

**2015 WESTERN SNOWY PLOVER MONITORING REPORT
GUADALUPE RESTORATION PROJECT
SAN LUIS OBISPO COUNTY, CALIFORNIA**



**Prepared for:
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
and the
UNITED STATES FISH AND WILDLIFE SERVICE**

Recovery Permit TE-211100-0

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LIST OF ACRONYMS

AB	Alyssa Berry (Padre Associates, Inc.)
CAHFS	California Animal Health and Food Safety Laboratory
CCC	California Coastal Commission
CESA	California Endangered Species Act
CEMC	Chevron Environmental Management Company
CDFW	California Department of Fish and Wildlife
CDP	Coastal Development Permit
CR	Connor Ritchie (Padre Associates, Inc.)
FESA	Federal Endangered Species Act
GRP	Guadalupe Restoration Project (Site or Project)
JFM/JM	Jeanette Moore (Padre Associates, Inc.)
JL	Jennifer Langford (Padre Associates, Inc.)
KLG/KG	Kenneth Gilliland (Padre Associates, Inc.)
KKP/KP	Kimberly Paradis (Padre Associates, Inc.)
OC	Octavio Camacho
ODSVRA	Oceano Dunes State Vehicular Recreation Area
Padre	Padre Associates, Inc.
RD	Rosalino Dolorez (Padre Associates, Inc.)
RZ	Ryan Zukor (Padre Associates, Inc.)
RWQCB	Regional Water Quality Control Board
SBMNH	Santa Barbara Museum of Natural History
SG	Shannon Gonzalez (Padre Associates, Inc.)
SMS/SS	Stephanie Seay (Padre Associates, Inc.)
USFWS	U.S. Fish and Wildlife Service
USCG	United States Coast Guard
VAFB	Vandenberg Air Force Base
WSPL	Western snowy plover

EXECUTIVE SUMMARY

Padre Associates, Inc. (Padre) has prepared this report to document the results of western snowy plover (*Charadrius nivosus nivosus*) (WSPL) surveys and monitoring events conducted during the 2015 breeding season at the Guadalupe Restoration Project (GRP), San Luis Obispo County, California (Project Site). Padre biologists who perform the western snowy plover surveys are permitted by the United States Fish and Wildlife Service (USFWS) to independently survey for the WSPL as permittee or subpermittees under USFWS Recovery Permit 10(a)(1)(A) TE-211100-0 and California Department of Fish and Wildlife (CDFW) Memorandum of Understanding (MOU) SCP-10627. The USFWS requires the submittal of an annual report to the Recovery Permit Coordinator at the Ventura Fish and Wildlife Office of USFWS following each year the permit is in effect. The County of San Luis Obispo administers the Conditions of Approval for the Guadalupe Restoration Project (GRP). Section F.62.m, requires a field-wide management plan for each sensitive species that is potentially impacted by site characterization, oil spill remediation, oil field abandonment, infrastructure removal, or other project-related activities. As part of the field-wide Sensitive Species Management Plan, the WSPL Monitoring Program requires an annual report summarizing the WSPL breeding season monitoring to be submitted to Chevron Environmental Management Company (Chevron).

Monitoring of breeding WSPL was conducted at the GRP between March 2, 2015 and September 15, 2015. WSPL were present during all 80 surveys conducted during this period. In 2015, an average of 23 WSPL were observed at the GRP during the peak breeding months of April through June 2015.

A total of 47 WSPL nests was recorded in 2015. The WSPL nests were present on the beach from March 25, 2015 through August 10, 2015. Of these 47 nests, 23 nests hatched successfully and 24 failed (with known fates). The number of WSPL nests found at the GRP Site in 2015 (n=47) was lower than the number of nests recorded in 2014 (n=50), but higher than those recorded in 2013 (n=45) and 2012 (n=40). The nest success percentage recorded in 2015 (49 percent), was higher than any annual success percentage recorded between 2008 and 2014 (range: 13-45 percent). The 47 located WSPL nests contained a total of 117 eggs, of which 64 hatched (55 percent) and 53 eggs were either depredated (33 percent) or abandoned (12 percent). The number of eggs that hatched in 2015 (64 eggs), was greater than the number of eggs that hatched in 2014 (54 eggs).

Twenty of the failed WSPL nests were confirmed depredations and four were lost to abandonment. Common ravens (*Corvus corax*) were the most common WSPL nest predator in 2015, responsible for 45 percent of the confirmed depredations, and were suspected to have depredated an additional 4 percent of nests. In 2015, four nests were abandoned, and no nests were affected by tidal overrun. In 2015, 42 percent of the nests were depredated as compared to 2014 when 32 percent were depredated. This increase in the percentage of depredated nests recorded in 2015, is believed to be a result of relatively lower nest depredations caused by common ravens in 2014. In 2014, a single nest was confirmed to have been depredated by common raven and a single nest was suspected to have been depredated by common raven.

Although relatively high common raven nest depredations occurred in 2015, the proactive approach to lethally remove a single common raven that was responsible for

depredating WSPL nests at the landscape-level contributed to a nest success percentage that is higher than any year at GRP recorded between 2008 and 2014.

Evidence suggesting that the common raven lethally removed from a location adjacent to GRP was the common raven responsible for depredating WSPL nests at GRP includes the following:

- No additional WSPL nest depredations caused by common raven in 2015 were documented following the removal of the common raven on June 1;
- The salient increase in the hatching success of WSPL following the removal;
- The locations of WSPL nests depredated by common raven relative to the location where the common raven was removed; and
- The relationship between the relatively smaller percentage of overall nests located on the Santa Maria River mouth sand spit relative to a higher percentage of common raven nest depredations recorded in this area.

Although nest exclosures have been used at GRP in the past, no nest exclosures were used in 2013, 2014, and 2015. The decision was made by the Padre WSPL biologist to not use exclosures based on adult WSPL fatalities potentially influenced by the placement of exclosures in 2011 and 2012. The lack of exclosure utilization since 2012 has reduced the risk of coyotes being attracted to the exclosed nests and attempting to dig under the exclosures as has been observed during previous years. In 2015, no adult, chick, or fledgling WSPL fatalities due to predators were observed.

In 2012 and 2013, a total of 1.28 acres of WSPL critical habitat at GRP was disturbed and restored at the A-8 Pad, A-6 West, and the A Road. Restoration activities occurred outside of the WSPL nesting season. Historically, the A-8 Area has not had suitable WSPL nesting habitat and nests have not been found in that area. Following excavation activities in these sites, restoration efforts included seeding, installation of sand fence for sand stabilization, and strategic placement of wrack and natural beach debris to increase suitable WSPL habitat heterogeneity. Additionally, straw plugs were added to A-6 West and the A Road. In 2014 and 2015, WSPL utilized the A-6 West area for breeding. In 2015, WSPL placed a total of four nests in the A-6 West area.

In the portion of the Restoration Dunes referred to as the 5X Beach Area, Chevron contractors, under the direction of CDFW, USFWS, United States Coast Guard (USCG), and the Regional Water Quality Control Board (RWQCB), continued to conduct 5X beach monitoring of the potential release of petroleum hydrocarbons into the ocean that was originally observed in 2010. WSPL did not show any signs of stress from the additional 5X beach monitoring personnel on the beach.

1.0 INTRODUCTION

Padre Associates, Inc. (Padre) has prepared this report to document the results of western snowy plover (*Charadrius nivosus nivosus*) (WSPL) surveys and monitoring events conducted during the 2015 breeding season at the Guadalupe Restoration Project (GRP), San Luis Obispo County, California (Project Site) Refer to Figure 1 - Site Location Map. The WSPL taxon is listed as a threatened species under the Federal Endangered Species Act (FESA). In accordance with the terms and conditions of the GRP-specific Biological Opinion (1-8-03-F/C-57) issued by the United States Fish and Wildlife Service (USFWS), monitoring of WSPL activities was conducted three times per week during the period between March 2, 2015 and September 15, 2015. The biologists who performed the surveys are permitted by the USFWS to independently survey the WSPL under Ms. Kimberly Paradis' USFWS Recovery Permit 10(a)(1)(A) TE-211100-0 and CDFW Memorandum of Understanding (MOU) SCP-10627.

2.0 SURVEY AREA

The WSPL survey area includes the coastal area that defines the western margin of the Project Site. Refer to Figure 2 - Field Map. The eastern boundary of the survey area can be divided into two parts. The southern portion of the eastern boundary is defined by the location of the former A Road that was once a gravel road running parallel to the coastline approximately 1,000 feet (300 meters) inland from the mean high tide line. Refer to Figure 3 - Western Snowy Plover Nest Locations [2015]. The A Road has been removed and the area is currently under restoration. North of the former A Road, the eastern survey boundary is at the crest of high dunes backing the beach. The western border of the survey area is roughly the mean high tide line along the Pacific Ocean. The northern border of the survey area abuts the Guadalupe-Nipomo Dunes National Wildlife Refuge. The southern border of the survey area lies on a sandspit created by the Santa Maria River and abuts the Santa Barbara County Rancho Guadalupe Dunes Preserve. In the past, the river has crossed near the GRP property line; however, in 2015, the river mouth was approximately 500 feet (152 meters) south of the property boundary. The length of the survey area from the northern to southern boundary is approximately 1.5 miles (2.4 kilometers), and the survey area covers approximately 97 acres (39 hectares).

The survey area is divided into five monitoring territories which include from north to south: 1) Northern Territory; 2) 7X Complex; 3) A Road; 4) Restoration Dunes; and 5) Sandspit. Refer to Figure 3 - Western Snowy Plover Nest Locations [2015].

Habitat types within the survey area suitable for WSPL include beach, foredune, and vegetated back dunes interspersed with open areas with sand and gravel substrates. Habitat heterogeneity includes driftwood of various sizes, kelp, wrack, and some man-made debris. During winter storms, the Santa Maria River occasionally discharges various types of natural and anthropogenic debris down the river and onto the beach resulting in increased habitat heterogeneity, which may provide camouflage from predators for WSPL nests. The beach received a significant amount of wrack (surf-cast kelp) throughout the nesting season resulting in suitable foraging and nesting habitat. The beach width varies throughout the year, generally being narrowest in late-winter with sand accumulation predominately occurring throughout the summer. In addition, the southern half of the beach is generally broader and more open than the northern half of the beach. The northern half of the beach is predominately composed of narrowly incised sand dunes.

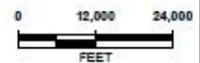
The foredunes support sparse vegetation consisting of beach-bur (*Ambrosia chamissonis*), yellow sand verbena (*Abronia latifolia*), and sea rocket (*Cakile maritima*). The foredunes also provide habitat for the beach spectacle pod (*Dithyrea maritima*) and surf thistle (*Cirsium rothophilum*), both listed as threatened under the California Endangered Species Act (CESA).

Remediation of the foredune habitat, an area now covered by roughly 24 dunes, was completed in 2001. The California Coastal Commission (CCC) and San Luis Obispo County granted completion of restoration activities in this area in 2014 by indicating that these areas met the established restoration performance criteria. This area is now commonly referred to as the Restoration Dunes. The beach and foredunes, including restored areas, provide suitable and occupied habitat for nesting WSPL along the entire length.



LEGEND:

 Guadalupe Restoration Project Boundary



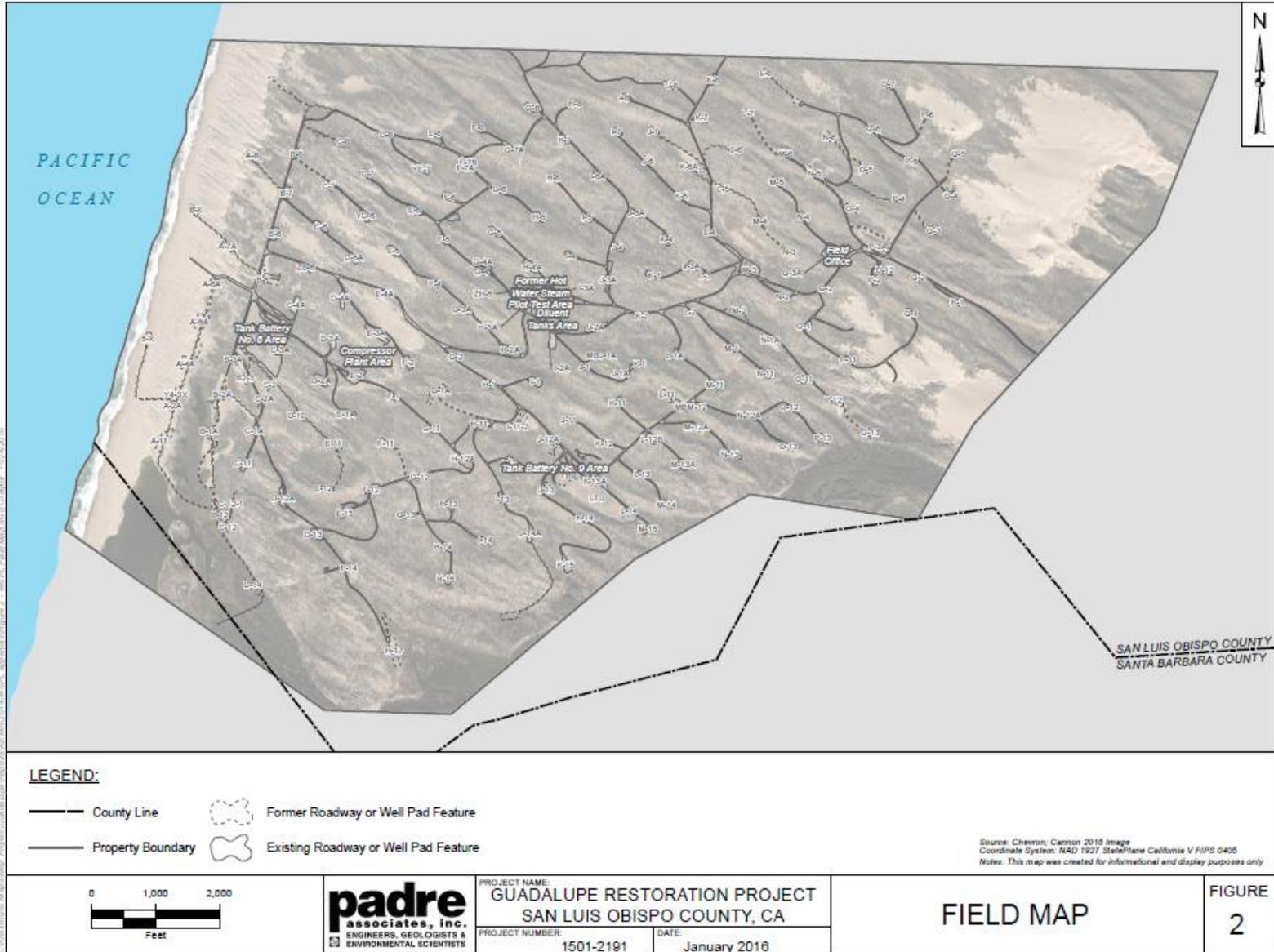
Source: USGS Topo Quad - ESRI Online
 Coordinate System: NAD 1983 StatePlane California V FIPS 405 Feet
 Note: This map was created for informational and display purposes only

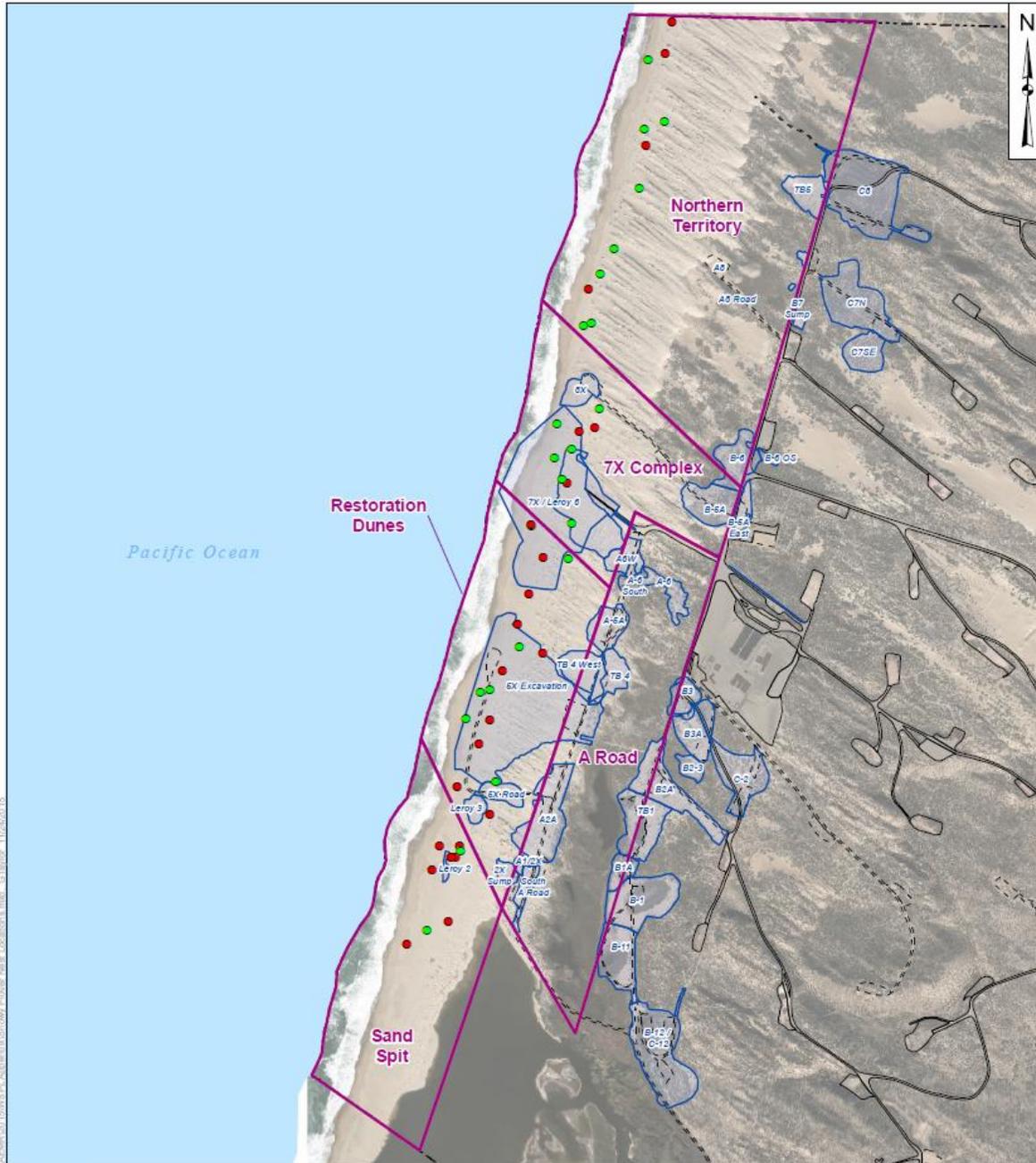


PROJECT NAME: GUADALUPE RESTORATION PROJECT SAN LUIS OBISPO, CA	
PROJECT NUMBER: 1501-2191	DATE: January 2016

SITE LOCATION MAP

FIGURE
1





LEGEND:

● Failed Nest	■ Plover Monitoring Territory	□ Existing Roadway or Well Pad Feature
● Hatched Nest	⊞ Excavation Area	- - Property Boundary
	⊞ Removed Roadway or Well Pad Feature	

Source: Cannon 2016 Aerial Imagery
 Coordinate System: NAD 1927 StatePlane California V FIPS 0406
 Notes: This map was created for informational and display purposes only

		PROJECT NAME: GUADALUPE RESTORATION PROJECT	WESTERN SNOWY PLOVER NEST LOCATIONS (2015)	FIGURE 3
		PROJECT NUMBER: 1501-2191		

3.0 METHODS

Padre biologists approved by the USFWS surveyed all potential WSPL habitat within the survey area three times per week, on non-consecutive days, when possible. Surveys were cancelled or rescheduled, when wind speeds greater than 15 miles per hour (mph) were recorded.

During each survey, the biologists followed a designated route through the survey area. Beginning at the intersection of the former A Road and the B Road, the biologists walked the former A Road south to where the road turns to the southeast. Refer to Figure 3 - Western Snowy Plover Nest Locations [2015]. At that point, the route followed the estuary edge, the eastern edge of the survey area, traveling west until reaching the southwest corner of the GRP property. From there, the biologists proceeded to the northern boundary of the survey area. Returning south from the northern boundary, the former 8X Pad area was surveyed. The biologists then walked south along the western edge of the dunes to the former 7X Road and returned to the intersection of the former A Road and B Road. Generally, the survey route was traveled in reverse at least once a week. The biologists would routinely take minor deviations from this route to follow tracks or other evidence of WSPL activity. To avoid disturbing rare plant species, every WSPL biologist was trained in special-status plant identification and avoided these species when surveying in the dunes.

Surveys were conducted by traveling the survey route with biologists stopping at approximately 325-foot (100-meter) intervals, scanning a 360-degree circle for WSPL with the aid of binoculars, and noting the number, age, sex, and presence of colored leg identification bands of all observed WSPL. When a WSPL was observed with colored leg identification bands, extra effort was made to record the band combinations. As WSPL tend to visit their nests several times a day during nest initiation and egg-laying stages, scanning areas with dense concentrations of WSPL footprints was the primary technique used to locate active WSPL nests. Areas of high concentrations of WSPL nest scrapes prior to egg deposition were also noted during each survey. Nests were also located opportunistically or by observing the behavior of adult WSPL.

During each survey, the status of every active nest was checked and assigned to one of the following categories:

- **Active/Tended** - Eggs present, with adults or fresh tracks near the nest;
- **Untended/Abandoned** - Eggs present, but no fresh tracks near the nest. Eggs partially covered in sand, displaced from the nest scrape, or present more than five days after expected hatch date;
- **Hatched** - Chicks or egg pips (small fragments of eggshell produced during hatching) present in nest. In the absence of pips, due to wind, nests that were empty on the expected hatch date without any signs of depredation;
- **Depredated** - Eggs gone before expected hatch date, or physical evidence of egg loss present (e.g. broken shells, spilled yolk in nest scrape, evidence of predator presence);
- **Unknown** - This category was assigned to nests that did not leave unequivocal clues to their fate.

The nest status and the location of the nest (GPS coordinates) were recorded on a nest card that was used to monitor the status of each individual nest. The location data were placed on a map indicating the success of each nest based on color. Refer to Figure 3 - Western Snowy Plover Nest Locations [2015]. Any predators or predator tracks that were observed during each survey along with human trespassers were also recorded. The time of the survey; biologists present; weather (wind speed and temperature); prior weather; visibility; estuary height; surf conditions; and presence of fisherman, beachcombers, and surfers were also recorded. All of these data were collected in field notebooks and transferred into an electronic database. The color combinations of each unique colored leg identification bands were reported to Point Blue Conservation Science (PBCS) where they are kept in a database. Reporting of WSPL colored leg identification bands observations to PBCS helps biologists understand to he range-wide status, movements, and distribution of the species.

Additional WSPL monitoring was conducted at the 5X Area as directed by the Regional Water Quality Control Board. Two separate paths for the monitors' access were designated depending on where nests were located during the time of beach monitoring activities. One path was from the former A Road to 7X Area and out to the shoreline. The second path was south on the A Road to an open dune near 5X Area and out to the shoreline. The paths were surveyed by an approved WSPL biologist prior to any monitoring activities. Additionally, approved WSPL biologists accompanied all monitoring personnel during each monitoring event.

Periodically, site activities required a search for WSPL scrapes or nests outside the normal survey area. If a proposed project would disturb an area west of the A Road, but outside the normally surveyed area, or east of the former A Road in an area that had potential or sheltering a WSPL nest, the WSPL biologist would survey the area for WSPL prior to the initiation of remediation activities. The area east of the B-ponds iwas surveyed and cleared for foot and ORV traffic once a week. No observations of WSPL have occurred in this area for the past five years, and the succession of the vegetation following remediation activities appears to be decreasing the availability of suitable WSPL nesting habitat.

4.0 RESULTS AND DISCUSSION

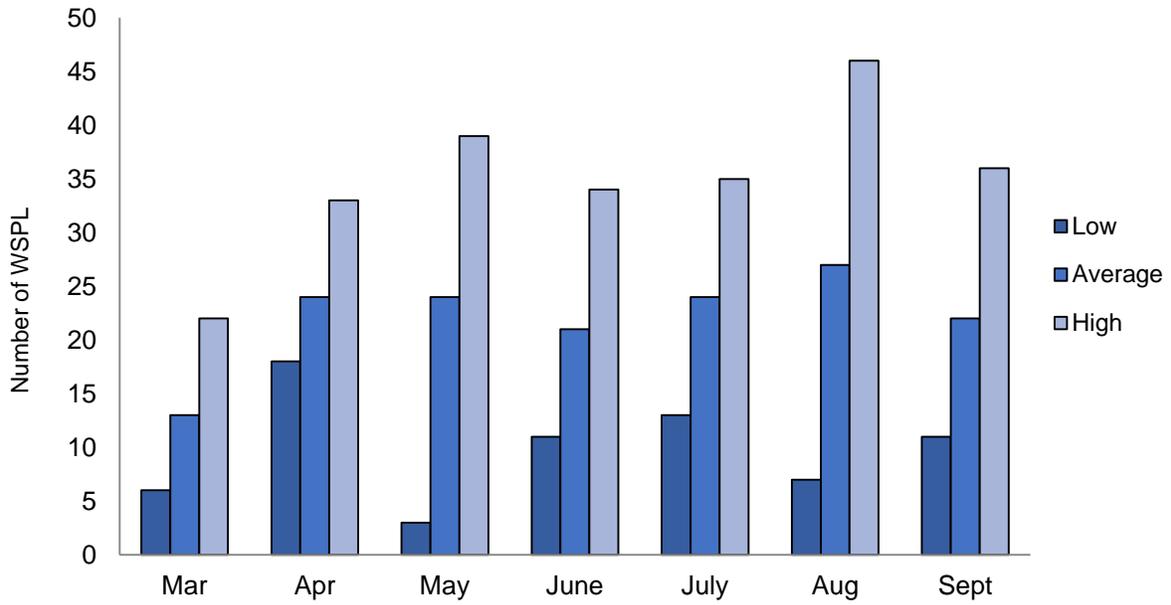
4.1 WESTERN SNOWY PLOVER NUMBERS

Padre's WSPL biologists conducted 80 surveys during the period between March 2, 2015 and September 15, 2015. The survey data are provided in Appendix A, Table A-1, Survey Dates and Western Snowy Plover Numbers. The average number of WSPL observed per survey throughout the 2015 nesting season was 22. The number of WSPL counted each month ranged from a minimum of three on May 11, 2015, to a maximum of 46 observed on August 12, 2015. The number of WSPL observations throughout the 2015 nesting season is presented on Figure 4 - Western Snowy Plovers Observed per Month in 2015 at GRP, which depicts the minimum, average, and maximum number of WSPL observed each month in 2015. An average of 23 WSPL was observed at the GRP during the peak breeding months of April through June. The increase in WSPL numbers observed in August 2015 is presumed to be an artifact of adult and juvenile WSPL completing their annual nesting cycle and subsequently migrating to areas of suitable wintering habitat.

The average of 22 WSPL observed during the period annually between March through September was higher than annual average number of WSPL observed during the same time period over the past five years, which included: 2009 = 15, 2010 = 12, 2011 = 15, 2012 = 16, 2013 = 16, 2014 = 15.

Among the WSPL observed in 2015, 63 individuals were marked with colored identification leg bands placed on the birds at various monitored areas throughout the WSPL breeding range. Refer to Appendix A, Table A-2, Color Banded Western Snowy Plovers Recorded. Of the banded birds observed in 2015, six were confirmed as nesting on-site throughout the season. The majority (40) of the 63 banded WSPL were banded at Oceano Dunes State Vehicular Restoration Area (ODSVRA), California, located to the north of GRP. Of the 40 banded WSPL from ODSVRA, 12 were fledglings banded in 2015. Ten of the banded individuals observed at GRP were banded at Vandenburg Air Force Base (VAFB), California, located to the south of GRP. Of the 10 banded WSPL from VAFB, 6 were fledglings banded in 2015. Additional banded WSPL observed at GRP included birds from Salinas National Wildlife Refuge, California (1); Monterrey Bay Aquarium, California (1); Monterrey, California (3); and Santa Barbara, California (1). Two WSPL from the northern portion of their range were observed at GRP. These WSPL included a banded WSPL from Humboldt County, California (1), and a banded WSPL from Fort Ord, Oregon (1).

Figure 4. Number of Western Snowy Plovers Observed Per Survey Each Month at GRP in 2015



4.2 WESTERN SNOWY PLOVER NESTS

In 2015, a total of 47 WSPL nests was located within the survey area. Refer to Figure 3 – Western Snowy Plover Nest Locations in [2015]. The number of nests found in 2015 (47) is fewer than the 50 nests found in 2014. Of the 47 nests observed, 23 hatched successfully (49 percent) and 24 failed (51 percent). Although more nests were located in 2014, there was greater hatching success in 2015 (44 percent and 49 percent, respectively). Refer to Figure 5 – Western Snowy Plover Nests and Hatching Success at GRP: 1995 - 2015.

Twenty of the failed nests were confirmed depredations. Common ravens were the most common nest predator in 2015. In 2015, four nests were abandoned and no nests were affected by tidal overrun. Refer to Figure 6 - Fate of Western Snowy Plover Nests at GRP in 2015. The first nest was observed on March 25, 2015, and the last nest hatched on August 5, 2015. The nest location data are presented in Appendix A, Table A-3, Western Snowy Plover Nests Located. April and May were the most active nesting months with 13 nests located, and June was the third most active month with 12 nests located. Refer to Figure 7 - Number of Western Snowy Plover Nests Located by Month at GRP in 2015.

A total of 28 nests (60 percent) was located before clutch completion (i.e., before there were three eggs in the nest), allowing for the calculation of an accurate expected hatch date. Refer to Table 4-1 - Western Snowy Plover Nest Fates for 2015 Breeding Season at GRP. Biologists were able to assign relatively accurate hatching dates to another 19 nests found after clutch completion due to nest searches that were recently completed near these nests.

The 49 percent nest hatch success rate recorded in 2015, was higher than the 44 percent hatch success rate recorded in 2014. Additionally, the 49 percent nest hatch success rate observed in 2015 was higher than any year between 2008 and 2014 (range: 13-45 percent) (Refer to Figure 5 - Western Snowy Plover Nests and Hatching Success at GRP: 1995 - 2015). In 2015, of the 109 WSPL eggs laid, 64 hatched (61%), and there were more eggs hatched in 2015 as compared to 2014 (64 eggs versus 51 eggs, respectively).

In 2015, the Restoration Dunes were the most productive area of WSPL nesting. Sixteen nests (34 percent) were located in the Restoration Dunes, 13 nests (28 percent) were located in the Northern Territory, nine (19 percent) were located in the 7X complex, and nine (19 percent) were located on the Sandspit. The former A Road did not have any WSPL nests in 2015. Figure 8 - Total Western Snowy Plover Nests by Location at GRP in 2015 depicts the spatial arrangements of the WSPL nests within the four monitoring territories.

Table 4-1. 2014 Breeding Season Western Snowy Plover Nest Fates at GRP

Nests	Hatched	Failed	Total
Found Before Completion	16	12	28 (60%)
Found Completed	7	12	19 (40%)
Total	23 (49%)	24 (51%)	47

Figure 5. Western Snowy Plover Nests and Hatching Success at GRP: 1995 to 2015

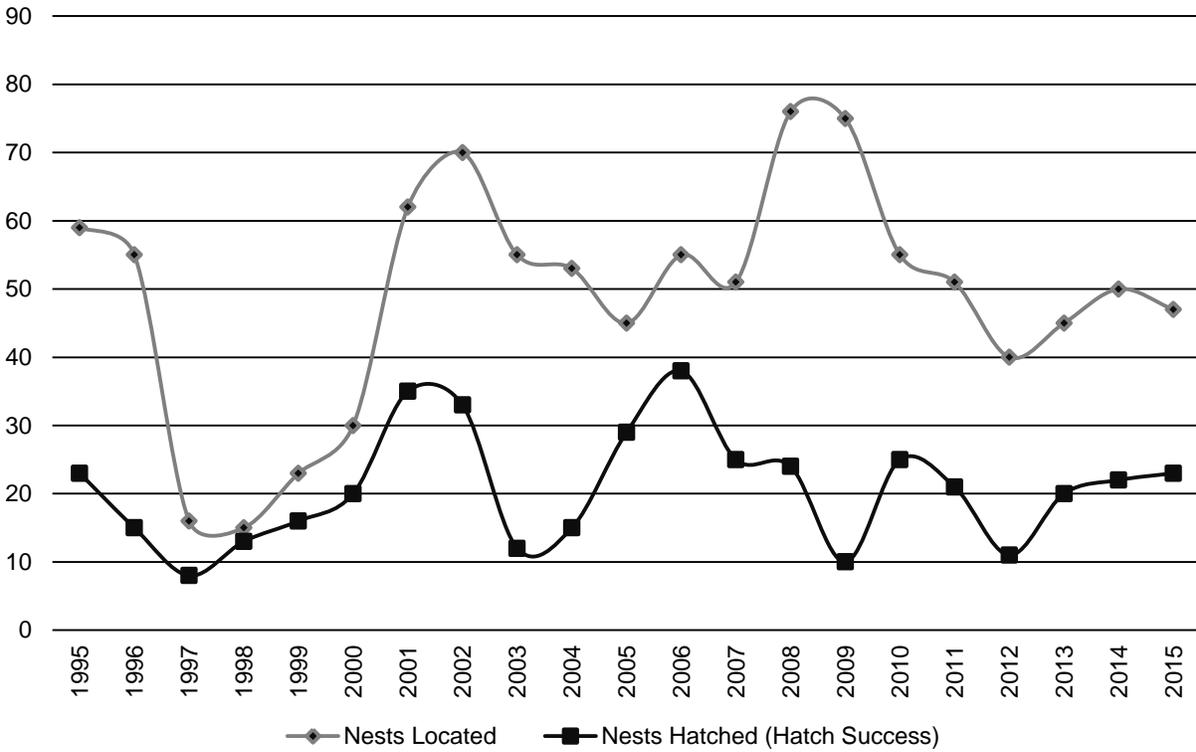


Figure 6. Fate of Western Snowy Plover Nests at GRP in 2015 (n=47)

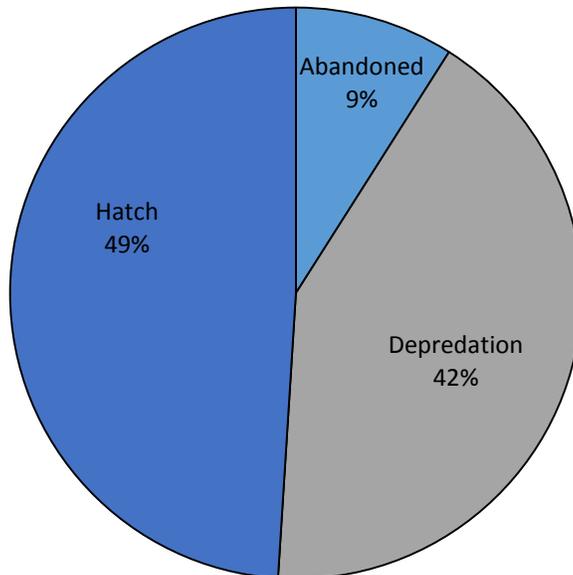


Figure 7. Number of Western Snowy Plover Nests Located by Month at GRP in 2015 (n=47)

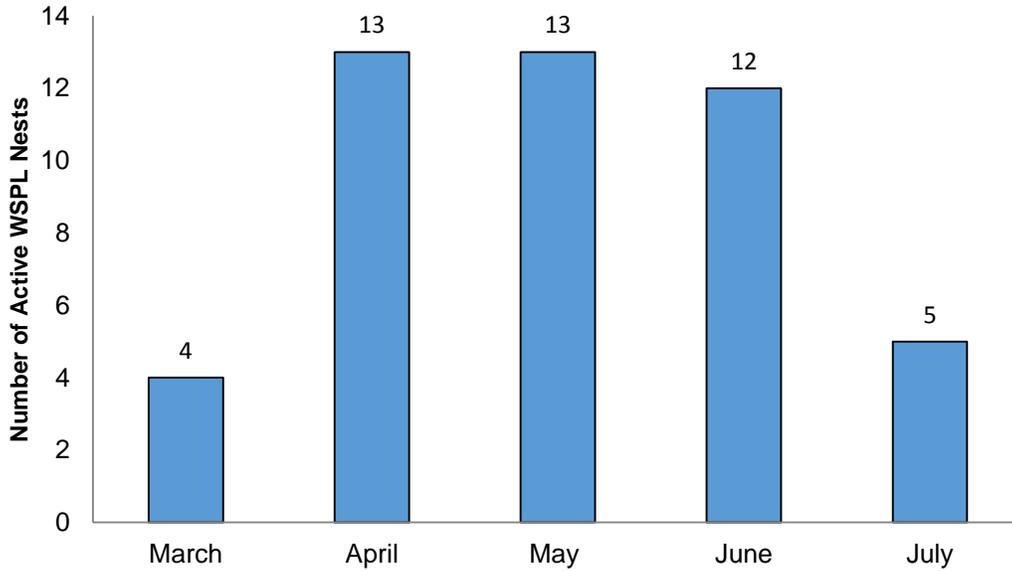
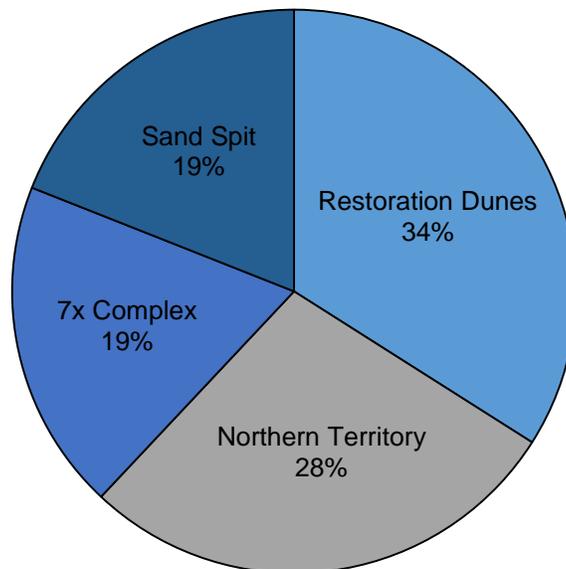


Figure 8. Western Snowy Plover Nests by Location in 2015 at GRP (n=47)



4.3 WESTERN SNOWY PLOVER NEST DEPREDATION AND FAILURE

To reduce the effects of WSPL predators, Padre's WSPL biologists coordinate closely with WSPL biologists at adjacent sites and throughout Recovery Unit 5 (including suitable WSPL habitat located between San Simeon, California, south to the northern border of Los Angeles County, California). The WSPL biologists at GRP distribute a weekly WSPL status update throughout the nesting season that includes predator observations to Santa Barbara County Rancho Guadalupe Dunes Preserve WSPL biologists, Guadalupe-Nipomo Dunes Wildlife Refuge WSPL biologists, ODSRVA WSPL biologists, and United States Department of Agricultural (USDA) Wildlife Services representatives and ODSRVA predator managers, USFWS representatives, and CDFW representatives. When common ravens or other potential avian WSPL nest predators are observed at GRP, ODSVRA WSPL biologists, USDA Wildlife Services representatives, and ODSVRA predator managers are notified by phone immediately.

In 2015, a total of 20 confirmed WSPL nest depredations were identified. The most frequent nest predators were common raven followed by coyote (*Canis latrans*). Of the 20 confirmed nest depredations, nine were confirmed common raven (45 percent), four were confirmed coyote (20 percent), two were confirmed gull (*Larus* spp.) (10 percent), and five were unknown predators (25 percent). Refer to Table 4-2 - Western Snowy Plover Nest Failure at GRP in 2015, Figure 9 - Western Snowy Plover Nest Depredations by Species at GRP in 2015, and Figure 10 – Western Snowy Plover Nest Success and Depredations by Month at GRP in 2015.

In 2014, coyotes were the primary nest predators (37 percent; n = 6), with one confirmed common raven nest depredation (6 percent) and one suspected common raven nest depredation (6 percent). Unknown predators were suspected to be avian if it was not windy the previous day (e.g., potential tracks were not obscured), there were recent avian nest depredations, and there were no mammalian tracks immediately adjacent to the nest. Following some avian depredations, track impressions left in the sand by WSPL returning to their nests obscured avian predator tracks making it difficult to identify the predator species responsible. To aid in predator identification, all observed predator tracks adjacent to the suspected WSPL nest depredation were investigated and measured, and the condition of all egg remains were documented.

In 2011, 2012, 2013, and 2015 nest predation by common ravens at GRP was identified as the most significant factor limiting the nesting success of WSPL at GRP. The USFWS Biological Opinion (1-8-03-FC-57), the scientific literature (Dinsmore *et.al.* 2014), and the *USFWS Western Snowy Plover Recovery Plan* indicate that the reduction of predation caused by common ravens can lead to increases in the nesting success of the WSPL. Term and Condition 13 of the USFWS Biological Opinion for the GRP states: “*When determined appropriate by the Service-approved biological monitor(s), Unocal (Chevron EMC) must implement predator control to reduce excessive predation on western snowy plovers or California red-legged frogs.*” To reduce the effects of common raven on the nesting success of the WSPL, GRP was issued a USFWS Migratory Bird Depredation Permit (MB23433B-0) that expires on May 31, 2016, to lethally remove 10 common ravens annually. This permit will be renewed annually. The USFWS Migratory Bird Depredation Permit allows for the lethal removal

through shooting with a shotgun (with non-toxic shells), and trapping with padded leg-hold or Swedish goshawk traps. To perform these activities, Chevron has entered into an informal agreement with the ODSVRA and USDA Wildlife Services to perform these activities.

In 2015, nine WSPL nests were confirmed common raven depredations, and two additional depredations that occurred in May 2015 were suspected to have been caused by common raven. All confirmed and suspected common raven depredations occurred between May 12th, 2015 and May 27th, 2015. On May 28th, 2015, Mr. Barry Lowry (USDA Wildlife Services) accessed the GRP to attempt to lethally remove the common ravens that were suspected to be causing the WSPL nest depredations. Mr. Lowry did not observe any common ravens at GRP during his site visit on May 28th, 2015, and therefore, no attempts to lethally control common ravens at GRP were performed in 2015.

On June 1st, 2015, Mr. Lowry lethally removed a single common raven near the Santa Maria River Estuary at the Santa Barbara County Rancho Guadalupe Dunes Preserve, immediately south of GRP. Mr. Lowry's activities were performed in accordance with Santa Barbara County's USFWS Migratory Bird Depredation Permit. Following the removal of the single common raven on June 1st, 2015, no additional WSPL nest depredations were caused by common raven at GRP during the 2015 season.

Evidence that suggests that the common raven lethally removed was the common raven responsible for depredating WSPL nests at GRP includes the increase in the hatching success of WSPL in June (after the removal of the raven) compared to May. Refer to Figure 10 – Western Snowy Plover Nest Success and Depredations by Month at GRP in 2015, showing the raven depredations ceased after the raven was removed June 1st. Additionally, a smaller percentage of the total nests in 2015 were located on the Santa Maria River mouth and spit (19 percent) in the southern portion of the survey area, and these nests received a relatively higher percentage of depredation caused by common raven (35 percent). The percentage of nest depredations caused by common ravens by location at GRP in 2015, included 35 percent recorded on the Sand Spit, 25 percent recorded in the Restoration Dunes, and 20 percent recorded in both the 7X Area and the Northern Territory. Refer to Figure 11 – Western Snowy Plover Nest Depredations by Common Raven by Location at GRP in 2015.

Additional potential WSPL predators (nest and/or adults, chicks, fledglings) including northern harrier (*Circus cyaneus*), great-horned owl (*Bubo virginianus*), peregrine falcon (*Falco peregrinus*), prairie falcon (*Falco mexicanus*), American kestrel (*Falco sparverius*), merlin (*Falco columbarius*), red-tailed hawk (*Buteo jamaicensis*), striped skunk (*Mephitis mephitis*), Virginia opossum (*Didelphis virginiana*), feral swine (*Sus scrofa*), and American black bear (*Ursus americanus*), were observed within suitable WSPL nesting habitat at GRP throughout the 2015 nesting season; however, no confirmed depredations were recorded by these species. The type and number of observations of each predator by month in 2015 is included in Appendix A, Table A-4, Potential Western Snowy Plover Predator Observations within Western Snowy Plover Habitat by Month in 2015

High winds and tidal overflows did not contribute to any nest failure in 2015 at GRP. Although no nests were lost to tidal overflows in 2015, a single two egg nest (AJB12) was displaced by tidal overflows, but one of the eggs successfully hatched. When the second egg

was determined to be abandoned or infertile, it was collected Ms. Kimberly Paradis and deposited in the collection at the Santa Barbara Natural History Museum (SBNHM) per the conditions of her USFWS and CDFW authorizations.

To prevent displacing WSPL adults from their nests during high winds, wind speed was recorded by biologists before initiating every WSPL survey, and surveys were immediately ceased if wind speed exceeded 15-20 mph. In 2015, many afternoons became extremely windy, but no WSPL nests were abandoned due to high wind events. Little evidence existed to indicate the cause of the four WSPL nests that were determined to have been abandoned by adult WSPL in 2015. Refer to Table 4-2 - Western Snowy Plover Nest Failure at GRP in 2015.

Table 4-2. Western Snowy Plover Nest Failure at GRP in 2015

Cause	Number of Failed Nests
Depredated – common raven	9
Depredated – coyote	4
Depredated – gull species	2
Depredated - Unknown Predator	5
Abandoned	4
Total	24

Figure 9. Western Snowy Plover Nest Depredations by Species in 2015 at GRP (n=20)

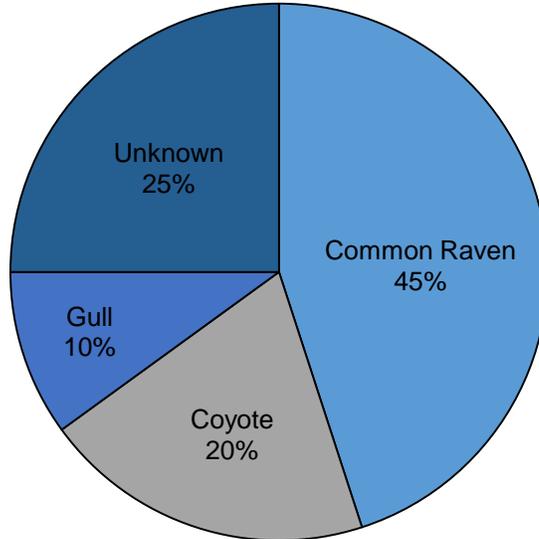


Figure 10. Western Snowy Plover Nest Success (n=25) and Depredations (n=20) by Month at GRP in 2015

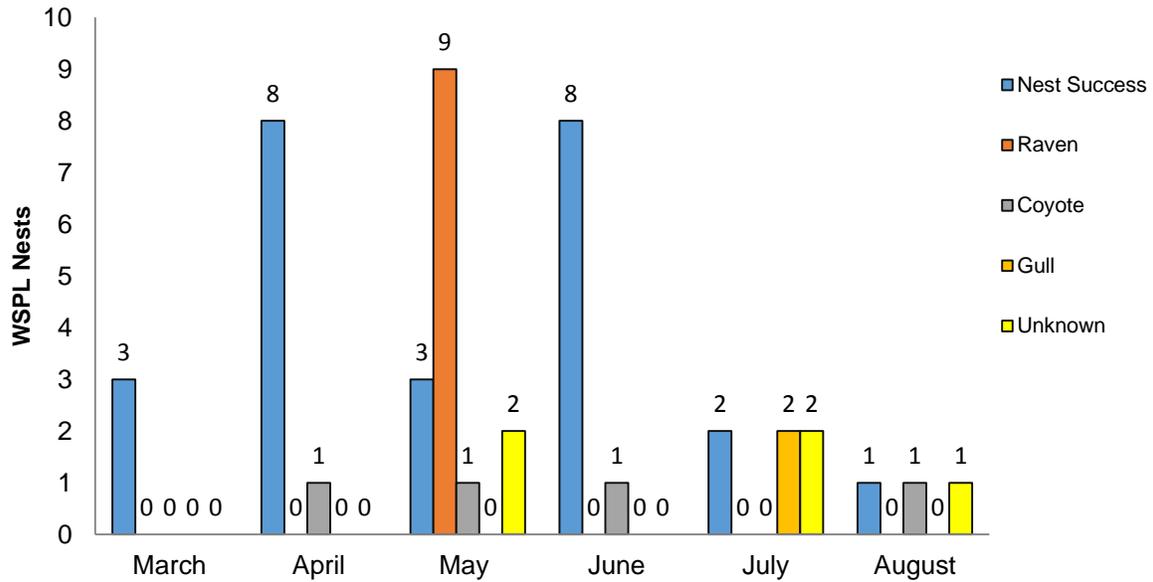
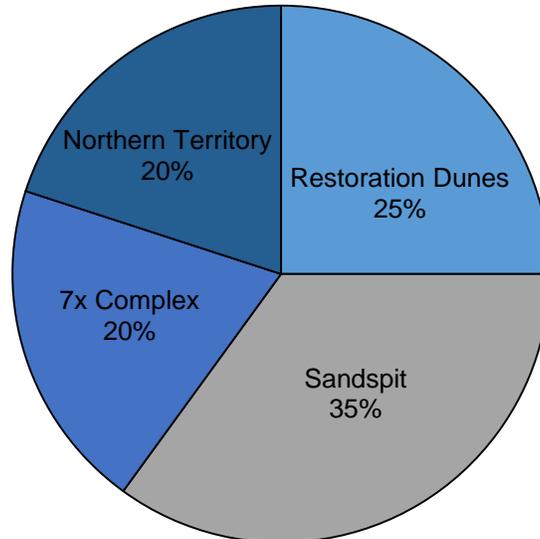


Figure 11. Western Snowy Plover Nest Depredations by Common Raven by Location in 2015 at GRP (n=9)



4.4 NEST EXCLOSURES

Although nest exclosures have been used at GRP in the past, no nest exclosures were used in 2013, 2014, and 2015. The decision was made by the Padre WSPL biologist to not use predator exclosures based on adult WSPL fatalities potentially influenced by the placement of exclosures in 2011 and 2012. Additionally, the scientific literature indicates that nest exclosures may increase depredations of adult WSPL (Neuman *et al.* 2004; Dinsmore *et al.* 2014). The decision was made at the beginning of the season to assess the severity of the predation on WSPL nests before using exclosures. The use of exclosures was still an option if deemed necessary by the Padre WSPL biologists.

Although nest exclosures have been shown to increase WSPL nest hatching success, they pose potential hazards to adult WSPL. The scientific literature and USFWS approved biologists' professional experience with nest exclosures indicate that small raptors, including American kestrel and merlin, may correlate the presence of exclosures with the presence of all life stages of WSPL, and may use this association to serially depredate WSPL. On the GRP Site specifically, peregrine falcons are present for the majority of the WSPL breeding season. Therefore, due to the potential risk that exclosures pose to adult WSPL, GRP biologists elected not to exclose any WSPL nests in 2013, 2014, or 2015. Throughout the range of the WSPL, many WSPL biologists are focusing their efforts on the removal of potential predators, and are working toward the elimination of exclosures due to the potential threats this method poses to the adult WSPL.

In 2011 and 2012, adult WSPL were found dead outside of exclosures. These adult mortalities were presumably caused by raptors. This event happened at two separate exclosures in the Restoration Dunes in 2011, and both exclosures were removed the morning of June 1st. The dead WSPL were found with coyote tracks around them, but the cause of death was uncertain. One of the nests continued to be incubated and later hatched. The second nest associated with the adult mortality was not attended to and was deemed abandoned. The eggs were eventually eaten by a coyote. In 2012, a common raven sign (i.e., tracks) was also observed adjacent to nest exclosures

In the past, coyotes have approached exclosures and dug under in attempts to depredate the nest. In some cases, these nests were later abandoned by the adult WSPL. In one instance, the nest had hatched and the coyote dug under in attempt to reach the chicks. The majority of the nests that have been recognized by coyotes have been in the 7X/A-6 areas where the topography is relatively flat and open. It is also an area that is easily accessible by the former A Road and is heavily traveled by coyotes (as indicated by the abundance of coyote tracks). When the coyotes recognized that the exclosures contained WSPL nests or chicks, the WSPL biologists removed exclosures in this area to prevent any adverse effects to adult WSPL. Ravens have also been documented walking up to and circling exclosures with active nests inside at GRP. It is possible that the common ravens perched on the exclosures.

4.5 WESTERN SNOWY PLOVER EGGS AND CHICKS

The 47 WSPL nests located by biologists contained a total of 117 eggs, of which 64 hatched (55 percent) and 53 eggs were either depredated (33 percent) or abandoned (12 percent). The number of eggs that hatched in 2015 (64 eggs), is greater than the number of eggs that hatched in 2014 (54 eggs).

During the period between March and April 2015, few WSPL chicks and juveniles were observed. During WSPL surveys, chicks are not actively sought out to avoid separating attending adult birds from their chicks. Consequently, the number of chicks observed annually is presumed to be a conservative estimate. As has been observed historically, older chicks and juveniles were more commonly observed during the latter part of the WSPL season (May through August).

Throughout the 2015 WSPL nesting season, three deceased WSPL chicks were observed. On May 6th, 2015, a single deceased WSPL chick that was presumed to be from nest JFM04 (a single egg nest) was found partially consumed by a trapdoor spider (*Bothriocyrtum californicum*). It remains unknown if the trapdoor spider depredated or scavenged the WSPL chick. On May 8th, 2015, two deceased WSPL chicks that were presumed to be from nest SMS03 (a two egg nest) were located. It was presumed that these chicks succumbed to exposure, since the chicks had no superficial marks indicating predation and the area experienced some unseasonably cold weather preceding the observations. All deceased WSPL were collected by Ms. Kimberly Paradis and deposited in the collection at the SBNHM per the conditions of her USFWS and CDFW authorizations.

4.6 NEWLY RESTORED DISTURBANCE AREAS WITHIN WESTERN SNOWY PLOVER CRITICAL HABITAT

Environmental regulatory agency-approved remediation activities within WSPL breeding habitat are scheduled outside of the WSPL nesting season. During the first quarters of 2012 and 2013, a total of 1.28 acres of WSPL critical habitat was disturbed and restored at the A-8 Area, A-6 West Area, and the A Road. Historically, the A-8 Area has not had suitable WSPL nesting habitat and nests have not been found in that area. Following excavation activities of these sites, restoration efforts included seeding and installation of sand fence for sand stabilization. Additionally, straw plugs were added to A-6 West Area and the A Road. In 2014 and 2015, WSPL nested in the A-6 West Area (near the border between the Restored Dunes and the 7X Area).

From 2001 through 2015, WSPL utilized the Restoration Dunes area for nesting. Following remediation activities in 2001, these dunes were restored to suitable WSPL breeding habitat. Following remediation activities in 2012 and 2013, the A-6 Area within the Restored Dunes area was restored to provide suitable nesting habitat for WSPL. In 2015, 16 nests were placed within the Restoration Dunes (including the A-6 Area). Of the 16 nests in these areas, seven hatched successfully (44 percent), five were depredated (31 percent), and four were abandoned (25 percent). When these data are compared to 2014, there is a five percent decrease in nesting success in the Restoration Dunes. Additionally, when the 2015 data are compared to 2013, there is a 10 percent reduction in nesting success in the Restoration Dunes. Although there was a reduction in the nesting success in the Restoration Dunes, the overall nesting success (49 percent) at GRP was higher than in any year between 2008 and 2014.

4.7 TRESSPASS INCIDENTS WITHIN WESTERN SNOWY PLOVER HABITAT

In 2015, no WSPL or their nests were affected by trespassing. There were 20 instances of trespass within suitable WSPL habitat at GRP. Only one instance was observed by Padre biologist; the remaining 19 were in the form of footprints within the habitat. On April 22nd, 2015, a European tourist was observed traversing the Restored Dunes and 7X Area looking for a potential access route to U.S. Highway 1. Padre biologist Mr. Kenneth Gilliland spoke with the trespasser and indicated that he was in WSPL suitable habitat and no public access route through GRP exists. Mr. Gilliland escorted the trespasser back to the tidally influenced area.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 MONITORING STUDY CONCLUSIONS

The WSPL nests located at GRP in 2015 (n=47) were lower than the number of nests recorded in 2014 (n=50), but higher than those recorded in 2012 (n=40) and 2013 (n=45). The nest success percentage recorded in 2015 (49 percent), was higher than any annual success percentage recorded between 2008 and 2014 (range: 13-45 percent). The 47 located WSPL nests contained a total of 117 eggs, of which 64 hatched (55 percent) and 53 eggs were either depredated (33 percent) or abandoned (12 percent). The number of eggs that hatched in 2015 (64 eggs), is greater than the number of eggs that hatched in 2014 (54 eggs).

Twenty of the failed WSPL nests were confirmed depredations, and four were lost to abandonment. Common ravens were the most common WSPL nest predator in 2015, responsible for 45 percent of the confirmed depredations, and were suspected to have depredated an additional 4 percent of nests. In 2015, four nests were abandoned, and no nests were affected by tidal overrun. In 2015, 42 percent of the nests were depredated as compared to 2014 when 32 percent were depredated. This increase in the percentage of depredated nests recorded in 2015, is believed to be a result of relatively lower nest depredations caused by common ravens in 2014. In 2014, a single nest was confirmed to have been depredated by common raven.

Although relatively high common raven nest depredations occurred in 2015, the proactive approach to lethally remove a single common raven responsible for depredating WSPL nests contributed to a nest success percentage that is higher than any year at GRP recorded between 2008 and 2014.

Evidence suggesting that the common raven lethally removed from a location adjacent to GRP was the common raven responsible for depredating WSPL nests at GRP includes the following:

- No additional WSPL nest depredations caused by common raven in 2015 were documented following the removal of the common raven on June 1;
- The salient increase in the hatching success of WSPL following the removal;
- The locations of WSPL nests depredated by common raven relative to the location where the common raven was removed; and
- The relationship between the relatively smaller percentage of overall nests located on the Santa Maria River mouth sand spit relative to a higher percentage of common raven nest depredations recorded in this area.

5.2 RECOMMENDATIONS

During the 2015 WSPL nesting season, the Padre WSPL biologists coordinated with ODSVRA representatives, Santa Barbara County Rancho Guadalupe Dunes Preserve representatives, and USDA Wildlife Services representatives to effectively control WSPL nest depredations by common raven at the landscape-level. These activities were performed in compliance with project-specific USFWS Migratory Bird Depredation Permits intended to

improve WSPL nesting success. During the 2016 WSPL nesting season, Padre WSPL biologists will continue to coordinate with representatives from Santa Barbara County Rancho Guadalupe Dunes Preserve, Guadalupe-Nipomo Dunes Wildlife Refuge, and ODSVRA regarding common ravens activity observed in WSPL habitat.

If the Padre WSPL biologists deem it necessary, due to loss of WSPL nests or individuals in 2016, USDA Wildlife Services may be called to assist in the lethal removal of common ravens at GRP. USDA Wildlife Services perform predator management annually at ODSVRA, and it would be beneficial to continue to utilize their services at GRP since common ravens have large geographic ranges (Boarman and Brown 1999) and are capable of causing harm to multiple WSPL populations within their ranges.

In 2016, if eggs fail to hatch due to abandonment or unviability, they will be collected and transported to the SBMNH for the Museum's collection per the individual's USFWS Section 10a1a Endangered Species Act Recovery Permit(s). Any deceased WSPL will be reported immediately to USFWS and either sent to SBMNH or California Animal Health and Food Safety Laboratory (CAHFS) depending on the recommendations of the USFWS.

To ensure that site characterization, oil field abandonment, remediation, infrastructure removal, or other project-related activities don't significantly affect the WSPL or suitable WSPL nesting habitat at GRP, monitoring activities in 2016 will be consistent with past WSPL nesting season monitoring regimes. The intent of the continued effort at GRP is to monitor the status of all life stages of WSPL and to adaptively manage the population and habitat at GRP to increase the productivity of the species.

Prior to the 2016 season, all public notification signs within suitable WSPL habitat should be checked for wear and replaced if needed. Signs present along the beach should continue to be outfitted with Nixalite© bird spikes to discourage perching by any potential WSPL predators (e.g., raptors and common ravens).

6.0 REFERENCES

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- Dinsmore, S.J., D.J. Lauten, K.A. Castelein, E.P. Gaines., and M.A. Stern. 2014. Predator exclosures, predator removal, and habitat improvement increase nest success of snowy plovers in Oregon, USA. *The Condor*. 116: 619-628.
- Neuman, K.K., G.W. Page, L.E. Stenzel, J.C. Warriner, and J.S. Warriner. 2004. Effect of mammalian predator management on Snowy Plover breeding success. *Waterbirds* 27 :257-263.

Personal communications

- Little, Stephanie, Environmental Scientist at Oceano Dunes State Vehicular Recreation Area (ODSVRA). 2015. Frequent personal communication regarding nest depredation and predator sightings on ODSVRA.
- Kelly, Melissa, Assistant Naturalist at Rancho Guadalupe Dunes Preserve. 2015. Personal communication regarding nest depredations and predator sightings on the Rancho Guadalupe Dunes Preserve.
- Oceano Dunes State Vehicular Recreation Area State Park. 2014. Frequent personal communication with various plover biologists and USDA Wildlife Service representatives regarding depredations within the region.

APPENDIX A

Table A-1: Survey Dates and Western Snowy Plover Numbers in 2015

Table A-2: Color Banded Western Snowy Plovers Recorded in 2015

Table A-3: Western Snowy Plover Nests Located in 2015

Table A-4: Potential Western Snowy Plover Predator Observations within Western Snowy Plover Habitat by Month in 2015

Table A-1. Survey Dates and Western Snowy Plover Numbers in 2015

Survey Date	Survey Crew	Total # of plovers
3/2/15	KG, JM	9
3/4/15	KG, SS	10
3/6/15	SS, SG	6
3/9/15	KG, JM	6
3/11/15	KG, SS	12
3/13/15	SS, KG, SG	11
3/16/15	KG, JM	17
3/18/15	KG, SS	16
3/20/15	SS, AB	22
3/23/15	KG, AB	17
3/25/15	KG, SS	15
3/27/15	SS, AB	8
3/30/15	KG, JM	19
4/1/15	SS, KG	19
4/3/15	SS, SG	27
4/6/15	KG, JM	24
4/8/15	SS, KG	26
4/10/15	SS, AB	29
4/13/15	KG, AB	31
4/15/15	SS, KG	24
4/17/15	SS, SG	18
4/20/15	KG, SG	33
4/22/15	SS, KG	27
4/24/15	SS, OC	18
4/27/15	SS, SG	21
4/29/15	SS, SG	17
5/1/15	SS, AB	37
5/5/15	KP, AB	25
5/6/15	KP, SS	15
5/8/15	KP, SS	39
5/11/15	KP, JM	3
5/12/15	KP, JM	24
5/13/15	KP, SS	33
5/15/15	KP, AB	31
5/18/15	KP, AB	28
5/20/15	KP, SS	35
5/22/15	KP, SS	19
5/26/15	KP, KG	17
5/27/15	KP, SS	14
5/29/15	KP, SS	14
6/1/15	KP, JM	18
6/3/15	KP, JM	26
6/5/15	KP, JL	18
6/8/15	KP, SG	27

Survey Date	Survey Crew	Total # of plovers
6/10/15	KP, JL	11
6/12/15	KP, AB	32
6/15/15	KP, KG	24
6/17/15	KP, KG	12
6/19/15	KP, AB	26
6/22/15	KP, JM	10
6/24/15	KP, SS	19
6/26/15	SS, AB	34
6/29/15	KP, JM	19
7/2/15	KP, JM	27
7/3/15	SS, AB	26
7/6/15	KP, KG	25
7/8/15	KP, KG	35
7/10/15	SS, SG	30
7/13/15	KG, JM	33
7/15/15	KP, KG	29
7/17/15	SS, SG	23
7/20/15	KP, KG	21
7/22/15	KP, KG	15
7/24/15	SS, AB	19
7/27/15	SS, KG	13
7/29/15	KG, JM	19
7/31/15	KG, SG	17
8/10/15	KP, KG	N/A
8/12/15	KG, CR	46
8/17/15	KP, KG	29
8/19/15	KP., KG	8
8/25/15	KG, CR	42
8/27/15	KP, KG	41
9/1/15	KG, CR	11
9/2/15	KP	14
9/3/15	KG, KP	31
9/8/15	KG, KP	36
9/10/15	KG, CR	25
9/15/15	KG, KP	14
Average number of western snowy plovers observed per survey		22

Table A-2. Color Banded Western Snowy Plovers Recorded in 2015

Bands Left Leg	Bands Right Leg	Sex	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total times Obs.	Confirmed Nesting at GRP	Site and Year Banded
AN	NA	J								1	1		VAFB 15
AN	NY	J								1	1		VAFB 15
AN	RW	F		7	3						10		Vandenberg Surf North 14
AP	GR	M			2	2					4		Monterey Bay Aquarium 14
BB	GY	M		3	8	6	1				18	Yes	ODSVRA 06
BB	LY	F					1				1		ODSVRA 10
BB	OW	J									1		ODSVRA 15
BB	OY	J								1	3		ODSVRA 15
BB	PG	F									1		ODSVRA 13 or 14
BB	RW	J							1		1		ODSVRA 15
BB	WG	F		4	7						11	Yes	ODSVRA 10 or 13
BB	YG	F			1						3		ODSVRA 11 or 15
BY	RR	M			1(F) 1(M)	3	7				11		Salinas NWR 11
GA	PW	J							1	1	2		ODSVRA 15
GG	AB	F									1		ODSVRA 07
GG	AY	M			1						1		ODSVRA 12 or 13
GG	GR	M				4					4		ODSVRA 11 or 13
GG	GW	M									2		ODSVRA 14
GG	LY	F		6	7	2				2	18	Yes	ODSVRA 12
GG	RW	F			1						1		ODSVRA 14
GG	WB	M			1						1		ODSVRA 11 or 13
GG	WG	F			1						1		ODSVRA 14
GG	WR	M			2						2		ODSVRA 14
GO	WO	J							1		1		Fort Ord, OR 15
NB	BB	J									1		VAFB 15
NO	PB	F									1		VAFB 14
NO	PR	J							1		1		VAFB 15
NW	GR	J							1		1		VAFB 15
NW	PW	J									1		VAFB 15
NW	WG	F					1		1		2		VAFB 14
OO	YW	F							1		1		Salinas NWR 10
PG	AB	M		1	2		1				4		ODSVRA 12 or 14
PG	AG	F		6	5	6	3				20	Yes	ODSVRA 12 or 14
PG	BY	J							1		1		ODSVRA 15
PG	GR	F		1							1		ODSVRA 11 or 14
PG	PY	M				7	7				14		ODSVRA 14
PG	RY	M			2						6		ODSVRA 14
PG	WG	J							1	2	3		ODSVRA 15
PV	AB	U									1		ODSVRA 14
PV	BY	J							1		1		ODSVRA 15
PV	GW	J							1		1		ODSVRA 15

Bands Left Leg	Bands Right Leg	Sex	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Total times Obs.	Confirmed Nesting at GRP	Site and Year Banded
PV	WY	J								1	1		ODSVRA 15
RO	AR	M			1						1		Salinas NWR 14
RR	BY	M			1						1		ODSVRA 10
RR	GY	M			1						1		ODSVRA 12
RR	WG	M		5	7		4				16		ODSVRA 12
S		M				1					1		Unk
V	GWG	F									1		VAFB 14
VG	GO	J							1		1		Monterey 15
VG	OY	J								2	2		ODSVR15
VG	VW	M			4	2	4			1	14	Yes	ODSVRA 11 or 13
VG	VY	U									1		ODSVRA 09
VV	AW	U									1		ODSVRA 13 or 14
VV	BW	J									2		ODSVRA 15
VV	GY	U								1	1		ODSVRA 14
VV	OY	J								2	2		ODSVRA 15
VV	RY	J								1	1		ODSVRA 15
VV	WG	F		1	8	2	2			1	14	Yes	ODSVRA 12
VV	WR	U									1		ODSVRA 11
VW	WB	F									1		Humboldt 11
YG	GO	J							1		1		Monterey 15
YO	GB	J							1		1		Marina SB 15
YR	GO	J							1		1		Monterey 15

Color band codes:

A=aqua, B= blue, G= green, K=black L=lime, N=brown, O=orange P=pink, R=red, V=violet, W=white, Y=yellow

Years are abbreviated by the last two numbers

Table A-3. Western Snowy Plover Nests Located in 2015

Nest #	Date	Initial # eggs	Projected Hatch date	End	Fate	Location	Notes
KLG01	3.25.15	3	4.23.15	4.20.15	Coyote	7X, just north of ORV trail	Coyote tracks
SMS02	3.25.15	3	4.26.15	5.1.15	Hatch	Northern Territory: far north, just south of large well	Two eggs hatched, one unviable egg collected
SMS03	3.27.15	2	4.29.15	5.6.15	Hatch	SS: mid-section eastern side, closer to yellow sand verbena	Two eggs hatched. 5/8/15 found the two chicks dead after very cold weather early that week.
JFM04	3.30.15	3	4.29.15	5.4.15	Hatch	SS: approx. 200' from fence, open sand area	One egg hatched, chick found dead two days later, leg eaten by possible trap door spider. Collected chick and two eggs.
SMS05	4.3.15	3	5.7.15	5.8.15	Hatch	RD: above 5XMW-33 well in gravel on hummock	Two chicks seen hatched in nest bowl. All three eggs hatched.
SMS06	4.3.15	3	5.2.15	5.8.15	Hatch	RD: between markers 13 & 14 below driftwood shelf	Three chicks seen running on the beach with male.
JFM07	4.6.15	2	5.2.15	5.20.15	Unknown predator	SS: south of fence on beach near asphalt field	Unviable, eggs look shiny and spread out but the adult continues to incubate. Eggs gone and no sign of birds, tracks, etc. Possible the raven took the eggs.
JFM08	4.6.15	1		4.13.15	Abandoned	RD: between markers 16 & 17 in driftwood shelf	One egg abandoned
JFM09	4.6.15	3	5.7.15	5.8.15	Hatch	8X: on red rock/asphalt cliff southeast side of 8X	Pips seen in nest, three chicks seen with adults.
JFM10	4.6.15	3	5.7.15	5.8.15	Hatch	NT: just north of 8X in driftwood shelf	One chick hatched in nest bowl with two eggs. All three eggs hatched.
SMS11	4.10.15	1		4.27.15	Abandoned	RD: north of fence in gravel patch above 3X-5 well	Nest bowl not attended, wind-blown sand around egg
AJB12	4.10.15	2	5.12.15	5.13.15	Hatch	RD: between markers 17 & 18 below shelf next to stick	One chick was seen in nest bowl. One egg was later collected.
AJB13	4.10.15	3	5.10.15	5.12.15	Hatch	NT: near northern boundary below shelf, in razor clam shell patch	All three eggs hatched, pips seen in nest.
AJB14	4.13.15	3	5.15.15	5.15.15	Hatch	7X: north of ORV trail in gravel patch near B58-11 well	Two chicks hatched, third egg was pipped and hatching.

Table A-3. Western Snowy Plover Nests Located in 2015

Nest #	Date	Initial # eggs	Projected Hatch date	End	Fate	Location	Notes
SMS15	4.15.15	3	5.19.15	5.18.15	Hatch	7X below sand fence in gravel patch, 30' southeast of A-6-9 well	All three chicks hatched and were running around with adult ten feet from the nest.
KLG16	4.22.15	3	5.25.15	5.12.15	Abandoned	RD: between well BEACH MW-13 and marker 8	Skunk scavenged one egg and the nest was no longer tended to. Remaining two eggs abandoned and collected.
SHG17	4.29.15	3	6.2.15	5.8.15	Coyote	SS: Just north of southern boundary and 1 st beach sign. Between first beach sign and small hummock in wrackline.	Coyote tracks seen walking up to the nest, yolk in nest bowl.
KKP18	5.6.15	3	6.2.15	5.12.15	Unknown predator	RD: Between marker 7 and 8. South of sign.	Found after heavy winds with no eggs. This nest was found at three eggs. No pips found.
KKP19	5.12.15	2	6.11.15	5.22.15	Raven	7X: west of well	Found with raven tracks all around nest.
JFM20	5.12.15	3	6.7.15	5.26.15	Raven	7X: Lower in habitat, far south of 7x	Nest found dug out, no shell or egg yolk. Coyote tracks walking by but not at nest. Raven track near nest, difficult to see.
SMS21	5.20.15	3	6.16.15	5.22.15	Raven	Sandspit: Just south of the first sign.	Found with raven tracks around the nest.
KKP22	5.20.15	3	6.16.15	5.27.15	Raven	RD: Just north of the property fence, directly west of the first sign.	Watched raven land at nest, hop away and eat eggs. Egg shell and tracks seen 10 feet away from nest.
KKP23	5.13.15	2		5.18.15	Raven	Sandspit: North of first sign and in line with back sign.	All eggs were gone, raven tracks and coyote around the nest. Coyote did not go right up to nest.
KKP24	5.22.15			5.27.15	Raven	RD: Five feet west from the 19 dune marker.	Raven tracks landed near nest and walked up to nest bowl.
KKP25	5.15.15	1		5.18.15	Raven	NT: North of 8x and south of first large log.	Gone with raven tracks around the nest bowl. No yolk or shell.
KKP26	5.26.15	1		5.26.15	Raven	SS: South of the fence.	Observed two ravens flying over sandspit and landing at nest. Picked up
KKP27	5.26.15	3	6.23.15	6.24.15	Hatch	7X: West of the large well that is north of the 7x trail.	Hatched three eggs.
KKP28	5.27.15	?		5.27.15	Raven	NT: Back dunes south of sign and pole.	Found with many plover tracks up to nest, female in area, raven tracks landing at nest. No eggs or shell seen.

Table A-3. Western Snowy Plover Nests Located in 2015

Nest #	Date	Initial # eggs	Projected Hatch date	End	Fate	Location	Notes
SMS29	5.29.15	3	6.28.15	6.29.15	Hatch	NT: East of large well in back dunes.	Three pips found in nest bowl.
SMS30	5.29.15	3	6.26.15	6.17.15	Hatch	RD: Back dunes between marker 2 and 3.	All three eggs hatched.
KKP31	6.8.15	1	7.3.15	7.8.15	Gull	SS: South of the fence.	On the day it was projected to hatch, no pips were found and gull tracks were at the nest.
KKP32	6.8.15	1	7.3.15	7.6.15	Hatch	RD: Just north of marker 8, east of large logs.	Three chicks hatched, two pips seen.
SHG33	6.8.15	1		6.24.15	Abandoned	RD: West of the second marker 8.	One egg looks active. Slowly became covered with sand. Was it an abandoned egg or a dropped egg?
KKP34	6.8.15	3	7.5.15	7.3.15	Hatch	NT: North of the first sign past 8X, back dunes.	Adults in area, broken wing.
KKP35	6.8.15	3	7.5.15	6.12.15	Coyote	NT: South of the last northern sign, back dunes.	Coyote tracks walking to nest.
KKP36	6.12.15	1	7.14.15	7.8.15	Hatch	7: Just north of the 7x road.	Two pips seen in nest and chicks on the beach nearby.
AJB37	6.12.15	3	7.9.15	7.6.15	Hatch	NT: North of 8X.	Three chicks seen in the nest bowl.
KKP38	6.12.15	2	7.9.15	7.10.15	Hatch	NT: North of 8x in a pile of bones, south of first sign.	Two pips seen in nest.
KLG39	6.15.15	2	7.14.15	7.6.15	Unknown predator	7X: North of the northern well, back dunes.	Small coyote tracks seen near nest and one egg missing, two days later the eggs were both gone, no tracks, egg or shell.
KLG40	6.15.15	1	7.16.15	7.15.15	Hatch	NT: North east of the 8A-11 well.	Two chicks seen in nest.
KLG41	6.22.15	3	7.21.15	7.2.15	Gull	SS: South west of the last sign, low in habitat	Gull tracks landing at nest and walking away.
SMS42	6.24.15	3	7.23.15	7.2.15	Hatch	RD: East of marker 15 down low.	Pips found in nest bowl.
JFM43	7.2.15	3	7.29.15	7.24.15	Hatch	7X: North of the 7x ORV trail, low in habitat	All three hatched.

Table A-3. Western Snowy Plover Nests Located in 2015

Nest #	Date	Initial # eggs	Projected Hatch date	End	Fate	Location	Notes
KKP44	7.8.15	2	8.4.15	8.5.15	Hatch	RD: Directly west of marker 2.	One egg hatched and the adults were doing a broken wing display. The second egg was found depredated by a coyote a few days later.
SHG45	7.10.15	2		7.17.15	Unknown predator	RD: Directly west of marker 4.	Unknown predator, gull tracks along with mammalian.
KKP46	7.15.15	2	8.11.15	8.5.15	Unknown predator	NT: 20 feet south of the Refuge property.	Unknown predator tracks near the nest. Not able to identify, no egg shell or yolk, no pips.
KKP47	7.22.15	2	8.20.15	8.10.15	Coyote	RD: below t-post between marker 11 and 12.	All eggs gone and small coyote tracks all around nest.
Color band codes: A=aqua, B= blue, G= green, K=black L=lime, N=brown, O=orange P=pink, R=red, V=violet, W=white, Y=yellow Location territories:							

Table A-4. Potential Western Snowy Plover Predator Observations within Western Snowy Plover Habitat by Month in 2015

Potential WSPL Predator	March	Apr	May	Jun	Jul	Aug	Sept*	Total
Northern harrier	2	0	0	0	0	3	0	5
Red-tailed hawk	1	0	0	0	1	0	0	2
Peregrine falcon	0	1	0	0	1	0	3	4
Prairie Falcon	0	1	0	0	0	0	0	1
Common raven	0	0	5	0	0	0	0	5
American kestrel	0	0	0	0	1	0	1	2
Skunk (tracks)	3	7	4	0	4	1	1	20
Great-horned owl (tracks)	1	0	0	0	0	0	0	1
Merlin	0	1	0	0	0	0	0	1
American black bear (tracks)	0	1	0	0	0	0	0	1
Virginia opossum	2	0	0	0	0	0	0	2
Gull, coyote, feral pig, and raccoon	Tracks from these potential predators were observed in snowy plover nesting habitat during all surveys.							N/A
Total	9	11	9	0	7	4	5	44

*Note: Surveys in September occur annually between September 1st and September 15th.