

**NESTING OF THE CALIFORNIA LEAST TERN AND
WESTERN SNOWY PLOVER AT
OCEANO DUNES STATE VEHICULAR RECREATION AREA,
SAN LUIS OBISPO COUNTY, CALIFORNIA
2020 SEASON**



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December 2020

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Cover photo from nest camera of northern harrier depredating the SP74 nest in 6 enclosure
at ODSVRA on 26 May 2020 at 5:18 pm.

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Attachments

- U.S. Department of Agriculture Wildlife Services. Oceano Dunes State Vehicular Recreation Area 2020 Predator Management Report
- Bloom Biological, Inc. Oceano Dunes Vehicular Recreation Area Predator Management 2020 Report
- Least tern necropsy examination report: two chicks
- Snowy plover necropsy examination report: one juvenile, one chick
- Snowy plover medical examination report: three adults, one 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 2020. This is the 19th consecutive year of both intensive banding of snowy plover chicks and predator management that includes options for selective relocation or removal of predators. Banding of least tern chicks began in 2003.

Closure due to coronavirus/COVID-19 concerns

In 2020, the beach and dunes were closed to public vehicle access and beach camping beginning 28 March in response to the COVID-19 pandemic. Public access and non-vehicle activities, such as walking, bicycles, and equestrians, were allowed. All the least tern and the majority of the snowy plover breeding season occurred during the closure period. In addition to the unexpected closure due to COVID-19, a 48-acre site north of marker post 6 was permanently closed to vehicles and camping beginning 16 December 2019 as a result of ongoing air quality projects. This site, referred to in this report as the Foredune closure, is intended to become more vegetated with developed hummocks to reduce downwind dust emissions. The current habitat in the Foredune closure's early stage of restoration is attractive to snowy plovers. As a result of the closure due to COVID-19 and reduced recreational activity there was a substantial number of snowy plover nests initiated in the open riding area and the Foredune closure, with 24 nests located in the Foredune closure and 22 in the open riding area (closed to vehicles in 2020). Nesting in the open riding area extended as far north as the area between marker post 3 and 4. Prior to 2020, the number of nests found outside of the seasonally protected nesting habitat in the Southern Enclosure and Oso Flaco was very low, averaging under two nests per year for the 10-year period 2010-19.

Least tern

In 2020, there were an estimated 35-42 least tern breeding pairs, higher than the previous two years (30-33 pairs) and compares to a minimum average of 41 (range=23-48) pairs in the 13-year period 2005-17. Breeding pairs at ODSVRA decreased after a near complete breeding failure in 2017, with only seven juveniles produced, due to high egg and chick predation by skunks. Subsequently, a number of ODSVRA banded terns expected to nest at the park relocated to nearby sites in Santa Barbara County in 2018-19 for breeding (information for 2020 is not available from other sites at the time of this report). In 2020, a minimum of 12 banded birds with known origins were documented as breeding at the park, with all of them banded as chicks and fledged from ODSVRA.

There were 48 known nesting attempts in 2020, 47 from the Southern Enclosure and one located in the open riding area. The hatching rate for known location and fate nests was 78.3% (36/46), which is below the average of 83.7% during the previous 15-year period 2005-19. Of the remaining 12 nests, two had an unknown fate (not known if hatched or failed), four were abandoned, four failed with unknown cause, one was depredated, and one failed due to wind.

Sixty-three chicks hatched and of these 57 were color-banded to individual. Thirty-eight chicks (35 banded, three unbanded) are known to have fledged (seen when 21 days old or older), for a fledging rate of 60.3% and an estimated 0.90-1.09 chicks fledged per pair. This compares with an average for the previous 14-year period 2006-19 (banding chicks to individual began in 2006) of 47 juveniles produced per year, a 74.7% chick fledging rate, and 1.04-1.19 chicks fledged per pair.

Snowy plover

There was a minimum of 190 breeding snowy plovers (110 males and 80 females), compared to 214 in 2019, a decrease of 11.2%. Eighty-seven banded birds with known origins were documented as breeding with 89.7% (78/87) banded as chicks and fledged from ODSVRA.

There were 226 known nesting attempts in 2020, including 12 identified only by detection of brood (unknown nest location). Of the 214 nests from known locations, 128 (59.8%) were in the Southern Exclosure, 39 (18.2%) in Oso Flaco, 24 (11.2%) in the Foredune closure, 22 (10.3%) in the open riding area, and one (0.5%) in Pawprint revegetation area. Of the 197 nests with known location and fate, 142 hatched for a nest hatching rate of 72.1%. This compares to an average of 74.6% for the previous 18-year period 2002-19. Fifty-five nests failed, attributed to the following causes: abandoned pre-term (5); abandoned post-term (1); abandoned unknown pre- or post-term (2); wind (13); overwashed by tide (3); cause unknown (4); unidentified predator (8); unidentified avian predator (12); coyote (1); common raven (3); and northern harrier (3). For all documented nest loss to predation, avian predators accounted for 66.7% (18/27).

Of the 410 hatching chicks, 250 were color-banded to brood with 32.0% (80/250) fledging, and the fate of the 160 unbanded chicks is believed known with 23.1% (37/160) fledging. A total of 117 chicks fledged (seen when 28 days old or older) for a low fledging rate of 28.5%. This compares to 27.1% in 2019 and an average rate of 39.2% for the 18-year period 2002-19. One chick fledged per breeding male is the estimated number needed to prevent the population of snowy plovers from declining and productivity of 1.2 chicks fledged per male should provide for moderate population growth (assuming approximately 75% annual adult survival and 50% juvenile survival) (U.S. Fish and Wildlife Service 2007). In 2020, an estimated 1.06 chicks fledged per breeding male at ODSVRA. For the 18-year period 2002-19, average productivity was 1.47 chicks fledged per breeding male.

INTRODUCTION

Oceano Dunes SVRA, located in southern coastal San Luis Obispo County, California, is a popular park with high attendance. Nearly 1.4 million people visited in 2019 for a variety of recreational opportunities, including driving vehicles on the beach and dunes.¹ In 2019, an estimated 315,022 street-legal vehicles and 63,988 off-highway vehicles were driven on the shoreline and dunes in the designated riding area of the park.² In 2020, to prevent the spread of COVID-19, ODSVRA began limiting recreational activities in the park; starting 23 March beach access was restricted to day use only with gates closed each night, and on 28 March closing the beach to all recreational vehicle traffic. Two campgrounds adjacent to the beach and managed by Oceano Dunes District were closed from 17 March to 20 September. In addition, parking lots adjacent to the ODSVRA beaches had limited one-hour parking, and Oso Flaco Lake parking lot closed from 28 March to 21 May. Public access to the beach for day use remained for other allowable non-vehicle activities including picnicking, walking, biking, and horseback riding. From 28 March through September 2020 when there was no vehicle access, there were an estimated 532,497 people visiting the beaches at Oceano Dunes SVRA, using the Grand and Pier Avenue ramp access locations, and an additional 10,926 people visiting Oso Flaco.³

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 2020 nesting season for least terns and snowy plovers at ODSVRA. A limited amount of data from previous years' reports has been updated in this report to reflect information that is more accurate and conforms to current analysis practices. Maps in figures and appendices use aerial imagery taken in 2018 by the National Agriculture Imagery Program, 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-815214-9 and California Department of Fish and Wildlife (CDFW) Scientific Collecting Permits. Predator removal activities are conducted under USFWS Depredation Permit MB25976A-0. Point Blue conducts monitoring and banding activities under USFWS permit 10(a)(1)(A) TE-807078-18, Federal U.S. Geological Survey Bird Banding Laboratory Banding Permit 09316, CDFW Scientific Collecting Permit SC-9591, and a CDFW Memorandum of Understanding.

¹ ODSVRA 2019 Annual Attendance figures (source ODSVRA)

² ODSVRA 2019 Monthly Carrying Capacity Summaries (source ODSVRA)

³ ODSVRA 2020 Day use count and estimate data (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 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, 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 (Guadalupe-Nipomo Dunes NWR). Inside the park, dunes that are normally open to vehicles extend inland approximately 0.6 to 1.3 miles. Eight numbered marker posts, located approximately 0.5 miles apart, are positioned along the coastal strand to orient park visitors and staff. Street-legal vehicles are normally allowed throughout the riding area. Off-highway vehicles, as well as overnight camping, are normally allowed along the beach and dunes south of marker post 2 (approximately 1.0 mile south of Pier Avenue). In the southern portion of ODSVRA is the Oso Flaco Lake area with an ocean shoreline of approximately 1.7 miles. Pedestrians are allowed at Oso Flaco Lake area, 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 and 2, Appendix C).

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 CDFW 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 street-legal and off-highway vehicles (approximately 1,360 acres). Prior to the nesting season beginning on 1 March, approximately 5.3 miles of beach was designated for street-legal vehicles from the Grand Avenue park entrance south to the southern boundary of the riding area (approximately 0.4 miles south of marker post 8) and off-highway vehicles were only allowed south of marker post 2. Located in the southern portion of the riding area, the seasonal Southern Exclosure (see description on following page) is closed to all vehicles during the breeding season. The entire riding area was closed to all public vehicle access beginning 28 March 2020 to prevent the spread of COVID-19 and remained closed during the nesting season.

Open riding area: The area within ODSVRA open to vehicle use during the nesting season (approximately 1,015 acres). This entire area was closed to all public vehicle access 28 March 2020 and remained closed during the nesting season. Fencing designates the eastern perimeter of the open riding area, however this fence is not maintained as predator fencing and coyotes (*Canis latrans*) and other mammals can easily move through this fencing.

Foredune closure: New restoration area within the open riding area closed in January 2020 to improve air quality conditions. Fencing was installed approximately a quarter mile south of marker post 4 to north of marker post 6 (approximately 0.8 miles of shoreline). The closure, totaling 48 acres, is broken into three plots: Foredune north, Foredune central, and Foredune south (Figure 1 and C.5 in Appendix C). The plots were given different experimental treatments using straw, native seed, and native plants. One control section was not treated. During the nesting season the treated plots had a minimal to moderate amount of plant cover, low topography, and areas of scattered to dense straw. The plots were not managed for snowy plovers but in this initial year of restoration suitable habitat was available for nesting. The fence is not maintained as predator fencing and coyotes and other mammals can easily move through this fencing. Alleyways

between these three plots are designated for public access to the restrooms and the open riding area east of the plots, however the restrooms were closed on 28 March to reduce the spread of COVID-19 and the alleyways were closed on 24 June to reduce disturbance to nests and broods. The adjoining shoreline west of the area was open to public use for the first part of the nesting season, but was closed on 2 July to protect plover broods in chick-rearing habitat. The Foredune closure shoreline and alleyways were opened to pedestrian access on 26 August when chicks were no longer present.

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 above the high tide line on the closed shoreline) for 2020 was approximately 307 acres, compared to a range of 271-305 acres (and an average of 292 acres) between 2004 and 2019. Although the basic configuration of the Southern Exclosure has remained consistent since 2004, changes in dune topography and public safety issues affect the placement of the east fence, resulting in small variations in acreage from year to year. Individually identified areas 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 61.2 acres), first incorporated into the Southern Exclosure for a full season in 2004. Habitat includes areas of bare sand, small hummocks, limited areas of organic surface debris (shells, driftwood, dried algal wrack), and sparse to heavily vegetated areas.

7 exclosure: The area from marker post 7 to the south side of 7.5 revegetation area (approximately 0.4 miles of shoreline and approximately 61.4 acres). Habitat includes areas of bare sand, extensive areas of small to medium sized hummocks, limited areas of organic surface debris (shells, driftwood, dried algal wrack), areas of sparse to heavily vegetated dunes, and dense vegetation in the 7.5 revegetation area (4.8 acres, included in the 61.4 total acres) located within the 7 exclosure.

8 exclosure: 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 86.8 acres). Habitat includes areas of bare sand, areas of tall dunes with bare sand in the eastern portion, areas of moderate to tall foredune hummocks with mostly dense vegetation, and limited areas of organic surface debris (shells, driftwood, and dried algal wrack).

Boneyard exclosure: The area east of the North Oso Flaco dunes. Habitat is primarily bare sand, includes tall sand dunes, especially on the eastern portion, with areas of densely vegetated moderate dunes in other areas, mostly in the western portion. This inland area does not have a shoreline component and is approximately 97.8 acres. A portion of the west side (approximately 15.5 acres) has been closed year-round since 2005. Straw bales were placed within the area in 2004 and have been mostly covered by sand. Portions of this area have also developed small to large vegetated hummocks. The eastern boundary of the Boneyard exclosure is not maintained with 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 exclosure during the nesting season, resulting in 48.7 acres in the western portion (contiguous with 6, 7, and 8 exclosures and North Oso Flaco) and 49.1 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 shoreline 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. The parking

area was closed from 28 March to 21 May to reduce the spread of COVID-19. 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 of 8 enclosure to the pedestrian boardwalk access trail to the Oso Flaco shoreline (approximately 0.5 miles of shoreline and approximately 68 acres). Beginning in 2002, the upper beach and dunes were closed to pedestrians during the nesting season with symbolic fencing. Since 2005, the North Oso Flaco area east of the shoreline has been part of the Seasonal Enclosure and managed in a similar manner with symbolic fencing replaced by predator fencing. Additionally, 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 of shoreline). 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 often receive single nest enclosures.

Seasonal Enclosure: The contiguous area enclosed by the predator fencing of Southern Enclosure and North Oso Flaco (does not include the shoreline or the eastern Boneyard area). ODSVRA fences this approximately 269-acre area during the nesting season to exclude coyotes, vehicles, and human trespass from the protected nesting habitat (see section titled Seasonal closure and fencing on page 17, Figure C.1 in Appendix C). A portion of the North Oso Flaco fence along the boardwalk is left in place year-round, however it is only maintained for predators during the nesting season (labeled as Permanent predator fence in Figure C.10 in Appendix C).

Pipeline revegetation area: Located adjacent to the east side of 8 enclosure. The area is heavily vegetated. Fencing designates the perimeter of the revegetation area adjacent to the open riding area, however this fence is not maintained as predator fencing.

Other revegetation areas mentioned in this report: Maidenform revegetation area is located adjacent to the east side of Boneyard enclosure and the open riding area. Several named revegetation areas are east or northeast of 6 and 7 enclosures including Eucalyptus North (573 feet east), Eucalyptus Tree (517 feet east) and Pawprint (541 to 850 feet east/northeast). Tabletop revegetation area is 677 feet east of 7 enclosure and Boy Scout Camp is 0.57 miles east of 8 enclosure. Moymel, Worm Valley, Pavilion Hill, and BBQ Flats revegetation areas are 0.4 to 1.0 mile north of the Southern Enclosure between marker posts 4 and 5. The areas are mostly heavily vegetated, but some small portions of the areas were expanded within the last two years for restoration and are lightly scattered with dry straw and widely scattered small plants. Fencing designates the perimeter of revegetation areas in the open riding area, however this fence is not maintained as predator fencing. Some portions of these revegetation areas are closed for restoration and in other portions pedestrian public entry is allowed within the revegetation areas, but all areas are closed to vehicles and camping.

Arroyo Grande Creek: Seasonally flows into the Pacific Ocean approximately 2.0 miles north of the Southern Enclosure. The associated lagoon is variably located east of the area near marker post 1 and north of 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; tall vegetated dunes and developed RV campground 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.

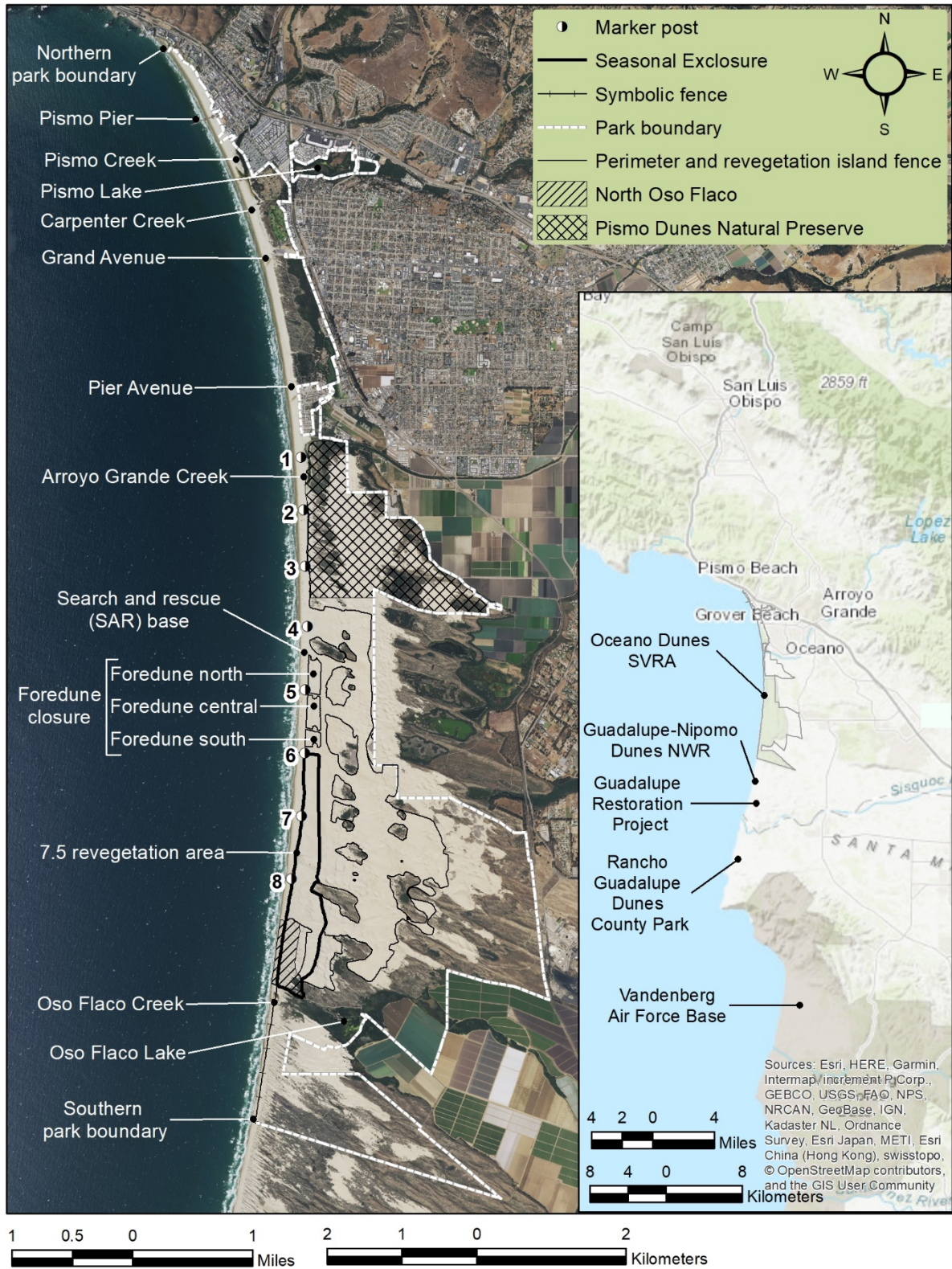


Figure 1. ODSVRA site map.



Figure 2. ODSVRA Southern Exclosure, Seasonal Exclosure, and Oso Flaco seasonally protected areas for breeding California least terns and snowy plovers in 2020.

Open riding area was closed to all recreational vehicles and camping during the 2020 season.

MONITORING AND MANAGEMENT ACTIONS

MONITORING

Daily monitoring occurs from 1 March to 30 September. At a minimum, ODSVRA maintains four 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 for 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.

Monitors collect and record data such as: nest status; brood location and count of chicks; fledgling identification; band combinations of chicks, juveniles, and adults; tern night roost location and number of birds; injuries or mortalities; predator sightings or tracks; and visitor infractions. Nest cameras placed on a small number of tern or plover nests provides additional monitoring information such as adult bands, adult behavior, nest attendance, predators, nest fates, nest fate dates, and chick numbers in areas otherwise difficult to access. Data from field notes and from nest cameras are entered into a comprehensive database system that includes a Microsoft Access database, ESRI ArcMap, ESRI ArcGIS Online's Survey123 and Collector, Microsoft Excel sheets, and paper charts.

Open riding area and Foredune closure

Monitoring of the open riding area and the Foredune closure by vehicle occurs daily along defined transects, as any nests initiated in this area require immediate protection from recreational activities and chicks in this area may require additional monitoring. These daily transects include portions of the revegetation islands closest to the open riding area. Staff looks for nesting bird signs, predator presence or signs, nonpermitted visitor activities (such as off-leash dogs or kites near the enclosure), rescues sick or injured wildlife, and collects deceased wildlife. Areas along transects with tern or plover activity indicating potential nesting interest (scraping or copulating) receive more thorough checks on foot and with increased frequency using binoculars or spotting scope. In 2020, the park closure to vehicles and camping on the beach and dunes during the nesting season resulted in reduced recreational activity, and staff found least tern adults, juveniles, and chicks roosting in the open riding area during the nesting season more frequently than was observed in previous years. Monitors scanned all areas thoroughly to determine location and number of roosting birds and avoided areas where least terns were roosting by using alternate driving routes. To deter snowy plover nesting in the open riding area where impacts from recreational activities are a concern, and in anticipation of the park opening during the 2020 season, monitors finding scrapes removed them by lightly covering them with sand (scuffing scrapes). (Male typically digs multiple depressions in the sand prior to nesting as part of the courtship behavior.) In 2020, monitors also installed bamboo stakes with mylar tape in the ground of some areas, also to deter nesting in the open riding area and Foredune closure. After 7 July, use of deterrents and scuffing scrapes ceased in order to conform to an agreement with the California Coastal Commission (CCC), as stated in "Consent Executive Director Cease and Desist Order No. ED-20- CD-01" (CCC Consent Order) (CCC 2020).

Close brood monitoring occurs daily and any time staff walk within the enclosure, and tracking brood movement toward or into the open riding area is a priority. Prior to the CCC Consent Order, when staff finds tern or plover chicks in the open riding area, they slowly direct them back into the protected Southern Enclosure using various measures to allow the brood's safe movement, including: diverting or regulating vehicle traffic flow and visitor foot traffic, flushing threats such as gulls or other predators within the travel corridor, obtaining assistance as necessary from ODSVRA patrol staff, and placing signs and/or symbolic fencing to provide a safe passage until the brood reaches the protected enclosure. To meet the CCC Consent Order agreement, staff located snowy plover broods in the open riding area each morning, but took no action to direct them towards a protected area (CCC 2020). Staff allowed least terns to move and roost in the open riding area with close monitoring. On 2 July, the park closed the shoreline from the north end of

the Foredune closure south to the Southern Enclosure to help protect plover chicks. Monitors safeguarded any plover broods found in areas remaining open to the public and encouraged the public to stay low on the shoreline to limit disturbance to broods.

Breeding least terns and snowy plovers

Finding and monitoring nests: The least tern and snowy plover management program documents size of breeding populations and 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 to minimize disturbance to nesting birds and broods. Additional nest searches conducted on foot confirm egg number and document activity at the nest bowl. Staff maps nest locations using a Global Positioning System (GPS) receiver blue-toothed to a phone.

Estimated initiation date: Initiation date estimates arise from multiple methods that include: timing of egg-laying sequence; floating eggs for plover nests; or when hatch date is known, using average length of time for nests to hatch and backdating to nest initiation. When none of this information is available, staff cannot estimate nest initiation dates.

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 constitute “unknown location nests” and egg numbers from such nests represent minimums derived from the number of chicks first observed (see section titled Assignment of broods to nests within this Monitoring section for more detail). When all chicks in a plover brood are known to hatch over more than one day, this is referred to as a “split hatch.” It is common for two- or three-egg tern nests to hatch over more than one day and the term “split hatch” is not applied.

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

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

Wind: Nest buried during periods of high winds, with eggs typically found almost or completely buried.

From 2010 to 2019, staff used the category of “abandoned, suspected due to wind” as a nest fate instead of “wind.” 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, staff reviewed least tern nests in the “abandoned pre-term” category for the previous eight years and reassigned a limited number to the category of “abandoned, suspected due to wind” and corrected report tables. For the 2020 report, nests in the “abandoned, suspected due to wind” converted to the category of “wind.”

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, or nests with insufficient information to estimate an initiation date. To decrease disturbance to chicks, monitors limit access to nests with nearby young tern and plover broods present, which may result in nests with unknown fate.

Banding chicks: In 2020, least tern chicks received a single size 1A blank aluminum band (covered with white over orange vinyl tape) on the left leg, and a size 1A numbered aluminum federal band on the right leg. Color tape placed on the federal band creates color band combinations unique to each individual chick for the season. Weighing chicks occurs immediately prior to banding, typically at one to three days old.

Staff inconsistently banded plover chicks prior to 2001. ODSVRA aims to band as many chicks as possible, with all chicks within one brood given the same color band combination since 2002. With a limited number of combinations designated for ODSVRA, reuse of combinations on birds known alive occurred from 2010-18, resulting in indeterminate ages of some adult banded plovers. To resolve this issue, when ODSVRA obtained additional band combinations in 2019, each brood of chicks received a truly unique color band combination.

To reduce disturbance to chicks, monitors may choose to leave chicks unbanded when broods remain in areas with nearby young tern and plover broods. In addition, loss of a number of very young unbanded chicks occurs prior to any banding opportunity. Staff tracks the fates of unbanded chicks with intense brood monitoring; in some instances, the associated adult or sibling chicks may have color bands.

Assignment of broods to nests: Point Blue bands most chicks at the nest. Unbanded broods found outside of the immediate nest area receive assignment to one of three categories: 1) a hatched preexisting known location nest, 2) a hatched new nest with unknown location and known only from brood, or 3) a hatched unassigned nest (listed as UNA1-UNA10 in Appendix B). Staff assigns unbanded broods to either a preexisting known location nest or a new nest with unknown location based on parent bands; or based on the brood location and age of chicks (estimated based on chick size) when adults lack bands. However, staff cannot assign broods to a specific nest in circumstances where several nearby nests hatch at the same time (hatching chicks confirmed from a distance with a spotting scope), banding at the nest is not possible, and unbanded broods with chicks of similar age appear on the same section of shoreline. Such broods fall within a category of hatched unassigned (UNA) nests.

Chick monitoring: Monitors record chick observation data during daily monitoring activities. While ODSVRA closed the open riding area to recreational vehicles and camping during the 2020 season, other public access such as walking, hiking, biking, and horseback riding continued. Nests found in the open riding area receive protective fencing, but after hatch broods move away from the nest toward the shore and into areas without fencing. Staff attempts to locate all broods in the open riding area every morning. When multiple broods forage in the open riding area, staff monitor the northernmost brood, contact visitors moving toward broods from the north, and explain how to avoid or minimize public impacts or disturbance to broods by staying low on the shoreline.

In addition, focused searching for broods occurs multiple times each week from vehicle surveys on the Southern Enclosure, Oso Flaco, and Foredune closure shorelines. 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 disperse widely over a large area. Specifically monitoring terns allows estimation of number of juveniles produced as well as identifying potential threats to survival. ODSVRA considers tern chicks surviving to 21 days or older as fledged (21 days after the hatch date, which counts as day zero). Tracking of juvenile terns occurs in the park at the Southern Exclosure, at Oso Flaco Lake, and any temporary daytime roosting areas that may become established. Staff also documented several ODSVRA juvenile terns off-site at Rancho Guadalupe Dunes County Park (RGDCP) in 2019 and 2020. To collect additional information on banded tern juveniles dispersing off-site, staff reviews photographic records from off-site birder visits (eBird.org 2020).

The fledgling least tern counting method varied 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 counts conducted from 2002-04 (chicks banded to site 2003-04). In 2005, ODSVRA color-banded chicks to brood and since 2006 color-banded most chicks 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.

ODSVRA considers plover chicks surviving to 28 days or older from the time of hatch as fledged (28 days after the hatch date, which counts as day zero). Staff identifies and records fledglings in the course of chick monitoring as described above. Prior to 2001, staff monitored Oso Flaco and Pismo Dunes Natural Preserve intermittently, resulting in a lack of fledgling information.

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, ODSVRA represents the number of breeding pairs as a range. The estimated minimum number of pairs equals the maximum number of concurrently active nests and broods. The estimated maximum number of pairs equals the minimum number of pairs plus one-half of the value of the minimum number of pairs subtracted from the total number of nests (assumes nests in addition to those accounted for by the minimum number of pairs are equally divided between reneating pairs and new pairs).

Max. no. pairs = min. no. pairs + [(total no. nests - min. no. pairs) / 2]

Banding least tern 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, ODSVRA did not always report the estimated number of breeding pairs or based it only on the number of concurrent nests. These reports, reviewed in 2005, looking at both nests and the limited brood information, resulted in identifying an increase in the minimum number of pairs in some years; ODSVRA provides this revised information in annual reports since 2005.

Individually banded snowy plover adults provide the most accurate means to identify breeding population size but currently too few banded adults breed at ODSVRA to rely solely on this method. A minimum number of breeding females derives 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. The minimum estimated number of breeding males equals the highest same day count of active nests and broods (males typically raise the chicks; not including males with broods three weeks of age or older if they could be associated with a new nest) and number of nests initiated the day after the high count. From 2009 to 2017, staff compiled numbers of color-banded adults confirmed breeding; staff adds any number of this group not accounted for on the same day high count, including nests or broods with unknown adults, to the same day high count for the appropriate sex. Beginning in 2018, using a database query, staff created a more accurate method to determine high counts of unbanded males and females actively associated with a nest on any given day and a total number of uniquely banded males and females associated with a nest at any point in the season.

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 using a thermal infrared scope (Trijicon REAP-IR). On occasions monitors cannot see terns due to darkness after dusk, but terns are heard vocalizing as they arrive to roost. ODSVRA considers counts a minimum due to the inherent limited visibility of the night roost. It is typically too dark to distinguish between adults and juveniles. In 2020, staff attempted only a limited number of night roost surveys in the early season, stopping after 27 May to avoid hazardous dune driving conditions at night. When possible, staff looked for evidence of the night roost during the day.

Least tern use of freshwater lakes: Freshwater lakes can provide a source of prey fish in addition to the near-shore ocean. Surveying nearby small freshwater lakes documents tern use and gives a better understanding of local food resources; importantly, determining if lakes provide additional appropriately-sized fish to feed chicks (chicks require fish small enough to be swallowed whole). Monitors conduct periodic surveys at Oso Flaco Lake (located on park property approximately 1.5 miles south of the middle of tern colony) during the season, do not monitor Dune Lakes (approximately 1.5 miles to northeast) on private property with no access, and no longer monitor Cypress Ridge Lake (approximately 3.2 miles to northeast) because of terns' absence since 2013. However, staff monitors the tern colony in the Southern Enclosure daily and observations of adults in flight provide information about the direction of foraging sources and, occasionally, fish size.

Wind speed monitoring

Since 2011, ODSVRA monitors wind speed from a tower (S1 wind tower) located approximately 360 feet east of 6 enclosure with a recording anemometer at a height of 10 meters. When data is not available from the S1 wind tower, staff access information from a National Oceanic and Atmospheric Administration (NOAA) marine buoy weather station, number 46011, located approximately 23 miles west/southwest of the Southern Enclosure (NOAA 2020). In 2010-11, ODSVRA placed a portable anemometer with data logger (from WindLog Rainwise, Inc.) in the breeding habitat. Before 2010, monitors periodically measured wind speeds by handheld weather gauges (Kestrel 2000 Weather Meter by Kestrel Meters).

Predator activity

Monitoring predator activities: Park staff and contractors (Bloom Biological Inc., 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 avian and mammalian predators or their sign (e.g., tracks, scat, regurgitated pellets, prey remains, depredated nests) monitors record, as possible, species, type of sign, behavior, duration of observation, direction of travel, and characteristics that may identify an individual.

Measures describing predator activity

Monitors record predator presence from 1 March to 10 September under the following three categories to better estimate the extent of predator activity, both temporally and spatially, in the protected areas:

Number of days detected: Total number of days different avian and mammalian predators occur in the nesting area (Southern Exclosure and Oso Flaco) during the nesting season.

Sightings: Record of avian predator activities, with most detections made by direct observation (with the notable exception of nocturnal owls). In addition, observations of an individual remaining in one area longer than one hour count as multiple sightings (one sighting per hour or portion thereof) in order to account for possible additional impacts.

Occurrences: Record of mammalian predator activities, with most detections occurring by tracks and sign. Because direct observation of mammalian predators is very limited, information typically does not include details such as number of individuals, behavior, or duration of presence.

For both sightings and occurrences, this report separates single day detections for the different areas of the Southern Exclosure (6, 7, 8, and Boneyard exclosures) and Oso Flaco (North and South). Note that the number of recorded sightings or occurrences 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.

Gull monitoring: Gulls may depredate snowy plover and least tern eggs and chicks, as well as young plover juveniles. Human activity, with its associated food resources, attracts gulls, making them a subsidized predator. Staff perform general monitoring of gulls around the Southern Exclosure and Oso Flaco to identify potential problem individuals. In addition, monitors count gull numbers at the trash dumpster area near marker post 2 two times per week in the morning on a Sunday and Monday when the trash dumpsters are usually full.

Nonbreeding season monitoring of snowy plovers

Beginning in 2009 and continuing through the 2019-20 winter, more consistent weekly surveys for snowy plovers occurred 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 to marker post 2 (street-legal vehicles and day use only, no camping);
- 3) marker post 2 to marker post 6 (street-legal vehicles, off-highway vehicles, and camping allowed year-round);
- 4) marker post 6 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.

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 around seasonally closed areas to visitors and posts signage. Staff augments existing habitat with branches, woodchips, and wrack (surf-cast kelp). An active predator management program reduces disturbance and depredation by mammalian and avian predators. Under select circumstances, ODSVRA staff may collect abandoned but potentially viable eggs or chicks for captive-rearing and may send carcasses to an approved facility for investigative necropsy. For 2020, ODSVRA took selective eggs or chicks to Coal Oil Point Reserve (COPR) in Santa Barbara County and sent carcasses appropriate for necropsy to CDFW, Office of Spill Prevention and Response, Marine Wildlife Veterinary Care and Research Center, Santa Cruz, California (MWVCRC).

Informational signage and enforcement of regulations

Staff places interpretive panels and signs at public access points, at bathrooms, on A-frame placards near winter plover flocks, and to identify closed areas during the breeding season, which 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. Park ranger staff 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 mesh or symbolic fencing. The wire fencing of the Seasonal Exclosure (see Site Description section and 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 Exclosure, staff may choose an alternative wire exclosure type with consideration for the species, topography, proximity to recreational activities, predator threats, and duration of disturbance to the area during exclosure construction.

ODSVRA uses the following fencing and exclosure types:

Seasonal Exclosure protected area (within Southern Exclosure and North Oso Flaco): ODSVRA encloses with wire mesh fencing this approximately 269-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. For the purposes of this report, this type of buried wire fence is referred to as “predator fencing.” Beginning in 2006, an additional layer of fence material attached to overlap the top of the fence increased 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.

Symbolic fencing

Rope fencing used in several areas of the park temporarily or seasonally protects nesting or shoreline brooding habitat, but varies in configuration and length of time used depending on the location and protection needs. Nests with symbolic fencing may also receive protection from a single nest wire exclosure.

Southern Exclosure and North Oso Flaco shoreline:

Symbolic rope fencing, with the addition of tall posts with large stop signs extending into the intertidal area at marker post 6 and the south end of North Oso Flaco, clearly designate a closed shoreline to visitors for the nesting season from March to October.

Foredune closure shoreline:

On 2 July 2020, ODSVRA closed the shoreline west of the Fore dune closure to the public to protect snowy plover broods during the breeding season. Rope fencing with posts and signs extended into the intertidal area to designate a closed shoreline and wire fencing closed off the alleyways on the east side (not maintained as predator fencing) (see Figure C.5 in Appendix C). Monitors contacted visitors on the beach after closing to make them aware of the change. On 26 August, the shoreline area opened to the public due to the absence of broods.

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). Staff moves the fencing in this area westward for nests found west of or very near the symbolic fence to provide an additional buffer between nests and pedestrians.

Arroyo Grande Creek and lagoon area:

Symbolic rope, posts and signs closes a portion of the riding area from March to October for the nesting season. This area, closed to vehicle use year-round, remains open to pedestrian use during the non-nesting season from October to February.

Open riding area:

Nest protections in the open riding area in 2020 include symbolic rope fencing and signs, and, when necessary, single nest wire exclosures. Staff removes fencing once nesting activity ceases or the brood moves outside the fencing.

Large single nest exclosure: Staff installs a large circular single nest exclosure using predator fencing with height of five feet (bottom eight inches buried) around any least tern or snowy plover nest found in the open riding area. In 2020, staff installed symbolic fencing for selected nests instead of single nest exclosures in areas with minimal public disturbance. Dependent on species, nests receive a minimum nest exclosure diameter size of 656 feet (200 meters) for tern nests and 200 feet for plover nests. (Prior to 2016, tern single nest exclosure minimum size equaled 200 feet in diameter.) ODSVRA may use single nest exclosures of differing sizes to protect snowy plover nests in areas closed to vehicles (Oso Flaco, Southern Exclosure shoreline, Arroyo Grande Creek area, and areas north of Grand Avenue) or in cases where topography or safety conditions preclude a full-sized exclosure.

10-foot by 10-foot exclosure, circular exclosure, and mini-exclosure: Staff selectively uses a small circular or one of two small square nest exclosures (made of two-inch by four-inch wire predator fencing) around individual snowy plover nests inside or outside of seasonal fencing for protection from predators, including roosting gull flocks. Permitted monitors use different exclosures based on a variety of factors including, but not limited to, weather, topography, predator threats, and proximity of young broods. Staff closely monitor nests within smaller exclosures since there may be an increase in abandonment due to predation on adult plovers attending the nests or a higher risk that sand accumulating inside the fencing during high wind events buries eggs.

Staff builds the 10-foot by 10-foot exclosure (available for use since 2003) and seven-foot-diameter circular exclosure (used since 2012) with five-foot-high sides with the bottom eight inches buried when located outside of the Seasonal Exclosure. Plastic netting, with 1/2-inch by 1/2-inch mesh, covers the top and protects against avian and climbing mammalian predators. Since 2014, ODSVRA prefers using circular exclosures around nests.

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

Bumpout: A nest in the Southern Exclosure or Foredune closure located close to the boundary of the open riding area requires temporary additional fencing extending into the open riding area to allow an adequate buffer from recreational activities. Least tern nests within 328 feet (100 meters) of the open riding area and snowy plover nests within 100 feet of the open riding area receive a bumpout. (Prior to 2016, tern nest minimum buffers equaled 100 feet.) Rarely, a slight reduction in bumpout size occurs to maintain a safe vehicle corridor adjacent to the east fence. Staff create these bumpouts using wire fence (unburied) or symbolic rope, thus they are not predator proof. Sometimes staff excloses nests on the shoreline close to the west fence with two-inch by four-inch mesh buried predator fencing extending as a bumpout from the Seasonal Exclosure fence.

Habitat enhancement

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

Each year, staff place material in 6, 7, and 8 exlosures to offer more areas of disruptive cover, provide shelter from wind and blowing sand, reduce exposure to predators, and augment potential nesting substrate for terns and plovers. Beginning in February or March, and prior to nest initiation, staff adds natural materials such as driftwood, woodchips, and wrack to the exlosures and shoreline areas 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, showed greatly depressed invertebrate populations on the Southern Exclosure shoreline during the five months when open to recreational vehicle use (October through February). The studies also showed that invertebrates cannot effectively recover species diversity and abundance on the Southern Exclosure shoreline in the following seven-month seasonal closure (March through September).

ODSVRA collects wrack in the open riding area and disperses it in the Southern Exclosure. Collection and distribution occurs by hand and relocation by truck and trailer. In addition to providing cover, wrack on the shoreline provides a food resource supporting invertebrates, which in turn become prey for plover chicks, juveniles, and adults. Staff collects talitrids (commonly called beach hoppers) from outside the vehicle use area north of Grand Avenue and from South Oso Flaco, taking care to not deplete talitrid numbers from collection sites. Inoculating the wrack addition areas of the Southern Exclosure shoreline with talitrids establishes a breeding population, thus increasing the food resources available for plover chicks and juveniles during the breeding months. Amount of wrack and talitrids collected and dispersed varies from year to year depending on availability of materials and amount of invertebrates found, as well as allowable staff time.

Woodchips, branches and driftwood: Staff adds woodchips to supplement the existing assorted debris that snowy plovers often choose as nesting substrate. Crews spread woodchips in patches, usually less than a quarter-acre in size, in the 6, 7, and 8 exlosures in areas of barren sand and over thinning woodchip patches remaining from previous years. ODSVRA 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 toward the west fence and upper shoreline west of the fence. Staff collects the branches and driftwood from the exclosures at the end of each season and stores them for use in the following season.

Predator management

In addition to preventative measures such as fencing, single nest wire exclosures, and cover provided by habitat enhancement, park staff removes animal carcasses (which attract scavengers) in or adjacent to nesting and brood-rearing habitat and haze predators to flush them from sensitive areas. Hazing techniques used include approaching an avian predator on foot or by vehicle, waving arms and making noise, or firing a bird whistler. A handheld launcher, the bird whistler fires a projectile up to 300 feet with a loud whistling sound, hazing predatory birds without harming them. In some situations, firing the bird whistler may cause less disruption to plovers and terns compared to approaching an avian predator on foot in the breeding habitat. When ODSVRA requires additional options for managing predators, Bloom Biological, Inc. performs selective live-trapping and relocation of avian predators and USDA Wildlife Services conducts lethal removal of mammalian and avian predators (see section titled Predators and predator management on page 44 for additional information).

Selective collection and transfer of abandoned chicks and potentially viable eggs

Under select circumstances, ODSVRA staff collects abandoned but potentially viable eggs or chicks. Monitors consider if disturbance factors from visitors or park management efforts contribute to abandonment. Some examples include: abandoned eggs or chicks from a nest in the open riding area; abandoned eggs or chicks from a nest within a single nest exclosure such as a circular exclosure, with suspected adult mortality; or abandoned eggs or chicks from a nest near the park's two-inch by four-inch exclosure fencing which can increase windblown sand deposition on the nest. First, monitors assess if nests with active incubation but nonviable eggs (well past estimated hatch date) exist to transfer the collected potentially viable eggs to. Without an available nonviable active nest, and in consultation with USFWS, staff transport the eggs to an approved facility for captive-rearing. For collected abandoned chicks, staff may first attempt to reunite them with their associated adults; if not possible, staff transports them to an approved facility for captive-rearing. Staff use a portable brooder to warm the collected eggs or chicks during transport, at an appropriate temperature and as directed by the rehabilitation trained staff, or may use a portable hand warmer in the field while awaiting a brooder. Color-banding fledglings raised in captivity to individual, prior to release and when possible, facilitates collecting information on movements, survival, and future reproductive success.

Investigation of least tern and snowy plover carcasses

As directed by CDFW, ODSVRA sends fresh carcasses of least terns to an approved facility for necropsy. When the primary facility, MWVCRC is unavailable, ODSVRA sends carcasses to UC Davis California Animal Health and Food Safety Laboratory System, Davis, California. Since 2017, under direction from USFWS, ODSVRA places snowy plover carcasses in a freezer for deferred necropsy, if USFWS determines it necessary. When USFWS deems investigation unnecessary, ODSVRA may refrigerate and then send a fresh carcass by overnight delivery service (within one day when possible to preserve tissue integrity) for testing to determine cause of death. In 2020, carcasses found at ODSVRA were all frozen and delivered to MWVCRC by CDFW staff because overnight delivery of unfrozen carcasses was not possible due to COVID-19 concerns.

RESULTS AND DISCUSSION

CALIFORNIA LEAST TERN

Number of breeding pairs

In 2020, least terns were first seen at ODSVRA on 28 April with two flying over the enclosure, and from this date onward terns were seen or heard daily. The last sighting was of a single adult at Oso Flaco Lake on 25 August. During the previous 18 years, first sightings occurred between 8 April and 15 May (median=5 May) and last sightings occurred between 10 August and 28 September (median=30 August). To determine the minimum number of breeding pairs ODSVRA uses the single day high count of concurrent nests and broods (see Monitoring and Management Actions section for additional information on determining number of breeding adults). In 2020, there was a known minimum of 35 breeding pairs and an estimated maximum of 42 pairs, with 35 nests and broods active at the same time on 7-8 July. This is higher than the 31-33 pairs in 2019 but similar to the average of 40-43 pairs (range=23-60) for the 15-year period 2005-19 (Table 1, Figure 3).

Number, clutch size, and distribution of nests

There was a total of 48 nests, with the first nest initiated approximately 19 May and the last 7 July (Appendix A). During the 18-year period 2002-19, there was an average of 47 nests per year (range=22-79) with initiation dates for first nests ranging from 16 May–8 June (median=28 May) (Table 1). Of the 44 nests with known complete clutch size, six had one egg, 36 had two eggs, and two had three eggs, with an average clutch size of 1.91 eggs. This compares to an average of 1.87 for 2005-19 (range=1.57-2.05), and the most recent reported statewide average of 1.67 from 2007–16 (range=1.60-1.82) (Marschalek 2008-12; Frost 2013-17). Of the 48 total nests, 27 (56.3%) were in 6 enclosure, 20 (41.7%) in 7 enclosure, and 1 (2.1%) in the open riding area. This is a noticeable change from 2019 where 5 (14.7%) and 29 (85.3%) in 6 enclosure and 7 enclosure, respectively (Figure 4). Prior to 2020, the last tern nest found outside of the Southern Enclosure was one nest at Arroyo Grande Creek in 2005.

Clutch hatching rate

Of the 48 nests 36 hatched, and the clutch hatching rate for known fate nests was 78.3% (36/46) (Table 2). This compares to an average hatching rate of 83.7% (range=64.7-97.9%) for known fate nests during the 15-year period 2005-19 (Table 1). The hatching rate was 76.0% (19/25) in 6 enclosure, 80.0% (16/20) in 7 enclosure, and 100% in the open riding area (1/1). Thirty-four chicks hatched from a minimum of 53 eggs in 6 enclosure, 27 chicks hatched from a minimum of 34 eggs in 7 enclosure, and 2 chicks hatched from a minimum of two eggs in the open riding area. Nest loss was due to abandonment (one post-term and three unknown if pre- or post-term), depredation (one), wind (one), unknown cause (four), and two nests had an unknown fate.

Table 1. Nesting success of California least terns at ODSVRA from 1991-2020.

Percent nests hatched calculated using number of nests with known fate. Percent chicks fledged and juveniles fledged per nest may include fledglings from unknown nest locations detected only by brood presence, but these are few. Chicks were banded to site in 2003 and 2004, banded to brood in 2005, and banded to individual from 2006-20.

Year	Estimated 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	Estimated no. juveniles fledged per pair
1991	4-5	6 (6)	2	33	4	100	4	0.67	0.80-1.00
1992	3-4	4 (4)	1	25	2	50	1	0.25	0.25-0.33
1993	0	0	0	0	0	0	0	0	0
1994	2	2 (2)	0	0	0	0	0	0	0
1995	1	1 (1)	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	16-19	21 (16)	3	19	6	0	0	0	0
1998	33-37	40 (32)	26	81	40	60	24	0.60	0.65-0.73
1999	28-31	34 (31)	22	71	42	40	17	0.50	0.55-0.61
2000	4-5	5 (5)	4	80	8	50	4	0.80	0.80-1.00
2001	12-15	18 (18)	13	72	22	55	12	0.67	0.80-1.00
2002	20-21	22 (19)	15	79	27	37	10	0.45	0.48-0.50
2003	53-66	79 (77)	60	78	101	37	37	0.47	0.56-0.70
2004	47-55	63 (60)	44	73	69	36	25	0.40	0.45-0.53
2005	47-53	59 (59)	39	66	66	30	20	0.34	0.38-0.43
2006	31-35	38 (38)	28	74	45	78	35	0.92	1.00-1.13
2007	54-60	66 (66)	51	77	90	79	71	1.08	1.18-1.31
2008	55-56	56 (56)	50	89	99	72	71	1.27	1.27-1.29
2009	25-26	26 (26)	23	88	43	77	33	1.27	1.27-1.32
2010	23-23	23 (23)	20	87	35	83	29	1.26	1.26-1.26
2011	33-34	35 (35)	31	89	55	91	50	1.43	1.47-1.52
2012	41-44	46 (39)	32	82	51	82	42	0.91	0.95-1.02
2013	48-53	57 (52)	45	87	85	66	56	0.98	1.06-1.17
2014	47-48	49 (46)	42	91	76	76	58	1.18	1.21-1.23
2015	44-49	54 (54)	48	89	84	82	69	1.28	1.41-1.57
2016	47-48	49 (47)	46	98	78	76	59	1.20	1.23-1.26
2017	42-47	52 (34)	22	65	39	18	7	0.13	0.15-0.17
2018	30-33	35 (35)	28	80	42	83	35	1.00	1.06-1.17
2019	31-33	34 (33)	31	94	52	73	38	1.12	1.15-1.23
2020	35-42	48 (46)	36	78	63	60	38	0.79	0.90-1.09

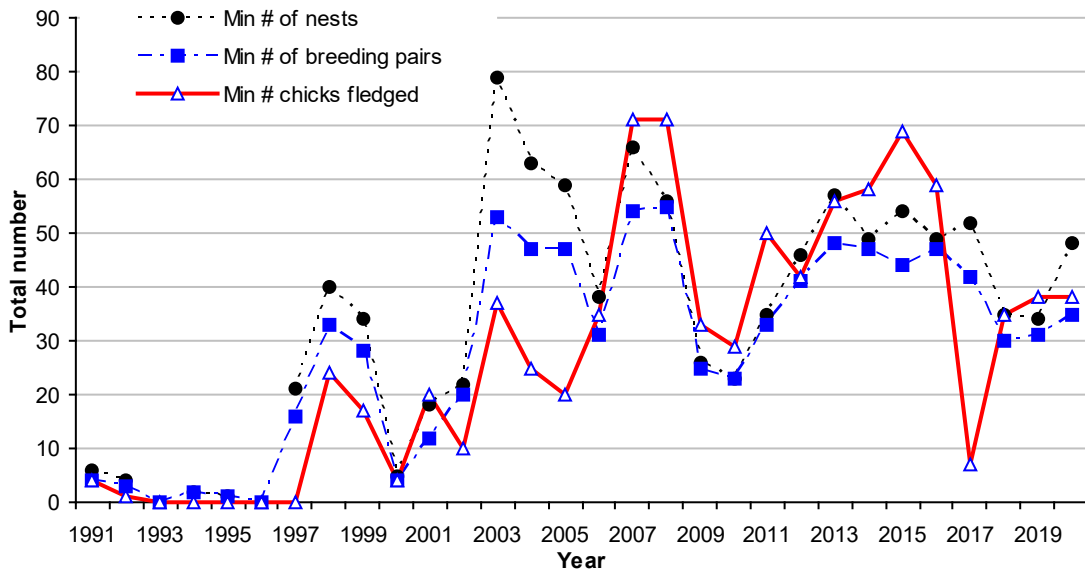


Figure 3. Number of California least tern nests, pairs, and fledglings at ODSVRA from 1991-2020.

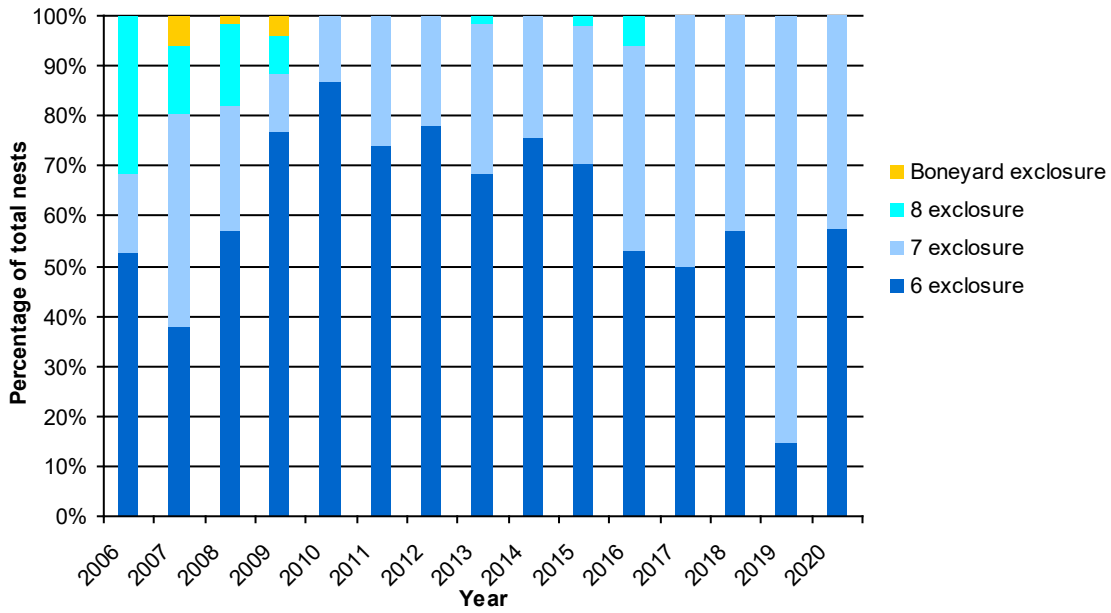


Figure 4. Distribution of least tern nests as a percent of total nests at ODSVRA from 2006-20.

Figure represents nest distribution in the Southern Exclosure. The one nest in 2020 outside of the Southern Exclosure was excluded.

Table 2. Causes of California least tern nest loss at ODSVRA from 2002-20.

Ab. = Abandoned.

Season	Ab. pre-term	Ab. post-term	Ab., unknown if pre- or post-term	Wind	Failed, unknown cause	Skunk	Coyote	Gull	Opossum	Raccoon	Unkown predator	Chick dies in egg at hatch	Total no. failed nests
2002	1	1					2						4
2003	6				5		1				2		14
2004	9	1			3		2				1		16
2005	7	3	4		4						1	1	20
2006	4	3	2								1		10
2007	2	4		4	5								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
2015	1	1	1		2					1			6
2016			1										1
2017	5		1		1	5							12
2018	4	2			1								7
2019	1		1										2
2020		1	3	1	4						1		10
Total	50	25	20	5	29	5	6	1	2	1	6	1	151
2002-20	33.1%	16.6%	13.2%	3.3%	19.2%	3.3%	4.0%	0.7%	1.3%	0.7%	4.0%	0.7%	

Chick fledging rate, juveniles produced per pair, and juvenile length of stay on-site

Fifty-seven of the 63 known hatching chicks were banded with a unique color combination. Thirty-eight of the 63 chicks were seen when 21 days old or older for a fledging rate of 60.3%. The fledging rate for banded chicks was 61.4% (35/57) and 50.0% (3/6) for unbanded chicks (Appendix A). The 60.3% fledging rate in 2020 compares to an average of 74.1% (range=17.9-90.9%) during the previous 14-year period 2006-19, when most chicks were banded to individual. In 2020, 40.7% (11/27) of the two-chick broods fledged both chicks. This compares to an average of 56.0% (range=0-86.0%) of 349 two-chick broods fledging both chicks during the previous 14 years, 2006-19. In 2020, the estimated number of fledglings produced per pair ranged from 0.90-1.09 and compares to an average of 1.12-1.19 for the previous 14 years (range=0.15-1.57) (Table 1). Estimated annual fledging rates for all of California are reported by CDFW as a range and averaged 0.27-0.39 fledglings per pair for the 12-year period 2005-16 (highest estimate in 2014 with range=0.37-0.68), but more recent California data is not available at time of this report writing (Marschalek 2006-12; Frost 2013-17).

From 2010-15, there were six known 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; two in 2013; and one in 2015). These chicks were monitored and directed back into the enclosure. From 2016-19, there were no known such occurrences. In 2020, ODSVRA was closed to public vehicle use and camping on 28 March and remained closed for the least tern nesting season. Unlike previous years, and due to the decrease in recreational activities, chicks, juveniles, and adults were seen roosting in the open riding area daily (range=1-20) for the period of 2-24 July. To protect and reduce disturbance to the roosting birds, close monitoring of terns in the open riding area occurred daily (see section titled Open riding area and Foregone closure on page 10).

Of the current or recent breeding sites in San Luis Obispo and Santa Barbara counties, banding tern chicks occurs at ODSVRA (since 2003) and VAFB (beginning 2018 with banding to site and year). Banding least tern chicks at ODSVRA, especially 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 method⁴. For the six-year period 2006-11, the three-week count method at ODSVRA consistently underestimated the minimum known number of juveniles produced each year, identifying an average of 49.0% (range=38.0-66.7%) of the known minimum number (see CDPR 2011 for greater details). ODSVRA relies on color band resighting data to derive a more accurate fledging rate and did not conduct three-week counts in 2012-20.

Color banding chicks to brood in 2005 and to individual since 2006 has also provided information on juvenile length of stay at ODSVRA. In 2020, 2.9% (1/35) of color-banded juveniles were documented remaining at ODSVRA for 21 days or longer post-fledging. This is much lower than the average of 29.4% (172/585) during the 14-year period 2006-19 (Table 3). In 2019-20, unlike many previous years, late season daytime use of Oso Flaco Lake (located in park) by ODSVRA banded adult and juvenile terns was very low. Conditions at Oso Flaco Lake appeared poor the last two years, with an increased amount of algae growth on the lake's surface, and the few adults seen fishing had poor success. Late season daytime presence at RGDCP (approximately 6.0 miles south of the ODSVRA tern colony and in the same dunes complex) was high in 2019 and there was lower use in 2020. (Figure 5). ODSVRA banded terns recorded at RGDCP during the day were typically seen roosting. In addition, there was repeated presence of hunting peregrine falcons (*Falco peregrinus*) (peregrine) and a northern harrier (*Circus hudsonius*) (harrier) at the tern colony site in ODSVRA in 2020, that may have contributed to post-fledging movement off-site.

⁴ 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.

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 15-year period 2006-20.

During this period, 620 color-banded fledglings (21 days old or older) were tracked at ODSVRA (sightings outside the park are not included). 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	≥35 post-fledge
2006	3 (9%)	9 (26%)	7 (20%)	12 (34%)	4 (11%)	0 (0%)
2007	9 (14%)	13 (20%)	15 (23%)	18 (28%)	9 (14%)	1 (2%)
2008	12 (18%)	29 (43%)	16 (24%)	11 (16%)	0 (0%)	0 (0%)
2009	3 (10%)	14 (48%)	8 (28%)	3 (10%)	1 (3%)	0 (0%)
2010	3 (11%)	4 (14%)	14 (50%)	7 (25%)	0 (0%)	0 (0%)
2011	2 (4%)	5 (10%)	9 (18%)	31 (63%)	2 (4%)	0 (0%)
2012	3 (9%)	7 (20%)	11 (31%)	12 (34%)	2 (6%)	0 (0%)
2013	5 (10%)	12 (23%)	25 (48%)	10 (19%)	0 (0%)	0 (0%)
2014	2 (5%)	7 (17%)	18 (43%)	14 (33%)	1 (2%)	0 (0%)
2015	12 (21%)	10 (18%)	21 (38%)	10 (18%)	1 (2%)	2 (4%)
2016	22 (39%)	9 (16%)	19 (34%)	5 (9%)	1 (2%)	0 (0%)
2017	0 (0%)	3 (60%)	1 (20%)	1 (20%)	0 (0%)	0 (0%)
2018	3 (9%)	5 (15%)	13 (39%)	4 (12%)	8 (24%)	0 (0%)
2019	4 (12%)	16 (50%)	10 (31%)	2 (6%)	0 (0%)	0 (0%)
2020	21 (60%)	12 (34%)	1 (3%)	1 (3%)	0 (0%)	0 (0%)
Total 2006-20	104 (17%)	155 (25%)	188 (30%)	141 (23%)	29 (5%)	3 (0%)

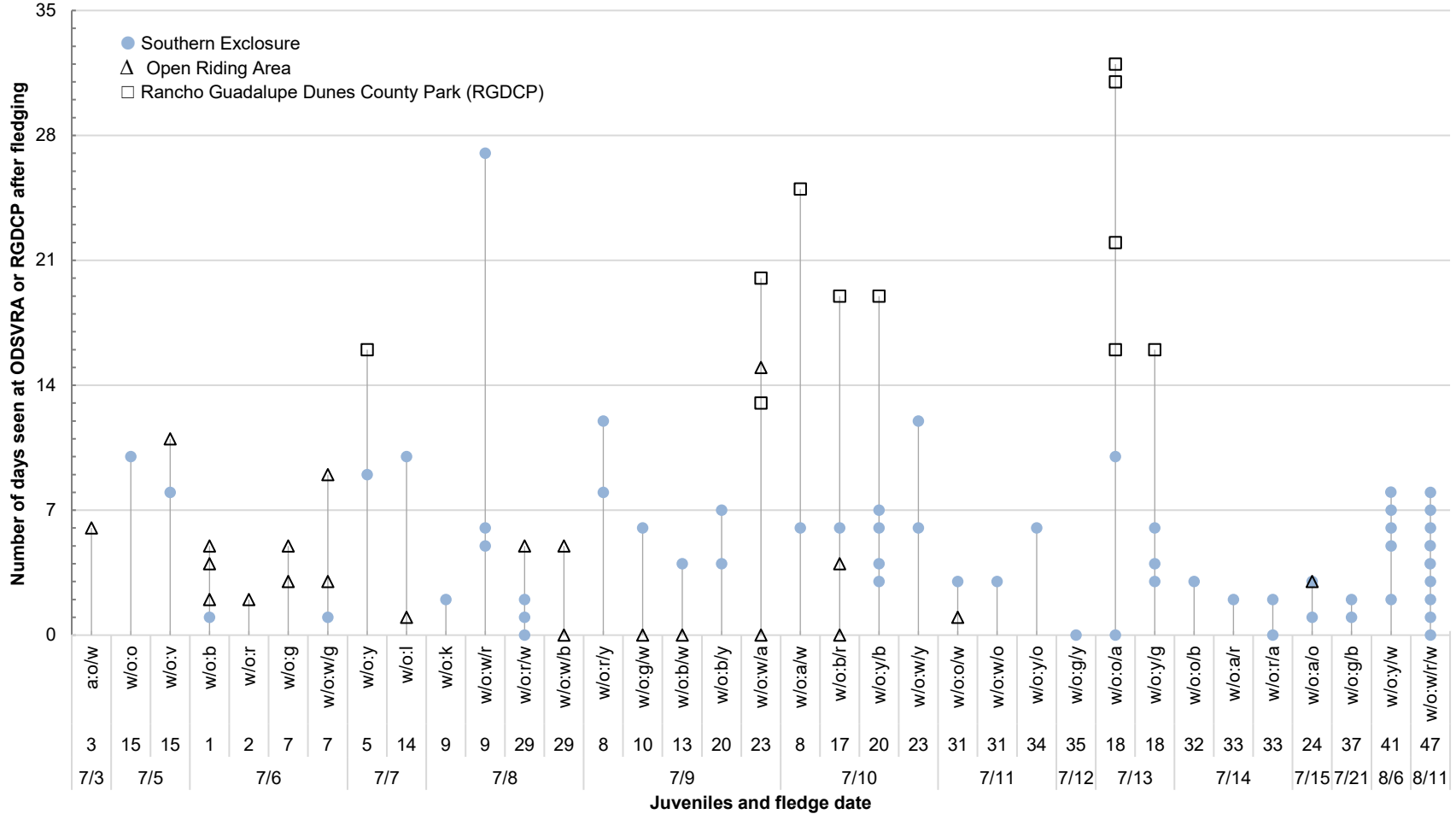


Figure 5. Number of days California least tern juveniles that hatched at ODSVRA in 2020 continued to be seen on-site and at Rancho Guadalupe Dunes County Park after reaching fledge age (21 days old).

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. Rancho Guadalupe Dunes County Park is located approximately 6.0 miles south of ODSVRA tern colony.

Mortality (other than eggs)

Two least tern chick carcasses were found at ODSVRA in 2020 (no tern carcasses were found in 2019 subsequent to the December 2019 annual report). A banded w/o:a chick carcass from the LT6 nest was found 23 June in 6 enclosure and an unbanded chick carcass from the LT42 nest found 22 July in 7 enclosure. Both carcasses were intact and necropsy results showed both deaths were a result of acute trauma likely caused by predation (necropsy reports attached). There was also an injured two-day-old least tern chick from the LT47 nest on 24 July and not seen subsequently (Table H.1 and Table H.3 in Appendix H).

Least tern use of nearby small freshwater lakes

At ODSVRA nearshore ocean waters are the primary source of prey fish for the tern colony, and in 2020 foraging activity over the ocean was observed throughout the season. During the chick-rearing period small fish may also be taken from freshwater sources. Over the past 14 years, nearby small freshwater lakes observed with more than incidental tern activity in one or more years include Oso Flaco Lake (located on park property approximately 1.5 miles south of the middle of tern colony), the Dune Lakes (1.5 miles northeast), and Cypress Ridge Lake (3.2 miles northeast). Monitoring of sites east of the park is typically done in response to observations of terns from the colony flying toward or returning from the east. In 2020, such observations were limited and small water bodies east of the park were not surveyed. Tern use of Oso Flaco Lake in the later part of the season was much reduced in 2020 compared to most previous years and no banded juveniles were documented.

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 2020, there was a minimum of 32 banded adults with known origin documented at ODSVRA. Thirty-one of these birds were identified as banded at ODSVRA as chicks (banding began in 2003). Breeding was documented for a minimum of 34 banded adults and this is likely a substantial underestimate. At least 12 of the 34 adults were banded as chicks at ODSVRA; the complete color combinations of the other 22 breeding adults could not be confirmed (Appendix A, Table D.1 in Appendix D).

Least terns typically first breed at three years old, with some breeding documented by two-year-old birds (Massey and Atwood 1981). A total of nine two-year-old banded terns have been documented as breeding at ODSVRA from 2012-20 (two in 2012, three in 2013, two in 2014, one in 2016, and one in 2018, all banded as chicks at ODSVRA). In 2005, a two-year-old tern banded as a chick at ODSVRA was documented breeding at VAFB, approximately 22 miles south of the park. The oldest confirmed breeding adults at ODSVRA in 2020 were two 10-year-old terns (w/b:w and w/b:w/g, both banded as chicks at ODSVRA in 2010).

Least terns banded at other sites and seen at ODSVRA

From 2011 to 2020 there have been three confirmed sightings of banded terns from other sites. One was an adult (s:a/o) seen 28 July–11 August 2011 that was banded at the U.S. Navy North Island Maintenance and Training Facility in San Diego Bay, San Diego County, California. The second was a juvenile (s:b) seen 16-18 August 2018 and the third was an adult (s:b) seen 9 July 2020, both of which were banded at VAFB in 2018 (the first year of banding terns at the site) (Table D.1 in Appendix D).

Least terns banded at ODSVRA seen at other sites

In 2020, there were 30 least terns (20 adults and 10 juveniles), all banded to individual as chicks at ODSVRA, documented at one or more sites other than ODSVRA. One juvenile was seen in Oxnard at the Santa Clara River Estuary, Ventura County. The majority were seen in Santa Barbara County at nearby RGDCP (20), VAFB (10), and COPR (2) and represented post-season movement from the ODSVRA breeding colony. Breeding of ODSVRA banded terns was documented at VAFB.

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. Surveys for the 2020 night roost were conducted on seven days between 21-27 May, a much reduced number of surveys compared to previous years because dune topography conditions at the park became critically unsafe for night driving. The night roost was initially located in northern 7 enclosure, but evidence of night roost locations (tracks, roosting scrapes, fecal deposits, and small regurgitated pellets composed of fish bone fragments) were seen in southern 6 enclosure and in the open riding area approximately 500 feet east of northern 6 enclosure.

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, 2020). 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. The RGDCP site, VAFB, and COPR are in Santa Barbara County and approximately six, 22, and 85 miles south of the ODSVRA colony, respectively. For this regional population, ODSVRA has become an important source of productivity. During the 17-year period 2004-20, ODSVRA produced a minimum of 735 juvenile terns while RGDCP, VAFB, and COPR combined reported an estimated 289 juveniles. In 2020, ODSVRA produced 38 juveniles compared to RGDCP (breeding but number of juveniles unknown), VAFB (6 juveniles), and COPR (no breeding). While it's likely RGDCP did produce juveniles in 2020, at the time of writing this report RGDCP described the number of juveniles produced as unknown (Appendix E, Table 4).

Table 4. 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 2004-20.

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. Beginning in 2018 VAFB banded tern chicks to site and year. Sources: RGDCP (pers. comm. Tom Applegate), VAFB (pers. comm. Samantha Kaisersatt), and COPR (pers. comm. Jessica Nielson).

Year	ODSVRA		RGDCP, VAFB, and COPR combined	
	Est. no. breeding pairs	No. juveniles	Est. no. breeding pairs	No. juveniles
2004	47-55	25	15	0
2005	47-53	20	48	1
2006	31-35	36	7	7
2007	54-60	70	23	17
2008	55-56	70	19	19
2009	25-26	33	32-33	40
2010	23	29	34	31
2011	33-34	50	33	4
2012	41-44	42	18	10
2013	48-53	56	15	19
2014	47-48	58	17	20
2015	44-49	69	22	29
2016	47-48	59	25	18
2017	42-47	7	27	8
2018	30-33	35	70-71	39
2019	31-33	38	59	21 ¹
2020	35-42	38	60	6 ¹
Total juveniles produced		735		289

¹RGDCP juvenile number reported as unknown, and therefore not included in totals

WESTERN SNOWY PLOVER

Number of breeding adults

In 2020, there was a minimum of 190 breeding adults (110 males and 80 females) and of these 87 were banded with known origin. This is a decrease of 11.2% from a minimum of 214 breeding adults in 2019 and compares to a range of 32-226 adults (average=142) for the 17-year period 2002-18. The average minimum number of breeding adults for the last five years (2016-2020) is 199, increasing slightly to 202 for the last three years (Table 5, Figure 6).

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 2020, the survey at ODSVRA counted 155 adult plovers (80 males, 61 females, and 14 of unknown sex), 82% of the minimum number documented for the entire season by known breeding activity. In 15 of the 16 years from 2005-20, the window survey count at ODSVRA was lower than the minimum number of breeding birds (54-95% of minimum number). It was higher (107%) than the minimum number in 2008. For the entire 16-year period the window survey count averaged 78% of the known minimum number of breeding adults for the season (Table 6).

Table 5. Number of snowy plover breeding adults, breeding males, fledglings, and chicks fledging per breeding male for the 19-year period 2002-20.

Year	Min. no. breeding adults	Min. no. breeding males	No. fledglings	No. fledges 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
2015	205	113	277	2.45
2016	209	110	157	1.43
2017	183	93	174	1.87
2018	201	115	200	1.74
2019	214	120	108	0.90
2020	190	110	117	1.06
Average for 19-year period 2002-20	149	83	121	1.45
Average for 5-year period 2016-20	199	110	151	1.40
Average for 3-year period 2018-20	202	115	142	1.23

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

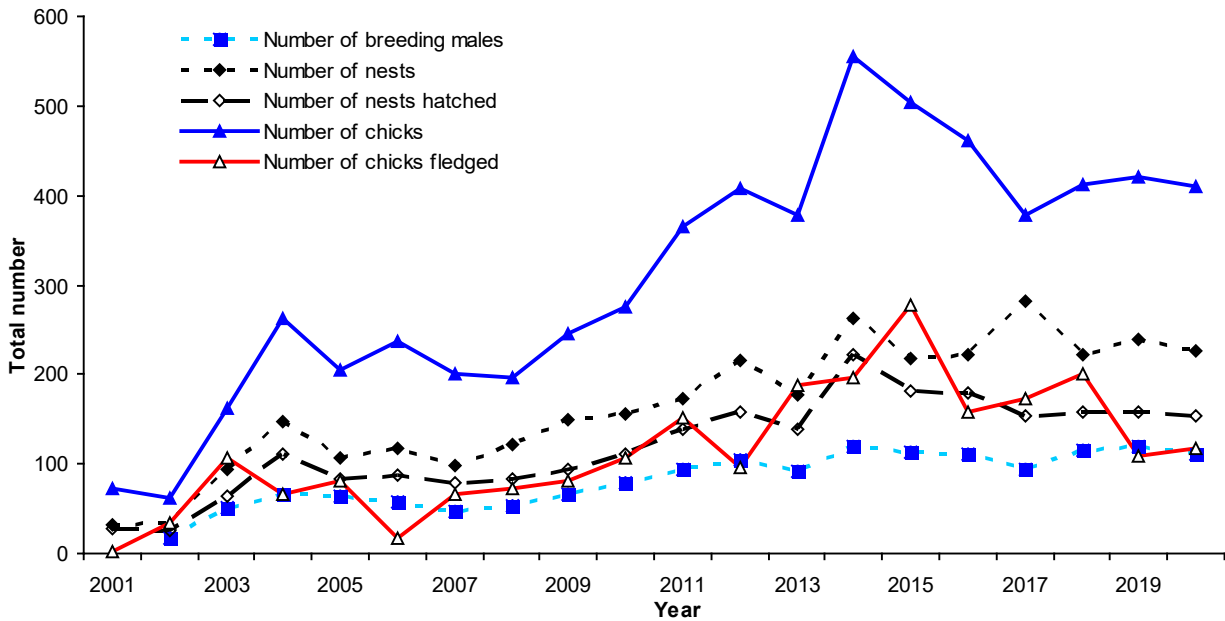


Figure 6. Number of snowy plover breeding males, nests, nests hatched, chicks, and chicks fledged at ODSVRA from 2001-20.

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

Table 6. Number of adult snowy plovers counted on USFWS breeding season window surveys versus calculated minimum number of breeding adults at ODSVRA from 2005-20.

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%
2015	205	180	88%
2016	209	160	77%
2017	183	174	95%
2018	201	155	77%
2019	214	154	72%
2020	190	155	82%

Number and distribution of nests

There were 226 known nesting attempts, including 12 with unknown nest location, initiated between 14 March–8 July (Appendix B, see section titled Assignment of broods to nests in the Monitoring and Management Action section for unknown nest location description). Of the 214 nests from known locations, 128 (59.8%) were in the Southern Enclosure, eight (3.7%) in North Oso Flaco, 31 (14.5%) in South Oso Flaco, 24 (11.2%) in the Foredune closure, 22 (10.3%) in the open riding area, and one (0.5%) in Pawprint revegetation area approximately 295 feet east of Foredune central. More specifically for the Southern Enclosure, there were 58 nests in 6 enclosure, 37 in 7 enclosure, 24 in 8 enclosure, and nine in Boneyard enclosure. The total number of nests found outside the Southern Enclosure and Oso Flaco for the 19-year period 2001-19 was 32 and averaged 1.7 nests per year (range=0-7). In 2020, 47 nests were found outside the Southern Enclosure and Oso Flaco. The maximum number of known location nests active at one time was 76 on 17 and 18 June, with the highest number in 6 enclosure (27 nests) (Table 7, Table 8, Figure 7, Figure 8, Appendix C, Table F.1 in Appendix F).

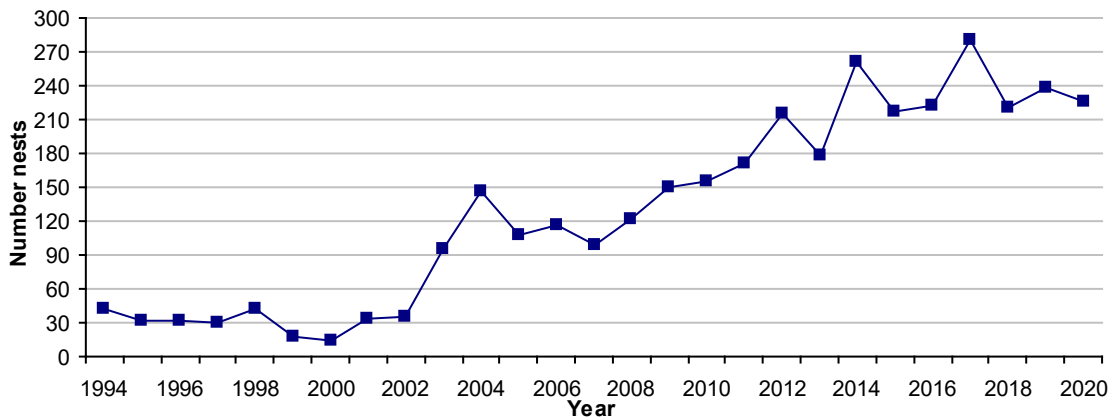


Figure 7. Number of snowy plover nests at ODSVRA from 1994-2020.

Table 7. Snowy plover nest distribution and success at ODSVRA in 2020.

Excludes 12 nests known only from detection of broods.

Location	No. nests (no. known location and fate)	Min. no. eggs laid	No. known location and fate nests hatching	Percent known location and fate nests hatching
6 enclosure	58 (52)	158	41	78.8
7 enclosure	37 (33)	99	24	72.7
8 enclosure	24 (23)	65	13	56.5
Boneyard enclosure	9 (9)	27	7	77.8
TOTAL SOUTHERN ENCLOSURE	128 (117)	349	85	72.6
North Oso Flaco	8 (7)	20	4	57.1
South Oso Flaco	31 (28)	88	17	60.7
TOTAL OSO FLACO	39 (35)	108	21	60.0
Paw print	1 (1)	3	1	100.0
Foredune closure	24 (22)	71	16	72.7
Open riding area	22 (22)	64	19	86.4

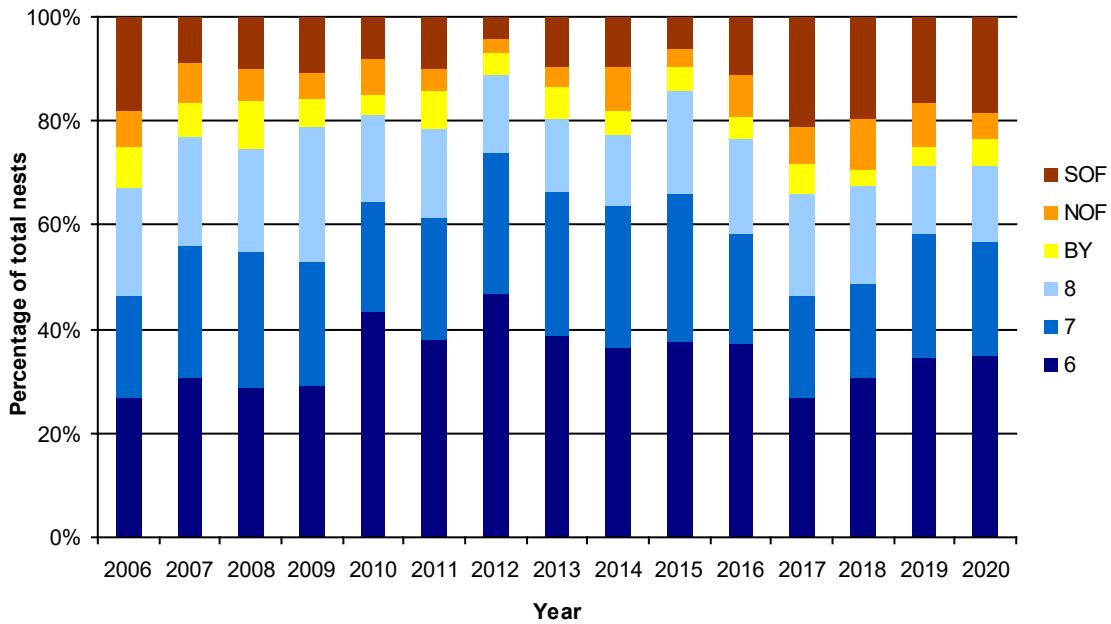


Figure 8. Distribution of snowy plover nests as a percent of total nests in the Southern Exclosure and Oso Flaco from 2006-20.

Includes all nest with known location in the Southern Exclosure and Oso Flaco. For the purpose of comparing to previous years, when nests were rarely found outside the Southern Exclosure and Oso Flaco, nests found in other areas were not included. 6 = 6 exclosure, 7 = 7 exclosure, 8 = 8 exclosure, BY = Boneyard exclosure, NOF = North Oso Flaco, SOF = South Oso Flaco

Table 8. Nesting success of snowy plovers at ODSVRA from 2001-20.

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 2001-20 is included as Table F.1 in Appendix F.
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 chicks fledged (percent fledged)	No. fledglings per nest	No. fledglings per egg
2001	33 (31)	na	na	27 (27)	87.1	72	3 (4.2)	0.09	na
2002	35 (35)	99	na	25 (25)	71.4	62	35 (56.5)	1.00	0.35
2003	95 (93)	255	na	63 (62)	66.7	162	107 (66.0)	1.13	0.42
2004	147 (140)	415	2.88 (138)	110 (105)	75.0	263	66 (25.1)	0.45	0.16
2005	107 (103)	290	2.86 (96)	84 (80)	77.7	204	82 (40.2)	0.77	0.28
2006	117 (114)	336	2.90 (115)	87 (89)	78.1	230	17 (7.4)	0.15	0.05
2007	99 (91)	288	2.96 (89)	78 (70)	76.9	200	66 (33.0)	0.67	0.23
2008	121 (119)	341	2.88 (113)	83 (81)	68.1	197	72 (36.5)	0.60	0.21
2009	150 (147)	418	2.88 (140)	95 (94)	63.9	245	81 (33.1)	0.54	0.19
2010	155 (150)	431	2.87 (144)	111 (109)	72.7	275	107 (38.9)	0.69	0.25
2011	172 (160)	487	2.90 (157)	138 (131)	81.9	365	152 (41.6)	0.88	0.31
2012	216 (203)	603	2.88 (199)	157 (152)	74.9	386	96 (24.9)	0.44	0.16
2013	178 (167)	502	2.94 (162)	138 (130)	77.8	343	187 (54.5)	1.05	0.37
2014	262 (239)	726	2.88 (234)	222 (206)	86.2	547	196 (35.8)	0.75	0.27
2015	217 (195)	613	2.93 (188)	182 (167)	85.6	494	277 (56.1)	1.28	0.45
2016	223 (193)	613	2.89 (188)	179 (165)	85.5	462	157 (34.0)	0.70	0.26
2017	281 (238)	738	2.88 (228)	153 (145)	60.9	378	174 (46.0)	0.62	0.24
2018	221 (200)	615	2.95 (184)	159 (144)	72.0	412	200 (48.5)	0.90	0.33
2019	239 (220)	649	2.92 (202)	158 (149)	67.7	398	108 (27.1)	0.45	0.17
2020	226 (197)	627	2.92 (194)	154 (142)	72.1	410	117 (28.5)	0.52	0.19

Average clutch size, clutch loss, and nest hatching rate

There were 226 identified nesting attempts, including twelve known only by brood, and of these 154 hatched. For 194 nests with known complete clutch size (and excluding nesting attempts known only by brood) the average number of eggs was 2.92. This compares to the average of 2.90 eggs per clutch (range=2.86-2.96) for the 16-year period 2004-19. Excluding 29 nests (17 with unknown fate and 12 detected by brood only), the nest hatching rate was 72.1% (142/197). This compares to an average of 74.6% (range=60.9-86.2%) from 2002-19 (Table 8). The nest hatching rate in 2020 was higher in the Southern Exclosure (72.6%) than in Oso Flaco (58.3%), as has been the case in 17 of the previous 19 years (Table F.1 in Appendix F). The nest hatching rate for nests found outside the Southern Exclosure and Oso Flaco was 80% (36/45). In 2020, 87.3% (48/55) of nest loss was due to predation (27), wind (13), and nest abandonment (8). For the broader category of predation, documented avian predation accounted for 66.7% (18/27) of this loss, attributed to unidentified avian predator (12), harrier (3) and common raven (*Corvus corax*) (raven) (3) (Table 9, Figure F.1 in Appendix F). Additionally, ravens ate one egg at a nest that later hatched and two eggs at a nest that was later lost to wind (Appendix B).

Table 9. Attributed causes of snowy plover nest loss at specific locations at ODSVRA in 2020.

Aband.=Abandoned

Area	Aband. pre-term	Aband. post-term	unknown pre- or post-term	Wind	Overwashed by tide	Failed, cause unknown	Unidentified predator	Unidentified Avian predator	Coyote	Raven	Harrier
Southern Enclosure											
6 enclosure	1	1		2			2	2		1	2
7 enclosure	2			1	1		4	1			
8 enclosure					1	1	1	4	1	1	1
Boneyard enclosure				1				1			
TOTAL SOUTHERN ENCLOSURE	3	1	0	4	2	1	7	8	1	2	3
Oso Flaco											
North Oso Flaco					1	1		1			
South Oso Flaco			2	5		2		1		1	
TOTAL OSO FLACO	0	0	2	5	1	3	0	2	0	1	0
Other											
Foredune closure	2			1			1	2			
Open riding area				3							
TOTAL OTHER	2	0	0	4	0	0	1	2	0	0	0
TOTAL ODSVRA	5	1	2	13	3	4	8	12	1	3	3

Snowy plover chicks in the open riding area

In 2020, there were 43 broods raised north of marker post 6 in the open riding area. A portion of this shoreline was closed to the public from 2 July to 26 August (see section titled Open riding area and Foredune closure on page 10 for more details). Of the 43 broods, 24 were raised in areas open to the public and 34 of 60 chicks fledged (56.7%). The remaining 19 broods were raised in areas that were closed to the public for partial or all the brood-rearing period and two of 48 chicks fledged (4.2%). The low fledge rate for chicks raised in the portion of the open riding area that was closed to the public is indicative of the overall ODSVRA high predation of chicks and low fledge rate during the latter part of the season (Figure 9). Broods raised in the open riding area came from nests hatching from the open riding area (13), Foredune closure (15), 6 enclosure (9) Pawprint revegetation area (1), broods from unknown location nests (2), and broods believed to be from known location nests but could not be assigned to a specific nest (3).

In 2020, snowy plover broods were moved by staff on 12 occasions, between 8 May and 1 July, to areas less visited by the public or park staff (a total of six broods and 16 chicks). Movement of broods ceased after 1 July to fulfill the CCC Cease and Desist Order (CCC 2020) (see section titled Open riding area and Foredune closure on page 10, Appendix B).

Chick fledging rate

Of the 410 snowy plover chicks hatched, 250 were banded and the fate of 160 unbanded chicks is believed known (Appendix B). Chick survival and fledging rates of unbanded chicks are obtained through a combination of intense monitoring of broods, banded associated adults, banded chick(s) in broods with unbanded chick(s), and banded broods present in the same area (reducing density of unbanded broods). Between 26 May–8 August, 10 unbanded broods (18 chicks) were observed on the Southern Enclosure, Oso Flaco, or Foredune closure shoreline and believed to be from known nests but could not be assigned to a particular nest (listed as UNA1-10 in Appendix B). Although these broods could not be assigned to a specific nest and enclosure, all chicks were tracked and fledglings are included in totals. Additionally, there were 12 unbanded broods (32 chicks) observed on the shore and believed to be from nests that were not found. Two of the 12 broods were subsequently banded (see sections titled Banding chicks and Assignment of broods to nests in the Monitoring and Management Action section for details on banded and unbanded broods). The fledging rate for banded chicks was 32.0% (80/250) and 23.1% (37/160) for unbanded chicks. The fledging rate for all chick combined in 2020 was a low 28.5% (117/410) and follows a year of poor

success (27.1% in 2019). For comparison, there was an average fledging rate of 39.9% (range=7.4-66.0%) for the 17-year period 2002-18. Continued poor fledging, as seen in 2019 and 2020, could result in a reduction in population size over time. For 2020, it is suspected that undocumented predation by peregrine, coyote, and gull was an important factor in poor chick survival, especially later in the season when presence of the predators increased (Table 8, Table F.1 in Appendix F) (CDPR 2007-18).

In 2020, the early season had a higher chick fledging rate (49.0%) compared to the late season (a very low 11.0%) and represents the greatest disparity in the 18-year period from 2003-20. In 14 of 18 years from 2003-20, the fledging rate of chicks hatching in the early season (prior to 20 June) has been higher than chicks hatching in the late season (20 June or later) (See 2012 report for how early and late seasons were determined.) For all years in the 18-year period 2003-20, the average early season chick fledging rate (44.6%) was 13.3 percentage points higher than the average late season chick fledging rate (31.3%) (Figure 9, Figure 10, Figure 11).

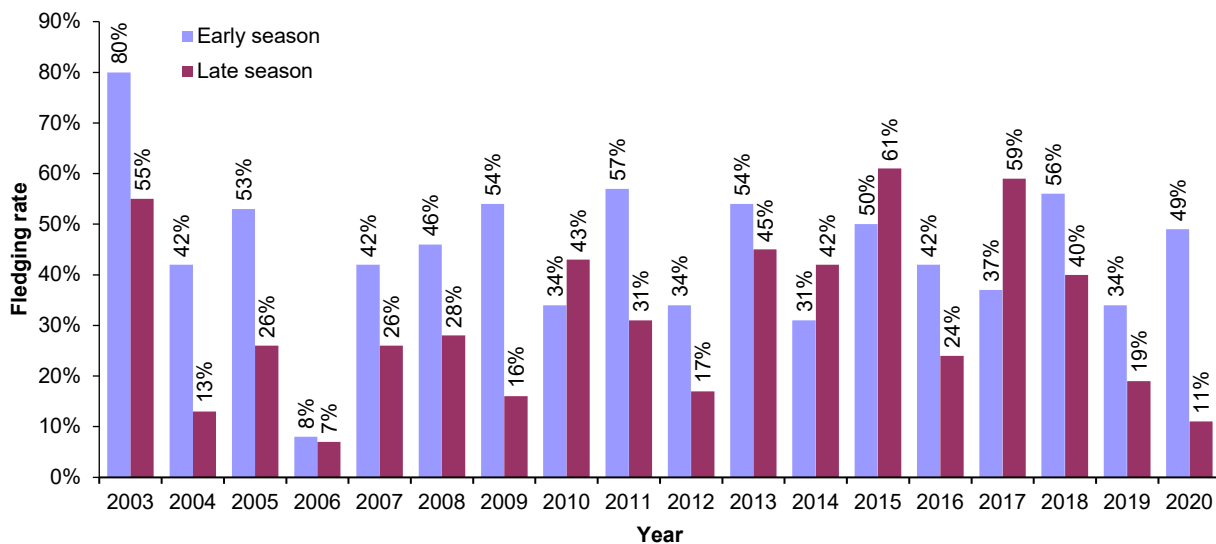


Figure 9. Fledging rate of chicks hatching in early season (prior to 20 June) and late season (20 June or later) at ODSVRA from 2003-20.

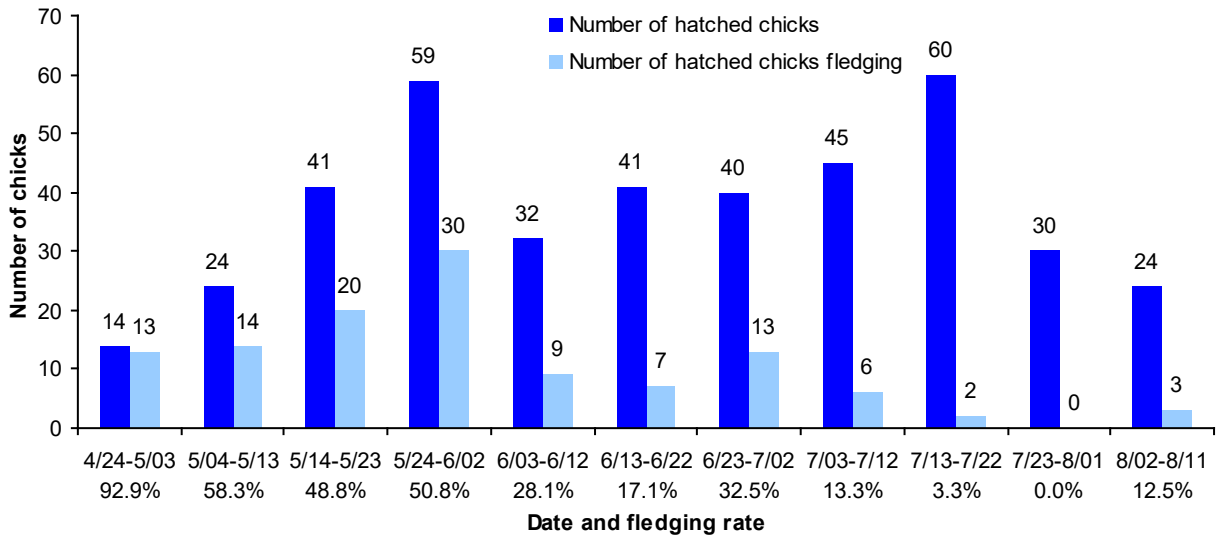


Figure 10. Number of snowy plover chicks hatching per 10-day period and number subsequently fledging at ODSVRA in 2020.

Includes all chicks with known fate (410). For broods that either originated from unknown location (32 chicks from 12 broods) or were not assigned to a specific nest (18 chicks from 10 broods) a hatch date was estimated within a 10-day period based on chick size.

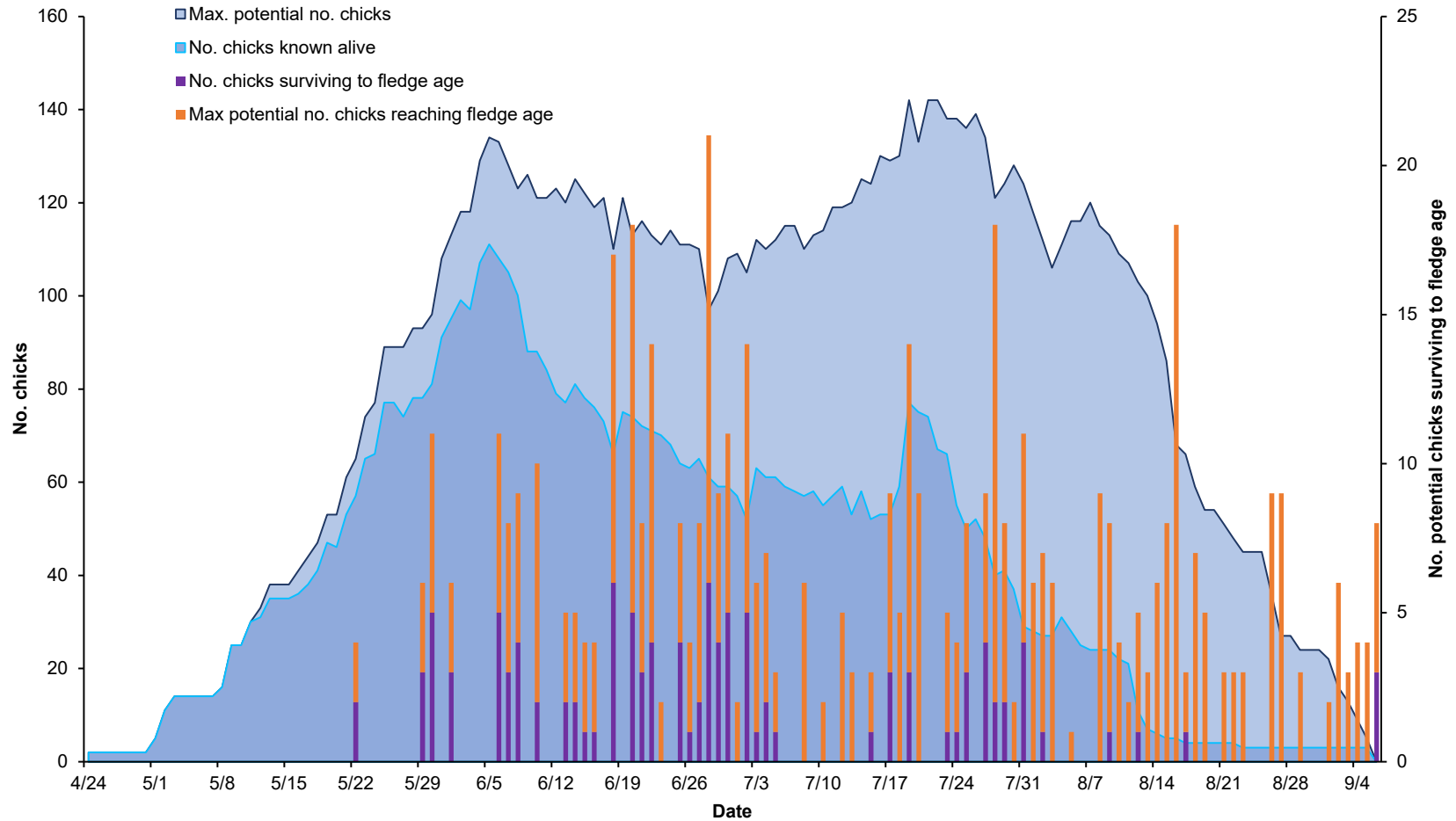


Figure 11. Chick survival and fledge rate from 14 May to 6 September at ODSVRA in 2020.

Of the total of 410 chicks hatching, 398 chicks (excludes 12 chicks that were found when approximately three days old or older) are represented in this figure. Number chicks known alive calculated using date of last sighting during regular surveys of all chicks.

Age of chick loss

Of 268 closely tracked chicks (244 banded and 24 unbanded chicks with banded siblings) from known location nests, 185 were believed lost. As has consistently been the case in previous years, chick loss measured in 5-day increments in 2020 was highest for very young chicks (0-4 days of age), accounting for 38.9% of total loss and at the lower end of the range 38%-64% (average=49%) from 2009-19 (Figure 12) (CDPR 2019). For 115 chicks reaching 16 days of age in 2020, the fledge rate was 72.2% (83/115). This is less than the average of 80% (range=71-93%) for the previous 11-year period 2009-19 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).

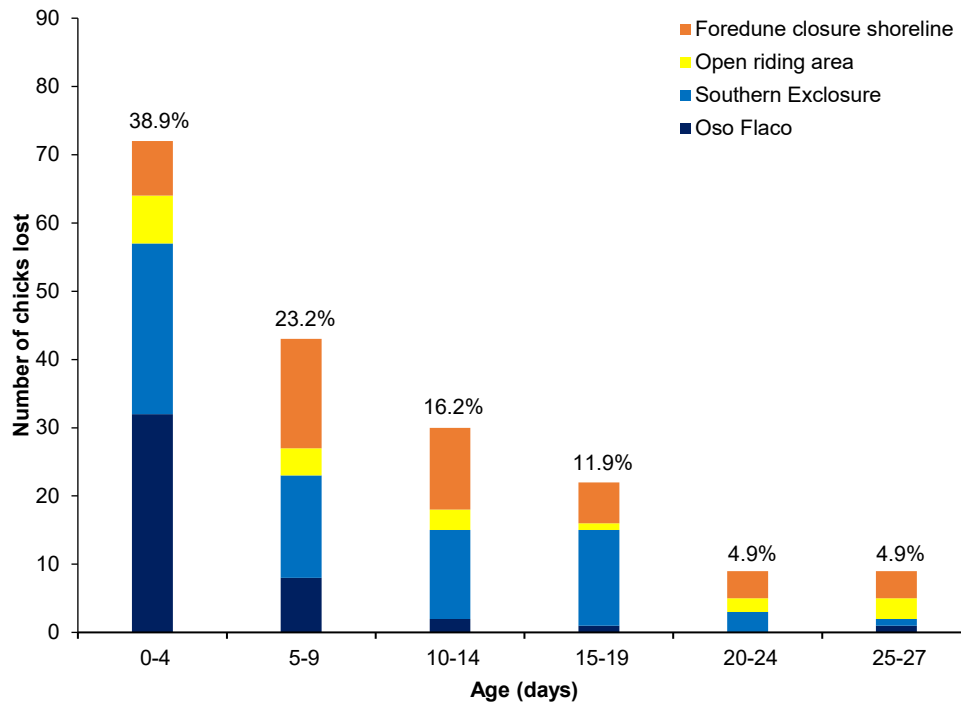


Figure 12. Loss of snowy plover chicks by age and location last seen at ODSVRA in 2020.

Number and percentage of total chicks lost shown for each age group. There were 268 chicks included in the analysis (244 banded and 24 unbanded with banded siblings); 185 of these were lost. Data excludes broods that could not clearly be identified and tracked individually.

Productivity measured by number of fledglings produced per adult male

Based on a population viability analysis in the 2007 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 fledglings per male allowing for moderate population growth (assuming approximately 75% annual adult survival and 50% juvenile survival) (USFWS 2007). In 2020, the number of chicks fledging per male was 1.06 and compares to 0.90 in 2019. For the 18-year period 2002-2019, the average productivity was 1.47 fledglings per male and the number of fledglings produced per male has exceeded 1.2 in 14 of the 18 years (Table 5). (Note that if the number of breeding males is underestimated, the number of chicks fledged per male is an overestimate.) The pronounced low productivity in 2019 and 2020 will depress natal site recruitment of young birds entering their first breeding seasons and may result in a reduction in the breeding population at ODSVRA in 2021.

Injuries, mortalities (other than eggs), and carcasses collected or observed

In 2020, there were nine adults and two chicks observed with injuries. Details of the injuries are provided in Table H.2 in Appendix H. There was a minimum of 24 documented snowy plover mortalities (other than eggs) at ODSVRA from 5 December of 2019 (subsequent to last year's report) to 16 December of 2020. Nineteen of the 24 mortalities were the results of predation. Predators involved were two peregrine falcons (three chicks, two juveniles, one adult, and one unknown age), two western gulls (*Larus occidentalis*) (one chick, one chick or juvenile, and one juvenile), one harrier (one chick or juvenile), one coyote (four unknown age) and unidentified predators (one chick or juvenile, two juveniles, and one adult). Documented mortality other than predation was five chicks and of these, three chicks were found in the open riding area (area was closed to vehicles all season) and two chicks in the Southern Enclosure. No clear evidence of predation was observed at any of these carcasses. For carcasses that received a necropsy, reports are attached if available at the time of this report. Details of the carcasses are provided in Table H.4 and H.5 in Appendix H.

Protection of known location and fate nests

Of the 197 nests from known location and with known fate, 83 were initiated within the wire mesh predator fencing of the Seasonal Enclosure that is installed at the beginning of the season (see Seasonal closure and fencing section description in the Monitoring and Management Actions section). These nests had a 71.1% (59/83) hatch rate.

For the 6, 7, and 8 enclosures and North Oso Flaco, there were an additional 41 nests with known location and fate established on the shoreline outside of the Seasonal Enclosure. This portion of shoreline is protected only by symbolic rope fencing and signage that provides no predator protection but is designed to discourage vehicle and pedestrian trespass. Seven of these received an individual circular enclosure and all hatched. Thirty-four nests did not receive single nest wire fence protection due to a combination of the following factors: avoiding disturbance of nearby broods, concerns of potential nest abandonment due to adult mortality, and a continuing acceptable hatch rate without the use of single nest wire enclosures. Of these nests 67.6% (23/34) hatched.

In South Oso Flaco there were 28 nests from known location and known fate, all ultimately within seasonal symbolic rope fencing (visitor pedestrian use allowed on beach west of symbolic fencing). On several occasions nests were found west of or very near the symbolic fence and the fence was moved westward to provide more of a buffer between nests and pedestrians. Fourteen nests did not receive any single nest wire enclosure due to concerns of avoiding disturbance of nearby broods, windblown sand potentially burying eggs, or adult vulnerability to predators. Of these, 42.9% hatched (6/14) and eight failed (two depredated, two abandoned, unknown pre- or post-term, two failed due to wind, and two failed from unknown cause). An additional two nests were depredated before a planned circular enclosure could be installed. Fourteen nests received circular enclosures and 78.6% hatched (11/14) and three failed due to wind (see Table F.3 in Appendix F for additional details of protective fencing measures for nest).

In the Foredune closure, there were 22 nests from known location and known fate, all surrounded by nonpredator fencing. Two of these nests received bumpouts; one hatched and one was depredated by an avian predator. The 20 other nests had no additional fencing; 15 hatched (75.0%) and five failed (two depredated, two abandoned pre-term and one failed due to wind) (Table F.3 in Appendix F).

One nest (SP155) was found inside nonpredator fenced Pawprint revegetation area to the east of the Foredune closure, and was protected with a bumpout. The nest hatched three chicks and the brood was raised on the closed Foredune closure shoreline as well as the open riding area (see Appendix B for additional brood info).

In 2020, 22 nests were initiated in the open riding area outside the Southern Enclosure, Oso Flaco, and revegetation areas (including Pawprint and Foredune closure). From 2001 to 2019, the most nests found in a single year in the open riding area is three in 2012 (11 total, range 0-3, average 0.58). Of these 22 nests in 2020, 10 received single nest enclosures, 4 received bumpouts, and one received a circular (with bumpout), and all nests hatched. The remaining seven nests had only symbolic rope fencing installed; four hatched (57.1%) and three failed due to wind (Table F.3 in Appendix F).

Banded snowy plovers breeding at ODSVRA in 2020

Banding of snowy plovers occurs at multiple breeding sites along the Pacific coast. The closest sites to ODSVRA where banding occurs are Monterey Bay in Monterey County to the north, and VAFB in Santa Barbara County to the south. In 2020, the minimum number of breeding adults at ODSVRA was 190 birds, and of these 87 (45.8%) were banded and with known origins (Figure 13). For known origin banded birds, the great majority (89.7%, 78/87) represent recruitment from chicks banded and fledged from ODSVRA. The remaining nine breeding birds were banded as chicks at VAFB (seven in 2016 and 2017), Reservation Road in Monterey County (one in 2016) and Camp Pendleton in San Diego County (2019). (Two breeding birds missing one or more bands were from unknown origins) (Table D.4 in Appendix D).

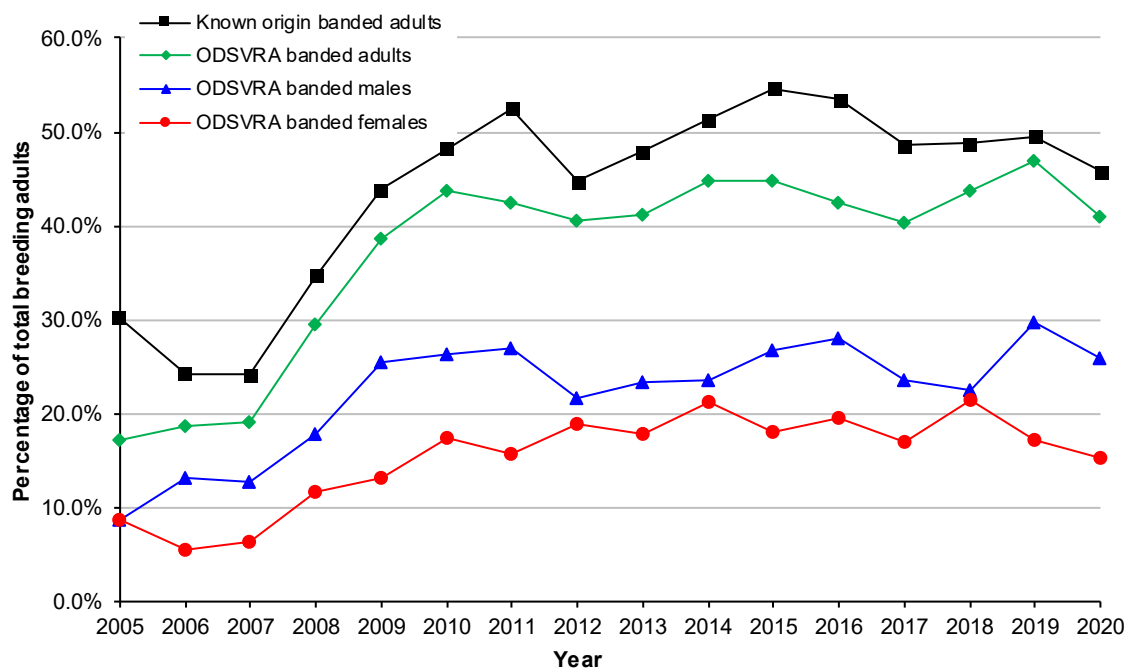


Figure 13. Percentages over the total calculated breeding population at ODSVRA of all known origin banded adults and the sum of males and females originally banded at ODSVRA breeding from 2005-20.

All ODSVRA banded adults were banded on-site when chicks.

Snowy plovers banded at ODSVRA confirmed breeding elsewhere in 2020

Sixteen plovers banded at ODSVRA and breeding away from the park were confirmed in four counties of California: San Luis Obispo County (two in Morro Bay area and one at Guadalupe-Nipomo Dunes NWR); Santa Barbara County (10 at VAFB and one at COPR); Ventura County (one at McGrath State Beach); and San Diego (one at Camp Pendleton). There was a minimum of 46 additional adult plovers banded at ODSVRA observed at other sites, ranging from Eden Landing in the San Francisco Bay to northern Baja California, during the months of April through June. A portion of these likely represent breeding adults, but breeding was not confirmed (Table D.6 in Appendix D).

Snowy plover surveys at ODSVRA during the nonbreeding season

Surveys for wintering plovers (Pacific coast breeding birds joined by interior breeding birds) were conducted four to six times a month during the five-month period October through February (see Monitoring and Management Actions for survey details). Between 2 October 2019 and 26 February 2020, single day wintering plover counts at ODSVRA ranged from 88-175 birds (single day high count on 16 November 2019). The shore was divided into five beach sections and the monthly average number of plovers (from four to six surveys) was obtained for each section. An average number of plovers for each beach section for the five-month winter period was obtained by averaging each month's average count. Of the five sections, the beach north of Grand Avenue had an average of zero plovers during the winter period (each month had an average of 0); Grand Avenue to marker post 2 had an average of 1 (range=0-3); marker post 2 to marker post 6 had an average of 61 (range=32-78); marker post 6 to the southern boundary of the riding area, closed to public entry during the breeding season, had an average of 14 (range=4-25); and Oso Flaco had an average of 58 (range=33-113) (Figure 14).

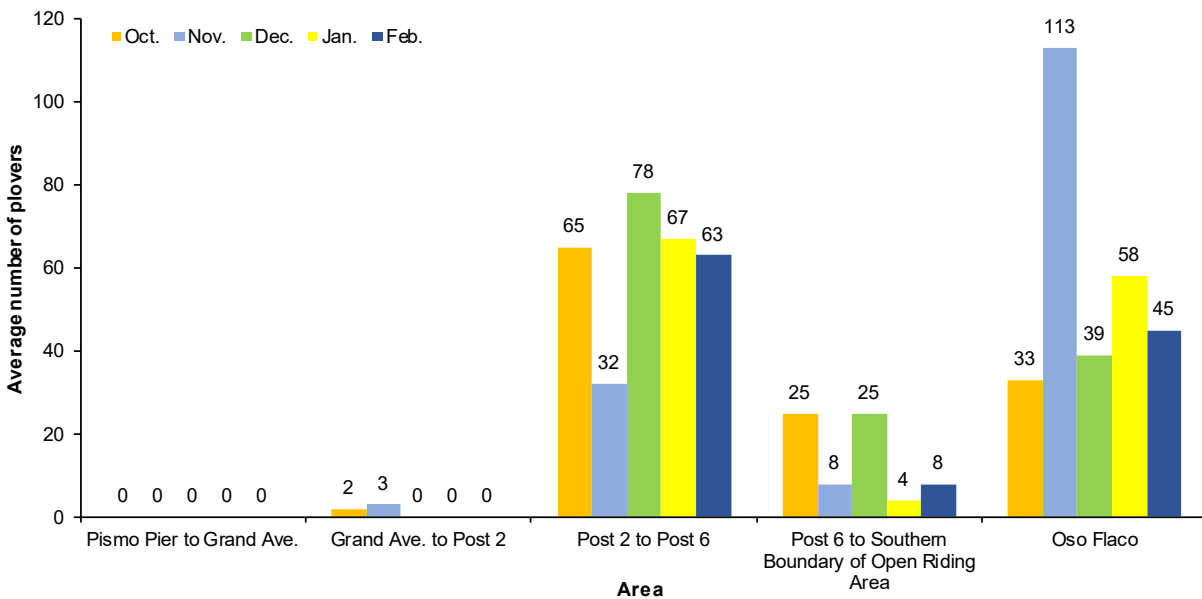


Figure 14. Monthly average number of snowy plovers observed during nonbreeding season surveys at ODSVRA from October 2019 to February 2020.

Surveys conducted four to six 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 2020, the survey at ODSVRA counted 134 adult plovers and is similar to the average of 129 (range 116-138) during the previous 3-year period 2017-19. During the 17-year period 2004-20, the winter window survey has averaged 155 plovers (range=62-261).

Sixty-four banded snowy plovers were recorded during surveys from 1 October 2019 to 29 February 2020 at ODSVRA. These birds were banded at the following locations: 50 from ODSVRA; five from VAFB and one captive-reared at Santa Barbara Zoo in Santa Barbara County, California; three from the Monterey Bay area in Monterey County, California; three from Oregon state in Douglas and Coos counties; and two were missing bands and were from unknown locations (Table D.3 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 and food resources

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, 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 less vegetation and very limited scattered natural debris. In some areas, especially in 8 enclosure and the western half of 6 and 7 enclosures, varying sizes of vegetation hummocks persist throughout the year. Areas of patchy cover can benefit plovers and terns during the nesting and chick-rearing periods and to make more such areas available materials, including surf-cast kelp (wrack), branches, driftwood, and woodchips, are placed in the 6, 7, and 8 enclosures. On the shoreline of 6, 7, and 8 enclosures talitrids may be added to help restore populations of this important invertebrate prey of snowy plover chicks, juveniles, and adults. Nearshore ocean waters provide the primary source of prey fish for the tern colony and nearby small freshwater lakes may provide additional sources of appropriately-sized fish to feed chicks (see paragraph titled Least tern use of freshwater lakes in the Monitoring and Management Actions section).

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.

Documented predator activity and management response in 2020

Species known to be predators of terns and plovers were documented by both number of days detected, as well as number of sightings (avian) and occurrences (mammalian) (see Monitoring and Management Actions section for more detail).

Live-trapping and relocation of raptors was conducted by Bloom Biological, Inc. and lethal removal of mammalian and avian predators was conducted by USDA Wildlife Services. Predator monitoring effort by Bloom Biological, Inc. was conducted from February until mid-September and USDA Wildlife Services monitoring effort was conducted from late March until mid-September.

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 2020 season included peregrine falcon, northern harrier, gull spp., common raven, American kestrel (*Falco sparverius*), great horned owl (*Bubo virginianus*) and coyote. Three coyotes, two western gulls and four common ravens were lethally removed. In addition, three raptors were incidentally live-trapped when targeting other individual birds and were released on-site. Avian predators perched in sensitive areas were hazed when possible (Table G.2 in Appendix G).

In 2020, one tern nest was identified as lost to an unknown predator. Twenty-seven plover nests were identified lost to the following predators: coyote (1), northern harrier (3), common raven (3), unidentified avian (12), and unidentified predator (8). From 2002-20, 2.5% (21/845) of all tern nests with known fate were documented lost to predators (14 mammalian, one gull, and six unidentified predator). During this same 19-year period, 9.7% (291/3004) of plover nests with known location and fate were documented lost to predation (48 mammalian, 186 avian, and 57 unidentified predator). In addition to documented loss, a number of failed nests attributed to “abandoned pre-term” and “unknown cause” are likely a result of predation (Appendices A and B) (CDPR 2002-2019).

In 2020, necropsy reports of two tern chick carcasses indicated cause of death to be acute trauma likely due to predation and no other tern losses, other than eggs, were documented lost to predation (necropsy reports attached). Nineteen documented plover losses, other than eggs, to predation in 2020 included: four plover chicks (one by western gull and three by peregrine); four chicks or juvenile plovers (one by northern harrier, one by third-year western gull and two by unidentified predator); four plover juveniles or fledglings (one by western gull, two by peregrine, and one by unidentified predator); two adult plovers (one by peregrine and one by unidentified predator); and five plovers of unknown age (four by coyote and one by peregrine) (Table H.4 in Appendix H). This compares to 15 documented losses in 2019: nine plover chicks (one by immature western gull, one by Brewer’s blackbird, and seven by peregrine); one juvenile or adult plover (peregrine); one adult plover (peregrine); two plovers of unknown age (immature western gull); one plover, thought to be an adult (unidentified predator); and one juvenile tern (harrier).

Mammalian predators at Southern Exclosure and Oso Flaco in 2020

Opossum

Virginia opossum (*Didelphis virginiana*) (opossum) tracks were documented on 13 days in the Southern Exclosure and South Oso Flaco in 2020 and averaged 12 days per season (range=3-25) from 2007-19 (Figure 15). From 2002-20, known nest loss to opossum was limited to two tern nests, occurring in 2010 and 2013.

Skunk

In 2020, striped skunk (*Mephitis mephitis*) (skunk) tracks were documented on six days in the Southern Exclosure compared to an average of 33 days per season (range=2-87) from 2007-19 (Figure 15). There were no known tern nests or plover nests lost to skunk in 2020 compared to one in 2019, zero in 2018 and 23 (18 plover and five tern) in 2017. From 2002-16, known nest loss to skunk was limited to six plover nests: five in Oso Flaco from 2009-11 and one in Boneyard exclosure in 2016.

Raccoon

Raccoon (*Procyon lotor*) tracks were documented on seven days in the Southern Exclosure. This is the lowest documented number of days compared to observations for the period 2007-19, when there was an average of 86 days (range=17-145) (Figure 15). Tracks and scat found over the years indicated that raccoons commonly traveled across the exclosure to forage in the intertidal zone on prey that included mole crabs (*Emerita analoga*). From 2002-20, known nest loss to raccoons was limited to one tern nest in 6 exclosure in 2015 and two plover nests in Oso Flaco in 2010 and 2011.

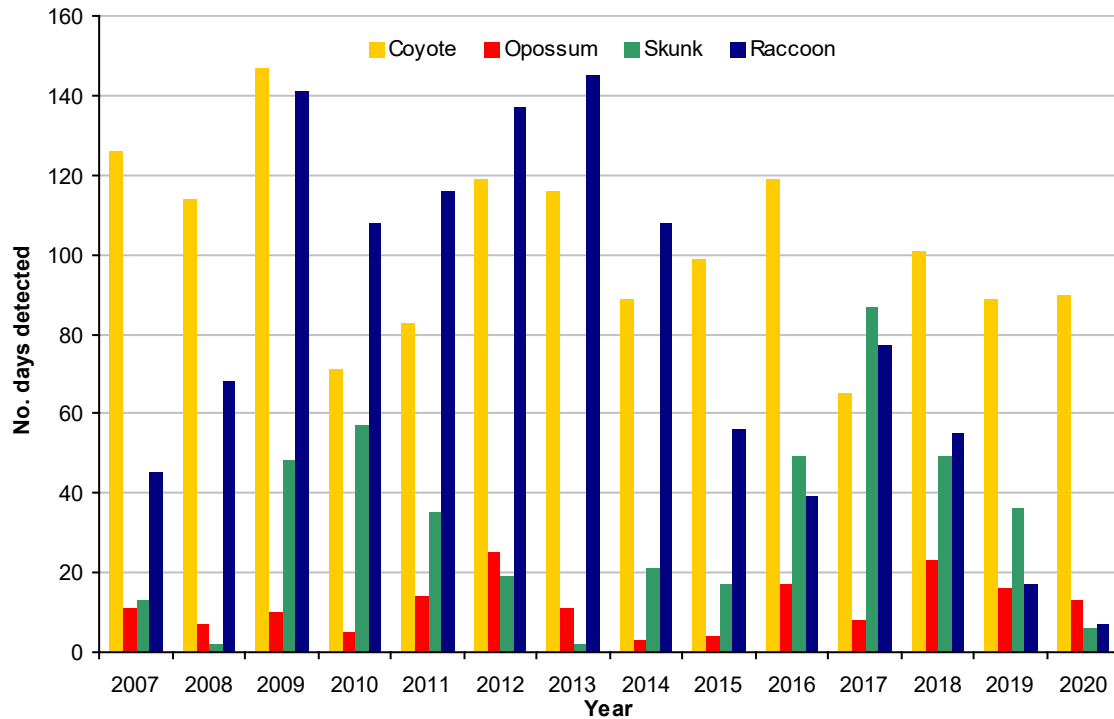


Figure 15. Number of days coyote, opossum, skunk, and raccoon were detected in the Southern Exclosure and Oso Flaco at ODSVRA from 2007-20.

Coyote

Live sightings of coyotes have rarely been documented in the Seasonal 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.

Three coyotes were removed in a targeted effort to reduce the threat of predation and disturbance due to coyote presence documented within sensitive nesting habitat. This is the fewest number of coyotes removed since 2007 and is below the average of six removed per year from 2007-19 (range=4-11). Since 2002, coyote scat encountered by monitoring staff and contractors is checked in the field for plastic or aluminum bands used for banding least terns and snowy plovers. In 2020, a single coyote scat containing 15 snowy plover bands, representing a minimum of four individual birds, was found on 6 exclosure shoreline. Bands were found in coyote scat for the first time in 2012, with four scat piles having a total of 11 bands (representing a minimum of one plover chick, two unknown age plovers, and one unknown age tern) (CDPR 2012). No bands were found in coyote scat in 2013-19 (CDPR 2013-19).

Documented coyote activity in 2020 was similar to the average of the previous 11 years for the following three measures: 1) recorded on 90 days in 2020 compared to an average of 103 for 2009-19, 2) 114 occurrences specific to the Southern Exclosure shoreline and North Oso Flaco shoreline compared to 102, and 3) 172 occurrences for all areas of the Southern Exclosure and Oso Flaco compared to 189 (Table 10). In 2020, coyote tracks were more common on the Southern Exclosure and North Oso Flaco shoreline later in the season when plover chick survival was poorer and undocumented chick loss to coyote is suspected (Figure G.1 in Appendix G, Figure 9). It should be noted that coyote tracks are documented opportunistically and counts represent a minimum level of activity. In addition, shoreline accessibility for

monitoring may vary between years, making direct comparison difficult. From 2002-20, 21 plover nests and six tern nests have been documented lost to coyote (Table 2, Table F.2 in Appendix F).

Table 10. Coyote occurrence in the Southern Exclosure and Oso Flaco at ODSVRA from 2009-20.

Date range is from 1 March to 10 September (a 194-day period). “Predator fenced Seasonal Exclosure” includes all areas inside the Southern Exclosure and North Oso Flaco seasonally exclosed with predator fencing.

Year	Predator fenced Seasonal Exclosure	6, 7, 8 exclosures 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)
2015	48	104	32	29	213 (99)
2016	36	61	49	63	209 (119)
2017	25	1	4	43	73 (65)
2018	22	55	52	69	198 (101)
2019	17	40	53	69	179 (89)
2020	27	84	30	31	172 (90)

Avian predators at Southern Exclosure and Oso Flaco in 2020

In 2020, of the known mammalian and avian predations on plover, 94.7% (18/19) of nests and 73.3% (11/15) depredated plover individuals were depredated by avian predators. An additional eight plover nests, one tern nest, two tern chicks, and four plover individuals were depredated by unknown predators, many suspected to be avian. Unsuccessful efforts were made to trap one adult male northern harrier, one adult peregrine banded with a silver USFWS band on the left leg and a black VID band with white code (W49) on the right leg, and one female kestrel. Two western gulls and four common ravens were lethally removed. In addition, three raptors were incidentally live-trapped when targeting other individual birds and were released on-site (Table G.2 in Appendix G). Avian predators perched in sensitive areas were hazed when possible.

Loggerhead shrike

From 21 April–9 September 2020, a minimum of one loggerhead shrike (*Lanius ludovicianus*) (shrike) was documented on five days in the Southern Exclosure and Oso Flaco. Shrike observations included perch-hunting and flying over 8 and Boneyard exclosures and North Oso Flaco. Shrikes were actively hazed when possible.

Merlin

From 16 March–9 April 2020, a minimum of one merlin (*Falco columbarius*) was documented on 10 days (34 sightings) perch-hunting and flying in the Southern Exclosure and Oso Flaco (Table 11, Table G.1 in Appendix G). In the 13-year period 2007-19, merlin activity averaged eight days (range=2-20) per season. From 2004-2020, merlins were documented taking four adult plovers (one in each of the years 2004-06 and one in 2015) at ODSVRA (CDPR 2004-19). In 2014, their presence coincided with several plover nests being abandoned pre-term with adult mortality suspected as the cause.

American kestrel

There were 134 documented sightings on 52 days of American kestrels in specific areas of the Southern Exclosure and Oso Flaco in 2020 (Table 11, Table G.1 in Appendix G). This is higher than the average of 18 days per season (range=6-37) for the 13-year period 2007-19 (CDPR 2007-19). In 2020, kestrels were primarily observed June through August perch-hunting and flying over all sensitive areas, and were hazed out of sensitive areas on 36 different occasions when perched. On 24 June, there was an effort to trap a female kestrel after it was observed perch hunting, persisting in areas known to have plover nests and chicks, and remaining in the area after using hazing methods. The attempt was unsuccessful, the bird traveled south off-site, and trapping efforts ceased.

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 covered quickly 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. Most owl tracks documented at ODSVRA are likely from great horned owls; barn owls (*Tyto alba*) have also been documented but to a much lesser extent. Burrowing owls (*Athene cunicularia*) have been seen at ODSVRA but tracks would not be confused with other species, and they have typically migrated out of the area before the tern and plover breeding season.

In 2020, owl tracks were periodically documented in sensitive nesting and chick-rearing habitat, with owl presence detected on 20 days with 23 separate sightings (Table 11, Figure 16). Owls were also known to roost during the daytime in areas adjacent to the Southern Exclosure. From 2007-19, owl activity was documented on an average of 29 days (range=5-53). Although owl presence in sensitive areas was a concern, trapping efforts were focused on other avian predator species in 2020 and no effort was made to trap owls.

Red-tailed hawk

Red-tailed hawks (*Buteo jamaicensis*) were observed perching and flying in the Southern Exclosure and Oso Flaco foredunes. In 2020, based on concurrent sightings and age, there was a minimum of three individuals (one adult, one subadult, and one juvenile) observed in the nesting area. Red-tailed hawk presence was documented on 37 days (85 sightings). From 2007-19, activity was recorded on an average of 41 days (range=7-74) (Table 11, Figure 16). Red-tailed hawks perched in the nesting area were hazed on 19 occasions in 2020 (sometimes requiring repeated efforts before the bird left the nesting area). Hazing red-tailed hawks out of sensitive areas provided temporary relief but did not deter individual hawks from returning to ODSVRA. In 2017, a juvenile red-tailed hawk was observed eating a plover chick. This was the first known predation by a red-tailed hawk at ODSVRA, but they have been a documented predator of plovers and terns at other sites (CDPR 2017). In 2020, two red-tailed hawks were incidentally trapped, one on 4 July and one on 9 July, when trapping for a northern harrier in Pipeline revegetation area. Each bird was released in the park the following day after receiving a USFWS band (Table G.2 in Appendix G).

Northern harrier

Northern harrier is a documented predator of plover and/or tern nests, chicks, and juveniles at ODSVRA. During the 11-year period 2008-18, harriers averaged 86 sightings on 42 days. In comparison, the last two years have seen an increase in sightings of 93% and 129% and days seen of 43% and 98% in 2019 and 2020, respectively (Table 11, Figure 16) (CDPR 2007-19). Based on age and sex, there was a minimum of four individuals (one adult female, one adult male, one subadult, and one juvenile) observed during this season.

An adult male northern harrier was frequently seen hunting and catching prey in 6, 7, and 8 exclosures beginning 2 March through mid-July. Documented losses to this individual harrier included three plover nests, one adult plover, and one suspected adult or juvenile plover, with additional losses suspected (Table 9, Table F.2 in Appendix F, Table H.4 in Appendix H). Unsuccessful attempts to trap this bird began 29 May and ended 17 July.

Table 11. Sightings of merlin, American kestrel, large owl spp., red-tailed hawk, northern harrier, and peregrine in specific areas of the Southern Exclosure and Oso Flaco at ODSVRA in 2020.

Date range is from 1 March to 10 September (194-day period). Note most owl “detection” based on tracks.

Location	Merlin	American kestrel	Large owl spp.	Red-tailed hawk	Northern harrier	Peregrine	Total
6 exclosure	3	17	1	2	49	46	118
7 exclosure	4	23	1	13	47	34	122
8 exclosure	6	23	5	23	43	31	131
Boneyard exclosure	10	15	11	9	17	4	66
North Oso Flaco	10	25	1	23	21	19	99
South Oso Flaco	1	31	4	15	20	44	115
TOTAL	34	134	23	85	197	178	651

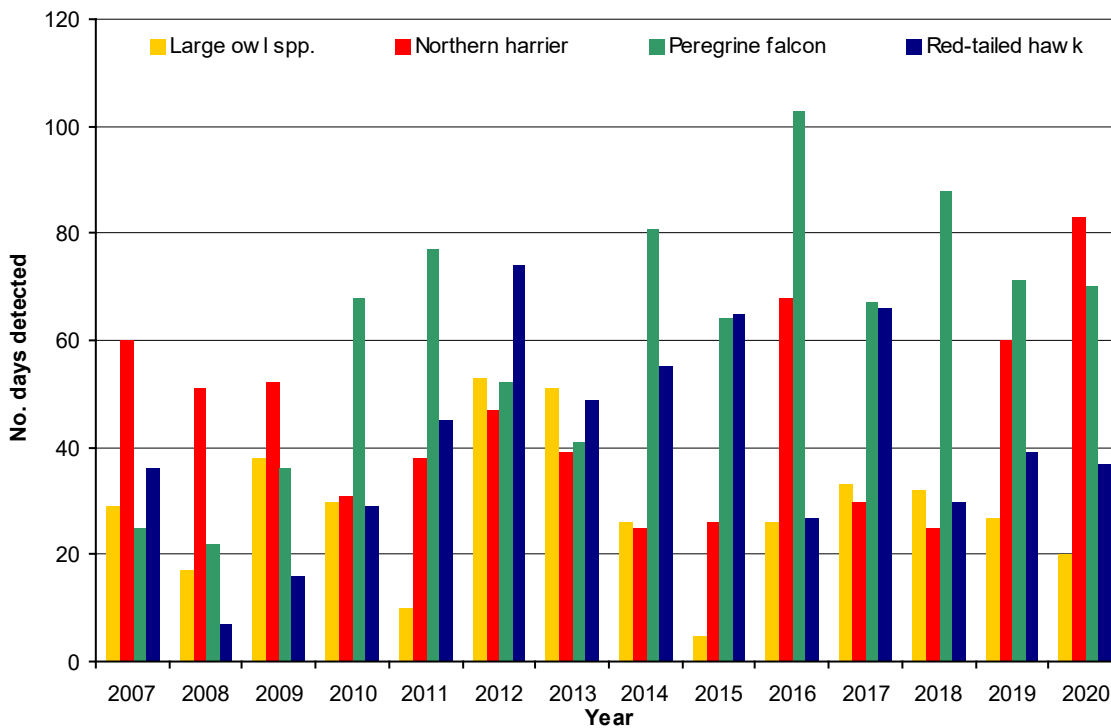


Figure 16. Number of days large owl spp., northern harrier, peregrine, and red-tailed hawk were detected in the Southern Exclosure and Oso Flaco at ODSVRA in 2007-20.

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

Corvids (American crow and common raven)

American crows (*Corvus brachyrhynchos*) and common ravens are efficient predators at many tern and plover nesting sites and can have pronounced impacts over a short period of time. In 2020, there were 17

sightings of crows on six days, a reduction from 2019 when there were 31 sightings on 13 days (Table G.1 in Appendix G). The number of days seen in 2020 is similar to the annual average of five days (range=1-13) for the 13-year period 2007-19 (CDPR 2007-19).

In 2020, there were 35 sightings of common raven, a 35% increase in sightings from 2019 (26 sightings) and a 192% increase from 2018 (12 sightings) (Table G.1 in Appendix G). In 2020, documented loss to raven included three plover nests, one egg from a nest that later hatched, and two eggs from a nest later lost to wind all during a 25-day period from 13 April–8 May (Table 9, Table F.2 in Appendix F). Two ravens were lethally removed from east of Oso Flaco Lake, one on 2 April and one on 15 April. On 5 May, two more ravens were lethally removed from an area where a raven nest had previously been found approximately 8.0 miles south of ODSVRA (Table G.2 in Appendix G). Raven sightings in sensitive habitat declined from 21 sightings from 1 March–5 May before lethal removal to eight sightings from 6 May–11 July after lethal removal.

Gulls

In 2020, there were no documented nests lost to gull. On 10 June, a third-year western gull was observed catching and eating a 28-day-old plover fledgling on the ground along 6 enclosure shore and was lethally removed the same day. Plover remains found in the gut, in addition to this 28-day-old fledgling, contained bands of a chick last seen 9 June on North Oso Flaco shoreline when 27 days old. On 10 August, an adult western gull was observed catching and eating a one-day-old plover chick on 8 enclosure shore and was lethally removed the same day. No additional remains were found when gut contents were examined (Table G.2 in Appendix G, Table H.4 in Appendix H). Additional chick loss to gulls is suspected during the season.

Gulls can pose a substantial 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 13 of the 17 years from 2004-20, gulls have been documented taking plover chicks. Between 2011-20, gulls took a minimum of 49 plover chicks, juveniles, and unknown age birds (CDPR 2011-19).

Peregrine falcon

Peregrine falcons were commonly observed actively hunting, perching, and consuming prey in the Southern Enclosure and Oso Flaco in 2020. Peregrines hunting in areas of nesting plovers and terns, even when not focused on them, can 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 were hazed on 28 occasions, sometimes requiring repeated efforts before the bird left. Hazing peregrines out of sensitive areas provided temporary relief but did not deter individual peregrines from returning to ODSVRA.

In 2020, there were 178 sightings of peregrines in the Southern Enclosure and Oso Flaco on 70 days, similar to the previous year (189 sightings on 71 days). This is close to the average of 181 (range=38-362) sightings from 2008-19. The average number of days peregrines were recorded during the period 2008-19 was 64 (range=22-103) (Table 12).

In 2019, a subadult female peregrine was trapped, banded with a federal band on the left leg and VID band (W49, white characters on black band) on the right leg, and relocated 179 miles from ODSVRA after a confirmed observation of it eating plover chicks (CDPR 2019). In 2020, this same peregrine was observed on multiple occasions eating plovers or plover-sized prey on the Southern Enclosure and Oso Flaco shorelines. On 16 July, the peregrine was observed with a plover juvenile on 7 enclosure shoreline. The remains were collected and it was confirmed to be an approximately 52-day-old plover fledgling. On the following day on North Oso Flaco shoreline, this peregrine was observed eating an adult male plover banded bb:ar and known to be associated with a recently hatching brood of two chicks (Table H.4 in Appendix H). (The associated chicks were found abandoned and taken to COPR for captive-rearing [see

Table F.4 in Appendix F]). The same peregrine continued to be seen habitually hunting areas of the Southern Exclosure and Oso Flaco and trapping was attempted, but was unsuccessful.

A minimum of six individual peregrines were identified at ODSVRA this season: one banded adult female (VID band W49) live-trapped from ODSVRA as a subadult in 2019, one banded adult female (VID band W48) live-trapped from ODSVRA as a subadult in 2019, one banded adult female (VID band 17D), one adult male, one subadult, and one juvenile. The adult female with VID band 17D was banded as a nestling in 2013 in southern California and has been seen at ODSVRA each year since 2016.

Table 12. Sightings of peregrine in specific areas of the Southern Exclosure and Oso Flaco at ODSVRA from 2008-20.

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

Year	6 exclosure	7 exclosure	8 exclosure	Boneyard exclosure	North Oso Flaco	South Oso Flaco	Total no. sightings (Total no. days detected)
2008	11	11	5	6	4	1	38 (22)
2009	13	13	13	6	9	20	74 (36)
2010	37	29	25	11	24	18	144 (68)
2011	39	45	40	32	37	12	205 (77)
2012	41	37	31	9	27	11	156 (52)
2013	28	23	19	2	14	14	100 (41)
2014	75	85	67	11	69	55	362 (81)
2015	41	31	28	15	19	29	163 (64)
2016	54	50	45	16	32	57	254 (103)
2017	31	35	40	8	37	41	192 (67)
2018	60	55	52	17	55	56	295 (88)
2019	45	36	28	15	32	33	189 (71)
2020	46	34	31	4	19	44	178 (70)

Peregrine falcon activity at Foredune closure in 2020

In 2020, the peregrine with VID band “W49” that was documented depredating plovers in the Southern Exclosure and Oso Flaco was seen perched on the Foredune closure west fence multiple times. This bird was also observed eating a total of three plover chicks on the Foredune closure shoreline (1 chick from uncertain brood on 23 July and 2 chicks from SP166 brood on 31 July) (Table H.4 in Appendix H). There were two additional incidents of this same peregrine eating plover-sized prey on the Foredune closure shoreline.

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 the effectiveness of those actions. 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.

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. Banding of tern and plover chicks also provides 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.

Provide adequate-sized bumpouts and single nest enclosures to protect least tern and snowy plover nests and chicks in or close to the open riding area

Least tern and snowy plover nests inside the Southern Enclosure or Fore dune closure, and located close to the fence that borders the open riding area, 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. The protocol at ODSVRA is to provide a 328-foot (100 meter) buffer between a tern nest and the open riding area, as recommended by CDFW, and a 100-foot buffer between a plover nest and the open riding area. The buffer will use bumpout fencing for nests inside the Southern Enclosure or other area not within the open riding area. A circular single nest enclosure will be used for nests in the open riding area. For 2021, it is recommended to continue to provide a bumpout for tern nests within 328 feet (100 meters) and for plover nests within 100 feet of the open riding area fencing. Nests in

the open riding area should receive a single nest enclosure with a minimum radius of 328 feet for terns and 100 feet for plovers. Bumpouts and single nest enclosures may be smaller in size only for cases where topography will not allow the minimum size or as necessary to maintain a safe vehicle corridor adjacent to the north and east fence, any bumpouts, and single nest enclosures. 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. Tern chicks and the night roost will also be monitored and the bumpout size may be adjusted if chicks or nocturnal roosting terns are observed to remain within 328 feet of the eastern bumpout fence.

For plover nests in the open riding area or any area outside of the Southern Exclosure, a fence corridor that can be closed to the public will be provided as appropriate prior to hatching and once nest is close to hatch. This may be done by extending fencing westerly to the surf line so as to provide a secure chick travel corridor to a protected area of shoreline for foraging habitat.

Close off sections of the shoreline in the open riding area, as necessary, to protect snowy plover broods

The shoreline is important as foraging habitat and for raising snowy plover chicks. After a nest hatches, broods will typically move toward the closest shoreline and establish a territory. In the 2020 season, for the first time, multiple broods were raised in the open riding area on the shoreline north of 6 exclosure. The majority of broods originated from Foredune closure or open riding area nests, and the highest numbers of chicks were present west of the Foredune closure. To decrease disturbance to plover broods, the Foredune closure shoreline was closed to the public on 2 July and extended to connect with the 6 exclosure shoreline. The area was reopened to the public on 26 August, after broods were no longer present. In 2021, it is recommended to provide protection to broods that move into the open riding area using symbolic fencing to close shoreline areas where broods establish territory. Closed areas will not be part of the park's habitat enhancement efforts. When closing areas, Staff will assist to direct traffic away from broods, move campers as needed to clear a path for brood movement, and staff will provide temporary safe travel corridors using cones or symbolic fencing until a brood moves to a protected shoreline.

If approved within the ODSVRA Habitat Conservation Plan (HCP), broods found in the open riding area that are determined to be in critical danger from recreational activities, and when it is not possible for a chick closure or travel corridor to be installed, it is recommended that chicks be captured and relocated to an approved rehabilitation facility. Examples of circumstances where chick capture would be needed include: broods that are found far away from any closed shoreline and surrounded by campers where a chick corridor or closed area is not practical; chicks become separated or appear weak while moving on their own within the riding area to a closed area; or no adult is present and chicks are unattended in the open riding area for an extended period. If possible, USFWS and CDFW will be consulted prior to any capture of chicks, however immediate action will be taken as necessary to avoid loss of chicks due to recreational activities.

Continue to use heavy equipment to maintain the effectiveness of the Seasonal Exclosure perimeter fence protecting terns and plovers breeding in the Southern Exclosure and North Oso Flaco

The Seasonal Exclosure protected area (within Southern Exclosure and North Oso Flaco) is important in discouraging coyotes from entering nesting and chick-rearing habitat, as well as to limit vehicle and human trespass. The fence is installed in February to be six feet above the surface (using two layers of fencing) and buried a minimum of eight inches. High winds at ODSVRA can cause gaps or blowouts at the bottom of the fence, and the fence is prone to falling down if not repaired in a timely manner. Other areas will become buried by sand which creates low sections in the fence. Coyotes will take advantage of the gaps and low spots to enter the exclosure, making nests and chicks vulnerable to predation. Additionally, gaps and downed fence can cause trespass issues. From 1 March to 15 June 2020, and in the years past, heavy equipment was used to repair and maintain the fence for the nesting season by pushing or pulling sand away

from the fence, usually once per week on the eastern fenceline that borders the open riding area, or more as needed to maintain the fence for predator control.

The use of heavy equipment to maintain the enclosure fence was halted after 16 June 2020 as required by the CCC. Hand crews were instead used for some fence repairs, but this method takes much more time, and causes more disturbance to nests. On two occasions (9 and 30 July), the CCC allowed ODSVRA to use heavy equipment to repair the eastern enclosure fence, which had been in disrepair for long periods, but this was not effective to maintain the fence for the later part of the nesting season. Without the weekly use of heavy equipment, the fence quickly became buried or undermined within a short period after the two days of equipment use, resulting in gaps, low areas, and even areas where the fence was close to falling over, making the enclosed least tern and snowy plover nests and chicks vulnerable to coyote entry.

The limit on use of heavy equipment to maintain the enclosure fence after 16 June highly impacted the predator control efforts for the 2020 season, was detrimental to ongoing predator management efforts, and has the potential to have serious impacts to nesting and chick fledging success at our site. During the period from 7 July to 30 September, coyote tracks were documented within the Seasonal Enclosure on 10 days, recorded on 12 occurrences, and two coyotes persistently entering the enclosure were lethally removed. For 2021, it is recommended to continue to use heavy equipment to cover gaps or pull sand away from heavily buried areas on a weekly basis to maintain the fence. Prior to equipment use, staff scans the area within and outside the enclosure fence line to determine if there is nesting activity near the fence, the area is monitored closely during operation to avoid any impacts to terns or plovers, and any sensitive areas are avoided by the equipment operator.

Continue to enhance habitat in the Southern Enclosure by distributing natural materials 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 enclosures (including the shoreline) to enhance habitat features. Enclosure areas with lower productivity should be identified, and additional habitat enhancement activities should be explored and tested, with the goal of improving nesting and chick-rearing habitat in these areas. Since 2002, wrack has been gathered into trucks or trailers and unloaded into the enclosure by hand. Since 2008, woodchips have been loaded into trucks or trailers using ODSVRA heavy equipment operators and distributed by hand into the enclosure. Past attempts to utilize heavy equipment to collect and distribute large amounts of wrack from the open riding area to the seasonal enclosure shoreline resulted in more sand than wrack being collected when compared to hand collection. Additionally, in 2018 and 2019, ODSVRA heavy equipment operators used a dump truck to transport and unload large piles of woodchips but these piles still needed to be distributed by hand within our enclosure. The dump truck was not equipped for use in 2020.

In 2021, it is recommended that methods to better use heavy equipment for wrack collection and woodchip dispersal should be further explored. The goal would be to increase staff efficiency, allow larger amounts of wrack and woodchips to be dispersed, a broader distribution of material to provide shelter from wind and cover from predators, and help maintain larger populations of invertebrate prey over a broader area for snowy plover chicks, fledglings, and adults. The use of heavy equipment also needs to be balanced with other operational needs in the park.

Wrack and woodchip additions could occur during the winter or prior to 1 March if materials and staff levels allow. As time permits, it is recommended 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.

Experiment with vegetation and topography manipulation in the Southern Enclosure to improve nesting habitat

Over the last several years there are areas that have developed dense vegetation within 6, 7, and 8 exclosures, and topography is very severe in areas of 8 exclosure. There is a noticeable decrease in nests where these conditions occur, partly because the substrate is not appropriate for nesting and partly because the large dune hummocks attract avian predators as perch locations. The foredune plants that have persisted in the exclosure include mainly sea rocket (*Cakile maritima*), beach bur (*Ambrosia chamissonis*), and Coastal sand verbena (*Abronia latifolia*). Experimental habitat manipulation is recommended for 2021 to improve nesting habitat focusing on removal of the nonnative sea rocket and larger dune hummocks. Modification of the habitat would use heavy equipment within a 200-foot area (approximately one acre) in 6, 7, and 8 exclosures (three test plots) to remove a portion (30-50%) of the existing vegetation and level out the dunes where vegetation is removed. The goal would be to create a mosaic of plants and open area attractive to snowy plovers for nesting. Prior to any habitat manipulation, park staff familiar with foredune plant species will verify sensitive listed plant species are absent and identify test areas dominated by sea rocket. The habitat manipulation will occur during the early season habitat enhancement and prior to any nest establishment. Monitors will document changes in tern and plover nesting numbers and nest fates in the experimental treatment areas.

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

A five-year study (2007-11) by Drs. Jenifer Dugan and Mark Page, researchers from the Marine Science Institute at the University of California Santa Barbara (UCSB), examined the responses of invertebrate numbers and diversity in areas where wrack was added to the Southern Exclosure shoreline throughout the breeding season. The unpublished results 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 Exclosure shoreline following five months of recreational use. Invertebrate sampling is done (by Dr. Dugan through 2012 and by park staff since 2013) with one series of transects at the beginning of the season and repeated once at the end of the season. The survey is comprised of 10 transects in the Southern Exclosure and three transects in North Oso Flaco (as a control) and samples are sent to Dr. Dugan for analysis. Since 2012, park staff has inoculated wrack added to the shoreline with invertebrates following protocols developed by UCSB. For 2021, it is recommended to continue these inoculation protocols and to continue the beginning and end of season sampling.

Continue to evaluate physical features of the nesting and chick-rearing habitat in the Southern Exclosure using drone/Unmanned Aircraft Systems (UAS) equipment

Beginning in 2018, drone equipment was used to experiment with photographing the Southern Exclosure habitat at the beginning and end of season. Flights in 2020 were performed 11-12 February, 19-20 March, and 4 September, prior to any nests established and after nests hatched and chicks fledged from the flight area. All areas with drone flights were continuously monitored for snowy plovers and their behavior. Snowy plovers generally showed no signs of disturbance, did not flush, but occasionally would crouch in reaction to the drone flights. The information collected during flights record placement of enhancement materials distributed by staff and can be used to assess nesting habitat. It is recommended for 2021 to perform beginning and end of season drone flights, using protocols previously developed in consultation with USFWS. It is recommended to continue scheduling early season drone flights prior to the initiation of nests and end of season flights after the last chick has fledged from the area. If approved within the HCP and in consultation with USFWS, ODSVRA will include in our management the use of drone flights during the nesting season.

Continue weekly gull surveys at the trash dumpster area

Full park monthly gull surveys were done from 2008-15 and daily gull surveys at the trash dumpster area at marker post 2 were done from 2014-17. Beginning in 2018, surveys were limited to one to two surveys

per week at the trash dumpster area. For the 2021 season, it is recommended to conduct two gull surveys per week at the trash dumpster area (see Monitoring and Management section for survey details).

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, eight feet wide, and four foot high with 20 cubic yards capacity) located near marker post 2 attract a large number of gulls landing on and foraging in the dumpsters. In a normal year when the park is open to vehicular activity, four to six dumpsters are present during the busy summer months, which attracts hundreds of gulls when the park is open. The maximum number of gulls present at one time at the dumpster area during the 2019 nesting season was 297 on 7 July. Since the park closed to camping in 2020, less trash was produced and gull numbers during the season were much lower in the trash area, with a max of 90 gulls on 14 June.

Experimental trash dumpster covers of different configurations were installed and tested in 2012 and 2016, but the designs presented logistical and operational challenges and were discontinued. In 2020, ODSVRA has been working with the local trash company and they provided a new trash cover design that was installed on the beach by 30 October. This new design is being monitored to see if it meets park requirements. It is recommended for 2021 to cover all the trash dumpsters in the marker post 2 area in a design to exclude gulls and continue to monitor them. Any field observations of operational issues that arise should be addressed and designs modified, as necessary, to meet the needs of ODSRVA staff and visitors.

Ongoing management actions that will continue in 2021

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, symbolic rope, and signs, as practiced since 2006 (Site Description).
- Night vision equipment will continue to be used for monitoring the least tern night roost. Night vision goggles were used for monitoring since 2007 and a thermal scope (Trijicon REAP-IR) was used in 2019. Night surveys were not performed in 2020 to avoid hazardous dune driving conditions at night. For 2021, the thermal scope will continue to be used and additional equipment options will be explored.
- Continue monitoring least tern juveniles and the night roost. Continue monitoring foraging activity at nearby freshwater lakes, if time allows.
- 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.
- The Seasonal 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 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 to position a large section of the 6 and 7 shoreline enclosure fence further east (inland by approximately 100 feet of the pre-2012 shoreline fence location) to provide a wider functional shoreline habitat. 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 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 mammalian and 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 weekly surveys have been conducted since the winter of 2009-10.
- Continue to maintain option to salvage and rescue eggs, chicks, juveniles, and adults under very limited circumstances.

- Continue to document impacts and, when possible, reduce disturbance caused by low-flying aircraft over the Southern Exclosure and Oso Flaco.
- Continue to work to address water quality issues at Oso Flaco Lake.
- Continue to work on outreach methods and informational signage at ODSVRA to increase public awareness of threats to nesting and roosting terns and plovers.
- Efforts to hire and retain skilled monitors throughout the year will continue at ODSVRA.

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APPENDICES

APPENDIX A. CALIFORNIA LEAST TERN NESTS AT ODSVRA IN 2020.

Least tern chicks were banded with white over orange vinyl tape on a size 1A blank aluminum band on the left leg and a size 1A numbered aluminum federal band on the right. Color tape was placed on the federal band to create combinations unique to individual. Chicks were weighed immediately prior to banding, typically at one to three days old. Six chicks from six hatching nests were not banded. Three unbanded chicks were confirmed to fledge. Evidence supports these three unbanded fledglings originated at ODSVRA. Information on adult pair is provided where known. Sex of adults is typically not known.

Nest protection type: see Management Actions for description of Seasonal Enclosure, single nest enclosure (excl.), symbolic fence, and bumpout.

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

U = unbanded

unk = unknown

na = estimated date not available due to insufficient information

? = unconfirmed band combinations or colors

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	Chick band combination and weight (grams)	Confirmed fledged	Nest protection type	Notes
1	7	(b:w/b)? U	22 May	Hatch	15 Jun	2	2 (1)	w/o:w (5.0) w/o:b (6.3)	w/o:b	Bumpout Seasonal Enclosure	Chick banded w/o:w last seen on 17 June at 1 day old.
2	7	w:g/y U	23 May	Hatch	15 Jun	2	1 (1)	w/o:r (6.0)	w/o:r	Bumpout Seasonal Enclosure	One egg abandoned post-term.
3	7	U?	19 May	Hatch	12 Jun	1	1 (1)	a:o/w (4.6)	a:o/w	Seasonal Enclosure	
4	7	Banded	On or prior to 26 May	Failed, unknown cause	30 May	1	0 (0)			Bumpout Seasonal Enclosure	On 26 May, nest found at 1 egg and seen incubated for a 4-day period from 26-29 June.
5	7	Banded	25 May	Hatch	16 Jun	2	2 (1)	w/o:p (4.9) w/o:y (7.3)	w/o:y	Seasonal Enclosure	Chick banded w/o:p last seen on 27 June at 10 days old.
6	6	Banded	25 May	Hatch	17 Jun	2	2 (0)	w/o:n (5.3) w/o:a (5.8)		Bumpout Seasonal Enclosure	Both chicks last seen when banded on 18 June at 1 day old. On 23 June, w/o:a chick found dead in 6 enclosure (see Table H.3 in Appendix H).
7	7		25 May	Hatch	15 Jun	2	2 (2)	w/o:g (8.9) w/o:w/g (5.8)	w/o:g w/o:w/g	Seasonal Enclosure	
8	6		26 May	Hatch	18 Jun	2	2 (2)	w/o:r/y (7.1) w/o:a/w (6.0)	w/o:r/y w/o:a/w	Bumpout Seasonal Enclosure	

Appendix A. California least tern nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	Chick band combination and weight (grams)	Confirmed fledged	Nest protection type	Notes
9	6	U o/g:b/w	26 May	Hatch	17 Jun	2	2 (2)	w/o:w/r (5.6) w/o:k (5.7)	w/o:w/r w/o:k	Bumpout Seasonal Exclosure	
10	6		26 May	Hatch	18 Jun	2	2 (1)	w/o:g/w (5.6) w/o:y/r (5.3)	w/o:g/w	Seasonal Exclosure	Chick banded w/o:y/r last seen on 22 June at 3 days old.
11	7	o:b/w U	26 May	Hatch	20 Jun	2	2 (0)	w/o:b/a (7.3) w/o:r/b (5.1)		Bumpout Seasonal Exclosure	Both chicks last seen on 21 June at 0 and 1 day old.
12	7	b/? :g U	27 May	Abandoned post-term	12 Jul	2	0 (0)			Bumpout Seasonal Exclosure	Nest found at 2 eggs and seen incubated for a 46-day period from 27 May to 11 July. Nest last seen with 2 eggs on 17 June, had 1 egg on 8 July, and no egg found when nest walked to 2 September.
13	7		27 May	Hatch	18 Jun	1	1 (1)	w/o:b/w (5.3)	w/o:b/w	Bumpout Seasonal Exclosure	
14	7	b? or (a/b)? :g/y	26 May	Hatch	16 Jun	1	1 (1)	w/o:l (5.5)	w/o:l	Bumpout Seasonal Exclosure	
15	7	y/g:w U	24 May	Hatch	14 Jun	2	2 (2)	w/o:o (5.3) w/o:v (4.9)	w/o:o w/o:v	Seasonal Exclosure	
16	7		29 May	Failed, unknown cause	8 Jun	2	0 (0)			Bumpout Seasonal Exclosure	Nest seen incubated for a 10-day period from 29 May to 7 June. Lost during a period of high winds and high nest loss to harrier predation.
17	7		29 May	Hatch	19 Jun	2	2 (1)	w/o:b/r (7.7) w/o:a/b (8.3)	w/o:b/r	Seasonal Exclosure	Chick banded w/o:a/b last seen on 21 June at 2 days old.
18	6	o/y:b/w U	29 May	Hatch	22 Jun	2	2 (2)	w/o:y/g (6.0) w/o:o/a (8.1)	w/o:y/g w/o:o/a	Bumpout Seasonal Exclosure	

Appendix A. California least tern nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	Chick band combination and weight (grams)	Confirmed fledged	Nest protection type	Notes
19	6		On or prior to 28 May	Wind	8 Jun	2	0 (0)			Bumpout Seasonal Exclosure	Nest seen incubated for a 10-day period from 29 May to 7 June. On 9 June, 2 eggs found buried and reset in nest bowl. No evidence of adult attendance subsequently. Lost during a period of high winds and high nest loss to harrier predation.
20	6		28 May	Hatch	18 Jun	2	2 (2)	w/o:b/y (6.8) w/o:y/b (5.4)	w/o:b/y w/o:y/b	Seasonal Exclosure	
21	6	U	28 May	Hatch	20 Jun	2	1 (0)	w/o:g/r (10.3)		Bumpout Seasonal Exclosure	Chick last seen when banded on 22 June at 2 days old. One egg abandoned post-term.
22	6	U	30 May	Unknown	18 Jun	2	0 (0)			Bumpout Seasonal Exclosure	On 30 May, nest visible with 1 egg, visible with 2 eggs on 15 June, and seen incubated for an 18-day period from 30 May to 16 June. Fate occurred during a period of high winds and high nest loss to harrier predation.
23	7	U w/b:w/g	28 May	Hatch	18 Jun	2	2 (2)	w/o:w/y (6.4) w/o:w/a (8.1)	w/o:w/y w/o:w/a	Bumpout Seasonal Exclosure	
24	6	y/g:w/b w:(w/b)?	30 May	Hatch	24 Jun	2	1 (1)	w/o:a/o (8.7)	w/o:a/o	Bumpout Seasonal Exclosure	One egg with unknown fate.
25	6	Banded	1 Jun	Hatch	23 Jun	2	2 (0)	w/o:r/o (6.6) w/o:o/r (8.9)		Bumpout Seasonal Exclosure	Both chicks last seen when banded on 25 June at 2 days old.
26	6	w/? :g/y	31 May	Hatch	22 Jun	2	2 (0)	w/o:y/a (11.7) w/o:a/y (13.7)		Bumpout Seasonal Exclosure	Chick banded w/o:y/a last seen on 26 June at 3 days old and w/o:a/y chick last seen on 8 July at 16 days old.
27	6		On or prior to 2 Jun	Failed, unknown cause	7 Jun	1	0 (0)			Bumpout Seasonal Exclosure	Nest seen incubated for a 5-day period from 2-6 June, and 1 egg present on 3 June. Lost during a period of high winds and high nest loss to harrier predation.

Appendix A. California least tern nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	Chick band combination and weight (grams)	Confirmed fledged	Nest protection type	Notes
28	6		On or prior to 31 May	Depredated	9 Jun	2	0 (0)			Bumpout Seasonal Exclosure	Nest seen incubated for a 8-day period from 1-8 June. No eggs found when walked to 9 June.
29	7		27 May	Hatch	17 Jun	2	2 (2)	w/o:w/b (6.0) w/o:r/w (6.5)	w/o:w/b w/o:r/w	Bumpout Seasonal Exclosure	
30	6	U U	2 Jun	Hatch	23 Jun	2	2 (1)	U U	U	Bumpout Seasonal Exclosure	One unbanded chick last seen on 26 June at 3 days old.
31	6	s:b	30 May	Hatch	20 Jun	2	2 (2)	w/o:w/o (12.6) w/o:o/w (11.5)	w/o:w/o w/o:o/w	Bumpout Seasonal Exclosure	
32	6	Banded U	1 Jun	Hatch	22 Jun	2	2 (1)	w/o:b/o (9.4) w/o:o/b (6.2)	w/o:o/b	Bumpout Seasonal Exclosure	Chick banded w/o:b/o last seen when banded on 24 June at 1 day old.
33	6	y/g:w/r	31 May	Hatch	23 Jun	2	2 (2)	w/o:r/a (7.1) w/o:a/r (8.1)	w/o:r/a w/o:a/r	Bumpout Seasonal Exclosure	
34	6	r/w:w/b b/w:g/y	30 May	Hatch	20 Jun	2	2 (1)	w/o:o/y (14.8) w/o:y/o (17.8)	w/o:y/o	Symbolic fence	Chick banded w/o:o/y last seen on 26 June at 5 days old.
35	6		31 May	Hatch	21 Jun	2	2 (1)	w/o:r/g (5.8) w/o:g/y (8.0)	w/o:g/y	Bumpout Seasonal Exclosure	Chick banded w/o:r/g last seen on 27 June at 5 days old.
36	6	Banded	On or prior to 6 Jun	Abandoned, unknown if pre- or post-term	16 Jun	2	0 (0)			Symbolic fence	Nest seen incubated for a 10-day period from 6-15 June. On 7 August, 2 eggs found 50% buried.
37	6	?:y/g/y U	8 Jun	Hatch	30 Jun	2	1 (1)	w/o:g/b (7.9)	w/o:g/b	Bumpout Seasonal Exclosure	One egg not found post-term.
38	6		On or prior to 10 Jun	Abandoned, unknown if pre- or post-term	15 Jun	3	0 (0)			Bumpout Seasonal Exclosure	Nest seen incubated for a 4-day period from 11-14 June. On 12 August, 3 eggs found on surface of sand.

Appendix A. California least tern nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	Chick band combination and weight (grams)	Confirmed fledged	Nest protection type	Notes
39	ORA	U w/b:w	23 Jun	Hatch	16 Jul	2	2 (0)	w/o:- (5.1) w/o:b/g (6.6)		Single nest excl. Symbolic fence	Nest established within existing plover nest enclosure (SP141). On 17-18 July, expanded area of symbolic fence added. Chick banded w/o:o/g lost band from right leg. Both chicks last seen on 22 July at 6 days old 400 feet southwest of nest within the Southern Enclosure.
40	6	U (w/r:w/b)?	24 Jun	Hatch	17 Jul	3	1 (unk)	U		Bumpout Seasonal Enclosure	One unbanded chick last seen on 18 July at 1 day old.
41	7	y/r:g/y y/g:w/b	25 Jun	Hatch	16 Jul	2	2 (1)	w/o:g/a (9.1) w/o:y/w (10.6)	w/o:y/w	Bumpout Seasonal Enclosure	Chick banded w/o:g/a last seen at 2 days old.
42	7		28 Jun	Hatch	20 Jul	1	1 (0)	U		Seasonal Enclosure	One unbanded chick last seen on 21 July at 1 day old. On 22 July, small unbanded chick found dead in 7 enclosure at nest site (see Table H.3 in Appendix H).
43	7	b/r:y/g U	26 Jun	Hatch	17 Jul	2	2 (2)	U U	U U	Bumpout Seasonal Enclosure	
44	6	w:g/y (g/y)?:-	24 Jun	Hatch	15 Jul	2	2 (0)	w/o:a/g (6.2) w/o:g/o (8.6)		Bumpout Seasonal Enclosure	Chicks last seen on 22 July at 6 and 7 days old.
45	7	U y/g:w/b	On or prior to 3 Jul	Abandoned, unknown if pre- or post-term	17 Jul	1	0 (0)			Seasonal Enclosure	Nest seen incubated for a 14-day period from 3-16 July. No incubation confirmed during period from 17-21 July. On 27 July, 1 egg found on surface of sand.
46	6	?:w/b	On or prior to 7 Jul	Failed, unknown cause	12 Jul	1	0 (0)			Symbolic fence	On 7 July, nest found at 1 egg and seen incubated for a 5-day period from 7-11 July.

Appendix A. California least tern nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	Chick band combination and weight (grams)	Confirmed fledged	Nest protection type	Notes
47	7	(g/y:o/y)? U	30 Jun	Hatch	21 Jul	2	2 (1)	w/o:w/r/w (10.7) w/o:w/b/w (8.1)	w/o:w/r/w	Bumpout Seasonal Exclosure	Chick banded w/o:w/b/w had leg wound on back of ankle joint and was last seen on 24 July at 2 days old (see Table H.1 in Appendix H).
48	6		On or prior to 19 Jun	Unknown	21 Jun	≥1	0 (0)			Seasonal Exclosure	Nest seen incubated for a 2-day period from 19-20 June. One egg unknown fate.

APPENDIX B. SNOWY PLOVER NESTS AT ODSVRA IN 2020.

Plover chicks were banded to brood. Split hatch noted for nests when hatching of all chicks in the brood may have occurred over more than one day. The majority of unbanded chicks were not banded to avoid disturbing nearby young snowy plover broods.

In reading the codes of color-banded birds the left leg is shown first and separated by a colon from the right leg. If two bands are on a single leg the upper band is shown first. Colors for letter codes: a = aqua (light blue), b = dark blue, g = dark green, l = lime (light green), k = black, n = brown, o = orange, p = pink, r = red, s = silver (bare metal federal band), v = violet, w = white, y = yellow.

Location: 6 = 6 enclosure, 7 = 7 enclosure, 8 = 8 enclosure, BY = Boneyard enclosure, NOF = North Oso Flaco, SOF = South Oso Flaco, ORA = open riding area, Foregone = Foregone closure, Veg Island = Pawprint revegetation area.

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

Nest protection type: see Management Actions for description of Seasonal Enclosure, circular enclosure (excl.), mini-enclosure, single nest enclosure, symbolic fence, and bumpout.

na = estimated date not available due to insufficient information

? = unconfirmed band combinations or colors

≥ = minimum of one or two eggs in nest and unable to confirm final egg number

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
1	6	F=U M=U	21 Mar	Hatch	24 Apr	3	2 (2)	2 bb:aa	Bumpout, Seasonal Enclosure	One egg (without cracks) abandoned post-term. Brood raised on northern 6 enclosure shoreline near the open riding area. On 8 to 10 May, staff moved brood from north of marker post 6 shoreline to the south and brood raised in areas open and closed to the public. On 5 May, male adopted a 4-day-old unbanded chick from SP65. This chick fledged.
2	6	F=U M=	14 Mar	Unknown	21 Apr	3	0 (0)		Seasonal Enclosure	Nest fate occurred during period of nest loss to raven.
3	7	F=U M=U	25 Mar	Unknown	23 Apr	3	0 (0)		Seasonal Enclosure	On 21 April, a raven was observed near nest pecking at ground. On 22 April, plover seen on nest, and on 23 April, no eggs and no nest bowl were present. Nest fate occurred during period of nest loss to raven.
4	6	F=nr:yg M=ga:ar	29 Mar	Hatch	2 May	3	3 (3)	3 bb:ag	Seasonal Enclosure	
5	6	F=U M=U	29 Mar	Hatch (Split)	3 May	3	3 (3)	3 bb:bv	Seasonal Enclosure	Raised in area on 6 enclosure shoreline with high brood density. On multiple occasion chicks were seen mixing with chicks from other broods.
6	8	F=U M=U	4 Apr	Depredated, avian	19 Apr	3	0 (0)		Symbolic fence	On 12 April, camera confirmed raven eating 2 of 3 eggs in nest bowl. Adults incubate remaining egg until 19 April and egg missing on 20 April. Lost during period of nest loss to raven.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
7	6	F=U M=U	6 Apr	Hatch (Split)	8 May	3	2 (1)	2 bb:ra	Seasonal Enclosure	On 22 April, common raven seen landing at nest and eating egg. On 23 April, 2 eggs remain in nest bowl and both hatched.
8	SOF	F=Banded M=U	7 Apr	Depredated, raven	13 Apr	2	0 (0)		Symbolic fence	
9	NOF	F=U M=U	7 Apr	Depredated, avian	14 Apr	3	0 (0)		Symbolic fence	On 12 April, 2 eggs present 8 inches apart and 1 foot downhill from the original nest location. Both eggs placed together in created nest bowl. On 13 April, bird observed on nest and 3 eggs present. Lost during period of nest loss to raven.
10	6	F=rr:bb M=vg:ay	6 Apr	Hatch (Split)	9 May	3	3 (1)	3 vv:va	Mini-enclosure, Seasonal Enclosure	Raised in area on 6 enclosure shoreline with high brood density. On multiple occasions chicks seen mixing with chicks from other broods.
11	6	F=pv:aw M=U	na	Abandoned pre-term	16 Apr	2	0 (0)		Seasonal Enclosure	On 15 April, camera confirmed adult female carrying 1 egg away from nest bowl and nest not seen incubated subsequently. On 16 April, 1 egg at nest bowl and second egg (suspected cracked from visual observation) found approximately 15 feet away with dried yolk material and wet sand adhering to shell.
12	8	F=U M=	na	Depredated, raven	22 Apr	3	0 (0)		Seasonal Enclosure	On 22 April, camera confirmed raven eating eggs at nest.
13	7	F=U M=U	31 Mar	Hatch	2 May	3	3 (2)	3 bb:bo	Seasonal Enclosure	
14	BY	F=U M=	8 Apr	Wind	28 Apr	3	0 (0)		Seasonal Enclosure	
15	6	F= M=U	na	Depredated, raven	13 Apr	≥1	0 (0)		Seasonal Enclosure	Nest known only by direct observation of raven eating egg(s) at nest bowl and adult plover observed carrying egg shell away after.
16	8	F= M=	5 Apr	Depredated, avian	18 Apr	3	0 (0)		Seasonal Enclosure	Lost during period of nest loss to raven.
17	6	F=U M=U	7 Apr	Hatch (Split)	9 May	3	2 (2)	2 unbanded	Symbolic fence	One egg unknown fate.
18	8	F=(vv)? :g(g)? M=vg:vy	9 Apr	Hatch	11 May	3	3 (2)	3 unbanded	Circular excl. with top, Symbolic fence	
19	SOF	F=vg:rg M=	na	Depredated, avian	19 Apr	≥1	0 (0)		Symbolic fence	Lost during period of nest loss to raven.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
20	6	F=U M=U	11 Apr	Hatch	13 May	3	2 (0)	2 unbanded	Seasonal Enclosure	On 23 April, camera shows 1 egg being buried during high winds, and 2 eggs observed at nest 30 April. On 6 May, camera shows 3 eggs at nest, suggesting 1 egg buried for undetermined period of time. One egg (without cracks) abandoned post-term.
21	6	F=ga:wy M=U	7 Apr	Hatch	9 May	3	1 (1)	1 bb:gl	Mini-enclosure, Seasonal Enclosure	Two eggs (without cracks) abandoned post-term. On 11 May, staff attempted to move the attending adults and single chick brood south to an area closed to the public, but they returned north on the same day and remained in area until chick fledged.
22	7	F=U M=U	14 Apr	Abandoned pre-term	25 Apr	3	0 (0)		Seasonal Enclosure	
23	6	F=U M=U	7 Apr	Hatch	9 May	3	3 (3)	3 vv:vg	Seasonal Enclosure	
24	SOF	F=ga:pr M=pg:ow	na	Unknown	19 Apr	2	0 (0)		Symbolic fence	Nest last attended on 18 April. Two eggs last seen 20 April. On 23 April, 1 egg found partially buried 15 feet from nest with a crack, leaking yolk and with adhering sand. Nest fate occurred during period of nest loss to raven.
25	6	F=U M=pv:rb	17 Apr	Hatch (Split)	19 May	3	3 (0)	2 vv:ga 1 unbanded	Mini-enclosure, Seasonal Enclosure	
26	6	F=gg:gr M=U	20 Apr	Hatch	23 May	3	2 (0)	2 unbanded	Seasonal Enclosure	One egg abandoned post-term.
27	6	F=vg:bw M=gg:ww	14 Apr	Hatch	16 May	3	3 (2)	3 vg:gv	Mini-enclosure, Seasonal Enclosure	Brood raised in area open to the public. On 27 May, one 11-day-old chick found dead and remaining 2 chicks separated from one another with associated adult attending only 1 of the chicks. Chicks reunited same day and both fledged.
28	SOF	F=U M=U	13 Apr	Wind	26 Apr	3	0 (0)		Circular excl. with top, Symbolic fence	
29	6	F=U M=U	10 Apr	Hatch (Split)	12 May	3	3 (2)	3 bb:wg	Symbolic fence	On 8 August, small bb:wg 3- or 4-day-old chick carcass found on 6 enclosure shoreline (see Table H.5 in Appendix H). On 10 June, a bb:wg 28-day-old fledgling observed depredated by a western gull (see Table H.4 in Appendix H).

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
30	NOF	F=U M=	na	Failed, unknown cause	23 Apr	≥1	0 (0)		Seasonal Exclosure	Lost during period of nest loss to raven.
31	6	F=nr:br M=gg:bb	23 Apr	Hatch	25 May	3	3 (1)	3 vg:bv	Seasonal Exclosure	Brood raised in area open to the public.
32	7	F=bb:ba M=pg:yb	20 Apr	Hatch (Split)	22 May	3	3 (1)	2 bb:og 1 unbanded	Mini-exclosure, Seasonal Exclosure	One banded chick fledged.
33	Foredune	F=ga:ry M=U	20 Apr	Hatch (Split)	22 May	3	3 (2)	3 bb:ww		On 23 May, 1 hypothermic chick at nest banded and black dots added to bands with black felt tip pen. All 3 chicks last seen 3 June at 12 and 13 days old. Brood raised in area open to the public.
34	6	F=pv:by M=U	25 Apr	Wind	28 Apr	2	0 (0)		Seasonal Exclosure	
35	ORA	F=pv:aw M=U	22 Apr	Hatch	24 May	3	3 (2)	3 ga:vg	Bumpout, Circular excl. with top, Symbolic fence	On 25 April, nest found at 2 eggs in area open to the public and protected with symbolic fencing until replaced with a bumpout on 7 May. Circular exclosure installed 28 April. Brood raised in area open to the public.
36	6	F=U? M=U?	26 Apr	Depredated	16 May	3	0 (0)		Seasonal Exclosure	Sometime between 7 and 17 May 2 eggs no longer present. Nest not observed incubated after 15 May. On 17 May, 1 egg on surface of sand with no nest bowl or plover tracks at egg, abandoned pre-term. Nest fate occurred during period of wind and nest loss to harrier.
37	7	F=U M=pg:by	27 Apr	Hatch (Split)	30 May	3	3 (1)	2 vg:gy 1 unbanded	Bumpout, Seasonal Exclosure	On 28 April, 1 egg unburied and placed in nest bowl. Unbanded chick fledged.
38	7	F= M=	28 Apr	Depredated	18 May	3	0 (0)		Seasonal Exclosure	Lost during period of nest loss to harrier.
39	7	F=rr:bw M=ny:wg	27 Apr	Hatch	29 May	3	3 (1)	3 ga:ag	Symbolic fence	
40	NOF	F=U M=bb:ar	27 Apr	Hatch	30 May	3	1 (0)	1 unbanded	Circular excl. with top, Symbolic fence	On 8 May, nest protected with mini-exclosure until replaced with a circular exclosure on 21 May. Two eggs abandoned post-term.
41	NOF	F= M=	27 Apr	Overwash by tide	7 May	≥2	0 (0)		Symbolic fence	
42	7	F=nb:oy M=gg:ww	26 Apr	Hatch	28 May	2	1 (1)	1 vv:by	Seasonal Exclosure	On 6 May, 1 egg missing pre-term.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
43	ORA	F=U M=bb:rr	28 Apr	Hatch	30 May	3	2 (2)	2 vv:rv	Bumpout, Symbolic fence	On 28 April, nest found at 1 egg in area open to the public and protected with symbolic fencing until replaced with a bumpout on 12 May. One egg abandoned post-term. Brood raised in area open to the public.
44	Foredune	F=U M=gg:rb	23 Apr	Hatch	25 May	3	2 (1)	2 vv:vo		One egg (without cracks) abandoned post-term. Brood raised in area open to the public.
45	6	F=vv:a- M=U	16 Apr	Hatch	18 May	3	3 (1)	3 bb:ab	Symbolic fence	On 22 August, leg remains of a likely depredated bb:ab chick or juvenile found on 6 enclosure shoreline (see Table H.4 in Appendix H).
46	ORA	F=U M=ga:ww	29 Apr	Hatch	31 May	3	3 (1)	3 vg:wa	Single nest excl.	On 29 April, nest found at 1 egg in area open to the public and protected with symbolic fencing until replaced with a single nest enclosure on 13 May. Brood raised in area open to the public.
47	SOF	F=U M=	na	Failed, unknown cause	6 May	≥2	0 (0)		Symbolic fence	Lost during period of high wind and nest loss to raven.
48	SOF	F=U M=	29 Apr	Wind	16 May	3	0 (0)		Circular excl. with top, Symbolic fence	
49	SOF	F=vg:rg M=pg:by	14 Apr	Wind	20 May	3	0 (0)		Circular excl. with top, Symbolic fence	On 4 and 14 May, 1 of 3 eggs at nest with an inward cracked dent. On 21 May, 2 eggs found buried in circular enclosure at edge of fencing, 1 of which was cracked with dead developed chick inside. Whole intact egg re-centered in created nest bowl but not seen incubated subsequently.
50	SOF	F= M=	18 Apr	Failed, unknown cause	6 May	3	0 (0)		Symbolic fence	Lost during period of high wind and nest loss to raven.
51	ORA	F=U M=U	29 Apr	Hatch (Split)	1 Jun	3	3 (3)	2 ga:by 1 unbanded	Single nest excl.	On 29 April, nest found at 1 egg in area open to the public and protected with symbolic fencing until replaced with a single nest enclosure on 30 April. On 4 May, 3 fully buried eggs were unburied and placed in created nest bowl.
52	SOF	F=pg:ow M=U	28 Apr	Wind	15 May	3	0 (0)		Symbolic fence	Between 4 and 8 May, 2 of 3 eggs depredated by raven, and incubation continued. On 15 May, remaining 1 egg buried during high winds and not seen incubated subsequently.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
53	ORA	F=U M=U	29 Apr	Hatch	31 May	3	3 (2)	3 bb:wo	Single nest excl.	On 1 May, nest found at 2 eggs in area open to the public and protected with symbolic fencing until replaced with a single nest enclosure on 15 May. Brood raised on northern 6 enclosure shoreline near the area open to the public. On 6 days between 31 May and 17 June brood observed to enter the area open to the public.
54	6	F=U M=U	21 Apr	Hatch	23 May	3	3 (1)	3 unbanded	Mini-enclosure, Seasonal Enclosure	
55	6	F=bb:ar M=bb:yb	23 Apr	Hatch (Split)	25 May	2	2 (0)	1 ga:va 1 unbanded	Seasonal Enclosure	
56	ORA	F=vg:vg M=U	30 Apr	Hatch	1 Jun	3	2 (1)	2 vg:ya	Single nest excl.	On 2 May, nest found at 2 eggs in area open to the public and protected with symbolic fencing until replaced with a single nest enclosure on 16 May. On 1 June, 1 egg found fully buried without cracks, and egg placed in nest bowl with recently hatched chicks. Non-hatching egg abandoned post-term.
57	ORA	F=bb:go M=U	3 May	Hatch	4 Jun	3	3 (2)	3 ga:gy	Bumpout	On 3 May, nest found at 1 egg in area open to the public and protected with symbolic fencing until replaced with a bumpout on 12 May. Brood raised in area open to the public. On 19 August, banded legs and feather remains of a ga:gy juvenile found on Foredune closure shoreline (see Table H.4 in Appendix H).
58	Foredune	F=U M=gg:ob	30 Apr	Hatch	1 Jun	3	3 (3)	3 vg:yb		Brood raised in area open to the public.
59	7	F= M=	19 Apr	Unknown	24 May	3	0 (0)		Seasonal Enclosure	On 18 May, 1 egg found buried at nest bowl, egg marked and reset with other 2 eggs. Nest seen incubated subsequently. Nest fate occurred during period of nest loss to harrier.
60	ORA	F=bb:ov M=pg:ag	4 May	Hatch	6 Jun	3	3 (2)	3 ga:ba	Single nest excl.	On 4 May, nest found at 1 egg in area open to the public and protected with symbolic fencing until replaced with a single nest enclosure on 13 May. On 8 June, staff moved brood south from marker post 4 to the Foredune closure shoreline. On 3 July, brood with two 27-day-old chicks moved back to marker post 4 and both fledged.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
61	Foredune	F=U M=U	29 Apr	Hatch	31 May	3	3 (0)	3 vg:vo		Brood raised in area open to the public.
62	8	F=U M=U	26 Apr	Hatch	28 May	3	3 (3)	3 ga:bg	Circular excl. with top, Symbolic fence	On 7 May, nest protected from high tides with wrack placed by staff between circular enclosure and ocean.
63	8	F=U M=	24 Apr	Overwash by tide	6 May	3	0 (0)		Symbolic fence	
64	7	F=U M=pv:wy	19 Apr	Hatch	21 May	3	2 (2)	2 ga:vw	Seasonal Enclosure	On 8 July, 1 egg at nest with large hole on side of egg and dried yolk material inside, abandoned post-term.
65	Unknown	F= M=U	na	Hatch	(1 May)	3	3 (3)	3 unbanded		Brood raised on northern 6 enclosure shoreline and entered the open riding area on several occasions. On 8 to 10 May, staff moved brood from north of marker post 6 shoreline to the south and brood raised in areas open and closed to the public. One 4-day-old chick adopted by SP1 brood beginning 5 May and fledged.
66	Foredune	F=U M=gg:or	4 May	Depredated, avian	1 Jun	3	0 (0)		Bumpout	Lost during period of nest loss to harrier.
67	6	F=U M=ga:wr	1 May	Hatch	2 Jun	3	3 (2)	1 ga:gg 2 unbanded	Seasonal Enclosure	One banded and 1 unbanded chick fledged.
68	ORA	F=U M=U	4 May	Hatch	5 Jun	3	2 (1)	2 vg:ga	Bumpout	On 6 May, nest found at 1 egg in area open to the public and protected with symbolic fencing until replaced with a bumpout on 18 May. One egg with unknown fate showed cracks, but egg or hatched chick not seen subsequently.
69	7	F=U M=gg:(g)?b	23 Apr	Hatch	25 May	3	3 (1)	3 bb:wv	Symbolic fence	
70	Foredune	F=U M=rr:bw	1 May	Hatch (Split)	2 Jun	3	2 (0)	2 vg:bo		One egg (with slight cracks) abandoned post-term. Brood raised in area open to the public.
71	Foredune	F=U M=U	3 May	Hatch	4 Jun	3	3 (3)	3 vv:ra		Brood raised in area open to the public.
72	Foredune	F=Banded M=	26 Apr	Depredated, avian	13 Jun	3	0 (0)			Lost during period of nest loss to harrier.
73	6	F=U M=U	4 May	Hatch	5 Jun	3	3 (0)	3 ga:ga	Mini-enclosure, Seasonal Enclosure	From 12 to 20 June, brood raised in area open to the public.
74	6	F=U M=U	8 May	Depredated, harrier	26 May	3	0 (0)		Seasonal Enclosure	On 26 May, camera confirmed adult male harrier eating eggs at nest.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
75	6	F= M=	na	Unknown	27 May	≥1	0 (0)		Symbolic fence	Nest location known by multiple observations of incubating adult. To avoid disturbing young snowy plover broods, nest not walked to and total egg number unknown. Nest fate occurred during period of nest loss to harrier.
76	7	F= M=	27 Apr	Depredated	18 May	3	0 (0)		Seasonal Enclosure	Lost during period of nest loss to harrier.
77	7	F=U M=pg:vb	21 Apr	Hatch (Split)	23 May	2	2 (1)	2 unbanded	Seasonal Enclosure	
78	8	F=U M=ga:ow	29 Apr	Hatch	31 May	3	3 (2)	3 vg:br	Circular excl. with top, Symbolic fence	
79	7	F=U M=	21 Apr	Hatch	23 May	3	2 (1)	2 vg:ab	Seasonal Enclosure	One egg with unknown fate showed cracks, but egg or hatched chick not seen subsequently. On 16 August, an intact carcass of a vg:ab juvenile plover was collected west of marker post 1 in an area open to the public. Juvenile was last seen on 11 August at 80 days old (see Table H.4 in Appendix H).
80	8	F=(bb:go)? M=	2 May	Depredated, coyote	13 May	3	0 (0)		Symbolic fence	
81	8	F=U M=U	19 Apr	Hatch	21 May	3	3 (1)	3 vg:wb	Symbolic fence	
82	7	F=U M=U	5 May	Hatch (Split)	6 Jun	3	2 (1)	2 unbanded	Symbolic fence	One egg unknown fate.
83	SOF	F=U M=U	3 May	Hatch (Split)	4 Jun	3	2 (0)	1 ga:vy 1 unbanded	Symbolic fence	On 18 May, 1 egg missing pre-term, 1 egg in nest, and 1 egg found buried below nest. Buried egg marked and reset with other egg.
84	SOF	F= M=	na	Abandoned, unknown if pre- or post-term	na	3	0 (0)		Symbolic fence	On 12 May, nest found as 3 eggs abandoned, unknown if pre- or post-term.
85	8	F= M=	na	Depredated, avian	14 May	≥1	0 (0)		Seasonal Enclosure	Nest location known by multiple observations of incubating adult. Nest not walked to until after predation and total egg number unknown. Lost during period of nest loss to harrier.
86	BY	F= M=	12 May	Depredated, avian	20 May	3	0 (0)		Seasonal Enclosure	Lost during period of nest loss to harrier.
87	BY	F=U M=vv:ww	28 Apr	Hatch	30 May	3	3 (0)	3 unbanded	Seasonal Enclosure	
88	SOF	F=U M=ga:or	13 May	Hatch (Split)	14 Jun	3	3 (0)	3 ga:bv	Circular excl. with top, Symbolic fence	On 23 May and 11 June, 3 eggs re-centered in circular enclosure.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
89	ORA	F=U M=U	18 May	Hatch	19 Jun	3	3 (3)	3 ga:av	Single nest excl.	On 20 May, nest found at 1 egg in area open to the public and protected with symbolic fencing until replaced with a single nest enclosure on 21 May. On 22 and 23 June, attempts were made to move brood south to Foredune closure shoreline with more protection, but brood returned north and moved between areas on its own until fledging. On 26 July, a 37-day-old ga:av fledgling was observed eaten by a peregrine (see Table H.4 in Appendix H).
90	Unknown	F= M=U	na	Hatch	(13 May)	3	3 (0)	1 vg:vw 1 vg:- 1 unbanded		On 17 May, found as brood of 3 small chicks on North Oso Flaco shoreline. On 18 May, only 2 chicks present when banded. On 27 May, 1 chick was first noted not putting weight on the right leg and was taken to PWC on 3 June where the right leg bands removed. On 19 June, chick was transferred to COPR for additional rehabilitation time and released on 29 June (see Table H.2 in Appendix H). On 9 June, 1 remaining vg:vw chick last seen at 27 days old. On 10 June, remains of the SP90 chick or young fledgling found in a gull's stomach (Table H.4 in Appendix H).
91	Unknown	F=U M=U	na	Hatch	(17 May)	3	3 (2)	3 unbanded		On 19 May, found as brood of 3 small chicks on South Oso Flaco shoreline.
92	7	F= M=(gg:ay)?	13 May	Hatch	14 Jun	3	3 (0)	3 unbanded	Symbolic fence	
93	BY	F=pg:vr M=U	20 May	Hatch	21 Jun	3	3 (0)	3 unbanded	Seasonal Enclosure	
94	6	F=vg:gr M=U	4 May	Abandoned post-term	5 Aug	3	0 (0)		Seasonal Enclosure	Nest seen incubated 71 days from 25 May to 5 August. Camera confirmed inconsistent incubation began 26 July with adult male on nest, adult female last on nest 5 August at 4:20 PM, and sex of bird on nest not always confirmed between these dates.
95	BY	F=U M=U	20 May	Hatch	21 Jun	3	1 (0)	1 vg:yv	Seasonal Enclosure	Two eggs (without cracks) abandoned post-term.
96	BY	F=b:g- M=rr:or	20 May	Hatch	21 Jun	3	1 (0)	1 vv:go	Seasonal Enclosure	On 9 June, 1 egg missing pre-term. One egg (without cracks) abandoned post-term.
97	NOF	F=bb:ga M=gg:rb	18 May	Hatch	19 Jun	3	3 (0)	3 unbanded	Symbolic fence	

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
98	BY	F=U M=U	26 May	Hatch	27 Jun	3	2 (0)	2 unbanded	Seasonal Enclosure	One egg unknown fate.
99	Foredune	F=Pw:yp M=U	25 May	Hatch	26 Jun	3	3 (1)	3 ga:rv		On 28 and 29 June, attempts were made to move the brood south from marker post 4 to the Fore dune closure shoreline, but the brood returned north and remained in the public area until fledging.
100	Foredune	F=U M=U	19 May	Hatch	20 Jun	3	3 (0)	3 vg:ob		On 2 July, area closed to the public where brood was raised. On 17 August, a dead and desiccated vg:ob chick found north of marker post 6 (Table H.5 in Appendix H).
101	7	F= M=	19 May	Hatch (Split)	20 Jun	2	2 (0)	2 unbanded	Seasonal Enclosure	One adult confirmed unbanded, unable to determine sex.
102	7	F=U M=U	16 May	Hatch	17 Jun	3	2 (1)	2 unbanded	Seasonal Enclosure	On 8 June, nest camera confirmed 1 of 3 eggs buried by wind. One egg found partially buried abandoned post-term.
103	7	F=U M=vg:bw	24 May	Hatch	25 Jun	3	1 (0)	1 unbanded	Seasonal Enclosure	Two eggs unknown fate.
104	7	F=U M=U	18 May	Hatch (Split)	19 Jun	2	2 (0)	2 pg:vv	Seasonal Enclosure	On 23 June, 1 unbanded chick of similar size appeared adopted into this brood. Unbanded chick not seen with brood subsequently.
105	8	F= M=vg:yg	3 May	Hatch	4 Jun	3	3 (0)	3 vv:rw	Symbolic fence	
106	7	F=bb:(gr)? M=	21 May	Wind	14 Jun	3	0 (0)		Seasonal Enclosure	
107	SOF	F=U M=nr:wb	21 May	Hatch	22 Jun	3	2 (0)	2 unbanded	Symbolic fence	On 30 May, nest found with 2 eggs in nest and third egg 30 feet west of nest in area overwashed by tide. This egg never had evidence of being attended and was last seen 5 June.
108	7	F=U M=U	27 May	Hatch (Split)	28 Jun	3	2 (1)	2 ga:gv	Seasonal Enclosure	On 17 June, 1 egg not present pre-term and likely buried by wind. The egg resurfaced after hatch and was collected. On 8 July, male adopted an 8-day-old ga:pv chick from SP112 and this chick fledged.
109	Foredune	F= M=rr:ab	8 May	Hatch (Split)	9 Jun	3	3 (0)	3 vg:aa		Brood raised in area open to the public.
110	6	F=U M=bb:w-	20 May	Hatch (Split)	21 Jun	3	2 (0)	2 bb:ry	Seasonal Enclosure	One egg (without cracks) abandoned post-term.
111	6	F=U M=U	18 May	Hatch (Split)	19 Jun	3	3 (3)	2 vv:pa 1 unbanded	Seasonal Enclosure	

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
112	ORA	F=U M=U	29 May	Hatch (Split)	30 Jun	3	3 (2)	2 ga:pv 1 unbanded	Single nest excl.	On 30 May, nest found at 1 egg in area open to public and protected with symbolic fence until replaced with a single nest enclosure on 11 June. On 3 July, unbanded chick last seen at 2 days old. One 8-day-old ga:pv chick adopted by SP108 brood beginning 8 July and fledged.
113	Foredune	F=U M=(gg)?:ba	31 May	Abandoned pre-term	8 Jun	3	0 (0)			
114	6	F=bb:ba M=bb:ga	28 May	Hatch (Split)	29 Jun	3	3 (0)	2 pg:vw 1 unbanded	Seasonal Enclosure	Brood last seen with 3 chicks 30 June (0 to 1 day old) and 1 chick 9 July (9 or 10 days old). On 13 and 15 July, 1 pg:vw small chick carcass observed with spotting scope on 6 enclosure shoreline in area brood was being raised. To avoid disturbing young snowy plover broods, carcass not collected (Table H.5 in Appendix H).
115	ORA	F=bb:ar M=vg:pg	1 Jun	Hatch (Split)	3 Jul	3	3 (0)	3 pv:bg 1 vg:wr	Single nest excl.	On 2 June, nest found at 1 egg in area open to public and protected with symbolic fence until replaced with a single nest enclosure on 11 June. Brood last seen with 3 chicks when banded on 4 July when 0 to 1 days old. On 8 July, adults adopted an approximately 3-day-old unbanded chick, likely from a known unbanded brood in the area (UNA9). This chick last seen on 10 July at approximately 5 days old.
116	7	F=U M=U	9 May	Hatch	10 Jun	3	3 (0)	2 unbanded	Seasonal Enclosure	
117	6	F= M=	1 Jun	Wind	8 Jun	3	0 (0)		Seasonal Enclosure	
118	7	F=bb:ow M=U	29 May	Hatch	30 Jun	3	2 (1)	2 pg:pv	Seasonal Enclosure	Three eggs last seen on 3 June. On 30 June, 1 egg missing at hatch. On 12 August, 1 egg found fully buried, failed due to wind.
119	6	F=pv:aw M=U	29 May	Hatch	30 Jun	3	3 (1)	3 unbanded	Seasonal Enclosure	
120	7	F= M=	na	Unknown	11 Jun	≥1	0 (0)		Symbolic fence	Nest location known by multiple observations of an incubating adult. To avoid disturbing young snowy plover and least tern broods nest not walked to and total egg number unknown. Nest fate occurred during period of nest loss to harrier.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
121	8	F=U M=U	23 May	Hatch (Split)	24 Jun	3	3 (1)	3 vg:rv	Symbolic fence	On 18 June, 1 egg found 2.5 feet outside nest was marked and placed back in nest.
122	6	F=gg:oa M=U	28 May	Hatch (Split)	29 Jun	3	3 (0)	3 vv:ar	Seasonal Exclosure	On 1 July, brood was on northern 6 exclosure shoreline near area open to public. Brood moved north to the Fore dune closure shoreline by 3 July and this area, where they remained, was closed to the public on 2 July.
123	6	F= M=	31 May	Depredated, avian	6 Jun	3	0 (0)		Seasonal Exclosure	Lost during period of nest loss to harrier.
124	6	F=U M=U	29 May	Hatch	30 Jun	3	3 (0)	3 unbanded	Seasonal Exclosure	Brood last seen with 3 chicks 13 July (13 days old). On 15 July, a small unbanded chick carcass was found near where brood was raised (see Table H.5 in Appendix H).
125	Fore dune	F= M=	25 May	Wind	14 Jun	3	0 (0)			Three eggs last seen and incubated on 13 June. On 15 June, 2 eggs (1 fully buried and 1 in the nest bowl) abandoned pre-term.
126	SOF	F=U M=	28 May	Wind	14 Jun	3	0 (0)		Symbolic fence	
127	SOF	F=vg:rg M=	27 May	Unknown	28 Jun	3	0 (0)		Symbolic fence	Nest fate occurred during period of nest loss to harrier.
128	Fore dune	F=nr:br M=U	1 Jun	Hatch (Split)	3 Jul	3	3 (1)	2 bb:rv 1 unbanded	Bumpout	
129	ORA	F= M=	28 May	Wind	7 Jun	3	0 (0)		Symbolic fence	
130	ORA	F=U M=	31 May	Wind	8 Jun	3	0 (0)		Symbolic fence	
131	Fore dune	F=U M=U	29 May	Unknown	3 Jul	3	0 (0)			Nest fate occurred during period of nest loss to harrier.
132	6	F=U M=U	29 May	Hatch	30 Jun	3	2 (0)	2 unbanded	Symbolic fence	One egg abandoned post-term. On 1 July, brood was on northern 6 exclosure shoreline near area open to public. Brood moved north to the Fore dune closure shoreline by 7 July and this area, where they remained, was closed to the public on 2 July.
133	6	F=U M=	3 Jun	Unknown	10 Jul	3	0 (0)		Seasonal Exclosure	Three eggs last seen on 17 June. One egg last seen 25 June and last seen incubated 9 July. Nest fate occurred during period of nest loss to harrier.
134	Fore dune	F=gg:gr M=pg:ag	1 Jun	Hatch (Split)	3 Jul	3	2 (0)	2 pv:vg		One egg abandoned post-term.
135	6	F=gg:oy M=vv:yg	31 May	Hatch	2 Jul	3	2 (0)	2 ga:ob	Circular excl. with top, Symbolic fence	One egg missing pre-term.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
136	7	F= M=	2 Jun	Unknown	29 Jun	3	0 (0)		Seasonal Exclusion	Three eggs last seen on 17 June and nest last seen attended on 28 June. Nest fate occurred during period of nest loss to harrier.
137	8	F= M=	1 Jun	Depredated	10 Jun	3	0 (0)		Seasonal Exclusion	On 9 June, nest found at 3 eggs and not seen incubated. No eggs at nest when walked to 18 June. Lost during period of nest loss to harrier.
138	6	F=vg:vg M=U	9 Jun	Hatch	11 Jul	3	3 (0)	3 unbanded	Seasonal Exclusion	
139	6	F=U M=U	6 Jun	Hatch	8 Jul	3	1 (0)	1 vv:oa	Seasonal Exclusion	After 26 June, 2 eggs missing pre-term.
140	Foredune	F=U M=U	28 May	Hatch	29 Jun	3	3 (3)	3 pv:gb		On 1 July, staff moved brood south, from north of marker post 2 to north of marker post 4, and brood raised in area open to the public.
141	ORA	F=vg:bw M=U	10 Jun	Hatch (Split)	12 Jul	3	3 (0)	2 pg:va 1 unbanded	Single nest excl.	Brood last seen with 3 chicks 16 July (4 and 5 days old), and 2 chicks 20 July (7 and 8 days old), 1 pg:va chick with tar on the right leg bands. Brood not seen subsequent to 20 July and no chicks known to fledge.
142	6	F= M=U	30 May	Hatch	1 Jul	3	3 (0)	3 unbanded	Symbolic fence	Brood last seen with 2 chicks 22 July at 21 days old and not confirmed to fledge.
143	7	F= M=	na	Depredated	24 Jun	3	0 (0)		Symbolic fence	Lost during period of nest loss to harrier.
144	6	F=U M=U	11 Jun	Hatch	13 Jul	3	3 (0)	3 pv:va	Seasonal Exclusion	
145	SOF	F=pg:ow M=U	21 May	Hatch	22 Jun	3	2 (0)	2 unbanded	Symbolic fence	On 12 June, symbolic fence moved west to reduce possible pedestrian disturbance. One egg abandoned post-term.
146	6	F= M=	na	Unknown	15 Jun	≥1	0 (0)		Symbolic fence	Nest location known by multiple observations of an incubating adult. To avoid disturbing young snowy plover and least tern broods, nest not walked to and total egg number unknown. Nest fate occurred during period of nest loss to harrier.
147	Foredune	F=U M=U	8 Jun	Hatch (Split)	10 Jul	3	3 (0)	3 pv:bv		
148	6	F=U M=nb:oy	7 Jun	Hatch	12 Jul	1	1 (0)	1 vg:py	Seasonal Exclusion	
149	Foredune	F=U M=	13 Jun	Depredated	4 Jul	3	0 (0)			Lost during period of nest loss to harrier.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
150	7	F= M=	4 Jun	Abandoned pre-term	20 Jun	4	0 (0)		Seasonal Enclosure	On 12 June, nest first identified by observation of an incubating adult. On 17 June, nest first walked to and 4 eggs present. On 19 June, nest last seen attended. On 8 July, 4 eggs found abandoned pre-term.
151	ORA	F=ga:wy M=pv:og	na	Wind	17 Jun	2	0 (0)		Symbolic fence	On 16 June, two eggs found with pair attending prior to period of high wind. On 17 June, 2 eggs unburied and reset on surface of sand. Camera confirmed eggs were not incubated through 21 June when eggs collected. On 18 June, associated pair seen foraging west of nest.
152	NOF	F=U M=	na	Unknown	30 Jun	2	0 (0)		Symbolic fence	On 16 June, nest found at 2 eggs. On 21 June, 1 egg found buried at shallow nest bowl and reset with other egg. On 27 June, 2 eggs last seen in shallow nest bowl a few inches apart. On 29 July, nest last seen incubated. On 9 July, one egg found fully buried. Nest fate occurred during period of nest loss to harrier.
153	SOF	F= M=	na	Unknown	20 Jun	3	0 (0)		Symbolic fence	On 16 June, nest found at 3 eggs. Three eggs last seen on 16 June and last attended on 19 June. Nest fate occurred during period of nest loss to harrier.
154	7	F=Banded M=Banded	2 Jun	Hatch	4 Jul	3	2 (0)	2 unbanded	Seasonal Enclosure	
155	Veg Island	F=ga:wy M=pv:og	17 Jun	Hatch	19 Jul	3	3 (0)	3 bb:ao	Bumpout	One banded SP155 chick adopted by SP167 brood on day of hatch, chick last seen on 30 July at 11 days old. From 19 to 26 July, SP155 brood raised on Foredune north shoreline when closed to public, moved between area closed to public and area open to public north of the Foredune closure from 27-30 July, and remained in the area north of the Foredune closure open to public from 30 July to 14 August. On 15 August, 1 chick last seen at 27 days old within Foredune central, far south of area raised and not known to fledge.
156	6	F=rr:bw M=U	7 Jun	Hatch (Split)	9 Jul	3	3 (0)	2 vg:pv 1 unbanded	Symbolic fence	On 12 and 15 July, unbanded male attending chicks noted with a right foot injury (see Table H.2 in Appendix H).
157	6	F= M=U	9 Jun	Hatch (Split)	11 Jul	3	2 (0)	2 unbanded	Symbolic fence	One egg abandoned post-term.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
158	8	F=U M=vg:rw	11 Jun	Hatch	13 Jul	3	1 (0)	1 pv:ba	Symbolic fence	On 14 July, 1 chick was banded at nest and 2 eggs in nest bowl (one with small crack/opening noted on shell with adhering dried sand not seen after, and second egg, without cracks, abandoned post-term).
159	7	F=U M=U	31 May	Hatch (Split)	2 Jul	3	3 (1)	3 unbanded	Seasonal Exclosure	
160	6	F=U M=Banded	16 Jun	Depredated, harrier	7 Jul	3	0 (0)		Seasonal Exclosure	On 7 July, nest camera confirmed adult male harrier ate eggs at nest over a 10-minute period.
161	6	F= M=	na	Unknown	20 Jun	≥1	0 (0)		Seasonal Exclosure	Nest location known by multiple observations of an incubating adult. To avoid disturbing young snowy plover and least tern broods, nest not walked to and total egg number unknown. Nest fate occurred during period of nest loss to harrier.
162	6	F=U M=U	12 Jun	Hatch (Split)	14 Jul	3	3 (1)	3 unbanded	Symbolic fence	
163	Foredune	F=U M=U	16 Jun	Hatch	18 Jul	3	3 (0)	3 vv:ao		On 23 July, peregrine seen eating a small chick with "ao" on right leg that could represent a 2-day-old chick from the SP187 brood or a 5-day-old chick from the SP163 brood (see Table H.4 in Appendix H).
164	6	F= M=	10 Jun	Depredated, avian	3 Jul	3	0 (0)		Seasonal Exclosure	Last seen incubated on 2 July. Lost during period of nest loss to harrier.
165	SOF	F=U M=pg:by	21 May	Hatch	22 Jun	3	3 (0)	3 unbanded	Symbolic fence	On 20 June, symbolic fence moved west to reduce possible pedestrian disturbance.
166	ORA	F=ga:py M=U	17 Jun	Hatch	19 Jul	3	3 (0)	3 ga:vr	Single nest excl.	On 23 June, nest found at 2 eggs in area open to the public and protected with symbolic fencing until replaced with a single nest exclosure on 25 June. On 21 July, associated vv:a-female captured and worn bands replaced with ga:py. Brood initially in area open to the public, moved south to the Foredune closure shoreline on its own by 22 July and was raised in an area closed to the public. Brood last seen with 3 chicks 8 July (9 days old). On 31 July, peregrine seen eating the 2 remaining chicks when 11 days old (see Table H.4 in Appendix H).

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
167	Foredune	F=U M=U	16 Jun	Hatch	18 Jul	3	3 (0)	3 vv:ov		On 19 July, male adopted one banded SP155 chick on day of hatch. This chick last seen on 30 July when 11 days old.
168	8	F=U M=rr:aw	na	Failed, unknown cause	24 Jun	≥1	0 (0)		Symbolic fence	Nest location known by multiple observations of an incubating adult. To avoid disturbing young snowy plover and least tern broods, nest not walked to and total egg number unknown. Lost during period of nest loss to harrier.
169	8	F=U M=	na	Depredated, harrier	28 Jun	3	0 (0)		Symbolic fence	Three eggs last seen at nest on 24 June. Nest last seen incubated on 27 June. On 1 July, 1 egg at nest with large inward dent and large clumps of yellow sand unburied from under nest bowl. On 3 July, nest camera confirmed adult male harrier eating last remaining egg at nest.
170	8	F= M=	9 Jun	Depredated, avian	2 Jul	3	0 (0)		Symbolic fence	On 1 July, 3 eggs last seen and last seen incubated. On 3 July, no eggs at nest, and camera confirmed adult male harrier ate eggs at SP169 200 feet north of SP170. Lost during period of nest loss to harrier.
171	NOF	F=gg:yb M=bb:ar	12 Jun	Hatch	14 Jul	3	2 (0)	2 vg:pa	Symbolic fence	Three eggs last seen on 24 June when nest was found. Two eggs last seen on 9 July and third egg not found after digging. On 17 July, bb:ar male depredated by a peregrine and subsequently the 2 chicks remained crouched and unattended. Chicks taken to COPR for captive-rearing (see Table H.4 in Appendix H, Table F.4 in Appendix F).
172	NOF	F=U M=U	15 Jun	Hatch (Split)	17 Jul	3	2 (0)	2 unbanded	Circular excl. with top, Symbolic fence	On 22 July, 1 egg (dead chick inside with bill poking out of pip hole) found abandoned post-term.
173	SOF	F=U M=U	17 Jun	Hatch (Split)	19 Jul	3	3 (0)	2 ga:bo 1 unbanded	Circular excl. with top, Symbolic fence	On 6 July, 3 eggs found overwashed and partially buried near west edge inside circular enclosure. Eggs were being incubated by a female. Eggs re-centered in circular enclosure, wrack added outside of circular enclosure for protection from tide, and bird returned to incubate.
174	SOF	F=U M=U	17 Jun	Hatch (Split)	19 Jul	3	2 (1)	2 unbanded	Circular excl. with top, Symbolic fence	One egg missing pre-term.
175	SOF	F=vv:gw M=U	14 Jun	Hatch (Split)	16 Jul	3	3 (0)	2 pv:ga 1 unbanded	Circular excl. with top, Symbolic fence	

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
176	6	F=U M=U	3 Jun	Hatch (Split)	5 Jul	3	3 (0)	3 unbanded	Seasonal Enclosure	Brood last seen with 3 chicks 22 July (16 and 17 days old), 2 chicks 31 July (25 to 26 days old), and not known to fledge.
177	6	F=U M=bb:pb	17 Jun	Hatch	19 Jul	3	3 (0)	3 pv:rw	Seasonal Enclosure	
178	ORA	F=U M=gg:ww	24 Jun	Hatch	26 Jul	3	3 (0)	3 pg:rw	Symbolic fence	
179	6	F=U M=pg:ar	13 Jun	Hatch	15 Jul	3	1 (0)	1 vg:ra	Seasonal Enclosure	Two eggs (without cracks) abandoned post-term.
180	6	F=yg:wl M=pv:ob	1 Jun	Hatch	3 Jul	3	1 (1)	1 ga:pa	Seasonal Enclosure	On 27 June, 1 egg found 2 feet from nest, marked and placed back in nest bowl with other 2 eggs. On 3 July, marked egg found 1.5 feet from nest and placed back in nest bowl with second egg (without cracks) and 1 banded chick. Two eggs abandoned post-term.
181	6	F= M=	na	Depredated	11 Jul	≥1	0 (0)		Symbolic fence	Nest location known by multiple observations of an incubating adult beginning 24 June. Nest last seen incubated on 10 July. To avoid disturbing young snowy plover and least tern broods nest not walked to and total egg number unknown. On 11 July, no incubation and many plover tracks overtracking the nest area. Lost during period of nest loss to harrier.
182	7	F=U M=U	19 Jun	Hatch (Split)	21 Jul	2	2 (0)	2 pg:yw	Seasonal Enclosure	
183	6	F=U M=	17 Jun	Hatch	19 Jul	3	3 (0)	2 vg:go 1 v:-go	Seasonal Enclosure	One chick lost green band on left leg by 21 July. Brood last seen with 3 chicks 8 August (20 days old), and 2 chicks 12 August (24 days old).
184	Foredune	F=ga:- M=vg:ay	28 Jun	Abandoned pre-term	6 Jul	2	0 (0)			On 30 June, orange band removed from female's right leg and bird released (see Table H.2 in Appendix H). On 6 July, 2 eggs abandoned pre-term transported to COPR (see Table F.4 in Appendix F).
185	7	F= M=	na	Depredated	3 Jul	3	0 (0)		Seasonal Enclosure	On 2 July, nest last seen incubated. Lost during period of nest loss to harrier.
186	ORA	F=U M=gg:bb	23 Jun	Hatch	25 Jul	3	3 (0)	3 pg:wr	Symbolic fence	Nest found by visitor in area open to the public on 29 June and symbolic fence erected around nest on 30 June.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
187	Foredune	F= M=U	19 Jun	Hatch (Split)	21 Jul	3	3 (0)	2 ga:ao 1 unbanded		On 21 July, 2 chicks banded and 1 egg (cracks and peeps) at nest. On 23 July, a peregrine seen eating a small chick west of the Fore dune closure with "ao" on right leg that could represent a 2-day-old chick from the SP187 brood or a 5-day-old chick from the SP163 brood (see Table H.4 in Appendix H). On 24 July, 2 chicks (1 banded and 1 unbanded) in Fore dune closure shoreline area brood was last seen. From 5 August to 13 August, brood raised in area open to the public. Brood last seen with 2 chicks (1 banded and 1 unbanded) 13 August (22 to 23 days old).
188	ORA	F=U M=ga:ww	27 Jun	Hatch	29 Jul	3	3 (0)	3 pv:ry	Bumpout	On 2 July, area closed to the public where brood was raised.
189	7	F=vg:yy M=U	2 Jun	Hatch	4 Jul	≥1	1 (0)	1 unbanded	Symbolic fence	To avoid disturbing young snowy plover and least tern broods nest not walked to and total egg number unknown. Brood last seen with 1 chick 22 July (18 days old).
190	7	F=Banded M=	na	Depredated, avian	8 Jul	≥1	0 (0)		Seasonal Exclosure	Nest location known by multiple observations of an incubating adult beginning 1 July. To avoid disturbing young snowy plover and least tern broods nest not walked to and total egg number unknown. Lost during period of nest loss to harrier.
191	7	F=Banded M=	na	Overwash by tide	4 Jul	3	0 (0)		Symbolic fence	On 2 July, nest overwashed by tide, 1 egg found 10 feet south of other 2 eggs (in a nest bowl and incubated by female), displaced egg placed in nest and female returns to incubate. On 3 July, female observed on nest. On 4 July, nest overwashed again, all 3 eggs found scattered 50 feet south of nest location with no evidence of being attended. Eggs placed together and not seen incubated subsequently.
192	SOF	F=U M=ga:ww	26 Jun	Hatch (Split)	28 Jul	3	3 (0)	3 unbanded	Circular excl. with top, Symbolic fence	

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
193	Foredune	F= M=gg:ay	26 Jun	Unknown	2 Aug	3	0 (0)			Consistent incubation confirmed until 21 July. From 22 July to 1 August, camera confirmed inconsistent incubation of a gg:ay male day and night, suggesting adult mortality of the female. Three eggs last seen at nest on 28 July. Nest last seen attended on 1 August. On 3 August, no eggs at nest. Nest fate occurred during period of nest loss to harrier.
194	SOF	F=U M=U	3 Jul	Hatch (Split)	4 Aug	3	3 (0)	2 pv:aa 1 unbanded	Circular excl. with top, Symbolic fence	On 7 and 15 July, symbolic fence moved west to reduce possible pedestrian disturbance. On 5 August, 2 mobile chicks attended by an adult were banded and 1 unattended and immobile chick was collected and taken to COPR (see Table F.4 in Appendix F).
195	SOF	F=U M=U	27 Jun	Hatch	29 Jul	3	3 (0)	3 vg:rr	Circular excl. with top, Symbolic fence	
196	7	F=pg:ow M=ga:pr	na	Hatch	13 Jul	≥1	1 (0)	1 unbanded	Symbolic fence	Nest location known by multiple observations of an incubating adult. To avoid disturbing young snowy plover and least tern broods nest not walked to and total egg number unknown.
197	6	F=U M=bb:yb	14 Jun	Hatch	16 Jul	3	3 (0)	3 ga:ra	Seasonal Enclosure	
198	ORA	F=U M=gg:rb	3 Jul	Hatch	4 Aug	2	2 (0)	1 pg:ra 1 unbanded	Symbolic fence	
199	SOF	F=U M=ga:or	28 Jun	Hatch	30 Jul	3	3 (0)	3 pv:ay	Circular excl. with top, Symbolic fence	
200	SOF	F=U M=U	22 Jun	Hatch	24 Jul	3	3 (0)	3 ga:vo	Circular excl. with top, Symbolic fence	
201	7	F= M=U	28 Jun	Hatch	30 Jul	3	3 (0)	3 unbanded	Symbolic fence	
202	SOF	F= M=	na	Abandoned, unknown if pre- or post-term	3 Jul	3	0 (0)		Symbolic fence	
203	SOF	F=U M=U	17 Jun	Hatch	19 Jul	3	3 (0)	3 pg:wa	Symbolic fence	On 10 July, symbolic fence moved west to reduce possible pedestrian disturbance.

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
204	8	F=bb:ga M=ny:wg	8 Jul	Hatch	9 Aug	3	2 (0)	2 pg:ya	Symbolic fence	Brood last seen with 2 chicks when banded 9 August (0 days old). On 10 August, adult western gull seen eating 1 chick, second chick not found, and associated male was alert nearby. The gull was lethally removed and gut contents contained the bands of a single SP204 chick (see Table H.4 in Appendix H). One egg (cracked and peeping on 9 August) with unknown fate.
205	8	F=U M=U	6 Jul	Hatch	7 Aug	2	2 (0)	2 unbanded	Circular excl. with top, Symbolic fence	
206	SOF	F=U M=U	19 Jun	Hatch	21 Jul	3	3 (0)	3 pg:ww	Circular excl. with top, Symbolic fence	On 14 July, symbolic fence moved west to decrease possible pedestrian disturbance.
207	BY	F= M=U	7 Jul	Hatch	8 Aug	3	3 (0)	3 vg:oa	Seasonal Enclosure	On 10 August, 1 banded chick limping and favoring right leg was briefly captured, had no obvious injury, and all bands moved freely. From 11 to 12 August, chick continued to limp (see Table H.2 in Appendix H). Brood last seen with 3 chicks 11 August (3 days old), and 2 chicks 12 August (4 days old).
208	BY	F=b:g- M=rr:or	27 Jun	Hatch (Split)	29 Jul	3	3 (0)	1 ga:go 2 unbanded	Seasonal Enclosure	
209	SOF	F=vg:rg M=pg:by	4 Jul	Hatch (Split)	5 Aug	3	3 (0)	3 pg:wy	Symbolic fence	
210	8	F= M=	na	Unknown	na	≥2	0 (0)		Symbolic fence	On 22 July, 2 eggs found scattered with no evidence of being attended and not seen incubated subsequently.
211	Unknown	F= M=bb:pa	na	Hatch	(21 Jul)	≥1	1 (0)	1 pg:wv		On 23 July, found as brood of 1 small chick near marker post 4. Brood raised in area open to the public.
212	8	F=U M=rr:aw	29 Jun	Hatch (Split)	31 Jul	3	3 (0)	3 pv:br	Seasonal Enclosure	
213	SOF	F=U M=U	8 Jul	Hatch	9 Aug	3	3 (3)	2 vg:ao 1 unbanded	Circular excl. with top, Symbolic fence	
214	ORA	F=U M=U	7 Jul	Hatch	8 Aug	3	1 (0)	1 pv:go	Symbolic fence	Single chick raised in area open to the public. Chick last seen on 10 August when 2 days old. Two eggs abandoned post-term.
215	8	F=U M=pv:yb	4 Jul	Hatch	5 Aug	3	3 (0)	3 unbanded	Seasonal Enclosure	
216	8	F=U M=vv:wr	6 Jul	Hatch	7 Aug	2	2 (0)	2 unbanded	Seasonal Enclosure	

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
217	6	F= M=	na	Unknown	na	≥2	0 (0)		Symbolic fence	On 11 September, 2 eggs (1 cracked with dead, well-developed embryo inside) found abandoned and total egg number unknown.
218	Unknown	F=U M=nb:oy	na	Hatch	(11 May)	≥2	2 (2)	2 unbanded		On 16 May, found as brood of 2 small chicks on 6 enclosure shoreline. Raised in area on 6 enclosure shore with high brood density and on multiple occasions chicks were seen mixing with chicks from other broods.
219	Unknown	F= M=gn:rr	na	Hatch	(19 May)	3	3 (1)	3 unbanded		On 24 May, found as brood of 3 small chicks on North Oso Flaco shoreline. Brood last seen with 3 chicks 9 June (21 days old), 1 chick seen subsequently, and chick fledged.
220	Unknown	F=vg:yy M=U	na	Hatch	(21 May)	3	3 (3)	3 unbanded		On 25 May, found as brood of 2 small chicks in 7 enclosure. Three chicks seen with brood beginning 26 May.
221	Unknown	F= M=ga:ww	na	Hatch	(14 Jun)	≥2	2 (0)	2 unbanded		On 19 June, found as brood of 2 small chicks on South Oso Flaco shoreline.
222	Unknown	F=ga:ry M=ga:ar	na	Hatch	(27 Jun)	3	3 (3)	3 unbanded		On 1 July, found as brood of 3 small chicks on 6 enclosure shoreline.
223	Unknown	F=vv:ab M=U	na	Hatch	(3 Jul)	3	3 (2)	3 unbanded		On 5 July, found as brood of 3 small chicks on 6 enclosure shoreline.
224	Unknown	F=U M=vg:vy	na	Hatch	(6 Jul)	3	3 (0)	3 unbanded		From 6-8 July, found as brood of 3 small chicks on 8 enclosure shoreline. Brood last seen with 3 chicks 11 July (5 days old), and 2 chicks 24 July (18 days old).
225	Unknown	F=pv:by M=U	na	Hatch	(17 Jul)	3	3 (0)	3 unbanded		On 20 July, found as brood of 3 small chicks on North Oso Flaco shoreline. Brood last seen with 3 chicks 21 July (4 days old).
226	8	F=by:o(v)? M=vg:yg	na	Hatch	(19 Jul)	3	3 (0)	3 unbanded	Symbolic fence	On 24 July, found as brood of 3 small chicks on 8 enclosure shoreline. Brood last seen with 3 chicks 24 July (5 days old), and 1 chick 1 August (13 days old).

Appendix B. Snowy plover nests at ODSVRA in 2020 (continued).

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. The majority of chicks could not be banded to avoid disturbing nearby young snowy plover broods. UNA = unassigned nest										
Nest	Location	Adult pair	Est. initiation date	Nest fate	Fate date (est.)	No. eggs	No. chicks (no. fledged)	No. chicks banded and combination	Nest protection type	Notes
UNA1	Unknown	F= M=U	na	Hatch	(23-May)	-	3 (2)	3 unbanded	-	
UNA2	Unknown	F= M=U	na	Hatch	(30-May)	-	3 (2)	3 unbanded	-	
UNA3	Unknown	F= M=U	na	Hatch	(12-Jun)	-	2 (0)	2 unbanded	-	
UNA4	Unknown	F= M=-:yg	na	Hatch	(11-Jun)	-	3 (0)	3 unbanded	-	
UNA5	Unknown	F= M=U	na	Hatch	(21-Jun)	-	1 (0)	1 unbanded	-	On 2 July, area was closed to the public where brood was raised.
UNA6	Unknown	F= M=U	na	Hatch	(23-Jun)	-	1 (0)	1 unbanded	-	
UNA7	Unknown	F= M=U	na	Hatch	(3-Jul)	-	1 (0)	1 unbanded	-	
UNA8	Unknown	F=bb:ar M=vg:pg	na	Hatch	(5-Jul)	-	1 (0)	1 unbanded	-	An approximately 3-day-old chick adopted by SP115 brood beginning 8 July, chick last seen on 10 July at approximately 5 days old.
UNA9	Unknown	F=U M=gg:or	na	Hatch	(12-Jul)	-	1 (1)	1 pg:wg	-	
UNA10	Unknown	F= M=U	na	Hatch	(25-May)	-	2 (1)	2 bb:yv	-	On 16 July, fledgling eaten by an adult peregrine with VID band W49 (see Table H.4 in Appendix H).

APPENDIX C. MAPS OF ALL CALIFORNIA LEAST TERN AND SNOWY PLOVER NEST LOCATIONS AT ODSVRA IN 2020.



Figure C.1. California least tern and snowy plover nest locations at ODSVRA in 2020.

Open riding area was closed to recreational vehicular and camping activity during the 2020 season to prevent the spread of COVID-19.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).

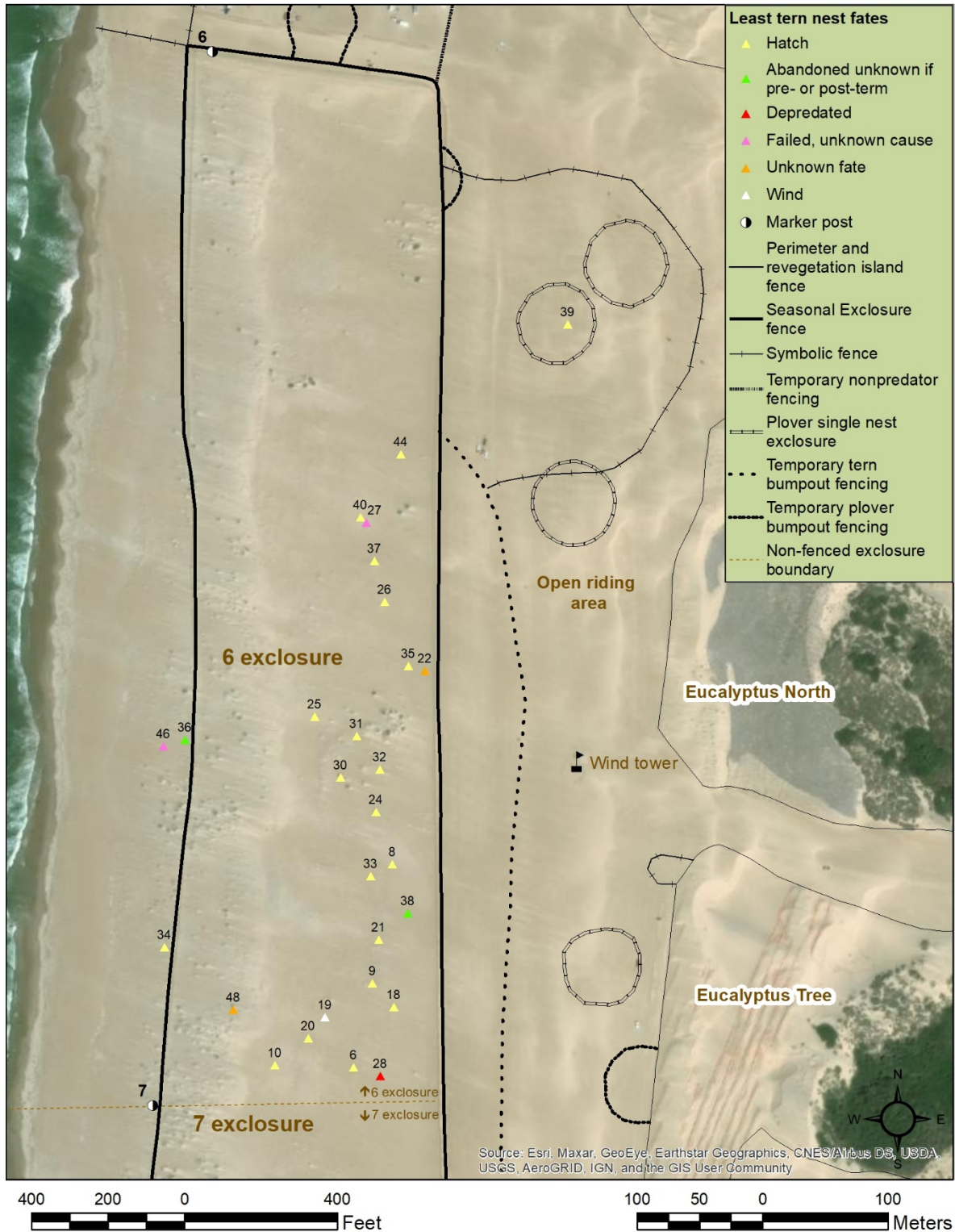


Figure C.2. California least tern nest locations at ODSVRA within and outside 6 enclosure in 2020. Open riding area was closed to recreational vehicular and camping activity during the 2020 season. Tern nest east of 6 enclosure (LT35) was established within existing plover nest enclosure (SP141).

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).

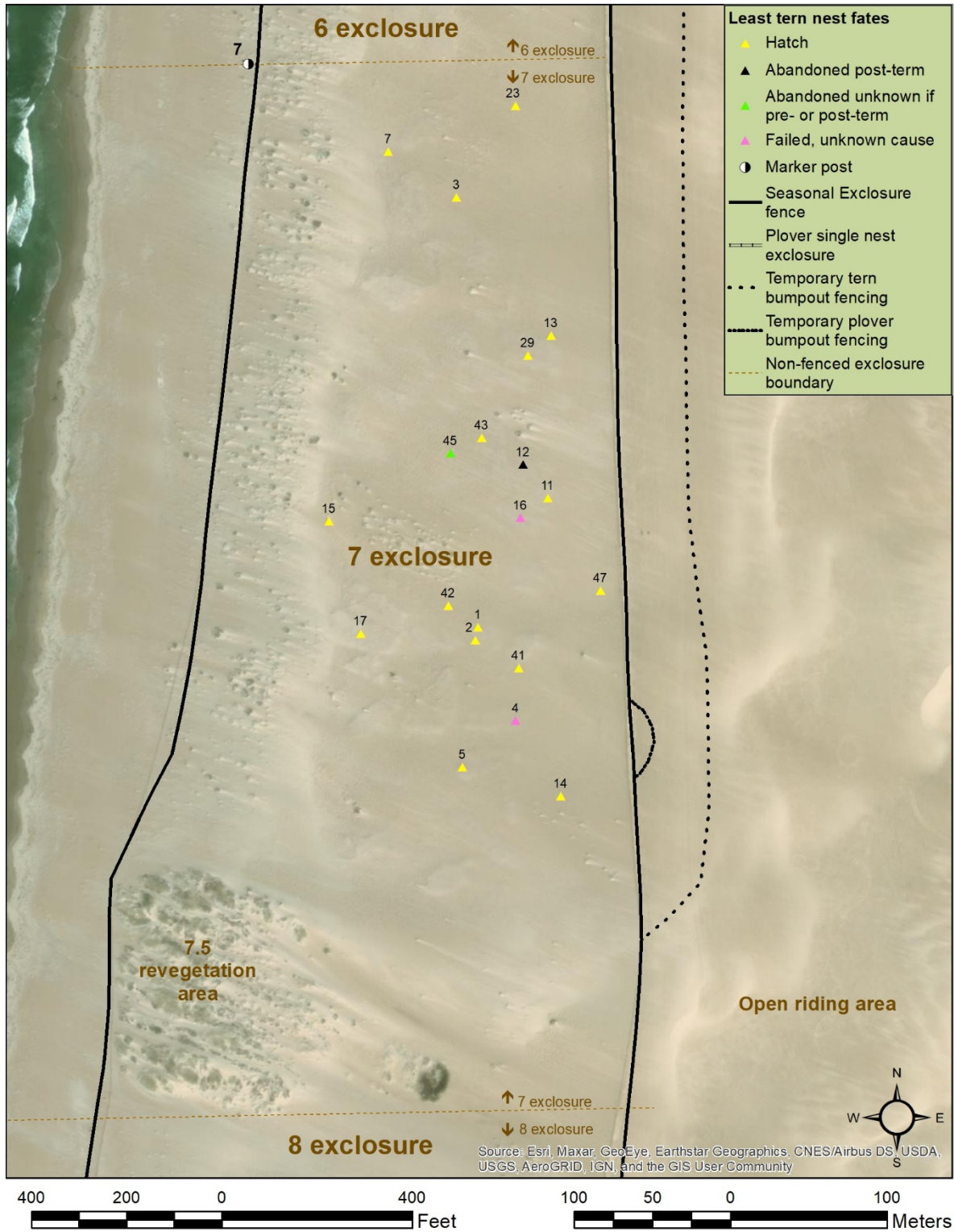


Figure C.3. California least tern nest locations at ODSVRA 7 enclosure in 2020. Open riding area was closed to recreational vehicular and camping activity during the 2020 season.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).

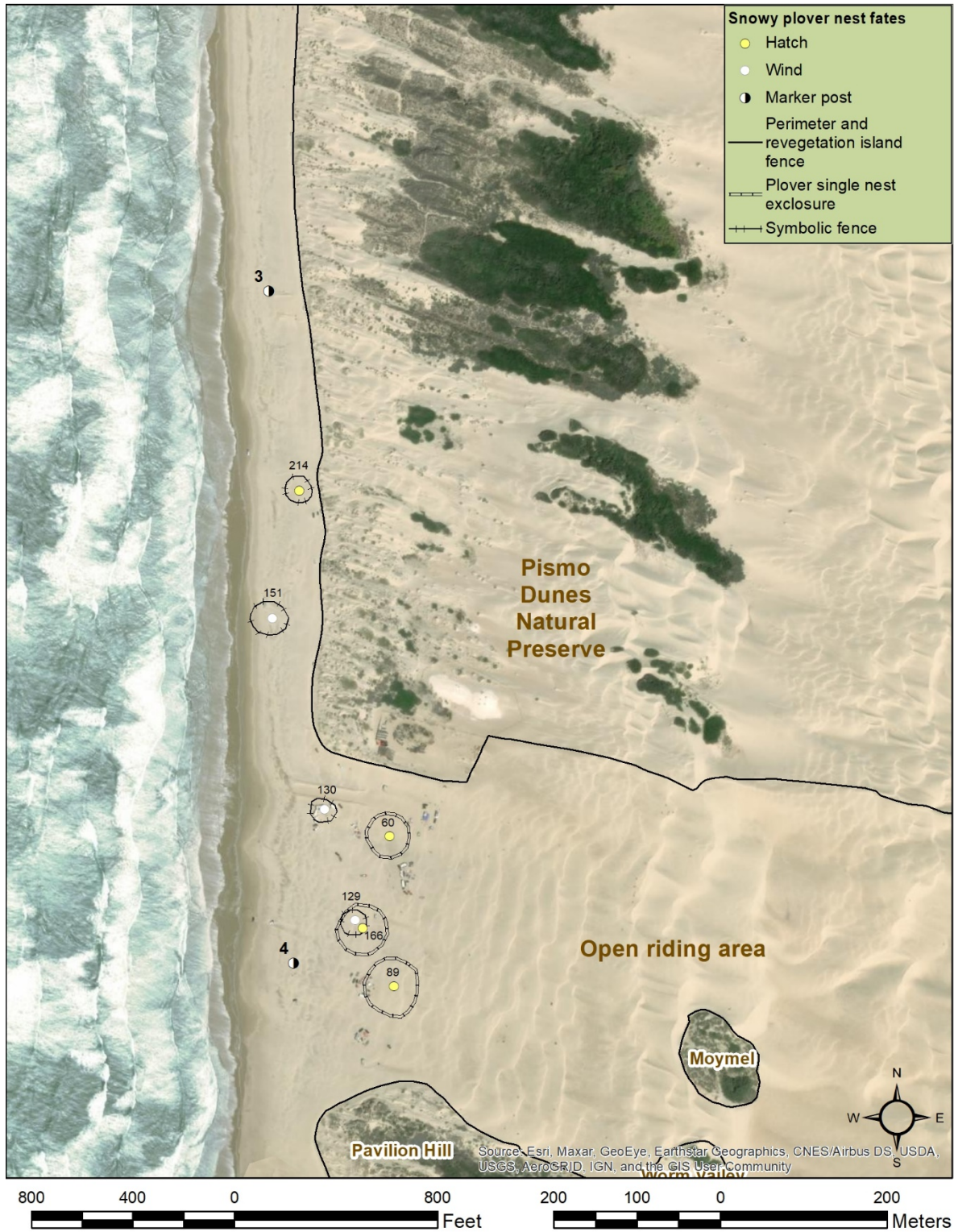


Figure C.4. Snowy plover nest locations at ODSVRA northern portion of open riding area in 2020. Open riding area was closed to recreational vehicular and camping activity during the 2020 season.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).

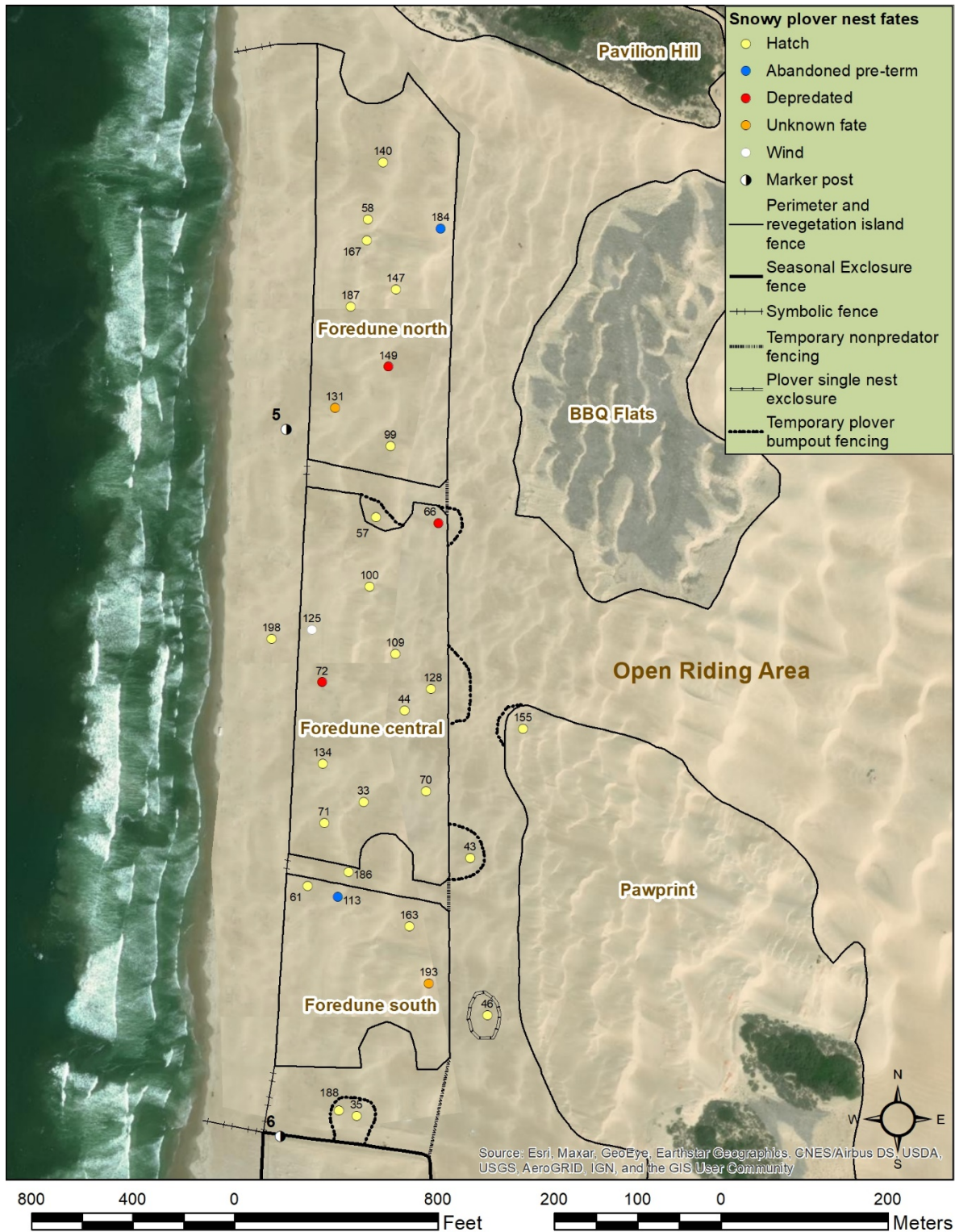


Figure C.5. Snowy plover nest locations at ODSVRA Foredune closure, open riding area west, east, and south of Foredune closure, and northwest corner of Pawprint revegetation area in 2020.

Open riding area was closed to recreational vehicular and camping activity during the 2020 season. The Foredune closure shoreline and alleyways (areas of the open riding area) were closed to public use from 2 July to 26 August.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).

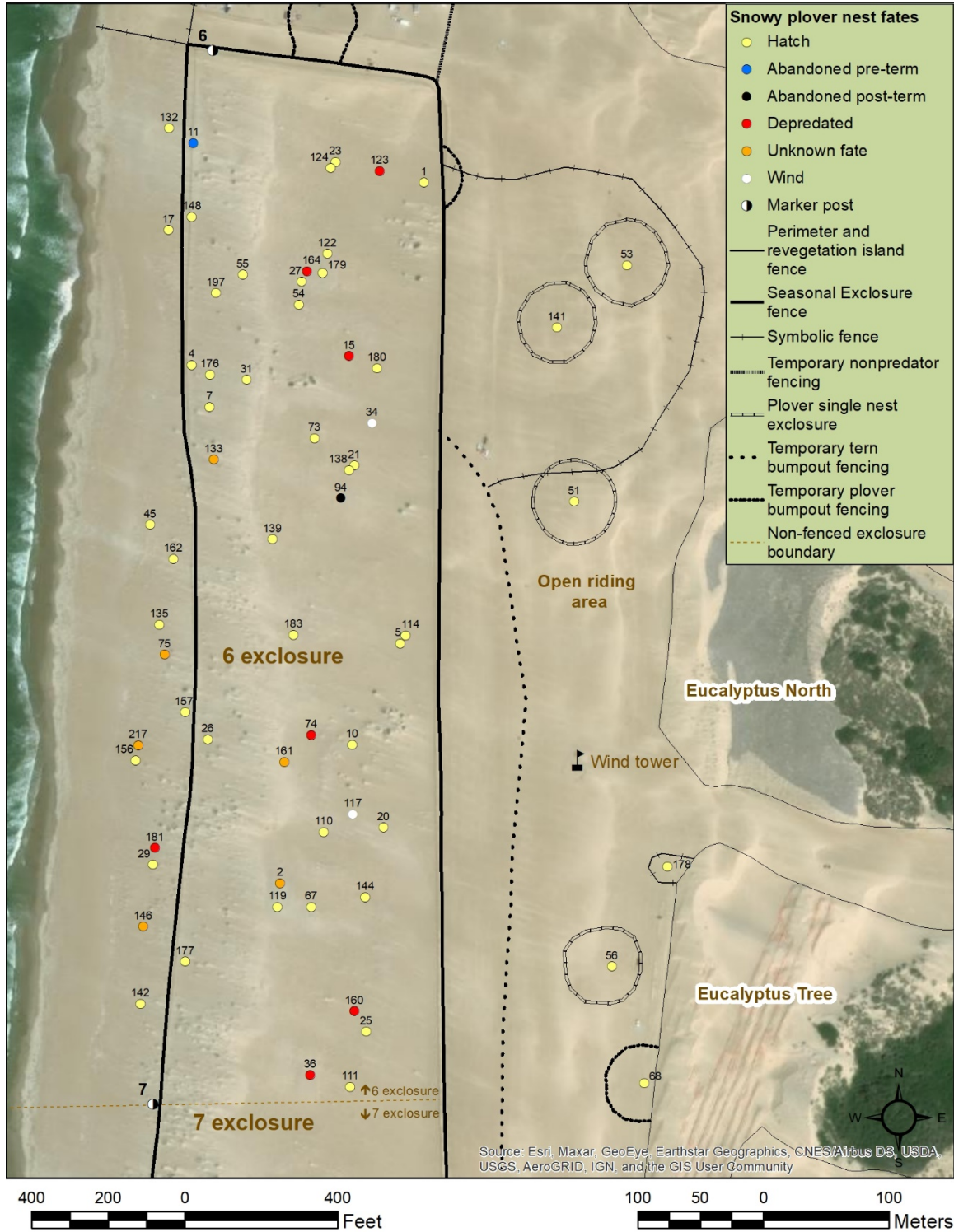


Figure C.6. Snowy plover nest locations at ODSVRA 6 enclosure and open riding area east of 6 enclosure in 2020.

Open riding area was closed to recreational vehicular and camping activity during the 2020 season.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).

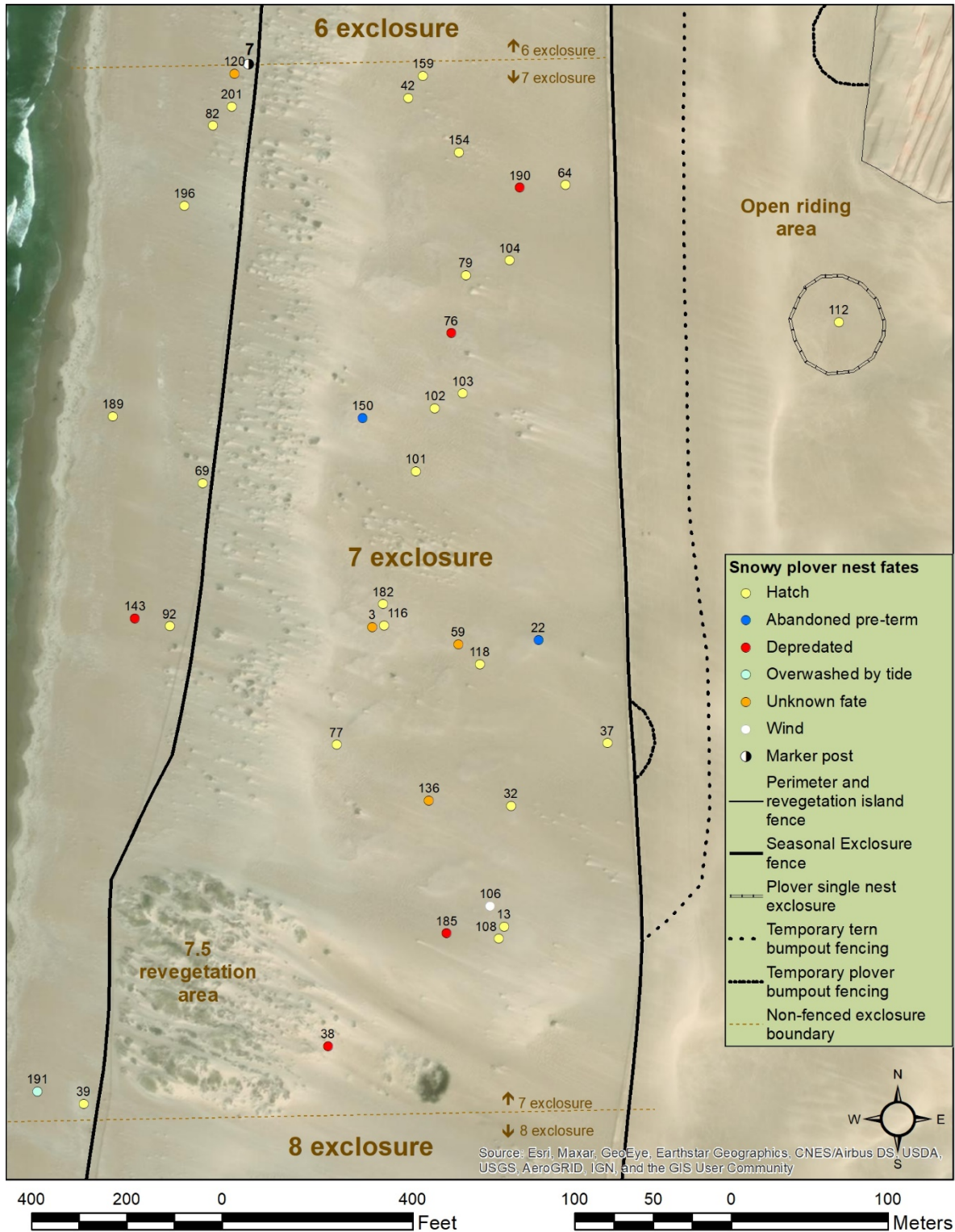


Figure C.7. Snowy plover nest locations at ODSVRA 7 enclosure and open riding area east of 7 enclosure in 2020.

Open riding area was closed to recreational vehicular and camping activity during the 2020 season.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).

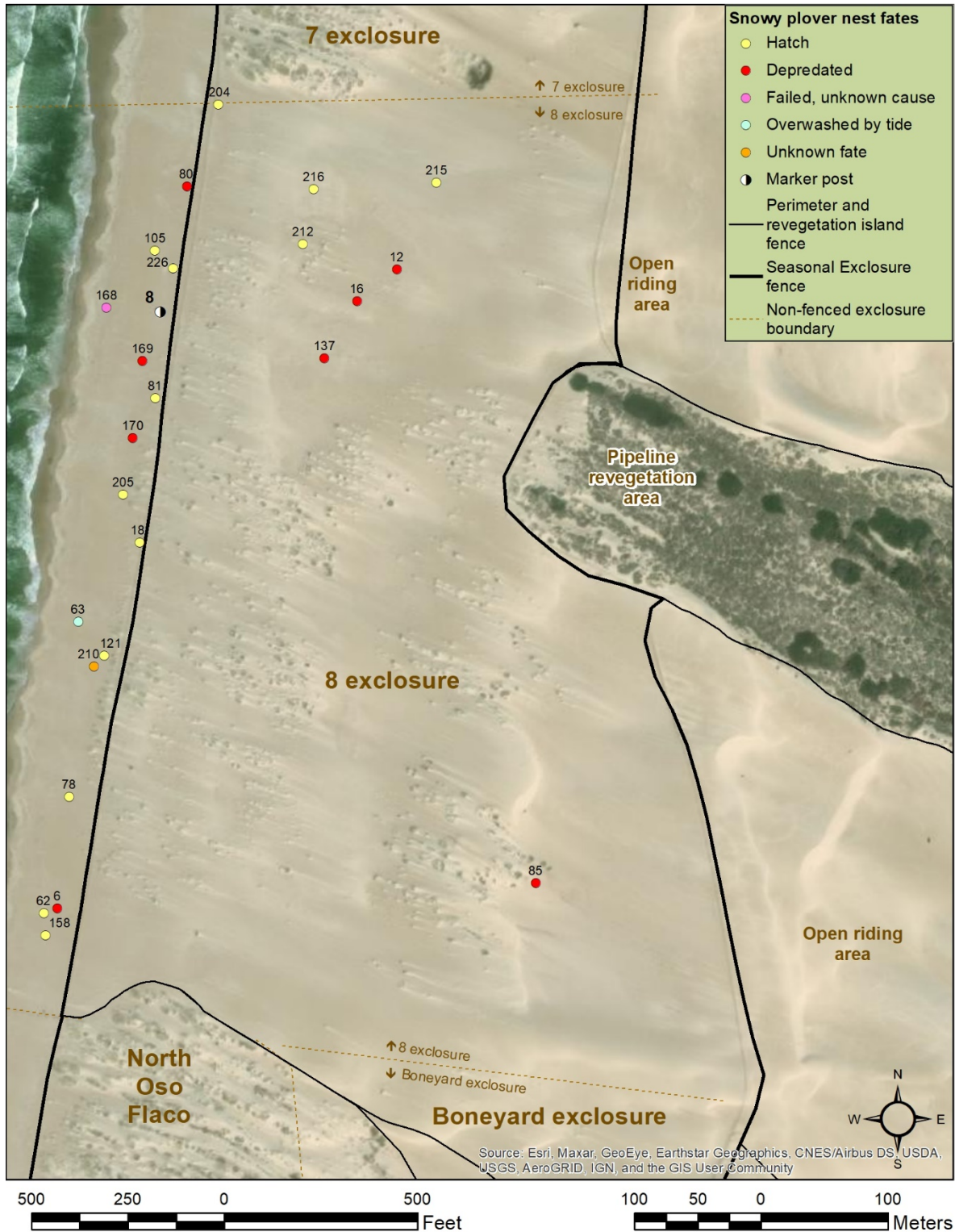


Figure C.8. Snowy plover nest locations at ODSVRA 8 enclosure in 2020.

Open riding area was closed to recreational vehicular and camping activity during the 2020 season. One nest (SP115, hatch) in the open riding area and approximately 2,300 feet east of 8 enclosure not included in map.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).

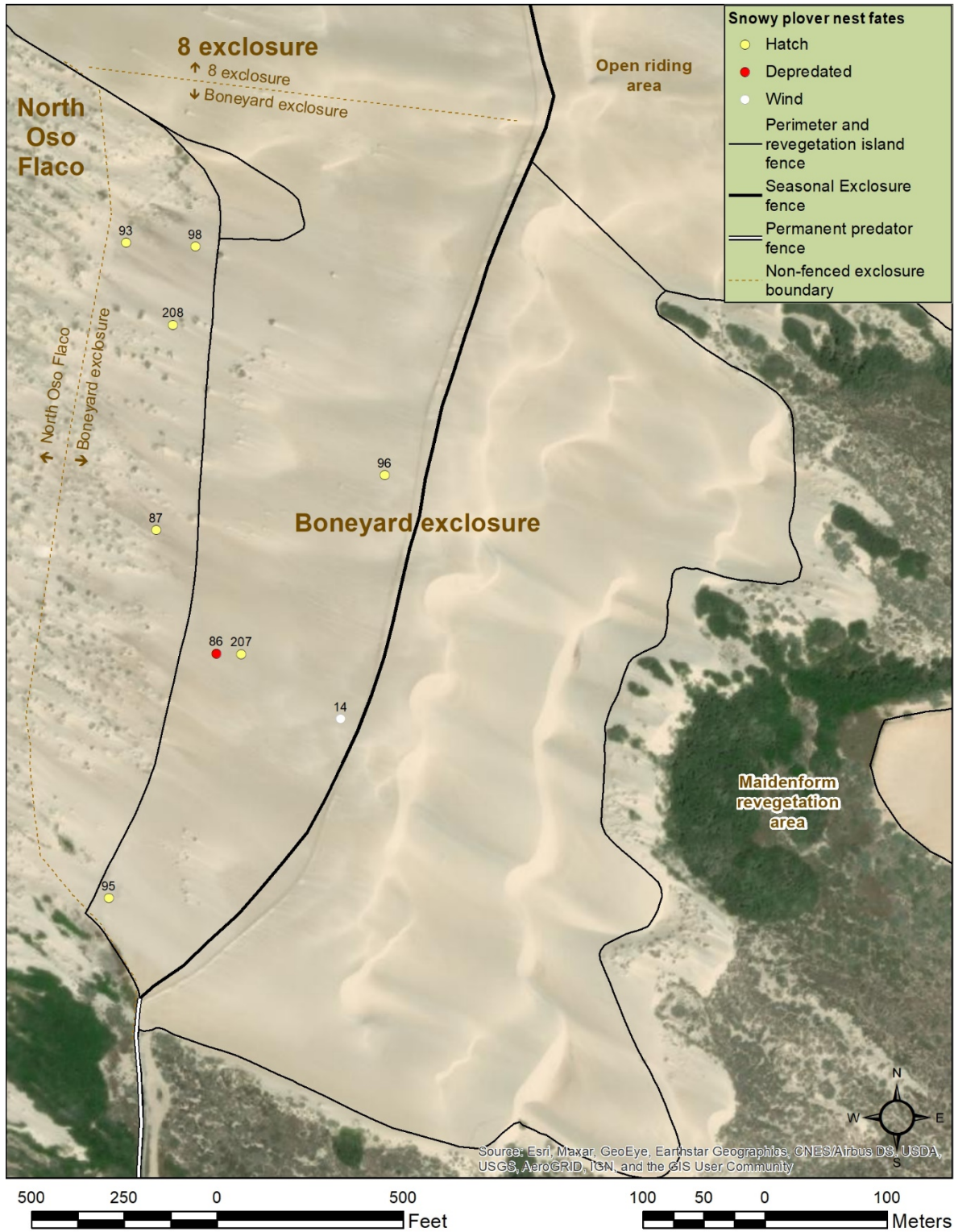


Figure C.9. Snowy plover nest locations at ODSVRA Boneyard enclosure in 2020.
Open riding area was closed to recreational vehicular and camping activity during the 2020 season.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).



Figure C.10. Snowy plover nest locations at ODSVRA North Oso Flaco in 2020.

Appendix C. Maps of all California least tern and snowy plover nest locations at ODSVRA in 2020 (continued).



Figure C.11. Snowy plover nest locations at ODSVRA South Oso Flaco in 2020.

APPENDIX D. BANDED LEAST TERNS AND SNOWY PLOVERS.

Table D.1. Banded least terns recorded at ODSVRA in 2020.

Juveniles fledged from ODSVRA in 2020 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 birds known fledging from ODSVRA are listed for incomplete band combinations or for band combinations that were used multiple years. Sex is included if copulation was observed and bands could be determined at that time. (For a description of color band letter codes see Appendix B.)

Band	Origin and Year Banded	Dates Seen	Notes
-:a/b	ODSVRA unknown year	5/30	Multiple birds banded at ODSVRA with a/b on the right leg.
-:g/o	ODSVRA 2008 or 2011	7/17	
a/y:b/w	ODSVRA 2012	7/3	
b/r:y/g	ODSVRA 2015	7/24, 8/7	LT43 breeding adult.
b/w:b/y	ODSVRA 2011	6/25	
b/w:g/y	ODSVRA 2007, 2011, or 2014	6/25	LT34 breeding adult.
b/w:y/g	ODSVRA 2011 or 2015	7/9	
g/y:a/b	ODSVRA 2008 or 2018	7/9	
g/y:a/w	ODSVRA 2008 or 2018	7/16	
l:y/g	ODSVRA 2015	6/17	
o/b:w/b	ODSVRA 2009 or 2013	5/28	
o/g:b/w	ODSVRA 2012	5/29	LT9 breeding adult.
o/w:w/b	2009 or 2013	5/28	
o/y:b/w	ODSVRA 2012	6/26, 6/27	LT18 breeding adult.
o:b/w	ODSVRA 2012	6/21	LT11 breeding adult.
o:w/b	ODSVRA 2013	6/18	
r/w:b/w	ODSVRA 2012	7/3	
r/w:w/b	ODSVRA 2009 or 2013	6/25, 7/10, 7/22	LT34 breeding adult.
r/y/r:-	ODSVRA 2007 or 2015	8/15	Originally banded r/y/r:g/y or r/y/r:y/g.
r:y/g	ODSVRA 2015	5/29	
s:b	VAFB 2018 or Unknown origin and year	7/9	In 2018 VAFB banded all chicks with s:b. Observation in past years at ODSVRA of s:b suggest bird could of lost tape on either leg. Multiple birds banded at ODSVRA with b on right leg.
w/b:w/g	ODSVRA 2010	7/3, 7/22	LT23 breeding adult.
w/b:w	ODSVRA 2010	7/15, 7/20	LT39 breeding adult.
w:b/w	ODSVRA 2012	7/21	
w:g/y	ODSVRA 2007 or 2014	7/17	LT2 and LT44 breeding adult.
w:w/b	ODSVRA 2009 or 2013	7/17, 7/19	
y/g:b/w	ODSVRA 2006, 2012, or 2016	6/3	
y/g:w/b	ODSVRA 2006, 2013, or 2016	6/24, 7/3, 7/12, 7/30	LT24, LT41, and LT45 breeding adult.
y/g:w/r	ODSVRA 2006 or 2016	6/23	LT33 breeding adult.
y/o:g/y	ODSVRA 2007 or 2014	7/16, 8/15	
y/r:g/y	ODSVRA 2007 or 2014	7/16, 8/13	LT41 breeding adult.
y/r:w/b	ODSVRA 2009 or 2013	6/23	

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

Table D.2. Least terns banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2020.

This is a partial list based on information received from monitors and managers. ODSVRA parks resource staff made specific trips to survey terns at RGDCP. All birds from ODSVRA were banded as chicks and some combinations have been used multiple years and it is possible to have more than one bird with the same combination. One bird had a band on only one leg, and may have been banded on only one leg or have lost a band. All possible band combinations of birds known fledging from ODSVRA are listed for incomplete band combinations or for band combinations that were used multiple years.

RGDCP = Rancho Guadalupe Dunes County Park (six miles south of ODSVRA in same dune complex), VAFB = Vandenberg Air Force Base

Band Combination	Year Banded	Location Seen	County	Dates Seen	Notes
-:y	Unknown year	RGDCP	Santa Barbara	7/15	Multiple birds banded at ODSVRA with yellow on the right leg.
b/w:b/y	2011	RGDCP	Santa Barbara	7/15	
b/w:g/w	2011	RGDCP	Santa Barbara	7/15	
b/w:r/w	2011	RGDCP	Santa Barbara	7/15	
b/w:w/a	2011	RGDCP	Santa Barbara	7/15	
g/y:o	2008	RGDCP	Santa Barbara	7/15	
l:y/g	2015	RGDCP	Santa Barbara	7/22	
n:g/y	2014	RGDCP	Santa Barbara	7/15	
r/y:y/g	2015	RGDCP	Santa Barbara	7/15	
w/o:b/r	2020	RGDCP	Santa Barbara	7/29	Juvenile.
w/o:g/w	2020	RGDCP	Santa Barbara	7/15	Juvenile.
w/o:o/a	2020	RGDCP	Santa Barbara	7/29, 8/4, 8/13	Juvenile.
w/o:w/a	2020	RGDCP	Santa Barbara	7/22	Juvenile.
w/o:y	2020	RGDCP	Santa Barbara	7/23	Juvenile.
w/o:y/b	2020	RGDCP	Santa Barbara	7/29	Juvenile.
w/o:y/g	2020	RGDCP	Santa Barbara	7/29	Juvenile.
w/y:g/y	2007, 2014	RGDCP	Santa Barbara	7/15	
y/g:b/w	2006, 2012, 2016	RGDCP	Santa Barbara	7/15	
y/g:w/b	2006, 2013, 2016	RGDCP	Santa Barbara	8/4	
y/g:w/r/w	2016	RGDCP	Santa Barbara	7/23	
b/o:y/g	2015	VAFB	Santa Barbara	7/29	
g/y:b	2008, 2017, 2018	VAFB	Santa Barbara	7/1, 7/22	
g:g/y	2007, 2014	VAFB	Santa Barbara	6/3	
o:y/g	2015	VAFB	Santa Barbara	7/1	
w/b:g/y	2007, 2014	VAFB	Santa Barbara	7/1	
w/o:a/w	2020	VAFB	Santa Barbara	7/29	Juvenile.
w/o:g/w	2020	VAFB	Santa Barbara	7/29	Juvenile.
w/o:r/y	2020	VAFB	Santa Barbara	7/29	Juvenile.
w:w/b	2009, 2013	VAFB	Santa Barbara	7/29	
y/a:y/g	2005, 2015	VAFB	Santa Barbara	7/1	
w/o:a/w	2020	COPR	Santa Barbara	8/4	Juvenile.
w/o:w/r	2020	COPR	Santa Barbara	8/4	Juvenile.
w/o:w/a	2020	Santa Clara River Estuary	Ventura	7/29	Juvenile.

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

Table D.3. Banded snowy plovers recorded at ODSVRA 1 October 2019 to 29 February 2020.

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. (For a description of color band letter codes see Appendix B.)

ODSVRA = Oceano Dunes SVRA, PWC = Pacific Wildlife Care, SB Zoo = Santa Barbara Zoo, SLO = San Luis Obispo, NWR = National Wildlife Refuge, VAFB = Vandenberg Air Force Base

Band Combination	Origin and Year Banded	County Banded	Dates Seen	Notes
g/r:b	Tenmile Creek 2019	Douglas, OR	10/3, 10/6, 10/14, 10/22, 11/11, 12/31	
w/a/w:b	Tahkenitch 2019	Douglas	10/1, 10/2, 10/3, 10/6, 10/8, 10/10, 10/11, 10/12, 10/17, 10/18, 10/19, 10/20, 10/29, 10/30, 11/2, 11/5, 11/6, 11/9, 11/10, 11/11, 11/13	
o/y/o:b	Coos Bay 2019	Coos	10/13, 10/14, 10/15, 10/17, 10/21, 10/22, 10/23, 10/24, 10/26, 10/28, 11/2, 11/5, 11/6, 11/10, 11/11, 11/18, 11/19, 11/21, 11/22, 11/23, 12/5, 12/8, 12/12, 12/13, 12/19, 12/20	
yg:wl	Reservation Road 2016	Monterey, CA	10/3, 10/6, 10/10, 10/11, 10/12, 10/14, 10/16, 10/18, 10/21, 10/22, 10/24, 10/25, 10/29, 10/30, 11/1, 11/5, 11/10, 11/13, 11/22, 12/4, 12/5, 12/8, 12/13, 12/18, 12/26	
ag:av	Salinas River NWR 2017	Monterey	10/2, 10/6, 10/10, 10/11, 10/12, 10/14, 10/17, 10/19, 10/20, 10/21, 10/23, 10/24, 10/25, 10/26, 11/2	
ol:gp	Salinas River NWR 2009	Monterey	10/24, 10/30, 11/11, 11/12, 11/13, 12/5, 12/8, 12/15, 12/18, 12/20, 12/26	
bb:gr	ODSVRA 2012 or 2015	SLO	10/22	
bb:or	ODSVRA 2016 or 2017	SLO	10/20, 10/29, 11/5	
bb:ov	ODSVRA 2019	SLO	10/6, 10/10, 10/11, 10/12, 10/13, 10/15, 10/16, 10/17, 10/18, 10/22, 10/24, 10/30, 10/31, 11/1, 11/2, 11/4, 11/9, 11/10, 11/13, 11/17, 11/23, 12/5, 12/7, 12/8, 12/13, 12/15, 12/20, 12/31, 1/17, 2/8, 2/12, 2/29	
bb:rr	ODSVRA 2016 or 2017	SLO	10/14	
bb:vr	ODSVRA 2011, 2013, or 2014	SLO	10/2, 10/10, 10/15, 10/20, 10/28, 11/5, 11/10	
bb:vy	ODSVRA 2016 or 2017	SLO	10/3, 10/5, 10/6, 10/11, 10/12, 10/14, 10/15, 10/17, 10/18, 10/19, 10/21, 10/22, 10/24, 10/27, 10/30, 11/1, 11/5, 11/9, 11/12, 11/19, 11/22, 12/5, 12/7, 12/8, 12/12, 12/18, 1/14	
ga:ar	ODSVRA 2015	SLO	2/29	
ga:og	ODSVRA 2014 or 2015	SLO	10/2	
ga:or	ODSVRA 2016 or 2017	SLO	2/15	
ga:oy	ODSVRA 2014 or 2015	SLO	10/2, 10/3, 10/4, 10/6, 10/7, 10/11, 10/12, 10/14, 10/15, 10/16, 10/17, 10/18, 10/19, 10/20, 10/21, 10/24, 10/30, 11/5, 11/6, 11/9, 11/14, 11/18, 11/21, 11/23, 12/4, 12/5, 12/8, 12/12, 12/13, 12/15, 12/19, 12/30, 2/8, 2/12, 2/18, 2/25	
ga:pr	ODSVRA 2016 or 2017	SLO	11/5, 11/11, 12/5, 2/16, 2/18	
ga:rg	ODSVRA 2015 or 2016	SLO	10/8, 10/10, 10/11, 10/12, 10/14, 10/15, 10/19, 10/20, 10/21, 10/22, 10/23, 10/25, 10/30, 11/5, 11/8, 11/10, 11/11, 12/12, 12/15, 12/21, 2/15, 2/16, 2/18, 2/19	

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

Table D.3. Banded snowy plovers recorded at ODSVRA 1 October 2019 to 29 February 2020 (continued).

Band Combination	Origin and Year Banded	County Banded	Dates Seen	Notes
ga:ry	ODSVRA 2017	SLO	10/2, 10/13, 10/14, 10/15, 10/19, 10/20, 10/21, 10/25, 10/26, 11/8, 11/10, 11/11, 11/17, 11/19, 11/21, 11/22, 12/12, 12/19, 12/21, 2/16	
ga:ww	ODSVRA 2016 or 2017	SLO	10/2, 10/8, 10/10, 10/11, 10/14, 10/15, 10/23, 10/30, 11/5, 11/11, 12/19, 2/15, 2/16, 2/18	
ga:wy	ODSVRA 2018	SLO	2/29	
gg:av	ODSVRA 2019	SLO	10/2, 10/3, 10/7, 10/10, 10/12, 10/14, 10/17, 10/21, 10/22, 10/23, 10/30, 11/2, 11/4, 11/6, 11/9, 11/11, 11/12, 11/13, 11/21, 11/23, 12/4, 12/8, 12/12, 12/13, 1/13, 1/17	
gg:gr	ODSVRA 2011 or 2013	SLO	2/29	
gg:ob	ODSVRA 2019	SLO	10/3, 10/6, 10/7, 10/8, 10/12, 10/13, 10/14, 10/15, 10/17, 10/18, 10/22, 10/29, 10/30, 11/1, 11/5, 11/10, 11/11, 11/12, 11/22, 12/4, 12/5, 12/7, 12/12, 12/18, 12/19, 12/20, 12/27, 2/11, 2/12, 2/18, 2/19, 2/21, 2/27	
gg:or	ODSVRA 2014 or 2015	SLO	10/1, 10/2, 10/3, 10/7, 10/13, 10/15, 10/16, 10/21, 10/22, 10/25, 10/30, 10/31, 11/1, 11/5, 11/9, 11/11, 11/18, 12/8, 12/15, 1/8, 1/17, 2/17	
gg:rb	ODSVRA 2016 or 2018	SLO	10/2, 10/3, 10/5, 10/8, 10/11, 10/12, 10/13, 10/14, 10/15, 10/16, 10/21, 10/25, 10/31, 11/5, 11/9, 11/10, 11/11, 12/4, 12/5, 12/8, 12/12, 12/30, 2/11, 2/12, 2/21, 2/29	
gg:yr	ODSVRA 2017 or 2018	SLO	11/5	
pg:ar	ODSVRA 2014	SLO	1/13, 1/14, 2/8, 2/12	
pg:by	ODSVRA 2017 or 2018	SLO	10/2, 10/14, 10/15, 10/16, 10/17, 10/18, 10/23, 10/30, 11/5, 11/10, 11/11, 11/16, 11/22, 12/5, 12/12, 12/15, 12/19, 12/21, 2/15, 2/16, 2/18, 2/26	
pg:gb	ODSVRA 2019	SLO	10/8, 10/11, 10/12, 10/13, 10/15, 10/18, 10/20, 10/21, 10/28, 11/9, 11/10, 11/11, 11/23, 12/18, 12/30, 12/31	
pg:ow	ODSVRA 2015 or 2016	SLO	10/2, 10/14, 10/15, 10/18, 10/21, 10/22, 10/23, 10/28, 10/30, 11/11, 12/5, 12/9, 12/12, 12/15, 2/16, 2/18	
pg:pb	ODSVRA 2014 or 2015	SLO	2/27	
pg:pg	ODSVRA 2014 or 2015	SLO	10/2, 10/14, 2/15, 2/23, 2/25	
pg:vg	ODSVRA 2014 or 2015	SLO	10/3, 10/5, 10/7, 10/12, 10/13, 10/14, 10/15, 10/16, 10/17, 10/19, 10/20, 10/21, 10/22, 10/24, 10/25, 10/29, 11/1, 11/2, 11/4, 11/5, 11/14, 11/17, 11/18, 12/5, 12/8, 12/12, 12/19, 1/17	
pg:vr	ODSVRA 2018	SLO	10/2, 10/8, 10/15, 10/16, 10/23, 11/5, 11/11, 12/12, 12/15, 2/18, 2/19, 2/26	
pv:-	ODSVRA unknown year	SLO	10/2, 10/10, 10/11, 10/16, 10/17, 10/18, 10/19, 10/20	
pv:aw	ODSVRA 2016 or 2017	SLO	2/29	
pv:by	ODSVRA 2015	SLO	2/15, 2/26	
pv:ob	ODSVRA 2015 or 2017	SLO	10/14, 10/30, 12/5, 12/19	
pv:og	ODSVRA 2018	SLO	10/21, 12/12	

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

Table D.3. Banded snowy plovers recorded at ODSVRA 1 October 2019 to 29 February 2020 (continued).

Band Combination	Origin and Year Banded	County Banded	Dates Seen	Notes
pv:pr	ODSVRA 2017 or 2018	SLO	10/2, 10/3, 10/4, 10/5, 10/6, 10/8, 10/13, 10/14, 10/15, 10/19, 10/20, 10/25, 10/29, 11/1, 11/5, 11/11, 11/13, 11/21, 12/5, 12/7, 12/12, 12/20, 12/26, 12/30, 12/31	
pv:rb	ODSVRA 2016	SLO	10/2, 10/3, 10/4, 10/5, 10/6, 10/10, 10/11, 10/12, 10/13, 10/14, 10/15, 10/17, 10/20, 10/21, 10/22, 10/23, 10/25, 10/29, 10/31, 11/1, 11/2, 11/10, 11/11, 11/19, 12/10, 12/12, 12/15, 12/18, 12/19, 12/21, 1/21, 2/22, 2/23, 2/26, 2/27, 2/29	
pv:wy	ODSVRA 2014 or 2015	SLO	2/18, 2/24	
rr:aw	ODSVRA 2017	SLO	10/3, 10/6, 10/8, 10/10, 10/11, 2/12	
rr:bb	ODSVRA 2016 or 2017	SLO	10/2, 10/3, 10/5, 10/8, 10/10, 10/12, 10/15, 10/17, 10/19, 10/22, 10/25, 10/30, 11/1, 11/5, 11/6, 11/11, 11/18, 11/22, 12/5, 12/8, 12/12, 12/15, 12/18, 12/30, 1/8, 2/8	
rr:bw	ODSVRA 2016 or 2017	SLO	10/2, 10/3, 10/5, 10/6, 10/7, 10/12, 10/13, 10/18, 10/20, 10/21, 10/22, 10/24, 10/25, 10/26, 10/29, 10/30, 11/1, 11/2, 11/6, 11/9, 11/18, 11/21, 12/8, 12/12, 12/13, 12/18, 12/30, 2/8, 2/12, 2/27, 2/29	
vg:ay	ODSVRA 2018	SLO	10/3, 10/6, 10/11, 10/13, 10/14, 10/18, 10/22, 10/27, 10/29, 10/30, 11/2, 11/6, 11/9, 11/10, 11/11, 12/8, 12/12, 12/13, 12/15, 12/18, 12/30, 1/13	
vg:bw	ODSVRA 2016 or 2017	SLO	10/2, 10/3, 10/6, 10/8, 10/11, 10/16, 10/17, 10/18, 10/19, 10/20, 10/22, 10/24, 10/25, 10/31, 11/11, 11/18, 11/23, 12/8, 12/15, 12/20, 2/12	
vg:ow	ODSVRA 2016 or 2017	SLO	11/21	
vg:rg	ODSVRA 2017 or 2018	SLO	10/2, 10/12, 10/13, 10/17, 10/19, 11/5, 11/8, 11/11, 11/16, 11/21, 12/5, 2/15, 2/26	
vg:vv	ODSVRA 2019	SLO	10/12	
vg:wv	ODSVRA 2019	SLO	10/1, 10/2, 10/8, 10/13, 10/14, 10/15, 10/16	
vv:a-	ODSVRA 2011	SLO	10/2, 10/7, 10/11, 10/13, 10/15, 10/16, 10/18, 10/19, 10/22, 10/25, 11/2, 11/6, 11/9, 11/10, 11/12, 12/4, 12/5, 12/7, 12/8, 12/10, 12/12, 12/13, 1/17, 2/8, 2/12, 2/19, 2/20, 2/25	Originally banded vv:aa, 1 aqua band missing on right leg.
vv:aw	ODSVRA 2013 or 2014	SLO	10/14	
vv:gw	ODSVRA 2015 or 2017	SLO	2/15, 2/16, 2/18, 2/26	
vv:vb	ODSVRA 2011 or 2013	SLO	10/2, 10/8, 10/15, 10/23, 10/30, 11/8, 11/11, 2/16, 2/17	On 17 February, bird was captured and taken to PWC. Bands were removed on the left leg due to injury. Released as -:vb in South Oso Flaco on 12 March (Table H.2 in Appendix H).
a:g/o/g	VAFB 2017	Santa Barbara	10/2, 10/14, 10/20, 10/30, 11/11, 12/21	
b:g/o/g	VAFB 2016	Santa Barbara	12/12, 12/15	
no:yo	VAFB 2019	Santa Barbara	10/8	
nr:nb	VAFB 2017	Santa Barbara	11/5	On federal service band on left leg there is exposed metal below red tape.

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

Table D.3. Banded snowy plovers recorded at ODSVRA 1 October 2019 to 29 February 2020 (continued).

Band Combination	Origin and Year Banded	County Banded	Dates Seen	Notes
nr:yg	VAFB 2017	Santa Barbara	10/2, 10/3, 10/10, 10/11, 10/12, 10/15, 10/18, 10/19, 10/21, 10/22, 11/2, 11/10, 11/11, 11/13, 11/18, 11/22, 12/4, 12/8, 12/12, 12/13, 12/26, 12/30, 1/13, 1/17, 2/12, 2/24, 2/25	On federal service band on left leg there is exposed metal above red tape.
vv:av	SB Zoo 2019	Santa Barbara	10/29, 11/6	Came to zoo as eggs from ODSVRA and released at COPR in 2019.
:-y/g	Unknown	Unknown	10/2, 10/8, 10/15, 10/20, 10/23, 10/30, 11/10, 11/11, 11/21, 12/5, 12/15, 2/15, 2/19	
b:-g-	Unknown	Unknown	11/8	On federal service band on left leg there is exposed metal below blue tape.

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

Table D.4. Banded snowy plovers with known origins recorded at ODSVRA 1 March to 30 September 2020.

Juveniles fledged from ODSVRA in 2020 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. (For a description of color band letter codes see Appendix B.)

ODSVRA = Oceano Dunes SVRA, PWC = Pacific Wildlife Care, SLO = San Luis Obispo, VAFB = Vandenberg Air Force Base

F = Female, M = Male

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
g/o:b		Tenmile Creek 2019	Douglas, OR	8/31, 9/16	
g/r:b		Tenmile Creek 2019	Douglas	3/12, 9/3	
b/r:y		New River 2020	Coos	8/21, 9/3	Juvenile.
yg:wl	F	Reservation Road 2016	Monterey	3/7, 3/13, 3/16, 5/29, 6/2, 6/23, 7/2, 7/3, 7/12, 7/23, 8/23, 8/27, 9/8, 9/12, 9/16, 9/17, 9/18, 9/21, 9/29, 9/30	ODSVRA breeding female.
wb:aw		Fort Ord 2020	Monterey	8/12, 8/14	Juvenile.
bb:ar	M & F	ODSVRA 2017 or 2018	SLO	3/24, 4/9, 4/22, 5/6, 5/12, 5/15, 5/26, 6/5, 6/9, 6/10, 6/12, 7/7, 7/9, 7/10, 7/13, 7/15, 7/16	ODSVRA breeding male and female. On 17 June, remains of bb:ar male collected from peregrine falcon predation site (Table H.4. in Appendix H).
bb:ba	F	ODSVRA 2019	SLO	3/10, 3/13, 3/18, 3/20, 3/21, 3/24, 3/25, 3/27, 5/23, 6/2, 6/23, 7/1, 7/8, 7/9, 7/22, 8/7, 8/14, 8/15, 9/3, 9/8, 9/12, 9/15, 9/16, 9/19, 9/29	ODSVRA breeding female.
bb:ga	M & F	ODSVRA 2019	SLO	4/6, 5/15, 5/18, 5/24, 5/28, 5/31, 6/2, 6/5, 6/9, 6/15, 6/16, 6/18, 6/23, 6/29, 7/1, 7/6, 7/9, 7/14, 8/8, 8/11	ODSVRA breeding male and female
bb:go	F	ODSVRA 2019	SLO	4/8, 4/11, 4/12, 4/16, 4/24, 4/29, 5/3, 5/5, 5/6, 5/7, 5/8, 5/23, 6/1, 6/8, 6/9, 6/14, 6/15, 6/22, 6/23, 7/5, 7/12, 7/14	ODSVRA breeding female.
bb:gr		ODSVRA 2012 or 2015	SLO	6/15	
bb:gw		ODSVRA 2018	SLO	4/17, 6/22	
bb:or		ODSVRA 2016 or 2017	SLO	4/29, 5/21, 7/14	
bb:ov	F	ODSVRA 2019	SLO	3/4, 3/7, 3/17, 3/18, 3/20, 3/22, 3/23, 3/25, 4/8, 4/9, 4/10, 4/21, 4/22, 4/23, 4/25, 5/1, 5/2, 5/4, 5/5, 5/22, 6/4, 6/6, 6/10, 6/11, 6/15, 6/18, 6/19, 6/20, 6/23, 6/27, 8/20, 8/23, 8/27, 9/2, 9/5, 9/16, 9/18, 9/20, 9/25, 9/26, 9/27	ODSVRA breeding female.
bb:ow	F	ODSVRA 2015 or 2016	SLO	6/17	ODSVRA breeding female.
bb:pa	M	ODSVRA 2019	SLO	4/11, 4/21, 4/22, 4/23, 4/25, 4/29, 5/1, 5/7, 5/21, 5/25, 5/27, 5/29, 5/31, 6/3, 6/5, 6/6, 6/8, 6/9, 6/10, 6/14, 6/15, 6/16, 6/17, 6/20, 6/22, 6/23, 6/24, 6/26, 6/27, 6/29, 6/30, 7/2, 7/3, 7/6, 7/7, 7/14, 7/23, 7/25, 7/26, 7/27, 7/28, 8/1, 8/2, 8/3, 8/4, 8/6, 8/7, 8/8, 8/9, 8/10, 8/11, 8/12, 8/15, 8/22, 8/30, 9/2, 9/5, 9/10, 9/16, 9/17, 9/18, 9/19, 9/20, 9/22, 9/23, 9/24, 9/28, 9/29	ODSVRA breeding male.
bb:pb	M	ODSVRA 2019	SLO	4/23, 6/6, 6/11, 7/3, 7/24, 7/25, 7/26, 7/28, 7/29	ODSVRA breeding male.
bb:rb		ODSVRA 2015	SLO	3/19	

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

Table D.4. Banded snowy plovers with known origins recorded at ODSVRA 1 March to 30 September 2020 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
bb:rr	M	ODSVRA 2016 or 2017	SLO	3/26, 4/9, 4/12, 4/17, 4/20, 4/22, 4/27, 4/28, 4/30, 5/1, 5/2, 5/5, 5/14, 5/21, 5/23, 5/24, 5/25, 6/2, 6/3, 6/8, 6/10, 6/14, 6/17, 6/21, 6/29, 7/7	ODSVRA breeding male.
bb:w	M	ODSVRA unknown	SLO	5/20, 6/5, 6/6, 6/16	ODSVRA breeding male.
bb:wa		ODSVRA 2019	SLO	6/24, 7/13	
bb:yb	M	ODSVRA 2011, 2013 or 2015	SLO	4/18, 4/19, 4/30, 5/14, 5/19, 5/21, 5/23, 5/31, 6/1, 6/2, 6/6, 6/14, 6/22, 6/23, 7/10, 7/21, 7/25	ODSVRA breeding male.
ga:-	F	ODSVRA unknown	SLO	6/30, 7/4, 7/6, 7/17, 7/21, 7/25, 8/16	ODSVRA breeding female. Previously banded ga:o- with missing right foot. On 30 June, orange band removed on right leg for concern of potential injury. Bird observed with missing foot as ga:o- since 2011 (Table H.2 in Appendix H).
ga:aa		ODSVRA 2019	SLO	4/23, 5/21	
ga:ar	M	ODSVRA 2015	SLO	5/9, 5/10, 5/19, 5/24, 5/25, 6/6, 6/15, 6/19, 7/1, 7/7, 7/12, 7/13, 7/14, 7/16	ODSVRA breeding male.
ga:o	F	ODSVRA Unknown	SLO	5/29, 6/22, 6/23, 6/26, 6/28	Bird missing right foot since 2011 and has been a successful breeder. On 30 June 2020 orange band removed from right leg. Now banded ga:-.
ga:or	M	ODSVRA 2016 or 2017	SLO	3/12, 3/24, 5/21, 5/26, 6/10, 6/16, 6/20, 6/24, 6/26, 6/29, 6/30, 7/11, 7/12, 7/15, 7/16	ODSVRA breeding male.
ga:ow	M	ODSVRA 2013 or 2014	SLO	6/2, 6/9, 6/21, 6/29, 7/1	ODSVRA breeding male.
ga:pr	M & F	ODSVRA 2016 or 2017	SLO	4/18, 4/21, 7/7, 7/10, 7/14, 7/15, 7/20, 7/22, 8/11, 8/15, 8/22, 8/28, 8/29, 8/30, 9/4	ODSVRA breeding male and female.
ga:py	F	ODSVRA 2011	SLO	7/21, 7/28, 7/29, 8/3, 8/19, 8/20, 8/21, 8/22, 8/27, 8/29, 8/30, 9/9, 9/10, 9/12	ODSVRA breeding female. Bird originally banded vv:aa as chick in 2011 at ODSVRA. On 21 July, bands removed due to wear and band loss and replaced with unique combination ga:py.
ga:rg		ODSVRA 2015 or 2016	SLO	4/12	
ga:ry	F	ODSVRA 2017	SLO	4/13, 4/25, 4/27, 7/1, 7/7, 7/12, 7/13, 7/14, 7/16, 7/25, 7/26, 8/19, 9/25	ODSVRA breeding female.
ga:wr	M	ODSVRA 2015 or 2016	SLO	3/17, 5/4, 5/27, 6/2, 6/10, 6/24, 7/1	ODSVRA breeding male.
ga:ww	M (2)	ODSVRA 2016 or 2017	SLO	4/17, 4/24, 4/25, 4/27, 4/29, 5/1, 5/3, 5/4, 5/5, 5/9, 5/12, 5/17, 5/18, 5/21, 5/22, 5/23, 5/29, 5/31, 6/2, 6/4, 6/8, 6/14, 6/15, 6/21, 6/22, 6/24, 6/29, 6/30, 7/13, 7/16, 7/18, 7/23, 7/25, 7/27, 7/29, 8/2, 8/3, 8/4, 8/10, 8/11, 8/12, 8/14, 8/15, 8/30, 8/31, 9/7	ODSVRA breeding males (2).
ga:wy	F	ODSVRA 2018	SLO	3/5, 3/11, 3/14, 3/19, 3/21, 3/22, 3/23, 3/25, 4/16, 5/8, 5/11, 5/12, 6/2, 6/10, 6/12, 6/13, 6/16, 6/18, 6/19, 6/23, 7/28, 7/29, 8/15, 8/19, 9/10, 9/11, 9/15, 9/20, 9/28	ODSVRA breeding female.
ga:yb		ODSVRA 2017 or 2018	SLO	5/7, 7/1, 7/15, 7/20	
gg:av		ODSVRA 2019	SLO	8/13	
gg:ay	M	ODSVRA 2012 or 2013	SLO	5/25, 6/26, 6/27, 6/29, 7/13, 7/16, 7/23, 7/26	ODSVRA breeding male.

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

Table D.4. Banded snowy plovers with known origins recorded at ODSVRA 1 March to 30 September 2020 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
gg:bb	M	ODSVRA 2018	SLO	4/10, 4/27, 4/28, 4/30, 5/5, 5/8, 5/12, 5/22, 5/26, 5/27, 5/30, 5/31, 6/2, 6/3, 6/4, 6/6, 6/8, 6/9, 6/10, 6/23, 6/29, 7/2, 7/13, 7/17, 7/19, 7/20, 8/2, 8/3, 8/4, 8/10, 8/14, 8/15	ODSVRA breeding male.
gg:bo		ODSVRA 2019	SLO	3/25, 4/29, 6/21	
gg:gb		ODSVRA 2016 or 2018	SLO	5/18	
gg:gr	F	ODSVRA 2011 or 2013	SLO	4/18, 5/26, 6/6, 7/5	ODSVRA breeding female.
gg:oa	F	ODSVRA 2019	SLO	5/17, 5/21, 5/24, 5/29, 7/3, 7/10, 7/12, 7/13	ODSVRA breeding female.
gg:ob	M	ODSVRA 2019	SLO	3/5, 3/7, 3/15, 3/20, 3/21, 3/23, 3/24, 3/26, 3/27, 4/3, 4/4, 4/12, 4/22, 4/23, 4/27, 4/30, 5/1, 5/10, 5/11, 5/12, 5/14, 5/18, 5/19, 5/21, 5/22, 5/24, 5/25, 6/1, 6/2, 6/3, 6/5, 6/6, 6/9, 6/10, 6/14, 6/15, 6/16, 6/22, 6/23, 6/30, 7/7, 7/15, 8/17, 9/5, 9/10, 9/16, 9/17, 9/18, 9/19, 9/20, 9/25	ODSVRA breeding male.
gg:or	M	ODSVRA 2014 or 2015	SLO	3/3, 4/25, 4/26, 4/29, 5/2, 5/6, 5/7, 5/13, 6/23, 6/26, 7/13, 7/18, 7/21, 8/3, 8/10, 8/20	ODSVRA breeding male.
gg:oy	F	ODSVRA 2018	SLO	6/6, 7/3, 7/7, 7/9, 7/22, 8/7	ODSVRA breeding female.
gg:rb	M (2)	ODSVRA 2016 or 2018	SLO	3/7, 3/17, 3/23, 3/24, 4/4, 4/9, 4/10, 4/11, 4/16, 4/18, 4/20, 4/22, 4/23, 4/24, 4/25, 4/26, 4/29, 4/30, 5/4, 5/5, 5/11, 5/12, 5/13, 5/14, 5/15, 5/19, 5/25, 5/26, 5/29, 5/31, 6/3, 6/5, 6/8, 6/10, 6/14, 6/15, 6/22, 6/23, 6/26, 6/28, 7/4, 7/6, 7/8, 7/10, 7/13, 7/14, 7/16, 7/17, 7/19, 7/20, 7/23, 7/25, 7/26, 7/30, 8/4, 8/12, 8/13, 8/14, 8/17, 8/19, 8/20, 8/28, 8/29, 9/1, 9/2, 9/12, 9/16, 9/17, 9/18, 9/19, 9/29	ODSVRA breeding males (2).
gg:ww	M (2)	ODSVRA 2018	SLO	3/17, 3/23, 4/9, 4/15, 4/16, 4/17, 4/22, 4/23, 4/25, 4/30, 5/1, 5/2, 5/3, 5/4, 5/6, 5/7, 5/9, 5/14, 5/19, 5/20, 5/21, 5/23, 5/26, 5/29, 5/31, 6/1, 6/2, 6/3, 6/5, 6/10, 6/22, 6/23, 6/24, 6/25, 6/26, 6/27, 6/29, 7/1, 7/2, 7/3, 7/7, 7/8, 7/9, 7/10, 7/13, 7/14, 7/18, 7/19, 7/22, 7/23, 7/24, 7/26, 7/28, 7/30, 8/3, 8/15, 9/24	ODSVRA breeding males (2).
gg:yb	F	ODSVRA 2019	SLO	4/10, 6/9	ODSVRA breeding female.
gg:yy		ODSVRA 2018	SLO	3/30, 4/9	
pg:ag	M (2)	ODSVRA 2019	SLO	4/17, 4/19, 4/21, 4/23, 4/26, 4/29, 5/4, 5/5, 5/6, 5/8, 5/18, 5/19, 5/21, 5/25, 5/28, 6/5, 6/6, 6/8, 6/10, 6/14, 6/15, 6/16, 6/17, 6/18, 6/20, 6/21, 6/22, 6/27, 6/29, 6/30, 7/1, 7/3, 7/5, 7/6, 7/7, 8/7, 8/14, 8/16, 8/22, 9/3, 9/4, 9/27	ODSVRA breeding males (2).
pg:ar	M	ODSVRA 2014	SLO	3/5, 3/13, 6/14, 7/21, 7/22, 7/26, 7/28, 8/11, 8/16, 8/20, 8/27, 8/29, 9/7, 9/9, 9/12, 9/16, 9/17, 9/18	ODSVRA breeding male.
pg:bg		ODSVRA 2015 or 2016	SLO	4/28	

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

Table D.4. Banded snowy plovers with known origins recorded at ODSVRA 1 March to 30 September 2020 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
pg:by	M (3)	ODSVRA 2017 or 2018	SLO	3/12, 4/27, 4/30, 5/2, 5/4, 5/12, 5/25, 5/30, 6/2, 6/9, 6/20, 6/29, 6/30, 7/9, 7/16, 7/22, 8/4, 8/6, 8/8, 8/12, 8/13, 8/14, 8/15, 8/16, 8/22, 9/3, 9/25	ODSVRA breeding males (3).
pg:ow	M & F	ODSVRA 2015 or 2016	SLO	3/24, 4/20, 4/29, 5/9, 6/4, 7/14, 7/15, 7/23, 7/24, 7/27, 8/8, 8/14, 8/16, 8/28, 8/29, 9/3, 9/5, 9/7, 9/15, 9/29	ODSVRA breeding male and female.
pg:pb		ODSVRA 2014 or 2015	SLO	6/18, 7/25, 8/14, 8/15, 8/17, 8/28, 9/5	
pg:pg		ODSVRA 2014 or 2015	SLO	3/17	
pg:rg		ODSVRA 2018	SLO	4/28	
pg:vb	M	ODSVRA 2015 or 2016	SLO	5/29, 6/1, 6/2, 6/10, 6/17, 6/29	ODSVRA breeding male.
pg:vg		ODSVRA 2014 or 2015	SLO	6/24	
pg:vr	F	ODSVRA 2018	SLO	3/24, 4/14, 6/20, 8/16, 9/3, 9/5	ODSVRA breeding female.
pg:yb	M	ODSVRA 2015 or 2017	SLO	4/17, 5/6, 5/13, 5/25, 6/24, 6/25, 7/3, 7/12	ODSVRA breeding male.
pv:aw	F	ODSVRA 2016 or 2017	SLO	4/16, 4/28, 5/2, 5/27, 5/29, 6/22, 7/1, 7/2, 7/5, 7/7, 7/8, 7/11, 7/12, 7/14, 8/11, 8/22, 8/29, 9/3, 9/4, 9/7	ODSVRA breeding female.
pv:by	F	ODSVRA 2015	SLO	3/12, 3/24, 4/25, 5/18, 6/4, 7/20, 7/22	ODSVRA breeding female.
pv:ob	M	ODSVRA 2015 or 2017	SLO	5/29, 5/30, 6/5, 7/3, 7/8, 7/13, 7/15, 7/22, 7/23, 7/25, 7/26, 7/28, 8/4, 8/16, 8/17, 8/23, 9/2, 9/4, 9/5, 9/9, 9/16, 9/19, 9/21, 9/24, 9/27, 9/28, 9/30	ODSVRA breeding male.
pv:og	M	ODSVRA 2018	SLO	3/23, 5/31, 6/2, 6/4, 6/5, 6/6, 6/10, 6/16, 6/18, 6/22, 6/25, 6/28, 7/2, 7/5, 7/7, 7/9, 7/13, 7/22, 7/26, 7/27, 8/2, 8/3, 8/4, 8/6, 8/7, 8/8, 8/12, 8/14, 8/15, 8/19, 8/22	ODSVRA breeding male.
pv:rb	M	ODSVRA 2016	SLO	5/21, 5/22, 5/24, 5/26, 6/1, 6/17, 7/1, 7/13, 7/26, 8/15, 9/30	ODSVRA breeding male.
pv:wy	M	ODSVRA 2014 or 2015	SLO	5/3, 5/23, 5/24, 6/24, 6/29, 7/24, 8/15, 9/3, 9/4, 9/25	ODSVRA breeding male.
pv:yb	M	ODSVRA 2012	SLO	6/10, 7/24, 7/31, 8/9, 8/10	ODSVRA breeding male.
rr:ab	M	ODSVRA 2016 or 2017	SLO	5/5, 5/11, 5/14, 5/15, 5/17, 5/18, 5/19, 5/20, 5/30, 6/5, 6/14, 6/15, 6/21, 6/23, 7/1	ODSVRA breeding male.
rr:aw	M	ODSVRA 2017	SLO	7/8, 7/20, 7/26, 8/3, 8/9, 8/15, 8/16, 8/29, 8/31, 9/7	ODSVRA breeding male.
rr:bb	F	ODSVRA 2016 or 2017	SLO	3/2, 3/3, 3/5, 3/16, 3/17, 3/21, 4/4, 4/10, 4/11, 5/6, 5/14, 5/20, 5/21, 6/13, 6/22, 7/5, 7/6, 7/7, 7/8, 7/9, 7/13, 7/14, 7/23, 8/7, 9/1, 9/3, 9/16, 9/29	ODSVRA breeding female.
rr:bw	M & F	ODSVRA 2016 or 2017	SLO	3/5, 3/19, 3/31, 4/10, 4/28, 4/29, 5/2, 5/14, 5/22, 5/23, 6/1, 6/2, 6/3, 6/4, 6/7, 6/14, 6/15, 6/17, 6/22, 7/1, 7/13, 7/14, 7/18, 7/30, 8/15	ODSVRA breeding male and female.
rr:or	M	ODSVRA 2010	SLO	5/27, 6/2, 6/22, 7/29, 8/1, 8/6	ODSVRA breeding male.
rr:pw		ODSVRA 2014	SLO	7/19, 7/21, 7/24, 8/7, 8/8, 8/11, 8/14, 8/16, 9/5	
vg:ar		ODSVRA 2018	SLO	8/15, 8/28, 8/29, 8/30, 8/31, 9/3, 9/5	
vg:aw		ODSVRA 2011 or 2013	SLO	9/3	

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

Table D.4. Banded snowy plovers with known origins recorded at ODSVRA 1 March to 30 September 2020 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
vg:ay	M	ODSVRA 2018	SLO	3/2, 3/3, 3/5, 3/17, 3/21, 4/4, 4/10, 4/28, 4/29, 5/6, 5/21, 5/27, 6/2, 6/18, 6/20, 6/22, 6/23, 6/24, 6/25, 6/26, 6/27, 7/1, 7/4, 7/5, 7/6, 7/7, 7/9, 7/13, 7/15, 8/20, 8/22, 8/23, 9/8, 9/15, 9/16, 9/17, 9/19, 9/29	ODSVRA breeding male.
vg:ba		ODSVRA 2019	SLO	4/24, 4/25, 4/27, 4/28, 5/1, 5/5, 5/16, 5/17, 5/20, 5/21, 5/23, 6/18, 6/19, 6/21, 6/22, 6/24, 6/26, 6/27, 6/29, 8/19	
vg:bw	M & F	ODSVRA 2016 or 2017	SLO	3/7, 3/17, 4/15, 4/16, 5/6, 5/16, 5/17, 5/23, 5/26, 6/6, 6/9, 6/14, 6/18, 6/27, 6/29, 7/12, 7/15, 7/16, 8/10, 8/15, 8/28, 8/29, 8/31, 9/2, 9/4, 9/16, 9/17, 9/18, 9/19, 9/25, 9/29	ODSVRA breeding male and female.
vg:by		ODSVRA 2012 or 2013	SLO	5/13, 6/22, 9/3	
vg:gr	F	ODSVRA 2017	SLO	6/4	ODSVRA breeding female.
vg:pg	M	ODSVRA 2018	SLO	4/21, 4/29, 5/1, 5/2, 5/7, 6/24, 6/25, 6/26, 7/9, 7/10	ODSVRA breeding male. On 4 May, bird was captured and taken to PWC and fine hairs were removed from both legs. Bird released at ODSVRA on the same day (Table H.2 in Appendix H).
vg:rb		ODSVRA 2017 or 2018	SLO	3/19	
vg:rg	F (2)	ODSVRA 2017 or 2018	SLO	4/18, 5/7	ODSVRA breeding females (2).
vg:rw	M	ODSVRA 2018	SLO	4/10, 4/18, 4/22, 5/26, 6/15, 7/14, 7/15	ODSVRA breeding male.
vg:vg	F	ODSVRA 2018	SLO	6/1, 6/10, 7/21, 8/11	ODSVRA breeding female.
vg:vy	M	ODSVRA 2015 or 2016	SLO	5/11, 5/17, 5/19, 5/20, 5/27, 6/10, 6/15, 7/24	ODSVRA breeding male.
vg:wg		ODSVRA 2017	SLO	7/21, 7/31	
vg:yg	M	ODSVRA 2018	SLO	6/9, 6/17, 6/22, 7/25, 7/27	ODSVRA breeding male.
vg:yy	F	ODSVRA 2016 or 2018	SLO	3/16, 3/17, 4/9, 5/25, 6/10, 7/4, 7/8	ODSVRA breeding female.
vv:a	F	ODSVRA 2011	SLO	6/8, 6/14, 6/16, 6/17, 6/20, 6/22, 6/23	ODSVRA breeding female. Bird originally banded vv:aa as chick in 2011 at ODSVRA. On 21 July, bands removed and replaced with ga:py due to wear and band loss and replaced with unique combination ga:py. Seen multiple times after this date.
vv:ab	F	ODSVRA 2017 or 2018	SLO	4/16, 4/18, 4/22, 4/28, 5/9, 6/2, 7/8, 7/13, 7/14, 7/15	ODSVRA breeding female.
vv:ag		ODSVRA 2018	SLO	6/18	
vv:ay		ODSVRA 2018	SLO	5/17, 7/19, 7/26, 8/8, 8/24, 8/31, 9/5, 9/25	
vv:bw		ODSVRA 2014 or 2015	SLO	3/26, 5/23, 6/12, 6/15	
vv:gw	F	ODSVRA 2015 or 2017	SLO	7/15, 7/16	ODSVRA breeding female.
vv:wr	M	ODSVRA 2015 or 2016	SLO	4/29, 7/14, 8/6	ODSVRA breeding male.
vv:ww	M	ODSVRA 2018	SLO	4/22, 5/26, 5/30, 5/31, 6/1, 6/4, 6/9, 6/10, 6/20, 6/22, 6/30	ODSVRA breeding male.
vv:yg	M	ODSVRA 2013 or 2015	SLO	4/29, 5/3, 5/9, 5/16, 5/24, 6/22, 6/26, 7/7, 7/9, 7/13, 7/21	ODSVRA breeding male.

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

Table D.4. Banded snowy plovers with known origins recorded at ODSVRA 1 March to 30 September 2020 (continued).

Band Combination	Sex (#)	Origin and Year Banded	County Banded	Dates Seen	Notes
a:g/o/g		VAFB 2017	Santa Barbara	5/11, 5/14, 5/21, 8/5	
gn:rr	M	VAFB 2017	Santa Barbara	5/15, 5/18, 5/24, 5/31, 6/1, 6/4, 6/9, 6/10, 6/15, 6/16, 6/22, 6/26, 7/6	ODSVRA breeding male. On federal service band on left leg there is exposed metal above brown tape.
gn:ww		VAFB 2020	Santa Barbara	7/21, 7/24, 7/28, 8/14, 8/15, 8/16	Juvenile.
nb:oy	M & F	VAFB 2016	Santa Barbara	4/17, 4/21, 4/22, 4/24, 5/16, 5/19, 5/26, 5/30, 6/9, 6/17, 6/19, 7/1, 7/14, 7/15, 7/25	ODSVRA breeding male and female.
no:ay		VAFB 2020	Santa Barbara	7/23	Juvenile.
nr:br	F	VAFB 2016	Santa Barbara	4/11, 4/27, 5/26, 5/28, 5/29, 6/2, 6/5, 6/11, 7/8	ODSVRA breeding female. On federal service band on left leg there is exposed metal below red tape.
nr:wb	M	VAFB 2016	Santa Barbara	3/24, 5/4, 5/25, 6/10, 6/11, 6/24, 6/29, 7/12, 8/8, 8/14, 9/7, 9/15	ODSVRA breeding male.
nr:yg	F	VAFB 2017	Santa Barbara	4/28	ODSVRA breeding female. On federal service band on left leg there is exposed metal above red tape.
nw:yy		VAFB 2020	Santa Barbara	7/25	Juvenile.
ny:wg	M	VAFB 2017	Santa Barbara	4/28, 5/29, 6/2, 6/9, 7/8, 8/10, 8/12	ODSVRA breeding male.
ny:wl		VAFB 2020	Santa Barbara	9/16, 9/17, 9/18, 9/20	
Pw:yp	F	Camp Pendleton 2019	San Diego	5/17, 5/21, 5/24, 6/28, 6/29, 6/30, 7/1, 7/2	ODSVRA breeding female.
-:y/g	M	Unknown	Unknown	6/17, 7/7, 7/15	ODSVRA breeding male.
b:g	F	Unknown	Unknown	7/28, 8/15	ODSVRA breeding female. On federal service band on left leg there is exposed metal below blue tape.

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 October 2019 to 29 February 2020.

This is a partial list based on information received from a coordinated effort throughout the range of monitors and managers to share band sightings. ODSVRA bands chicks to brood and some bands have been used multiple years and it is possible to have more than one bird with the same combination. (For a description of color band letter codes see Appendix B.)

Guadalupe RP = Guadalupe Restoration Project, SB = State Beach, SLO = San Luis Obispo, RGDCP = Rancho Guadalupe Dunes County Park, VAFB = Vandenberg Air Force Base

Band Combination	Year Banded	Location Seen	County	Dates Seen
ga:or	2016 or 2017	Salmon Creek Beach	Sonoma, CA	1/14
pv:ag	2015 or 2016	Dillon Beach	Marin	1/17
vv:or	2015 or 2016	Point Reyes National Seashore	Marin	1/15
bb:gr	2012 or 2015	Seabright SB	Santa Cruz	12/26
ga:pb	2016 or 2017	San Carpoforo	SLO	11/12, 1/14, 1/22, 2/6, 2/18
gg:ar	2011	San Carpoforo	SLO	12/31, 1/22
vg:ar	2018	San Carpoforo	SLO	10/15, 10/29, 11/5, 2/6, 2/18
gg:pb	2012 or 2013	Arroyo De La Cruz	SLO	10/28, 10/29
pv:gy	2018	Arroyo De La Cruz	SLO	2/29
vv:gw	2015 or 2017	Arroyo De La Cruz	SLO	10/29
gg:pb	2012 or 2013	Arroyo Laguna	SLO	10/1, 10/6, 12/5
gg:pr	2017	Arroyo Laguna	SLO	10/29, 12/10
gg:yb	2019	Arroyo Laguna	SLO	10/29, 12/5, 12/10, 1/3
pv:gw	2015 or 2017	Arroyo Laguna	SLO	10/6
vv:gw	2015 or 2017	Arroyo Laguna	SLO	11/12, 12/5, 1/3
gg:pb	2012 or 2013	Santa Rosa Creek	SLO	1/3, 1/14, 1/22, 2/6, 2/8
gg:pr	2017	Santa Rosa Creek	SLO	1/3, 2/6
gg:yb	2019	Santa Rosa Creek	SLO	1/2
pv:gy	2018	Santa Rosa Creek	SLO	10/29, 11/12, 12/10, 1/3, 2/7, 2/11, 2/18
bb:ar	2017 or 2018	Villa Creek	SLO	10/1, 10/8, 10/15, 10/18, 10/22, 10/29, 11/4, 12/14, 12/17, 1/7, 1/21, 2/5, 2/18, 2/23
gg:oa	2019	Villa Creek	SLO	10/29, 11/4, 11/12, 11/26, 12/10, 12/17, 1/7, 1/21, 2/5, 2/18, 2/23
gg:ob	2019	Villa Creek	SLO	2/26
gg:oa	2019	Morro Strand SB	SLO	11/19
gg:yb	2019	Morro Strand SB	SLO	1/21, 1/22
pg:ag	2019	Morro Strand SB	SLO	10/1, 10/8, 2/9
rr:ag	2017	Morro Strand SB	SLO	10/1, 11/26, 12/5, 12/17
vg:vv	2019	Morro Strand SB	SLO	11/19, 12/17
b-:ao (formally bb:ao)	2019	Morro Bay Sandspit	SLO	10/1, 10/22, 11/5, 11/19, 12/5
bb:go	2019	Morro Bay Sandspit	SLO	11/26
gg:og	2013 or 2014	Morro Bay Sandspit	SLO	10/1, 10/10, 10/15, 10/22, 10/24, 11/19
pg:ag	2019	Morro Bay Sandspit	SLO	11/19, 11/26, 12/10, 2/18
rr:ag	2017	Morro Bay Sandspit	SLO	10/10, 1/14
pg:by	2015 or 2016	Guadalupe RP	SLO	1/14
vg:rg	2017 or 2018	Guadalupe RP	SLO	1/14
ga:wa	2019	RGDCP	Santa Barbara	1/14
pv:yb	2012	RGDCP	Santa Barbara	1/14
bb:wa	2019	VAFB	Santa Barbara	10/9
ga:pb	2016 or 2017	VAFB	Santa Barbara	10/9
pv:yr	2017 or 2018	VAFB	Santa Barbara	10/9, 2/16, 2/25, 2/28

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 October 2019 to 29 February 2020 (continued).

Band Combination	Year Banded	Location Seen	County	Dates Seen
vg:ag	2017 or 2018	VAFB	Santa Barbara	12/2, 12/31, 1/18, 2/3, 2/6, 2/28
ga:aw	2018	Jalama Beach	Santa Barbara	10/10
pv:yr	2017 or 2018	Jalama Beach	Santa Barbara	10/10
vv:ab	2017 or 2018	Hollister Ranch	Santa Barbara	1/6
gg:oy	2018	Point Mugu	Ventura	10/18, 11/14, 12/27
bb:pa	2019	Zuma Beach	Los Angeles	11/8, 12/6, 12/19, 1/24, 2/17, 2/21
vv:yv	2019	Zuma Beach	Los Angeles	10/4, 11/1, 11/8, 11/14, 12/6
vg:vr	2018	San Clemente SB	Orange	11/15
bb:vb	2011, 2013 or 2014	Camp Pendleton	San Diego	11/13, 11/19, 11/26, 1/8, 1/15, 1/22, 1/29, 2/5, 2/12, 2/19, 2/25
gg:pg	2018	Camp Pendleton	San Diego	2/25
pg:vb	2015 or 2016	Silver Strand SB	San Diego	11/11
gg:va	2019	Bahia Todos Santos	Baja California, Mexico	1/17
gg:ww	2018	Bahia Todos Santos	Baja California	10/18

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

Table D.6. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2020.

This is a partial list based on information received from a coordinated effort throughout the range of monitors and managers to share band sightings. ODSVRA is banding chicks to brood and some combinations have been used multiple years so it is possible to have more than one bird with the same combination. Guadalupe NWR = Guadalupe-Nipomo Dunes National Wildlife Refuge, Guadalupe RP = Guadalupe Restoration Project, SB = State Beach, SLO = San Luis Obispo, RGDCP = Rancho Guadalupe Dunes County Park, VAFB = Vandenberg Air Force Base
M = male, F = female

Band Combination	Year Banded	Sex	Location Seen	County	Dates Seen	Notes
bb:ob	2014 or 2016		Tenmile Creek	Douglas, OR	8/8	
ga:or	2016 or 2017		Salmon Creek SB	Sonoma, CA	8/22	
bb:bo	2020		Eden Landing	Alameda	8/18	Juvenile.
pv:yb	2012		Eden Landing	Alameda	8/17, 8/25, 9/1, 9/8, 9/10, 9/15, 9/16, 9/29	
rr:ag	2017		Eden Landing	Alameda	3/5, 4/20, 5/19, 5/25, 6/1, 6/8	
vg:ar	2018		San Carpoforo	SLO	3/19, 3/26, 4/2	
vg:ar	2018		Point Sierra Nevada Beach	SLO	3/19	
pv:gy	2018		Arroyo De La Cruz	SLO	3/5	
ga:ba	2020		Arroyo Laguna	SLO	8/13	Juvenile.
ga:by	2020		Arroyo Laguna	SLO	9/1	Juvenile.
gg:pb	2012 or 2013		Arroyo Laguna	SLO	8/3, 8/6, 8/11, 8/13, 8/15, 8/18, 8/26, 9/1, 9/8, 9/17, 9/22	
gg:pr	2017		Arroyo Laguna	SLO	8/3, 8/6	
gg:yb	2019		Arroyo Laguna	SLO	3/26, 4/9	
vv:gw	2015 or 2017		Arroyo Laguna	SLO	9/17, 9/22	
pv:gy	2018		Santa Rosa Creek	SLO	3/5, 8/3, 9/1, 9/17, 9/22	
vg:ab	2020		Santa Rosa Creek	SLO	8/3	Juvenile.
bb:ar	2017 or 2018		Villa Creek	SLO	3/2, 3/3, 3/4, 3/6, 3/13, 3/20, 7/11, 8/8, 8/10, 8/11, 8/12, 8/13, 8/14, 8/15, 8/17, 8/19, 8/21, 8/24, 8/25, 9/1, 9/3, 9/8, 9/10, 9/15, 9/20, 9/22, 9/24	
gg:oa	2019		Villa Creek	SLO	3/2, 3/5, 3/6, 3/18, 3/19, 3/20, 3/24, 3/25, 3/26, 3/29, 4/6, 4/8, 4/10, 4/17, 4/20, 4/24, 5/4, 5/5, 5/7, 7/15, 7/16, 7/21, 7/24, 7/25, 7/30, 7/31, 8/3, 8/4, 8/5, 8/6, 8/8, 8/10, 8/11, 8/12, 8/14, 8/15, 8/17, 8/21, 8/24, 8/26, 9/1, 9/2, 9/3, 9/8, 9/10, 9/15, 9/17, 9/22	
bb:ag	2020		Morro Strand SB	SLO	6/27, 6/30, 7/4, 7/9	Juvenile.
bb:ar	2017 or 2018		Morro Strand SB	SLO	8/28	
bb:ga	2019		Morro Strand SB	SLO	4/17, 4/21, 4/23, 4/27, 4/28, 5/7, 5/8	
bb:ww	2020		Morro Strand SB	SLO	8/1, 8/4, 8/6	Juvenile.
ga:ba	2020		Morro Strand SB	SLO	8/14, 8/18	Juvenile.
ga:by	2020		Morro Strand SB	SLO	8/4, 8/5, 8/7, 8/18, 8/21, 8/28	Juvenile.
gg:ob	2019		Morro Strand SB	SLO	3/2, 3/3	
rr:ag	2017		Morro Strand SB	SLO	7/8, 7/13, 7/18, 7/21, 7/22, 7/23, 8/1, 8/3, 8/5, 8/6, 8/8, 8/11, 8/16, 8/17, 8/19, 8/24, 8/28, 9/1	
vg:ab	2020		Morro Strand SB	SLO	8/5	Juvenile.
vg:by	2012 or 2013		Morro Strand SB	SLO	8/28	
vg:ya	2020		Morro Strand SB	SLO	8/24, 8/25, 8/28, 9/10	Juvenile.

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

Table D.6. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2020 (continued).

Band Combination	Year Banded	Sex	Location Seen	County	Dates Seen	Notes
vv:gw	2015 or 2017		Morro Strand SB	SLO	8/3, 8/5, 8/6, 8/8, 8/11, 8/18, 8/19, 8/28, 9/1	
vv:or	2015 or 2016	M	Morro Strand SB	SLO	3/4, 3/19, 3/20, 3/23, 3/24, 3/27, 3/30, 4/2, 4/6, 4/9, 4/13, 4/14, 4/15, 4/17, 4/20, 4/21, 4/23, 4/27, 5/10, 5/11, 5/12, 5/13, 5/18, 5/19, 5/20, 5/23, 5/28, 5/30, 6/1, 6/7, 6/9, 6/16, 6/20, 6/22, 6/24, 6/25, 6/27, 6/30, 7/1, 7/6, 7/7, 7/9, 7/10, 7/15, 7/17, 7/29, 7/31, 8/1, 8/2	Morro Strand SB breeding male.
vv:ra	2020		Morro Strand SB	SLO	8/19	Juvenile.
vv:rv	2020		Morro Strand SB	SLO	8/4, 8/6, 8/8	Juvenile.
vv:vo	2020		Morro Strand SB	SLO	8/3, 8/4, 8/5, 8/6	Juvenile.
bb:ww	2020		Morro Strand SB	SLO	8/1	Juvenile.
bb:ag	2020		Morro Bay Sandspit	SLO	8/12	Juvenile.
bb:ar	2017 or 2018		Morro Bay Sandspit	SLO	9/17	
bb:bo	2020		Morro Bay Sandspit	SLO	9/3, 9/22	Juvenile.
bb:wg	2020		Morro Bay Sandspit	SLO	7/14	Juvenile.
ga:av	2020		Morro Bay Sandspit	SLO	9/11	Juvenile.
ga:by	2020		Morro Bay Sandspit	SLO	8/16	Juvenile.
ga:pv	2020		Morro Bay Sandspit	SLO	9/22, 9/24	Juvenile.
gg:oa	2019		Morro Bay Sandspit	SLO	5/12	
gg:pb	2012 or 2013	F	Morro Bay Sandspit	SLO	3/3, 3/16, 3/17, 3/19, 3/20, 3/23, 4/3, 4/14, 4/15, 4/21, 5/12, 5/14, 5/16, 5/18, 5/26, 5/29, 6/2, 6/3, 6/5, 6/9, 6/20, 6/24, 6/25, 6/26, 6/27, 7/3, 7/23	Morro Bay Sandspit breeding female.
pg:ag	2019		Morro Bay Sandspit	SLO	3/5, 3/6, 3/17, 3/24, 4/2, 4/3	
pv:gb	2020		Morro Bay Sandspit	SLO	9/22, 9/24	Juvenile.
vg:ab	2020		Morro Bay Sandspit	SLO	7/31	Juvenile.
vv:or	2015 or 2016		Morro Bay Sandspit	SLO	5/5	
vv:ra	2020		Morro Bay Sandspit	SLO	8/18, 9/11, 9/17, 9/23	Juvenile.
bb:ba	2019		Guadalupe NWR	SLO	5/26, 6/16	
bb:bw	2018		Guadalupe NWR	SLO	4/7, 5/12, 5/26, 6/4, 6/16	
bb:or	2016 or 2017	M	Guadalupe NWR	SLO	6/4, 6/11, 6/30	Guadalupe NWR breeding male.
ga:aa	2019		Guadalupe NWR	SLO	5/14, 5/19	
ga:or	2016 or 2017		Guadalupe NWR	SLO	7/14	
ga:pr	2016 or 2017		Guadalupe NWR	SLO	3/26, 4/2, 4/16, 6/23, 6/30	
ga:wr	2015 or 2016		Guadalupe NWR	SLO	5/19, 7/14	
gg:og	2013 or 2014		Guadalupe NWR	SLO	5/19	
gg:ol	2019		Guadalupe NWR	SLO	6/4, 6/11, 6/30	
gg:yr	2017 or 2018		Guadalupe NWR	SLO	3/18	
pg:ag	2019		Guadalupe NWR	SLO	4/16, 5/19	
pg:by	2017 or 2018		Guadalupe NWR	SLO	3/18, 4/7, 4/16	
pg:ow	2015 or 2016		Guadalupe NWR	SLO	5/19	
pg:vr	2018		Guadalupe NWR	SLO	6/30, 7/14	
pg:yb	2015 or 2017		Guadalupe NWR	SLO	3/12, 5/19	
pv:ob	2015 or 2017		Guadalupe NWR	SLO	3/18, 4/2, 4/7, 5/5, 5/19, 6/30	
pv:yb	2012		Guadalupe NWR	SLO	7/14	

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

Table D.6. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2020 (continued).

Band Combination	Year Banded	Sex	Location Seen	County	Dates Seen	Notes
rr:pw	2014		Guadalupe NWR	SLO	3/18, 3/26, 4/2, 4/7, 5/26	
vg:bb	2011, 2013 or 2014		Guadalupe NWR	SLO	4/7	
vg:bv	2020		Guadalupe NWR	SLO	7/14	Juvenile.
vg:rg	2017 or 2018		Guadalupe NWR	SLO	4/7	
bb:bb	2018		Guadalupe RP	SLO	3/2, 3/13, 3/18, 3/25, 4/24, 5/19, 5/28, 6/11, 7/2, 7/7, 7/9	
bb:gw	2018		Guadalupe RP	SLO	5/19, 6/4	
bb:rb	2015		Guadalupe RP	SLO	6/25	
bb:wa	2019		Guadalupe RP	SLO	3/25	
ga:gr	2015 or 2016		Guadalupe RP	SLO	3/2, 3/4, 3/18, 4/7, 5/12	
ga:pr	2016 or 2017		Guadalupe RP	SLO	3/2	
ga:pw	2014 or 2015		Guadalupe RP	SLO	3/13, 3/18	
gg:av	2019		Guadalupe RP	SLO	3/4, 3/18, 3/25, 4/16, 4/21, 5/7, 5/12, 5/28, 6/2, 6/4, 6/9	
gg:bo	2019		Guadalupe RP	SLO	6/16	
gg:yr	2017 or 2018		Guadalupe RP	SLO	3/2, 3/18, 3/25, 4/27, 5/21, 5/26, 6/4, 6/18, 6/30	
pv:yr	2017 or 2018		Guadalupe RP	SLO	4/14, 5/28, 6/2, 6/4, 6/23, 6/25, 7/9, 7/16	
vg:ab	2020		Guadalupe RP	SLO	7/14, 7/16	Juvenile.
vv:gy	2014		Guadalupe RP	SLO	3/2	
vv:vg	2020		Guadalupe RP	SLO	7/16	Juvenile.
bb:vw	2018		RGDCP	Santa Barbara	3/25, 4/1	
ga:wa	2019		RGDCP	Santa Barbara	3/20	
gg:ol	2019		RGDCP	Santa Barbara	7/15	
bb:ag	2020		VAFB	Santa Barbara	7/24	Juvenile.
bb:ba	2019		VAFB	Santa Barbara	6/2, 6/18, 6/23, 7/9	
bb:bo	2020		VAFB	Santa Barbara	6/29	Juvenile.
bb:bw	2018		VAFB	Santa Barbara	6/29	
bb:gl	2020		VAFB	Santa Barbara	7/2	Juvenile.
bb:or	2016 or 2017	F	VAFB	Santa Barbara	3/23, 4/6, 4/8, 4/13, 4/17, 5/8, 5/20, 6/3, 6/24, 6/30, 7/7, 7/14, 7/17	VAFB breeding female.
bb:vw	2018		VAFB	Santa Barbara	7/16	
bb:wa	2019	F	VAFB	Santa Barbara	3/12, 3/27, 4/6, 4/16, 4/21, 5/5, 5/8, 5/12, 5/19, 5/29, 6/3, 6/4, 6/5, 6/9, 6/23, 6/25, 7/8, 7/13, 7/24, 8/31, 9/8, 9/21	VAFB breeding female.
bb:wv	2020		VAFB	Santa Barbara	7/20	Juvenile.
bb:ww	2020		VAFB	Santa Barbara	7/14	Juvenile.
ga:aa	2019		VAFB	Santa Barbara	3/19, 5/28, 6/18, 6/30, 7/23, 7/28, 9/21	
ga:aw	2018		VAFB	Santa Barbara	4/10, 4/13	
ga:bg	2020		VAFB	Santa Barbara	7/15, 7/22	Juvenile.
ga:bw	2019		VAFB	Santa Barbara	7/14	
ga:or	2016 or 2017	F	VAFB	Santa Barbara	5/27, 6/17, 7/8, 7/15, 7/17, 7/22, 8/7, 8/19, 8/31, 9/16	VAFB breeding female.

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

Table D.6. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2020 (continued).

Band Combination	Year Banded	Sex	Location Seen	County	Dates Seen	Notes
ga:pb	2016 or 2017	M	VAFB	Santa Barbara	3/27, 4/16, 4/21, 5/5, 5/8, 5/11, 5/15, 5/26, 5/28, 6/2, 6/4, 6/5, 6/9, 6/11, 6/16, 7/7, 7/14, 7/21, 7/24, 7/29, 8/12, 8/17, 9/2	VAFB breeding male.
ga:vw	2020		VAFB	Santa Barbara	7/8, 7/16	Juvenile.
ga:wa	2019		VAFB	Santa Barbara	6/16	
gg:av	2019	F	VAFB	Santa Barbara	3/3, 3/24, 3/27, 3/31, 4/7, 4/16, 4/21, 4/28, 5/15, 5/19, 5/28, 6/2, 6/4, 6/18, 6/23, 6/25, 7/22, 7/23, 7/30, 8/18, 9/8, 9/21	VAFB breeding female.
gg:aw	2017 or 2018	F	VAFB	Santa Barbara	3/3, 3/12, 3/27, 4/7, 5/11, 6/2, 6/4, 6/9, 6/23, 6/29, 7/2, 7/9, 7/14, 7/21, 7/30, 8/11, 8/31, 9/21	VAFB breeding female.
gg:pb	2012 or 2013		VAFB	Santa Barbara	6/18	
gg:pr	2017	F	VAFB	Santa Barbara	3/26, 3/27, 4/10, 5/19, 6/2, 6/9, 6/11, 6/25, 6/29, 7/14	VAFB breeding female.
gg:rb	2016 or 2018	F	VAFB	Santa Barbara	3/3, 3/20, 3/31, 4/7, 4/21, 5/19, 5/28, 6/4, 6/9, 6/16, 6/18, 6/23, 6/25, 7/7, 7/9, 7/14, 7/23, 7/30, 9/8, 9/21	VAFB breeding female.
pv:yr	2017 or 2018	F	VAFB	Santa Barbara	3/4, 3/6, 3/11, 3/20, 4/8, 4/13, 4/15, 4/28, 5/7, 5/8, 5/18, 5/25, 5/27, 6/1, 6/3, 6/17, 6/25, 6/26, 7/1, 7/13, 7/17, 7/22, 8/3	VAFB breeding female.
vg:ag	2017 or 2018		VAFB	Santa Barbara	3/4, 3/11, 3/23, 4/6, 4/8, 4/15, 4/30, 5/8, 5/14, 5/20, 6/3, 6/18, 6/25, 7/13, 7/15, 7/22, 7/24, 8/6, 8/7, 8/11, 9/3, 9/9, 9/16	
vg:av	2019	F	VAFB	Santa Barbara	3/12, 3/26, 4/7, 5/11, 5/26, 5/28, 6/30, 7/9, 7/14, 7/23, 7/30, 9/21	VAFB breeding female.
vg:bb	2011, 2013 or 2014		VAFB	Santa Barbara	4/7	
vg:br	2020		VAFB	Santa Barbara	7/29	Juvenile.
vg:bv	2020		VAFB	Santa Barbara	7/23	Juvenile.
vg:ya	2020		VAFB	Santa Barbara	7/29, 8/21	Juvenile.
vg:yb	2020		VAFB	Santa Barbara	7/27	Juvenile.
vv:ra	2020		VAFB	Santa Barbara	8/24, 9/8, 9/21	Juvenile.
vv:vg	2020		VAFB	Santa Barbara	7/6	Juvenile.
ga:aw	2018		Jalama Beach	Santa Barbara	8/25, 9/23, 9/29	
pv:yr	2017 or 2018		Jalama Beach	Santa Barbara	8/25, 9/23	
vg:rv	2020		Jalama Beach	Santa Barbara	9/23	Juvenile.
vv:ab	2017 or 2018		Hollister Ranch	Santa Barbara	9/17	
bb:bv	2020		Coal Oil Point Reserve	Santa Barbara	7/22	Juvenile.
ga:bb	2017 or 2018		Coal Oil Point Reserve	Santa Barbara	4/24	
ga:pb	2016 or 2017		Coal Oil Point Reserve	Santa Barbara	3/5, 4/22, 5/19, 5/27, 6/5, 7/1	COPR breeding adult.
bb:ag	2020		McGrath SB	Ventura	8/5	Juvenile.
vv:bo	2019		McGrath SB	Ventura	6/29, 6/30, 8/31, 9/14	McGrath SB breeding male.
vv:pa	2019		McGrath SB	Ventura	8/31	
rr:or	2010		Hollywood Beach	Ventura	8/17, 9/7, 9/14	
gg:oy	2018		Point Mugu	Ventura	3/17, 4/29, 7/10, 8/5, 8/11	
bb:pa	2019		Zuma Beach	Los Angeles	3/6, 3/27	

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

Table D.6. Snowy plovers banded as chicks at ODSVRA seen at other sites from 1 March to 30 September 2020 (continued).

Band Combination	Year Banded	Sex	Location Seen	County	Dates Seen	Notes
vv:yv	2019		Zuma Beach	Los Angeles	3/6, 3/27	
ga:ay	2018		Hermosa Beach	Los Angeles	4/11	
bb:ww	2020		Newport Beach	Orange	8/1	Juvenile.
gg:pg	2018		Huntington Beach	Orange	8/16, 8/26	
vv:vg	2020		Huntington Beach	Orange	7/9	Juvenile.
bb:vb	2011, 2013 or 2014		Camp Pendleton	San Diego	3/5, 3/11	
gg:pg	2018	F	Camp Pendleton	San Diego	3/5, 3/11, 3/26, 5/7	Camp Pendleton breeding female.
ga:bg	2020		Ocean Beach	San Diego	8/8	Juvenile.
bb:oa	2019		Naval Base Coronado	San Diego	5/21, 5/23, 6/4, 6/8, 6/25, 6/29, 7/2	
bb:ww	2020		Naval Base Coronado	San Diego	8/6	Juvenile.
pg:yb	2015 or 2017		Naval Base Coronado	San Diego	3/19	
pg:vb	2015 or 2016		Silver Strand SB	San Diego	7/6	
ga:ba	2020		Tijuana River Mouth	San Diego	8/27	Juvenile.
vg:bv	2020		Tijuana River Mouth	San Diego	9/10, 9/17, 9/24	Juvenile.
bb:rr	2016 or 2017		Bahia Todos Santos	Baja California, Mexico	7/8	
ga:ar	2015		Bahia Todos Santos	Baja California	7/18	
ga:ay	2018		Bahia Todos Santos	Baja California	4/29	
ga:ba	2020		Bahia Todos Santos	Baja California	7/8	Juvenile.
ga:wr	2015 or 2016		Bahia Todos Santos	Baja California	7/16	
pg:vb	2015 or 2016		Bahia Todos Santos	Baja California	7/25	

APPENDIX E. CALIFORNIA LEAST TERN REPRODUCTIVE SUCCESS REPORTED FOR CURRENT OR RECENT BREEDING SITES IN SAN LUIS OBISPO AND SANTA BARBARA COUNTIES FROM 2004-20.

Note that chicks are not banded at Rancho Guadalupe Dunes County Park (RGDCP) or Coal Oil Point Reserve (COPR) and other methods are used to estimate number of juveniles produced. In 2020, the number of juveniles at RGDCP was unknown, therefore number of juveniles per nest and per pair are also unknown (unk). In 2018, Vandenberg Air Force Base (VAFB) began banding chicks to site and year. Sources: RGDCP (pers. comm. Tom Applegate), VAFB (pers. comm. Emily Rice), and COPR (pers. comm. Jessica Nielson).

na = estimated number not available at time of 2020 report

unk = number not available due to insufficient information

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	47-53	59	39	66	20	0.34	0.38-0.43
	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	31-35	38	28	45	36	0.95	1.04-1.16
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB ²	2	2	0	0	0	0.00	0.00
	COPR	5	5	4	7	7	1.40	1.40
2007	ODSVRA	54-60	66	51	90	70	1.06	1.17-1.3
	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	56	50	99	70	1.25	1.26-1.27
	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	26	23	43	33	1.27	1.29-1.32
	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	33-34	35	31	55	50	1.43	1.47-1.52
	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	41-44	46	33	52	42	0.91	0.97-1.02
	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	48-53	57	45	85	56	0.98	1.07-1.17
	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	47-48	49	42	76	58	1.18	1.21-1.23
	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

Appendix E. California Least Tern reproductive success for San Luis Obispo and Santa Barbara Counties from 2004-19 (continued).

Year	Site	No. pairs	No. nests	No. nests hatching	No. chicks	No. juveniles	No. juveniles per total no. nest	No. juveniles per pair
2015	ODSVRA	44-49	54	48	84	69	1.28	1.41-1.57
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB	22	22	22	45	29	1.32	1.32
	COPR	0	0	0	0	0	0.00	0.00
2016	ODSVRA	47-48	49	46	78	59	1.20	1.23-1.26
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB	25	27	21	38	18	0.67	0.72
	COPR	0	0	0	0	0	0.00	0.00
2017	ODSVRA	42-47	52	22	39	7	0.13	0.15-0.17
	RGDCP	0	0	0	0	0	0.00	0.00
	VAFB	27	28	23	41	8	0.29	0.30
	COPR	0	0	0	0	0	0.00	0.00
2018	ODSVRA	30-33	35	28	42	35	1.00	1.06-1.17
	RGDCP	10-11	11	5	10	4	0.36	0.36-0.40
	VAFB	60	83	33	57	35	0.42	0.58
	COPR	0	0	0	0	0	0.00	0.00
2019	ODSVRA	31-33	34	31	52	37	1.09	1.12-1.19
	RGDCP	17	17	8	15	unk	unk	unk
	VAFB	42	47	36	63	21	0.44	0.50
	COPR	0	0	0	0	0	0.00	0.00
2020	ODSVRA	35-42	48	36	63	38	0.79	0.90-1.09
	RGDCP	na	56	10	18	unk	unk	unk
	VAFB	10	12	7	11	6	0.50	0.60
	COPR	0	0	0	0	0	0.00	0.00

^{1,2} Minimum counts of adult terns at the VAFB colony site were 60 and 40 in 2004 and 2006, respectively, but nesting was limited.

APPENDIX F. ADDENDUMS TO SNOWY PLOVER NESTING SUCCESS.

Table F.1. Nesting success of snowy plovers in identifiable areas at ODSVRA, 2001-20.

Nests from unknown locations (identified only by presence of broods) are not included in table. Percent nests hatching is calculated using number of hatching nests from known location divided by number of known location and fate nests. Those chicks whose specific area where hatching could not be identified are not included in table. Beginning in 2006, an additional 0.4 miles of shoreline at the southern end of the park has been monitored by ODSVRA (a survey conducted by the Guadalupe-Nipomo Dunes NWR in 2005 determined this area was part of the ODSVRA and not the refuge, as was previously thought). Between 1998-2003, increases occurred in the size of the seasonal Southern Enclosure; size has remained consistent since 2004. Area information is provided in the report Site Description section on page 4.

Excl. = Enclosure, BY = Boneyard

Year	Area	No. known location nests	No. nests with known location and known fate	No. nests with known location hatching	% nests hatching	No. chicks from known location	No. chicks from known location fledged	% chicks known fledged
2001	Open Riding Area	1	1	0	0	0	0	0
	Arroyo Grande Excl. ¹	3	3	3	100	9	0	0
	Southern Enclosure	25	25	22	88	57	2	4
	Oso Flaco	4	2	2	100	6	1	17
	Total	33	30	26	87	71	3	4
2002	Southern Enclosure	33	33	25	76	62	35	56
	Oso Flaco	2	2	0	0	0	0	0
	Total	35	35	25	71	62	35	56
2003	Dunes Preserve	1	1	1	100	3	0	0
	Open Riding Area	1	1	1	100	3	3	100
	Pipeline Revegetation	3	3	2	67	4	2	50
	East of BY Enclosure ²	2	2	1	50	3	2	67
	Southern Enclosure	74	73	52	71	136	91	68
	Oso Flaco	13	13	5	38	11	7	64
Total	94	93	62	67	160	106	67	
2004	Open Riding Area	1	1	0	0	0	0	0
	Pipeline Revegetation	1	1	1	100	3	0	0
	Southern Enclosure	113	111	87	78	208	59	29
	Oso Flaco	27	27	17	63	40	7	18
	Total	142	140	105	75	251	66	27
2005	East of BY Enclosure ²	2	2	2	100	6	2	33
	Southern Enclosure	79	79	60	76	142	57	40
	Oso Flaco	22	22	18	82	49	23	47
	Total	103	103	80	78	197	82	42
2006	Open Riding Area	1	1	0	0	0	0	0
	Southern Enclosure	87	84	65	77	173	8	5
	Oso Flaco	29	29	22	76	57	9	16
	Total	117	114	87	76	230	17	7
2007	Southern Enclosure	76	76	61	80	159	58	37
	Oso Flaco	15	15	9	60	20	4	20
	Total	91	91	70	77	179	62	35
2008	Southern Enclosure	100	100	73	73	172	64	37
	Oso Flaco	19	19	8	42	19	5	26
	Total	119	119	81	68	191	69	36

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

Table F.1. Nesting success of snowy plovers in identifiable areas at ODSVRA, 2001-20 (continued).

Year	Area	No. known location nests	No. nests with known location and known fate	No. nests with known location hatching	% nests hatching	No. chicks from known location	No. chicks from known location fledged	% chicks known fledged
2009	Pismo Lagoon	1	1	0	0	0	0	0
	Southern Exclosure	125	124	86	69	221	79	36
	Oso Flaco	23	22	8	36	22	2	9
	Total	149	147	94	64	243	81	33
2010	Carpenter Creek	1	1	0	0	0	0	0
	Arroyo Grande Creek	3	3	0	0	0	0	0
	Open Riding Area	1	1	1	100	2	2	100
	Southern Exclosure	126	123	95	77	234	86	37
	Oso Flaco	22	22	13	59	33	15	45
	Total	153	150	109	73	269	103	38
2011	Open Riding Area	2	2	2	100	5	1	20
	Southern Exclosure	140	135	113	84	300	129	43
	Oso Flaco	23	23	16	70	40	18	45
	Total	165	160	131	82	345	148	43
2012	Open Riding Area	3	3	0	0	0	0	0
	Southern Exclosure	194	186	143	77	353	85	24
	Oso Flaco	14	14	9	64	21	4	19
	Total	211	203	152	75	374	89	24
2013	Southern Exclosure	147	144	115	80	286	123	43
	Oso Flaco	23	23	15	65	39	25	64
	Total	170	167	130	78	327	172	53
2014	Open Riding Area	1	1	0	0	0	0	0
	Southern Exclosure	201	194	173	89	428	142	33
	Oso Flaco	44	44	33	75	86	35	41
	Total	246	239	206	86	514	177	34
2015	Arroyo Grande Creek ³	1	-	1	-	2	0	0
	Southern Exclosure	182	175	153	87	401	215	54
	Oso Flaco	20	20	14	70	39	24	62
	Total	203	195	168	86	442	239	54
2016	Arroyo Grande Creek ³	1	-	1	-	2	1	50
	Southern Exclosure	169	156	136	87	326	94	29
	Oso Flaco	40	37	29	78	82	36	44
	Total	210	193	166	85	410	125	30
2017	Arroyo Grande Creek	1	1	0	0	0	0	0
	Southern Exclosure	195	165	107	65	252	105	42
	Oso Flaco	77	72	38	53	96	55	57
	Total	273	238	145	61	348	160	46
2018	Southern Exclosure	145	139	111	80	274	131	48
	Oso Flaco	61	61	33	54	84	43	51
	Total	206	200	144	72	358	174	49
2019	Eucalyptus North	1	1	1	100	3	1	33
	Southern Exclosure	172	163	118	72	299	82	27
	Oso Flaco	57	56	30	54	75	13	17
	Total	230	220	149	68	377	96	25

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

Table F.1. Nesting success of snowy plovers in identifiable areas at ODSVRA, 2001-20 (continued).

Year	Area	No. known location nests	No. nests with known location and known fate	No. nests with known location hatching	% nests hatching	No. chicks from known location	No. chicks from known location fledged	% chicks known fledged
2020	Open Riding Area	22	22	19	86	51	21	41
	Pawprint reveg. area ⁴	1	1	1	100	3	0	0
	Foredune Closure	24	22	16	73	45	14	31
	Southern Exclosure	128	117	85	73	206	56	27
	Oso Flaco	39	35	21	60	55	4	7
	Total	214	197	142	72	360	95	26

¹Arroyo Grande Excl.: A seasonal exclosure (with two-inch by four-inch wire mesh fencing and closed from the riding area) in use in 2001 and 2002, but not subsequently. This area had three nests in 2001, none in 2002.

²East of BY Exclosure: Area closed to vehicles year-around and open to pedestrians. There were two nests in 2003 and two nests in 2005. All nests had a single nest wire exclosure (10-foot by 10-foot exclosure).

³Brood with approximately one-day-old chicks found in Arroyo Grande Creek area, likely from an unknown nest nearby.

⁴Pawprint revegetation area located approximately 295 feet east of Foredune central.

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

Table F.2. Attributed causes of snowy plover nest loss in Southern Exclosure and Oso Flaco at ODSVRA from 2002-20.

Flooded nests include nests overwashed by tide and nests flooded by creek. The percentage of total loss for each cause is shown for the 19-year period 2002-20. The category “abandoned, suspected due to wind” used from 2010-19 was converted to a category of “wind” for this report. Prior to 2010, nest loss to wind was included with nests abandoned pre-term. So. Excl. = Southern Exclosure, Aband. = Abandoned

Year	Area	Aband. pre-term	Aband. post-term	Aband. unknown pre- or post-term	Wind	Failed, cause unknown	Unidentified predator	Avian predator	Gull	Corvid	Raven	Harrier	Peregrine	Coyote	Raccoon	Skunk	Flooded	Total
2002	So. Excl.			6		1								1				8
	Oso Flaco			2														2
2003	So. Excl.	17	2				3				1							23
	Oso Flaco	2				1	1				4							8
2004	So. Excl.	12				7	2				2			1				24
	Oso Flaco	4				2	3										1	10
2005	So. Excl.	9	3			7												19
	Oso Flaco	2	1				1											4
2006	So. Excl.	5	4			2	1		3					4				19
	Oso Flaco			1			1		3								2	7
2007	So. Excl.	4	1			9					1							15
	Oso Flaco	2				2					1			1				6
2008	So. Excl.	10		3		2	2	5	1			2					1	26
	Oso Flaco	3		1				4	1			1					2	12
2009	So. Excl.	9	1			3	5	16	2			1					1	38
	Oso Flaco	4				2	1	5								1	1	14
2010	So. Excl.	5	2		9		4	6									2	28
	Oso Flaco	1			2			2							1	2	1	9
2011	So. Excl.	6	3	1	1	2	1	5		3								22
	Oso Flaco						2			2					1	2		7
2012	So. Excl.	11	1	3	6	3	3	5		3		5	1	1			1	43
	Oso Flaco	3	1		1													5
2013	So. Excl.	5	5		15	3	1											29
	Oso Flaco	3	2		2				1									8
2014	So. Excl.	13	1	4		2											1	21
	Oso Flaco	6		1	1		1							1			1	11
2015	So. Excl.	11	1	4	1	2		2			1						2	24
	Oso Flaco	1				1	1				3							6

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

Table F.2. Attributed causes of snowy plover nest loss in Southern Exclosure and Oso Flaco at ODSVRA from 2002-20 (continued).

Year	Area	Aband. pre-term	Aband. post-term	Aband. unknown pre- or post-term	Wind	Failed, cause unknown	Unidentified predator	Avian predator	Gull	Corvid	Raven	Harrier	Peregrine	Coyote	Raccoon	Skunk	Flooded	Total
2016	So. Excl.	5	7	2	2	3										1		20
	Oso Flaco	4				1	1		1								1	8
2017	So. Excl.	5	3	3	1	11	9	2	2		6			1		15		58
	Oso Flaco	5		2	2	15					4			1		3	2	34
2018	So. Excl.	9	3	5		2		3			5						1	28
	Oso Flaco	2		2	3		2	10	5					4				28
2019	So. Excl.	3		2	3	3		6	10	1	12	1				1	3	45
	Oso Flaco	3		1		2	4	2	4		1			4			5	26
2020	So. Excl.	3	1		4	1	7	8			2	3		1			2	32
	Oso Flaco			2	5	3		2			1						1	14
2002-20 Total nest loss	So. Excl.	142	38	33	42	63	38	58	18	7	30	12	1	9	0	17	14	522
	Oso Flaco	45	4	12	16	29	18	25	15	2	14	1	0	11	2	8	17	219
2002-20 Grand Total So. Excl. and Oso Flaco		187	42	45	58	92	56	83	33	9	44	13	1	20	2	25	31	741
		25.2%	5.7%	6.1%	7.8%	12.4%	7.6%	11.2%	4.5%	1.2%	5.9%	1.8%	0.1%	2.7%	0.3%	3.4%	4.2%	

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

Table F.3. Nest protection used at ODSVRA in 2020.

Nests with unknown location and unknown fate and one nest found in Pawprint revegetation area are excluded. Nonpredator fencing includes symbolic fencing and hard fencing not maintained as predator fencing. Percent in parenthesis is percent nests hatched. rav = common raven; ha = harrier; av = avian; un = unknown predator; coy = coyote; pre = abandoned pre-term; pos = abandoned post-term; ukp = abandoned unknown pre- or post-term; w = wind; fld = flooded; unk = failed, cause unknown.

Area	Seasonal Enclosure			Nonpredator fencing			Single nest enclosure
	No additional fencing	Bumpout	Mini	No additional fencing	Circular	Bumpout	
6 enclosure	35	1	6	9	1		
Nests hatched	25 (71%)	1 (100%)	6 (100%)	8 (89%)	1 (100%)		
Nests depredated	6 (2 ha, 1 rav, 2 av, 1 un)			1 (1 un)			
Nests failed other causes	4 (1 pre, 1 pos, 2 w)						
7 enclosure	22	1	1	9			
Nests hatched	15 (68%)	1 (100%)	1 (100%)	7 (78%)			
Nests depredated	4 (1 av, 3 un)			1 (1 un)			
Nests failed other causes	3 (2 pre, 1 w)			1 (1 fld)			
8 enclosure	7			12	4		
Nests hatched	3 (43%)			6 (50%)	4 (100%)		
Nests depredated	4 (1 rav, 2 av, 1 un)			4 (1 coy, 1 ha, 2 av)			
Nests failed other causes				2 (1 fld, 1 unk)			
Boneyard	9						
Nests hatched	7 (78%)						
Nests depredated	1 (1 av)						
Nests failed other causes	1 (1 w)						
SOUTHERN ENCLOSURE TOTALS	73	2	7	30	5		
Nests hatched	50 (68%)	2 (100%)	7 (100%)	21 (70%)	5 (100%)		
Nests depredated	15 (2 ha, 2 rav, 6 av, 5 un)			6 (1 coy, 1 ha, 2 av, 2 un)			
Nests failed other causes	8 (3 pre, 1 pos, 4 w)			3 (2 fld, 1 unk)			
North Oso Flaco	1			4	2		
Nests hatched	0 (0%)			2 (50%)	2 (100%)		
Nests depredated				1 (1 av)			
Nests failed other causes	1 (1 unk)			1 (1 fld)			
South Oso Flaco				14	14		
Nests hatched				6 (40%)	11 (79%)		
Nests depredated				2 (1 rav, 1 av)			
Nests failed other causes				6 (2 ukp, 2 w, 2 unk)	3 (3 w)		
OSO FLACO TOTALS	1			18	16		
Nests hatched	0 (0%)			8 (42%)	13 (81%)		
Nests depredated				3 (1 rav, 2 av)			
Nests failed other causes	1 (1 unk)			7 (2 ukp, 2 w, 1 fld, 2 unk)	3 (3 w)		
Foredune closure				20		2	
Nests hatched				15 (75%)		1 (50%)	
Nests depredated				2 (1 av, 1 un)		1 (1 av)	
Nests failed other causes				3 (2 pre, 1 w)			
Open riding area				7	1	4	10
Nests hatched				4 (57%)	1 (100%)	4 (100%)	10 (100%)
Nests depredated							
Nests failed other causes				3 (3 w)			
GRAND TOTAL	74	2	7	75	22	6	10
Nests hatched	50 (68%)	2 (100%)	7 (100%)	48 (63%)	19 (86%)	5 (83%)	10 (100%)
Nests depredated	15 (4 ha, 2 rav, 4 av, 5 un)			11 (1 coy, 1 ha, 1 rav, 5 av, 3 un)		1 (1 av)	
Nests failed other causes	9 (3 pre, 1 pos, 4 w, 1 unk)			16 (2 pre, 2 ukp, 6 w, 3 fld, 3 unk)	3 (3 w)		

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

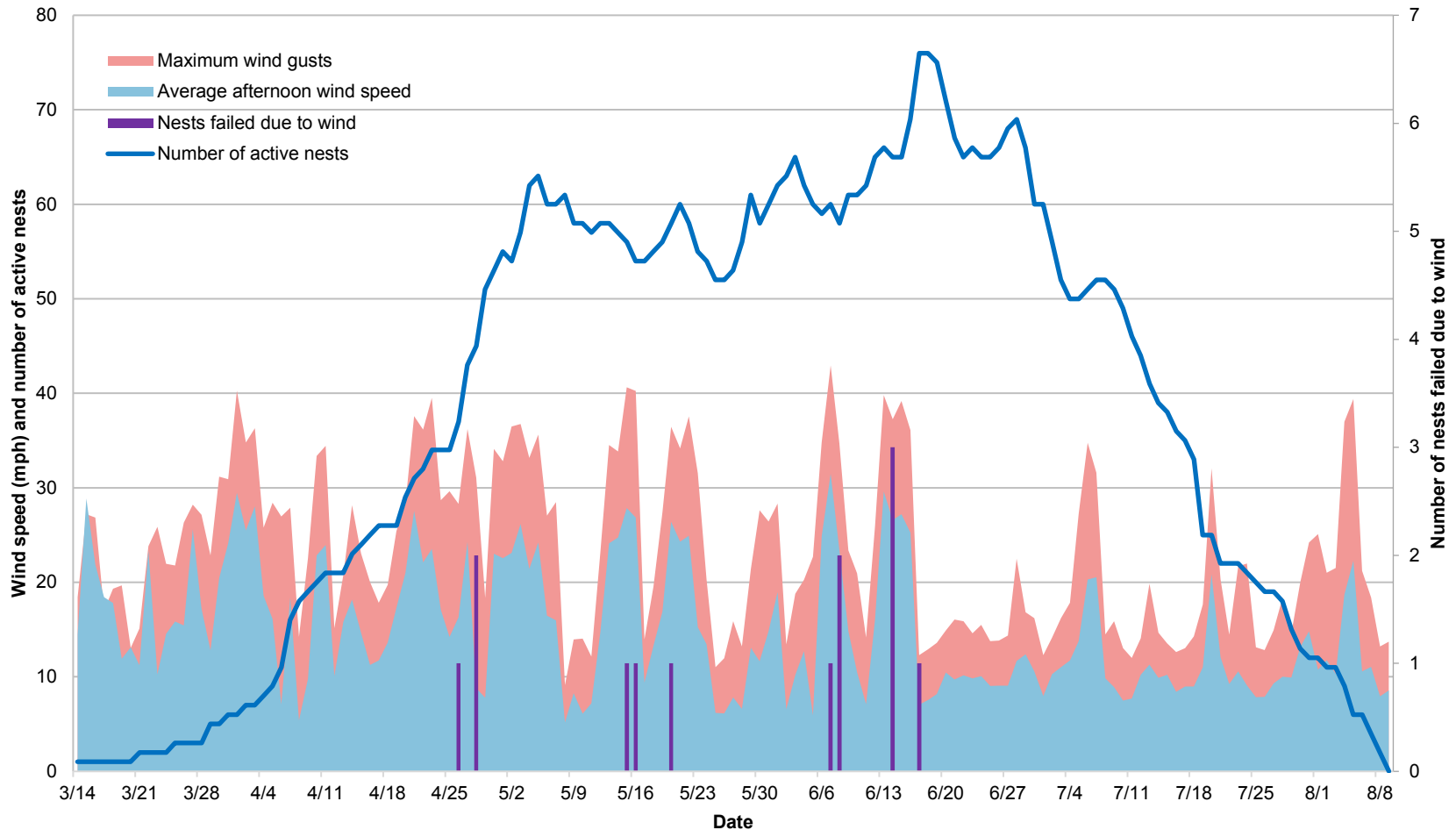


Figure F.1. Daily wind speed data (daily afternoon average and daily maximum wind gust) and snowy plover nest loss attributed to wind at ODSVRA from 14 March to 9 August 2020.

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 wind (only nests with entire clutch lost, whether incomplete or complete, are included and not eggs lost from a nest that remained active). From 1 April to 9 August 2020, wind speed was collected from an anemometer on the S1 wind tower and 10 meters above the surface. The S1 tower is located approximately 360 feet east of 6 enclosure. Prior to 1 April 2020, wind data was used from a NOAA weather station (see report section titled Wind speed monitoring on page 14 for more information). 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. Addendums to snowy plover nesting success (continued).

Table F.4. Selective transfer of abandoned snowy plover chicks and potentially viable eggs to Coal Oil Point Reserve, Santa Barbara County, California in 2020.

All fledglings were released at Coal Oil Point Reserve (COPR).

No. chicks or eggs	Date collected	No. eggs hatched	Band combinations of fledglings	Release date (age)	Notes
2 eggs	6 July	2	vy:vy vy:gg	2 September (36 days)	On 28 June, the SP184 nest was found with one egg in Fore dune north. On 30 June, the nest had two eggs and the female banded ga:o- was captured near the nest to evaluate the right leg for a possible injury (USFWS consulted prior to capture, see Table H.2 in Appendix H). The bird was released the same day back near the nest and a male was observed incubating the nest later that day. Over the next few days the nest had inconsistent incubation by the male and the female was observed on the shore but not attending the nest. The nest was determined to be abandoned on 6 July, the two eggs were collected, placed in a brooder, and transferred to COPR. Two chicks hatched 28 July, initially were weak and needed antibiotics for eye infection, recovered, reached fledge age, and were released. The two fledglings were resighted at COPR on 2 October.
2 chicks	17 July		vg:pa (2)	17 August (34 days)	On the morning of 17 July, a peregrine falcon was on the North Oso Flaco shoreline eating prey. Remains collected were of a male snowy plover banded bb:ar and associated with the SP171 brood. The two chicks, banded vg:pa from the SP171 brood, were located later the same morning approximately 200 feet north of the prey location. The 3-day-old chicks were observed remaining crouched and unattended, both were ultimately collected and placed in a warmed brooder, and transferred to COPR later in the day for captive-rearing. Both chicks reached fledge age and were released. The two fledglings were resighted at COPR on 28 August.
1 chick	5 August		U	2 September (28 days)	On 5 August, one recently hatched chick with yolk sac still visible was inside the SP194 circular nest enclosure in South Oso Flaco. The chick was alive, but chilled and immobile, and two sibling chicks were approximately 200 feet away. An unbanded male attended and then led the two banded chicks away and did not return to the unbanded chick in the circular. The chick remained unattended, was ultimately picked up, and placed in a warm brooder where it became more active. The following morning efforts to reunite the chick with the brood were unsuccessful as the adult and banded chicks were not located, and brood was never seen subsequently. The chick was taken to COPR later that same morning for captive-rearing. Later, the chick's left leg became tangled in a feather duster used at the aviary and the chick developed a limp but recovered completely within a couple weeks, reached fledge age, was actively flying in the aviary, and was released unbanded.

APPENDIX G. PREDATOR SUMMARY TABLES AND FIGURES.

Table G.1. Summary of predators detected in the Southern Exclosure and Oso Flaco at ODSVRA in 2020.

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 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					
Coyote	7 Mar	10 Sept	90	-	Most common on the Southern Exclosure shoreline (primarily during June to August). Noted inside the Seasonal Exclosure on 19 days (27 occurrences). One plover nest on 8 exclosure shore documented depredated by coyote. On 21 August, not fresh coyote scat was found on 6 exclosure shoreline with 15 plover bands representing a minimum of 4 individual plovers of unknown age. Three coyotes were lethally removed this season.
Opossum	13 Apr	1 Aug	13	-	Activity primarily noted in the Southern Exclosure irregularly April to July. There was 1 documentation in South Oso Flaco in April.
Raccoon	3 Mar	29 Jul	7	-	Number of days detected is the lowest documented since comparable observations began in 2007. The limited activity noted was throughout all areas of the Southern Exclosure.
Skunk	5 Apr	2 Aug	6	-	Activity only documented in 7, 8, and Boneyard exclosures.
Avian					
American crow	12 Mar	6 Aug	6	3	Primarily observed in March flying over the Southern Exclosure and Oso Flaco. Three crows seen at the same time on 12 March.
American kestrel	12 Mar	5 Sept	52	3	Frequent sightings June to August. Observed hunting in all areas of the Southern Exclosure and Oso Flaco. Minimum of 3 individuals based on sex characteristics observed during season: 1 female and 2 males. Two males seen together on 12 June and 1 September.
Common raven	3 Apr	31 Aug	14	2	Primarily observed flying over exclosure areas in late March to mid-May. Two ravens seen at the same time flying from 8 exclosure to 6 exclosure on 3 April. Five plover nests were documented losing eggs to raven: 3 losing all eggs in clutch and 2 losing a partial number of eggs. A total of 4 ravens were lethally removed, on or prior to 5 May. Sightings were reduced June through August (5 sightings).
Cooper's hawk	6 Apr	28 Jul	7	1	Primarily observed in Oso Flaco. There was a 2-day period 27-28 July, when a bird was seen flying between Boneyard exclosure and 7.5 revegetation area within 7 exclosure.
Gull spp.	Present daily throughout season				Gulls were present the length of the shoreline of the Southern Exclosure and Oso Flaco. Two western gulls were lethally removed, 1 after eating a single plover chick and 1 after eating a juvenile and a chick or juvenile plover (see Table H.4 in Appendix H).
Loggerhead shrike	21 Apr	9 Sept	5	1	All observations in 8 and Boneyard exclosures, and North Oso Flaco.
Merlin	16 Mar	9 Apr	10	1	Observed hunting throughout the Southern Exclosure. Also present on one day in South Oso Flaco.

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

Table G.1. Summary of predators detected in the Southern Exclosure and Oso Flaco at ODSVRA in 2020 (continued).

Species	First date observed	Last date observed	No. days detected	Min. no. individ.	Notes
Northern harrier	2 Mar	4 Sep	83	4	Observed throughout the Southern Exclosure and Oso Flaco (primarily in 6, 7, and 8 exclosures) in flight and perching, sometimes over an extended period. Observed multiple times pursuing, consuming, and/or carrying prey from inside exclosures. Northern harrier was documented taking 1 large chick or juvenile plover (see Table H.4 in Appendix H). Three plover nests in the Southern Exclosure documented depredated by harrier. Minimum of 4 individuals (based on age and sex characteristics) observed during season: 1 adult female, 1 adult male, 1 subadult male, and 1 juvenile.
Osprey	Common throughout season				Although not documented as a predator of plovers or terns, ospreys (<i>Pandion haliaetus</i>) are included in this table due to the disturbance they can cause when perched for long periods of time in sensitive areas. Primarily observed flying over 6, 7 and 8 exclosures and occasionally perched and eating fish. Hazed as appropriate.
Large owl spp.	21 Mar	1 Sep	20		Great horned owl and barn owl documented on-site but observations and tracks indicate great horned owl make up the majority of owl presence. Activity primarily noted in Boneyard exclosure. Noted inside 8 exclosure on 5 days and South Oso Flaco on 4 days. The remaining 6 and 7 exclosures and North Oso Flaco each had a single documentation of tracks.
Peregrine falcon	1 Mar	8 Sep	70	6	Observed throughout the Southern Exclosure and Oso Flaco in flight and perching, sometimes over an extended period. Observed multiple times pursuing and/or consuming prey on the shoreline and inside exclosures. Peregrines were documented taking 1 adult male plover, 2 juvenile plovers, 3 plover chicks and one plover of unknown age (see Table H.4 in Appendix H). Minimum of 6 individuals (based on bands and/or age and sex characteristics) observed during season.
Red-tailed hawk	13 Mar	2 Sep	37	3	Observed throughout the Southern Exclosure and Oso Flaco. Minimum of 3 individuals (based on age characteristics) observed during season: 1 adult, 1 subadult, and 1 juvenile.

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

Table G.2. Mammalian and avian predators removed or trapped under predator management actions for least terns and snowy plovers at ODSVRA in 2020.

Three coyotes, four common ravens, and two western gulls were lethally removed. Incidentally live-trapped and released on-site were two red-tailed hawks and one peregrine. The released date is given in parenthesis. All animals trapped or removed were within ODSVRA boundaries, with the exception of four ravens removed off-site with the permission of the landowner.

Date	Species	Age/Sex	Location
Lethally removed			
2-April	common raven	adult	Oso Flaco Road (east of Oso Flaco Lake)
15-April	common raven	adult	agricultural fields east of Oso Flaco Lake
5-May	common raven	adult	Brown Road, Santa Maria
5-May	common raven	adult	Brown Road, Santa Maria
10-June	western gull	subadult	6 enclosure
19-June	coyote	adult female	Maidenform revegetation island
10-August	western gull	adult	South Oso Flaco
3-September	coyote	adult female	Maidenform revegetation island
10-September	coyote	adult male	South Oso Flaco
Incidentally live-trapped and released on site			
4-Jul (5-Jul)	red-tailed hawk	adult	Pipeline revegetation area
9-Jul (10-Jul)	red-tailed hawk	adult	Pipeline revegetation area
11-Aug (11-Aug)	peregrine	adult	South Oso Flaco

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

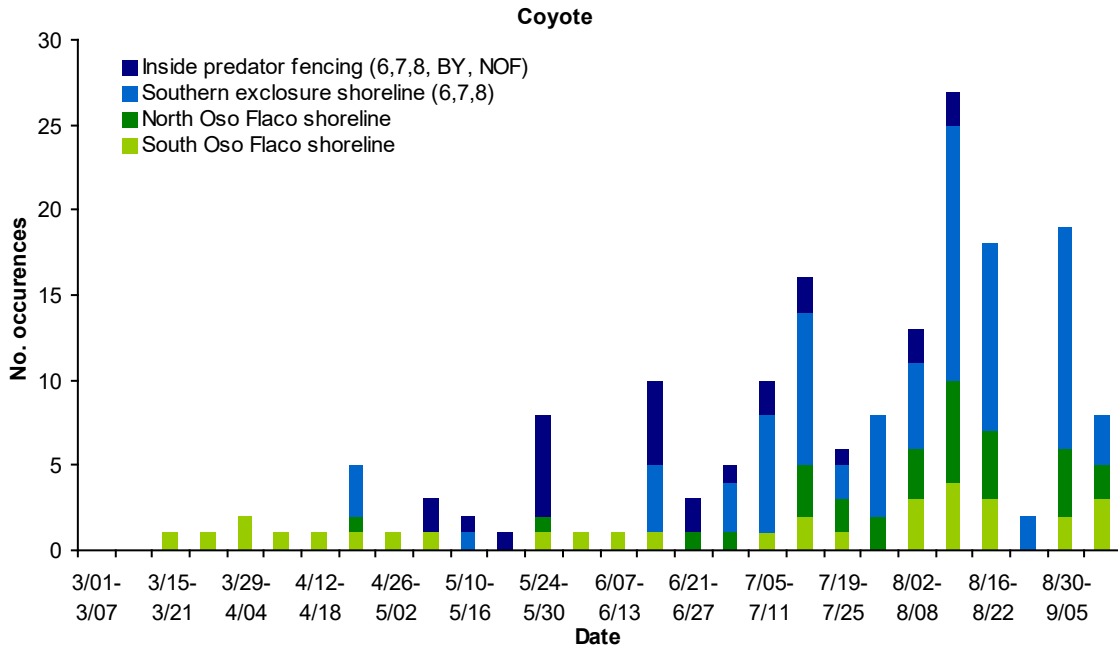


Figure G.1. Coyote occurrences documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2020.

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

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

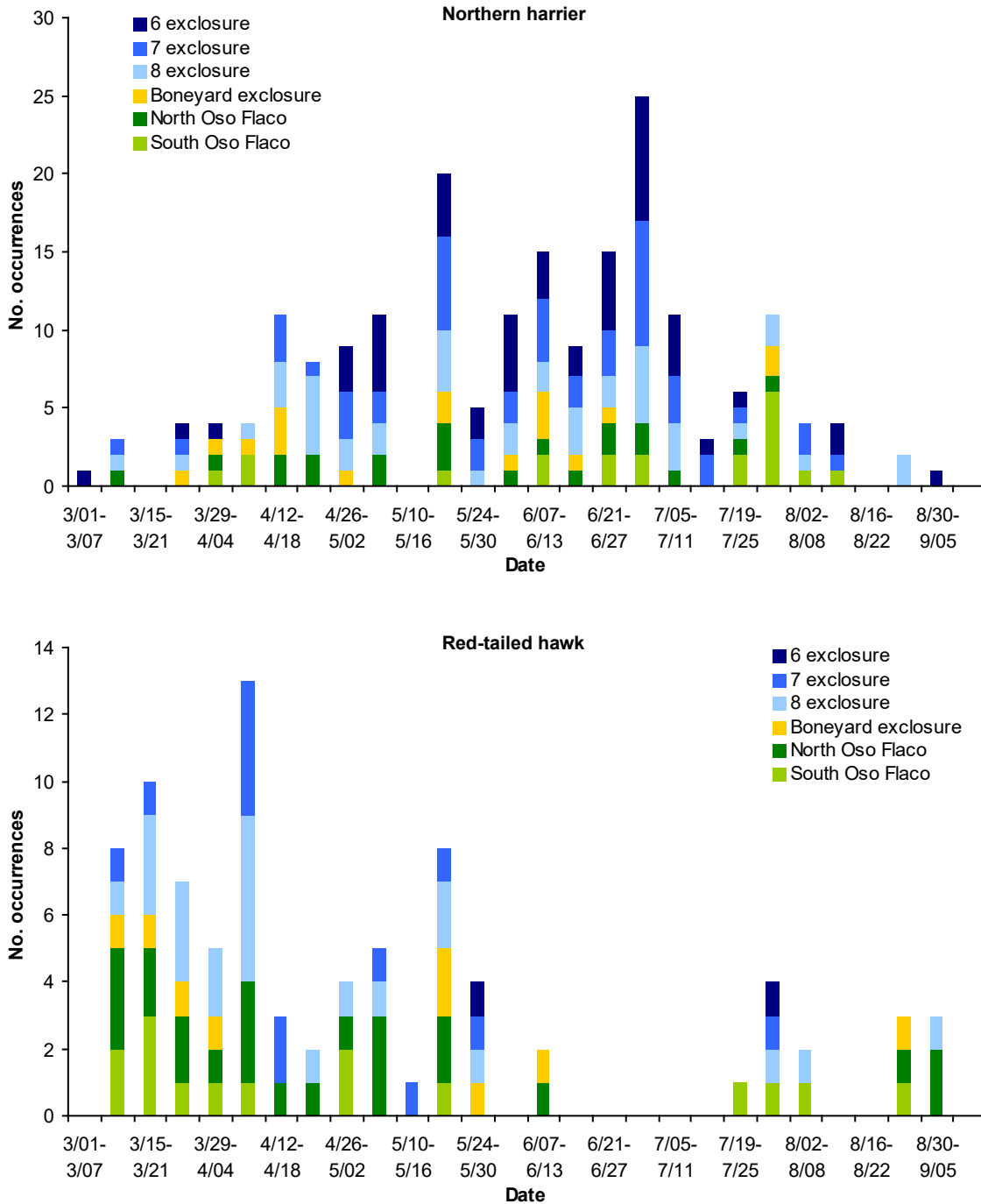


Figure G.2. Avian predator sightings documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2020.

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

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

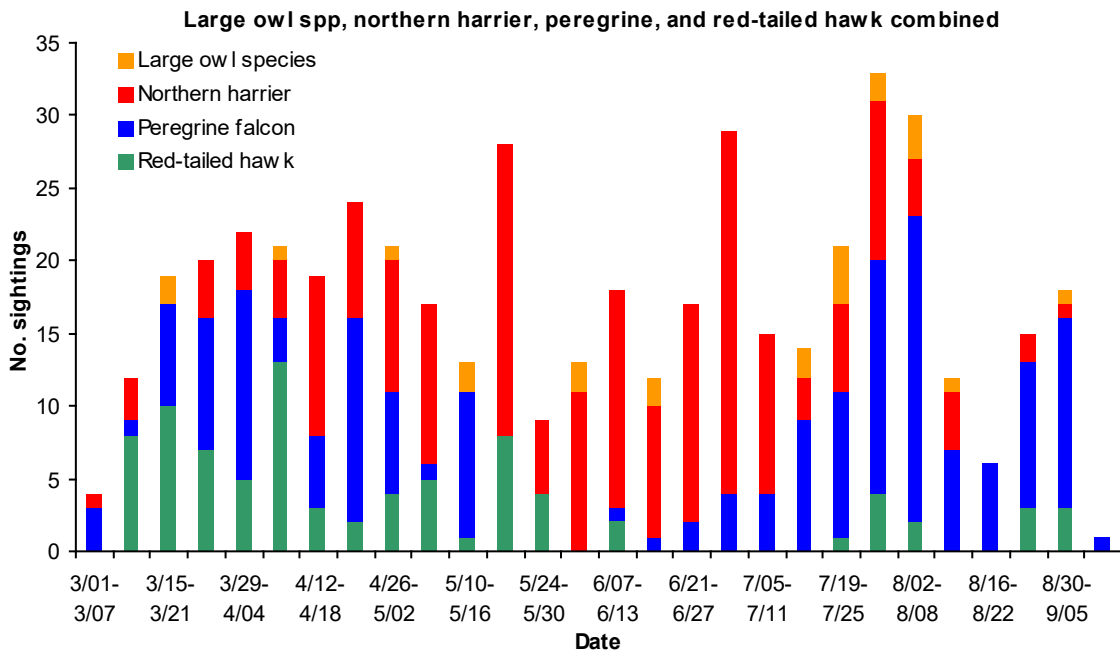
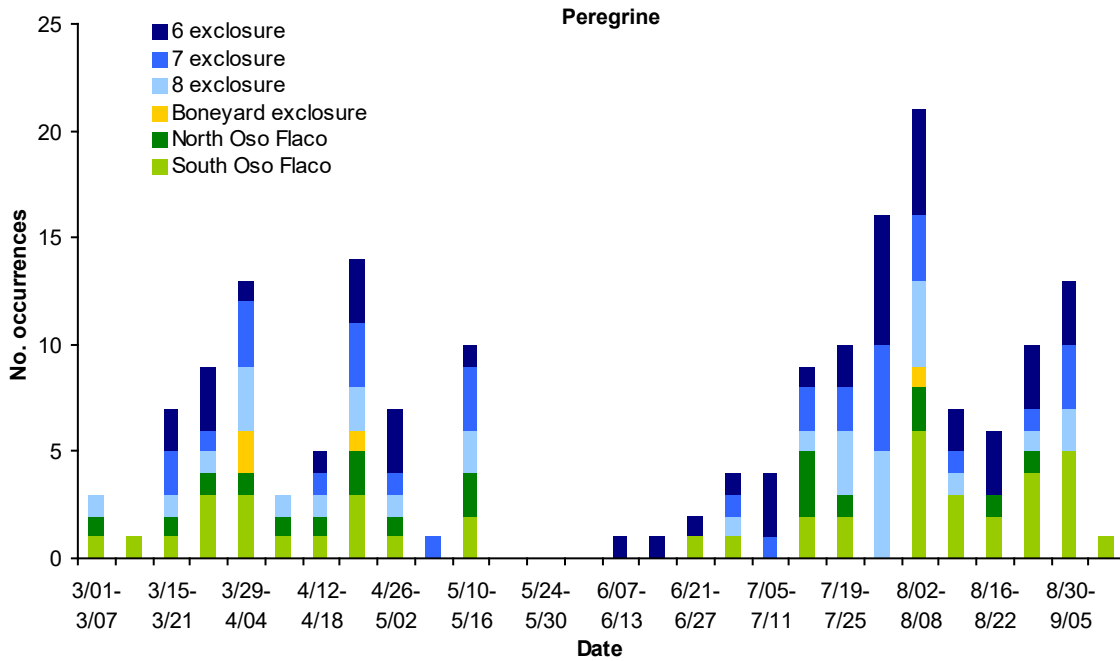


Figure G.2. Avian predator sightings documented in the Southern Exclosure and Oso Flaco at ODSVRA in 2020 (continued).

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

APPENDIX H. SIGHTINGS OF INJURIES AND DOCUMENTED MORTALITY OF CALIFORNIA LEAST TERN AND SNOWY PLOVER ADULTS, JUVENILES, AND CHICKS AT ODSVRA.

Table H.1. Sightings of injured least terns in 2020.

No. (age)	Location	Notes
1 (chick)	7 enclosure	On 24 July, a 2-day-old least tern chick from the LT47 nest was banded w/o:w/b/w and noted to have a small wound on the left leg. Skin was missing from the back of the tibiotarsal joint and sand grains were adhering to wound. The band did not come in contact with the wound. The chick was not seen again but the sibling chick, banded w/o:w/r/w, fledged.

Table H.2. Sightings of injured snowy plovers in 2020.

PWC=Pacific Wildlife Care, Morro Bay, CA; COPR=Coal Oil Point Reserve, Santa Barbara County, CA

No. (age)	Location	Notes
1 (adult)	South Oso Flaco shoreline	On 16 February, an adult plover banded vv:vb was observed with a left foot injury. It was limping and hopping, lower portion of left leg was swollen, and the lower band did not move freely. The following day the bird was captured and transported to PWC. The bands on left leg were removed by the veterinarian and it was treated for a severe constriction wound to leg and injured toes. The bird recovered to the point it could run well and all three toes were viable with some slight thickness remaining (medical record attached). The bird, now banded -:vb, was released in South Oso Flaco on 12 March and has not been seen since release. This plover was banded as a chick in 2013 or 2011 at ODSVRA and an adult male vv:vb has been documented nesting at ODSVRA since 2015.
1 (adult)	Open riding area, Foredune central shoreline	On 4 May, a male plover, banded vg:pg was observed on the shoreline holding up the left leg and material attached to the legs. The bird was captured on 7 May and had fine hairs wrapped around both legs and the left leg and middle toe appeared swollen. All bands moved freely and were not removed. It was immediately taken to PWC, the veterinarian removed hairs, and the bird was released later the same morning (medical record attached). On 24 June, the bird was seen with no noticeable injury and successfully nested at ODSVRA (SP115). This plover was banded as a chick at ODSVRA in 2018.
1 (adult)	6 and 7 enclosures shoreline	On 15 May, an unbanded male was observed on the 7 enclosure shoreline with a right foot injury. The bird was putting very little weight on leg when walking, hopping often, and the toes were left dangling above ground when stopping. The bird continued to be seen occasionally on the 6 enclosure shoreline from 19 May to 15 July and injury appeared unchanged. From 9-15 July, a male with the same description was associated with a brood from the SP156 nest on the 6 enclosure shoreline.
1 (chick)	North Oso Flaco shoreline	On 27 May, a 14-day-old chick banded vg:vw was observed holding up the right leg while walking (age estimated when found 17 May from an unknown location nest, designated as SP90). The injury persisted and the chick was taken to PWC on 3 June, the bands of the right leg were removed, and a constriction wound to the right foot was treated (medical record attached). The chick, now vg:-, improved and was taken to COPR on 19 June when 37 days old for additional rehabilitation time. It was released 29 June when 47 days old and resighted multiple times at COPR after that date.
1 (adult)	6 enclosure	On 1 to 2 June, a male plover banded ga:(w?)r was observed with a right leg injury, limping, holding the leg up, and right foot drooping slightly. On both occasions the bird was only seen briefly and the band combination was not confirmed. A ga:wr male was observed from 10 June to 1 July without injury and associated with the SP67 nest in 6 enclosure, the nest hatched on 2 June, and two chicks fledged.
1 (adult)	Open riding area, marker post 4 to post 6	On 14 June, an unbanded male was observed on the shoreline south of marker post 4 with a right leg injury, limping and putting very little weight on leg when walking. A bird with the same description continued to be seen occasionally 1-17 July on the shoreline from marker post 4 to north of marker post 6 and the injury appeared unchanged.

Appendix H. Sightings of injuries and documented mortality of California least tern and snowy plover adults, juveniles, and chicks at ODSVRA (continued).

Table H.2. Sightings of injured snowy plovers in 2020 (continued).

No. (age)	Location	Notes
1 (adult)	Open riding area, Foredune north shoreline	On 22 June, a female plover banded ga:o- was observed and there were concerns the right leg was swollen. This is a well known bird at ODSVRA and has been seen with a missing right foot since 2016 and has nested successfully in the past. On 30 June, after consultation with USFWS, the bird was captured at its associated SP184 nest in Foredune north and examined in the hand. There was no noticeable swelling or other sign of injury, except for the pre-existing missing foot, and the orange band moved freely. Photos of the captured bird were sent to the PWC veterinarian and it was recommended to be released without treatment. The orange band was removed as a precautionary measure and the bird was immediately released near the nest (see Appendix B for additional nest information). This bird was subsequently seen on multiple occasions foraging and moving well.
1 (chick)	North Oso Flaco shoreline	On 10 August, a 2-day-old chick banded vg:oa from the SP207 nest was observed with a slight limp and putting less weight on the right leg. The chick and the two unbanded sibling chicks were captured on the shoreline and the chick with limp had no obvious injury and all bands moved freely. The other two chicks were banded, all were released, and the three chicks were seen moving together as a group. On the following two days, the chick was observed to still be limping while foraging and the brood was no longer seen after 12 August.
1 (adult)	7 enclosure	On 30 August, an unbanded female was observed with a deformed left foot or toes. The bird was not relocated again.
1 (adult)	Open riding area, marker post 4	On 28 September, an unbanded plover was observed on the shoreline south of marker post 4 with a left leg injury, hopping and putting no weight on leg when foraging. The bird was not relocated after this date.
1 (adult)	North Oso Flaco	On 19 November, an unbanded plover was observed with fine material wrapped around at least one of its legs. On 27 November, after consultation with USFWS, it was captured and taken to PWC where it was treated for constriction wounds to both feet and hair-like material was removed from the left foot. The constriction wounds healed, weight was being put on both legs, and it was released in South Oso Flaco on 15 December (medical record attached).

Table H.3. Documented predation of least terns from 1 March to 30 September 2020.

No carcasses were found December 2019, subsequent to the 2019 annual report. In 2020, mortality of least terns, other than predation, was not documented. MWVCRC=CDFW, Office of Spill Prevention and Response, Marine Wildlife Veterinary Care and Research Center, Santa Cruz, CA.

No. (age)	Predator	Location	Notes
1 (chick)	Unknown	6 enclosure	On 23 June, a least tern chick carcass, banded w/o:a from the LT6 nest, was found approximately 175 feet east of the western enclosure fence. The chick was last seen when banded on 18 June at one day old. The carcass was intact with a slight protrusion in the neck area. It was sent to MWVCRC for examination and the results indicate the chick died from acute trauma with wounds presumably caused by attempted predation (necropsy report attached).
1 (chick)	Unknown	7 enclosure	On 22 July, a small unbanded least tern chick carcass was found approximately two feet from its nest (LT42, a 1-egg nest hatching 20 July). The chick was last seen alive at the nest 21 July. The intact carcass had blood around the bill and upper portion of neck. It was sent to MWVCRC for examination and the results indicate the chick died from acute trauma with wounds presumably caused by attempted predation (necropsy report attached).

Appendix H. Sightings of injuries and documented mortality of California least tern and snowy plover adults, juveniles, and chicks at ODSVRA (continued).

Table H.4. Documented predation of snowy plovers from 1 March to 30 September 2020.

No. (age)	Predator	Location	Notes
2 (1 chick or juvenile and 1 juvenile)	Western gull (third-year subadult)	6 enclosure shoreline	On 10 June at 8:37 am, a third-year western gull was observed eating a 28-day-old plover fledgling (SP29 nest) on the 6 enclosure shoreline. The gull was lethally removed from the same area soon after the predation was observed. Plover bands found in the gut, in addition to the one fledgling from SP29 nest, included four bands representing a second chick or fledgling from the SP90 nest that would have been 28 days old on 10 June and was last seen on 9 June at 27 days old on North Oso Flaco shoreline.
1 (chick or juvenile)	Northern harrier (adult male)	7.5 revegetation area	On 12 June, an adult male northern harrier was observed consuming prey in the 7.5 revegetation area. Prey remains collected included small feathers and half of the upper mandible of a plover, representing an older chick or a young juvenile.
1 (unknown age)	Peregrine (adult)	Foredune north shoreline	On 29 June, an adult peregrine was observed catching and eating avian prey on the Fore dune north shoreline. Prey remains collected included feathers of a plover of unknown age.
1 (juvenile)	Peregrine (adult with VID band W49)	7 enclosure	On 16 July, an adult peregrine with a VID band (W49, white characters on black band) on the right leg, was observed catching and eating a plover on the 7 enclosure shoreline. Prey remains collected were of an approximately 52-day-old banded juvenile (UNK2).
1 (adult male)	Peregrine (adult with VID band W49)	North Oso Flaco shoreline	On 17 July, a banded peregrine was observed eating prey on the North Oso Flaco shoreline. The peregrine was flushed out of the area using a bird whistler and collected prey remains contained bands (bb:ar) of a known adult male plover associated with a nearby brood of two banded chicks (SP171). The two 4-day-old abandoned chicks were found later the same day and collected for captive-rearing (see Table F.4 in Appendix F).
1 (chick)	Peregrine (adult with VID band W49)	Open riding area, west fence of Fore dune north	On 23 July, a banded adult peregrine was observed eating a plover chick on the west fence of Fore dune north. The peregrine was flushed to the east with a bird whistler and collected prey remains included the right leg "ao" bands of either a 2-day-old plover chick from SP187 nest or a 5-day-old plover chick from SP163 nest.
1 (juvenile)	Peregrine (juvenile)	Open riding area, west fence of Fore dune north	On 26 July, an unbanded juvenile peregrine falcon was observed eating avian prey on the west fence of Fore dune north. The peregrine was flushed with a bird whistler out of the area and collected prey remains were those of a 37-day-old juvenile plover banded ga:av from the SP89 nest.
2 (chicks)	Peregrine (adult with VID band W49)	Open riding area, west of Fore dune south	On 31 July, while attempting to trap a perched banded adult peregrine, it was observed flying to the ground and eating two 12-day-old plover chicks banded ga:vr (SP166 nest) on the shoreline of Fore dune south. The peregrine was hazed out of the area.
1 (chick)	Western gull (adult)	8 enclosure shoreline	On 10 August, an adult western gull was observed eating a 1-day-old plover chick (SP204 nest) on the 8 enclosure shoreline. Attempts were made to trap the gull with a leg-hold trap, but were unsuccessful. The gull flew to the South Oso Flaco shore where it was lethally removed. Gut contents contained the bands of the one plover chick observed consumed.
1 (juvenile)	Unknown	Open riding area, marker post 1	On 16 August, a juvenile plover carcass, banded vg:ab from the SP79 nest, was found west of marker post 1 that was closed to public vehicle use at the time. The carcass was dried and did not appear fresh, was found partially buried about one foot from a vehicle track and was flattened. It was sent to MWVCRC for examination and results showed likely cause of death to be from a predator (necropsy report attached). Only one chick fledged from this nest on 20 June and was last seen in the post 1 area on 11 August at 80 days old.
1 (chick or juvenile)	Unknown	Fore dune north shoreline	On 19 August, banded legs and feathers of a plover were found on the Fore dune north shoreline, representing an older chick or young juvenile from SP57 nest. The brood was last seen with three 25-day-old chicks on 29 June and two chicks fledged.
4 (unknown age)	Coyote	6 enclosure shoreline	On 21 August, degraded coyote scat was found on the 6 enclosure shoreline with 15 plover plastic bands inside (seven violet, four green, and one each of aqua, white, orange and blue) representing a minimum of four snowy plovers of unknown age.

Appendix H. Sightings of injuries and documented mortality of California least tern and snowy plover adults, juveniles, and chicks at ODSVRA (continued).

Table H.4. Documented predation of snowy plovers from 1 March to 30 September 2020 (continued).

No. (age)	Predator	Location	Notes
1 (chick or juvenile)	Unknown	6 exclosure shoreline	On 22 August, remains (two legs with attached bands bb and ab) of a chick or juvenile from the SP45 nest were found on the shoreline. Three chicks banded bb:ab were last seen 24 May at 6 days old, two chicks were last seen on 30 May at 12 days old, and one fledgling was last seen on 19 June at 32 days old.
1 (adult)	Unknown	8 exclosure shoreline	On 22 August, an adult plover wing was found on 8 exclosure shoreline.

Table H.5. Mortality, other than documented predation, of snowy plovers in 2020.

No carcasses were found December 2019, subsequent to the 2019 annual report. MWVCRC=CDFW, Office of Spill Prevention and Response, Marine Wildlife Veterinary Care and Research Center, Santa Cruz, CA.

No. (age)	Location	Notes
1 (chick)	6 exclosure	On 16 May, a 3- to 4-day-old chick, banded bb:wg from the SP29 nest, was seen alive but laying flat on the shoreline, not mobile, and not attended by an adult approximately 350 feet south of the nest location and 250 south of two banded siblings being brooded. The area was left undisturbed. Only two chicks were seen after this date, both of which fledged. On 8 August, a small dead bb:wg chick was found on the shoreline, approximately 40 feet north of the nest location, and approximately 390 feet north of the immobile chick location on 16 May. The desiccated carcass was found partially buried and was not sent for necropsy.
1 (chick)	Open riding area, west of Foredune central	On 27 May, a snowy plover chick carcass, banded vg:gv from the SP27 nest, was found on the shore above the high tide line. The two sibling chicks were seen in the vicinity of the carcass on the same day. All three chicks from the SP27 nest were last seen alive on 24 May when 11 days old. The desiccated carcass was found partially buried and was not sent for necropsy.
1 (chick)	6 exclosure	On 13 and 15 July, the carcass of a small chick, banded pg:vw from the SP114 nest, was observed on the shoreline. Three chicks hatched from this nest and all chicks were seen 30 June at 1 to 2 days old, two chicks were seen 1 July, and one chick was last seen on 9 July when 9 to 10 days old. The carcass could not be recovered due to the proximity of young plover broods.
1 (chick)	Open riding area, north of marker post 6	On 15 July, a small unbanded plover chick carcass was found above the high tide line. The area was closed to public vehicles and no tire tracks were present. Based on location and size of chick, it is likely from the SP124 brood with three unbanded chicks last seen on 13 July at 13 days old, and no chicks seen subsequently. The chick appeared fresh, was sent to MWVCRC for necropsy, and results indicate it died of a congenital or infectious disease, causing torticollis characterized by a marked lateral displacement of head and neck (necropsy report attached).
1 (chick)	Open riding area, north of marker post 6	On 17 August, a small desiccated plover chick carcass banded vg:ob from the SP100 nest, was found above the high tide line. The area was closed to public vehicles and no tire tracks were present. Three chicks were last seen on 22 June at 2 days old, two chicks seen on 23 June, and one chick was last seen on 5 July at 15 days old. The chick was not sent for necropsy.

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Oceano Dunes State Vehicular Recreation Area

2020 Predator Management Report



Submitted To:

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&
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CA Wildlife Services Program

Introduction

Prior to the 2020 California Least Tern (*Sternula antillarum browni*) (CLTE) 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 CLTE and SNPL nesting areas. Wildlife Specialist (WS) Hannah Garland was assigned to the ODSVRA project to monitor and selectively remove mammalian or avian predators to protect nesting CLTE and SNPL.

WS Hannah Garland began working on site at the ODSVRA project on March 31st, 2020 and worked through September 15th, 2020 for the protection of CLTE and SNPL. Her work will continue throughout the year based on available funding and the need to control other invasive pests.

Methods

Throughout this SNPL and CLTE nesting season a variety of predator management methods were utilized. Methods utilized include surveying, trapping, hazing, and shooting.

Predator surveys were performed regularly by wildlife services during the SNPL and CLTE nesting season. Surveys were conducted by vehicle and on foot in order to search for evidence of predator activity on the property. Leupold® BX-4 Pro Guide HD 10x42mm binoculars and Vortex Optics Diamondback 20-60x80 Spotting Scope were utilized during surveys to locate signs of predator activity and presence. Surveys mainly took place east of the nesting enclosure within the revegetation areas (Appendix 1). Additionally, Wildlife Services stayed in regular communication with State Parks staff to share information about predator sightings and activity.

Trapping was the primary method of predator control used during the 2020 nesting season. The main type of trap used was #1-1/2 and #3 padded leg-hold traps used in an attempt to capture coyotes (*Canis latrans*) and common ravens (*Corvus corax*). Padded leg-hold traps for coyotes were baited with commercially made gland and food-based scent lures, urine, and various other food baits. Raven traps were baited by creating false plover nests using quail eggs. The second type of trap utilized were cage traps in an attempt to capture striped skunk (*Mephitis mephitis*). Cage traps used for striped skunks were baited with cat food.

Wildlife Services regularly assisted Bloom Biological biologist Robert Chapman with trapping and hazing of problematic raptors on the Oceano Dunes property. Wildlife services stayed in regular communication with Robert about the location and habits of avian predators. When patterns of behaviors were discerned for individuals regularly recorded on property, trapping was initiated. The traps utilized were the Bal-Chatri trap (B-C trap) and the Bownet trap. The traps were baited with live avian and small mammal prey items.

Utilization of a firearm was the main method of euthanasia for Ravens, gulls, and coyotes. The model of firearm used for captured animals was a Ruger® 77/22 Bolt-Action Rifle. Ammunition for the firearm was Ruger® 77/22 Bolt-Action Rifle. Ravens and Gulls were euthanized with a Benelli® M2 20-gauge and 12 gauge semi-automatic shotgun with Federal Premium FS Steel 3-

inch shells with #4 shot, a Ruger® 77/22 Bolt-Action Rifle firing Ruger® 77/22 Bolt-Action Rifle and a Ruger® American .223 caliber rifle firing handloaded Hornady non-lead 35 grain NTX bullets.

An attempt to bait ravens using a secondary method whereby platforms were erected, and boiled chicken eggs were fixed to the platform to habituate the ravens to return to the location regularly. Trail cameras were placed nearby to confirm raven presence at the platforms. After the ravens visited the platforms regularly, the boiled chicken eggs would be replaced with chicken eggs dosed with two milligrams of the corvidicide DRC-1339. The active chemical in DRC-1339 3-Chloro-p-Toluidine Hydrochloride causes renal failure in the target bird species within 24 to 72 hours of ingestion. DRC-1339 was chosen because it is a selective avicide that is highly toxic to nest-depredating corvids but would require much larger doses to be toxic to mammals and other species of non-target birds.

Results

The main predators during the 2020 SNPL and CLTE nesting season were coyote, California gull, common raven, peregrine falcon, and northern harrier. A total of three SNPL nests were confirmed to have been depredated by common ravens and one SNPL nest was confirmed to be depredated by a coyote. Three SNPL nests were confirmed to have been depredated by Northern Harriers. Finally, Twelve SNPL nests were identified to be depredated by an unknown avian, and nine were depredated by unknown predators. Only one CLTE nest was proven to be depredated, however the predator was not identified. A total of two CLTE nests and a total of twenty SNPL nests were missing due to unknown causes. Chick survival started off positive this nesting season, but the fledge rate dropped in the second half of the season. This is likely due to higher rates of predator activity in the later months of the nesting season. Wildlife Services and the State Parks staff noted increased coyote and gull presence along the shoreline during this time. Personnel also recorded increased Peregrine Falcon (PEFA) and Northern Harrier (NOHA) hunting activity on the property during the nesting season. There were three PEFA predation events witnessed by staff and one NOHA predation event witnessed. Wildlife Services aided Bloom Biological Bob Chapman with problem raptor trapping when possible. Additionally, the remains of several banded chicks on the shoreline were discovered by state parks, who hypothesized them to be the remains of a coyote predation event. The remains contained the bands of at least four individuals.

Three coyotes (*Canis latrans*) were removed during the 2020 nesting season. The first and second coyotes were removed from the Maidenform revegetation area after being spotted traveling westwards towards the nesting area (Appendix 1) (Table 1). The third coyote was trapped using a padded leg-hold trap set within the foredunes near the South Oso Flaco Creek area (Table 1) (Appendix 1).

Gull predation was a likely reason for the reduced survival rate of SNPL chicks during the 2020 nesting season. There were multiple recorded incidents of suspicious gull behavior on the shoreline areas associated with SNPL broods and there were two confirmed gull predation events witnessed by state parks staff. After confirmation of predation, wildlife services removed two

adult western gulls (*Larus occidentalis*) (WEGU). The first WEGU was removed on June 10th from the six enclosure shoreline (Table 1). The second WEGU was removed on August 10th from the south oso flaco shoreline (Table 1). After lethal removal, birds were necropsied, and it was confirmed that both birds' stomach contents included the bands of at least one SNPL chick.

Historically, common ravens (*Corvus corax*)(CORA) have been a prevalent predator for SNPL and CLTE nests. During the 2020 SNPL and CLTE nesting season, a total of four SNPL nests were confirmed to have been predated by CORAs. This season, a total of four CORAs were removed by USDA-WS staff. On April 2nd, one CORA was removed from Oso Flaco Road (Table 1). On April 15th, a second CORA was removed from the agricultural fields close to Oso Flaco road (Table 1). Finally, on May 5th, two CORA were removed from the agricultural fields near Brown Road in Santa Barbara County (Table 1).

Peregrine Falcons (*Falco peregrinis*)(PEFA) and Northern Harriers (*Circus hudsonius*)(NOHA) were commonly observed on the Oceano Dunes property within and in close proximity to the nesting enclosures throughout the nesting season. Four nests were confirmed to have been predated by NOHAs. Several SNPL chick predation events by both PEFAs and NOHAs were witnessed as well. Wildlife Services assisted State Parks staff with tracking and hazing raptors that were close or within areas of concern. Wildlife Services assisted Bloom Biological staff member Robert Chapman with raptor trapping, but trapping efforts for target species this season were unsuccessful.

Future Recommendations

WS recommends that state parks continue to check the enclosure fencing regularly for changes in the sand that may cause gaps or mounded sand. This will prevent terrestrial predators from accessing sensitive nesting areas.

WS recommends that state parks continue to remove carcasses in order to remove attractants for scavenging predators.

WS recommends the continued removal of species that present a threat to the SNPL and CLTE populations at ODSVRA.

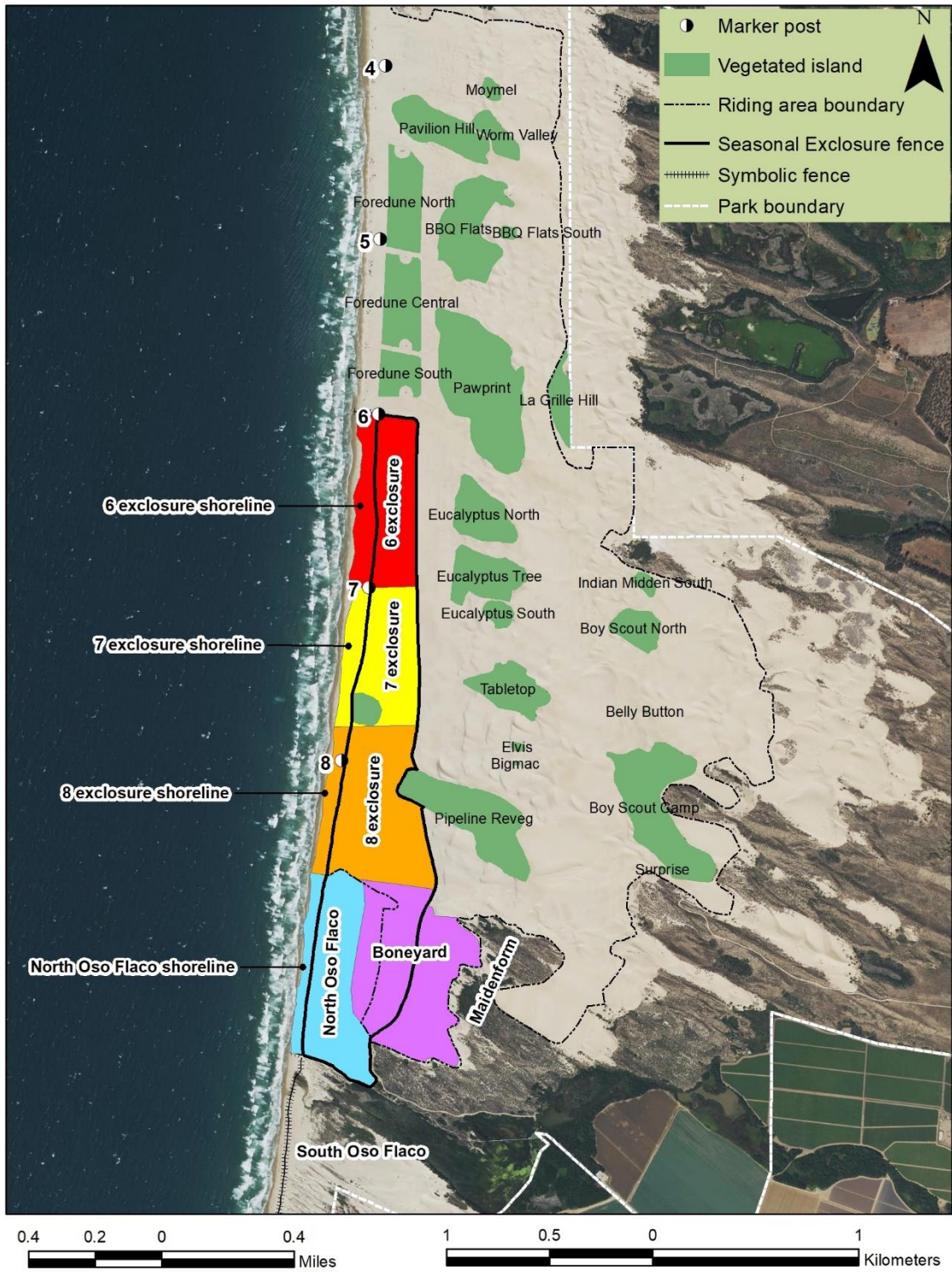
Table 1: Predator Removal Summary

Date	Species	Age/Sex	Location
4/02/20	Common Raven	Adult/NA	Oso Flaco road
4/15/20	Common Raven	Adult/NA	Ag fields near Oso Flaco Road
5/5/20	Common Raven	Adult/NA	Ag fields near Brown Road
5/5/20	Common Raven	Adult/NA	Ag fields near Brown Road
6/10/20	Western Gull	Adult/NA	6 exclosure shoreline
8/10/20	Western Gull	Adult/NA	South Oso Flaco Shoreline
6/19/20	Coyote	Adult/Female	Maidenform
9/3/20	Coyote	Adult/Female	Maidenform
9/10/20	Coyote	Adult/Male	South Oso Flaco Creek


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



Appendix 2: DRC-1339 EPA Label

<p>RESTRICTED USE PESTICIDE</p> <p>Due to High Acute Inhalation Toxicity and Eye and Skin Corrosiveness to Humans; High Acute Toxicity to Nontarget Birds and Aquatic Invertebrates; and the Need for Highly Specialized Applicator Training.</p> <p>For retail sale to and use only by USDA APHIS Certified Applicators trained in bird control or by persons under their direct supervision.</p>		<p>PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS</p> <p>DANGER</p> <p>Acute Hazards: Fatal if inhaled. Corrosive. Causes irreversible eye damage and skin burns. May be fatal if swallowed. Harmful if absorbed through skin. Prolonged or frequently repeated skin contact may cause allergic reactions in some people.</p> <p>Hazard Avoidance: Do not get in eyes, on skin, or on clothing. Do not breathe dust. Wear protective clothing, eyewear, and respiratory protection as listed under "PERSONAL PROTECTIVE EQUIPMENT." Wash thoroughly with soap and water after handling and before eating or smoking. Remove contaminated clothing and wash before reuse.</p> <p>PERSONAL PROTECTIVE EQUIPMENT (PPE): Handlers who mix packages containing 1 lb (0.45 kg) or more of this product must wear:</p> <ul style="list-style-type: none"> - Coveralls over long-sleeved shirt and long pants - Chemical-resistant gloves (such as waterproof or rubber gloves) - Chemical-resistant footwear plus socks - Protective eyewear (goggles or face shield) - A NIOSH approved particulate respirator with any N, R, or P filter with NIOSH approval number prefix TC-84A <p>Handlers who mix packages containing less than 1 lb (0.45 kg) of this product must wear:</p> <ul style="list-style-type: none"> - Long-sleeved shirt and long pants - Chemical-resistant gloves (such as waterproof or rubber gloves) - Protective eyewear (goggles or face shield) <p>Applicators who handle bait must wear:</p> <ul style="list-style-type: none"> - Long-sleeved shirt and long pants - Chemical-resistant gloves (such as waterproof or rubber gloves) <p>User Safety Requirements:</p> <ul style="list-style-type: none"> - Follow manufacturer's instructions for cleaning/ maintaining PPE. If no such instructions are provided for washables, use detergent and hot water. Keep and wash PPE separately from other laundry. - Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. - Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. - Remove PPE immediately after handling this product. As soon as possible, wash thoroughly and change into clean clothing. <p>ENVIRONMENTAL HAZARDS:</p> <p>This product is very highly toxic to birds and aquatic invertebrates. Do not use in any manner that may endanger nontarget and protected bird species. Runoff may be hazardous to aquatic organisms in neighboring areas. Do not apply when runoff is likely to occur. Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water by the cleaning of equipment or disposal of waste.</p> <p style="text-align: center;">UNITED STATES DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE 4700 River Road, Unit 149 Riverdale, MD 20737</p> <p style="text-align: center;">EPA Reg. No. 56228-29 EPA Est. No. 56228-ID-1 Net Contents: _____ Batch Code No.: _____</p> <p style="text-align: right;">Registration No. 56228-29, Page 1 of 3</p>	
<p>COMPOUND DRC-1339 CONCENTRATE – LIVESTOCK, NEST & FODDER DEPREDATIONS</p> <p><i>For control of crows, ravens, and magpies that prey on newborn livestock, that prey on eggs or the young of Federally-designated Threatened or Endangered Species or of other species designated to be in need of special protection or that damage and feed on the contents of silage/fodder bags.</i></p> <p>ACTIVE INGREDIENT: DRC-1339, 3-chloro-p-toluidine hydrochloride:..... 97.0%</p> <p>OTHER INGREDIENTS:..... 3.0%</p> <p>TOTAL:100.0%</p>			
<p>KEEP OUT OF REACH OF CHILDREN</p> <p>DANGER-PELIGRO</p> <p>POISON</p> 			
<p>FIRST AID</p> <p>Have the product container or label with you when calling a poison control center or doctor, or going for treatment. If you need immediate medical attention call the Poison Control Center at 1-800-222-1222 or a doctor. For non-emergency information concerning this product, call the National Pesticide Information Center at 1-800-858-7378.</p>			
If swallowed		<ul style="list-style-type: none"> - Call a poison control center or doctor immediately for treatment advice. - Have person sip a glass of water if able to swallow. - Do not induce vomiting unless told to do so by the poison control center or doctor. - Do not give anything to an unconscious person. 	
If on skin or clothing		<ul style="list-style-type: none"> - Take off contaminated clothing. - Rinse skin immediately with plenty of water for 15-20 minutes. - Call a poison control center or doctor immediately for treatment advice 	
If inhaled		<ul style="list-style-type: none"> - Move person to fresh air. - If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. - Call a poison control center or doctor immediately for treatment advice. 	
If in eyes		<ul style="list-style-type: none"> - Hold eye open and rinse slowly and gently with water for 15-20 minutes. - Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. - Call a poison control center or doctor immediately for treatment advice. 	
<p>NOTE TO PHYSICIAN AND VETERINARIAN: Probable mucosal damage may contraindicate the use of gastric lavage. See additional "PRECAUTIONARY STATEMENTS" on right panel. If pet eats bait, call a veterinarian at once.</p>			

ENDANGERED SPECIES CONSIDERATIONS:

Before undertaking any control operations with the product, consult with local, State, and Federal Wildlife authorities to ensure the use of this product presents no hazard to any Threatened or Endangered Species. **DO NOT** apply treated baits where there is a danger that Threatened or Endangered Species will consume baits unless special precautions are taken to limit such exposures.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

READ THIS LABEL:

Read the entire label. This product must be used strictly in accordance with this label's precautionary statements and use directions, as well as with all applicable State and Federal laws and regulations.

Before using this product, contact the U.S. Fish and Wildlife Service and the applicable State wildlife agency and obtain all necessary kill or collecting permits. Use only for the sites, pests, and application methods described on this label.

PRODUCT INFORMATION:

This product contains a slow-acting avicide which kills target bird species (see list below) in 1 to 3 days. As many types of nontarget birds are potentially vulnerable to DRC-1339, it is necessary to use care and to follow the requirements of this label to minimize impacts to nontarget species.

USE RESTRICTIONS:

Baits made from Compound DRC-1339 - Livestock, Nest & Fodder Depredations may only be used to control the following species:

- Common raven (*Corvus corax*),
- Chihuahuan raven (*Corvus cryptoleucus*),
- American crow (*Corvus brachyrhynchos*),
- Black-billed magpie (*Pica hudsonia*), and
- Fish crow (*Corvus ossifragus*).

This product may be used to prepare egg or meat-cube baits to control the target species listed above in the following use sites:

- Rangeland and pastureland areas where ravens or crows prey upon newborn livestock;
- Refuges or other areas where ravens or crows prey upon the eggs and/or young of Federally-designated Threatened or Endangered Species, or upon the eggs and young of other species which Federal or State wildlife agencies have determined to be in need of protection from nest predators due to documented declines in numbers and/or in nesting success; or
- Within 25 feet (7.6 m) of silage/fodder bags that have been damaged or are likely to be damaged by crows, ravens, or black-billed magpies.

Baits must be prepared and applied as specified on this label. **DO NOT** apply baits made from this product by air or by use of any mechanical equipment designed to broadcast baits or other pesticides. Users of this product must follow all limitations indicated on this label regarding the placement and monitoring of treated baits.

Before baits made from this product are applied, sites that are to be treated must be observed for evidence of nontarget activity and must be prebaited (see specific instructions for these activities). **DO NOT** apply treated baits where there is a danger that Threatened or Endangered Species will consume baits unless special precautions are taken to limit such exposures. Such precautions shall include observation of baited sites and use of hazing tactics to frighten away Threatened or Endangered Species that otherwise might feed upon baits.

DIRECTIONS FOR USE, continued**USE RESTRICTIONS, continued:**

DO NOT apply treated baits within 50 feet (15.2 m) of permanent manmade or natural bodies of water, unless baited sites are under constant observation while baits are exposed.

DO NOT exceed a maximum application rate of 0.083 lbs of active ingredient per acre (0.93 g active ingredient/100 m²), or a maximum yearly application rate of 0.5 lb of active ingredient per acre (5.61 g active ingredient/100 m²).

DO NOT store treated bait in locations accessible to children, pets, domestic animals, or nontarget wildlife.

Prior to application, and during the time between the conclusion of application and the disposal of unconsumed bait, **DO NOT** temporarily place treated bait in locations accessible to children, pets, domestic animals, or nontarget wildlife. Follow the directions in "ENTRY RESTRICTIONS" to avoid exposure to children, pets, or domestic animals during application. Follow the directions in "PRETREATMENT OBSERVATIONS" to mitigate exposure to nontarget wildlife during application.

DO NOT apply bait in a way that will contact workers or other persons.

DO NOT use treated baits as food or feed.

DO NOT apply baits made from this product in any way that could contaminate human food or animal feed.

ENTRY RESTRICTIONS:

Only protected applicators may be in the area during bait application. Keep pets and livestock, and persons other than authorized handlers away from the bait at all times, and exclude all unauthorized persons from application sites during prebaiting and baiting. For example, post signage near, in the vicinity of, or at main entrances or commonly used access points to prebaiting and baiting sites that warns persons not to pick up or handle any baits and to keep pets and livestock away from bait.

PRETREATMENT OBSERVATIONS:

Prior to application, carefully observe target birds' feeding habits to locate their preferred feeding sites, determine the optimum time of application, and evaluate potential hazards of the application to nontarget and protected species.

PREBAITING:

Prebaiting with untreated bait materials (or use of a draw station) is necessary to promote feeding by target species and to assess potential for exposure of nontarget species. Apply prebait using the same procedures that are prescribed below for the type of bait ("EGG BAITS" or "MEAT BAITS") that is to be used for toxic baiting.

Observe baited areas (from blinds) early in prebaiting period to determine whether nontarget species are approaching baits. Haze away Threatened or Endangered and nontarget species that might consume baits. Remove baits if such nontarget species continue to approach them.

(See next page for additional "DIRECTIONS FOR USE")

DIRECTIONS FOR USE, continued

BAIT PREPARATION:

MEAT BAITS:

MEAT BAIT PREPARATION:

Mix 0.027 oz (0.75 g) of this product with 0.18 oz (5.0 g) of powdered sugar. Pour or sprinkle concentrate-sugar mixture over 200 meat cubes that measure about 0.5 in (1.3 cm) on each side.

Mix or tumble bait slowly until all meat cubes appear to be evenly covered.

MEAT BAIT APPLICATION:

NOTE: During application, wear all PPE as listed under "PERSONAL PROTECTIVE EQUIPMENT."

Control of crows, magpies, and ravens with meat baits prepared from this product is limited to the sites indicated above under "USE RESTRICTIONS." Wear rubber gloves while handling baits. Place no more than 75 meat cube baits at each baited site. Place 5 to 10 baits in clusters over an area not to exceed 1,000 ft² (93 m²) where control of ravens, magpies, and/or crows is to be affected. **Draw stations** (fresh, unpoisoned animal carcasses) may be needed to attract ravens, magpies, and/or crows to the locations selected for bait exposure. If draw stations are used, place meat baits on or within a few feet of the animal carcasses.

WHILE TREATED MEAT BAITS ARE EXPOSED, BAITED AREAS MUST BE OBSERVED CONTINUOUSLY FROM A DISTANCE OF NO MORE THAN 1,000 YARDS (914 m) TO DETECT APPROACHES BY THREATENED OR ENDANGERED SPECIES AND OTHER NONTARGET OR PROTECTED ANIMALS LIKELY TO EAT BAITS. Because of wariness of target bird species, it may be necessary to observe baits from behind natural or specially-constructed blinds. Haze away Threatened or Endangered and nontarget species that might consume baits. Remove baits if such nontarget species continue to approach them.

Unconsumed bait cubes must be retrieved daily, at the conclusion of each observation period and no later than one hour after sunset. Dispose of retrieved baits in accordance with applicable State and Federal laws.

EGG BAITS:

EGG BAIT PREPARATION:

Dissolve 0.07 oz (2 g) of the product in 0.2 pint (100 ml) of warm potable water at 110 °F (43.3 °C) to make an approximately 2% solution; or dissolve 0.14 oz (4 g) of the product in 0.2 pint (100 ml) of warm potable water at 110 °F (43.3 °C) to make an approximately 4% solution; or in other proportions to produce a 2% or 4% solution.

Using an 18-gauge hypodermic needle or similarly-sized implement, make an entry hole in the end of each hard-boiled chicken, turkey, or duck egg to be used. Using a syringe and a 20-gauge hypodermic needle, slowly inject 0.002 pints (1 ml) of the 2% solution (or 0.001 pints or 0.5 ml of the 4% solution) into the yolk of each egg.

Make only enough solution to treat the desired number of eggs. Mark treated eggs with small skull and crossbones or the word POISON.

DIRECTIONS FOR USE, continued

EGG BAIT APPLICATION:

NOTE: During application, wear all PPE as listed under "PERSONAL PROTECTIVE EQUIPMENT."

Control of crows, magpies, and ravens with egg baits prepared from this product is limited to the sites indicated above under "USE RESTRICTIONS." Place all egg baits to be used at one baited site within 25 ft (7.6 m) of the center of the site or within 25 ft (7.6 m) of any silage/fodder bags that are to be protected. Place 1-4 eggs in each bait set, and do not use more than a total of 18 eggs per baited site. If a draw station (fresh, unpoisoned animal carcass) is used, all bait sets must be located at least 10 ft (3 m) from the carcass. Wherever practical, bait sets should be made in "dummy" nests created by making small depressions in the ground. Dummy nests may be partially hidden by vegetation or other debris. In other situations, eggs may be placed on elevated wooden platforms 1 to 2 ft² (0.1 to 0.2 m²) in area. Eggs placed on platforms must be restrained by wire to prevent them from falling off platforms or being removed by birds. Apply 2-3 eggs per platform.

DO NOT USE MORE EGGS THAN ARE NEEDED TO EFFECT CONTROL, as ravens and crows tend to cache surplus food.

Observe baited areas (from blinds) early in baiting period to determine whether nontarget species are approaching egg baits. Haze away Threatened or Endangered and nontarget species that might consume baits. Remove baits if such nontarget species continue to approach them.

Rebait with additional treated eggs when more than 50% of the treated eggs offered have been removed by ravens, magpies, or crows. When replacing baits, take care not to frighten target birds actively removing or feeding upon eggs. Retrieve unconsumed treated eggs within 7 days of exposure. Old treated eggs and treated eggs not eaten by the time control operations cease must be disposed of in accordance with applicable State and Federal laws.

POSTTREATMENT CLEAN-UP

(Meat and Egg Baits):

NOTE: During clean-up, wear long-sleeved shirt and long pants and chemical-resistant gloves (such as waterproof or rubber gloves). To further reduce the potential for exposure, use appropriate implements such as scoops or other tools to collect carcasses or uneaten bait.

Collect unconsumed and leftover meat daily, and unconsumed and leftover egg baits, dying birds, and carcasses within 7 days of treatment. Dispose of such baits and carcasses by burning or burial, as authorized by applicable laws and ordinances.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

PESTICIDE STORAGE: Store only in original container, in a dry place inaccessible to children, pets, and domestic animals.

PESTICIDE DISPOSAL: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spilled bait, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER HANDLING: Nonrefillable container. Do not reuse or refill this container. Offer for recycling, if available. Completely empty bags by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application equipment. If bags are not to be recycled, dispose of bags in a sanitary landfill or by incineration if allowed by State and local authorities. If burned, stay out of smoke.

Revised: 05-06-2016

Registration No. 56228-29, Page 3 of 3

Appendix 3: Safety Data Sheet for DRC-1339



Safety Data Sheet

Issue Date: 2-Feb-2004

Revision Date: 21-Dec-2017

Version 4

1. IDENTIFICATION

Product Identifier

Product Name
Compound DRC-1339 Concentrate – Feedlots
Compound DRC-1339 Concentrate – Gulls
Compound DRC-1339 Concentrate – Pigeons
Compound DRC-1339 Concentrate – Livestock, Nest & Fodder Depredations
Compound DRC-1339 Concentrate – Staging Areas
Compound DRC-1339 Concentrate – Bird Control
DRC-1339 Technical

Other Means of Identification

SDS # USDA-0001

Synonyms
Starlicide
3-chloro-p-toluidine hydrochloride
3-chloro-4-methylamine hydrochloride
3-chloro-4-methylbenzamine hydrochloride
CPTH

Registration Number(s)
EPA Reg. # 56228-10: Compound DRC-1339 Concentrate – Feedlots
EPA Reg. # 56228-17: Compound DRC-1339 Concentrate – Gulls
EPA Reg. # 56228-28: Compound DRC-1339 Concentrate – Pigeons
EPA Reg. # 56228-29: Compound DRC-1339 Concentrate – Livestock, Nest & Fodder Depredations
EPA Reg. # 56228-30: Compound DRC-1339 Concentrate – Staging Areas
EPA Reg. # 56228-63: Compound DRC-1339 Concentrate – Bird Control
EPA Reg. # 56228-59: DRC-1339 Technical

Recommended Use of the Chemical and Restrictions on Use

Recommended Use Restricted Use Pesticide: For retail sale to and use only by USDA APHIS Certified Applicators trained in bird control or by persons under their direct supervision.

Uses Advised Against Any use(s) not strictly adhering to the Directions for Use on the EPA-approved labels is strongly advised against and a violation of federal law.

Details of the Supplier of the Safety Data Sheet

Registrant Address
United States Department of Agriculture
Animal & Plant Health Inspection Service
4700 River Road
Riverdale, MD 20737

Manufacturer Address
Pocatello Supply Depot
238 E. Dillon Street
Pocatello, ID 83201-6623

Emergency Telephone Number

Company Phone Number 1-208-236-6920
Emergency Telephone (24 hr) INFOTRAC: 1-352-323-3500 (International)
INFOTRAC: 1-800-535-5053 (North America)
National Pesticide Information Center Hotline: 1-800-858-7378
Poison Control Center: 1-800-222-1222

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: HAZARDOUS TO HUMANS AND DOMESTIC ANIMALS: Fatal if inhaled, harmful if swallowed, causes severe skin burns and serious eye damage, may be harmful in contact with skin, and may cause an allergic skin reaction. This chemical is a product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-EPA registered chemicals. Please see Section 15 for additional EPA information.

Appearance Off-white to yellow powder**Physical State** Powder**Odor** Moth ball**Classification**

Acute toxicity - Oral	Category 4
Acute toxicity - Inhalation (Dusts/Mists)	Category 1
Skin corrosion/irritation	Category 1C
Serious eye damage/eye irritation	Category 1
Skin sensitization	Category 1B
Hazardous to aquatic environment, Acute	Category 1
Hazardous to aquatic environment, Chronic	Category 1

Hazards Not Otherwise Classified (HNOC)**Signal Word**

Danger

Hazard Statements

Fatal if inhaled.

Harmful if swallowed.

Causes severe skin burns and eye damage.

May cause an allergic skin reaction.

Very toxic to aquatic life with long lasting effects.

**Precautionary Statements - Prevention**

Wash face, hands and any exposed skin thoroughly after handling.

Do not eat, drink or smoke when using this product.

Do not breathe dust/fume/gas/mist/vapors/spray.

Use only outdoors or in a well-ventilated area.

Wear respiratory protection.

Wear protective gloves/protective clothing/eye protection/face protection.

Contaminated work clothing should not be allowed out of the workplace.

Avoid release into the environment.

Precautionary Statements - Response

Immediately call a poison center or doctor/physician.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Immediately call a poison center or doctor/physician.

IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

Wash contaminated clothing before reuse.

If skin irritation or rash occurs: Get medical advice/attention.

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician.

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth. Do not induce vomiting.

Collect spillage. Hazardous to the aquatic environment.

Precautionary Statements - Storage

Store in a well-ventilated place. Keep container tightly closed.
Store locked up.

Precautionary Statements - Disposal

Dispose of contents/container to an approved waste disposal plant.

WHMIS Classification

This product was classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations, and the SDS contains all the information required by these regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms

3-chloro-p-toluidine hydrochloride
3-chloro-4-methylaniline hydrochloride
3-chloro-4-methylbenzamine hydrochloride
CPTH
DRC-1339
Starlicide

Chemical Name	CAS No	Weight-%
3-chloro-p-toluidine hydrochloride	7745-89-3	97

Chemical Additions

Other ingredients make up 3% of this product.

Molecular Weight

178.06 g/mol

Molecular Formula

C₇H₉NC₂

4. FIRST-AID MEASURES

First Aid Measures

General Advice	Immediately call a poison center or doctor/physician.
Eye Contact	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor/physician.
Skin Contact	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Immediately call a poison center or doctor/physician.
Inhalation	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician. If person is not breathing, call an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible.
Ingestion	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. DO NOT induce vomiting, unless directed by medical personnel. Have victim rinse mouth thoroughly with water and sip a glass of water, if conscious and able to swallow. Never give anything by mouth to a victim who is unconscious.
Self-Protection of the First Aider	Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know locations of rescue equipment before the need arises.

Most Important Symptoms and Effects

Symptoms	Overexposure or poisoning symptoms include: central nervous system depression, hematuria, diuresis, and burning of skin and eyes.
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Indication of Any Immediate Medical Attention and Special Treatment Needed

Notes to Physician	Treat symptomatically. Possible mucosal damage may contraindicate the use of gastric lavage.
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5. FIRE-FIGHTING MEASURES**Suitable Extinguishing Media**

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Water spray. Dry chemical. Carbon dioxide (CO₂).

Unsuitable Extinguishing Media	Not determined.
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Specific Hazards Arising from the Chemical

Non-flammable. Non-explosive. Can release hazardous vapors during a fire. Nitrogen oxides (NO_x). Hydrochloric gas (HCl(g)).

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES**Personal Precautions, Protective Equipment and Emergency Procedures**

Personal Precautions	Handle only with protective gloves, clothing and face mask or respirator.
For Emergency Responders	Use personal protection recommended in Section 8: Exposure Controls/Personal Protection.
Environmental Precautions	Prevent from entering ditches, sewers, waterways and/or groundwater. See Section 12: Ecological Information. Notify authorities if spill has entered watercourse or sewer or has contaminated soil or vegetation.

Methods and Material for Containment and Cleaning Up

Methods for Containment	Prevent further leakage or spillage if safe to do so.
Methods for Clean-Up	Pick up spillage mechanically and place in suitable, closed, properly labeled container for recovery or disposal. For waste disposal, see Section 13: Disposal Considerations.

7. HANDLING AND STORAGE**Precautions for Safe Handling**

Advice on Safe Handling	Wash face, hands, and any exposed skin thoroughly after handling. Do not eat, drink or smoke when using this product. Do not breathe dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Wear respiratory protection. Wear protective gloves/protective clothing and eye/face protection. Contaminated work clothing should not be allowed out of the workplace.
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Conditions for Safe Storage, Including Any Incompatibilities

Storage Conditions	Keep/store only in original container. Store locked up. Keep container tightly closed and store in a cool, dry and well-ventilated place. Keep away from children, pets and domestic animals. Keep away from other chemicals. Store away from food stuffs. Do not contaminate water, food or feed by storage.
Incompatible Materials	Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Appropriate Engineering Controls

Engineering Controls Engineering methods to prevent or control exposure are preferred. Methods include process or personnel enclosure, mechanical ventilation (dilution and local exhaust), and control of process conditions. In using this material follow suitable precautions to control dust, this helps to prevent fire and health hazards.

Individual Protection Measures, Such as Personal Protective Equipment

Eye/Face Protection	ALL USERS: Protective eyewear (goggles or face shield).
Skin and Body Protection	ALL USERS: Chemical-resistant gloves. USERS MIXING PACKAGES CONTAINING 1 LB OR MORE OF THIS PRODUCT: Long sleeved shirt and long pants. Chemical-resistant gloves. Chemical-resistant footwear plus socks. USERS MIXING PACKAGES CONTAINING LESS THAN 1 LB OF THIS PRODUCT: Long sleeved shirt and long pants. Chemical-resistant gloves.
Respiratory Protection	USERS MIXING PACKAGES CONTAINING 1 LB OR MORE OF THIS PRODUCT: Respirator with a dust/mist filtering respirator (MSHA NIOSH approval number prefix TC-21C or NIOSH approved respirator with any N, R, P or HE filter). USERS MIXING PACKAGES CONTAINING LESS THAN 1 LB OF THIS PRODUCT: No special protection required.
General Hygiene Considerations	Handle in accordance with good industrial hygiene and safety practice. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Wash face, hands and any exposed skin thoroughly after handling.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State	Powder	Odor	Moth ball
Appearance	Off-white to yellow powder	Odor Threshold	No data available
Color	Off-white to yellow		
Property	Values	Remarks • Method	
pH	2.67		
Melting Point/Freezing Point	Sublimes 220-230 °C (428-446 °F)	@ 760 mmHg	
Boiling Point/Boiling Range	No data available		
Flash Point	No data available		
Evaporation Rate	No data available		
Flammability (Solid, Gas)	No data available		
Upper Flammability Limits	No data available		
Lower Flammability Limit	No data available		
Vapor Pressure	1.408 x 10 ⁻² Pa (1.06 x 10 ⁻⁴ mmHg)	@ 25 °C	

Vapor Density	No data available	
Specific Gravity	No data available	
Water Solubility	9.1 g/100 ml water	@ 30 °C
Solubility in Other Solvents	0.5 g/100 ml n-octanol	@ 30 °C
	0.013 g/100 ml acetonitrile	@ 30 °C
Partition Coefficient	0.022	estimated
Auto-Ignition Temperature	No data available	
Decomposition Temperature	No data available	
Kinematic Viscosity	No data available	
Dynamic Viscosity	No data available	
Explosive Properties	No data available	
Oxidizing Properties	No data available	
Density	0.44 g/ml or g/cm ³	

10. STABILITY AND REACTIVITY

Reactivity

Not reactive under normal conditions.

Chemical Stability

Stable under recommended storage conditions.

Possibility of Hazardous Reactions

None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

Conditions to Avoid

Keep out of reach of children. Contact with incompatible materials. Heat above 300 °C (570 °F) will cause release of nitrogen oxides (NO_x) and hydrochloric gas (HCl(g)).

Incompatible Materials

Strong oxidizing agents.

Hazardous Decomposition Products

No data available.

11. TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Product Information	The EPA did not require a subchronic toxicity study for DRC-1339 Concentrate based on the low volumes used and restricted use nature of its application. The agency does not believe the potential exists for significant exposure of production workers or applicators to DRC-1139 Concentrate.
Eye Contact	Causes severe eye damage. Contact causes burning, redness, and severe damage, including blindness.
Skin Contact	Corrosive to skin. Causes severe skin irritation, dermatitis, and chemical burns. May cause an allergic skin reaction. May be absorbed through the skin in harmful amounts.
Inhalation	Fatal if inhaled. Inhalation of dusts may be severely irritating and may cause chemical burns to the respiratory tract.
Ingestion	Harmful if swallowed.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
3-chloro-p-toluidine hydrochloride 7745-89-3	302-350 mg/kg (rat)	>2,000 mg/kg (rabbit)	No data available

Information on Physical, Chemical and Toxicological Effects

Symptoms Please see Section 4: First-Aid Measures for symptoms.

Delayed and Immediate Effects and Chronic Effects from Short- and Long-Term Exposure

Sensitization May cause an allergic skin reaction.

Germ Cell Mutagenicity Negative test results in three mutagenicity studies.

Carcinogenicity This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP.

Reproductive Toxicity The EPA did not require a developmental toxicity study based on the use characteristics of DRC-1339 Concentrate. The agency does not believe the potential exists for repeat oral, dermal or inhalation exposures to production workers or applicators.

Numerical Measures of Toxicity

Not determined.

12. ECOLOGICAL INFORMATION

Ecotoxicity

This product is very highly toxic to birds and aquatic invertebrates. This product is toxic to fish.

Chemical Name	Algae/Aquatic Plants	Fish LC ₅₀	Toxicity to Microorganisms	Crustacea EC ₅₀
3-chloro-p-toluidine hydrochloride 7745-89-3	No data available	9.7 mg/l: <i>Oncorhynchus mykiss</i> (rainbow trout); 10.5 mg/l: <i>Lepomis macrochirus</i> (bluegill sunfish)	No data available	0.07 mg/l: <i>Daphnia magna</i> (water flea)

Persistence/Degradability

No data available.

Bioaccumulation

Slightly accumulates in bluegill sunfish (*Lepomis macrochirus*).

Mobility

No data available.

Other Adverse Effects

Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

13. DISPOSAL CONSIDERATIONS

Waste Treatment Methods

Disposal of Wastes	Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinse is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency or Hazardous Waste representative at the nearest EPA regional office. Never place any unused product down an indoor or outdoor drain. Do not contaminate water, food or feed by disposal.
Contaminated Packaging	Completely empty bag in application equipment. Then dispose of empty bag in a sanitary landfill or by incineration or if allowed by state and local authorities, by burning. If burned, stay out of smoke. Do not reuse or refill this container.

14. TRANSPORT INFORMATION

Note Please see current shipping paper for most up to date shipping information, including exemptions and special circumstances.

DOT

UN/ID No	UN2239
Proper Shipping Name	Chlorotoluidines, solid
Hazard Class	6.1 (over 66 lbs)
Packing Group	III (over 66 lbs)

IATA

UN/ID No	UN2239
Proper Shipping Name	Chlorotoluidines, solid
Hazard Class	6.1
Packing Group	III

IMDG

UN/ID No	UN2239
Proper Shipping Name	Chlorotoluidines, solid
Hazard Class	6.1
Packing Group	III
EmS-No	F-A, S-A

TDG

UN/ID No	UN2239
Proper Shipping Name	Chlorotoluidines, solid
Hazard Class	6.1
Packing Group	III

15. REGULATORY INFORMATION

International Inventories

This product is excluded/exempt from TSCA regulation under FIFRA section 3(2)(B)(ii) when used as a pesticide (EPA Reg. # 56228-10, 56228-17, 56228-28, 56228-29, 56228-30, and 56228-63) and from DSL listing as it is regulated under the Pesticide Control Products Act when used as a pesticide.

TSCA	Exempt
DSL	Excluded

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDL - Canadian Domestic Substances List/Non-Domestic Substances List

U.S. Federal Regulations

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

U.S. State Regulations

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
3-chloro-p-toluidine hydrochloride 7745-89-3		X	

EPA Pesticide Registration Numbers

EPA Reg. # 56228-10: Compound DRC-1339 Concentrate – Feedlots
 EPA Reg. # 56228-17: Compound DRC-1339 Concentrate – Gulls
 EPA Reg. # 56228-28: Compound DRC-1339 Concentrate – Pigeons
 EPA Reg. # 56228-29: Compound DRC-1339 Concentrate – Livestock, Nest & Fodder Depredations
 EPA Reg. # 56228-30: Compound DRC-1339 Concentrate – Staging Areas
 EPA Reg. # 56228-63: Compound DRC-1339 Concentrate – Bird Control
 EPA Reg. # 56228-59: DRC-1339 Technical

EPA Statement

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

EPA Pesticide Label

SIGNAL WORD: Danger
 PICTOGRAM: Skull and crossbones
 ACUTE ORAL TOXICITY: May be fatal if swallowed.
 ACUTE DERMAL TOXICITY: Harmful if absorbed through skin.
 ACUTE INHALATION TOXICITY: Fatal if inhaled (EPA accepted Category I in lieu of animal testing data).
 SKIN IRRITATION/CORROSION: Corrosive.
 EYE DAMAGE/EYE IRRITATION: Causes irreversible eye damage and skin burns.
 SENSITIZATION: Mild to moderate sensitizer. Prolonged or frequently repeated skin contact may cause allergic reactions in some people.
 ENVIRONMENTAL HAZARDS: This product is very highly toxic to birds and aquatic invertebrates. Runoff may be hazardous to aquatic organisms in neighboring areas. Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark.

16. OTHER INFORMATION

NFPA	Health Hazards	Flammability	Instability	Special Hazards
	3	0	0	None
HMIS	Health Hazards	Flammability	Physical Hazards	Personal Protection
	3	0	0	E

Issue Date: 2-Feb-2004
Revision Date: 21-Dec-2017
Revision Note: Information updated

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

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Oceano Dunes Vehicular Recreation Area Predator Management

2020 Report

Prepared for:

CA Department of Parks and Recreation
Oceano Dunes District
340 James Way
Suite 270
Pismo Beach, CA 93449

Prepared by:

Bloom Biological, Inc.
13611 Hewes Avenue
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September 2020

REPORT CONTRIBUTORS

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Report Authors: Robert Chapman, Peter Bloom Ph.D

ABOUT BLOOM BIOLOGICAL, INC,

For more than 40 years, Bloom Biological, Inc. (BBI) has provided biological consulting services for large and small clients. Our resume of services includes raptor and endangered species research, biological monitoring, impact assessment, permitting, conservation planning and geospatial analysis. Our innovative approach has provided solutions to complex problems for clients and projects throughout a range of industries including alternative energy, residential development and the public sector. Collectively, the management and staff of BBI hold permits or memoranda of understanding for participating in the conservation and recovery of more than a dozen endangered or threatened species, as well as a number of other special-status species, in California and the western United States. Over the years, BBI has established an impeccable relationship with the resource agencies, project proponents, and environmental organizations by skillfully balancing the needs and objectives of land planning, resource conservation, and the public interest. In addition to our work in California and the western United States, BBI biologists have worked in Alaska, Central and South America, Europe, Southern Asia, and the western Pacific. BBI is a certified Small Business Enterprise and Woman-owned Business Enterprise.

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1.0 SUMMARY OF PREDATOR OBSERVATIONS

The presence and behavior of avian predators changed with time throughout the project term, 1 March-10 September 2020 (i.e., '2020 season'). This report summarizes avian predator observations within this date range, and from across the entire Oceano Dunes SVRA ('Oceano Dunes') area, unless otherwise specified. Observations of the same species that were separated by more than 20 minutes were considered unique observations. In describing the frequency of occurrence for a given species at different areas of the Oceano Dunes, one individual observation had the potential to result in multiple occurrences if that individual was observed in multiple areas.

Hazing is a term used in this report to refer to an act directed at a potential predator to persuade it to leave an area. Hazing was performed collectively by park staff, USDA Wildlife Services contractors, Point Blue contractors and Bloom Biological, Inc. ('BBI') contractors, and was performed using bird whistlers, or by approaching the predator on foot or in a vehicle. **Bird Whistlers**® are a pyrotechnic deterrent device that makes a very loud 'SCREECH' sound designed to scare away pest birds and wildlife.

Raptor observations are addressed according to the following seasonal periods:

- **Wintering:** Individuals on-site and using the project area early, prior to nesting period, these individuals may or may not migrate out of the area after the arrival of "spring."
- **Pre-nesting:** Individuals that arrive on-site during "spring" which begin to set-up nesting territories. They may stay on-site, or they may continue to other areas.
- **Nesting:** Individuals which are breeding on or near the project site.
- **Post-breeding:** Juvenile birds that arrive on-site during summer or adult birds that begin to roam.

The 2020 season presented several challenges to the Avian Predator Specialist ('APS') which ultimately skewed data making year-to-year comparisons spurious. The closure of the park due to the COVID-19 pandemic and the intensive, singular focus on Northern harrier (*Circus hudsonius*) and peregrine falcon (*Falco peregrinus*) trapping, severely impacted the APS' observation time. Also, the closure of the park opened new habitat, expanding nesting habitat for the federally threatened Western snowy plover (*Charadrius nivosus nivosus*, 'plover') which subsequently expanded the predator monitoring area. In past years most avian predators were passively tracked through non-sensitive areas as they were little threat to the colonies. This season, due to expanded plover nesting, avian predators were now of concern in non-sensitive areas and subsequently monitored and tracked (e.g., vegetated islands).

During the 2020 season, authorization was sought and granted by the California Department of Fish & Wildlife ('CDFW'; Carrie Battistone, Senior Environmental Scientist) and the United States Fish & Wildlife Service ('USFWS'; Jennifer Brown, Wildlife Biologist) to trap and relocate two raptor individuals of two species; peregrine falcon and northern harrier. Justification for trapping and relocation of the peregrine falcon was based on the observed predation of plover adults/fledglings and/or chicks along with the habitual disturbance to the nesting colonies. The male Northern harrier was authorized for removal based on its perpetual hunting in plover and tern nesting and brood rearing habitat and visual confirmation of nest predation via nest cameras.

One adult male Northern harrier was authorized for trapping and relocation on 29 May 2020. Despite extensive and intensive efforts by several BBI raptor specialists operating numerous traps, this individual was able to elude capture. This bird eventually ceased visiting the area with any regularity beginning 12 July. Constant trapping efforts were implemented from 29 May through 17 July comprising a 34-day effort (see 'Summary of Trapping Activities' for details).

One well-known and well-documented adult peregrine falcon of unknown sex, visual identification band ('VID') white on black, "W/49" right: USFWS 1947-18002 silver left, was documented taking plovers and was authorized for removal 29 July 2020. This individual was trapped and banded as a subadult on 24 June 2019, and relocated 25 June 2019, by the APS. (see 2019 report). Constant trapping efforts were implemented from 31 July through 17 August for an 11-day effort (see 'Summary of Trapping Activities' for details).

2.0 PREDATOR SPECIES OCCURRENCE

AMERICAN KESTREL

No American kestrel (*Falco sparverious*) nests were found in the project area. However, observations of paired individuals were made at the Phillips 66, Santa Maria Refinery adjacent to Oceano Dunes to the east. Historically kestrels nested here, but no nest was confirmed in 2020. The numerous and regular documentation of a male and female kestrel in the Oso Flaco Creek area, in conjunction with a post-breeding spike of kestrel observations in this vicinity, is a likely indication that birds nested nearby, most likely along the creek's riparian corridor.

Kestrels were frequently observed during the project period with 30 observations of 36 individuals made through the project term. March through July held constant; averaging 3 observations of 5 individuals per month, but post-breeding dispersal saw an August jump in observations, rising to 12 observations of 14 individuals for the month. The first 10 days of September continued to reflect this rise with 4 observations of 6 individuals in the 10-day period.

MERLIN

Merlins (*Falco columbarius*) winter in the project area and migrate out of San Luis Obispo County, typically becoming casual by 1 April annually. This was a very light year for this species with only three observations documented through the project term by this observer with the last sighting being 1 April. While this was the last observation for this species by this observer, park staff documented Merlin as late as 9 April. All observations were of two adult males predominantly in or over the eastside of the North Oso Flaco enclosure or West Boneyard. Park staff collected avian remains from beneath a regular perch-site on two occasions. The remains were of a male American goldfinch (*Spinus tristis*) and a rufous hummingbird (*Selasphorus rufus*). There were no further observations of Merlins through the project term. As of 10 September, no returning migrant was observed or documented.

PEREGRINE FALCON

Peregrine falcons are one of the most numerous raptors on-site at Oceano Dunes, along with red-tailed hawks and great horned owls, and are possibly the greatest raptor threat to plovers and California least terns (*Sternula antillarum browni*, 'tern'). The APS documented 40 peregrine falcon observations comprising 41 individuals during the 2020 season, although many dozens more were documented by park staff. The precise number of peregrine falcon individuals having been on-site is impossible to ascertain but based on the presence of marked birds and photographic documentation, at least eight unique individuals were observed. Peregrine falcons are wide-ranging birds and habitually wander when not attached to an aerie or territory, thusly the true number of peregrine falcons passing through the project area is undoubtedly much higher.

Three observations of peregrine falcons with prey were documented although the only prey item identified was that of a sanderling (*Calidris alba*). Prey selection of peregrine falcons documented at Oceano Dunes 2016-2020:

- Mallard (*Anas platyrhncos*)
- Green-winged teal (*Anas crecca*)
- Eared grebe (*Podiceps nigricollis*)
- Clark's grebe (*Aechmophorus clarkii*)
- Western grebe (*Aechmophorus occidentalis*)
- Western snowy plover
- Willet (*Tringa semipalmata*)
- Whimbrel (*Numenius phaeopus*)

- Long-billed curlew (*Numenius americanus*)
- Marbled godwit (*Limosa fedoa*)
- Sanderling
- Western sandpiper (*Calidris mauri*)
- Heermann's gull (*Larus heermanni*)
- California gull (*Larus californicus*)
- Sabine's gull (*Xema sabini*)
- Western gull (*Larus occidentalis*)
- California least tern
- Elegant tern (*Thalasseus elegans*)
- Common tern (*Sterna hirundo*)
- Rock pigeon (*Columba livia*)
- Eurasian collared-dove (*Streptopelia decaocto*)
- Mourning dove (*Zenaida macroura*)
- Horned lark (*Eremophila alpestris*)
- Blue-gray gnatcatcher (*Polioptila caerulea*)
- Swainson's thrush (*Catharus ustulatus*)

Three peregrine falcons were identified by their white on black VID bands: W/49, "W/48" and "17/D," although there were numerous observations of banded birds whose bands could not be read.

- **"Blue-tail"**: This subadult, in juvenal plumage, was first documented on-site on or around 6 March and continued with regularity through early May. This individual, most likely a female, had lost eight feathers along the right side of its tail which had grown back in their adult form (i.e., shorter, blue). The 4 tail feathers along the left side remained intact and were the typical brown feathers of juvenal plumage. This individual never became a threat to the colonies and was easily identifiable. It was typically observed from Pismo Creek lagoon to Arroyo Grande Creek, but on occasion it was noted south of Pavilion Hill. On 13 March it was found perched on a peeler pole near Interp Trail eating a crow. It was easily approachable and offered good photographic documentation.
- **W/48**: This bird is known colloquially as "Turtle Beak" due to a broken bill which, at the time, resembled a turtle's beak. It has now grown out and no longer retains this characteristic. This female was trapped and banded as an adult by the APS on 28 June 2019 and released 30 June 2019 near the Oregon border at the Butte Valley Wildlife Area, Siskiyou County (41°51'21.60" N, 122°04'21.54" W). She returned 33 days later. She was on-site and positively identified by VID by park staff on 1 May 2020. On 12 May and 14 May two peregrine falcons, male and female, an assumed pair, were present along the shoreline, west of the exclosures. The birds were sallying about often perching as they casually moved along. This observer believed this to be W/48 with her mate. The historic aerie at Shell Beach (35°9'3.63" N, 120°39'25.76" W) 6.3 miles north of post 6, was occupied early in the breeding season but failed at some point. I believe these birds to be that pair, abandoning their territory after nest failure, ultimately venturing into the project area.
- **17/D**: This large female has been on-site every year at Oceano Dunes since at least 2015, when she was first documented by the previous APS. This APS has noted her on-site every season since. She was banded in California as a nestling on 11 April 2013. On 11 August 2020 she came into a trap-set intended for W/49. Superficially her band combination is identical to that of W/49 and she was incidentally trapped. The Bird Banding Lab was notified, and she was released that same day on-site.
- **W/49**: This bird, known as "Scruffy nape," was trapped and banded on 24 June 2019 by the APS and released in the Owen's Valley near Lone Pine, California (36°33'35.88" N, 118°03'28.15" W) on 25 June 2019. This suspected female (her taxonomic measurements are not definitive) was not documented on-site the remainder of the 2019 season. She was first documented back on-site 9 April 2020. She had been targeting

large prey items and was photographed eating a whimbrel by park staff on 14 May. On 16 July, this individual was observed perched on the enclosure shoreline with a plover prey item. From this point forward, this peregrine falcon began targeting plovers along the shore. This bird predated at least 2 adult plovers and 3 chicks. The APS witnessed this bird predated 2 plover chicks, ironically, during a trapping attempt. Documentation for removal was submitted to the agencies on 29 July and on 31 July she presented herself and active trapping commenced (see 'Summary of Trapping Activities' for details).

SHARP-SHINNED HAWK

Sharp-shinned hawks (*Accipiter striatus*) probably winter in small numbers in and around the project area to the east where there are thick stands of eucalyptus. They appear during migration but usually pass through the area quickly.

No individual was documented within sensitive areas of the project during the 2020 season. They are not known to be a threat to plovers and terns at Oceano Dunes.

COOPER'S HAWK

Cooper's hawks (*Accipiter cooperi*) were observed on seven occasions in the project area but only once in a sensitive area. All other sightings were of birds in the vegetation islands. This species held to its typical pattern with 4 observations of adult birds in March and April, then becoming absent during the breeding season. An adult male was observed on 21 June making three visits to Eucalyptus Grove North to hunt. This behavior confirms that this species nests on the fringes of the project area. Cooper's hawks were noted again beginning in July when 2 juvenile birds were documented. On 23 July, a juvenile was hazed, by use of bird whistler, from South Oso Flaco. Cooper's hawks are not identified as a significant threat to plovers and terns at Oceano Dunes.

NORTHERN HARRIER

"Northern harriers are not a numerous species within the project area" was this observer's observation in the 2016 annual report. However, the 2020 season saw a significant uptick in Northern harrier occurrences. The APS tallied 36 notations by all staff of Northern harrier for March and April. All age and sex classes were documented. The APS personally documented 13 Northern harrier sightings in this time frame. While the vegetation islands, teaming with various size rodents, lagomorphs, and insects, provide good foraging, the dunes do not provide adequate nesting habitat.

In March and April, the APS conducted 6 post-up surveys of the Dune Lakes area located adjacent to the park 1.0 miles east of Pavilion Hill. On 4 of the 6 occasions Northern harrier were present. At least two females and one male were noted in the vicinity. Their presence however was not confirmation of nesting. One male Northern harrier was authorized for removal (see 'Summary of Trapping Activities' for details).

RED-TAILED HAWK

Red-tailed hawks (*Buteo jamaicensis*) are ubiquitous throughout the project area and are a common nesting raptor species in the region, although no nests were found in the project area. In part due to limited availability of appropriate nesting habitat: Groves of large trees. The historic nest located along the eastern park boundary in Long

Valley was once again active. There was no follow-up and there is no data on productivity. Two of the three historic nests in Guadalupe-Nipomo National Wildlife Refuge 1.5 miles ESE of the south boundary were fallen/dilapidated and no longer useable. The third nest was again active but there was no follow-up and there is no data on productivity.

Red-tailed hawks have been documented predating plovers at Oceano Dunes, but this singular incident was an aberration exhibited by young birds and no predations by this species were documented this season. The biggest concern presented by red-tailed hawks is the disturbance they cause to nesting and brooding birds. There were 29 observations of red-tailed hawks in March, dropping to 5 for April and 5 for May. The decline in red-tailed hawk presence is typical as they move from the wintering period into the nesting period.

Due to circumstances outlined earlier in this report, monitoring of avian raptors became anecdotal after 29 May, but data for March through May shows a distinct upward trend in red-tailed hawk hazing. The 39 observations of red-tailed hawks during this time frame notes 8 incidents of hazing, 6 by whistler, one by car and one on foot. Red-tailed hawks are routinely hazed from sensitive areas but due to the expanded scope of concern this season, red-tailed hawks were actively hazed from Dune Preserve and the newly constructed foredune exclosures. Two red-tailed hawks were incidentally trapped on 4 July and 9 July (see 'Summary of Trapping Activities' for details).

RED-SHOULDERED HAWK

Red-shouldered hawks (*Buteo lineatus*) are of minimal concern to the plover and tern project at Oceano Dunes. There were five observations of this species by the APS, three from the Carpenter Creek area, one from Arroyo Grande Creek, and one early season sighting of this species in South Oso Flaco, a regular occurrence in past years. This species is known to nest in the Oso Flaco Lakes area and the Oceano Campground.

GREAT HORNED OWL

Great horned owls (*Bubo virginianus*) are ubiquitous at Oceano Dunes and are present in all appropriate habitats. They have been documented by their track, mutes, pellets or feathers, the entire length and breadth of the project. Visually they have been documented roosting at Arroyo Grande Creek, Pavilion Hill, Pipeline Revegetated island ('PLR'), Maidenform, Eucalyptus Grove, Boy Scout Camp, Oso Flaco Lakes and Pawprint. Great horned owls are known to predate plovers and terns and can be a disturbance. No birds were targeted for removal this season. Owl pellets are inspected when found and of the dozens of pellets inspected this season none contained bands or feathers, sign of plover/tern predation.

BARN OWL

Barn owls (*Tyto alba*) were historically considered uncommon visitors to the project area but in recent years, their presence has been well documented by way of carcasses, feathers, and direct observation. A portion of "owl species unknown" recorded by park staff is likely barn owl. With a little experience the track of barn owl can be easily separated from great horned owl. Barn owls exhibit a "smooth toed" impression and great horned owls exhibit a "knuckled" impression. They can be similar in size. The APS now considers barn owls regular in the project area but their impact to plovers and terns is uncertain.

BURROWING OWL

Burrowing owls (*Athene cunicularia*) over-winter annually at Oceano Dunes. This season one bird was present in Pawprint. There were indications that the bird was associated with a burrow but after some investigation, including the placing of a nest camera at an entrance, it was determined this bird was not associating with a burrow. The individual eventually moved on and was last noted in early March. Burrowing owls are of no real concern to the project owing to their early departure date.

LOGGERHEAD SHRIKE

Loggerhead shrikes (*Lanius ludovicianus*) are a significant threat to plover and tern nesting colonies, therefore much of the APS' early season efforts are dedicated to the search for this species. It is imperative that any early-season territorial shrike be identified and monitored for pair forming and/or nest building. A nesting loggerhead shrike would prove to be a very difficult challenge. Listed as a "California Species of Special Concern" it is afforded protections that if not mitigated early could prove problematic. Loggerhead shrikes over winter in the project area and year-to-year a small number are recorded. South Oso Flaco, the vegetated islands, Dune Preserve, and the eastside of the park are prime habitat for this species. However, this season no wintering loggerhead shrikes were found despite an intensive search. A lone observation of a loggerhead shrike along the eastside of north Oso Flaco Foredues on 21 April by park staff is curious. The timeframe places the occurrence within the nesting period for loggerhead shrikes. Shrikes are an early breeder and are typically on nest as early as mid-March but no later than mid-April. However not all individuals nest in any given year. There were no observations of loggerhead shrike again until 2 July when a BBI raptor specialist observed a shrike foraging along the vegetated bowl located west of the Sand Road gate, at the south end of East Boneyard. This bird was present again on the 3rd. On 6 July, a shrike was found perched on a plover single nest enclosure ('SNE'). The bird departed on its own to the northeast perching momentarily on the wind tower located nearby then continuing northeast out of view. A search for a larder at the SNE revealed no remains. Park staff observed a lone shrike north of the red route on 29 July but was gone quickly and never relocated. On the 30th a shrike was present in PLR but was lost quickly and not relocated. Later that morning a shrike was observed along the West Boneyard fence. The bird was tracked and repeatedly hazed over the course of an hour and a half until it flew to the west and was unable to be relocated.

WHITE-TAILED KITE

White-tailed kites (*Elanus leucurus*) are a graceful and elegant species, yet a formidable predator, known to capture a wide range of prey. They are sporadically found in and around Oceano Dunes, most typically far to the north or east, where they are suspected to nest. A juvenile bird with the distinctive rusty wash about the head was observed on several occasions kiting above Arroyo Grande Creek lagoon. This season there were three occurrences of this species traveling near the enclosures. They have not proven to be a threat to the colonies at Oceano Dunes but are worth monitoring especially if their occurrence near the colonies continues.

3.0 TRAPPING ACTIVITIES

Due to the intensive and all-encompassing effort placed on trapping this season it seemed necessary to devote an entire section to those efforts.

AMERICAN KESTREL

On 24 June, a juvenile female kestrel was hunting from the west fence along the 7 shore. Park staff leads determined this individual to be a candidate for relocation. Due to a misinterpretation of the permit verbiage, the APS attempted trapping, deploying two bal-chattris ('BC'). The kestrel showed no interest and after 45 minutes the traps were pulled, and the kestrel hazed out of the area. The total trap time; 1.5 hours.

NORTHERN HARRIER

On 26 May a male Northern harrier was captured on nest camera predated a snowy plover nest. Justification forms were submitted to agency personnel and authorization for relocation granted. On 29 May trapping commenced. Fifty-three days later trapping efforts ceased. This male Northern harrier was servicing a nest and great effort was put into locating it. Male harriers can service multiple nests and mates, potentially as many as five. Over a 53-day period three BBI raptor specialists endeavored to trap the male Northern harrier without success.

On the morning of 12 June, the APS was able to track the male harrier prey carry off-site. From a high vantage point in East Boneyard the male harrier was tracked, in flight, to the south disappearing behind the Oso Flaco Creek riparian corridor. This observation supplied good data but proved incomplete. That same afternoon, the male harrier was once again able to be tracked carrying prey off-site. The bird was followed using a 60x spotting scope and eventually descended below the horizon dropping into the vicinity of the Santa Maria River mouth, approximately 4.75 miles to the south.

Beginning 15 June observations were conducted at the Santa Maria River mouth at Rancho Guadalupe Dunes Preserve in Santa Barbara County. Two days of post-up surveillance of the area revealed no harrier activity. On the third day the APS and a BBI raptor specialist hiked and surveilled the shoreline from Rancho Guadalupe Dunes Preserve north to Guadalupe-Nipomo NWR in search of appropriate harrier nesting habitat. Northern harriers in this region tend to nest in black mustard (*Brassica nigra*) patches. No appropriate habitat was found. On the fourth day a female harrier flew into the Santa Maria River bottoms and foraged for approximately 30 minutes. This female flew in from the south and departed to the south. Working with this information efforts were focused along Brown Road; south of Rancho Guadalupe Dunes Preserve where the agricultural fields end, and the coastal hills begin. These grasses covered hills provide appropriate nesting habitat with large patches of black mustard. On the 18th numerous Northern harriers were sighted at the Sal Point trailhead and further east along Brown Road. On the 19th a Northern harrier nest was confirmed on a hillside along the southside of Brown Road. One near fledge chick was observed. The USDA Wildlife Services, Santa Barbara County trapper was contacted: Permission was sought to enter the property to band the chicks and potentially trap the male. Permission was not granted, but important information was gathered. The male Northern harrier in this specialist's opinion is nesting in this vicinity and traveling the 8 miles north to Oceano Dunes to forage. This individual is a young adult male (third year bird), competing with other males for hunting territory.

Table 1 below shows the scope of time and effort dedicated to the capture of the targeted male Northern harrier. The trap predominantly used for harrier trapping is the bal-chatri ('BC'), a wire cage trap covered with monofilament fishline nooses. This trap type was deployed for a total of 551 trap hours. A lure animal is placed inside the cage where it attracts the avian predator, which hopefully tangles its feet/toes in the nooses. Five species of lure were employed utilizing 6 BCs, but to no avail. On 16 July, a radio transmitter attached to one of the BCs, located at the southeast corner of 7.5 revegetated island, activated, indicating manipulation of the trap. Upon inspection, the trap was empty but had been moved 6" implying an avian predator (no mammalian track nearby) had struck the trap but failed to get caught.

A bownet is a large, 6' diameter, net-covered hoop trap that is spring loaded and folds back upon itself; it is triggered and held in place via a radio-controlled release device and a lure secured at its center. When an avian predator binds to the lure the trap is deployed and the half portion of the hoop "flops" over the lure and predator, trapping the bird beneath the netting. Four lure species were employed but to no avail. It is important to note that while the number of trap hours is significant the limiting factor to all trapping is the presence of the targeted individual, referred to as "contact-time." The contact-time for this individual, at this trap type, was less than 2 minutes (of the 169.25 hours operated). Three times the lure was deployed but in 2 of the 3 deployments the bird showed no interest and continued on. The other deployment saw the harrier make three passes but refused to bind to the lure and ultimately continued on.

The utilization of a noose carpet was an "out-of-the-box" attempt to trap the harrier with a familiar presentation. Documented eating plover eggs, a noose carpet with monofilament fishline nooses encircled a depression in the sand mimicking a plover nest. It was baited with *Coturnix* quail eggs, similar in size and appearance to plover eggs. A mechanical dove lure was placed nearby as an attractant. Again, to no avail.

TABLE 1. BREAKDOWN OF NORTHERN HARRIER TRAPPING EFFORTS AT OCEANO DUNES FOR THE 2020 SEASON SHOWING; TRAP TYPE, TRAP HOURS, AND TRAP LOCATIONS.

Trap Type	Trap Hours	Trap Locations
Bal-chatri	551	Pawprint Revegetated Island
		West of South Foredune Exclosure
		Six Exclosure
		Eight Shore; Post 8
		East of 7.5 Revegetated Island
		Eastside North Oso Flaco Foredues
		South End North Oso Flaco Foredues
		South End West Boneyard
Bownet	169.25	Pawprint Revegetated Island
		West Boneyard
Noose Carpet	18.5	Pawprint Revegetated Island

While trapping for the male harrier two adult red-tailed hawks were incidentally trapped. They were processed, banded, and released the following day on-site at Oceano Dunes (see 'Table 3.').

PEREGRINE FALCON

On 29 July justification forms were submitted for relocation of W/49 for the reasons outlined previously. On 31 July the first trapping attempt commenced and despite fourteen subsequent attempts the APS was unsuccessful in securing this bird. Having been previously trapped this bird proved to be “trap shy,” a condition where an avian predator learns from experience and becomes hyper wary, avoiding suspicious circumstances (i.e., easy prey). Trapping was discontinued on 18 August. Going forward the bird was hazed from sensitive areas.

Table 2 below shows the trap type and trap hours utilized in the trapping effort for W/49. Thirty-two and a half hours of trap time elicited no response from this individual. A noosed pigeon is the standard go-to trap for peregrine falcons. A feral rock pigeon fitted with a leather harness covered in monofilament fishline nooses has a very high degree of success. This is the trap type that captured this individual in 2019. A similar noose harness for a domestic turtle dove was utilized, also without success.

A “ring padam” or “hoop trap” is a wire hoop with vertically standing monofilament fishline nooses about its perimeter. A lure bird is placed in the center of the hoop which is placed on the ground. This trap type takes advantage of the peregrine falcons natural hunting behavior of strafing (i.e., grabbing their prey on the fly from a shallow stoop). Ideally the target falcon (this trap is specific to falcons) will entangle in a noose as it passes, catching a toe or foot, entrapping them.

TABLE 2. LIST OF PEREGRINE FALCON TRAPPING EFFORTS AT OCEANO DUNES FOR THE 2020 SEASON SHOWING; TRAP TYPE TRAP HOURS PER TRAP TYPE AND TOTAL TRAP HOURS.

Trap Type	Trap Hours
Noosed Dove	1.5
Noosed Pigeon	5.5
Bal-chatri	4.5
Bownet	19.5
Ring Padam	1.5
TOTAL HOURS	32.5

On 11 August while operating a bownet at the South Oso Flaco flats, an adult peregrine falcon with a black VID right, silver left band combination bound to the lure and was trapped. Upon collection, the bird was identified by VID as 17/D (see ‘Summary of Predator Species Occurrence’ for details).

Table 3. List of incidentally trapped raptors at Oceano Dunes during the 2020 season showing; Species using AOU 4 letter code, Date trapped, Age/Sex, Band Number(s), Location trapped, Coordinates, and the Disposition of bird and date.

Species	Date	Age/Sex	Band Number	Location	Coordinates	Disposition
RTHA	4-Jul	AHY/U	1957-23001	PLR	35°02'45.71' N	Released on-site 4-JUL
					120°37'40.44" W	
RTHA	9-Jul	AHY/U	1957-23002	PLR	35°02'45.71' N	Released on-site 9-JUL
					120°37'40.44" W	
PEFA	11-Aug	AHY/U	17D right	SOF	35°01'57.27" N	Released on-site 11-AUG
			1687-22141 left		120°37'58.45" W	

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CDFW SEABIRD NECROPSY REPORT



California Department of Fish and Wildlife
Office of Spill Prevention and Response
Marine Wildlife Veterinary Care and Research Center
1451 Shaffer Road
Santa Cruz, CA 95060
(831) 469-1719

MWVCRC#: 20-0472

Species: LETE

UCD PATH#: None

OWCN Intake#: None

Band#: w/o a-

CASE PROFILE

COMMON NAME: Least Tern

SCIENTIFIC NAME: *Sternula antillarum*

DATE FOUND: 6/23/2020

COLLECTION LOCATION: Oceano Dunes SVRA

COUNTY: San Luis Obispo

STATE: California

CARCASS CONDITION: Advanced Decomposition

OILED/FOULED: No

AGE: Chick

SEX: Unknown

NECROPSY DATE: 10/30/20

NECROPSY BY: Corinne Gibble

REPORT DATE: 12/3/2020

REPORT BY: Corinne Gibble

CASE BACKGROUND

This bird was found at Oceano Dunes State Vehicular Recreation Area (ODSVRA), by staff biologists. It was a chick from a known nest (LT006-20) and was confirmed to have hatched on 6/17/20. The chick was banded (w/o a-) on 6/18/20, and was last seen alive at this time. The bird was found dead on 6/23/20, was collected, stored frozen, and submitted to MWVCRC for gross necropsy.

CASE SUMMARY

External examination showed a decomposing intact carcass with wounds to the beak and legs. There was severe vascular congestion visible through the skin, and present on both legs at the tibiotarsus, tarsometatarsus, and into the phalanges. The digits of the left foot were absent (presumptive: postmortem predation and/or decomposition), and the feet were dry. There was trauma on the left side of the beak. Fractures and associated bruising and hemorrhage were present at the upper and lower mandible, with a portion of the upper and lower mandible absent (presumptive: antemortem predation). The area was dry from decomposition.

Internal examination revealed the bird was in good body condition with moderate subcutis adipose, and intestinal adipose. The pectoral muscle complex was in moderate condition, even with the keel, and with no visible pectoral muscle atrophy. Observed adipose and muscle mass indicate that the bird was in good nutritional condition just prior to death. Due to the state of decomposition, organ health could not be assessed. The skull was intact, and the brain was within normal limits of health grossly. Findings from postmortem gross necropsy were indicative of acute trauma as the cause of death (presumptive: predation event).

COMPLETED TESTS/PROCEDURES

- 1.) Radiographs
- 2.) Gross photographs
- 3.) Gross Necropsy
- 4.) Archived samples

GROSS FINDINGS

Acute trauma (presumptive: predation event), characterized by:

- Large wound and fracture to upper and lower left mandible (portion is absent) with associated bruising and hemorrhage
- Severe vascular congestion and trauma visible at tibiotarsus, tarsometatarsus and phalanges

FINAL DIAGNOSES

Presumptive cause of death: Acute trauma

SAMPLES SAVED

Cryo-archived samples: carcass

IMAGES

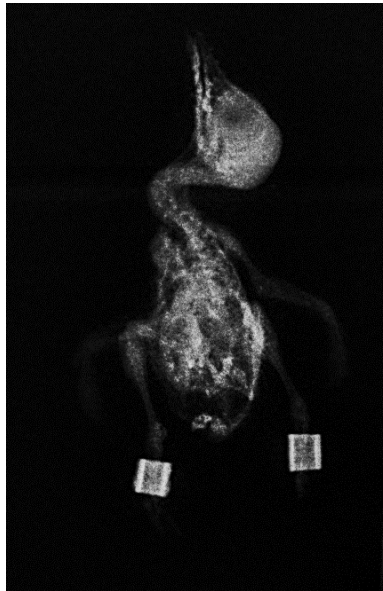


Figure 1. Radiograph showing an intact carcass with fractured lower left mandible

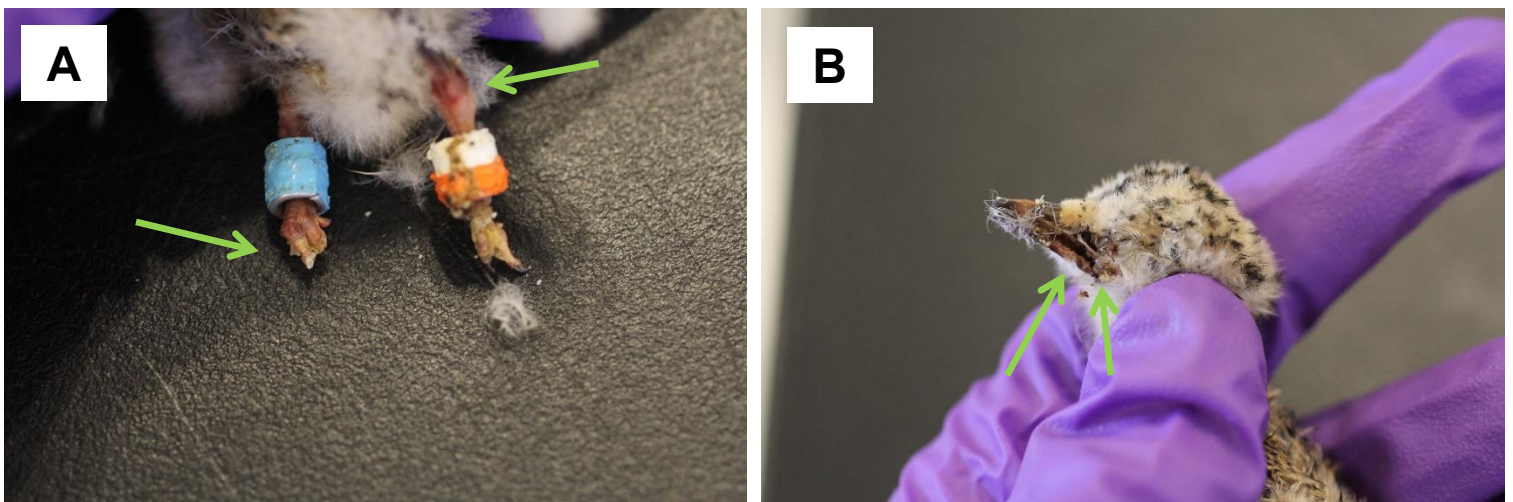


Figure 2A. Ventral view of bird showing vascular congestion to tibiotarsus, tarsometatarsus and phalanges on both sides, digits of left foot are absent (presumptive: postmortem predation and/or decomposition), 1B. Lateral view of bird showing fractures and missing portions of upper and lower mandible on left side, bruising and hemorrhage present

CDFW SEABIRD NECROPSY REPORT



California Department of Fish and Wildlife
Office of Spill Prevention and Response
Marine Wildlife Veterinary Care and Research Center
1451 Shaffer Road
Santa Cruz, CA 95060
(831) 469-1719

MWVCRC#: 20-0470

Species: LETE

UCD PATH#: None

OWCN Intake#: None

Band#: None

CASE PROFILE

COMMON NAME: Least Tern

SCIENTIFIC NAME: *Sternula antillarum*

DATE FOUND: 7/22/2020

COLLECTION LOCATION: Oceano Dunes SVRA

COUNTY: San Luis Obispo

STATE: California

CARCASS CONDITION: Advanced Decomposition

OILED/FOULED: No

AGE: Chick

SEX: Unknown

NECROPSY DATE: 10/30/20

NECROPSY BY: Corinne Gibble

REPORT DATE: 11/18/2020

REPORT BY: Corinne Gibble

CASE BACKGROUND

This bird was found at Oceano Dunes State Vehicular Recreation Area (ODSVRA), by staff biologists. It was a chick from a known nest (LT42) and was found dead within 2 feet of the nest. There were no predation tracks noted. This bird was collected, stored frozen, and submitted to MWVCRC for gross necropsy.

CASE SUMMARY

External examination showed an intact carcass with abrasion wounds and associated hemorrhage found surrounding the eyes at the sclerotic ring on both sides, and at the left side of the lower mandible. A portion of the left lower mandible is absent, and the entire beak was surrounded by blood. The abrasions of the skin at the sclerotic ring and near the lower left mandible had associated muscle tissue exposure. Postmortem scavenging was found at the lower right abdomen.

Internal examination revealed the bird was in good body condition with moderate subcutis adipose, pericardial adipose, and intestinal adipose. The pectoral muscle complex was in moderate condition, even with the keel, and with no visible pectoral muscle atrophy. Observed adipose and muscle mass indicate that the bird was in good nutritional condition just prior to death. Insect shells were found in the ventriculus and digesta was found in the gastrointestinal tract, signifying the bird had recently eaten. Due to the state of decomposition, organ health could not be assessed. Findings from postmortem gross necropsy were indicative of acute trauma as the cause of death (presumptive: predation event).

COMPLETED TESTS/PROCEDURES

- 1.) Radiographs
- 2.) Gross photographs
- 3.) Gross Necropsy
- 4.) Archived samples

GROSS FINDINGS

Acute trauma (presumptive: predation event), characterized by:

- Large abrasion wound to the skin surrounding the sclerotic ring with associated hemorrhage
- Abrasion and associated hemorrhage lower mandible with underlying musculature exposed
- The lower mandible is fractured, and a portion is absent

INCIDENTAL FINDINGS

The gastro-intestinal tract was full of digesta.

FINAL DIAGNOSES

Presumptive cause of death: Acute trauma

SAMPLES SAVED

Cryo-archived samples: carcass

IMAGES

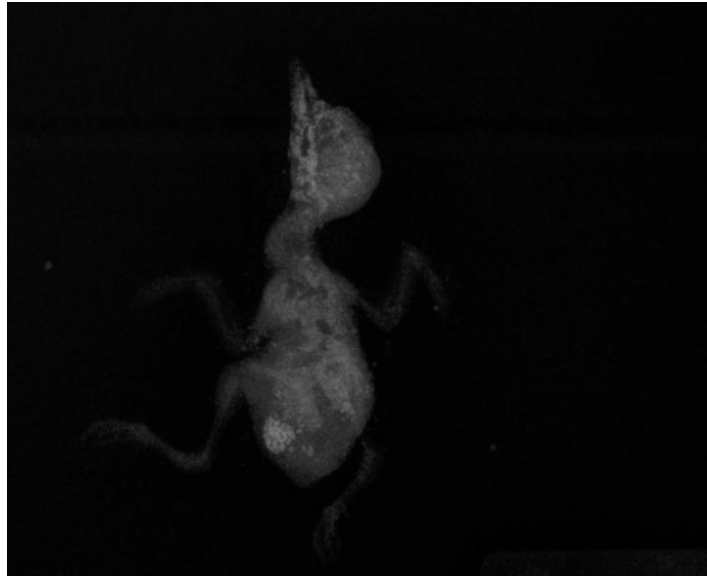


Figure 1. Radiograph showing an intact carcass with fractured lower left mandible

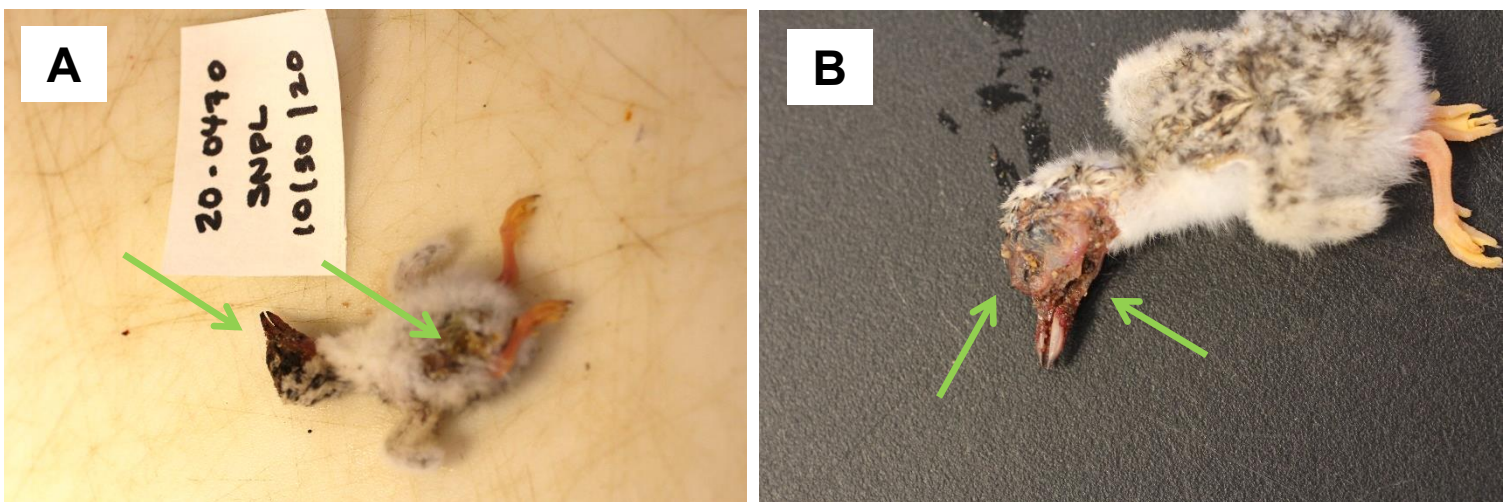


Figure 1A. Ventral view of bird showing intact carcass, abrasion and hemorrhage at the right eye, postmortem scavenging at the lower right abdomen; 1B. Ventral view of bird showing abrasion and hemorrhage of left eye, fracturing and trauma to lower left mandible, with a portion of the lower left mandible missing, and exposed underlying musculature.

CDFW SEABIRD NECROPSY REPORT



California Department of Fish and Wildlife
Office of Spill Prevention and Response
Marine Wildlife Veterinary Care and Research Center
1451 Shaffer Road
Santa Cruz, CA 95060
(831) 469-1719

MWVCRC#: 20-0416

Species: SNPL

UCD PATH#: None

Other Intake#: None

Band#: VG:AB

CASE PROFILE

COMMON NAME: Western Snowy Plover	SCIENTIFIC NAME: <i>Charadrius nivosus</i>
DATE FOUND: 8/16/2020	COLLECTION LOCATION: Oceano Dunes SVRA
COUNTY: San Luis Obispo	STATE: California
CARCASS CONDITION: Advanced Decomposition	OILED/FOULED: No
AGE: Juvenile	SEX: Unknown
DEATH DATE: Unknown	EUTHANASIA: No
NECROPSY DATE: 10/1/2020	NECROPSY BY: Corinne Gibble
REPORT DATE: 10/12/2020	REPORT BY: Corinne Gibble

CASE BACKGROUND

This bird was found by a biological monitor at Oceano Dunes State Vehicular Recreation Area (ODSVRA) on August 16th, 2020, west of marker post 1. This area is normally open to vehicles, but at the time the bird was recovered, this area was only open to public day use such as walking, bikes, and horse riding. Park and public safety staff in the park drive this area, but overall vehicle use is quite limited. This was a known bird that hatched and fledged from ODSVRA on June 20th, 2020 and was last seen in the post 1 area on August 11th, 2020.

CASE SUMMARY

External examination revealed heavy antemortem trauma, abrasions, postmortem scavenging, and lateral postmortem compression of the carcass. Blood and sand were found at the mouth. Antemortem abrasions to the skin and associated bruising and acute hemorrhage were found near the upper insertion of both left and right femur. A puncture wound was found near the upper right chest and associated acute hemorrhage and bruising at the underlying pectoral muscle. Antemortem abrasions to the skin were also found at the upper right back near the scapula with feathers missing and acute hemorrhage and bruising were present internally. Postmortem scavenging to the eyes and skull was also evident. Internal examination was limited due to the advanced state of decomposition. All organs were autolyzed and decomposing, and therefore organ health could not be assessed. The sex of the bird is unknown due to decomposition. The causes of the trauma are unknown, but injuries are suggestive of a predation event.

COMPLETED TESTS/PROCEDURES

- 1.) Gross photographs
- 2.) Gross Necropsy

GROSS FINDINGS

Acute trauma (presumptive), characterized by:

- Puncture wound at chest with associated acute hemorrhage and bruising
- Abrasion injuries with associated hemorrhage and bruising at the insertion of both femur bones
- Puncture wound with associated acute hemorrhage and bruising at right scapula

FINAL DIAGNOSES

Presumptive cause of death: acute trauma

IMAGES

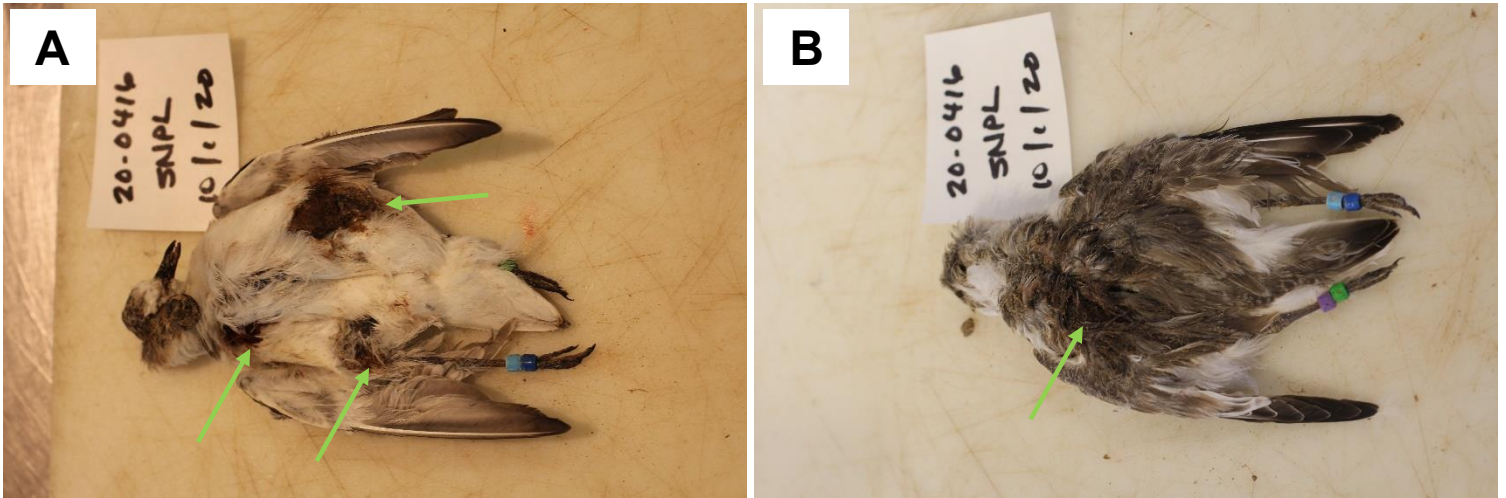


Figure 1A. External ventral view of bird showing antemortem puncture wound and abrasion injuries, Figure 1B. External dorsal view of bird with puncture wound visible.

CDFW SEABIRD NECROPSY REPORT



California Department of Fish and Wildlife
Office of Spill Prevention and Response
Marine Wildlife Veterinary Care and Research Center
1451 Shaffer Road
Santa Cruz, CA 95060
(831) 469-1719

MWVCRC#: 20-0471

Species: SNPL

UCD PATH#: None

OWCN Intake#: None

Band#: None

CASE PROFILE

COMMON NAME: Western Snowy Plover

SCIENTIFIC NAME: *Charadrius nivosus*

DATE FOUND: 7/15/2020

COLLECTION LOCATION: Oceano Dunes SVRA

COUNTY: San Luis Obispo

STATE: California

CARCASS CONDITION: Fair

OILED/FOULED: No

AGE: Chick

SEX: Unknown

NECROPSY DATE: 10/30/20

NECROPSY BY: Corinne Gibble

REPORT DATE: 11/23/2020

REPORT BY: Corinne Gibble

CASE BACKGROUND

This bird was found at Oceano Dunes State Vehicular Recreation Area (ODSVRA), by staff biologists. The chick was estimated to be 3-5 days old and found in the P6 alleyway just above the high tide line. It was thought likely that the chick was from area SB124. The carcass was noted to be very fresh when collected and many snowy plover tracks were found near and around the carcass. This bird was collected, stored frozen, and submitted to MWVCRC for gross necropsy.

CASE SUMMARY

Radiographic images showed an intact chick carcass with no obvious fractures, but a pattern in the neck resembling torticollis. External examination confirmed obvious torticollis (abnormal, asymmetrical head or neck position, which may be due to a variety of causes).

Internal examination showed no evidence of trauma. The bird was in good body condition with moderate subcutis adipose, pericardial adipose, and intestinal adipose. The pectoral muscle complex was even with the keel, and with no visible pectoral muscle atrophy. All organs were within normal limits of health, bright in color, with no lesions present. While the brain was also within the normal limits of health, mild vascular congestion was found in the musculature near insertion of the skull (presumptive: related to strain from torticollis). With the exception of visible torticollis (presumptive: congenital), no gross evidence of pre-existing disease or postmortem scavenging was found.

COMPLETED TESTS/PROCEDURES

- 1.) Radiographs
- 2.) Gross photographs
- 3.) Gross Necropsy
- 4.) Archived carcass

GROSS FINDINGS

Congenital or infectious disease (presumptive), causing torticollis, which was characterized by marked lateral displacement of head and neck.

INCIDENTAL FINDINGS

The gastro-intestinal tract was full of digesta.

FINAL DIAGNOSES

Presumptive cause of death: Congenital or infectious disease

SAMPLES SAVED

Cryo-archived samples: carcass

IMAGES

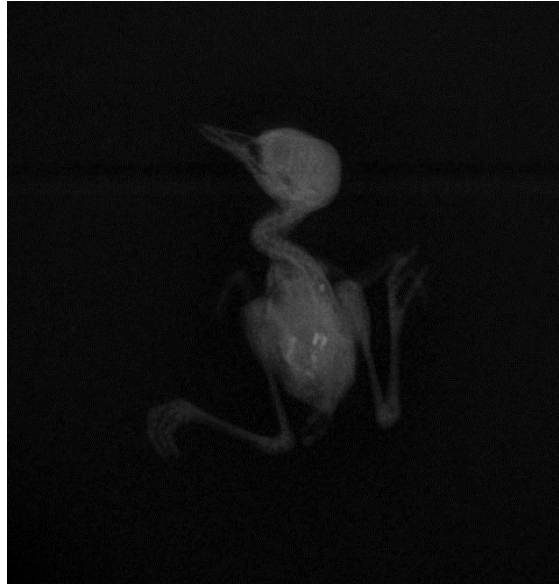


Figure 1. Radiograph showing torticollis of neck

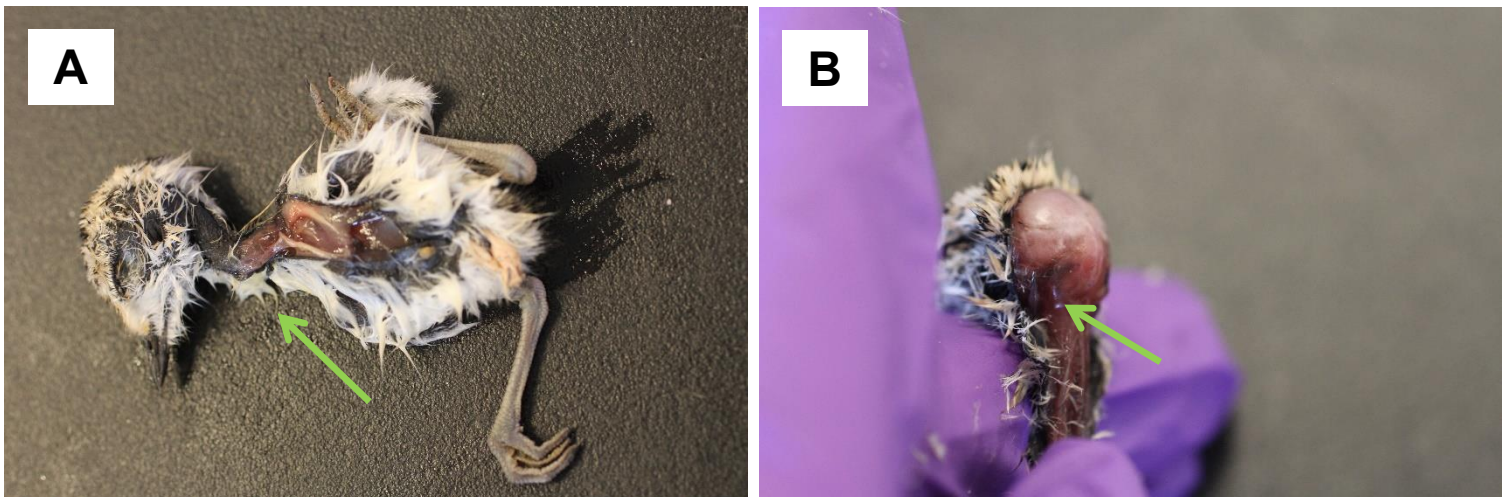


Figure 1A. Dorsal view of bird showing torticollis of neck; 1B. View of neck musculature with vascular congestion present, no evidence of trauma.

CASE#: 20-98 SPECIES: SNOWY PLOVER

Date Admitted 2/17/2020 9:59 am **Band** **Name**
Reference Number **Microchip Number**

Intake

Admitted By Karen Lund
Address Found Oceano Dunes Oceano, CA United States **Date Found** 2/17/2020
Reasons for Admission Swollen foot below band
Care by Rescuer
Notes About Rescue

Initial Exam

Dehydration	Mild	Weight	35.40g	Sex	Unknown
Age	Adult	Attitude	Alert	BCS	Good
Mucous Membrane Color	Pink	Temperature			

Feathers / Fur / Skin a few lice. Covert feathers worn
Legs / Feet / Hocks Severe constriction wound L pedal joint, caused by plastic band. All 3 digits on foot necrotic.

Comments
Treatments meds/fluids
Examiner VM/KB

Treatment Log

Mar 9, 2020 12:03 pm **BW: 35.20g** BAR. Flying low around enclosure. Decent body condition. No lameness. Runs very fast. Difficult to catch. Toes of L foot look remarkably good. D3/D4 just slightly thickened w/normal color. D2 moderately thickened w/some remaining eschar, but appears as though toe will remain viable. OK to release. SR

Mar 7, 2020 10:56 am **BW: 35.80g**

Mar 4, 2020 10:31 am **BW: 34.70g** MM

Mar 2, 2020 1:05 pm **BW: 34.90g** BAR. Decent body condition. Running fast w/o lameness. Flying as well. R D2/D3 looking very good. D4 looks half viable and half dark and crusty. Will give to next week to see how things go. Recheck Wed. Hoping to be able to release next week. SR

Mar 2, 2020 10:13 am **BW: 35.70g** BP

Feb 28, 2020 10:55 am **BW: 35.00g** VRF

Feb 26, 2020 12:14 pm Moved to BBR Annex B

Feb 24, 2020 4:06 pm **BW: 35.10g** BAR. Decent body condition. Running and flying in basket. Looks like might actually keep all digits. Wound over dorsal pedal joint healing well. D3/D4 viable. D2 has crust along most of length, but bleeds when disrupted, so apparently still mostly viable. Not sure if has pain sensation, however. D/C meds. OK to move to larger enclosure. SR

Feb 24, 2020 10:37 am **BW: 34.70g** BP

Feb 23, 2020 8:42 am **BW: 36.00g** VRF

Feb 20, 2020 1:20 pm BAR. Decent body condition. Very flighty in basket, but appears to be placing weight on feet evenly. Cleaned some debris from D2. Actually looks like chance might remain viable. Small amt bleeding. Covered w/tegaderm. Other two digits look OK. Pain perception present. Color normal. Recheck Monday. SR

Feb 20, 2020 12:00 pm Moved to AV2/3 Entry

Feb 20, 2020 11:04 am **BW: 35.90g** BP

Feb 20, 2020 FECAL: Float=Negative, Direct=Negative. Technician: vm

Feb 19, 2020 9:56 am **BW: 37.00g** MM

Feb 18, 2020 5:04 pm BAR. Flying around playpen. Decent body condition. Difficult to tell how much using L leg b/c flying so much. Has pain perception in D3/D4, but not apparent in D2. D2 markedly swollen and ulcerated. Might lose that digit, but seems that the others will remain viable. Deep constriction over dorsal surface of proximal D2 and dorsal surface of pedal joint. Cleaned sites w/saline. Continue meds. Recheck Thurs. SR/KB

Feb 17, 2020 12:46 pm Removed bands from L foot/leg. Applied small amount topical 0.5% bupivacaine to wound site. Bands removed easily with small scissors, minimal amount of bleeding from injury. Moved to small outdoor basket with soft substrate for day. VM/KB

Feb 17, 2020 12:44 pm Moved to SBR

Feb 17, 2020 10:04 am Moved to TXR

Feb 17, 2020 FECAL: Float=Negative, Direct=Negative, inconclusive. Technician: vm

Feb 17, 2020 RX: 0.04ml of 10mg/ml Isoxuprine 10mg/kg po sid. from 2/17/2020 until 2/24/2020

Feb 17, 2020 RX: 0.05ml of 25mg/ml Tramadol 30mg/kg po bid. from 2/17/2020 until 2/23/2020

Feb 17, 2020 RX: 0.07ml of 62.5mg/ml Clavamox 125mg/kg po bid. from 2/17/2020 until 2/24/2020

Feb 17, 2020 RX: 0.02ml of 1.6mg/ml Meloxicam 1mg/kg po bid. (Loading Dose: 0.04) loading dose until 2/20. from 2/17/2020 until 2/21/2020

Feb 17, 2020 RX: 0.04ml of 2mg/ml Butorphanol 2mg/kg im sd. from 2/17/2020 until 2/17/2020

Feb 17, 2020 RX: 0.04ml of 1mg/ml Dilute Midazolam 1mg/kg im sd. from 2/17/2020 until 2/17/2020

Feb 17, 2020 **Intake Exam: Weight:** 35.40g, **Age:** Adult, **Sex:** Unknown, **BCS:** Good, **Dehydration:** Mild, **Mucous Membrane Color:** Pink, **Mucous Membrane Texture:** Moist, **Attitude:** Alert, Feathers / Fur / Skin: a few lice. Covert feathers worn, Legs / Feet / Hocks: Severe constriction wound L pedal joint, caused by plastic band. All 3 digits on foot necrotic., **Treatment:** meds/fluids, **Examiner:** VM/KB

Disposition

Disposition	Released	Criminal Activity?	Transfer Type
Disposition Date	3/12/2020	Carcass Saved?	Release Type
Disposition Location	Oceano CA		

CASE#: 20-665 SPECIES: SNOWY PLOVER

Date Admitted 5/7/2020 11:35 am Band Name

Reference Number Microchip Number

Intake

Admitted By KB
Address Found 928 Pacific Blvd. Oceano, CA United States Date Found 5/7/2020
Reasons for Admission line wrapped around leg
Care by Rescuer
Notes About Rescue

Initial Exam

Dehydration None Weight 36.00g Sex Unknown
Age Adult Attitude Alert BCS Good
Mucous Membrane Color Temperature

Feathers / Fur / Skin Few feather lice
Legs / Feet / Hocks Fine hairs wrapped tightly around TMT both legs. R leg below bands and L leg both above and below. Wrapped more tightly on R. Using both legs normally.

Comments Using legs normally after constrictions removed. Constrictions to not appear to have been chronic enough or tight enough to cause significant perfusion injuries.

Treatments Removed constrictions, meloxicam, mite/lice spray

Examiner SR/VM

Diagnosis

Constriction injuries, bilateral TMT

Treatment Log

May 7, 2020 RX: 0.02ml of 1.6mg/ml Meloxicam 1mg/kg po sd. from 5/7/2020 until 5/7/2020
May 7, 2020 **Intake Exam:** Weight: 36.00g, Age: Adult, Sex: Unknown, BCS: Good, Dehydration: None, Attitude: Alert, Feathers / Fur / Skin: Few feather lice, Legs / Feet / Hocks: Fine hairs wrapped tightly around TMT both legs. R leg below bands and L leg both above and below. Wrapped more tightly on R. Using both legs normally., **Comments:** Using legs normally after constrictions removed. Constrictions to not appear to have been chronic enough or tight enough to cause significant perfusion injuries., **Treatment:** Removed constrictions, meloxicam, mite/lice spray, **Examiner:** SR/VM

Disposition

Disposition Released Criminal Activity? Transfer Type
Disposition Date 5/7/2020 Carcass Saved? Release Type Returned to rescuer
Disposition Location ODSVRA CA

CASE#: 20-2564 SPECIES: SNOWY PLOVER

Date Admitted 11/27/2020 11:16 am **Band** **Name**
Reference Number **Microchip Number**

Intake

Admitted By: TS

Address Found: Oceano Dunes on shore North Oso Flaco Oceano, CA United States **Date Found:** 11/27/2020

Reasons for Admission: constriction wound

Care by Rescuer:

Notes About Rescue:

Diagnosis

Constriction injuries bilateral pedal joints (L>R)

Treatment Log

Date:	Type:	Comments:
Dec 14, 2020 12:57 pm	Treatment Log	Weight: 45.00g. BAR. Good body condition. Good feather condition. Placing both feet normally. Moves quickly and w/agility. Constriction wounds completely healed. All digits intact. OK for release anytime. Coordinate w/state parks staff. SR
Dec 11, 2020 12:26 pm	Treatment Log	Weight: 44.00g. BAR. Good body condition. Using both legs/feet normally, but still looks like function of digits impaired. Starting to develop pressure lesion on plantar surface R foot. Constriction wounds healed. Plan to assess movement in larger space on Monday before clearing for release. SR
Dec 9, 2020 4:01 pm	Treatment Log	BAR. Good body condition. Using both feet evenly. Placing feet normally, but not sure if able to move digits normally. Constriction wounds healing around both pedal joints. D/C meds. Might be able to consider release early next week. SR
Nov 29, 2020	Lab Values	FECAL: Float=Negative, Direct=Negative. Technician: vm
Nov 27, 2020 12:45 pm	Patient Location	Moved to SBR
Nov 27, 2020	Prescription	RX: 0.06ml of 62.5mg/ml Clavamox 125mg/kg po bid. from 11/27/2020 until open
Nov 27, 2020	Prescription	RX: 0.03ml of 20mg/ml Pentoxifylline 20mg/kg po bid. from 11/27/2020 until open
Nov 27, 2020	Prescription	RX: 0.02ml of 1.6mg/ml Meloxicam 1mg/kg po bid. from 11/27/2020 until 12/1/2020
Nov 27, 2020	Exam	Intake Exam: Weight: 33.00g Age: Adult Sex: Unknown BCS: Reasonable Dehydration: Mild Attitude: Alert Legs / Feet / Hocks : Constriction wounds around both pedal joints. Material still wrapped tightly around L foot. No material around R foot. Thickening above L constriction wound. Digits on L foot dark and cool. Slightly edematous. Difficult to ascertain pain perception. Comments: Hair-like material wrapped tightly around pedal joint and all proximal digits. Removed w/small scissors. Flexor tendon on caudal surface pedal joint nearly exposed. Very concerned about retaining viability. Soaked feet in warm water for ~5 minutes. Favoring L foot once material removed, but placing weight on both feet. Unsure at this point whether or not digits will remain viable. Think likely that some digits/parts of digits will be lost. Treatment: Removed constriction, 3ml LRS SQ w/B complex, meloxicam, Clavamox, pentoxifylline Examiner: SR/TS

Disposition

Disposition: Released
Disposition Date: 12/15/2020
Disposition Location: Oceano CA

Criminal Activity?:
Carcass Saved?:

Transfer Type:
Release Type:

CASE#: 20-1007

SPECIES: SNOWY PLOVER

Date Admitted 6/3/2020 2:13 pm Band Name

Reference Number Microchip Number

Intake

Admitted By vm
 Address Found 928 Pacific Blvd. Oceano, CA United States Date Found 6/3/2020
 Reasons for Admission constriction injury
 Care by Rescuer bands removed from affected leg
 Notes About Rescue

Initial Exam

Dehydration Mild Weight 14.60g Sex Unknown
 Age Hatchling / Chick Attitude Alert BCS Reasonable
 Mucous Membrane Color Temperature

Legs / Feet / Hocks Constriction injury dorsal surface R foot. Moderate swelling around pedal joint and distal. Ulcerated skin dorsal surface foot. Superficial pain perception present in foot distal to constriction. Heavily favors R foot, but does bear some weight and places foot in normal position

Comments
 Treatments Cleaned/covered wound, 1.5ml LRS SQ w/B complex, meloxicam, tramadol, Clavamox
 Examiner SR/VM

Diagnosis

Constriction injury, R foot

Treatment Log

Jun 17, 2020 6:04 pm **BW: 27.50g** BAR. Good body condition. Digits on R foot kind of splayed. D3 going way lateral. Despite odd appearance, seems to function very well. Placed in larger enclosure to watch how using foot. Bearing weight evenly. Bird is fast and difficult to catch when in a larger space. Think ready to go back to the beach. Will contact ODSVRA about transfer. SR/Shy

Jun 15, 2020 4:30 pm BAR. Good body condition. Shoe has come off foot. Third digit deviating laterally quite significantly, but bearing weight on foot normally. Wound on dorsal surface of foot healed. Plan to recheck Wed and, unless something has gone horribly awry, contact ODSVRA about potential release. SR

Jun 12, 2020 8:37 pm BAR. Good body condition. D3 deviating in abnormal lateral direction. Still bearing weight on foot normally. Wound on dorsal surface foot nearly healed. While probably not a huge issue, would prefer if digits were aligned correctly so placed R foot in light splint. D/C meds. Recheck Monday. SR/KD

Jun 10, 2020 2:15 pm **BW: 22.50g** BAR. Good body condition. Using R foot normally, although D2 heading off at an abnormal angle. Foot almost looking anisodactyl. Wound on dorsal surface foot healing well. Dry crust over surface. Careful to not disrupt. Continue Clavamox through next recheck on Friday. Expect to be able to discontinue then with possibly looking to release next week. SR

Jun 8, 2020 9:14 pm **BW: 21.00g** BAR. Good body condition. Using R leg/foot normally. Crust on dorsal surface R foot came off w/handling, leaving ~2mm skin defect. Attempted to place suture, but skin would not hold suture. Applied Redi-heal and covered w/tegaderm. Recheck Wed. SR/KB

Jun 7, 2020 FECAL: Direct=Negative. Technician: vm

Jun 5, 2020 5:27 pm **BW: 17.00g** BAR. Decent body condition. Running around in small enclosure. Appears to be bearing weight evenly on both feet. Swelling of R foot decreased, but not resolved completely. Dry eschar over dorsal surface of foot. Toes still appear viable. Superficial pain perception present. Recheck Monday. SR
Jun 5, 2020 12:00 pm Moved to Space Pod-East
Jun 3, 2020 4:22 pm Moved to SBR
Jun 3, 2020 FECAL: Float=Negative, Direct=Positive, D+3 giardia. Technician: vm
Jun 3, 2020 RX: 0.02ml of 62.5mg/ml Clavamox 125mg/kg po bid. from 6/3/2020 until 6/12/2020
Jun 3, 2020 RX: 0.01ml of 1.6mg/ml Meloxicam 1mg/kg po bid. (Loading Dose: 0.02ml) from 6/3/2020 until 6/7/2020
Jun 3, 2020 RX: 0.01ml of 25mg/ml Tramadol 30mg/kg po bid. from 6/3/2020 until 6/5/2020
Jun 3, 2020 RX: 0.01ml of 10mg/ml Isoxuprine 10mg/kg po sid. from 6/3/2020 until 6/12/2020
Jun 3, 2020 RX: 0.03ml of 25mg/ml Flagyl 50mg/kg po bid. from 6/3/2020 until 6/8/2020
Jun 3, 2020 **Intake Exam: Weight:** 14.60g, **Age:** Hatchling / Chick, **Sex:** Unknown, **BCS:** Reasonable, **Dehydration:** Mild, **Attitude:** Alert, **Legs / Feet / Hocks:** Constriction injury dorsal surface R foot. Moderate swelling around pedal joint and distal. Ulcerated skin dorsal surface foot. Superficial pain perception present in foot distal to constriction. Heavily favors R foot, but does bear some weight and places foot in normal position, **Treatment:** Cleaned/covered wound, 1.5ml LRS SQ w/B complex, meloxicam, tramadol, Clavamox, **Examiner:** SR/VM

Disposition

Disposition	Transferred	Criminal Activity?	Transfer Type	Continued care
Disposition Date	6/19/2020	Carcass Saved?	Release Type	
Disposition Location	Coal Oil Point Reserve, Goleta CA			