO	4/22, 5/7, 6/22, 6/23, 7/17, 8/24, 8/27, 9/25	ODSVRA breeding male.
VV:GB	M	ODSVRA 2009	SLO	5/19, 6/3, 7/22	ODSVRA breeding male.
VV:GG	M	ODSVRA 2009	SLO	4/2, 4/11, 5/17, 6/11, 6/30, 7/11, 7/13, 7/17, 7/18, 7/20, 7/21, 7/22, 7/23, 7/27, 7/28, 8/2, 8/5	ODSVRA breeding male.
VV:GR	F	ODSVRA 2012 or 2013	SLO	6/23, 7/21, 7/22, 8/19, 8/25, 9/8, 9/11, 9/30	ODSVRA breeding female.
VV:VB	M	ODSVRA 2008, 2011 or 2013	SLO	4/12, 4/16, 7/2, 7/27, 8/12, 8/14, 8/27, 9/4, 9/7	
VV:VG	F	ODSVRA 2009, 2011, or 2013	SLO	3/17, 3/21, 8/13, 8/17, 8/21, 9/25	ODSVRA breeding female.
VV:VR	M	ODSVRA 2008	SLO	7/6, 7/12	ODSVRA breeding male.
VV:VW	F and M	ODSVRA 2008, 2011 or 2013	SLO	5/5, 5/11, 5/26, 6/2, 6/9, 6/10, 6/14, 6/15, 6/21, 7/13, 8/1, 8/5, 8/15, 8/17, 8/18, 8/21, 8/25, 9/2, 9/11, 9/25, 9/30	ODSVRA breeding female and male.
VV:WB	M	ODSVRA 2013	SLO	5/18, 5/26, 5/29, 6/3, 6/14, 6/17, 6/23, 6/26, 7/3, 7/9, 7/16, 7/21	ODSVRA breeding male.
VV:WG	F	ODSVRA 2012	SLO	4/7, 6/9, 8/7, 8/19, 9/3, 9/4	ODSVRA breeding female.
VV:WW	F	ODSVRA 2011 or 2013	SLO	5/2/, 8/18	ODSVRA breeding female.
VV:WY	F and M	ODSVRA 2012 or 2013	SLO	3/24, 3/26, 4/1, 4/14, 5/12, 5/15, 6/9, 7/1, 7/8, 7/15, 7/16, 7/21, 7/25, 8/2, 8/17, 8/18, 8/27, 8/29, 9/26, 9/27	ODSVRA breeding female and 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 2014 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
VV:YG	F	ODSVRA 2013	SLO	3/24, 5/6, 8/31	
VV:YW	M	ODSVRA 2011 or 2013	SLO	4/23, 6/23, 6/24, 7/12, 8/18, 8/19, 8/29, 9/25	ODSVRA breeding male.
A:-G/Y/G	J	VAFB 2014	Santa Barbara, CA	8/5	
AN:AR		VAFB 2013	Santa Barbara	9/25, 9/26, 9/29, 9/30	All sightings as AY:AR.
B:-Y/G	F	VAFB 2013	Santa Barbara	6/20, 6/28, 9/25, 9/26, 9/27	ODSVRA breeding female.
NB:BY	J	VAFB 2014	Santa Barbara	7/2, 7/27	
NB:NB	J	VAFB 2014	Santa Barbara	7/15, 7/16	
NB:OW	F	VAFB 2011	Santa Barbara	6/7, 6/8, 6/23, 9/27	ODSVRA breeding female. All sightings as RB:OW.
NB:PG		VAFB 2011	Santa Barbara	3/23, 4/14, 7/2, 7/3, 8/19, 9/25	
NO:AG	F	VAFB 2013	Santa Barbara	4/16, 5/15, 8/15, 8/17, 8/18, 8/21, 8/22, 8/23, 8/25, 9/2, 9/4, 9/14	ODSVRA breeding female.
NO:BY	F	VAFB 2013	Santa Barbara	4/14, 6/5, 7/8, 7/12	ODSVRA breeding female.
NO:GB	F and M	VAFB 2013	Santa Barbara	3/13, 3/16, 3/23, 4/26, 5/26, 7/7, 7/8, 7/9, 7/13, 7/15, 7/21, 7/27, 8/5, 8/6, 8/13, 8/17, 8/18, 8/21, 8/22, 9/1, 9/2, 9/7, 9/8, 9/11, 9/30	ODSVRA breeding female and male.
NO:OG	J	VAFB 2014	Santa Barbara	9/6	Silver exposed on lower portion of orange band on left leg.
NO:PB	J	VAFB 2014	Santa Barbara	8/6, 8/18	
NO:WB	M	VAFB 2013	Santa Barbara	3/6, 4/22, 4/23, 4/30, 5/1, 5/11, 5/12, 5/13, 5/25, 5/28, 6/24, 6/26, 6/27, 7/2, 7/6, 7/13, 7/20, 7/25, 7/27, 8/27	ODSVRA breeding male.
NO:WY	F	VAFB 2013	Santa Barbara	5/14, 5/23, 6/18, 7/7, 7/13, 7/16, 8/6, 8/15, 8/19, 9/2, 9/7, 9/12, 9/27	ODSVRA breeding female.
NR:WB		VAFB 2013	Santa Barbara	4/24	
NS:WW	F	VAFB 2012	Santa Barbara	7/25, 8/24, 8/25, 9/1, 9/25	
NW:BB	J	VAFB 2014	Santa Barbara	6/30	
NW:RG	J	VAFB 2014	Santa Barbara	7/21	
NW:WG	J	VAFB 2014	Santa Barbara	7/30, 8/17, 9/4	
NY:RB	F	VAFB 2008 or 2013	Santa Barbara	4/23, 6/2, 6/30, 7/8, 7/9, 8/11, 8/30	ODSVRA breeding female.
P:-W/O/W		VAFB 2013	Santa Barbara	7/25	
R:-W/B/W	M	VAFB 2013	Santa Barbara	3/6, 3/27, 4/2, 4/12, 4/13, 4/20, 4/21, 4/22, 4/23, 4/24, 5/18, 6/1, 6/3, 8/1, 8/17, 8/21, 8/30, 9/26, 9/29	ODSVRA breeding male.
W:-Y/G	M	VAFB 2012	Santa Barbara	5/5, 6/22, 7/18, 8/12, 8/13, 8/17	ODSVRA breeding male.
Y:G/O/G		VAFB 2013	Santa Barbara	4/10, 4/15, 4/16, 4/17, 4/30, 8/14, 8/17, 8/18, 8/21, 8/26	
Y:-GO	M	VAFB unknown year	Santa Barbara	3/30, 7/14, 7/16, 7/18, 7/19, 7/22, 7/27, 8/1, 8/2, 8/8, 8/27	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 2014 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
V-:AY	M	Unknown Origin		6/10, 6/11, 6/15, 6/17, 7/4, 7/16, 7/20, 7/24, 8/5, 8/12, 8/15, 9/2, 9/18, 9/25	ODSVRA breeding male.
V-:YG	F	Unknown Origin		3/27, 8/30	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 2013 to 28 February 2014.

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.

SLO = San Luis Obispo, SB = State Beach, NWR = National Wildlife Refuge

Band Combination	Year Banded	Location Seen	County	Dates Seen
VV:OB	2009 or 2013	Half Moon Bay	San Mateo, CA	10/6, 11/22
BB:BW	2006 or 2010	San Carpoforo Creek	SLO, CA	12/17
GG:VR	2011 or 2013	San Carpoforo Creek	SLO	12/17
GA:YG	2011 or 2013	San Simeon SB	SLO	1/9
GG:AY	2012 or 2013	San Simeon SB	SLO	1/9
GG:PB	2012 or 2013	San Simeon SB	SLO	1/9
-:AG	2008	Villa Creek	SLO	11/18
GA:AG	2012 or 2013	Villa Creek	SLO	11/18
GA:AG	2012 or 2013	Estero Bluffs	SLO	10/15
B-:PR	2010	Morro Strand SB	SLO	12/5, 1/7
GA:VR	2009	Morro Strand SB	SLO	12/18
GG:YB	2009 or 2013	Morro Strand SB	SLO	12/5, 1/7
GG:YR	2012	Morro Strand SB	SLO	12/18, 1/7
PV:W-	2008	Morro Strand SB	SLO	12/5, 1/7
GG:AW	2012 or 2013	Morro Bay Sandspit	SLO	12/18
GG:GR	2011 or 2013	Morro Bay Sandspit	SLO	12/18
GG:WB	2011 or 2013	Morro Bay Sandspit	SLO	12/18
RR:WW	2010	Morro Bay Sandspit	SLO	12/18
PG:GG	2012 or 2013	Guadalupe-Nipomo Dunes NWR	SLO	1/21
GA:VG	2012 or 2013	Jalama	Santa Barbara, CA	11/18
GG:WY	2012 or 2013	Jalama	Santa Barbara	11/18
RR:PB	2007 or 2013	Jalama	Santa Barbara	11/18
VG:WB	2012 or 2013	Jalama	Santa Barbara	11/18
GG:AG	2013	San Buenaventura SB	Ventura, CA	12/5, 12/29, 1/9
GA:AG	2012 or 2013	Hollywood Beach	Ventura	10/6, 10/13
PG:AB	2012	Hollywood Beach	Ventura	10/6, 10/13, 10/19, 11/3, 11/10, 11/17, 11/24
RR:OR	2010	Hollywood Beach	Ventura	10/6, 10/27, 11/3, 11/17, 11/24, 12/15, 12/29
GG:YG	2011 or 2013	San Nicolas Island	Ventura	10/1
GG:BR	2013	Malibu Lagoon	Los Angeles, CA	10/28, 11/8

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 2014 (continued).

Band Combination	Year Banded	Location Seen	County	Dates Seen
VV:VB	2008, 2011, or 2013	Dockweiler SB	Los Angeles	10/7
VG:AY	2011 or 2013	Bolsa Chica	Orange, CA	10/9
GG:YR	2012	Torry Pines	San Diego, CA	10/10
GA:WB	2012 or 2013	San Quintin	Baja California, Mexico	12/1

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 2014.

This is a partial list based on information received from Point Blue Conservation Science (pers. comm. F. Bidstrup, J. Miller), 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.

SLO = San Luis Obispo, Chevron = Chevron property in Guadalupe-Nipomo Dunes complex, Guadalupe NWR = Guadalupe-Nipomo Dunes National Wildlife Refuge, SB = State Beach, VAFB = Vandenberg Air Force Base

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

Band Combination	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
VV:OB	2013		Half Moon Bay	Monterey, CA	7/22, 7/29, 8/05, 8/12, 8/19, 8/27, 9/20	
GG:PB	2012 or 2013		Arroyo Laguna Creek	SLO, CA	9/17	
-:AG	2008	F	Villa Creek	SLO	4/2, 4/4, 4/14, 4/15, 4/17, 4/19, 4/20, 4/21, 4/22, 4/23, 4/25, 4/29, 4/30, 5/1, 5/2, 5/6, 5/12, 5/13, 5/14, 5/16, 5/19, 5/21, 5/22, 5/23, 5/24, 5/26, 5/27, 5/28, 6/2, 6/3, 6/11, 6/12, 6/13, 6/15, 6/17, 8/2, 8/3, 8/4, 8/5, 8/6, 8/7, 8/8, 8/9, 8/13, 8/15, 8/16, 8/20, 8/22, 8/25, 8/26, 8/27, 8/29, 9/1, 9/5	
B:VG	2013	F	Villa Creek	SLO	5/21, 5/24, 5/27, 6/3, 6/17, 6/21, 6/24, 7/2	
GA:AG	2012 or 2013	F	Villa Creek	SLO	4/23, 4/25, 4/28, 4/29, 7/24, 8/13, 8/15, 8/16, 8/20, 8/22, 8/26, 9/1, 9/5, 9/9, 9/11, 9/16, 9/18, 9/23	
GG:AG	2013		Villa Creek	SLO	7/23	
PV:W-	2008	M	Villa Creek	SLO	4/21, 4/22, 4/23, 4/24, 4/25, 4/28, 4/29, 5/1, 5/2, 5/5, 5/6, 5/7, 5/8, 5/14, 5/15, 5/21, 5/22, 5/27, 6/5, 6/10, 6/19, 6/20, 6/24, 6/27, 7/2, 7/10, 7/12, 7/29, 7/31, 8/2, 8/3, 8/5, 8/6, 8/7, 8/9, 8/15, 8/20, 8/26, 8/27, 9/5, 9/9, 9/11, 9/16, 9/18, 9/23	Villa Creek breeding male.
RR:WW	2010	M	Villa Creek	SLO	5/8	Villa Creek breeding male.
VG:OB	2014	J	Villa Creek	SLO	8/16, 8/20, 8/22, 9/1, 9/5, 9/9, 9/11, 9/16, 9/23	
GG:PB	2014 or 2013		San Simeon SB	SLO	8/26	
B:PR	2010	M	Morro Bay Sandspit	SLO	4/17, 7/31	
BB:GB	2014	J	Morro Bay Sandspit	SLO	9/11	
BB:GR	2014	J	Morro Bay Sandspit	SLO	9/11	
GA:AG	2014 or 2013	F	Morro Bay Sandspit	SLO	7/29, 8/4, 8/5	
GA:OY	2014	J	Morro Bay Sandspit	SLO	8/19	
GA:VR	2013	F	Morro Bay Sandspit	SLO	4/22, 4/23, 8/6, 8/11, 8/13, 8/14, 8/15, 8/18, 8/19, 8/26, 8/27, 9/5, 9/16	
GA:VW	2014	J	Morro Bay Sandspit	SLO	9/5	
GG:OG	2014	J	Morro Bay Sandspit	SLO	9/1	

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 2014.

Band Combination	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
GG:OW	2009	J	Morro Bay Sandspit	SLO	9/11	
GG:PB	2013 or 2013		Morro Bay Sandspit	SLO	8/4, 8/20	
GG:PW	2014	J	Morro Bay Sandspit	SLO	9/11	
GG:WB	2011 or 2013	F	Morro Bay Sandspit	SLO	3/18, 3/26, 4/2, 4/17, 4/22, 4/24, 4/29, 8/26, 8/29, 9/1, 9/18, 9/23	Morro Bay Sandspit breeding female.
GG:WR	2014	J	Morro Bay Sandspit	SLO	8/20	
GG:YB	2009 or 2013	F	Morro Bay Sandspit	SLO	4/22, 9/16	
PG:BB	2014	J	Morro Bay Sandspit	SLO	9/18	
PG:BW	2014	J	Morro Bay Sandspit	SLO	8/27, 8/29, 9/9, 9/11, 9/16	
PV:AB	2014	J	Morro Bay Sandspit	SLO	8/19, 8/25	
PV:BB	2014	J	Morro Bay Sandspit	SLO	8/29, 9/1, 9/16, 9/18	
PV:GG	2014	J	Morro Bay Sandspit	SLO	9/18, 9/23	
PV:PW	2014	J	Morro Bay Sandspit	SLO	9/16	
PV:VB	2013	F	Morro Bay Sandspit	SLO	5/20	
PV:W-	2008		Morro Bay Sandspit	SLO	4/16	
RR:WB	2011	F	Morro Bay Sandspit	SLO	4/25, 5/13	
RR:WW	2010	M	Morro Bay Sandspit	SLO	3/18, 3/25, 3/26, 3/28, 3/31, 4/2, 4/4, 4/17, 4/22, 4/23, 4/29, 5/1, 5/6, 5/12, 5/13, 5/16, 5/20, 5/28, 5/29, 6/9, 6/10, 6/25, 6/26, 7/3, 7/14, 7/15, 7/17, 7/21, 7/24, 8/6, 8/6, 8/12, 8/13, 8/14, 8/19, 8/22, 8/26, 9/1, 9/5, 9/9, 9/11, 9/16, 9/18	Morro Bay Sandspit breeding male.
VV:AR	2009		Morro Bay Sandspit	SLO	8/14	
VV:GR	2012 or 2013	F	Morro Bay Sandspit	SLO	3/19, 3/27, 4/2, 4/17, 4/24, 4/28, 5/13, 5/30, 6/10	Morro Bay Sandspit breeding female.
VV:GY	2014	J	Morro Bay Sandspit	SLO	8/25, 9/1, 9/11	
VV:OG	2009 or 2014		Morro Bay Sandspit	SLO	8/15, 8/19	
-:AG	2008	F	Morro Strand SB	SLO	3/17, 3/18, 3/20, 3/25, 6/28, 7/2, 7/22	Morro Strand SB breeding female.
B:-PR	2010	F	Morro Strand SB	SLO	3/18, 3/25, 3/26, 3/29, 3/30, 4/2	
B:-VG	2013	F	Morro Strand SB	SLO	5/20	
GA:AG	2012 or 2013	F	Morro Strand SB	SLO	3/18, 3/21, 3/25, 4/2	
GA:YW	2010 or 2013	F	Morro Strand SB	SLO	3/30	
GG:VG	2008	J	Morro Strand SB	SLO	9/9, 9/11	
GG:YB	2010 or 2013	F	Morro Strand SB	SLO	3/17, 3/18, 3/19, 3/26, 3/30	
GG:YR	2012	F	Morro Strand SB	SLO	3/19, 3/21, 3/24, 3/26, 4/1, 4/2, 4/14	Morro Strand SB breeding female.

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 2014.

Band Combination	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
PV:AB	2014	J	Morro Strand SB	SLO	8/27	
PV:W-	2008	M	Morro Strand SB	SLO	3/25, 3/29, 3/31, 5/20	
VV:WB	2013		Morro Strand SB	SLO	9/18	
GA:PY	2010	M	Guadalupe-Nipomo Dunes NWR	SLO	5/27, 5/29	
PG:VW	2011 or 2013	M	Guadalupe-Nipomo Dunes NWR	SLO	5/27	
PV:WB	2007 or 2010		Guadalupe-Nipomo Dunes NWR	SLO	8/25	
VG:AB	2011 or 2013	M	Guadalupe-Nipomo Dunes NWR	SLO	8/25	
VV:VY	2008 or 2011	F	Guadalupe-Nipomo Dunes NWR	SLO	3/7	
BB:GY	2006	M	Chevron	SLO	3/24, 9/3	Chevron breeding male.
BB:RY	2010	M	Chevron	SLO	3/3, 9/3	
BB:YW	2010 or 2013	M	Chevron	SLO	9/3	
GA:AG	2013 or 2013	M	Chevron	SLO	9/3	
GA:WB	2012 or 2013	M	Chevron	SLO	9/3	
GG:AB	2007	M	Chevron	SLO	9/3	
GG:BB	2005, 2010 or 2013	F	Chevron	SLO	9/3	Chevron breeding female.
GG:GR	2011 or 2013	M	Chevron	SLO	9/3	
GG:LY	2012	M and F	Chevron	SLO	9/3	Chevron breeding female.
GG:OG	2013	M	Chevron	SLO	9/3	Chevron breeding male.
GG:PG	2009	M	Chevron	SLO	9/3	
GG:RY	2012	F	Chevron	SLO	9/3	
GG:YG	2011 or 2013	F	Chevron	SLO	3/3, 9/3	Chevron breeding female.
PG:AB	2012	F	Chevron	SLO	3/3, 9/3	Chevron breeding female.
PG:GG	2012 or 2013	F	Chevron	SLO	9/3	
PV:BW	2014	J	Chevron	SLO	9/3	
RR:PR	2008	F	Chevron	SLO	9/3	
RR:WG	2012	M	Chevron	SLO	3/3, 9/3	
V:-BR	unknown	F	Chevron	SLO	9/3	
VG:GY	2013	M	Chevron	SLO	3/3, 9/3	Chevron breeding male.
VG:VW	2008, 2011 or 2013	M	Chevron	SLO	9/3	Chevron breeding male.

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 2014.

Band Combination	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
VV:BB	2011 or 2013	M	Chevron	SLO	9/3	
VW:BB	2010 or 2013	F	Chevron	SLO	9/3	
GA:AB	2013	M and F	VAFB	SLO	3/13, 3/31, 4/14, 4/18, 4/21	
GA:VG	2012 or 2013		VAFB	SLO	3/4	
GA:WB	2013 or 2013	F	VAFB	SLO	3/13, 3/19	
GA:YW	2011 or 2013	F	VAFB	SLO	3/10, 4/11	
GG:AB	2007		VAFB	SLO	3/19	
GG:BB	2005 or 2010	F	VAFB	SLO	4/14	
GG:PB	2012 or 2013	M and F	VAFB	SLO	3/13, 3/28, 4/4, 4/8, 4/10, 4/18	VAFB breeding female.
GG:WB	2012 or 2013	M and F	VAFB	SLO	3/11, 3/25, 4/1, 4/9, 4/17	
GG:YY	2011 or 2013	F	VAFB	SLO	3/4, 3/13, 3/19, 4/18	
RR:LY	2010	M	VAFB	SLO	3/4, 3/11, 3/19, 4/7, 4/11, 4/15	
VG:BR	2003 or 2013	M	VAFB	SLO	3/19	
VV:AW	2013	F	VAFB	SLO	4/11, 4/13, 4/15	
VV:OA	2011	F	VAFB	SLO	3/4, 3/13, 4/1, 4/3, 4/14	VAFB breeding female.
VV:OR	2009	F	VAFB	SLO	4/18	
GG:AG	2013		San Buenaventura SB	Ventura, CA	8/27	
PG:AG	2012		San Buenaventura SB	Ventura	9/3	
VG:AW	2011 or 2013		San Buenaventura SB	Ventura	8/27	
RR:AR	2010		Ormond SB	Ventura	3/15	
RR:AR	2010	M	Point Mugu	Ventura	7/10	Point Mugu breeding male.
GA:GG	2011 or 2013		Hollywood SB	Los Angeles, CA	9/8	
GA:WB	2014 or 2013		Jalama Beach	Los Angeles	3/3	
VG:WB	2012 or 2013		Jalama Beach	Los Angeles	3/3	
GG:AR	2011		Malibu Lagoon SB	Los Angeles	8/21, 8/24, 9/17, 9/28	
VV:AW	2013		Malibu Lagoon SB	Los Angeles	9/17, 9/28	
BB:GG	2007 or 2013	F	Bolsa Chica	San Diego, CA	7/8	
VG:AY	2011 or 2013		Bolsa Chica	San Diego	3/19, 8/13	
VG:GY	2013		Bolsa Chica	San Diego	7/21	
PV:GG	2014	J	Carlsbad SB	San Diego	8/26	
VV:BB	2011 or 2013	M	Naval Base Coronado	San Diego	5/9	

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 2014.

Band Combination	Year Banded	Sex or Age	Location Seen	County	Dates Seen	Notes
PV:GG	2008 or 2014		San Elijo Lagoon	San Diego	8/26	
GA:OW	2013		Silver Strand SB	San Diego	7/21	
GA:AB	2013		Tijuana Rivermouth	San Diego	7/24	
GA:AG	2012 or 2013	M	Punta Abrejos	Baja California, Mexico	4/10	
GG:AG	2013		Punta Azufre	Baja California, Mexico	6/4	On 4 June, bird observed with injured foot.

Appendix E. Addendums to snowy plover nesting success.

Table E.1. Nesting success of snowy plovers at ODSVRA, 2001-14.

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). Riding area includes the area seasonally closed to vehicle use. 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	Percent nests hatching	No. chicks	No. banded or known fate chicks	No. chicks fledged	Percent 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
	Total	33	30	27	90	71-74	69	2	3
2002	Riding Area	33	33	25	76	62	62	35	56
	Oso Flaco	2	2	0	0	0	-	-	-
	Total	35	35	25	71	62	62	35	56
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
	Total	95	93	63	67	162	159	108	67
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
	Total	147	140	110	75	263	263	66	25
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
	Total	107	103	84	78	204	204	82	40
2006	Riding Area	88	85	65	76	173	173	8	5
	Oso Flaco	29	29	22	76	57	57	9	16
	Total	117	114	87	76	230	230	17	7
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
	Total	99	91	78	77	200	198	66	33
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
	Total	121	119	83	68	197	197	72	37
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
	Total	150	147	95	64	245	245	81	33
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
	Total	155	150	111	73	275	275	107	39
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
	Total	172	160	138	82	365	365	152	42

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

Table E.1. Nesting success of snowy plovers at ODSVRA, 2001-14 (continued).

Year	Area	No. nests	No. nests with known fate and known location	No. nests hatching	Percent nests hatching	No. chicks	No. banded or known fate chicks	No. chicks fledged	Percent known fledged
2012	Riding Area	197	189	143	76	353	353	85	24
	Oso Flaco	14	14	9	64	21	21	4	19
	Unknown location	5	-	5	-	12	12	2	17
	Unassigned broods	7	-	7	-	19	19	5	26
	Total	216	203	157	75	386	386	96	25
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
	Unassigned broods	4	-	4	-	8	37	3	8
	Total	178	167	138	78	343	343	190	55
2014	Riding Area	202	195	173	89	428	428	142	33
	Oso Flaco	44	44	33	75	86	86	35	41
	Unknown location	16	-	16	-	33	33	16	48
	Unassigned broods	4	-	4	-	8	8	3	38
	Total	262	239	222	86	547	547	196	36

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

Table E.2. Nest protection used at ODSVRA in 2014.

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 and circular enclosures 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. Percent in parenthesis is percent nests hatched. un=unknown predator; av=avian; coy=coyote; pre=abandoned pre-term; pos=abandoned post-term; ukp=abandoned unknown pre- or post-term; fld=flooded; win=abandoned, suspected wind; unk=failed, cause unknown.

Area	Large seasonal enclosure					Symbolic fencing					Bumpout
	No additional fencing	Bumpout	10x10	Circular	Mini	No additional fencing	10x10	Circular	Mini	Bumpout	
6 enclosure	67	4	0	0	0	11	0	2	1		
Nests hatched	65 (97%)	2 (50%)				10 (91%)		2 (100%)	1 (100%)		
Nests failed (none lost to predation)	2 (1pre, 1unk)	2 (2 pre)				1 (1pos)					
7 enclosure	49	0	0	0	0	15	0	2	0		
Nests hatched	42 (86%)					14 (93%)					
Nests failed (none lost to predation)	7 (3 pre, 3 ukp, 1 unk)					1 (1pre)		2 (2 pre)			
8 enclosure	22	0	0	0	0	8	0	1	0	1	
Nests hatched	19 (86%)					7 (88%)		1 (100%)			
Nests failed (none lost to predation)	3 (2 pre, 1 ukp)					1 (1fld)				1 (1pre)	
Boneyard	11	0	0	0	0						
Nests hatched	10 (91%)										
Nests failed other causes	1 (1pre)										
SOUTHERN ENCLOSURE TOTALS	149	4	0	0	0	34	0	5	1	1	
Nests hatched	136 (91%)	2 (50%)				31 (91%)		3 (60%)	1 (100%)		
Nests failed (none lost to predation)	13 (7 pre, 4 ukp, 2 unk)	2 (2 pre)				3 (1pre, 1pos, 1fld)		2 (2 pre)		1 (1pre)	
North Oso Flaco	0	0	0	0	0	7	0	13	1		
Nests hatched						6 (86%)		11 (85%)	1 (100%)		
Nests depredated						1 (1un)					
Nests failed other causes								2 (1pre, 1win,)			
South Oso Flaco						6	0	17	0		
Nests hatched						1 (17%)		14 (82%)			
Nests depredated						1 (1coy)					
Nests failed other causes						4 (3 pre, 1ukp)		3 (2 pre, 1fld)			
OSO FLACO TOTALS	0	0	0	0	0	13	0	30	1		
Nests hatched						7 (54%)		25 (83%)	1 (100%)		
Nests depredated						2 (1un, 1coy)					
Nests failed other causes						4 (3 pre, 1ukp)		5 (3 pre, 1win, 1fld)			
Open riding area										1	
Nests depredated										1 (1av)	
GRAND TOTAL	149	4	0	0	0	47	0	35	2	1	
Nests hatched	136 (91%)	2 (50%)				38 (81%)		28 (80%)	2 (100%)		
Nests depredated						2 (1un, 1coy)				1 (1av)	
Nests failed other causes	13 (7 pre, 4 ukp, 2 unk)	2 (2 pre)				7 (4 pre, 1pos, 1ukp, 1fld)		7 (5 pre, 1win, 1fld)		1 (1pre)	

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

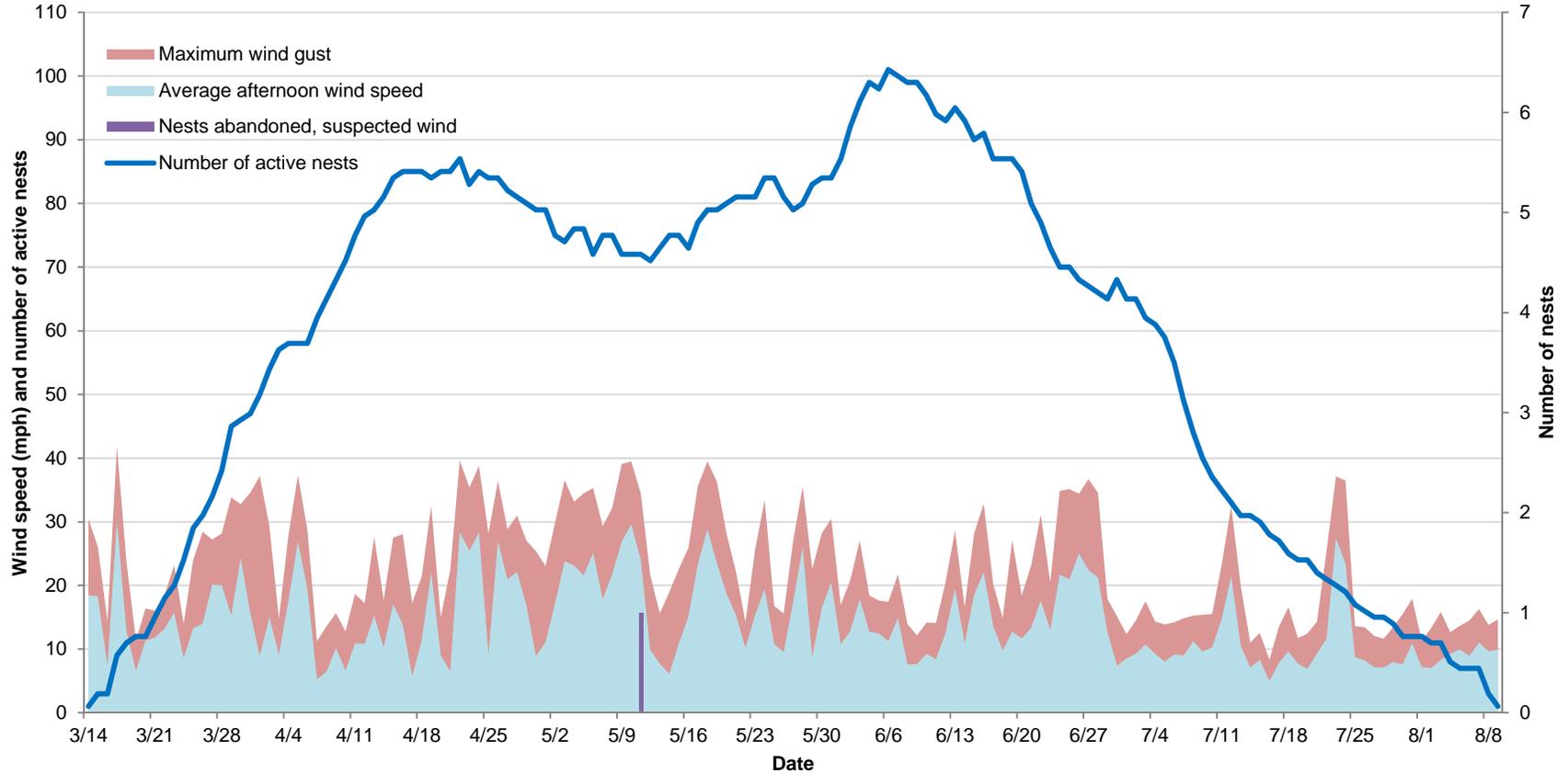


Figure E.1. Daily wind speed data (daily afternoon average and daily maximum wind gust) and snowy plover nest loss attributed to wind at ODSVRA from 14 March to 9 August 2014.

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 S1wind 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.

Appendix F. Predator summary tables and figures.

Table F.1. Summary of predators detected in the Southern Enclosure and Oso Flaco at ODSVRA in 2014.

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). Min no. individ. = minimum number of different individuals identified during season. 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	Min no. individ.	Notes
Mammalian					
Bobcat	18 Apr	29 July	2	-	Tracks encountered in 8 enclosure on two days.
Coyote	18 Mar	4 Sep	89	-	Common on the Southern Enclosure shoreline and North and South Oso Flaco shoreline. Noted inside the predator fencing of the Southern Enclosure on 20 days. Four 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	5 Mar	12 June	3	-	Activity noted in South Oso Flaco, 8 and Boneyard enclosures and only detected on 3 days.
Raccoon	2 Mar	7 Sep	108	-	Highest occurrences in North and South Oso Flaco, and within the predator fencing of 6 and 8 enclosures. Less frequently noted on 6, 7, and 8 enclosure shoreline. Two raccoons were lethally removed this season.
Skunk	28 Apr	27 Aug	21	-	Activity primarily noted in North and South Oso Flaco. Less frequently noted in 8 and Boneyard enclosures.
Avian					
Osprey	22 Mar	7 Sep	37	4	Although not documented as a predator of plovers or least terns, ospreys are included in this table due to their disturbance when perched for long periods of time in sensitive areas. Primarily observed flying over 6, 7 and 8 enclosures. Perched on the Southern Enclosure shore and fence on 15 days during season and on three days within 6 and 7 enclosures.
Northern harrier	15 Mar	10 Sep	25	4	Almost all observations in flight and/or hunting. Minimum of 4 individuals (based on age and sex characteristics) observed during season: one adult female, one adult male, one sub-adult male and one immature. On 18 May, one adult male was trapped and relocated.
Cooper's hawk	15 July	15 July	1	1	Observed once in 8 enclosure and North Oso Flaco.
Red-tailed hawk	3 Mar	26 July	55	2	Observed primarily perch-hunting in north end of North Oso Flaco, 7.5 revegetation area, and South Oso Flaco. Minimum of two individuals (based on age characteristics) observed during this season: one adult and one immature.
American kestrel	8 Apr	22 Aug	12	1	Most sightings of birds perched in or flying over enclosure occurred during juvenile dispersal in July and August. On 9 April, a female kestrel perched on 8 enclosure fence was hazed to south. On 26 February, one adult male was trapped and relocated.
Merlin	6 Mar	30 Apr	11	2	Primarily observed on 6, 7 and 8 enclosure shoreline in flight and perching on shoreline fence. On 9 April, a female merlin was observed with unidentified small shorebird prey on 6 enclosure shoreline.

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

Table F.1. Summary of predators detected in the Southern Exclosure and Oso Flaco at ODSVRA in 2014 (continued).

Species	First date observed	Last date observed	No. days detected	Min no. individ.	Notes
Peregrine falcon	3 Mar	9 Sep	81	7	Observed throughout the Southern Exclosure, North Oso Flaco and South Oso Flaco in flight and perching, sometimes over an extended time period. Observed multiple times pursuing and/or consuming prey on the shoreline and inside the exclosure. Three plover chicks and two least terns were known depredated by peregrine falcon. Minimum of 7 individuals (based on age and sex characteristics) observed during season: one adult male, one adult female, three sub-adults (one VID banded "17D" female, one unbanded female, one male), one immature, and one juvenile. On 26 June, one sub-adult male was trapped (banded with silver band colored blue with indelible ink) and relocated, and returned to ODSVRA on 17 July.
Great horned owl	7 Apr	7 Sep	10	5	Observed perch hunting in 8 exclosure and North Oso Flaco during evening surveys. Four adult males and one adult female were trapped and relocated this season.
Large owl spp.	19 Mar	13 Aug	16	-	Primarily identified by tracks. Most tracks believed to be from great horned owl. Primarily noted inside 8 exclosure, Boneyard exclosure, and North and South Oso Flaco. Less frequently noted in 7 exclosure.
Gull spp.	Present daily throughout season				The maximum number of gulls in the Southern Exclosure and Oso Flaco was recorded during the month of August. This includes birds in flight, foraging on shoreline, and roosting. On 24 June a California gull was observed eating one plover chick on 7 exclosure shoreline. On 3 August a California gull was observed eating one large plover chick (near fledge age) and a second plover of unknown age. Both gulls were lethally removed on the dates predation was observed.
Loggerhead shrike	-	-	-	-	None were observed during season. One loggerhead shrike was trapped 13 Feb in South Oso Flaco and relocated.
American crow	5 Mar	8 Jul	9	3	Primarily observed flying over North and South Oso Flaco and Boneyard exclosure. Less frequently noted flying over 7 and 8 exclosure. One individual landed in 7 exclosure on 8 July.
Common raven	21 Jul	6 Aug	4	1	Observed in flight over South Oso Flaco and over 6, 7 and 8 exclosures.
White-tailed kite	18 Apr	9 Sep	5	1	Primarily observed in flight or kiting in South Oso Flaco. Observed once over 8 exclosure.

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 2014.

Four coyotes, two raccoons, and two California gulls were lethally removed. All other animals were live-trapped and relocated. All animals trapped or removed were within ODSVRA boundaries.

Date	Species	Age/Sex	Location
Lethally removed			
16 May	Coyote	Male	Oso Flaco Creek
28 May	Raccoon	Female	North Oso Flaco shoreline
7 Jun	Coyote	Female	Oso Flaco Creek
12 Jun	Coyote	Male	Oso Flaco boardwalk
20 Jun	Raccoon	Male	Oso Flaco boardwalk
24 Jun	California gull	Sub-adult	8 shoreline
26 Jun	Coyote	Female	Oso Flaco Creek
3 Aug	California gull	Adult	6 shoreline
Live-trapped and relocated			
13 Feb	Loggerhead shrike	Unknown	South Oso Flaco
26 Feb	American kestrel	Adult male	North Oso Flaco
25 Mar	Great horned owl	Adult male	Eucalyptus Revegetation Area (Open Riding Area)
9 Apr	Great horned owl	Adult female	8 enclosure
20 Apr	Great horned owl	Adult male	North Oso Flaco
4 May	Great horned owl	Adult male	North Oso Flaco
18 May	Northern harrier	Adult male	North Oso Flaco
4 Jun	Great horned owl	Adult male	8 enclosure
24 Jun	Peregrine falcon	Sub-adult male	8 shoreline

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

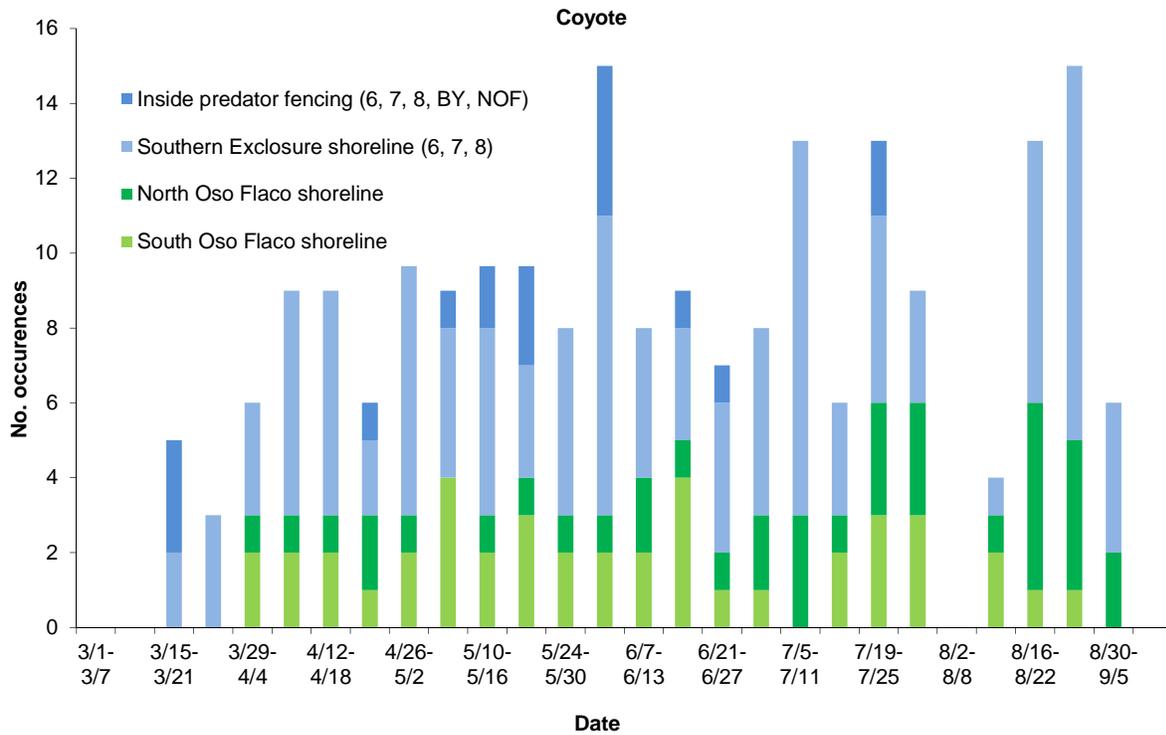


Figure F.1. Coyote occurrences documented in the Southern Enclosure and Oso Flaco at ODSVRA in 2014.

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).

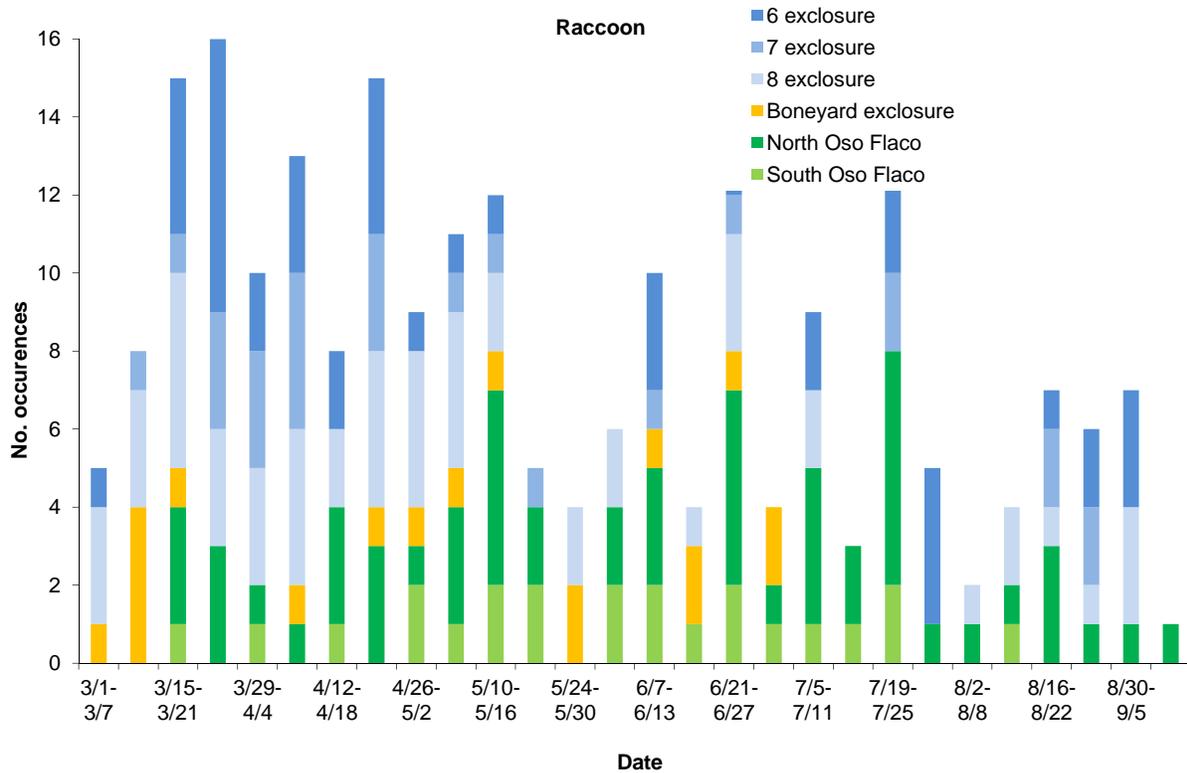


Figure F.2. Raccoon occurrences documented in the Southern Enclosure and Oso Flaco at ODSVRA in 2014.

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

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

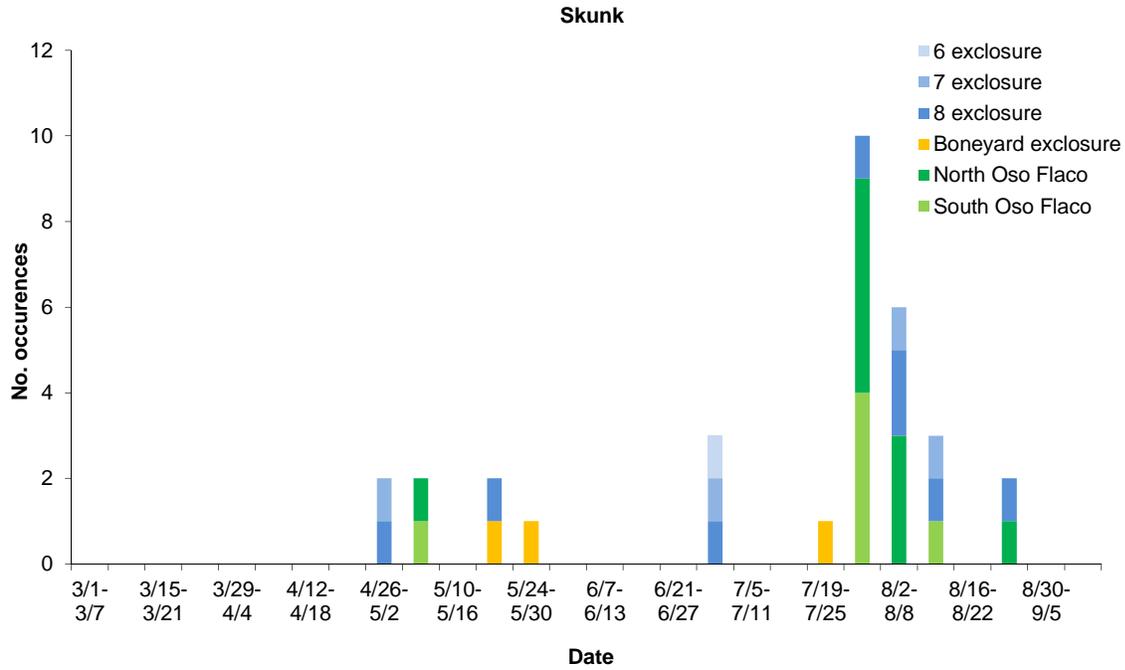


Figure F.3. Skunk occurrences documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2014.

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).

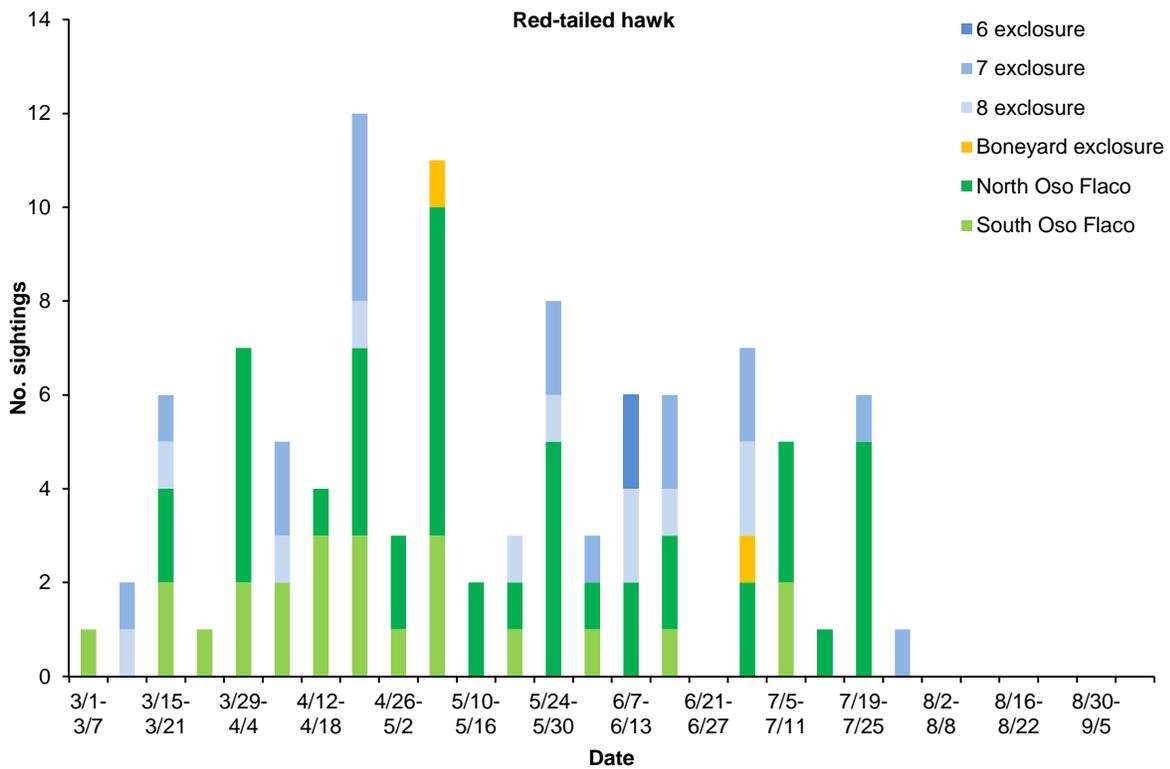
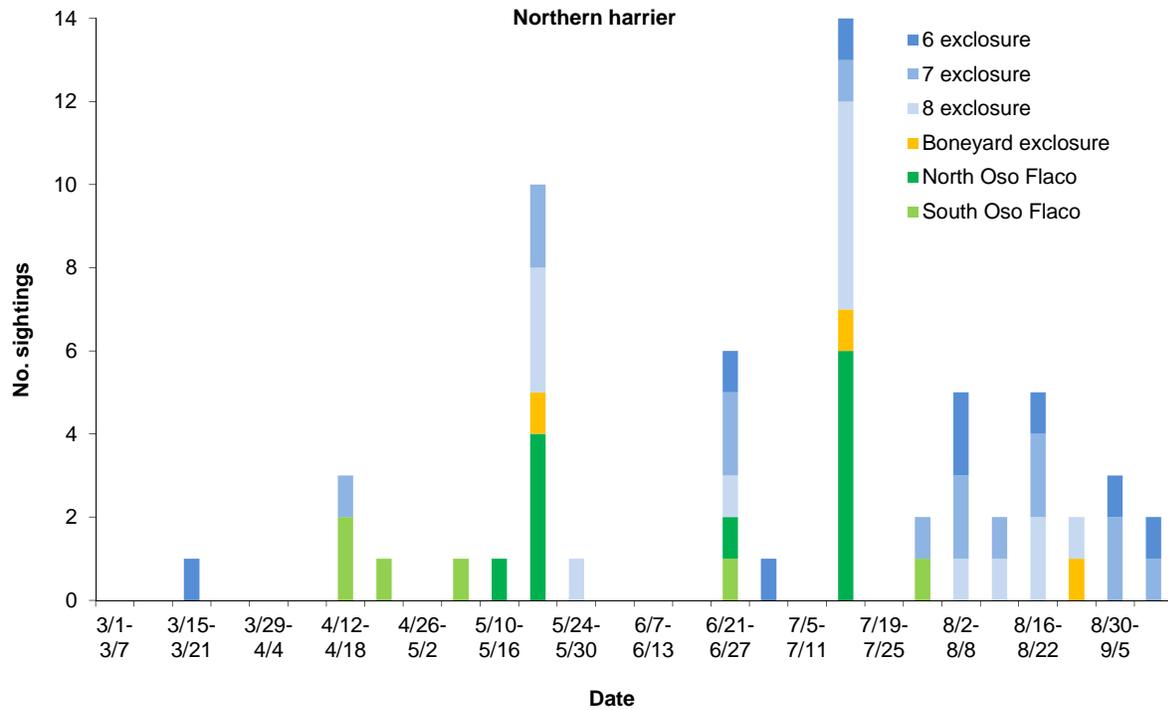


Figure F.4. Avian predator sightings documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2014.

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

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

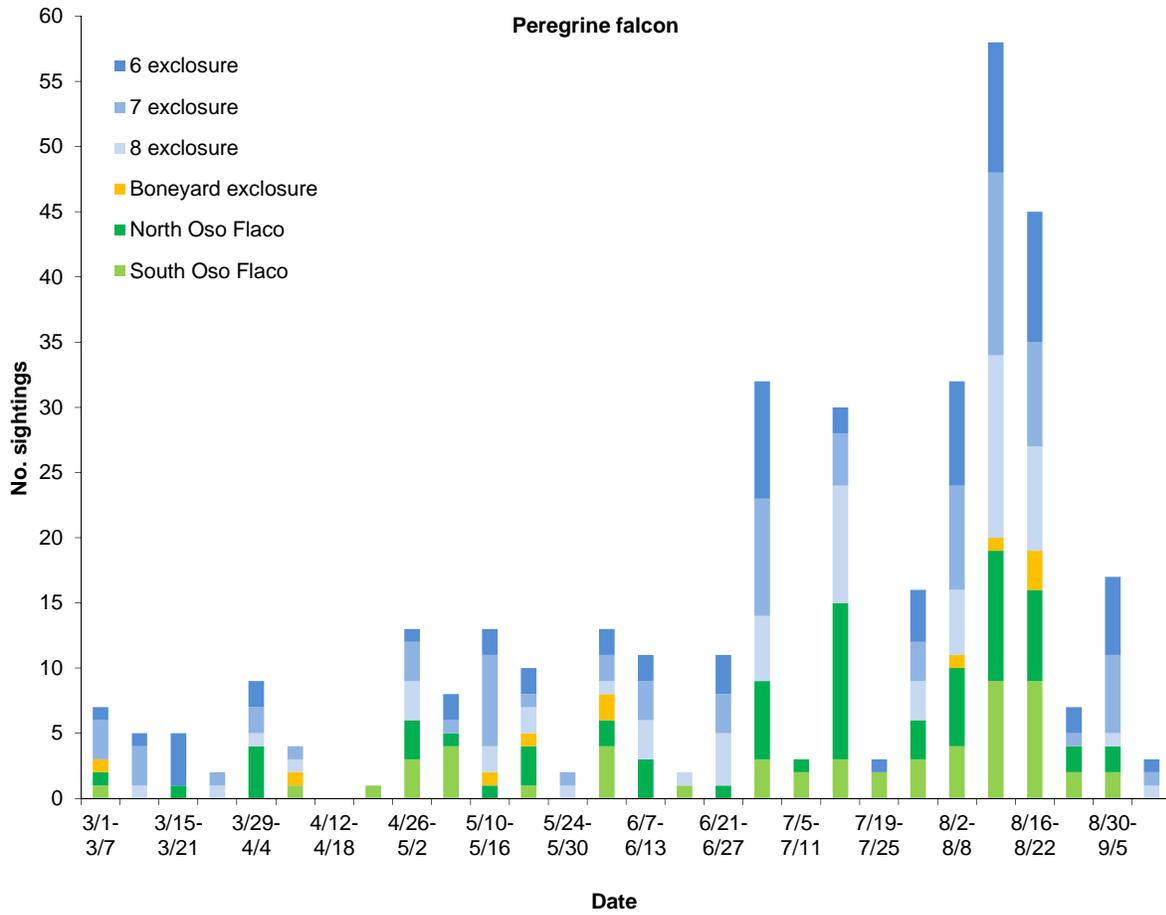


Figure F.4. Avian predator sightings documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2014 (continued).

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

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

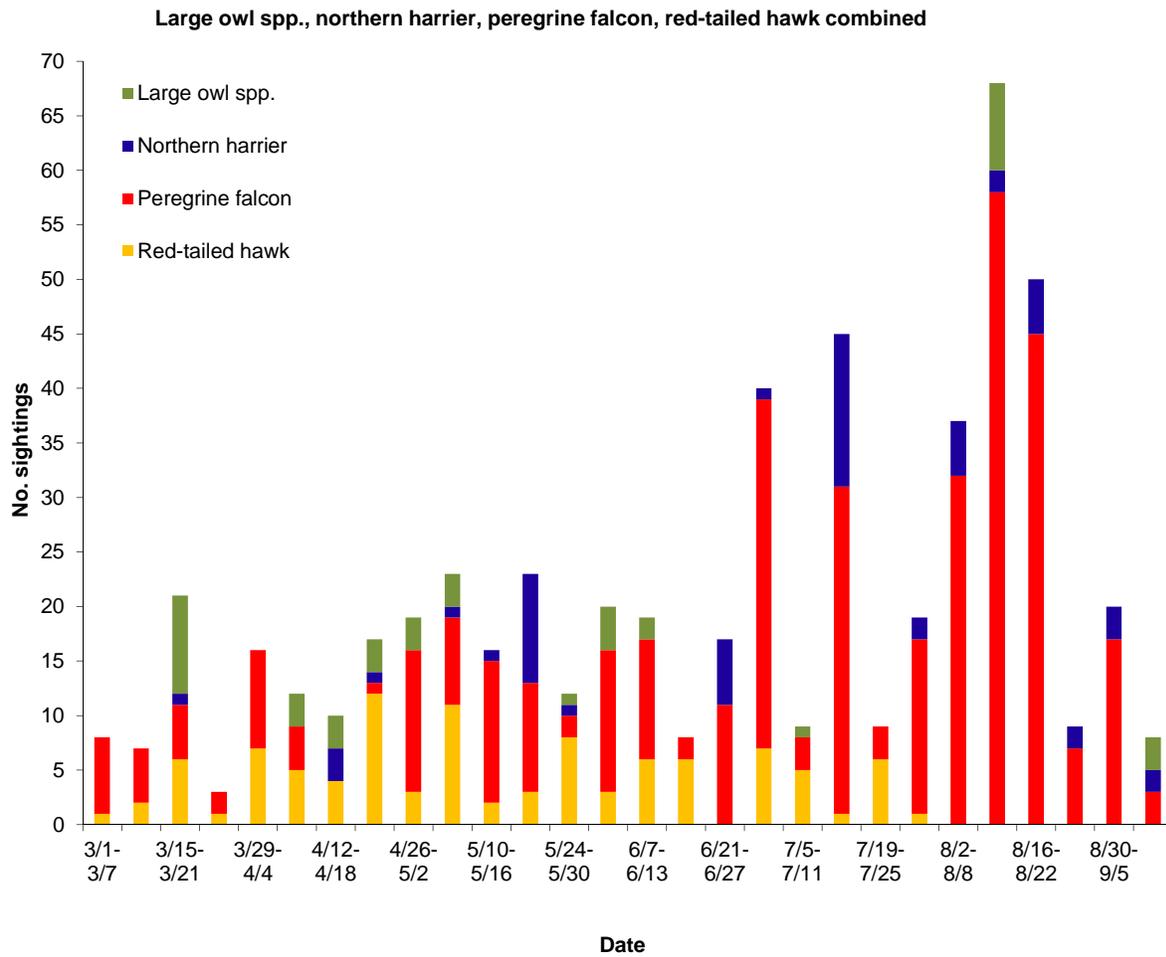


Figure F.4. Avian predator sightings documented in the Southern Enclosure and Oso Flaco at ODSVRA in 2014 (continued).

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 2014.

No. (age)	Predator	Location	Notes
1 (juvenile or adult)	Peregrine falcon	6 enclosure	On 29 July, a peregrine falcon was observed eating a least tern (juvenile or adult) in 6 enclosure.
1 (juvenile or adult)	Peregrine falcon ⁵ (sub-adult banded male)	7 enclosure	On 7 August, a sub-adult peregrine falcon was observed eating a least tern (juvenile or adult) in 7 enclosure.

Table G.2. Documented predation of snowy plovers from 1 March to 30 September 2014.

No. (age)	Predator	Location	Notes
2 (chick)	Peregrine falcon ⁵ (sub-adult male)	8 enclosure	On 24 June, a sub-adult male peregrine falcon was observed eating two small to medium-sized chicks in 8 enclosure. The falcon was live-trapped the same day. Prior to its release it regurgitated a pellet containing two pink bands and two green bands.
1 (chick) 1 (unknown)	California gull (sub-adult)	7 enclosure	On 24 June, a sub-adult California gull was observed eating a chick on 7 enclosure shoreline. The gull was lethally removed by USDA Wildlife Services and five plover bands (pink, violet, white, blue and one unknown) were found in the gut, representing a minimum of two plovers.
1 (chick) 1 (unknown)	California gull (adult)	7 enclosure	On 3 August, an adult California gull was observed eating one large chick (near fledge age) and a second plover of unknown age on 7 shoreline. Prior to lethal removal of the gull by USDA Wildlife Services it was observed regurgitating likely plover remains (not recovered). One blue plover band was found in the gut.
1 (chick)	Peregrine falcon ⁵ (sub-adult male)	8 enclosure	On 7 August, a sub-adult peregrine falcon was observed hunting on foot and eating a plover chick within 8 enclosure.
1 (adult)	Unknown	7 enclosure	On 9 September, a pair of desiccated adult plover wings was found inside 7 enclosure.

⁵ The same individual peregrine falcon (sub-adult male) was involved in the depredation events documented on 24 June and 7 August. It was trapped on 24 June and a metal USGS band was placed on left leg (blue ink applied to band to provide temporary identification in the field). Bird was translocated 26 June to Sacramento National Wildlife Refuge, approximately 360 miles away from ODSVRA. It returned to ODSVRA and was seen on multiple occasions from 17 July onward.

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

Table G.3. Mortality, other than documented predation, of least terns from 1 March to 30 September 2014.

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 (juvenile)	6 enclosure	On 28 July, a live unbanded juvenile least tern was observed with a broken right wing in 6 enclosure. Although a carcass was not recovered it is assumed that the bird did not survive.
1 (juvenile)	6 enclosure	From 30 July to 2 August, a live juvenile least tern (R/B:G/Y from LT36) was observed with a broken right wing in 6 enclosure. Although a carcass was not recovered it is assumed that the bird did not survive. This bird was last seen and in normal condition on 19 July when it was 31 days old.
1 (juvenile)	6 enclosure	On 31 July, the intact carcass of a juvenile least tern (R:G/Y from LT1) was found lying on its ventral surface with wings extended. The carcass was sixteen inches east of the western fence and nine feet south of another juvenile least tern carcass. Nothing unusual was noted around carcass. The carcass was sent for necropsy. This bird was last seen alive and in normal condition on 28 July when it was 47 days old.
1 (juvenile)	6 enclosure	On 31 July, the intact carcass of a juvenile least tern (R/Y:G/Y from LT41) was found lying on its back three feet east of the western fence and nine feet north of another juvenile least tern carcass (R:G/Y from LT1). Nothing unusual was noted around the carcass. The carcass was sent for necropsy. This bird was last seen alive and in normal condition on 23 July when it was 32 days old.
1 (juvenile)	Open Riding Area	On 31 July, an injured juvenile least tern (B/Y:G/Y from LT25) was found sitting one foot east of the eastern fence of 6 enclosure with a broken left wing and left leg. The injured bird was transported to Pacific Wildlife Care where it was euthanized the next day and later sent for necropsy. This bird was last seen and in normal condition on 28 July when it was 37 days old.
1 (juvenile)	6 enclosure	On 9 August, the decomposed carcass of a juvenile least tern (G/O:G/Y from LT34) was found on its ventral surface with open cavities and was missing its right wing. The left wing measured 154 mm. This bird was last seen alive and in normal condition on 28 July when it was 32 days old.
1 (adult)	6 enclosure	On 14 September, the decomposed intact carcass of an unbanded adult least tern was found on its back two feet east of the western fence.

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

Table G.4. Mortality, other than documented predation, of snowy plovers from 1 March to 31 October 2014.

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)	Open Riding Area	On 13 May, a gull (unknown species) was observed with a dead GG:VW adult male plover in its bill. The plover carcass was recovered and sent for necropsy. Necropsy did not suggest predation and the gull had likely scavenged the plover carcass.
1 (chick)	7 enclosure	On 15 May, the desiccated carcass of a small RR:AB chick from SP45 with an open cavity on the right side of the body and head was collected on the 7 enclosure shoreline. All three chicks from this brood were last seen on 8 May at four days old (no chicks known to fledge).
1 (chick)	6 enclosure	On 15 May, one unbanded chick from SP129 was found dead on 6 enclosure shoreline. NO:WB male was present and attempted to brood dead chick. This chick was last seen alive on 14 May on 6 enclosure shoreline at approximately four days old. The one-chick brood is from a nest of unknown location and was first found on 10 May in the open riding area 0.25 miles north of 6 enclosure with NO:WB male.
3 (chick)	North Oso Flaco	On 19 May, two chicks (one unbanded and one GG:YW) from SP84 were observed motionless and assumed dead after persistent adult aggression involving all three chicks on North Oso Flaco shoreline (see Notes section). The third chick was led away by the associated banded adults. This chick was last seen alive but lying on its side and unable to stand on 21 May with BB:WY male and was seen dead later the same day. The carcasses were not recovered at the time due to proximity of other young plover broods. On 12 September, the intact desiccated carcass of one small unbanded chick was recovered from the location where the aggression occurred on 19 May.
1 (chick)	6 enclosure	On 31 May, one small dead RR:BG chick from SP70 was found on 6 enclosure shoreline but was not recovered at the time due to proximity of other young plover broods. The intact desiccated carcass was recovered on 14 September. All three chicks from this brood were last seen on 8 May at five days old (no chicks known to fledge).
1 (chick)	6 enclosure	On 13 June, a small unbanded chick from SP153 was observed near nest location unattended by adults and being attacked repeatedly by adult least terns and plovers in the area. It was concluded to be dead after being observed motionless and unattended for thirty minutes (no chicks from this three-chick brood were known to fledge) The carcass was not recovered due to proximity of plover and tern broods.
1 (chick)	6 enclosure	On 19 June, a gull (unknown species) was observed picking up and dropping a PV:GG chick from SP101. The chick was recovered (one small cut on leg with bone protruding) and it is unknown if it was alive or dead when found by the gull. All three chicks were last seen alive on 14 June when they were 17 days old (two chicks fledged).
2 (chick)	6 enclosure	On 23 June, two small unattended chicks were observed motionless (one on its side) and concluded to be dead after being observed for twenty minutes on the 6 enclosure shoreline. The carcasses were not collected due to proximity of young plover broods.
1 (chick)	6 enclosure	On 3 July, the carcass of one small RR:AY chick from SP63 was observed on 6 enclosure shoreline but was unable to be recovered due to proximity of young broods. All three chicks from this brood were last seen alive on 23 May when they were seven days old (no chicks known to fledge). The carcass was recovered on 14 September.
1 (chick)	South Oso Flaco	On 5 August, the decomposed carcass of a large unbanded chick (head and muscle tissue missing) was found in the water at Oso Flaco Creek.
1 (chick)	7 enclosure	On 10 September, the intact desiccated carcass of a small VV:BR chick from SP77 was found on 7 enclosure shoreline. All three chicks from this brood were last seen on 23 May when they were two to four days old (no chicks were known to fledge).
1 (chick)	7 enclosure	On 11 September, the intact desiccated carcass of a small BB:YW chick from SP31 was found on 7 enclosure shoreline. All three chicks from this brood were last seen on 1 May when they were two days old (no chicks were known to fledge).
1 (chick)	7 enclosure	On 13 September, the intact desiccated carcass of a small RR:BY chick from SP74 was found on 7 enclosure shoreline. Both chicks from this brood were last seen on 6 May when they were one day old (no chicks known to fledge).
1 (chick)	6 enclosure	On 14 September, the intact desiccated carcass of a small BB:VG chick from SP30 was found on 6 enclosure shoreline. All three chicks from this brood were last seen on 3 May when they were four days old (no chicks known to fledge).
1 (chick)	6 enclosure	On 14 September, the intact desiccated carcass of a small GG:GY chick from SP68 was found on 6 enclosure shoreline. All three chicks from this brood were last seen on 19 May when they were three to four days old (no chicks known to fledge).

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

Table G.4. Mortality, other than documented predation, of snowy plovers from 1 March to 31 October 2014 (continued).

No. (age)	Location	Notes
1 (adult)	6 enclosure	On 29 September, the carcass of an GA:GR adult female plover was found on 6 enclosure shoreline adjacent to the fencing for a single nest enclosure. The carcass was found lying on the ventral surface and right eye was missing with dried blood around it and was sent for necropsy. This bird was last seen alive on 26 September and was a breeding bird at ODSVRA in 2013-14.
1 (adult or juvenile)	Open Riding Area	On 18 October, the carcass of a female plover (banded PV:B) was recovered from the open riding area in vehicle tracks 150 feet north of marker post 7 after a group of vehicles was observed speeding through the area. The carcass was sent for necropsy (see Notes section).

Oceano Dunes State Vehicular Recreation Area

2014 Predator Management Report



Submitted To:

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

Submitted By:

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

Introduction

Prior to the 2014 California Least Tern (*Stenula antillarum browni*)(LETE) and Western Snowy Plover (*Charadrius nivosus nivosus*)(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 Services Specialist (WSS) Anthony Jennings was assigned to the ODSVRA project to monitor, or selectively remove, mammalian and avian predators for protection of nesting LETE and SNPL.

WSS Anthony Jennings began working the ODSVRA project April 29, 2014. WSS Jennings underwent mandatory APHIS-WS training (firearms, trapping, defensive driving, civil rights, all aspects of safety, and all other USDA mandatory training) used during the project.

Methods of Predator Management

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

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. Wildlife Services stayed in communication with State Park resource staff in order to stay up to date on their observations of predator activity. Predator surveys were conducted in Eucalyptus, Table Top, Pipeline revegetation, Boy Scout, Maidenform, Southern Enclosure, North Oso Flaco and the South Oso Flaco areas (Appendix 1).

Hazing was conducted throughout the season in an attempt to harass predatory birds away from the SNPL and LETE enclosures. WS would fire pyrotechnics at the bird until it left the site. The type of pyrotechnic that was used was a 15 mm noisemaking pyrotechnic called a "Bird Whistler®" manufactured by Zink-Feuerwerk for Sutton Agricultural Enterprises. They were fired from a Model RJ 1 "Scare Away Launcher®" manufactured by Reed-Joseph International". "Bird Whistlers®" emit a high pitched whistle, bright light, and a trail of smoke when fired (Appendix 2).

Trapping was the most commonly used method for predator management. Trapping methods included the use of Bridger #3 padded jaw leg-hold traps for mammalian predators such as coyotes and raccoons. Traps were baited with commercially available lures made from different scents, glands and meat based baits as well as dry and canned cat food. Pole traps were used in an attempt to trap Great Horned Owls. Pole traps are placed on a pole in a location where raptors are frequently observed perching. A cable is attached from the trap to the pole which slows the fall of the bird to the ground once it is captured in the trap to help reduce

the chances of injury. Pole traps used were a modified Bridger #1 ½ padded jaw leg-hold trap. Modifications made to the trap included removing the factory coil springs and replacing them with coil springs from a “Victor” rat trap to reduce the tension of the jaws and reduce chances of injury to the bird captured in the trap. A perch was added to the pan to entice the bird to land on the trap and a cable was attached the trap to attach it to the post or pole they perch on.

Calling and shooting was another method used for predator management, mainly coyotes. Calling is most effective at dawn or dusk. Calling is done by producing a sound that imitates a wounded prey animal and entices the predator to seek out the source of the noise. Once the coyote was positively identified, it would be lethally removed by shooting. The type of call most commonly used was a “Crit’R-Call®” manufactured by Major L. Boddicker of LaPorte, Colorado. The type of rifle used to remove the coyotes was a Weatherby Vanguard chambered in .25-06 caliber firing 100 grain Barnes Vortex® non-lead ammunition.

Spotlighting is a common method of predator management. It is usually done while driving a vehicle and shining a high powered spotlight looking for the reflective eye shine of the predator caused by light reflecting off the tapetum lucidum layer in the back of the predator’s eyes. Once eye shine has been located, positive identification of the predator can then be made with the use of binoculars. Once positive identification is made, removal can take place if the animal is a target predator. The spotlight used to locate predators was a one million candle power SL 70 Styker® by Lightforce Optics. Binoculars used in identifying predators were 10 X 40mm Mojave® by Leupold Optics.

Results of Predator Management Methods

When predator management efforts by Wildlife Services began in 2014, the SNPL nesting season was well under way. One predation concern was coyote presence along the shoreline near SNPL and LETE habitat. Coyotes appeared to be hunting and scavenging along the shoreline looking for food sources in areas where SNPL chicks often fed.

Coyotes presented a predation threat to LETE and SNPL nesting success in 2014. One concern stemmed from predation problems during past nesting seasons. Chicks had been missing with no direct evidence to suggest why. It was suspected that coyotes could have been responsible for predation since coyote tracks were observed along the shoreline each morning. WS personnel began searching coyote scat and found SNPL bands in the scat which showed direct evidence coyotes were preying on SNPL chicks. One area where SNPL bands were located in coyote scat was along trails used by coyotes in the South Oso Flaco area and along the boardwalk between Oso Flaco Lake and the shoreline. No SNPL bands were discovered in coyote scat during the 2014 nesting season. Initial trapping efforts

during the 2014 nesting season were focused in that area as well as targeting coyotes repeatedly coming onto the shoreline.

Four coyotes were lethally removed during the 2014 season (Table 1). All four coyotes were removed from the Oso Flaco Creek and the Boardwalk areas where coyotes were traveling from the foredunes to the shoreline. The first coyote was removed with the use of a rifle and call on May 16th near Oso Flaco Creek. The second coyote was trapped on June 7th along Oso Flaco Creek near the foredunes. On June 12th, a coyote was trapped in the dunes north of the Oso Flaco Boardwalk. The fourth and last coyote was trapped on June 26th between the mouth of Oso Flaco Creek and the foredunes.

In previous years, predation by gulls of SNPL chicks of all ages, as well as young fledglings, has been documented at ODSVRA. Extensive gull surveys and monitoring were conducted during the entire 2014 nesting season. On June 20th, a California Gull was observed by Paul Young, Wildlife Biologist (Ventana Wildlife Society) eating a SNPL chick. WSS Jennings responded but the target gull flew off prior to his arrival. On June 24th, one sub-adult California Gull was observed eating a SNPL chick and was removed by WSS Jennings. A second California Gull was observed by State Park resource staff on August 3rd eating a SNPL chick and the gull was removed by WSS Jennings. A coordinated effort was conducted by State Park resource staff and Paul Young to ensure the specific gull responsible for the predation was removed. The digestive tracks of both gull carcasses were examined and snowy plover bands were recovered.

Peregrine Falcons and Northern Harriers were periodically observed in and around SNPL and LETE exclosures. Peregrine Falcons were observed perched on exclosure fences and inside the exclosures on several occasions. WSS Jennings often hazed the predator birds with Pyrotechnics at the request of State Park Resource Staff and also assisted Paul Young with raptor trapping efforts throughout the season.

Great Horned Owl tracks were observed in and around the exclosures and revegetation areas. WSS Jennings spent the night of June 4th assisting Paul Young in an unsuccessful attempt to capture an owl with pole traps. However, Paul Young was successful in capturing an owl with a bownet that evening.

Raccoons were hindering removal of coyotes for the protection of nesting LETE and SNPL. Raccoons exposed and interfered with the padded jaw leg hold traps that were set for coyotes. Two raccoons were captured in coyote sets and were euthanized after approval was obtained by State Park resource staff. One raccoon was removed from the Exclosure shoreline on May 28th and the other was removed from Oso Flaco Creek near the foredunes on June 20th.

Table 1: Predator Removal Summary

Date	Species	Sex	Location
5/16/2014	Coyote	Male	Oso Flaco Creek
5/28/2014	Raccoon	Female	Exclosure shoreline
6/7/2014	Coyote	Female	Oso Flaco Creek
6/12/2014	Coyote	Male	Oso Flaco Boardwalk
6/20/2014	Raccoon	Male	Oso Flaco Creek
6/24/2014	California Gull	Unknown	Exclosure shoreline
6/26/2014	Coyote	Female	Oso Flaco Creek
8/3/2014	California Gull	Unknown	Exclosure shoreline

Recommendations

WS recommends educating the public about the importance of not feeding wildlife to help reduce attracting predators.

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

WS recommends the State Park continues to maintain the height and strength of the perimeter fence surrounding the enclosures during the nesting season. 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 the State Park continues to enforce the leash law for pets on the beach, which is crucial during nesting season.

WS recommends the State Park continues to remove 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.

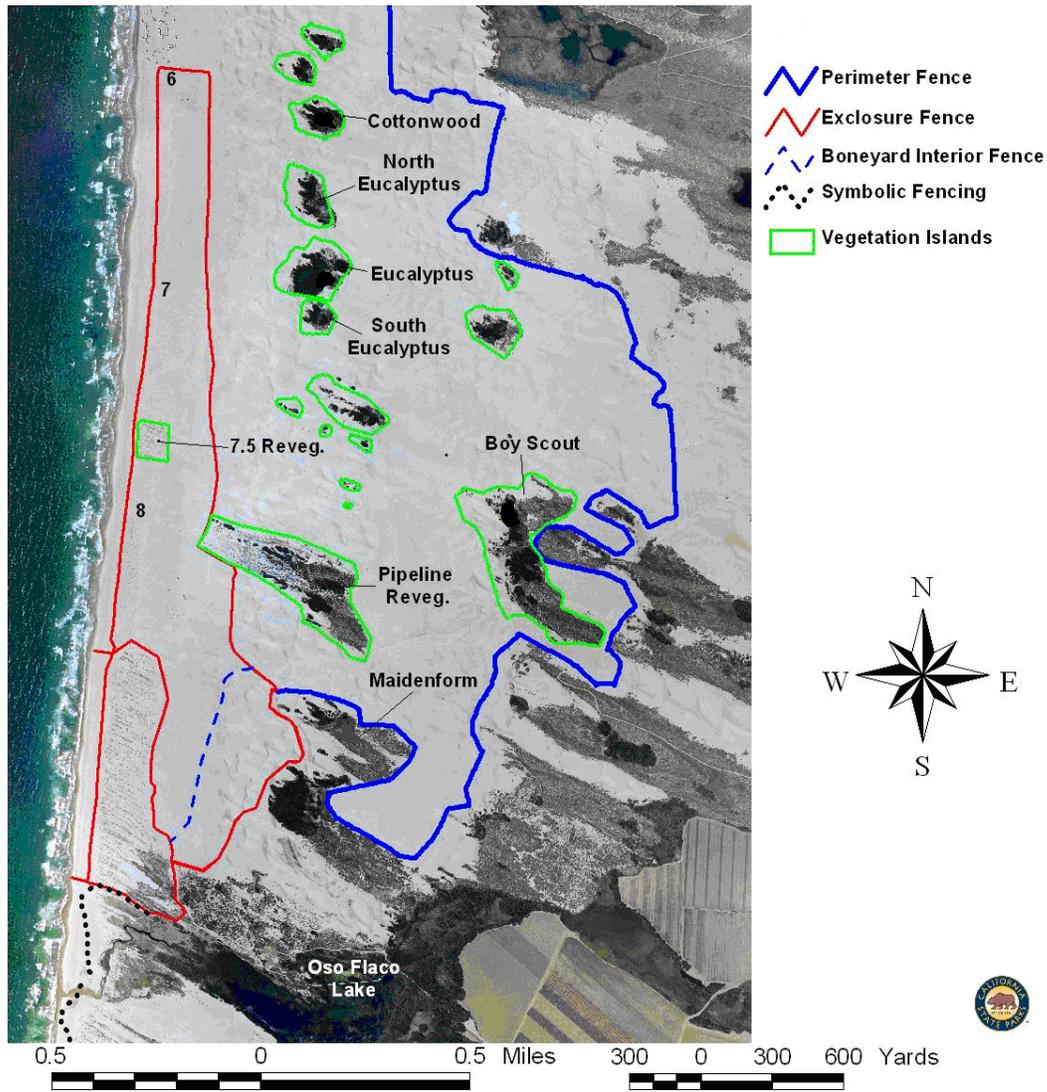
WS recommends the State Park continues to train WS Specialists so they can be added to permits that allow entrance into areas where predators are threatening the productivity of LETE and SNPL as well as areas where predators travel, such as the shoreline and South Oso Flaco Dunes. The ability to capture the problem predators where they are located without having to be escorted by ODSVRA staff increases WS efficiency in removing problem predators.

Anthony Jennings, 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



Appendix 2: Photo of “Scare-Away Launcher”, “Bird Whistler” and Percussion Caps



**Avian Predator Management Project:
Trapping and Relocation of Problem Avian Predators
At Oceano Dunes State Vehicular Recreation Area in 2014**

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

Agreement Number – CO853004

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

Table of Contents

Introduction	1
Methods	2
Surveying, Monitoring, and Trapping	2
Results and Discussion	4
Gulls and Ravens	5
American Kestrel	6
Loggerhead Shrike.....	7
Great Horned Owl	8
Peregrine Falcon	9
Northern Harrier	12
Red-tailed Hawk	13
Merlin.....	14
Other Raptors.....	15
Recommendations	16
Acknowledgments.....	16
Figure 1.	18
Figure 2.	19
Appendix A.....	20

Avian Predator Management Project: Trapping and Relocation of Problem Avian Predators at Oceano Dunes State Vehicular Recreation Area in 2014

Introduction

Oceano Dunes State Vehicular Recreation Area (ODSVRA) contains nesting habitat for California least terns (*Sternula antillarum browni*) and western snowy plovers (*Charadrius nivosus 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 (hereafter, least tern or tern) is listed as a state and federally endangered species. Western snowy plover (hereafter, snowy plover or 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 living 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 ODSVRA resource staff discovered at least seven snowy plover bands in loggerhead shrike castings (i.e., 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 posed an unacceptable threat to the reproductive success of the terns and plovers, and capture, band, and relocate the predatory birds. For the last five 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 2014.

Methods

Surveying, Monitoring, and Trapping

Surveying for raptors and other avian predator species (e.g., shrikes) at the 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 predator individuals. 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 ODSVRA since 2002. Because there are no paved roads in the areas where terns and plovers nest at ODSVRA, a four-wheel drive vehicle was essential to navigate 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 survey, monitoring, and trapping efforts. 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 2014, Young focused surveys on the following areas (Table 1, Fig. 1): the enclosure shoreline area, the north portion of the park from Arroyo Grande Creek (AG Creek) south to the Maidenform Revegetation Area, the South Oso Flaco (SOF) Foredues, the North Oso Flaco (NOF) Foredues, and the Oso Flaco (OF) Area. Areas outside of the park were surveyed and monitored as needed, including the Phillips 66 (formerly ConocoPhillips) refinery and the historical peregrine falcon (*Falco peregrinus*) nest site at Shell Beach, approximately three miles north of ODSVRA. The Dune Lakes area, beyond the park’s east boundary, was usually monitored for northern harrier (*Circus cyaneus*) activity at the same time the north portion of the ODSVRA was surveyed. Because we did not gain access to this privately-owned area, Dune Lakes was monitored from high dunes within the park’s boundaries.

Table 1. The number of days during which avian predator activity was surveyed at Ocean Dunes State Vehicular Recreation Area in 2014.

Survey Location	Number of Days Surveyed in 2014
Exclosure Shoreline Area	47
Arroyo Grande Creek to Maidenform Revegetation Area	37
South Oso Flaco Foredues	24
North Oso Flaco Foredues	18
Oso Flaco Area	17
Shell Beach Peregrine Falcon Nest	9
Phillips 66 Refinery Area	2

Great horned owls were surveyed at ODSVRA by regular visits to all the revegetation areas surrounding the plover and tern nesting habitat. In 2014, Young surveyed the Pipeline, Maidenform, Eucalyptus, and Tabletop revegetation areas, along with the OF Area, the NOF Foredues, and the SOF Foredues for large owl tracks left in the sand. In addition to 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 that all interested parties were aware of them. Heavily vegetated thickets surrounding the exclosure area were sometimes walked during the day with the intent of flushing any roosting owls from 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 sensitive area, as indicated by track sign, and the proximity of this track sign to concentrations of nesting plovers and terns or their chicks.

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

In addition to surveys and monitoring, observations of avian predators were gathered from the ODSVRA predator sighting logbook. The logbook contained observations from Young; Doug George, Point Blue Conservation Science; Tony Jennings, United States Department of Agriculture (USDA) 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 Jennings and Young would increase their monitoring of the exclosure area shoreline to identify any gulls targeting terns or plovers. Most observations of predators occurred during the morning and early afternoon hours, when Young and resource 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.

Avian predators that are perched in sensitive areas were almost always flushed or hazed with a bird-whistler device before any trapping attempts were made. 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. Most of the avian predators that are flushed or hazed are not immediate candidates for removal, because they have not been observed to target plovers or terns or have not been seen perched in sensitive areas regularly enough so that their presence constitutes a disturbance to the nesting terns and plovers. Nevertheless, any avian predator that is perched in a sensitive area might start targeting plovers and terns if they are not moved out of these areas as quickly as possible. Hazing a perched avian predator at close range with a bird-whistler device does not permanently prevent the bird from returning to the exclosure areas (Young, personal observation). However, a bird-whistler device might quickly move an avian predator out of a sensitive area because of the volume of the projectile, and it might be safer for the plovers and terns because it can be employed from a vehicle without approaching the birds. When flushing a potential avian predator by walking, there is a risk of disturbing a plover or tern, which could then be more easily targeted by the predator. Avian predators previously hazed are candidates for removal if they subsequently target, appear likely to target, or appear likely to disturb plovers and terns. In 2014, two bird-whistler devices were purchased by State Parks and provided to resource staff in the field in order to more easily move avian predators out of sensitive areas.

When potential predators of terns and plovers, or their eggs or 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 other predators to collaborators, such as USDA Wildlife Services. Young was fully permitted under state and federal laws to band and relocate avian predators. Once birds were trapped, they were put into padded and darkened animal carriers and transported away from ODSVRA. Translocated birds were released as soon as possible, far enough away from ODSVRA that they would be unlikely to return. Trapped birds that could not be relocated the same day as they were trapped were kept in a 16 x 7-ft mews and fed while they were being held in captivity. Before birds were translocated, they were fitted with an appropriate-sized USGS bird band (Appendix A).

This report summarizes avian predator observations by species, including the number of birds trapped, descriptions 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 deployed. 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.

Results and Discussion

Nine raptors or shrikes were trapped and relocated during 70 trap days at ODSVRA in 2014 (Table 2, Appendix A). Trapped birds included four males and one female great horned owl (*Bubo virginianus*), one adult male northern harrier, one sub-adult male peregrine falcon, one male American kestrel, and one loggerhead shrike. Primary concerns in 2014 included predation on plovers and terns by a sub-adult male peregrine falcon and frequent observations of large owl tracks, necessitating the capture of more great horned owls than in typical years. Conversely, loggerhead shrikes were less of a concern than in previous years.

Table 2. The number of birds trapped and days during which trapping was attempted for the purpose of translocating avian predators from Oceano Dunes State Vehicular Recreation Area in 2014.

Species	Number of Birds Trapped in 2014	Number of Days Trapping Attempted
Great Horned Owl	5	16
Peregrine Falcon	1	14
American Kestrel	1	10
Northern Harrier	1	9
Loggerhead Shrike	1	4
Red-tailed Hawk	0	17
Total	9	70

Avian predators were trapped throughout ODSVRA, but trapping efforts were focused mostly in the enclosure areas or in the revegetation areas immediately adjacent to the enclosure areas (Fig. 2). One of the great horned owls was trapped at the Eucalyptus Revegetation Area, two were trapped inside the 8 Enclosure, and two were trapped at the south end of the NOF Foredunes Enclosure. The northern harrier

was trapped at the south end of the NOF Foredunes Exclosure, the peregrine falcon at the 8 Exclosure shoreline, the American kestrel at the mid-NOF Foredunes Exclosure, and the loggerhead shrike at the OF Creek Area near the shoreline.

The five great horned owls that were trapped in the late evening or at night were all relocated the next day and released in the evening. The northern harrier was relocated the same day it was trapped, whereas the kestrel and shrike were relocated the day after they were trapped. The peregrine falcon was relocated two days after it was trapped.

Although relocated avian predators have rarely been documented returning to ODSVRA, the sub-adult peregrine falcon trapped and translocated on 24 June 2014 was re-sighted later in the summer on 17 July at ODSVRA. This bird had been transported to the northern portion of the Sacramento National Wildlife Refuge Complex, Tehama County, approximately 100 miles north of Sacramento. At the time of release, this bird was fitted with a silver USGS band on its left leg; the band was color marked blue. This peregrine falcon was identified on 17 July perched in the NOF Foredunes based on the blue band on the left leg, plumage characteristics and head markings identical to the trapped bird, and hunting behavior similar to that previously observed. This bird had two unusual white streaks on the back of its head that made it easy to confirm its identify in the field as the bird previously captured. Efforts to re-trap this bird were unsuccessful, and it was subsequently seen numerous times at ODSVRA until the end of the season. Since 2002, only one other relocated raptor has been documented returning to ODSVRA. This was an adult male American Kestrel captured in 2008 near the Phillips 66 refinery, transported and released near San Jose, California, and recaptured near the Phillips 66 refinery in 2009. In 2010, Young recaptured a juvenile female peregrine falcon that had been trapped, banded, and relocated by USDA Wildlife Services 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 USDA Wildlife Services. However, predator management at ODSVRA is a team effort including 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 exclosure 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. For example, four gulls were removed by USDA Wildlife Services during the 2011 tern and plover nesting season; plover remains and bands found inside of these gulls indicated that a minimum of 16 plovers had been consumed, some of them juveniles. A single gull has also been observed to eat four plover chicks from multiple broods in less than 30 minutes at ODSVRA (Young, personal observation). Despite the fact that there are thousands of gulls at the park, relatively few gulls exploit plover or tern 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 unless they were observed to catch, eat, or pursue a plover or tern.

In 2014, two California gulls (*Larus californicus*) were removed by USDA Wildlife Services after they had been observed catching and consuming plover chicks on the exclosure shoreline. On 24 June, Young

observed a sub-adult California gull walking by itself in the dry wrack portion of the 7 Exclosure shoreline. Young observed this bird flying low to the west fence of the 7 Exclosure and catch and consume at least one plover chick while the adult plovers displayed aggressively to distract the gull. This gull immediately flew south to the 8 Exclosure shoreline, where it was found by Young and removed by Tony Jennings of Wildlife Services. Chick remains and five plover bands were found inside this gull. On August 3, an adult California gull was observed by resource ecologists to catch and consume one plover chick and a second plover of unknown age on the 7 Exclosure shoreline. During the removal process, this gull disgorged a likely plover carcass that was not recovered. A single plover band was found inside the gull when it was removed.

No plover or tern nests were known to be depredated by corvids at ODSVRA in 2014, although ravens were identified flying over ODSVRA during at least eight days. A raven was flushed from the Pipeline Revegetation area on 21 July, and the same bird was later hazed by Young with a bird-whistler device when it perched in the NOF Foredues. On 31 July, a raven was hazed with a bird-whistler device as it flew north through the SOF Foredues. No ravens were removed by USDA Wildlife Services during the 2014 season.

American Kestrel

One American Kestrel was trapped at ODSVRA and relocated during the 2014 plover and tern nesting season (Appendix A). A male kestrel was trapped on 26 February as it perch-hunted at the NOF Foredues. Ten days were spent attempting to trap kestrels.

In previous years, we attempted to trap adult kestrels prior to their nesting at the Phillips 66 refinery, approximately 1.5 miles east of the 8 Exclosure. The Phillips 66 refinery traditionally provided the nearest suitable nesting habitat for kestrels, prompting the need to preemptively remove kestrels from this area to prevent them from feeding at ODSVRA. However, relatively few kestrels have been found here since 2010, when refinery management removed many of the old structures at the south end that had provided the preferred nesting sites. Early surveys in February and March of 2014 documented only one pair of kestrels near the refinery.

Although the refinery provides the nearest suitable kestrel nesting habitat to ODSVRA, there are 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 here 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 1.5 miles 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 2014, kestrels were observed at ODSVRA on 27 days, the same number of days as in 2013, although there were more February observations in 2014 (12 days) than in 2013 (3 days). All 12 of the kestrel sightings in February were probably of the same male kestrel that was most often seen perch-hunting at the Pipeline Revegetation Area, the NOF Foredues, or the SOF Foredues. This bird was trapped on 26 February as it perch-hunted at the NOF Foredues. Two kestrel sightings in March were of birds seen at the Boy Scout Area near the extreme eastern portion of the park near the refinery, and one kestrel sighting in March was of a bird in the Dune Preserve Area of the park well north of the plover and tern nesting

areas. Single kestrel sightings in April and May were of birds in the SOF area. In July and August, kestrel sightings at ODSVRA rose substantially, with all 10 sightings consisting of birds perched inside the enclosure area or flying over the enclosure area. Most, if not all, of the kestrel sightings in July and August were of juveniles dispersing from natal territories east of ODSVRA. This conclusion is based on the timing of their arrival, a historical perspective of kestrel sightings during July at this site for the last 14 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).

Kestrels were hazed from the enclosure area on two occasions. On 8 April, a kestrel was hazed with a bird-whistler device at the SOF Foredues, and on 26 July, a female kestrel was hazed with a bird-whistler device as it perched on the west fence of the 8 Enclosure, and then hazed again when it re-perched on the west fence of the NOF Foredues.

Loggerhead Shrike

One shrike was trapped at ODSVRA during the 2014 plover and tern nesting season, less than the four shrikes trapped in 2013, and the nine shrikes trapped and relocated in 2012 (Appendix A). This shrike was trapped near the shoreline at the OF Creek area on 13 February. Four days were spent attempting to trap shrikes in 2014.

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 enclosures with net tops.

Tern and plover chicks are particularly 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 enclosure 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 that exposure. Unlike kestrels or red-tailed hawks, shrikes are exclusively perch-hunters, and have the smallest hunting territories of any 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 far removed from the plover and tern nesting areas are rarely trapped.

Shrikes were observed on eight days at ODSVRA in 2014, including seven days in February and one day in May. On 3 and 4 February, a shrike was seen by Young perch-hunting at the Dune Preserve area, but was not seen thereafter. On 5 February, a shrike was seen by Young perch-hunting the shoreline area near OF Creek. This bird was trapped on 13 February and relocated the next day. On 28 May, a shrike was seen at the west end of the Maidenform Revegetation area. The lack of juvenile shrike sightings in July and August of 2014, compared to previous years, might be a result of the continuing drought conditions existing in central California.

Great Horned Owl

Five great horned owls were trapped during the 2014 tern and plover nesting season at ODSVRA (Appendix A). One male great horned owl was trapped at the Eucalyptus Revegetation Area on 25 March; a female and male great horned owl were trapped at the 8 Exclosure on 10 April and 4 June, respectively; and two male great horned owls were trapped at the south end of the NOF Foredures Exclosure on 20 April and 4 May. Sixteen days were spent attempting to trap great horned owls at ODSVRA in 2014.

Great horned owls are common residents at the park. Although great horned owl predation on incubating adult plovers and terns at night has been documented at other sites, relatively little is known about great horned owl predation on plover and tern chicks on the ODSVRA shoreline or inside the nesting exclosures. On 31 March 2014, a great horned owl might have killed one of the incubating adult plovers at a nest, where a bump-out exclosure was attached to the west fence of the 8 Exclosure. This bump-out exclosure was not fitted with a net top. There were two sets of large owl tracks in the sand inside the bump-out exclosure. One set was located at the inside northwest perimeter edge of the bump-out fencing. At this same location, there were many small white contour feathers scattered in the sand and adhering to a small gap at the bottom of the fencing, where an adult plover may have tried to exit the bump-out exclosure. This nest was eventually abandoned, raising suspicions that one of the incubating adults had died. This was the only occasion during the 2014 season that large owl tracks were found at a plover or tern nest, although they were found many times in the exclosure areas.

During the 2014 plover and tern nesting season at ODSVRA, large owl tracks were observed on 37 days either inside the exclosure areas or in, or around, adjacent revegetation areas. These observations do not include the Dune Preserve Area or other areas to the north which are somewhat removed from the usual plover and tern nesting areas. Large owl tracks were observed during each month from March through August and most often in the Pipeline Revegetation Area (17 days) and the 8 Exclosure (12 days), with observations also in the Boneyard Exclosure (five days), the Tabletop Revegetation Area (four days), the SOF Foredures (four days), the Eucalyptus Revegetation Area (three days), the NOF Foredures (two days), and the 7 Exclosure (one day) 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 each day.

In 2014, 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 could have been associated with an active nest somewhere. Therefore, a strong effort was made to confirm that a targeted owl was roosting in the Eucalyptus, Tabletop, 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 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.

Four of the five great horned owls that were trapped in 2014 at ODSVRA were trapped inside the plover and tern nesting areas that are closed to the public. The great horned owl that was not trapped inside the enclosed plover and tern nesting areas was an owl that was trapped at the Eucalyptus Revegetation Area, which is approximately 600 feet to the east of the 7 Exclosure. Visual observations of this owl at dusk by Young and track sign evidence left in the sand indicated that this great horned owl was roosting in one of the smaller revegetation areas to the north of the Eucalyptus Revegetation Area and then moving south into the Pipeline Revegetation Area and then into the 8 Exclosure. Both great horned owls that were later

trapped in the east 8 Enclosure were roosting during daylight hours in the Pipeline Revegetation Area and were observed by Young to fly into the 8 Enclosure in the early evening. Both of these birds were trapped inside the 8 Enclosure before 2030 when they could still be visually observed. The two great horned owls that were trapped at the south end of the NOF Foredues Enclosure were observed to be roosting during daylight hours in the willow thickets on the north side of OF Creek and then perch-hunting at the south end of NOF Foredues. On the days that these owls were observed by Young, but not trapped, both owls appeared at the south end of the NOF Foredues before 2030 and quickly moved to the north through the NOF Foredues towards the 8, 7, and 6 enclosures. Both of these great horned owls were trapped before 2040 when they could still be visually observed.

Peregrine Falcon

One sub-adult male peregrine falcon was trapped at ODSVRA during the 2014 plover and tern nesting season (Appendix A). This bird was trapped on the 8 Enclosure shoreline on 24 June. Fourteen days were spent attempting to trap peregrine falcons.

Peregrine falcons are a common local resident at ODSVRA. There is a historical 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 Vandenburg 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 2014, the Shell Beach peregrine nest site was active for the second straight year after being inactive in 2010-2012, and Young documented fledging of three peregrine falcons. A pair was present in early March, and the adult male appeared to be the same individual as the bird observed in 2013, based on plumage characteristics. The adult female, however, had different plumage characteristics from the female observed in 2013. In late February, Young observed a dead peregrine falcon tangled in some monofilament fishing line and suspended from the cliff face near the nest site. It is possible that this bird was the adult female attached to this nest site in 2013. The dead peregrine falcon was reported to a local game warden by Young, but the inaccessibility of the carcass and the disturbance factor involved in any retrieval effort to the actively nesting falcons, made the removal of this dead peregrine inadvisable until the completion of nesting. On 6 March, Young observed the pair copulating near the nest cliff, and an incubation exchange was seen on 11 March. Chicks were observed on 23 April, and three juveniles were observed perching and flying near the nest on 16 June. Neither of the adults associated with this nest site was banded. Adult peregrine falcons have been observed flying south from this nest towards ODSVRA on many occasions and can reach the park after only several minutes of flying.

On 7 September 2014, a dead peregrine falcon was recovered by resource ecologists at the high tide line on the beach north of the Pismo Pier. The carcass was examined by Young and determined to be an

unbanded adult female. The carcass was not well preserved, and a cause of death was not determined. It is unknown if this was the adult female attached to the Shell Beach nest site.

Because peregrine falcons are afforded considerable legal protection, it is important to keep track of individual peregrine falcons at ODSVRA by sex and plumage, so that trapping efforts, when needed, target the correct individual and avoid nesting pairs. It was sometimes a challenge to determine the age and sex of peregrine falcons that were observed at ODSVRA. Factors contributing 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 one-third smaller than females, but their plumages can be similar, and determining the relative size of a single peregrine at a distance is difficult. The challenge of identifying individual peregrine falcons was simplified by photographing birds when possible and comparing plumage characteristics and head markings. Photographs taken by resource ecologists, with cameras affixed to spotting scopes, and e-mailed to Young, helped inventory individual peregrine falcons that were regularly seen in or around ODSVRA. Peregrine falcons were photographed on 16 occasions during the 2014 season.

Peregrine falcons were observed on 100 days at ODSVRA in 2014 (Table 3), more than in any previous year from 2010-2013. Despite the challenges of determining peregrine falcon age and sex, most identifications were reliable enough to include in a breakdown of age and sex-specific peregrine falcon sightings at ODSVRA. Most observations were of adults and sub-adults, and these observations occurred in most months from March through August (Table 3). Adult male peregrine falcons were observed during at least two days, whereas adult female peregrine falcons were observed during at least 11 days. Ten of the 11 adult female peregrine falcon observations occurred in March and early April and were of a bird with plumage characteristics different from the adult female peregrine falcon associated with the Shell Beach nest site. There were at least three individual sub-adult peregrine falcons that were observed at the ODSVRA in 2014. There was an unbanded sub-adult female, a banded sub-adult female, and an unbanded (but later banded) sub-adult male. Unbanded sub-adult female peregrine falcons were observed during eight days, a banded sub-adult female peregrine falcon (left leg silver USGS band, right leg VID band 17 D) was observed during 13 days, and a sub-adult male peregrine falcon was observed during 20 days. Sub-adult peregrine falcons that could not be identified according to sex were observed during 14 days. At least seven different individual peregrine falcons were seen from 1 March to 1 September at ODSVRA during the 2014 plover and tern nesting season. This is a conservative number and includes at least one adult male peregrine, at least one adult female peregrine, at least three sub-adult peregrines, at least one immature peregrine, and at least one juvenile peregrine. During the 2013 season, at least seven individual peregrines were also seen.

Table 3. The number of days per month peregrine falcons of different age groups were observed at Oceano Dunes State Vehicular Recreation Area in 2014.

Peregrine Falcon Age	March	April	May	June	July	August	Total
Adult	10	5	1	0	1	1	18
Sub-adult	0	1	11	10	9	12	43
Immature	0	2	0	0	0	0	2
Juvenile	0	0	0	0	2	2	4
Unknown	10	4	4	5	6	4	33
All Ages Combined	20	12	16	15	18	19	100

Peregrine Falcons were observed catching or consuming birds at ODSVRA on 23 occasions in 2014, more than the 16 observations of such behavior in 2013. Observations in 2014 included one sanderling (*Calidris alba*), nine Heermann's gulls (*Larus heermanni*), one western gull (*L. occidentalis*), one

unidentified gull, one adult snowy plover, three snowy plover chicks, two least terns, one whimbrel (*Numenius phaeopus*), one unidentified small shorebird, two unidentified medium-sized birds, and one unidentified small bird.

Adult peregrine falcons were associated with four of these predation events, whereas sub-adult peregrines were associated with 16 events, and a juvenile peregrine was associated with one event. Unidentified peregrine falcons were associated with two events. Sub-adult female peregrine falcons were associated with 11 events, whereas sub-adult male peregrines were associated with five.

In 2014, peregrine falcons were observed eating prey near the shoreline north of the 6 Exclosure on 10 occasions. Peregrine falcons were observed consuming prey inside the 6 Exclosure or the 6 Exclosure shoreline (six times), the 7 Exclosure or the 7 Exclosure shoreline (twice), the 8 Exclosure or the 8 Exclosure shoreline (three times), and the SOF Area (twice).

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 2014 plover and tern nesting season at ODSVRA, at least four snowy plovers and two least terns were captured and consumed by peregrine falcons. On 28 February, an adult female peregrine falcon was observed eating an adult snowy plover on the shoreline north of the exclosure area. Between 24 June and 7 August, a sub-adult male peregrine falcon caught and consumed at least three plovers and two terns on three different dates, despite trapping and translocation of the bird after the first observed predation. When first observed, this sub-adult male peregrine falcon landed in the 6 Exclosure and was observed walking and picking at things on the ground with its beak. It then flew to the 8 Exclosure near the shoreline and perched on a low hummock there. Young watched this bird from the shoreline and observed it to make a short low flight to the west and capture a plover chick on the ground and eat it there. The peregrine then flew west to the 8 Exclosure shoreline and perched there. The peregrine was observed by Young to be closely scanning the shoreline area near where it was perched, and running quickly or making quick short flights and picking up objects in its beak. At the time, adult plovers displayed within six feet of the peregrine in order to distract it. The peregrine then picked up a plover chick in its beak and ate it there. Because this sub-adult male peregrine had been flushed and hazed previously at ODSVRA, and was observed at this time to be targeting plover chicks, an effort was made to immediately trap this bird. This bird was trapped on the 8 Exclosure shoreline within an hour using a remote-controlled bow net with a pigeon as the lure animal. The peregrine was fitted with a USGS band on its left leg colored blue with indelible ink so it could be identified should it return. A peregrine casting found in Young's mews on 25 June contained four plover bands which were turned over to State Parks.

On 17 July, the sub-adult male peregrine that was relocated on 26 June was observed again at ODSVRA. It was perched at the NOF Foredunes and was identified by its plumage characteristics and a blue band on its left leg. Thirteen days were spent attempting to re-trap this bird, but these efforts proved unsuccessful. This bird was observed at ODSVRA during at least eight days from 17 July to 1 September. After it returned, it was observed to kill and consume one adult or juvenile least tern and one snowy plover chick.

Peregrine falcons were flushed on foot or with a vehicle, or hazed with a bird-whistler device from sensitive plover and tern nesting areas during 34 days in 2014, more than the 14 days peregrine falcons were flushed or hazed in 2013. Peregrine falcons were sometimes flushed and hazed numerous times before they finally moved out of sensitive plover and tern habitat. Peregrine falcons were flushed on foot or with a vehicle during 19 days. Peregrine falcons were hazed with a bird-whistler device during 21 days. Peregrine falcons of a variety of ages were flushed or hazed, including adults (during 11 days), sub-

adults (25 days), and juveniles (two days). Sometimes, several different individual peregrine falcons needed to be flushed or hazed on the same day. Flushing or hazing a raptor can disturb the nesting plovers and terns. Therefore, flushing a raptor required coordination with the entire resource staff in the field in order to prevent plovers and terns from suspending incubation, chicks from running into the open riding area, and chicks becoming separated from the attending adults. Resource staff also monitored peregrine falcons after they were flushed or hazed to see if they re-perched in another sensitive location in the large enclosure area.

Northern Harrier

One adult male northern harrier was trapped and relocated at ODSVRA during the 2014 plover and tern nesting season (Appendix A). This bird was trapped on 18 May at the south end of the NOF Foredues Enclosure. Nine days were spent attempting to trap harriers.

Harriers were observed during at least 40 days at ODSVRA in 2014 (Table 4), compared to 61 days during 2013 and 53 days during 2012. Most of the harrier sightings at ODSVRA in 2014 were of adult females. Most of these sightings were of an adult female harrier hunting the revegetation areas east of the enclosure areas, or the Dune Preserve and AG Creek areas. Harriers were observed flying over relatively sensitive areas (i.e., the 6, 7, and 8 enclosure areas) during 15 days between May and August, the period when plover and tern chicks are most likely present and vulnerable. Nevertheless, harriers were not observed to take plover or tern adults or their chicks at ODSVRA during 2014.

Table 4. The number of days per month northern harriers of different sex and age groups were observed at Oceano Dunes State Vehicular Recreation Area in 2014.

Harrier Age/Sex	March	April	May	June	July	August	Total
Adult Female	7	4	4	1	3	2	21
Adult Male	0	0	3	1	0	3	7
Immature	0	1	0	0	0	0	1
Juvenile	0	0	0	0	0	0	0
Unknown Age/Sex	1	2	1	2	1	4	11
All Harriers	8	7	8	4	4	9	40

Although not observed depredating adults or chicks, an adult male harrier depredated eggs from an abandoned plover nest in the 7 Enclosure on 17 May. During that morning, the harrier was flushed from this area to the south by park staff, but was again seen hunting low over the 7 Enclosure approximately 30 minutes later. It landed at a plover nest in the 7 Enclosure and began eating the plover eggs at this nest. It flushed from this nest and was then hazed with a bird-whistler device on two occasions before it finally flew to the south. Prior to this event, there had been only one sighting of an adult male harrier at ODSVRA and that was at the SOF Foredues on 8 May. Because the harrier had flown to the south, Young constructed a trap-set at the south end of the NOF Foredues Enclosure, hoping to trap this bird before it reached the plover and tern nests in the 8, 7, and 6 enclosures. At 0645 the next morning, on 18 May, an adult male harrier was trapped at the south end of the NOF Foredues as it flew north through this area. This bird was relocated to the northern portion of the Sacramento National Wildlife Refuge Complex, Tehama County, on the same day it was trapped. After this bird was relocated, there were no confirmed cases of harriers depredating plover or tern nests, although there were nests with unknown fate or depredated by unknown predators. An adult male harrier was observed flying over the enclosure areas on 26 June and 7 August.

Observers have recorded other evidence of predation by harriers at ODSVRA in recent years. In 2008-2010, most of the plover nests that were lost to avian depredation were believed to be caused by an adult male harrier. In 2008, Doug George investigated 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, five plover nests were depredated by an unknown avian predator, and eggshell fragments and clumping of egg contents were consistent with signs documented at nests depredated by harriers in previous years. In 2012, five plover nests were lost to a depredation event involving an adult male harrier, and an adult male harrier was suspected in the loss of five additional nests.

Five of the nine harrier trapping days at ODSVRA in 2014 were spent attempting to trap an adult female harrier in April at the AG Creek Area. It was strongly suspected that the adult female harrier seen at AG Creek was the same bird that may have nested in the Dune Lakes Area in 2013. The Dune Lakes Area east of the park contains many small lakes and marshy areas where harriers have nested in previous years. This area is private property and off limits to trapping, but can be viewed from the park. Observations of the Dune Lakes Area by Young in mid-April indicated that there was no harrier nesting activity here and efforts to trap the adult female were suspended.

Northern harriers were hazed with a bird whistler device on two days at ODSVRA during the 2014 season.

Red-tailed Hawk

No red-tailed hawks were trapped at ODSVRA during the 2014 plover and tern nesting season. Seventeen days were spent attempting to trap red-tailed hawks.

Red-tailed hawks are a common local resident at ODSVRA. In 2012 and 2013, the resident pair of adult red-tailed hawks that were usually seen perch-hunting in or around the exclosure areas nested near the OF Lake Area. These nests failed in both years. In 2014, no nesting occurred, and it was rare to see two adult red-tailed hawks at the same time near the exclosure areas at ODSVRA. It is suspected that one of the hawks died sometime between the 2013 and 2014 season.

There is also a resident pair of red-tailed hawks that probably nest to the east of AG Creek. Adult and immature red-tailed hawks were seen perched at the AG Creek Area and at the Dune Preserve Area regularly.

Red-tailed hawks have not been observed to take adult plovers or terns or their chicks at ODSVRA over the last 13 years. They have been observed to depredate plover nests and kill plover and tern chicks at other sites. Red-tailed hawks and peregrine falcons have been the most commonly observed raptors at ODSVRA in recent years. In 2014, most of these sightings of red-tailed hawks were of a resident adult that was seen almost daily hunting the heavily vegetated areas east of the plover and tern nesting areas or the NOF Foredues and SOF Foredues. 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 immature red-tailed hawks were seen on just six days at ODSVRA; no juvenile red-tailed hawks were seen. The resident pair of red-tailed hawks had not been trapped in past years because they have not been

seen to take plover or tern chicks, and they drive off other red-tailed hawks that might target plover and tern chicks. Prior to 2012, when both resident adult red-tailed hawks nested successfully and raised young, they were observed relatively infrequently perched inside the exclosure areas (Young, personal observation).

In late March and early April, an immature red-tailed hawk was observed perched in the SOF Foredunes on three days. Several days were spent attempting to trap this bird, but trapping efforts were suspended when the hawk was not seen in this area after 9 April. In March, April, and May, an adult red-tailed hawk was observed perched inside the exclosure area during 43 days, most often in the NOF or SOF Foredunes. Because this bird was not nesting, and its presence constituted a disturbance to the nesting terns and plovers, an effort was made to trap during May and early June. These trapping efforts were suspended when adult red-tailed hawks were seen on fewer days in June (seven days), July (eight days), and August (one day).

During 2014, red-tailed hawks were observed perched either at the 7.5 Revegetation Area, the 8 Exclosure, the NOF Foredunes, the SOF Foredunes, or the west end of the Pipeline Revegetation Area, during 59 days. Most often, an individual red-tailed hawk would perch-hunt in several of these sensitive areas on a single day before it was flushed or just moved on. Red-tailed hawks were perched at the 7.5 Revegetation Area (17 days), the NOF Foredunes (34 days), the SOF Foredunes (21 days), the west end of the Pipeline Revegetation Area (four days), and the 8 Exclosure (two days). A red-tailed hawk was observed perched in one of these sensitive areas in each month from March through August.

Red-tailed hawks were flushed by foot or with a vehicle, or hazed with a bird-whistler device, on 18 days at ODSVRA in 2014.

Merlin

No merlins (*Falco columbarius*) were trapped and no trapping efforts were made at ODSVRA during the 2014 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. However, merlins depredated adult plovers once each year in 2004-2006 at ODSVRA, and an adult female merlin was observed eating a small shorebird that might have been a snowy plover in 2011.

On 8 April 2014, a merlin was observed to catch a plover-sized shorebird on the 6 Exclosure shoreline. The brown merlin perched with its prey on the 6 Exclosure shoreline and then flew to the east after it was hazed with a bird-whistler device by park ecologists. It perched east of the 6 Exclosure and was flushed again by a State Parks vehicle. It landed northeast of the 6 Exclosure and ate its prey there. Prey remains were collected but were inconclusive.

Merlins were seen during at least 14 days in 2014, compared to eight days in 2013, and three days in 2012. In 2014, they were seen during two days in February, three days in March, and nine days in April. During three days, there was more than one merlin sighting per day. These observations of merlins included adult males (11 and 13 April) and females (12 and 18 February). Merlins that could only be

identified as “brown merlins” were observed on 8, 9, 10, 17, and 24 April. Immature male, immature female, and adult female merlins are all brown and are challenging to identify more specifically in the field.

In April, there was a relatively high number of plover nest abandonments, possibly the result of the death of one of the breeding adults. Merlins and great-horned owls were suspected in the deaths of some adult plovers during this time. On 13 April, Doug George observed an adult male merlin hunting low over the 6, 7, and 8 enclosure shoreline. George observed this merlin flying north and south along the enclosure shoreline, perching occasionally, and flying several feet off the ground “in a coursing, not in a sustained straight flight”. To George, it appeared as though this “behavior was suggestive of a hunting technique to flush bird(s) from the ground”. This sort of low, coursing hunting behavior by falcons might be a speculative hunting technique employed to flush birds whose main defense is to remain crouched and not try to out-fly the falcon.

In 2014, merlins were flushed or hazed from sensitive areas during five days.

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. An immature red-shouldered hawk was seen here later in the season.

Cooper's hawks (*Accipiter cooperii*) were observed on four 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 AG Creek Area, the mid-ramps area, the NOF Foredunes, and the OF Creek Area.

Sharp-shinned hawks (*Accipiter striatus*) were not seen at the ODSVRA in 2014 or 2013. There were two sightings of this species in 2012.

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 2014 or 2013 season. A golden eagle was seen on one day in 2012.

American bald eagles (*Haliaeetus leucocephalus*) were seen on one day. On 13 August, an immature bald eagle was seen flying over the 8 Enclosure and then disappearing to the northeast. This bird had a blue wing tag on the left wing. There was one bald eagle sighting in 2013 at ODSVRA.

Burrowing owls (*Athene cunicularia*) were not seen at ODSVRA in 2014 or 2013. Burrowing owls were seen on one day in 2012.

Barn owls (*Tyto alba*) were not seen at ODSVRA in 2014 or 2013. Large owl tracks observed at the ODSVRA that were distinctly different from great horned owl tracks may have been barn owl tracks. In 2012, two barn owls were trapped and relocated at ODSVRA.

White-tailed kites (*Elanus leucurus*) were observed at ODSVRA on five days, less than the 18 days they were seen in 2013, and the eight days they were seen in 2012. They were most often seen in the SOF Area.

Prairie Falcons (*Falco mexicanus*) were not seen at the ODSVRA during the 2014 or 2013 season. A prairie falcon was seen on one day in 2012.

Recommendations

Ventana Wildlife Society encourages ODSVRA management to continue the practice of depositing wood chips and other substrates into the 6, 7, and 8 exclosures 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 exclosure 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 exclosure 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 exclosures. One of the most basic advantages nesting terns and plovers enjoy at ODSVRA is the considerable size of the exclosure area. If the exclosure 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 more bird-whistler devices. Several times in 2014 bird-whistler devices were not available to the resource vehicles closest to the avian predator perched in a sensitive area. Hazing with a bird-whistler device will not permanently keep an avian predator from returning to the large exclosure 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.

Acknowledgments

We thank Ronnie Glick and all ODSVRA resource ecologists for all their invaluable assistance with this project. In addition, we thank Doug George (Point Blue Conservation Science), Tony Jennings, 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.

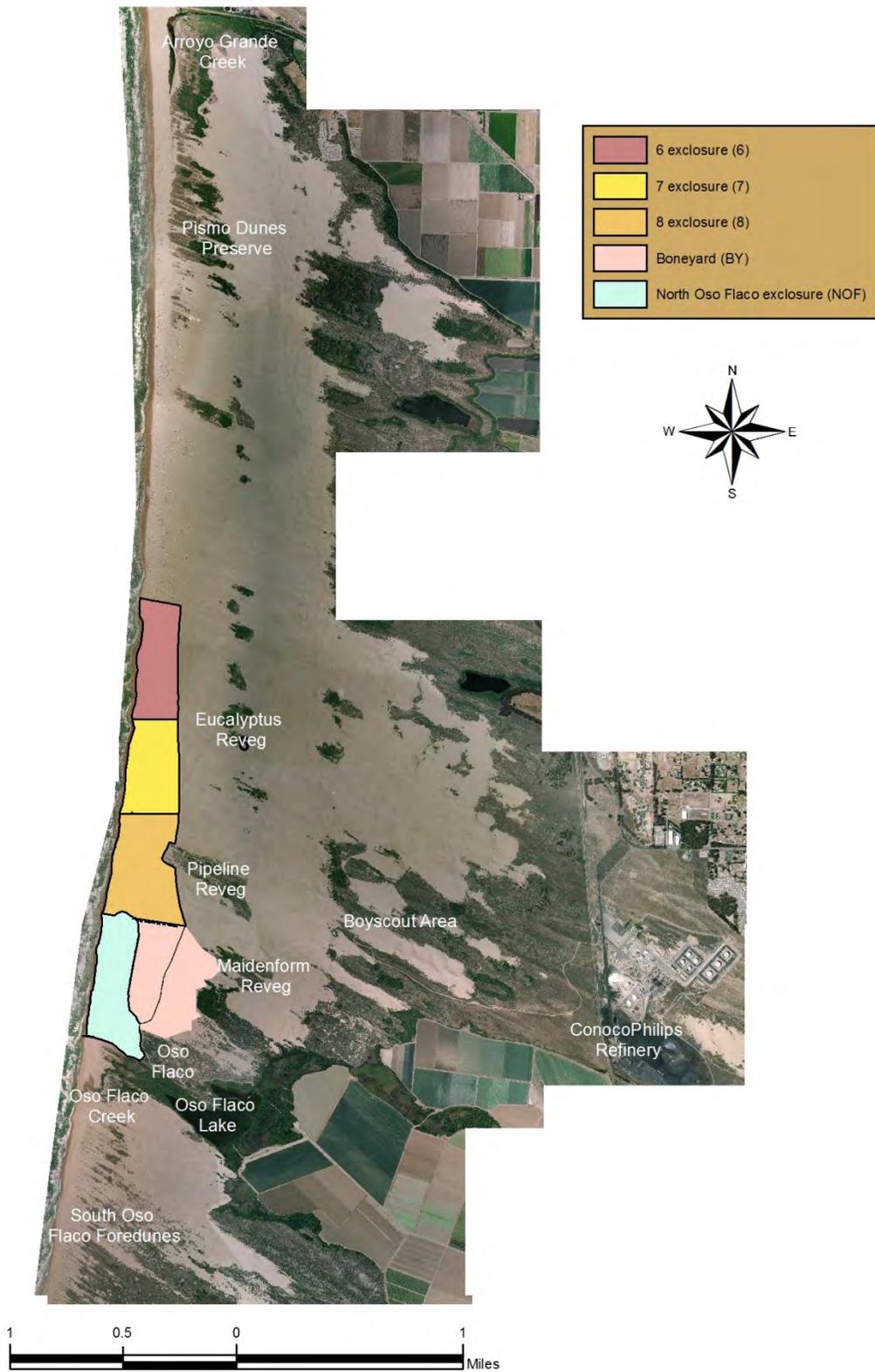


Figure 1. Location of avian predator management activities at Oceano Dunes State Vehicular Recreation Area in 2014.

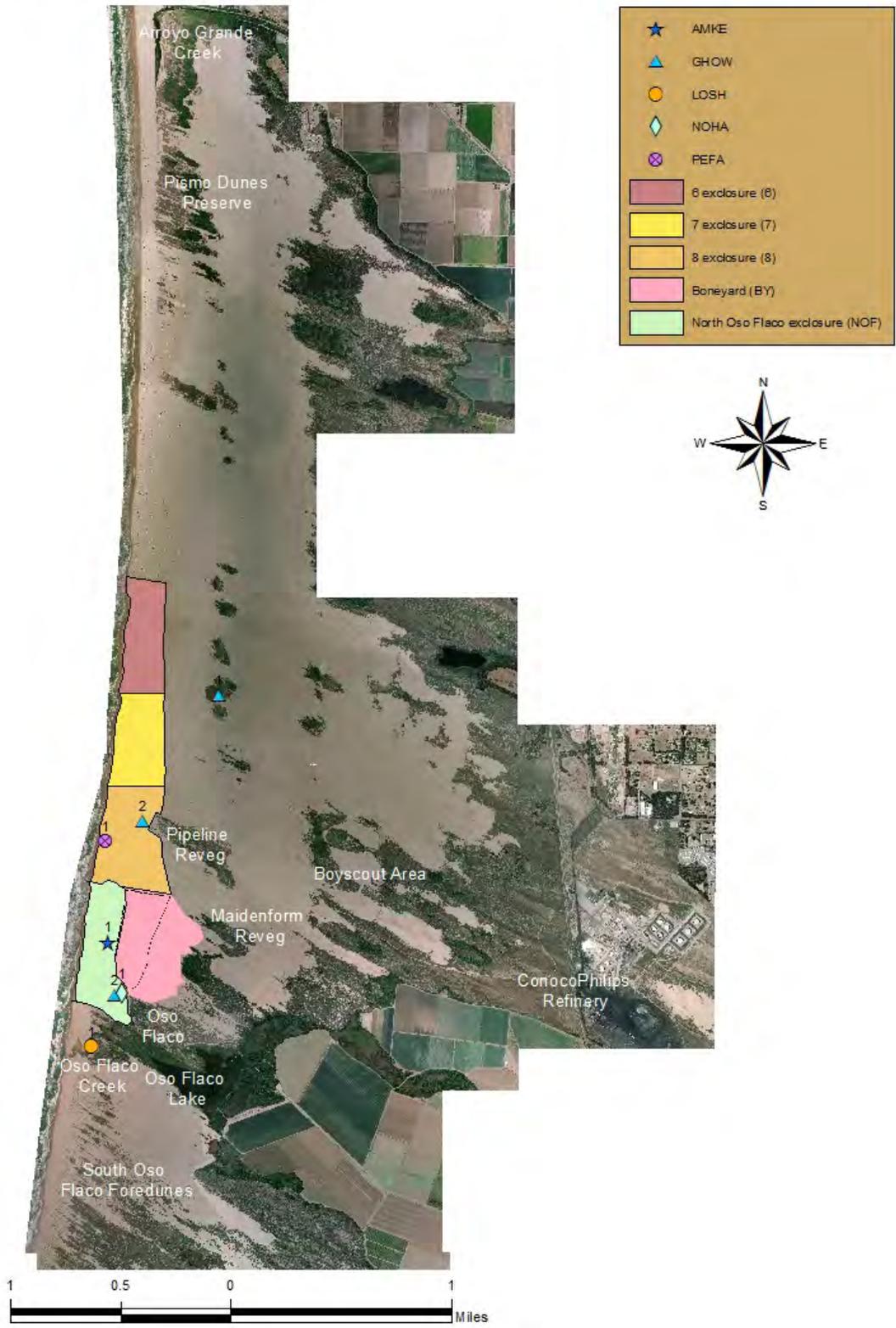


Figure 2. Avian predator trapping locations at Oceano Dunes State Vehicular Recreation Area in 2014.

Appendix A. Avian predators trapped at Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California, and relocated in 2014.

Date	Species	Age	Sex	Banding Site	Banding Zone/UTM	Release		Band Number
						Date	Release Site	
02/13/14	Loggerhead Shrike	AHY	U	South Oso Flaco	10/715963-3879110	02/14/14	Cuyama Valley	8101-08427
02/26/14	American Kestrel	AHY	M	North Oso Flaco	10/716077-3879916	02/27/14	Kernville	1593-52105
03/25/14	Great Horned Owl	U	M	Eucalyptus Reveg Area	10/716779-3881663	03/26/14	Wind Wolves Preserve	0928-11978
04/09/14	Great Horned Owl	U	F	8 Exclosure	10/716338-3880707	04/10/14	Gorman	0928-11979
04/20/14	Great Horned Owl	U	M	North Oso Flaco	10/716112-3879430	04/21/14	Tehachapi	0928-11980
05/04/14	Great Horned Owl	U	M	North Oso Flaco	10/716112-3879430	05/05/14	Kernville	0928-11981
05/18/14	Northern Harrier	AHY	M	North Oso Flaco	10/716177-3879507	05/18/14	Sacramento NWR	1004-10603
06/04/14	Great Horned Owl	U	M	8 Exclosure	10/716338-3880707	06/05/14	Mount Pinos	0928-11982
06/24/14	Peregrine Falcon	AHY	M	8 Exclosure	10/716047-3880635	06/26/14	Sacramento NWR	2206-79505

14-1426 Species Tern, Least

Date Admitted July 31, 2014 at 3:16 pm

Last Update August 1, 2014 at 4:01 pm

Identity

Band	Name
Keywords	
Nature of Injury	

Intake

Location Found	Oceano Dunes, Oceano CA
Date Found	July 31, 2014
Rescuer's Observations	Broken wing & leg
What fed by Rescuer	Nothing
Notes	

Initial Exam / Treatment

Dehydration	Mild	Admit Weight	28.00 g
Sex	Unknown	Admit Age	Immature
Admit Mentation	Alert	Admit BCS	Thin

Wings / arms : Open fracture L metacarpus. Site contaminated w/sand and debris. Bone exposed. Severe soft tissue trauma. Wing only has few thin soft tissue. attachments.

Legs : Closed, mid-diaphyseal fracture L tarsometatarsus. Underneath bands. Seems newer than the wing injury

Other : TMT fracture should heal relatively uneventfully if treated soon before opens. Wing not salvageable. Bird will not be flighted/releasable. Possibility of amputation at fracture site and placement of bird. Unsure of chronicity of injury given that bird is quite thin as well.

Initial Treatment : Butorphanol, placed wing in fig-8 wrap and leg in tape splint while awaiting decision about direction of treatment.

Medical Record

Date	Treatment
8/1 4:01 PM	Tube feeding 1.5ml 50% EC throughout day. Offered slivered smelt, but not interested. As of 4pm, no word for placement, so per discussion w/Stephanie Little of ODSVRA, elected to euthanize rather than put through surgery and wait for word of placement that might not come. SR

Disposition

Disposition	Euthanized in 24hr	Enclosure	
Transfer Type		Enclosure History	
Release Type		Holding At	
Disposition Date	August 1, 2014	Criminal Activity?	
Disposition Location	PWC CA	Carcass Saved?	

Rescuer Contact Information

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

Notes

Prescriptions

Dose	Prescription	Start date	End date
0.01 ml	Butorphanol 10mg/ml IM ONCE (3mg/kg)	7/31/2014	7/31/2014
0.02 ml	Enrofloxacin 22.7mg/ml PO BID (15mg/kg)	7/31/2014	
0.02 ml	Meloxicam 1.6mg/ml PO BID (1mg/kg)	7/31/2014	8/4/2014
0.03 ml	Clindamycin 25mg/ml PO BID (25mg/kg)	7/31/2014	
0.04 ml	Tramadol 25mg/ml PO BID (40mg/kg)	7/31/2014	8/6/2014
0.1 ml	Somnasol	8/1/2014	8/1/2014



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

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

CAHFS Case #: D1409343
Referral #:
Date Collected:
Date Received: 08/01/2014
Case Coordinator: Asli Mete. DVM, PhD
**Electronically Signed and Authorized
By:** Mete, Asli on 8/5/2014 6:10:23PM

FINAL REPORT

*This report supersedes all
previous reports for this case*

Email To:
OCEANO DUNES SVRA
ronnie.glick@parks.ca.gov

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

Specimens Received: 2 Carcass;

Comments: 2-carcass

Case Contacts

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

Specimen Details

Animal/Source	ID Type	Taxonomy	Gender	Age
D1409343-01	CAHFS Internal ID	Least Tern		

Laboratory Findings/Diagnosis

- Least Tern A: Left peri-orbital hemorrhage
 - Partly digested fish in the esophagus and stomach
 - Diffuse severe bilateral pulmonary congestion/hyperemia and edema
 - Lung and liver swab: *Vibrio damsala* isolated
- Least Tern B: Left proximal neck, subcutaneous focal hemorrhage
 - Diffuse severe bilateral pulmonary congestion/hyperemia, fibrinous parabronchal accumulations, and edema with thick rod bacterial colonies
 - Liver and lung swab: *Aeromonas* spp. isolated

Case Summary

8/5/2014:

Microscopic examination of the tissues did not reveal definitive specific disease processes in either bird. Least Tern B was in advanced autolytic state however and some detailed lesions may have been precluded. The *Aeromonas* spp. isolated from bird B may reflect an acute infection since there was fibrin in the lungs however terminal colonisation cannot be excluded. In Least Tern A, *V. damsala* is isolated from liver and lung and may be significant although there is no associated inflammatory changes indicating peracute infection or may likely be an incidental postmortem finding.

There are no other findings, salmonellosis and avian influenza are ruled out.

8/4/2014:

Both birds demonstrated some hemorrhagic foci on gross exam, ancillary tests and microscopy are pending.

Clinical History

Two California least tern fledges found 7/31/14 at Oceano Dunes SVRA in San Luis Obispo Co. One fledge from Least Tern Nest #1, banded R:G/Y hatched 6/11, one fledge from Least Tern Nest #41 banded R?Y:G/Y hatched 6/21. Birds found inside nesting enclosure within a few feet of the fence. Please ascertain injuries and the probable causes of death for these birds.

Gross Observations

Submitted are two Least Tern birds, nest #1 is designated "A" and nest #421 is designated "B". Bird A is in moderate and B in advanced decomposed state. Both birds are presumptively male. Bird A has peri-orbital hemorrhagic soft tissue around left eye and extending to subcutis of cranium over the left to midline rostral skull. The esophagus and stomach are distended and contain a partly digested fish. The intestines are torn and brown liquid feces is in the body cavity (no inflammatory change detected). A very small bursa may be present. The lungs bilaterally are diffusely black to dark red-black. Bird B has clotted blood (subcutaneous hemorrhage) over the left proximal cervical neck. The stomach is empty. There is a hole in the right ventral peritoneum (post-mortem presumptive without any inflammatory change). The oral cavity, carina and at least 50% of rostral brain is obliterated by live maggots. Both lungs diffusely are dark red-black. A small bursa may be present. The livers are unremarkable, except for mild pallor in both.

Bacteriology

An organism that was isolated from Lung Swab A was identified by MALDI as *Photobacterium damsela*, which was formerly known as *Vibrio damsela*.

Test Specific Comments

Biotyper Organism Identification (under validation)

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
D1409343-01	A; Nest # 1	Liver Swab	<i>Vibrio damsela</i> Rare# Mixed flora Rare#
D1409343-01	A; Nest # 1	Lung Swab	<i>Aeromonas</i> sp. Lg# <i>Vibrio damsela</i> Lg# See Discipline Summary
D1409343-01	B; Nest # 41	Liver Swab	<i>Aeromonas</i> sp. Mod#
D1409343-01	B; Nest # 41	Lung Swab	<i>Aeromonas</i> sp. Mod#

Biotyper Organism Identification (under validation)

Animal/Source	Specimen	Specimen Type	Results
D1409343-01	A; Nest # 1	Lung Swab	<i>Vibrio damsela</i>
D1409343-01	B; Nest # 41	Liver Swab	<i>Aeromonas</i> sp.

Salmonella PCR and Confirmation Culture

Animal/Source	Specimen	Specimen Type	Results
D1409343-01	AB pool	Feces Pool	No salmonella detected

Biotechnology

Avian Influenza matrix gene qRT-PCR

Animal/Source	Specimen	Specimen Type	Results
D1409343-01	AB pool	Oropharyngeal Swab	Not Detected

Histology

Least tern A: brain, heart, skeletal muscle, trachea, lung, kidney, liver, bursa, air sacs, esophagus, proventriculus, ventriculus small and large intestines (A7): In the kidneys there is marked focal tubular mineralization with necrosis. Fibrillar eosinophilic material and red blood cells in small numbers are in pulmonary airways. The lungs are overall severely congested and there is likely pulmonary edema.

Least tern B: brain, heart, skeletal muscle, trachea, lung, kidney, liver, ovary (presumptive), air sacs, esophagus, proventriculus, ventriculus small and large intestines (B6): The lungs are mostly covered with eosinophilic exudate

(autolysis). There is marked pulmonary edema congestion/hyperemia and frequent large colonies of thick rod bacteria in the parenchyma and vessels. In multiple Airways there is thick dense fibrin accumulation. There may be some fibrin over the air sacs.



**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 #: D1410463
Referral #:
Date Collected: 07/31/2014
Date Received: 08/27/2014
Case Coordinator: Santiago Diab, DVM,
DipACVP
**Electronically Signed and Authorized
By:** Diab, Santiago on 8/29/2014
6:22:09PM

Email To:
Iwanicha, Joanna
joanna.iwanicha@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

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

Specimen Details

Animal/Source	ID Type	Taxonomy	Gender	Age
LB 25 B/Y:G/Y	Unknown	Least Tern		

Laboratory Findings/Diagnosis

California Least Tern –

- Whole body, poorly fleshed with scant fat deposits.
- Left wing, metacarpal fracture, open, complete, displaced, severe.
- Left leg, closed, complete, displaced, fracture of the tarsal metatarsus.
- No significant gross or microscopic lesions in the visceral organs.

Other laboratory test results:

- Negative AI PCR; oropharyngeal swab.
- Negative Salmonella PCR; feces.

Case Summary

8/29/2014: Histopathology was performed and no significant lesions were detected. AI and Salmonella PCR were negative. Note that in the submission form it is stated to please determine cause of death if possible. Whereas the cause of death was not determined in this bird, the clinical history implies that this bird was euthanized on August 1st, 2014. There was no evidence of serious ongoing infectious disease in this bird. This concludes all testing in this case.

8/27/2014: As reported in the clinical history and in the attached medical record, this bird had a fractured left wing and left leg. No other obvious lesions were observed in any of the visceral organs and brain. Histopathology, avian influenza and Salmonella PCR are underway. More results to follow.

Clinical History

One CA Least Tern found alive with an injured leg and wing on 7/31/14 at Oceano Dunes SVRA. This bird is banded B/Y:G/Y, estimated hatch date of 6/20. Bird was examined by veterinarian 7/31 and euthanized 8/1 at approx 42 days old (report attached).

Gross Observations

Necropsy of a California Least Tern (presumptive male) was performed on August 27, 2014 beginning at 11:05 AM. The carcass was poorly fleshed, had scant fat deposits and the tissues were in a moderate to advanced state of post-mortem decomposition. The left wing had a complete, displaced, open fracture of the metacarpal bone with accompanying surrounding soft tissue and skin trauma. The left leg had a closed, complete, displaced fracture of the mid to distal tarsometatarsus diaphysis. The intestines were filled with a moderate amount of dark red, semi-solid contents. All else was 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.

Salmonella PCR and Confirmation Culture

Animal/Source	Specimen	Specimen Type	Results
LB 25 B/Y:G/Y	LB 25 B/Y:G/Y	Feces	No salmonella detected

Biotechnology

Avian Influenza matrix gene qRT-PCR

Animal/Source	Specimen	Specimen Type	Results
LB 25 B/Y:G/Y	LB 25 B/Y:G/Y	Oropharyngeal Swab	Not Detected

Histology

Sections of brain, spinal cord, skeletal muscle, trachea, esophagus, lungs, liver, kidney, heart, and gastrointestinal tract were examined and findings are summarized. Many tissues had moderate to advanced autolysis and/or marked freezing artifact.

No significant lesions were detected in any of the organs examined.



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

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

CAHFS Case #: D1405843
Referral #:
Date Collected:
Date Received: 05/14/2014
Case Coordinator: Asli Mete, DVM, PhD
**Electronically Signed and Authorized
By:** Mete, Asli on 5/19/2014 3:55:10PM

FINAL REPORT

*This report supersedes all
previous reports for this case*

Email To:
Iwanicha, Joanna
joanna.iwanicha@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

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

Specimen Details

Animal/Source	ID Type	Taxonomy	Gender	Age
GG:VW	Unknown	Snowy Plover		

Laboratory Findings/Diagnosis

Cause of death undetermined;
- Pulmonary hemorrhage with intracoelomic blood clots
- Multifocal pulmonray, renal, hepatic, mesenteric dissecting hemorrhages, mild
- Acute multifocal mild myodegeneration
- Intestinal cestodiasis

Case Summary

5/19/2014:
Microscopic exam revealed small hemorrhages in the tissues as expected from the gross inspection. There is also mild acute skeletal muscle degenerative changes however this is a more common finding with usually no specific significance. Overall, these findings in conjunction with the evisceration of the gastrointestinal tract would be most consistent with trauma. The skin wound appears to be postmortem, and the heavy metal screen and all cultures are negative/within normal limits. Selenium is found to be elevated however this is interpreted as an incidental finding (see toxicology section summary). There are no additional findings.

5/14/2014:
The skin wounds observed grossly are reported. There was blood on some ventral pectoral feathers however the open skin tear did not appear antemortem and neither did the eventration of the ventriculus and intestines. The most significant finding was the hemorrhagic lungs and some small blood clots in the dorsal thoracic cavity. Musculoskeletal injuries are not appreciated. Underlying disease investigation will be pursued by ancillary laboratory testing and microscopy. It is unlikely but please let me know if you would like me to add anticoagulant rodenticide screen to the testing, or, I can wait for my histopathology to see if there are more specific findings. I will keep you updated as I get results.

Clinical History

Western snowy plover found 5/13/14 at Oceano Dunes SVRA in SLO Co near Pavillion Hill. Banded GG:VW. First observed being carried by a gull. The retrieved carcass had a missing eye, possible neck puncture wound, and entrails protruding from the abdomen. This bird was likely dead before the gull attempted to eat it.

Gross Observations

Examined is the carcass of a Snowy Plover in fair nutritional condition with well-formed pectoral muscles and moderate autolysis. Both eyes are present and unremarkable. There is a 1 cm in diameter skin hole in the pectoral ventral region, the edges of the hole appear smooth and normal coloration. There is blood stain on few adjacent feathers. The ventriculus is severed from the esophagus and protrudes from the skin at the vent with eventration of some intestinal segments. Sand primarily covers most of the body and predominantly the right side. The lungs are bilaterally hemorrhagic and there are some small blood clots in the coelom. The liver is mildly pale. The kidneys are disrupted, torn, pale appearing. Intestinal segments mostly contain white liquid proximally and green contents distally. The spleen could not be reliably identified.

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
GG:VW	GG:VW	Liver Swab	No growth after 48 hours
GG:VW	GG:VW	Lung Swab	No growth after 48 hours

Salmonella PCR and Confirmation Culture

Animal/Source	Specimen	Specimen Type	Results
GG:VW	GG:VW	Feces	No salmonella detected

Biotechnology

Avian Influenza matrix gene qRT-PCR

Animal/Source	Specimen	Specimen Type	Results
GG:VW	GG:VW	Oropharyngeal Swab	Not Detected

Histology

Examined are sections of brain, peripheral nerve, heart, trachea, air sacs, lung, liver, kidneys, feathered skin, skeletal muscle (pectoral, thigh), esophagus, proventriculus, ventriculus, pancreas and intestines (T4): Multiple skeletal muscle sections demonstrate acute mild myodegeneration and small hemorrhages are dissecting between myocytes in couple of foci. The lungs are hemorrhagic for the most part, multifocally the mesentery is expanded by hemorrhages and there are small dissecting hemorrhages in the kidneys and liver. Cells adjacent to the blood have a disintegrated, hypereosinophilic to homogenous appearance (antemortem presumptive?). Occasional karyorrhexis-like aggregates are in pulmonary parabronchial subepithelium. In the intestinal tract are couple of cestode cross sections. The ventral (pectoral) skin is 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 contained the listed heavy metals in acceptable concentrations for birds with the exception of an elevated selenium concentration. This is likely an incidental finding.

HEAVY METAL SCREEN

Animal/Source	Specimen	Specimen Type
GG:VW	GG:VW	Liver Tissue

Analyte	Result	Units	Rep. Limit	Units	Ref. Range
Lead	Not Detected	PPM	6	PPM	
Manganese	2.2	PPM	0.24	PPM	

Iron	320	PPM	1.2	PPM
Mercury	Not Detected	PPM	6	PPM
Arsenic	Not Detected	PPM	6	PPM
Molybdenum	Not Detected	PPM	2.4	PPM
Zinc	32	PPM	0.6	PPM
Copper	5.3	PPM	0.6	PPM
Cadmium	Not Detected	ppm	0.05	ppm

SELENIUM - TISSUE/OTHER

Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit	Ref. Range
GG:VW	GG:VW	Liver Tissue	3.5	ppm	0.020	



**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 #: D1314682
Referral #:
Date Collected:
Date Received: 12/07/2013
Case Coordinator: Asli Mete. DVM, PhD
**Electronically Signed and Authorized
By:** Mete, Asli on 12/13/2013 7:35:25PM

Email To:
OCEANO DUNES SVRA
ronnie.glick@parks.ca.gov

Collection Site:
CA Dept of Parks and
Recreation
340 JAMES WAY, SUITE
270
PISMO BEACH CA

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
D1314682-01	CAHFS Internal ID	Avian		

Laboratory Findings/Diagnosis

Trauma presumptive;

- Pulmonary hemorrhages
- Mild focal lymphocytic hepatitis
- Ventral abdominal skin tear, evisceration of intestines with detachment from stomach, liver tear, displaced heart
- Fractured skull, brain missing (only a small piece of cerebellar vermis is present)

Case Summary

12/13/2013:
All laboratory tests are completed, the only finding is the detection of incidental levels of cadmium on the liver heavy metal screen. Aerobic cultures, Salmonella spp PCR, and influenza virus are all negative.

12/9/2013:
The gross examination of this snowy plover revealed changes consistent with trauma. Underlying and/or concurrent conditions are under investigation.

Clinical History

Western snowy plover found 12/6/13 in the open riding area of Oceano Dunes SVRA, west of 7.5 revegetation Island. Unbanded bird. The carcass was found between fresh sets of tire tracks but did not appear flattened. Entrails were protruding from the bird's cloaca and fresh blood was covered with sand on the top left portion of the head. Fun the full slate of bacterial tests to ascertain the health of the bird prior to death. Also determine if extreme cold weather may have been a factor in this bird's death.

Gross Observations

Examined is the carcass of a female snowy plover in good nutrition with good pectoral muscles. There is slight flattening of the carcass. The intestines are eviscerated distally, from a tear in the ventral abdomen, detached from the stomach. The liver is torn into fragments, the spleen could not be located. The heart is dislocated through the skin tear as well and attached (stuck) to the subcutis. Sand is adhered on intestines, heart, and head region. The cranium is fractured - the frontal bones are separated, the cerebrum is missing. A small portion of the cerebellar vermis is left in the cranial vault. Small hemorrhages are in the left pectoral, superficial thigh muscles, and surround lungs, expanding the pleura. The lungs

are pink-red. Presumptive ova cluster is very small, bursa is not visible.

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
D1314682-01	Snowy Plover	Liver Swab	No growth after 48 hours
D1314682-01	Snowy Plover	Lung Swab	No growth after 48 hours

Salmonella PCR and Confirmation Culture

Animal/Source	Specimen	Specimen Type	Results
D1314682-01	Snowy Plover	Feces	No salmonella detected

Biotechnology

Avian Influenza matrix gene qRT-PCR

Animal/Source	Specimen	Specimen Type	Results
D1314682-01	Snowy Plover	Oropharyngeal Swab	Not Detected

West Nile Virus (avian) qRT PCR

Animal/Source	Specimen	Specimen Type	Results
D1314682-01	Snowy Plover	Kidney Tissue	Negative

Histology

Examined are sections of brain, peripheral nerve, heart, trachea, air sacs, lung, liver, spleen, kidneys, ova, oviduct, feathered skin, adrenal glands, skeletal muscle, esophagus, proventriculus, ventriculus, pancreas and intestines (T7): Regional hemorrhages in the lungs. Scattered small lymphocytic foci are predominantly periportal in the liver.

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 the listed heavy metals in acceptable concentrations for most birds with the exception of an elevated, non-toxic cadmium concentration.

The liver contained an adequate selenium concentration.

HEAVY METAL SCREEN

Animal/Source	Specimen	Specimen Type
D1314682-01	Snowy Plover	Liver Tissue

Analyte	Result	Units	Rep. Limit	Units	Ref. Range
Lead	Not Detected	PPM	1.000	PPM	
Manganese	3.1	PPM	0.040	PPM	
Iron	170	PPM	0.200	PPM	

Mercury	Not Detected	PPM	1.000	PPM
Arsenic	Not Detected	PPM	1.000	PPM
Molybdenum	0.59	PPM	0.400	PPM
Zinc	37	PPM	0.100	PPM
Copper	7.3	PPM	0.100	PPM
Cadmium	9.1	ppm	0.300	ppm

SELENIUM - TISSUE/OTHER

Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit	Ref. Range
D1314682-01	Snowy Plover	Liver Tissue	0.81	ppm	0.020	



**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 #: D1412158
Referral #:
Date Collected:
Date Received: 10/01/2014
Case Coordinator: Anabell Montiel Del Valle
**Electronically Signed and Authorized
By:** Montiel Del Valle, Anabell on
10/7/2014 3:36:00PM

Email To:
Iwanicha, Joanna
joanna.iwanicha@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 Iwanicha, Joanna
Submitter OCEANO DUNES SVRA 805-773-7180 340 JAMES WAY, SUITE 270 PISMO BEACH, CA 93449

Specimen Details

Animal/Source	ID Type	Taxonomy	Gender	Age
D1412158-01	CAHFS Internal ID	Snowy Plover		

Laboratory Findings/Diagnosis

Undetermined cause of death; no significant gross/microscopic lesions detected.

Case Summary

10-7-2014: The cause of death in this bird remains undetermined. There is no evidence of any infectious, neoplastic or toxic insult within the examined sections. The changes described in the proventriculus and heart are minimal and non-specific, and likely of low or no clinical significance in this bird. No bacterial growth was observed in 48 hours from samples of liver and lung, avian influenza and Salmonella PCR were negative and hepatic heavy metals were within normal range.

10-2-2014: The cause of death in this bird could not be determined by gross examination; histopathology and ancillary tests are underway to aim to identify it. Results to follow.

The small amount of dry blood under the right orbit, in the absence of the right eye, suggests predation or other trauma.

Clinical History

One Western Snowy Plover found dead in the breeding enclosure (north 6) of Oceano Dunes SVRA on 9.29/14. Bird found with dry blood around head. Banded bird last seen alive on 9-26-14 in a flock at Arroyo Grande Creek. Adult banded bird GA: GR hatched in 2012 from Oceano Dunes SVRA and confirmed as a breeding female in 2013 and 2014.

If possible, determine cause of death.

Gross Observations

Necropsy performed on October 1, 2014. Examined is the carcass of a female snow plover of unknown age, well fleshed and with scant amounts of fat reserves within the coelomic cavity, and in moderate state of postmortem decomposition.

A small amount of dry blood is under the right ocular orbit and the right eye is missing. Diffusely the liver is slightly pale. The gastrointestinal, cardiovascular, respiratory, urinary and central nervous systems are 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
D1412158-01	Oceano	Liver Swab	No growth after 48 hours
D1412158-01	Oceano	Lung Swab	No growth after 48 hours

Salmonella PCR and Confirmation Culture

Animal/Source	Specimen	Specimen Type	Results
D1412158-01	Oceano	Intestinal Contents	No salmonella detected

Biotechnology

Avian Influenza matrix gene qRT-PCR

Animal/Source	Specimen	Specimen Type	Results
D1412158-01	Oceano	Oropharyngeal Swab	Not Detected

Histology

Sections of kidney, lung, liver, heart, trachea, esophagus, adrenal gland, central nervous system and gastrointestinal tract were examined. Findings as follows:

Kidney, spleen, lung, liver, trachea, esophagus, adrenal gland, central nervous system: No significant finding.

Proventriculus: Multifocally, there is a small amount of cellular debris and necrotic epithelial cells with the lumen of the submucosal glands with rare mixed inflammatory infiltrates. Small lymphocytic aggregates are occasionally present within the interglandular stroma.

Heart: Focally surrounding one arterial profile, there are few lymphocytes.

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 other detected liver mineral results are within acceptable or non-diagnostic ranges for this species.

HEAVY METAL SCREEN

Animal/Source	Specimen	Specimen Type
D1412158-01	Oceano	Liver Tissue

Analyte	Result	Units	Rep. Limit	Units	Ref. Range
Lead	Not Detected	PPM	1.000	PPM	
Manganese	4.1	PPM	0.040	PPM	
Iron	230	PPM	0.200	PPM	
Mercury	Not Detected	PPM	1.000	PPM	
Arsenic	Not Detected	PPM	1.000	PPM	
Molybdenum	0.73	PPM	0.400	PPM	
Zinc	42	PPM	0.100	PPM	

Copper	8.6	PPM	0.100	PPM
Cadmium	4.3	ppm	0.300	ppm

SELENIUM - TISSUE/OTHER

Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit	Ref. Range
D1412158-01	Oceano	Liver Tissue	2.9	ppm	0.020	



**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 #: D1413037
Referral #:
Date Collected: 10/21/2014
Date Received: 10/21/2014
Case Coordinator: Anabell Montiel Del Valle
**Electronically Signed and Authorized
By:** Montiel Del Valle, Anabell on
10/30/2014 3:41:34PM

Email To:
Iwanicha, Joanna
joanna.iwanicha@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
Report To	Iwanicha, Joanna		

Specimen Details

Animal/Source	ID Type	Taxonomy	Gender	Age
D1413037-01	CAHFS Internal ID	Snowy Plover		

Laboratory Findings/Diagnosis

Death due to trauma, presumptive

Findings:

- Moderate, multifocal lymphoplasmacytic and heterophilic proventriculitis with focal mural nematode
- Mild, multifocal lymphoplasmacytic, histiocytic and heterophilic hepatitis

Case Summary

10-30-2014: The only findings in the examined sections are the proventriculitis and hepatitis with a proventricular nematode. It is likely that the hepatitis is secondary to the proventriculitis due to the nematodiasis. The exact clinical significance and contribution to the demise of this bird is unclear. Based on the morphology, is likely that the nematode in the proventriculus is part of the family of Tetrameres sp.

No bacteria were isolated and Salmonella and AI PCR are negative.

10-22-2014: The cause of death is likely to be trauma; however, a proper assessment of concurrent disease was obscured by the described physical changes. Histopathology and ancillary tests are pending. Results to follow.

Clinical History

One western snowy plover found dead in vehicle tracks at Oceano Dunes SVRA on 10/18/14. Bird found 250 feet NW of Post 7. Bended bird PV on left leg, right leg not found.

Gross Observations

Necropsy performed on October 21, 2014. Examined is the carcass of a female Western Snowy plover of unknown age, in presumable good body condition and moderate to severe state of postmortem decomposition.

The carcass is flattened and covered with large amounts of gritty mud. Upon removal of this mud, the coelomic cavity is open and all viscera are mashed and covered with similar gritty mud. The right leg is folded within the covering mud and is surrounded by a blue plastic band.

Attached on the serosa of the proventriculus there is an approximately 1.5 cm long, rolled up, thin and white-translucent nematode. On the mucosal side of this area there is a pinpoint pitted area (ulcer?).

B a c t e r i o l o g y

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
D1413037-01	plate	Liver Tissue	No growth after 48 hours
D1413037-01	plate	Lung Tissue	No growth after 48 hours

Salmonella PCR and Confirmation Culture

Animal/Source	Specimen	Specimen Type	Results
D1413037-01	PV	Intestinal Tissue	No salmonella detected

B i o t e c h n o l o g y

Avian Influenza matrix gene qRT-PCR

Animal/Source	Specimen	Specimen Type	Results
D1413037-01	PV	Oropharyngeal Swab	Not Detected

H i s t o l o g y

Sections of kidney, lung, liver, heart, trachea, central nervous system, proventriculus and small intestine were examined. Findings as follows:

Proventriculus: Multifocally within the lamina propria and separating the glands there are variably size inflammatory infiltrates composed of lymphocytes, plasma cells and scattered heterophils and macrophages. Focally attached to the muscularis layer of the wall is a transverse section of a female nematode of about 1 mm in diameter, with an irregularly indented cuticle and polymyarian/coelomyarian musculature; a digestive tract lined by many uninucleate cuboidal cells with a brush border containing abundant brown pigment; uteri containing numerous 25 x 50um, oval, thick shelled, embryonated eggs, and variably sized ovaries with ova.

Liver: Multifocally and randomly distributed there are variably sized inflammatory infiltrates similar as those described in the section of proventriculus.



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 #: T1402158
Referral #: SPCA# 14-1594
Date Collected: 08/09/2014
Date Received: 08/12/2014
Case Coordinator: H. L. Shivaprasad
BVSc, PhD
Electronically Signed and Authorized
By: Shivaprasad, H.L. on 8/22/2014
7:11:28PM

Email To:
MURRAY, MICHAEL
mmurray@mbayaq.org

Collection Site:
AVIARY
886 CANNERY ROW
MONTEREY CA 93940
County: MONTEREY

Specimens Received: 1 Carcass;

Comments: Carrier: FedEx

Case Contacts

Table with 4 columns: Bill To, Submitter, Contact Name, and Contact Info. Includes Monterey Bay Aquarium and Murray, Michael.

Specimen Details

Table with 5 columns: Animal/Source, ID Type, Taxonomy, Gender, Age. Includes spca#14-1594, Anonymous Identifier, Snowy Plover, Unknown, 1.00 Weeks.

Laboratory Findings/Diagnosis

1. None made.

Case Summary

08/14/14: Cause of death could not be determined in this bird. I will check the bird for West Nile virus and get back to you. In the meantime if you have any questions please let me know.
08/22/14: Most organs tested are negative for WNV by immunohistochemistry. The cause of death remains undetermined in this bird. This completes all the tests on this case. If you have any questions please let me know.

Clinical History

Not active, given to park ranger by public.

Gross Observations

A six-day-old Plover is presented dead for necropsy. The bird is in fair to poor postmortem condition and weighed 6 gms. There are no lesions of diagnostic significance.

Bacteriology

BACTERIAL AEROBIC CULTURE

Table with 4 columns: Animal/Source, Specimen, Specimen Type, Results. Includes spca#14-1594, Liver Tissue, Escherichia coli Lg#, Proteus spp.

SALMONELLA CULTURE - AVIAN

Table with 4 columns: Animal/Source, Specimen, Specimen Type, Results.

spca#14-1594 spca # 14-1594 Intestinal Swab No Salmonella sp. detected

ANTIMICROBIAL TEST-KIRBY BAUER (KB) AVIAN

Animal/Source	Specimen	Specimen Type	Isolate
spca#14-1594	spca # 14-1594	Liver Tissue	Escherichia coli

EXTRA-LABEL USE ANTIMICROBIAL AGENTS -- NOT approved for use in this animal species--

Antibiotic	Reading	Interpretation
Ceftiofur	26mm	sensitive
Erythromycin	9mm	resistant
Gentamicin	22mm	sensitive
Neomycin	19mm	sensitive
Penicillin	6mm	resistant
Spectinomycin	19mm	sensitive
Tetracycline	20mm	sensitive
Sulfonamides	20mm	sensitive
Enrofloxacin	30mm	sensitive
TMP/Sulfa	26mm	sensitive

Selection of the appropriate antimicrobial agent should be made by a veterinarian.

Selection of the appropriate antimicrobial agent may be influenced by dose, route of administration, etiologic agent and affected site. Not all antimicrobial agents within drug classes (ie. sulfonamides) are approved for use in all avian species.

Histology

Brain, spinal cord, trachea, lungs, kidney, liver, spleen, heart, crop/esophagus, proventriculus, gizzard, intestine, pancreas, skeletal muscles, eyes, bone and bone marrow are examined, Histopathology did not reveal any significant lesions.

DECALCIFICATION

Animal/Source	Specimen	Specimen Type	Results
spca#14-1594	decal tissue	Tissue - Fixed	COMPLETED

Immunohistochemistry

West Nile Virus immunohistochemistry

Animal/Source	Specimen	Specimen Type	Results
spca#14-1594	block 2	Heart Tissue	Negative