Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve, Guadalupe CA

2018 Final Report

Prepared for:

The County of Santa Barbara
Santa Barbara, California

Prepared by:

Thomas E. Applegate and Sandra J. Schultz
Wildwing Consulting
Carlsbad, CA 92011

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Summary

This report summarizes the 2018 Western snowy plover (snowy plover, plover) and California least tern (least tern, tern) breeding season monitoring on Rancho Guadalupe Dunes Preserve (RGDP). RGDP is owned and operated by the County of Santa Barbara (County). Monitoring was conducted by Thomas Applegate (Wildwing Recovery Permit # TE-823990-4) under contract to the County of Santa Barbara. This was the twelfth season Wildwing conducted the monitoring at RGDP.

Sixty-two plover surveys were conducted between March 5 and August 27, 2018. The first known snowy plover nest was initiated on approximately March 25 and the last on July 12. Fifty-nine nests were found, and the fates of 50 were determined. Thirty nests hatched at least 1 chick, 16 were lost to predators, 2 were abandoned, 2 were destroyed by unknown causes, and the fates of 9 nests could not be determined. Seventy-five chicks hatched from the 30 successful nests. The first known hatch occurred on approximately May 3 and the last on July 31. Color banding of chicks did not occur so chick survival rates could not be determined.

Least tern monitoring was conducted concurrently with snowy plover monitoring during the period breeding terns would be expected to be present. Terns were first observed on May 14 when 2 were seen flying over breeding habitat. The first known tern nest was located on June 20 and the last on July 15. A total of 11 nests were found, and the fates of 7 were determined. Five hatched 2 chicks each, for a total of 10 chicks for the season. Two nests were destroyed by coyotes, and the fates of the remaining 4 nests could not be determined. Of the 10 chicks hatched, 4 were confirmed to have fledged during the first half of August.

Introduction

Western snowy plovers (*Charadrius nivosus nivosus*) are small shorebirds measuring about 6 inches in length with pale brown to grey upper parts, a white belly and dark patches on the head and shoulders. The Pacific coast population nests near tidal waters of the Pacific Ocean on sand beaches and dunes, adjacent bays, and coastal river bars. The current known breeding range is from Damon Point, Washington to Bahia Magdalena, Baja California, Mexico. Snowy plovers that nest inland at alkaline lakes, ponds and river bars in the western states are not considered part of the coast population. The U.S. Fish and Wildlife Service (USFWS) designated the Pacific Coast population as "Threatened" on March 5, 1993 (Federal Register 58(42)12864-12874) under provisions of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

California least terns (*Sterna antillarum brownii*) are grey, white and black, and measure about 9 inches in length. They are the smallest North American tern. Least terns utilize suitable breeding habitat from Baja California, Mexico to the San Francisco Bay area in California. Nesting occurs on open sand, sand-shell beaches, and sand-fill sites where little vegetation exists. Breeding colonies are typically located within close proximity to waterways where birds forage for small fish. Least terns tolerate a considerable range in colony sizes. Some colonies have hundreds of birds, while some pairs nest alone or with a few other pairs. The species was given state and federal endangered status in 1970 (Federal Register 35(106)8491-8498) under the provisions of the Endangered Species Conservation Act of 1969 (16 USC 851 *et seq*.). Least terns are present in

their breeding areas from late May through August and are absent the remainder of the year.

RGDP contains suitable breeding habitat for both snowy plovers and least terns. The site was monitored in 2001, and from 2003 through 2018. Prior to 2001 some non-intensive intermittent monitoring occurred, but no comparable data resulted from those efforts. Plovers have been documented nesting and wintering yearly and terns have nested 7 seasons since monitoring began. This report compares available and applicable yearly data collected since 2001 with the 2018 breeding season data (Applegate and Schultz 2003, 2004, 2007 through 2012, 2016 through 2018, Kelly 2014, 2015, Kelly and Applegate 2013, SRS 2006, Sandoval 2005, Persons 2001).

Study Area

RGDP encompasses approximately 592 acres of dune, scrub and riparian habitat immediately south of the Santa Maria River in northern Santa Barbara County. RGDP borders the Pacific Ocean for approximately 1.3 miles, extends inland up to 1.4 miles, and is part of the 18 mile long Guadalupe-Nipomo Dunes Complex. Suitable plover and tern breeding habitat extends north of RGDP through the Guadalupe Restoration Project, Guadalupe-Nipomo Dunes National Wildlife Refuge, and Oceano Dunes State Vehicular Recreation Area (Oceano Dunes SVRA). South of RGDP, contiguous breeding habitat exists on Gordon Sand and the Leroy Trust properties.

The majority of RGDP is suitable breeding habitat for snowy plovers and least terns. Breeding habitat consists of a coastal beach strand bordered by open sand sheets with partially vegetated foredunes, backdunes, manmade gravel flats, sections of old asphalt road and pad, and seasonal mudflats along the Santa Maria River. Beaches have numerous logs, small plant debris, kelp, rocks and shells of varying sizes, and human litter. The remainder of the habitat is coastal dune scrub with a riparian corridor. An access road on the north side of the property leads to a parking area near the beach. Strong westerly and northwesterly winds of 25 to 35 miles per hour are common in spring and early summer, but generally decrease as the season progresses. Heavy winter surf generally erodes and narrows the beach, but sand returns and beaches widen in the summer with smaller surf conditions.

Vegetation on RGDP is relatively stable, and the quality of tern and plover breeding habitat is high. Dominant native plant species are sand verbena (*Abronia latifolia*, *A. maritima*), beach morning glory (*Calystegia soldanella*), beach saltbrush (*Atriplex leucophylla*), and beach bur (*Ambrosia chamissonis*). Dominant non-native species are sea rocket (*Cakile maritima*) and iceplant (sea fig, *Carpobrotus chilensis*). European beachgrass (*Ammophila arenaria*), a problematic invasive found on the northern portion of the Dunes Complex, is absent on RGDP.

Methods

Snowy Plovers

Snowy plover monitoring was conducted in suitable breeding habitat from March 5 to August 27, 2018. A total of 62 field surveys were conducted on foot. Seven field surveys were conducted in

March, 9 in April, 13 in May, 14 in June, 12 in July, and 7 in August. In an attempt to avoid frequent afternoon high winds, most surveys were conducted during morning hours. Late in the season when high winds became less frequent some afternoon and evening surveys were conducted.

An attempt was made to locate all nests. “Nests” include scrapes containing 1 or more eggs, and empty scrapes with convincing evidence that one or more eggs had been present. Empty scrapes without evidence of eggs or chicks, and single "dumped" eggs are not counted as nests. Nests were consecutively numbered and pertinent information was recorded. Regular subsequent visits to each nest were made to monitor its status. Nests were not physically marked: their locations were recorded using existing landmarks, and locations were recorded using GPS equipment in August.

Nest fates were determined by evidence at the nest sites. Those that disappeared before their expected hatch date were examined for the probable cause of loss. Empty nests near or past their expected hatch date were checked for chicks in the vicinity of the nest, displaying adults, eggshell pips in the nest, a flattened nest area, or for evidence of predators or other causes of loss. Hatching dates were estimated by known or estimated egg laying dates, and were projected 31 days after clutch initiation (Warriner et.al., 1986). Eggs were not floated, chicks were not banded, and nest exclosures were not used.

A snowy plover census was conducted on May 22 as part of a coordinated range-wide survey. This yearly census is coordinated by the U.S. Fish and Wildlife Service and occurs when the population is expected to be stable and consist primarily of breeding plovers. Census data includes age, sex, location, and the number and size of chicks. Each plover was checked for color-bands.

California Least Terns

Least tern monitoring was conducted concurrently with snowy plover monitoring. Searches for least terns began in mid May and extended into August. When least terns were observed, their number, location and activities were recorded.

To minimize disturbance, terns were monitored as a Type 3 colony: monitoring was conducted from a distance and birds were not approached during courtship and nest initiation. Most monitoring was done from 4 specific locations using binoculars and a spotting scope. When nests were established occasional walk through surveys were made to determine the number of eggs in nests and nest status. Broods were monitored from a distance from various locations.

Results

Snowy Plovers

Nesting Population

The number of nesting snowy plovers on RGDP was estimated using active nest data for bi-weekly

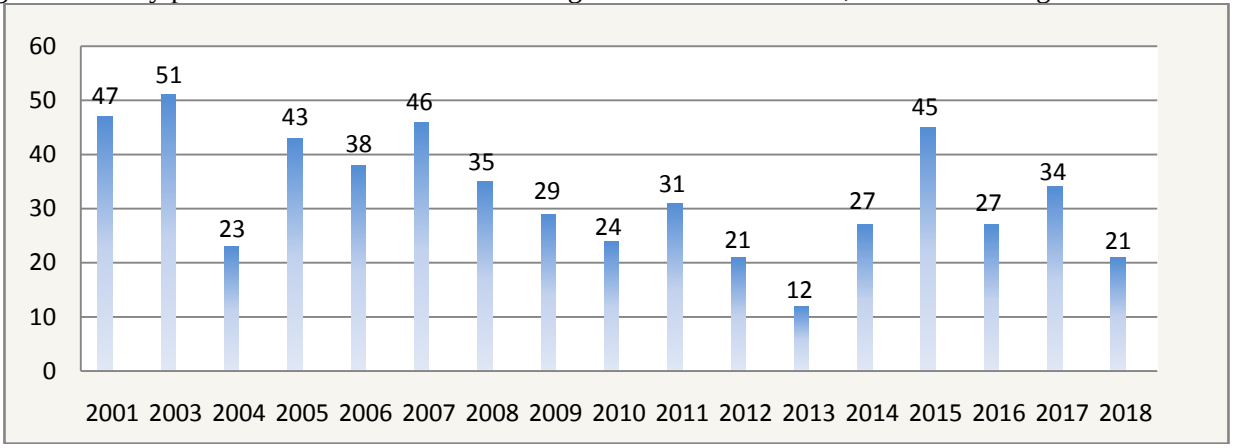
population estimates (Table 1). The estimate includes only nesting plovers and does not include birds that were rearing broods or in the process of nest initiations. Nesting peaked in late June with 27 pairs (54 plovers). Topography and wide spread habitat use precludes a visual census of all on site plovers.

Table 1. Estimated bi-weekly nesting pairs during the 2018 season.

March		**April**		**May**		**June**		**July**		**August**	
Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late
0	1	15	21	23	21	26	27	16	4	1	0

On May 22 a snowy plover population census was conducted as part of an annual coordinated range-wide survey. Beach and backdune habitats were surveyed. Seventeen adult plovers and 4 chicks were observed (Figure 1). Eight of the adults were males, and 6 were females. The sex of 3 adults was not determined. All but 4 plovers were checked for color bands. One male plover was color banded NW:YR (brown over white on the right leg and yellow over red on the left leg). The number of plovers observed on these censuses is not considered the total number utilizing habitat on those dates, as plovers may be hidden from view, temporarily leave the site, or move during the survey. Nest data shows that approximately 17 adult pairs were nesting on RGDP at the time of the census and 2 nests had hatched a week prior indicating that at least 38 plovers were utilizing RGDP at the time of the census.

Figure 1. Snowy plovers counted on the RGDP range-wide census in 2001, and 2003 through 2018.



Nesting and Productivity

Fifty-nine plover nests were found on RGDP during the season (Appendix 1, Figure 2). The fates of 50 were determined. Thirty nests hatched at least 1 chick, 16 were lost to predators, 2 were destroyed by unknown causes, 2 were abandoned, and the fates of the remaining 9 nests were not determined (Table 2). The number of nests and their fates from 2001 through 2018 are compared in Appendix 2.

Figure 2. Number of snowy plover nests on RGDP in 2001, and 2003 through 2018.

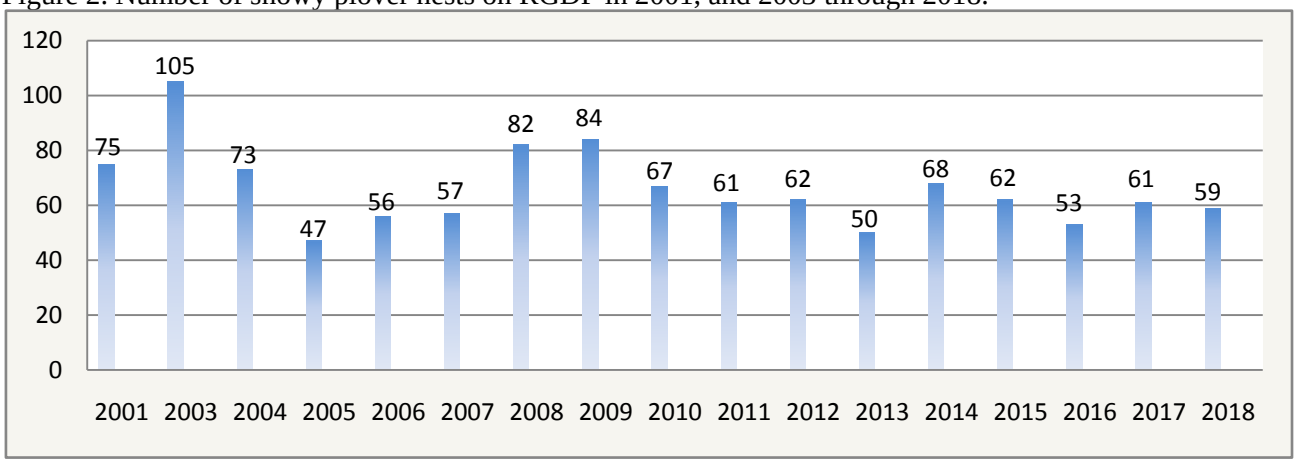


Table 2. The number and fates of snowy plover nests in 2018.

Year	Total Nests	Hatch	Predator	Dst. Unk	Aband.	Unk. Fate
2018	59	30	16	2	2	9
		51%	27%	3%	3%	15%

Hatch - hatched one or more eggs, Predator - destroyed by predator, Dst.Unk. - destroyed, cause undetermined, Aband. - abandoned before hatch, Unk. Fate - unknown, disappeared without evidence of hatch or loss.

A total of 1,122 snowy plover nests have been documented on RGDP over the past 17 monitored breeding seasons (Appendix 2). Of these, 468 hatched, resulting in an overall hatch rate of 42%. At least 1,109 chicks hatched during the 16 reported years.

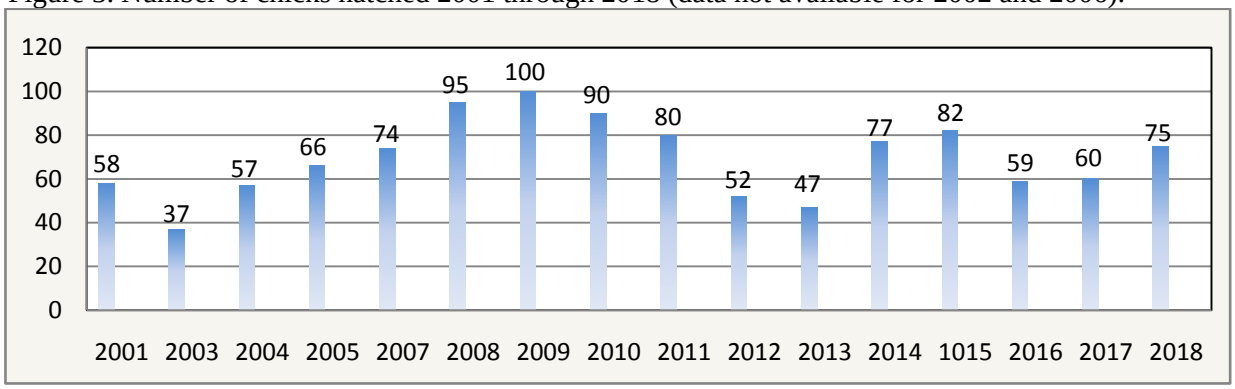
Completion status for 53 of the 59 2018 nests was determined. Forty-nine had 3-egg clutches, 3 had 2-egg clutches and 1 was a single egg nest resulting in a total of 154 eggs and an average of 2.91 eggs per clutch (Table 3). Completion status of 6 nests was not determined. Two of those were destroyed by predators before status could be confirmed, 2 were found after they had been destroyed by predators, 1 was found after hatch within the least tern colony, and 1 nest was located near a tern nest so was not checked. Seventy-five chicks hatched from the 53 successful nests (Figure 3).

Table 3. Mean clutch size 2003 through 2018.*

Year	2003	2004	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Mean	2.99	2.90	2.96	2.93	2.94	2.88	2.93	2.89	2.90	2.98	2.98	2.91	2.91	2.91

*Data not available for 2001, 2005, and 2006.

Figure 3. Number of chicks hatched 2001 through 2018 (data not available for 2002 and 2006).



Estimated or actual initiation dates were determined for all 59 nests. The estimated number of monthly nest initiations compared with available data from previous years is shown in Table 4.

Table 4. Nest initiations by month in 2003, 2004, and 2007 through 2018.*

Month	Number of Nests													
	2003	2004	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
March	7	0	0	4	4	1	3	0	0	3	3	0	10	1
April	15	20	17	11	24	10	22	20	7	23	26	14	13	21
May	23	21	18	23	15	23	14	13	13	15	16	15	13	17
June	33	21	13	19	31	23	15	20	23	19	14	21	15	16
July	11	6	8	22	10	10	7	9	7	7	3	3	7	4
August	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Total	89	68	56	79	84	67	61	62	50	68	62	53	58	59

* Data not available for 2001, 2002, 2005, and 2006. Nests with estimated or known initiation dates only.

Fledging and Brood Movement

The earliest possible fledge date for 2018 plover chicks was approximately May 30 and the last fledging was expected to occur about August 27. Because color banding of chicks did not occur, specific brood movement and chick survival and fledging rates could not be determined. Broods are evasive by nature and were not often seen during the breeding season but indications of brood presence were common. Brood activity was most common in areas which offered more cover than open sand expanses where low dunes dominated by beach bur, sand verbena and beach morning glory was present. With the establishment of the tern colony many broods moved into or just south of the colony.

Banded Plovers

Four color banded plovers nested on RGDP in 2018. One male, banded AG:AY hatched 2 chicks from 3 eggs. This plover was banded at Moss Landing Salt Ponds in 2011. Another male banded NW:YR hatched 3 chicks from 3 eggs and was banded on Vandenberg AFB in 2016. A male

banded PV:AW hatched 2 chicks from 3 eggs and was banded at Oceano Dunes SVRA in 2016 or 2017 A female banded PV:YY hatched 2 chicks from 3 eggs and was banded at Oceano Dunes SVRA in 2015 or 2017.

Predators

Predators destroyed at least 16 (27%) of the 59 nests this season (Table 6). Coyotes were the main predator (11 nests). Gulls of undetermined species destroyed 2 nests and 3 nests were destroyed by unknown predator species. Coyotes were observed in breeding habitat on only 1 survey but their tracks were observed on all surveys. In early July, 2 sea lion carcasses washed up on the beach south of the parking area, and coyote presence increased through July due to scavenging activities. Six of the 11 nests lost to coyotes were lost in July when the carcasses were on the beach.

Table 6. Number of snowy plover nests lost to predators on RGDP in 2001, and 2003 through 2018.

Year	Raven	Coyote	Gull	Crow	Harrier	Skunk	Feral Pig	Great Horned Owl	Avian Pred.	Corvid Species	Unk. Pred. Species	Total Nests
2018	0	11	2	0	0	0	0	0	0	0	3	16
2017	6	1	8	0	0	0	0	0	3	0	0	18
2016	0	3	11	0	0	1	1	0	2	0	3	21
2015	12	0	0	0	0	0	0	0	0	0	14	26
2014	7	1	0	0	0	0	0	2	1	0	12	23
2013	8	1	0	0	0	0	0	0	0	0	2	11
2012	19	1	0	0	0	0	0	0	3	0	4	27
2011	11	0	0	1	0	0	0	0	6	0	2	20
2010	1	6	0	0	1	0	0	0	4	2	10	24
2009	0	7	1	2	0	0	0	0	9	0	8	27
2008	0	8	4	0	0	0	0	0	0	0	14	26
2007	6	10	1	0	0	0	0	0	0	0	5	22
2006	0	10	1	0	0	0	0	0	0	0	5	16
2005	0	4	2	0	0	0	0	0	0	0	2	8
2004	20	7	0	0	0	0	0	0	0	0	9	36
2003	16	14	4	2	0	0	0	0	0	0	28	64
2001	0	0	0	4	0	0	0	0	0	0	14	18
Total	106	84	34	9	1	1	1	2	28	2	135	403

A single peregrine falcon was seen on 5 occasions sitting on dunes or flying in the most active brood rearing area which was in and just south of the least tern colony. Four of the sightings were in late July and early August and brood activity declined dramatically in this period. Northern harriers were seen near active brood rearing areas on 3 occasions, once being chased from the site by a peregrine. A single raven was seen on April 30 flying near the parking lot. It left the site and flew north. This was the only raven sighting of the season. Feral pigs occasionally entered breeding habitat from the Santa Maria River margins. They typically roamed the beach and foredune areas where they rooted up and ate sand verbena and rooted around kelp. Evidence of pigs was reduced compared to previous breeding seasons.

Other potential plover and nest predators observed visually or by tracks this season were American kestrel (*Falco sparverius*), California gull (*Larus californicus*), Cooper's hawk (*Accipiter cooperii), g*reat blue heron (*Ardea herodius*), *g*reat horned owl (*Bubo virginianus*), Heermann's gull (*Larus heermanni*), raccoon (*Procyon lotor*), red-tailed hawk (*Buteo jamaicensis*), ring-billed

gull (*Larus delawarensis*), western gull (*Larus occidentalis*) and whimbrel (*Numenius phaeopus*).

Least Terns

Least terns were observed between May 14 and August 27, and were present during 37 surveys (Table 7). Accurate counts of terns were difficult due to frequent fog, wind, and their erratic flight. When an accurate count was not possible no number was recorded.

Table 7. The number of least terns observed during surveys in 2018.

Date	Adults	Chicks	Fledglings
5/14/18	2		
5/16/18	2		
5/22/18	2		
5/24/18	2		
5/28/18	2		
5/29/18	6		
5/30/18	6		
6/4/18	1		
6/6/18	4		
6/7/18	1		
6/8/18	2		
6/11/18	1		
6/12/18	5		
6/14/18	6		
6/15/18	8		
6/18/18	1		
6/20/18	14		
5/29/18	6		
6/22/18	27		
6/25/18	15		
6/27/18	9		
6/29/18	19		
7/2/18	26		
7/6/18	26		
7/9/18	18		
7/11/18	2		
7/15/18	11		
7/18/18	8	2	
7/`9/18	2		
7/30/18	11		
7/31/18	8	3	
8/1/18		4	
8/4/18	7		
8/8/18	4	4	
8/13/18	2	3	
8/17/18	6		4
8/27/18	6		

Nesting and Productivity

Eleven least tern nests were found on RGDP during the 2018 breeding season (Appendix 1). The first nest was confirmed on June 4. The next two nests were located on June 22. Three more nests were confirmed on June 27, then 2 on June 29, 2 on July 5 and 1 on July 15. The fates of 7 of the 11 nests were determined. Five nests hatched 2 chicks each, 2 were destroyed by coyotes, and the

fates of the remaining 4 nests were not determined. Completion status was determined for all eleven nests. Nine nests contained 2 eggs and 2 were single egg nests.

The five hatched nests produced 2 chicks each for a total of 10 chicks. The first chicks hatched on July 17 and 18 but were not observed in the days following their hatch. One chick was later found dead near a nest, and probably died within a day of hatching. These nests were inland in the colony. The 3 additional nests that hatched (1 on July 19 and 2 on July 31) were closer to the shoreline and of these 6 chicks 4 were confirmed to have fledged (2 from 1 brood and 1 each from the other two broods). The number of tern nests and their fates from 2001 through 2018 are compared in Table 8.

Table 8. Least tern nests, fates, and chick and fledgling numbers from 2001 - 2018.*

Year	Total Nests	Hatch	Dst. Predator	Dst. Unk.	Aband.	Unk. Fate	Number chicks	Number Fledged
2018	11	5	2	0	0	4	10	4
2017	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0
2010	1	1	0	0	0	0	2	1
2009	3	2	1	0	0	0	3	3
2008	0	0	0	0	0	0	0	0
2007	1	1	0	0	0	0	1	1
2006	0	0	0	0	0	0	0	0
2005	4	0	1	0	0	3	0	0
2004	8	3	1	3	1	0	7	0
2003	0	0	0	0	0	0	0	0
2001	12	8	2	1	0	1	14	6 to 8

Fate Codes

Hatch - hatched one or more eggs, Dst. Predator - destroyed by predator, Dst.Unk. - destroyed, cause undetermined, Aband. - abandoned before hatch, Unk. Fate - unknown, disappeared without evidence of hatch or loss.

* No least tern monitoring was conducted in 2002.

Human Activities Affecting Plovers and Terns

RGDP is generally open to the public during daylight hours 7 days per week year round, but some closures occur. The Park was closed most Mondays until noon to clear sand from the access road and during unsafe conditions. During closed hours a locked gate prohibits public entry.

Visitor access in the Park is restricted during the breeding season to protect nesting plovers and terns. Visitors are only allowed access to the road, parking area, and the beach west of a symbolic fence line. A symbolic fence is in place yearly from March 1 through September 30 and consists of a single strand of yellow nylon rope stretched between metal or wood posts. Habitat closure signs written in English and Spanish are mounted on approximately every fifth post. The fence runs a short distance above the mean high tide line along the beach from the north to the south boundary,

along both sides of the access road, and along the south boundary. Visitors cannot access the north or east boundaries so fences are not installed there. Fencing is maintained by County staff.

One to 3 County Rangers were on site during all open hours throughout the breeding season. In addition to other duties, they educate and inform visitors of the closures, monitor beach users to prevent entry into the closed breeding habitat, and remove visitors who enter closed areas. Even with their presence, trespassing still occurs: the size and topographical features of RGDP make it difficult for the staff to effectively monitor the entire area.

Incidents of trespass into breeding habitat were recorded but it was not possible to document all trespass due to frequent winds that erase evidence. Twenty-six trespass incidents, involving 48 people were documented. The number of incidents was down 26% from the 2017 breeding season when 35 incidents involving 62 people were recorded and down 42% from 2016 (45 incidents involving 96 people). No trespass was observed in March, 5 incidents were recorded in April, 7 in May, 4 in June, 7 in July, and 3 in August. Many of the trespassers were contacted by Rangers and removed from breeding habitat.

Intrusions into habitat varied in length, some were short, but some people traveled long distances within breeding habitat. Trespassers entered over most of the western boundary, from the parking lot, and from several locations along the access road. One person traversed the entire tern colony from east to west and through a small area being used by the 4 remaining chicks.

On June 25 a visitor found a chick on the beach north of the parking lot and captured it. He took the chick to the parking lot and gave it to a Park Ranger. The Head Ranger contacted Applegate and he instructed her to return it to the same area immediately. Applegate arrived an hour later but could not locate the chick.

Also on June 25 a dead adult plover was found next to the roadway. The cause of death could not be determined. The USFWS was notified of the incident and the plover was moved from the roadway. No further action was taken.

Discussion

This was the first season since 2010 that terns nested at RGDP. It is the 7th in 17 monitored breeding seasons that terns utilized the site. Nesting has occurred in the same general location each year: approximately 1000 to 3500 feet south of the parking area, and approximately 200 to 800 feet east of the shoreline. Monitoring did not occur in 2002, but Applegate visited the site that year and observed multiple nesting least terns and chicks. There were no apparent reasons for the terns return this season. The habitat and management practices have remained similar since 2001.

Up to 6 terns used RGDP breeding habitat early in the season and eventually 1 pair established a nest. After the nest was established tern activity declined until mid June when a second wave of terns began arriving. Most activity was in the area near the active nest which may have been the catalyst for other terns to establish nests. Terns did not mob the monitor as much as expected. Possible reasons for that are that they were young birds or birds from Type 1 colonies where monitors are in the colony regularly.

This was the seventeenth year with comprehensive plover monitoring on RGDP and trends are consistent with earlier breeding seasons. Plovers utilize breeding habitat closer to the shoreline more often than backdune areas. Forty-nine nests were initiated within 1,000 feet of the shoreline and the remaining 10 were initiated in backdune areas. Plovers have historically utilized the eastern-most habitat on the Ten Commandments site more often, but only 1 nest was initiated there this season. We speculate that this is a natural variation in nest site selection driven by new generations of plovers. Also in the past, plovers have moved to the backdune areas to re-nest during seasons with significant avian predator activity near the beach. Heavy predator activity near the beach was absent this year. The high hatch rate this season is at least in part due to the lack of raven and gull depredation.

Consistent with previous breeding seasons, there were 4 main areas where brood activity was most often observed. All of the brood rearing areas have similar vegetation characteristics: sand blowouts with adequate low growing vegetation. Broods that hatched on the sand spit tended to stay north of the parking area and utilized numerous vegetated humps there for cover. The brooding areas south of the parking area were used less than in recent years. Many broods moved into or near the tern colony where the normally intruder aggressive terns provided some protection. The protection was only effective however until the peregrine began to frequent the site.

The peregrine was seen sitting on the ground on humps at the colony edge. Applegate did not see the bird catch chicks, but tern and plover brood activity dropped sharply after it arrived. Applegate observed the peregrine successfully catch a bird, but when the kill site was examined he could not find traces of the prey species. Applegate suspects it was an adult or fledgling plover. He also suspects the peregrine frequented the site more often than was documented.

Peregrines, ravens and harriers have the potential to significantly adversely affect tern and plover productivity. When terns return, placement of artificial chick shelters may help protect young birds from these predators. To encourage terns to nest on little used breeding sites, monitors sometimes deploy decoys. We do not recommend this due to the fact that there is no active onsite predator management.

Trespass into breeding habitat is the most significant negative impact by humans on RGDP. Trespass causes both plover and tern adults to flush from active nests and leave broods, which could cause nest or chick loss especially during periods of high winds. Nests and chicks can also be stepped on or intentionally destroyed if found. One plover nest was nearly stepped on this season with a footprint 6 inches from the eggs. Least terns are particularly susceptible to disturbance and can abandon nests and broods.

The decrease in trespass incidents this season can be attributed at least in part to the staff that was onsite this season. The Park has a new manager, and the Rangers were more vigilant. Their increased efforts had a positive impact. Breeding habitat directly south of RGDP on Gordon Sand and Leroy Trust properties is not protected and is negatively impacted by beach users from RGDP.

Management Recommendations

RGDP is important nesting habitat for snowy plovers and least terns, and wintering habitat for snowy plovers. The County has the ability to protect habitat and direct management goals toward habitat improvements that may increase overall populations. To increase productivity and reduce disturbance to plovers and terns on RGDP, we present the following recommendations:

Management – The County has actively supported the Preserve status of RGDP with management strategies. We recommend that the County continue a proactive management strategy for the Preserve and explore ways to improve the protection of the habitat while still being open to the public.

Visitor use - To protect nesting plovers and terns, continue to install the symbolic fence and closure signs from March 1 through September 30 each year. Continue to staff RGDP with Rangers during all open hours during the breeding season with a priority of monitoring visitors and preventing trespass into breeding habitat. Explore options to reduce speeding on the access road.

Trespass – Trespass into breeding habitat continues to put plovers and terns at risk. Rangers staffing the Preserve should be trained to monitor visitors as a priority during breeding season. When possible rangers should patrol the road and staff the kiosk. If visitors enter breeding habitat they should be ejected from the Preserve.

Predators - Although some nest loss to predators is to be expected during any breeding season, predators can have a catastrophic influence on breeding success. Predator management strategies should be developed to reduce the incidence of depredation.

Park staff – Staff should continue to practice good predator management activities such as daily removal of trash from the beach area and the discouragement of visitors feeding wildlife. Additionally, since staff is onsite while RGDP is open, the current monitor should provide training to staff to identify potential predators and record their observations. This would provide valuable information for the monitor who is onsite less often. The monitor should also provide limited plover and tern training to give staff a good understanding of the species.

Least terns - We recommend that when least terns nest on RGDP that they receive priority protection given their sensitive nature and endangered status. A long-term plan to increase least tern nesting on the site would be valuable. The plan should include: 1) ways to encourage increased nesting each year, 2) protecting nests and chicks from predators, 3) protecting the colony from human disturbance, 4) protecting and improving habitat as needed.

Habitat enhancement - Exotic invasive plant species reduce and degrade breeding habitat. Iceplant and sea rocket have the ability to overtake suitable plover and tern nesting habitat. Iceplant does not receive significant use by plovers and terns, but patches of sea rocket within the tern colony and plover brooding did provide cover. We recommend the County explore cooperative efforts to address invasive plants during winter months.

Monitoring - We recommend that RGDP continue to support ongoing quality monitoring that addresses population, nesting, depredation, hatching and fledging success, along with other issues

such as impacts of public use. Successful management of the site will depend on the use of this information as a basis for sound short and long term management practices.

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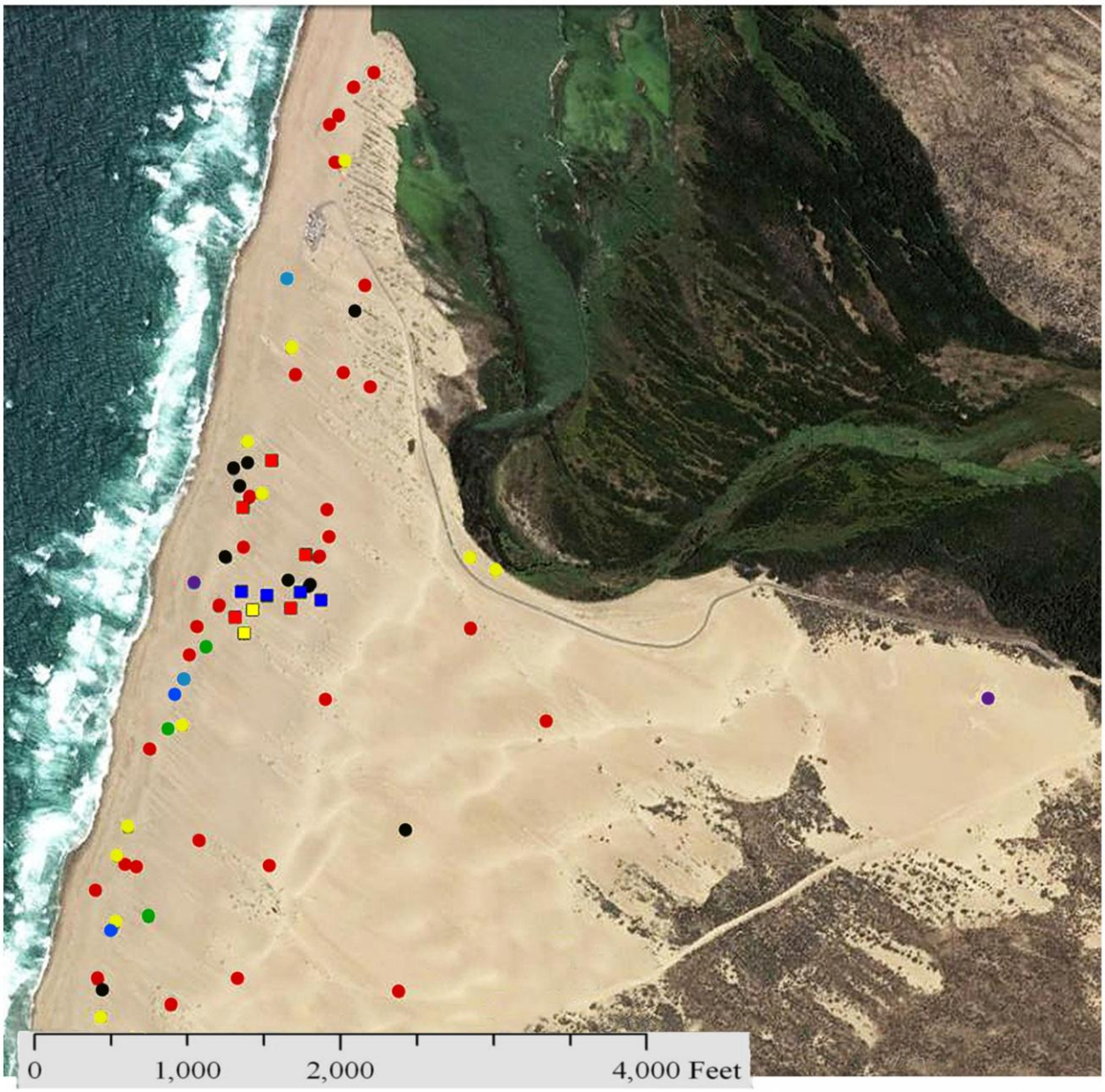
Appendix 1. Snowy plover and least tern nest locations and fates during the 2018 breeding season.



Appendix 2. Number and percent of snowy plover nests and their fates from 2001-2018.*

Year	Total Nests	Hatch (N) %	Predator (N) %	Dst. Unk (N) %	Unk. Fate (N) %	Aband. (N) %	Dst. Surf (N) %	Dst. Wind (N) %	Dst. Cattle (N) %	Dst. Riv. (N) %	Dst. Hu. (N) %
2018	59	(30) 51%	(16) 27%	(2) 3%	(9) 15%	(2) 3%	0	0	0	0	0
2017	61	(26) 43%	(18) 29%	(4) 6.5%	(4) 6.5%	(9) 15%	0	0	0	0	0
2016	53	(26) 49%	(21) 39%	0	(1) 2%	(3) 6%	0	(2) 4%	0	0	0
2015	62	(31) 50%	(26) 42%	0	(2) 3%	(2) 3%	0	(1) 2%	0	0	0
2014	68	(31) 46%	(23) 34%	0	(5) 7%	(6) 9%	0	(3) 4%	0	0	0
2013	50	(21) 42%	(11) 22%	0	(10) 20%	(8) 16%	0	0	0	0	0
2012	62	(20) 32%	(27) 43%	(2) 93%	(1) 2%	(11) 18%	(1) 2%	0	0	0	0
2011	61	(29) 47%	(20) 33%	(1) 2%	(1) 2%	(10) 16%	0	0	0	0	0
2010	67	(34) 51%	(24) 36%	(4) 6%	(1) 1%	(3) 5%	0	0	0	0	(1) 1%
2009	84	(39) 46%	(27) 32%	(5) 6%	(5) 6%	(8) 10%	0	0	0	0	0
2008	82	(33) 0%	(26) 32%	(11) 14%	(6) 7%	(5) 6%	0	(1) 1%	0	0	0
2007	57	(27) 7%	(22) 39%	(1) 2%	(4) 7%	(3) 5%	0	0	0	0	0
2006	56	(32) 57%	(16) 29%	0	(2) 3%	(5) 9%	0	0	0	0	(1) 2%
2005	47	(27) 57%	(8) 17%	0	(2) 4%	(10) 21%	0	0	0	0	0
2004	73	(23) 32%	(36) 49%	(2) 3%	(3) 4%	(4) 5%	0	(1) 1%	0	(4) 5%	0
2003	105	(14) 13%	(64) 61%	(10) 9%	(5) 5%	(5) 5%	0	(5) 5%	(2) 2%	0	0
2001	75	(25) 33%	(18) 24%	(25) 33%	(1) 1%	(4) 5%	0	(2) 3%	0	0	0

Fate Codes

Hatch - hatched one or more eggs, Predator - destroyed by predator, Dst.Unk. - destroyed, cause undetermined, Unk. Fate - unknown, disappeared without evidence of hatch or loss, Aband. - abandoned before hatch, Dst. Surf - destroyed by surf wash, Dst. Wind - destroyed by wind, Dst. Cattle - destroyed by cattle, Dst. Riv. - destroyed by river flooding, Dst. Hu. - destroyed by human activity.

* Snowy plover monitoring was not conducted in 2002.