

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

2016 Final Report



Prepared for:

The County of Santa Barbara
Santa Barbara, California
And
U.S. Fish and Wildlife Service

Prepared by:

Thomas E. Applegate and Sandra J. Schultz
Wildwing Consulting
Baywood Park, CA 93402

September 25, 2016

Table of Contents

Summary	2
Introduction	2
Study Area	3
Methods	4
<i>Snowy Plovers</i>	4
<i>California Least Terns</i>	5
Results	5
<i>Snowy Plovers</i>	5
Population	5
Figure 1. Snowy plovers counted on the RGDP range-wide census 2001 – 2016.....	6
Table 1. The estimated bi-weekly number of nesting pairs during the 2016 season.....	6
Nesting and Productivity	6
Figure 2. Number of snowy plover nests on RGDP in 2001, and 2003 through 2016.* ...	6
Table 2. Number and percent of snowy plover nests and their fates from 2001-2016.* .	7
Table 3. The mean clutch size of nests 2003 through 2016.*	7
Figure 3. Number of chicks hatched 2001 through 2016.*.....	8
Table 4. Nest initiations by month in 2003, 2004, and 2007 through 2016.*	8
Table 5. The combined number of snowy plover nests and fates from 2001 - 2016.*	9
Brood Movement and Fledging	9
Banded Plovers	9
Predators	9
<i>Least Terns</i>	10
Table 6. Number of snowy plover nests lost to predators on RGDP in 2001, and 2003 through 2016.....	11
Table 7. Least tern nests, fates, and chick and fledgling numbers from 2001 - 2016.* .	12
Human Activities Affecting Plovers and Terns	12
Discussion	13
Management Recommendations	15
Literature Cited	16
Appendix 1. Snowy plover nest locations and fates during the 2016 breeding season.	18
Appendix 2. Color banded plovers on RGDP during the 2016 breeding season.	19
Appendix 3. Other species or their sign observed on RGDP during 2011.	20

Summary

This report summarizes the 2016 breeding season monitoring of western snowy plovers (snowy plover, plover) and California least terns (least tern, tern) 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.

Snowy plovers were monitored on RGDP between March 10 and August 26, 2016. Fifty-eight field surveys were conducted. Least tern monitoring was conducted concurrently with snowy plover monitoring during the time when breeding terns would be expected to be present. The first known snowy plover nest was initiated on approximately April 3 and the last on July 5. Fifty-three snowy plover nests and no least tern nest were discovered. The fates of 52 nests were determined. Twenty-six nests hatched at least 1 chick, 21 were lost to predators, 3 were abandoned, and 2 nests were lost to wind. The fate of 1 nest could not be determined. The first known hatch occurred on approximately April 29 and the last on August 3. At least 59 chicks hatched from the 26 successful nests. The earliest expected fledge date for 2016 chicks was May 26 and the last fledging was expected to occur about August 30. Color banding of chicks did not occur so chick survival rates could not be determined. No plover nests or chicks were lost to human activities, but 1 adult plover was killed by a vehicle. Least terns were observed during the breeding season but no nests were initiated.

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 with dark patches on the head and shoulders. The Pacific coast population nests near tidal waters of the Pacific Ocean, on coastal sand beaches and dunes, adjacent bays, and coastal river bars along the Washington, Oregon, California, and Mexico coastlines. 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 small grey, white, and black water birds that 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, and nest on open sand, sand-shell beaches, and sand-fill sites where little to no vegetation exists. Breeding colonies are typically located within close proximity to estuaries or 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 only a few other pairs. The species was given both 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 typically 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. Snowy plovers nest and winter there yearly, and least terns have nested intermittently on the site since monitoring began.

Nesting snowy plovers and least terns were monitored on RGDP in 2001, and from 2003 through 2016. Prior to 2001 some non-intensive intermittent monitoring occurred, but no comparable data resulted from those efforts. This report compares available and applicable data collected since 2001 with the 2016 breeding season data (Kelly 2014, 2015, Kelly and Applegate 2013, Applegate and Schultz 2003, 2004, and 2007 through 2012, SRS 2006, Sandoval 2005, Persons 2001).

Study Area

RGDP encompasses approximately 592 acres of dune 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 (ODSVRA). 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. The remainder of the habitat is coastal dune scrub and a riparian corridor. An access road leads to a parking area near the beach at the north end of the property. Beaches have numerous logs, small plant debris, kelp, rocks and shells of varying sizes, and human litter.

Strong westerly and northwesterly winds of 25 to 35 miles per hour or more 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.

The dominant native plant species in breeding habitat 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 (*Carpobrotus edulis* and *C. chilensis*). European beachgrass (*Ammophila arenaria*) a problematic invasive found on neighboring breeding sites is absent on RGDP.

Methods

Snowy Plovers

Snowy plover monitoring was conducted in suitable habitat from March 10 to August 29, 2016. Five field surveys were conducted in March, 7 in April, 9 in May, 12 in June, 13 in July, and 12 in August. In an attempt to avoid frequent high afternoon winds, most surveys were conducted during morning hours. Late in the season when high winds became less frequent, some afternoon surveys were conducted. All surveys were conducted on foot.

An attempt was made to locate all snowy plover 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 were not counted as nests. Nests were consecutively numbered and all pertinent information including location, and number of eggs was recorded. Regular subsequent visits to each known nest were made, and the nest status was recorded. Nests were not physically marked: their locations were recorded using existing landmarks. Nest locations were recorded using GPS equipment in late 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 enclosures were not used.

A snowy plover census was conducted on May 20 as part of a coordinated range-wide survey. This yearly census is coordinated by the U.S. Fish and Wildlife Service and is scheduled to occur when the population is expected to be stable and consist primarily of breeding plovers. Census data includes plover age, sex, location, and the number and size of accompanying 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 through late August. When least terns were observed, their number, location and activities were recorded. Least terns did not nest on RGDP in 2016 so no nest data was recorded.

Results

Snowy Plovers

Population

On May 20 a snowy plover population census was conducted as part of an annual coordinated range wide survey. Beach and backdune habitats were surveyed. Twenty-six adult plovers and 1 chick were observed. Thirteen of the adults were males, and 12 were females. The sex of 1 adult was undetermined. All but 1 bird was checked for color bands. One female was banded AG:AY (aqua over green on the left leg and aqua over yellow on the right leg). This plover was banded at Moss Landing Salt Ponds in 2011.

Yearly population censuses have been conducted in late May each year between 2001 and 2016, excluding 2002 (Figure 1). The number of plovers observed on these censuses is not considered the total number using RGDP on those dates, as plovers may be hidden from view or may temporarily leave the site, or move during the survey. Nest data shows that approximately 21 pairs (42 plovers) were nesting on RGDP at the time of the census.

The number of nesting snowy plovers on RGDP was estimated bi-weekly from active nest data. The estimate includes only nesting plovers and does not include birds that were rearing broods or in the process of nest initiations. A peak number of 23 nesting plovers were present in late June (Table 1).

Figure 1. Snowy plovers counted on the RGDP range-wide census 2001 – 2016.

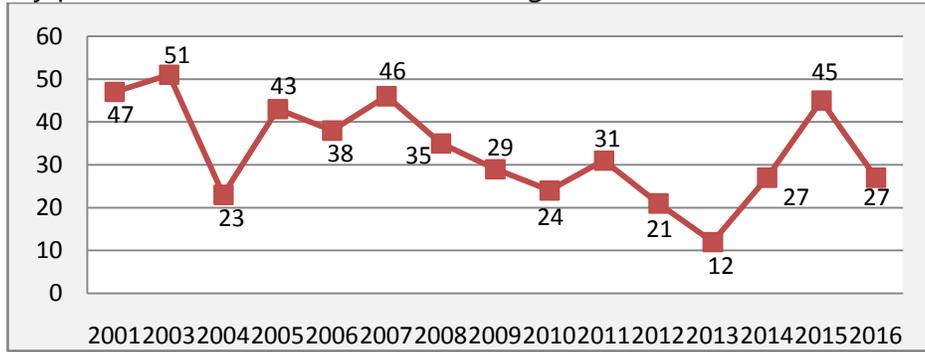


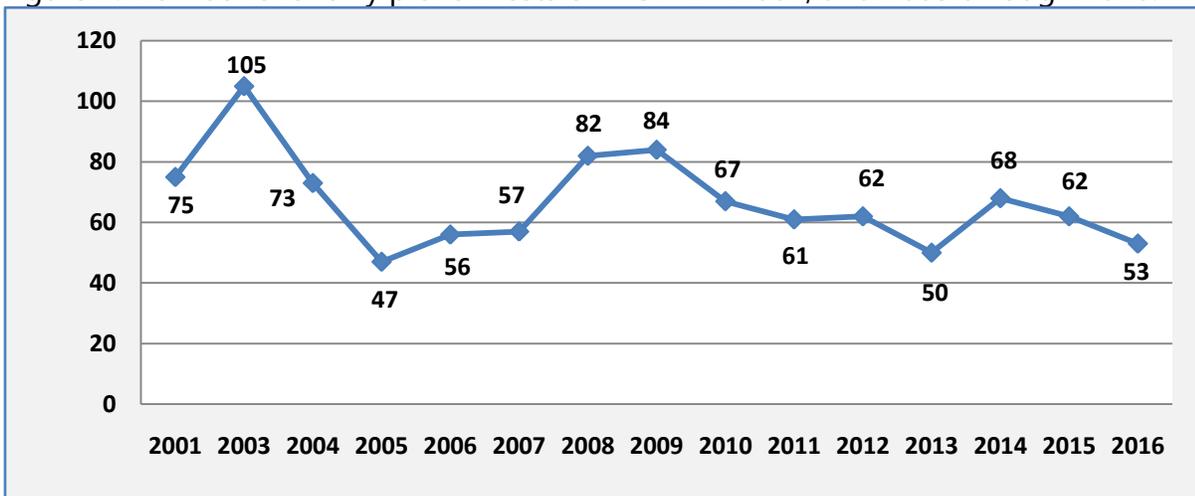
Table 1. The estimated bi-weekly number of nesting pairs during the 2016 season.

March		April		May		June		July		August	
Early	Late	Early	Late								
0	0	8	12	19	21	15	23	12	9	4	0

Nesting and Productivity

Fifty-three snowy plover nests were located on RGDP during the 2016 breeding season (Appendix 1). The total is lower than average (n=67) with only 2005 and 2013 having lower nest totals (Figure 2). The number of nests and their fates from 2001 through 2016 are compared in Table 2.

Figure 2. Number of snowy plover nests on RGDP in 2001, and 2003 through 2016.*



The fates of 52 of the 53 nests were determined. Twenty-six nests hatched at least 1 chick, 21 were lost to predators, 3 were abandoned, 2 were lost to wind, and the fate of the remaining nest was not determined.

Table 2. Number and percent of snowy plover nests and their fates from 2001-2016.*

Year	Hatch	Dest. Pred.	Dest. Unk.	Unk. Fate	Aband.	Dest. Surf	Dest. Wind	Dest. Cattle	Dest. River	Dest. Human	Total Nests
2016	26 49%	21 39%	0	1 2%	3 6%	0	2 4%	0	0	0	53
2015	31 50%	26 42%	0	2 3%	2 3%	0	1 2%	0	0	0	62
2014	31 46%	23 34%	0	5 7%	6 9%	0	3 4%	0	0	0	68
2013	21 42%	11 22%	0	10 20%	8 16%	0	0	0	0	0	50
2012	20 32%	27 43%	2 93%	1 2%	11 18%	1 2%	0	0	0		62
2011	29 47%	20 33%	1 2%	1 2%	10 16%	0	0	0	0	0	61
2010	34 51%	24 36%	4 6%	1 1%	3 5%	0	0	0	0	1 1%	67
2009	39 46%	27 32%	5 6%	5 6%	8 10%	0	0	0	0	0	84
2008	33 40%	26 32%	11 14%	6 7%	5 6%	0	1 1%	0	0	0	82
2007	27 47%	22 39%	1 2%	4 7%	3 5%	0	0	0	0	0	57
2006	32 57%	16 29%	0	2 3%	5 9%	0	0	0	0	1 2%	56
2005	27 57%	8 17%	0	2 4%	10 21%	0	0	0	0	0	47
2004	23 32%	36 49%	2 3%	3 4%	4 5%	0	1 1%	0	4 5%	0	73
2003	14 13%	64 61%	10 9%	5 5%	5 5%	0	5 5%	2 2%	0	0	105
2001	25 33%	18 24%	25 33%	1 1%	4 5%	0	2 3%	0	0	0	75

Fate Codes

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

* No snowy plover monitoring was conducted in 2002.

Forty-seven of the 53 nests were completed. Forty-four had 3-egg clutches, 2 had 2-egg clutches, and 1 was a single egg clutch, for a total of 137 eggs. The mean clutch size was 2.91. Yearly mean clutch sizes are compared in Table 3.

Table 3. The mean clutch size of nests 2003 through 2016.*

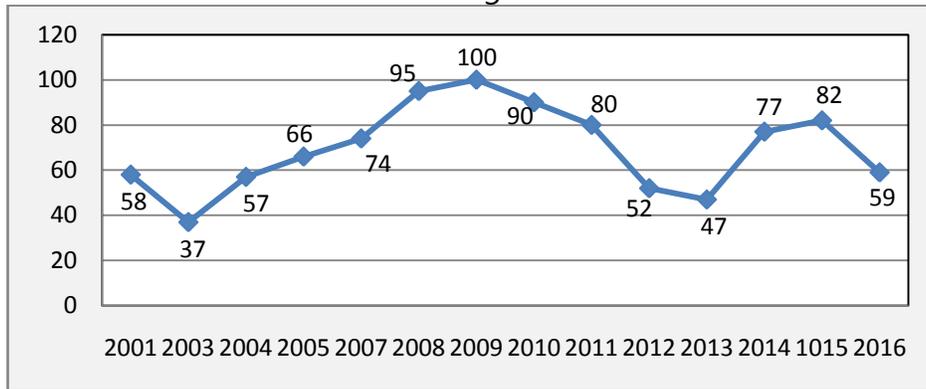
Year	2003	2004	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Mean	2.99	2.90	2.96	2.93	2.94	2.88	2.93	2.89	2.90	2.98	2.98	2.91

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

Of the 6 uncompleted nests, 3 were lost to predators with at least 2 eggs each, 2 were lost to wind at 1 egg, and 1 nest was abandoned with 1 egg before incubation status could be determined (9 eggs total). This brought the total number of observed eggs to 146.

Fifty-nine chicks hatched from the 26 successful nests. Twelve nests hatched 3 chicks, 9 nests hatched 2 chicks, and 5 nests hatched 1 chick. The number of chicks hatched from 2001 through 2016 - excluding 2006 - is compiled in Figure 3.

Figure 3. Number of chicks hatched 2001 through 2016.*



*Data not available for 2002, or reported in 2006.

** At least 100 and possibly as high as 104 chicks hatched in 2009.

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

A total of 1,002 snowy plover nests have been documented on RGDP over the past 15 monitored breeding seasons (Table 5). Of these, 412 have hatched, resulting in an overall hatch rate of 41%. At least 974 chicks hatched (the number of chicks hatched was not reported in 2005). The depredation rate for this period was 37%. Six percent were destroyed by unknown causes, 9 % were abandoned, 1% were lost to wind, 0.5% were lost to river flooding, 0.2% were destroyed by cattle, 0.2% were destroyed by human activities and 0.1% were destroyed by surf wash. Fates of 5% of the total nests were undetermined.

Table 4. Nest initiations by month in 2003, 2004, and 2007 through 2016.*

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

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

Table 5. The combined number of snowy plover nests and fates from 2001 - 2016.*

Years	Hatch	Dest. Pred.	Dest. Unk.	Aband	Unk. Fate	Dest. Wind	Dest. River	Dest. Cattle	Dest. Human	Dest. Surf	Total Nests
2001-2016	412	369	61	87	49	15	4	2	2	1	1,002
Percent	41%	37%	6%	9%	5 %	1%	.05	.02	.02	.01	100%

* No snowy plover monitoring was conducted in 2002.

Brood Movement and Fledging

Because color banding of chicks did not occur on RGDP in 2016 specific brood movement and chick survival rates could not be determined. Since broods are evasive by nature they were rarely seen during the breeding season, but indications of brood presence was common. Brood activity was most common in 4 locations (Appendix 1).

The earliest expected fledge date for 2016 chicks was approximately May 26 and the last fledging was expected to occur about August 30. The first fledgling was observed on July 1, and unbanded fledglings were observed on most surveys after that date. Most were observed in back dune flocking areas.

Banded Plovers

Two color banded plovers nested on RGDP. One was a male banded NR:YB on Vandenberg AFB in 2015. This bird was associated with nest number P02. The other was a female banded R:GW on Vandenberg AFB in 2015 and associated with nest P20. Banded Fledglings were first observed on July 22. A list of banded plover sightings is compiled in Appendix 2.

Predators

Predators destroyed at least 21 (39%) of the 53 nests this season (Table 6). A single gull of unidentified species probably was the leading predator. On June 22, 8 nests were observed to have been depredated. At each nest, a gull landed at the nest then departed southward in an identical manner. Three more nests were lost with the same pattern on June 27, July 5, and July 7. On June 27 two additional nests were lost to unidentified avian predators that were likely gull(s).

While coyote tracks were observed along the shoreline or back dunes on every survey,

they destroyed only 3 nests. Many times coyote tracks were very close to active nests. Coyotes fed on seal carcasses and tracks indicated that they occasionally hunted gulls on the beach.

Feral pigs regularly 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 on the beach. One plover nest located within a sand verbena patch was destroyed by a pig. No evidence of eggs or egg fragments remained.

Ravens, which have been a leading predator on RGDP in recent years, were observed only 3 times this season. On May 1, a single raven was observed, on May 9, 2 were seen, and on July 11, a single raven was observed. The birds were all flying from south to north and seemed to be traversing the site, not actively searching for plover nests or broods.

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*), great blue heron (*Ardea herodias*), great horned owl (*Bubo virginianus*), Heermann's gull (*Larus heermanni*), merlin falcon (*Falco columbarius*), northern harrier (*Circus cyaneus*), peregrine falcon (*Falco peregrines*), raccoon (*Procyon lotor*), red-tailed hawk (*Buteo jamaicensis*), ring-billed gull (*Larus delawarensis*), and western gull (*Larus occidentalis*).

Least Terns

Least terns did not nest on RGDP in 2016. They were first observed on May 12 when 2 or more were heard mid-Preserve near the beach. On June 1, 3 terns were observed flying north in the mid-Preserve. On June 3, 4 terns were observed flying near the parking lot and later that day 2 were seen on the ground mid-Preserve approximately 300 feet east of the shoreline, which is a documented historic nesting area. Terns were also observed on July 13, 25, and August 4, flying over the Preserve. Beginning in early July, terns were regularly observed foraging in the Santa Maria River. Terns were last observed on August 4 when 3 foraged in the river and 4 flew south traversing RGDP.

Least terns nested at RGDP 6 of the 15 monitored breeding seasons since 2001 (Table 7). Nesting in these years occurred in the same general location, approximately 2500 to 3500 feet south of the parking area, and approximately 300 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 in the same area. Least terns have not successfully nested on RGDP since 2010. A tern nest may have been initiated in 2013 when courtship

activity and scraping by a pair were observed, but the pair left the site before nesting could be confirmed.

Table 6. Number of snowy plover nests lost to predators on RGDP in 2001, and 2003 through 2016.

Year	Raven	Coyote	Gull	Crow	Harrier	Skunk	Feral Pig	Great Horned Owl	Unk, Avian Pred.	Unk. Corvid Species	Unk. Pred. Species	Total Nests
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	94	72	24	9	1	1	1	2	25	2	132	369

In 2001, 12 nests were initiated and the fates of 11 were determined. Eight hatched (73%), 2 were destroyed by coyotes (18%), and 1 failed (9%). Fourteen chicks hatched, and 6 to 8 chicks fledged (43% – 57%). In 2004, eight nests were established: 3 hatched at least 1 chick (37.5%), 3 were destroyed by unknown causes (37.5%), 1 was lost to a predator (12.5%), and 1 was abandoned (12.5%). All nests were extant during the same period, indicating that 8 pairs nested on the site. In 2005, 4 nests were established, but no hatches occurred. That year, one nest was lost to a coyote (25%) and the cause for the 3 failures was not determined (75%). In 2007, 1 nest was initiated which hatched and fledged 1 chick. In 2009, terns produced 3 nests. One was nest destroyed by an unidentified predator (33%), and 2 hatched (67%) producing 3 chicks, all of which fledged.

Table 7. Least tern nests, fates, and chick and fledgling numbers from 2001 - 2016.*

Year	Total Nests	Hatch	Dest. Predator	Dest. Unk.	Aband.	Unk. Fate	Number chicks	Number Fledged
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 (100%)	0	0	0	0	2	1
2009	3	2 (67%)	1 (33%)	0	0	0	3	3
2008	0	0	0	0	0	0	0	0
2007	1	1 (100%)	0	0	0	0	1	1
2006	0	0	0	0	0	0	0	0
2005	4	0	1 (25%)	0	0	3 (75%)	0	0
2004	8	3 (37.5%)	1 (12.5%)	3 (37.5%)	1 (12.5%)	0	7	0
2003	0	0	0	0	0	0	0	0
2001	12	8 (67%)	2 (17%)	1 (8%)	0	1 (8%)	14	6 to 8

Fate Codes

Hatch - hatched one or more eggs, Dest. Predator - destroyed by predator, Dest.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 open to the public 7 days per week during daylight hours with occasional closures to clear sand from the access road. During closed hours a locked gate prohibits public entry. Visitor access is restricted during the breeding season to protect nesting plovers and terns. Visitors are restricted to the access road, parking area, and the beach west of a symbolic fence line. The symbolic fence was in place from March 1 through September 30 and consisted of a single strand of yellow nylon rope stretched between metal or wood posts. Habitat closure signs written in English and Spanish were mounted on approximately every fifth post. The fence ran 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 boundary or east boundary so no fences were installed there. Fencing was maintained by staff throughout the season. County staff, consisting of 1 to 2 Rangers, was on site during open hours throughout the breeding season. In addition to other duties they inform visitors of the closures, monitor beach users to prevent entry into the closed breeding habitat, and remove visitors who enter the breeding habitat. Even with their presence trespassing still occurred. The size

and topographical features of the Preserve make it difficult for the staff to effectively monitor the entire area.

An accurate number of trespass incidents is not possible due to frequent high winds that erase tracks. Forty-five trespass incidents, involving 96 people were documented. Some intrusions were short, but other people traveled long distances within breeding habitat. Trespass occurred over most of the western boundary, both north and south of the parking lot, from the parking lot, and from several locations along the access road.

One adult plover of unknown sex was killed by a vehicle on the access road. The USFWS was notified of the incident and the carcass was shipped to the California Animal Health and Food Safety Laboratory System for necropsy.

Discussion

Nesting

The 2016 breeding season was the fifteenth year with comprehensive snowy plover and least tern monitoring on RGDP. As in previous years, plovers utilized most of the available suitable breeding habitat, but favored specific areas. Prior to June 22, all but 2 nests (n=40) were located from the mid-dune west to the high tide line. Two nests were initiated in the backdunes. Between June 22 and July 1, plovers initiated 7 nests in the backdunes, a likely response to gull depredation. No backdune nests were destroyed by gulls. By the end of the season 44 nests (83%) had been initiated on the mid-dune and west area, and 9 (17%) were located in the back-dunes.

The 2016 nest total (n=53) was the third lowest recorded. Only 2005 (n=47) and 2013 (n=50) had fewer nests. The low total may have been partly due to low predator activity prior to June 22. By that date, 24 nests had been completed, with an 83% hatch rate (20 nests). In contrast, only 6 of the 29 nests completed after June 22 hatched (21%). The overall 49% hatch rate for 2016 is consistent with previous breeding seasons and is above the mean hatch rate of 42.8% for the 15 recent breeding seasons.

Predators

Predators are the leading cause of nest loss on RGDP. In 2005 Sandoval reported that nest abandonments (n=10) were higher than depredations (n=8), but in all other seasons predators have been the leading cause of nest loss. This season's number of nests lost to predators was 39% compared to the 15 year average of 37%. Without what appeared to be a single gull keying in on nests, predation may have been much lower than average.

Ravens which were a consistent predator on RGDP in recent years were not a problem this season. In addition, the Guadalupe Restoration Project and Guadalupe Nipomo Dunes NWR, both to the north of RGDP did not lose nests to ravens (Kimberly Paradis pers com, Applegate data). The reason for the lack of raven activity is not known. Vandenberg Air Force Base actively removed ravens this year, but they continued to lose nests to them (Samantha Kaisersatt pers com).

Human Caused Fatality, Loss and Disturbance

On May 18 an adult plover was killed by a vehicle on the RGDP access road. Visitors regularly speed on the road, which endangers adults, juveniles, and chicks. Efforts to slow vehicles with signs, speed bumps, and confrontation of speeders have had little effect on some visitors. Trespass into breeding habitat also continues to endanger nests and chicks.

Breeding habitat directly adjacent to the south boundary on Gordon Sand and Leroy trust properties is negatively impacted by beach users accessing the area from RGDP. One plover nest, located approximately 50 feet south of the south RGDP boundary was destroyed by humans this season. Two people located the nest, which Applegate had documented, and destroyed it by walking in circles on it. Crushed egg was found. This is not the only recorded incident of nest loss there. In 2012 a Park visitor reported to staff that he found a plover nest approximately 150 feet south of the south boundary. The visitor said he marked the nest. Applegate checked on the nest the next day and found the visitor had covered the nest with rocks causing the nest to be abandoned. Another visitor found the nest several days later and crushed 2 of the 3 eggs with a rock.

Least Terns

Least terns did not nest on the site this season. Ample suitable breeding habitat exists on RGDP and birds have historically nested on the site. There are no indications that there was a particular cause or event associated with terns not nesting. The potential for a large breeding colony is possible on RGDP, and means to improve nesting conditions and habitat should be taken into account while developing future management plans.

Habitat

Plover and tern breeding habitat is generally of high quality on RGDP. Iceplant (*Carpobrotus sp.*) and sea rocket (*Cakile maritime*), nonnative invasive plants, are found on RGDP and continue to degrade habitat. Preserve staff has been removing iceplant from breeding habitat by hand and is having a positive impact overall, but much iceplant remains and continues to spread. While it is beneficial for staff to continue to remove iceplant, creating a long term comprehensive plan for invasive plant eradication would be beneficial. Joining an ongoing cooperative effort with other land managers in the dunes complex to restore habitat could also be beneficial.

Plover and tern monitoring on RGDP since 2001 has shown that it is an important breeding site for snowy plovers and has unrealized potential for least terns. Monitoring efforts have identified trends, important nesting areas, and a range of predators and other factors that may affect nesting and fledging success. These data should be used to implement management plans that will protect and enhance least tern and snowy plover populations, while allowing continuing recreational use by the public.

Management Recommendations

RGDP provides important nesting habitat for snowy plovers and least terns, and wintering habitat for snowy plovers. The County has the ability to protect the 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:

1. *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 the Preserve with Rangers during all open hours with the priority of monitoring visitors and preventing trespass into breeding habitat.

2. *Trespass* – Trespass into breeding habitat continues to put plovers and terns at risk. We recommend that the County utilize its citation authority to ticket visitors who knowingly enter breeding habitat. If the public knows citations will be issued, they will be less likely to enter the closed habitat. If visitors enter breeding habitat they should be ejected from the Preserve.

3. *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 on the RGDP. We also recommend that the County apply for a Federal depredation permit so problem predators could be removed or captured and relocated.

4. *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, they should be trained to identify potential predators and record their observations. This would provide valuable information for the monitor who is onsite less often.

5. *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, 5) providing for long-term monitoring.

5. *Habitat enhancement* - Exotic invasive plant species are an ongoing problem at RGDP and they reduce and degrade breeding habitat. Iceplant overtakes more suitable plover and tern nesting habitat each year. Park staff has been removing invasive plants by hand where and when feasible. We recommend the County become part of the dunes complex wide eradication program to attempt to completely remove invasive species.

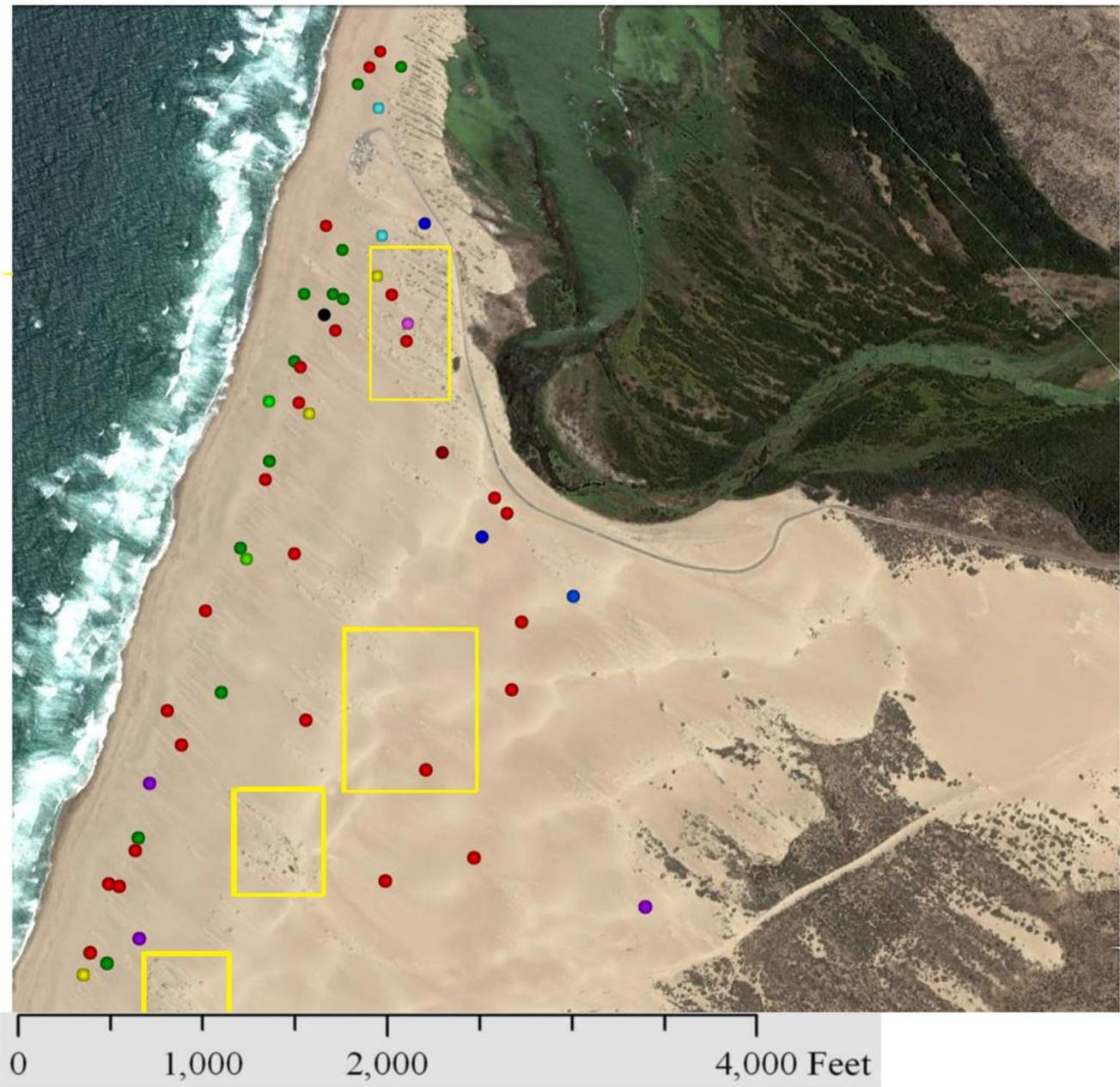
6. *Monitoring* - We recommend that RGDP continue to support ongoing quality monitoring that addresses population, nesting, depredation, hatching and fledging success, along with other issues such as impacts of public use. Successful management of the site will depend on the use of this information as a basis for sound short and long term management practices.

Literature Cited

- Kelly M. 2015. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve, Guadalupe CA, 2015 Final Report. Unpub. Rept.
- Kelly M. 2014. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve, Guadalupe CA, 2014 Final Report. Unpub. Rept.
- Kelly M. and Applegate T. E. 2013 Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve, Guadalupe CA, 2013 Final Report. Unpub. Rept.
- Applegate, T. E. and S. J. Schultz. 2012. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve RGDP, Guadalupe CA, 2009 Final Report. Unpub. Rept.
- Applegate, T. E. and S. J. Schultz. 2011. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve RGDP, Guadalupe CA, 2009 Final Report. Unpub. Rept.
- Applegate, T. E. and S. J. Schultz. 2010. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve RGDP, Guadalupe CA, 2009 Final Report. Unpub. Rept.
- Applegate, T. E. and S. J. Schultz. 2009. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve RGDP, Guadalupe CA, 2009 Final Report. Unpub. Rept.
- Applegate, T. E. and S. J. Schultz. 2008. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve RGDP, Guadalupe CA, 2008 Final Report. Unpub. Rept.

- Applegate, T. E. and S. J. Schultz. 2007. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve RGDP, Guadalupe CA, 2007 Final Report. Unpub. Rept.
- Applegate, T. E. and S. J. Schultz. 2004. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve RGDP, Guadalupe CA, 2004 Final Report. Unpub. Rept.
- Applegate, T. E. and S. J. Schultz. 2003. Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve RGDP, Guadalupe CA, 2003 Final Report. Unpub. Rept.
- Hardy and Colwell 2008. The Impact of Predator Exlosures on Snowy Plover Nesting Success: A Seven Year Study, Wildlife Department, Humboldt State University.
- Marschalek, D. A. 2010. California Least Tern Breeding Survey 2009 Season. State of California, The Recourses Agency, Department of Fish and Game.
- Page, G.W., J.S. and J.C. Warriner, and P.W.C. Paton. 1995. Snowy Plover (*Charadrius alexandrinus*). In *The Birds of North America*, No. 154, (A Poole and F. Gill, eds.). The Acad. of Nat. Sci., Philadelphia, PA, and The American Ornithologists' Union, Washington DC.
- Persons, P.E. 2001. Nesting of the Western Snowy Plover and the California Least Tern at the Rancho Guadalupe Dunes County Park, Santa Barbara County, California, in 2001. Unpub. Rept.
- Persons, P. E., E. S. Hutchinson, 2003. The 2003 Breeding Season of the Western Snowy Plover at Guadalupe-Nipomo Dunes National Wildlife Refuge San Luis Obispo County, California. 21 pp.
- Sandoval, C. PHD. 2005. Western Snowy Plovers Rancho Guadalupe Dunes County Park, Guadalupe CA. 2005 Final Report.
- Schultz, S.J. 1997. California Least Terns on Vandenberg Air Force Base, A Report Review. Report submitted to Vandenberg Air Force Base.
- SRS Technologies. 2006. Breeding Activities of the Western Snowy Plover and California Least Tern at Rancho Guadalupe Dunes Preserve, Santa Barbara County, CA. 2006 Annual Report.
- Warriner, J.S., J.C. Warriner, G.W. Page, and L.E. Stenzel. 1986. Mating system and reproductive success of a small population of polygamous snowy plovers. *Wilson Bulletin* 98:15-37.

Appendix 1. Snowy plover nest locations and fates during the 2016 breeding season.



- | | | |
|-------------|----------------|-------------------------------|
| ● Hatch | ● Skunk | ● Unidentified Predator |
| ● Gull | ● Pig | ● Unidentified Avian Predator |
| ● Coyote | ● Wind | |
| ● Abandoned | ● Unknown Fate | □ Main Brood Rearing Areas |

Appendix 2. Color banded plovers on RGDP during the 2016 breeding season.

Date	Combo	Sex/Age	Natal Site	Year
4/4/16	PV:YY	male	Oceano Dunes SVRA	2015
4/18/16	PV:YY	male	Oceano Dunes SVRA	2015
4/22/16	PV:YY	male	Oceano Dunes SVRA	2015
5/1/16	V:GW	male	Vandenberg AFB	2012
5/1/16	NR:YB	male	Vandenberg AFB	2015
5/9/16	R:GW	unk adult	Vandenberg AFB	2015
5/16/16	R:GW	female	Vandenberg AFB	2015
5/20/16	AG:AY	female	Moss Landing Salt Ponds	2011
5/20/16	Y:W	female	Unknown	Unk.
5/31/16	AG:AY	male	Moss Landing Salt Ponds	2011
6/1/16	AG:AY	male	Moss Landing Salt Ponds	2011
6/16/16	AG:AY	female	Moss Landing Salt Ponds	2011
6/20/16	R:GW	male	Vandenberg AFB	2015
6/22/16	GB:AY	female	Salinas S.B.	2013
6/22/16	R:GW	female	Vandenberg AFB	2015
6/24/16	AG:AY	female	Moss Landing Salt Ponds	2011
6/29/16	R:GW	female	Vandenberg AFB	2015
6/29/16	AG:AY	female	Moss Landing Salt Ponds	2011
7/1/16	NRGW	male	Vandenberg AFB	2012
7/7/16	R:YB	female	Unknown	Unk
7/22/16	PV:RB	juvenile	Oceano dunes SVRA	2016
7/28/16	PV:RB	juvenile	Oceano dunes SVRA	2016
7/28/16	PG:WW	juvenile	Oceano Dunes SVRA	2016
8/10/16	VV:OR	juvenile	Oceano Dunes SVRA	2016
8/26/16	RR:BG	juvenile	Oceano Dunes SVRA	2016
8/26/16	LO:WW	juvenile	Moss Landing Salt Ponds	2011

Appendix 3. Other species or their sign observed on RGDP during 2011.

American pipit (*Anthus rubescens*)
Barn swallow (*Hirundo rustica*)
Black-bellied plover (*Pluvialis squatarola*)
Black phoebe (*Sayornis nigricans*)
Blacktailed jack rabbit (*Lepus californicus*)
Brewer's blackbird (*Euphagus cyanocephalus*)
California brown pelican (*Pelecanus occidentalis californicus*)
Caspian tern (*Sterna caspia*)
Cottontail rabbit (*Oryctolagus cuniculus*)
Elegant tern (*Sterna elegans*)
Feral pig (*Sus scrofa*)
Forester's tern (*Sterna forsteri*)
Golden eagle (*Aquila chrysaetos*)
Great egret (*Ardea alba*)
Horned lark (*Eremophila alpestris*)
House finch (*Carpodacus mexicanus*)
Kangaroo rat (*Dipodomys sp.*)
Least sandpiper (*Calidris minutilla*)
Long-billed curlew (*Numenius americanus*)
Mallard (*Anas platyrhynchos*)
Marbled godwit (*Limosa fedoa*)
Mountain lion (*Puma concolor*)
Mourning dove (*Zenaida macroura*)
Osprey (*Pandion haliaetus*)
Pocket gopher (*Thomomys sp.*)
Redwinged blackbird (*Agelaius phoeniceus*)
Royal tern (*Sterna maxima*)
Sanderling (*Calidris alba*)
Sea lion (*Zalophus californianus*)
Semipalmated plover (*Charadrius semipalmatus*)
Southern mule deer (*Odocoileus hemionus fuliginatus*)
Toad (*Bufo sp.*)
Turkey vulture (*Cathartes aura*)
Unidentified rodent(s)
Western meadowlark (*Sturnella neglecta*)
Western sandpiper (*Calidris mauri*)
Whimbrel (*Numenius phaeopus*)
White crowned sparrow (*Zonotrichia leucophrys*)
White tailed kite (*Elanus leucurus*)
Willet (*Catoptrophorus semipalmatus*)