# Western Snowy Plovers and California Least Terns on Rancho Guadalupe Dunes Preserve, Guadalupe CA 2013 Final Report

Prepared for:

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January 23, 2014

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This report summarizes 2013 breeding season monitoring of western snowy plovers and California least terns on Rancho Guadalupe Dunes Preserve, a Santa Barbara County Park. The Park is owned and operated by the County of Santa Barbara. Monitoring was conducted by Melissa Kelly (Assistant Naturalist/Ranger II, Recovery Permit # TE-54710A-0) and Thomas Applegate (Wildwing Recovery Permit # TE-823990-4) who assisted from June 10 – Aug 31 under contract to the County of Santa Barbara.

## Abstract

Snowy plovers were monitored between March 2 and September 18, 2013. Ninety-four field surveys were conducted. Fifty snowy plover nests and no least tern nests were discovered. The first known snowy plover nest was initiated on approximately 15 April and the last on 10 July. The fates of 40 nests were determined: 21 hatched at least one chick, 11 were lost to predators, 0 were destroyed by unknown causes, 7 were abandoned, 0 nests were lost to surf wash, and there were 10 nests for which the fate could not be determined since all evidence was erased by wind. The first known hatch occurred on approximately 16 May and the last about 7 August. At least 49 chicks hatched from the 21 successful nests. The earliest expected fledge date for 2013 chicks was 15 May and the last fledgling was expected to occur about 4 September; however, what appeared to be three unfledged chicks, with tails approximately one-third the adult length were seen on September 26. It is thought this nest occurred south of the Park boundary. Least tern monitoring was conducted concurrently with snowy plover monitoring during the time that breeding terns would be expected to be present. Areas where least terns were observed were not entered by the monitors. Observations were made from a distance.

## Introduction

Western snowy plovers (*Charadrius nivosus*) (Clements. 2007) inhabit coastal sand beaches along the Washington, Oregon, California, and Mexico coastlines, and suitable inland habitat at alkaline lakes, ponds and river bars in the western states (Page et.al., 1995). The U.S. Fish and Wildlife Service designated the Pacific Coast population as "Threatened" on March 5, 1993. The designated breeding season begins on March 1 and ends on September 30 annually. Nest initiations can begin in early March, but typically the first nests are not initiated until mid to late March, and occasionally early April. The last nests are initiated by mid July, and hatch by mid August, with the chicks fledging by mid September. Snowy plovers are present year round at RGDP, with wintering populations ranging from 78-114 birds.

California least terns (*Sterna antillarum brownii*) utilize suitable breeding habitat from Baja California, Mexico to the San Francisco Bay area in California. Terns nest in colonies 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. In 1973, the population of the species neared 600 pairs, but had risen to an estimated 6437 to 6699 pairs in 2010 (Marschalek, 2010). Least terns are typically present on RGDP from late May through August, and are absent the remainder of the year.

Nesting snowy plovers (snowy plover, plover) and least terns (least tern, tern) were monitored on RGDP in 2001, and from 2003 through 2013. Monitoring did not occur in 2002. Prior to 2001 some non-intensive intermittent monitoring occurred, but no comparable data resulted from those efforts. This report compares data collected since 2001 when available and applicable (Applegate et. al. 2003, 2004, 2007, 2008, 2009, 2010, 2011, 2012, SRS 2006, Sandoval 2005, Persons 2001), with 2013 breeding season data. The RGDP boundaries were not surveyed and marked until 2003, so some nests recorded in 2001 may not have been on RGDP property.

## Study Area

Rancho Guadalupe Dunes Preserve (RGDP) is located in northern Santa Barbara County (County), California, and encompasses approximately 592 acres, primarily immediately south of the Santa Maria River. A small area of estuary and sandspit breeding habitat at the northwest corner of the RGDP is currently north of the river mouth. This area was not surveyed this year because it was thought to be part of the Chevron (previously Unocal) property. Their monitors were thought to be surveying this area; however, in 2014 RGDP will monitor it. The majority of the property within RGDP is suitable breeding habitat for snowy plovers and least terns. RGDP borders the Pacific Ocean for approximately 1.3 miles and extends inland up to 1.4 miles.

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. The breeding habitat is composed of windswept open sand beaches, fore-dune and back-dune zones, manmade gravel flats, sections of old asphalt road and pad, coastal dune scrub and a riparian corridor with seasonal mudflats. Beaches are littered with logs, small plant debris, kelp, rocks and shells of varying sizes, and human litter. The fore-dune habitat is made up of open sand with low sparsely vegetated humps and small dunes bordering the beach. Open sand expanses lead from the fore-dune area through the mid-dune and into the back-dunes. The mid-dunes are sparsely vegetated, and the back-dune area varies from open sand expanses to sparsely vegetated dunes and scrub-covered areas.

Suitable plover and tern breeding habitat extends north of RGDP through the Guadalupe Restoration Project (a Chevron property formerly known as Guadalupe Oil Fields), Guadalupe-Nipomo Dunes National Wildlife Refuge, Oso Flaco State Park and Oceano Dunes State Vehicular Recreation Area. To the south, contiguous breeding habitat exists on Gordon Sand and Leroy Trust properties.

The habitat has changed little since our first monitoring season in 2003. The 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*), iceplant (*Carpobrotus edulis and C. chilensis*) in the foredunes, and perennial veldt grass (Erharta calycina) and Bermudagrass (Cynodon dactylon) in the backdunes. European beachgrass (*Ammophila arenaria*) a problematic invasive found on neighboring breeding sites was eradicated at RGDP several years ago and has so far remained absent.

## Methods

### Snowy Plovers

Snowy plover monitoring was conducted in all suitable breeding habitat between March 2 and September 18, 2013. Melissa Kelly was the primary snowy plover monitor on site from March 1 through September 30. Thomas Applegate assisted M. Kelly monitoring plovers from 10 June – 31 August and conducted California least tern monitoring. All surveys were conducted on foot. To avoid high afternoon winds, most surveys were completed in the morning. Later in the season when high winds became less frequent, some afternoon surveys were conducted.

An attempt was made to locate all snowy plover nests. The definition of a nest includes scrapes containing 1 or more eggs, or 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 status of nests was recorded. Nests were not physically marked: their locations were recorded using a Global Positioning System (GPS) and existing landmarks.

Nest fates were determined by evidence at the nest sites. Those that disappeared before the 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 and chicks were not banded.

Mini nest exclosures were installed over most nests after Common Ravens (Corvus corax) were seen in the Park. The exclosures consisted of a 36 inch cube made of no-climb wire fencing, open on the bottom and secured over the nests with 4 foot T-posts or fiberglass rods.

A snowy plover census was conducted on May 21 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 during the period when the population is expected to be stable and consist primarily of breeding plovers. During this census, plover age, sex, location, and the number and size of accompanying chicks were recorded. Each plover was checked for color-bands.

### California Least Terns

At least one pair was observed several times daily from 25 May - 8 June, in flight with fish over previously used nesting area, on the ground, and numerous copulations. On 2 June a pair was seen copulating 800-900 meters south of the parking lot. On 6 June 3 Least Tern copulations were observed, also south of the parking lot. On 8 June 7 copulations were observed in the same general area. On 10 June Tom Applegate arrived to perform least tern monitoring; this was conducted concurrently with snowy plover monitoring. Searches for least terns continued through late August, and consisted of searching for least terns in the air and on the ground, and listening for vocalizations. When least terns were observed, their number, location and activities were recorded.

# Results

## Snowy Plovers

### Population

The number of nesting snowy plovers on RGDP was estimated bi-weekly from active nest data. The estimate includes only nesting plovers and not breeding plovers that were rearing broods or in the process of nest initiation. An accurate number of brood rearing plovers is not possible without chick banding. A peak number of 10 nesting plovers were present in late May, and also early and late June (Table 1).

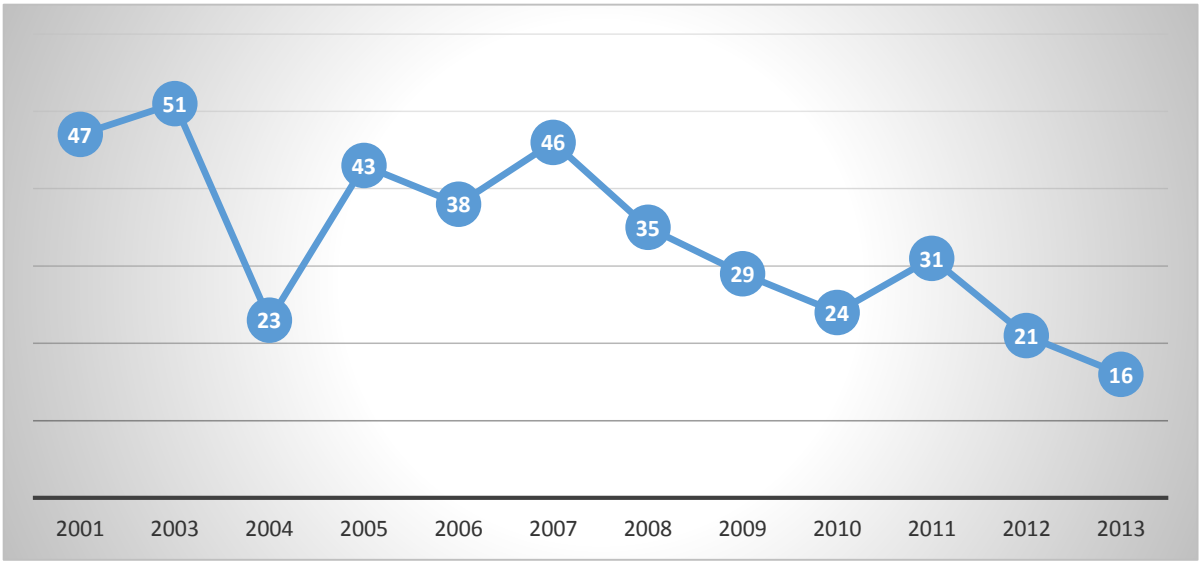
**Table 1. The estimated number of nesting pairs bi-weekly during the 2013 breeding season.**

| March | | April | | May | | June | | July | | August | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Early | Late | Early | Late | Early | Late | Early | Late | Early | Late | Early | Late |
| 0 | 0 | 0 | 7 | 8 | 10 | 10 | 10 | 9 | 6 | 4 | 1 |

Yearly censuses were conducted in late May on RGDP between 2001 and 2013, excluding 2002 (Figure 1). The number of plovers observed on the censuses is not considered the total number using RGDP at the time because plovers are not easily detected due to expansive topography, and plovers may leave the site temporarily or move during the survey. The 2013 plover population census was conducted on 21 May. Sixteen adults, and no chicks or fledglings were seen. Four of the adults were males, one was female, and eleven were undetermined. All plovers were checked for color bands. Four banded adults seen were:

AG:AY
VG:WB
PV:YB
RB:AG female

**Figure 1. Snowy plovers counted during the range-wide census on RGDP 2001 through 2013.***
* No snowy plover monitoring was conducted in 2002.

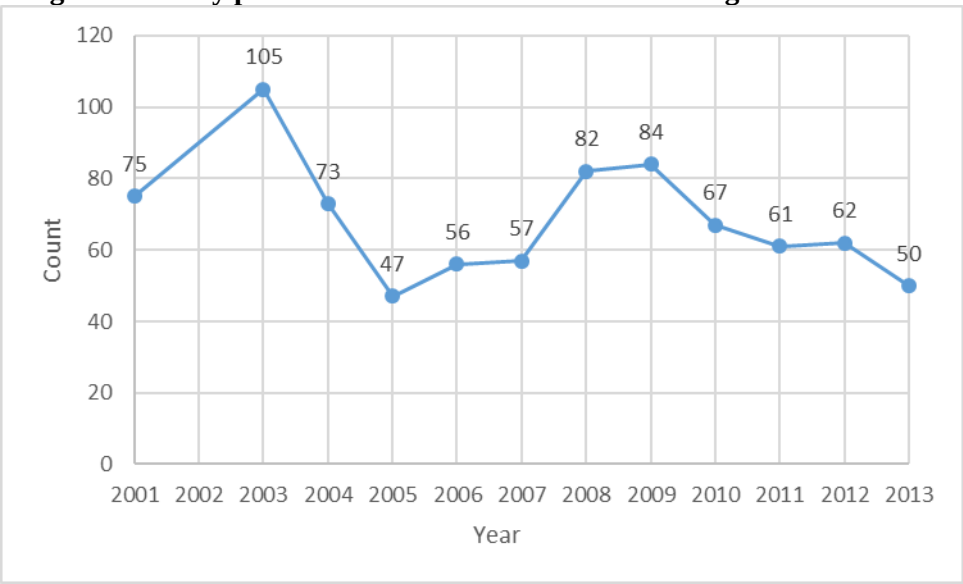



* No snowy plover monitoring was conducted in 2002.

## Nesting and Productivity

Fifty snowy plover nests were located on RGDP during the 2013 breeding season (Appendix 1). The actual number of nests was likely higher. It is probable that some nests were preyed on by ravens before they could be documented. The number of nests and their fates from 2001 through 2013 are compared in Figure 2 and Table 2.

**Figure 2. Snowy plover nests on RGDP from 2001 through 2013.***




* No snowy plover monitoring was conducted in 2002.

The fates of 40 of the 50 nests were determined. Twenty-one nests hatched at least 1 chick, 11 were lost to predators, 8 were abandoned, 0 nests were destroyed by unknown causes, 0 were lost to surf wash, and the fate of 10 nests were not determined since the wind destroyed any evidence.

The completion status of 21 of the 50 nests was established. Of the completed nests, 2 were 2-egg clutches, and the remaining 19 nests were 3-egg clutches (61 eggs). This resulted in a mean clutch size of 2.90 eggs for the 21 nests. The mean clutch size for each year is as follows:

2013 – 2.90 eggs
2012 – 2.89 eggs
2011 – 2.93 eggs
2010 – 2.88 eggs
2009 – 2.94 eggs
2008 – 2.93 eggs
2007 – 2.96 eggs
2004 – 2.90 eggs
2003 – 2.99 eggs

This data is not available for 2001, 2005, and 2006.

Of the 29 nests where completion status was not determined, 4 were abandoned with 1 egg, 3 with 2 eggs; and 1 with 3 eggs (13 abandoned eggs); 11 nests with 19 eggs were destroyed by predators; 2 of the 11 predated nests were observed with 3 eggs, 4 with 2 eggs, and 5 with 1 egg, and the remaining 10 nests with a fate unknown had a total of 19 eggs. This brought the total number of known eggs produced on RGDP in 2013 to at least 114 eggs. An unknown number of nests were probably predated by ravens before we could determine the number of eggs, but wind erased any evidence of predation.

**Table 2. The number and percent of snowy plover nests and their fates from 2001 through 2013.***

| Year | Hatch | Dest. Pred. | Dest. Unk. | Unk. Fate | Aband. | Dest. Surf | Dest. Wind | Dest. Cattle | Dest. River | Dest. Human | Total Nests |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2013 | 21 (42%) | 11 (22%) | 0 | 10 (20%) | 8 (16%) | 0 | 0 | 0 | 0 | 0 | 50 |
| 2012 | 20 (32%) | 27 (43%) | 2 (3%) | 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.

Estimated or actual initiation dates were determined for all 50 nests. The estimated number of nest initiations monthly is compiled in Table 3, and compared with years this data was available.

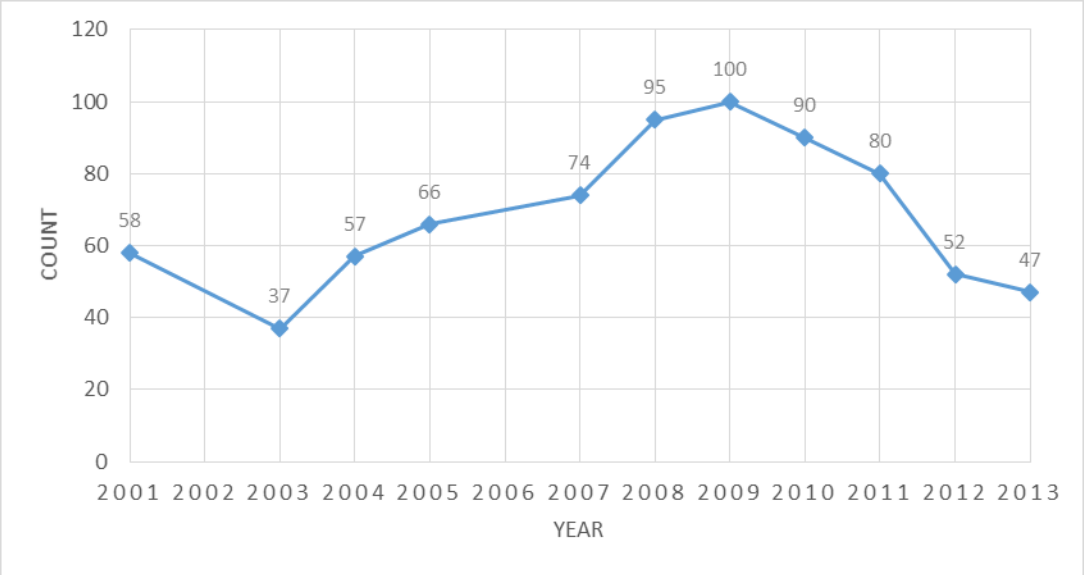
**Table 3. Nest initiations by month in 2003, 2004, 2007, 2008, 2009, 2010, 2011, 2012 and 2013.***

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

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

At least 49 chicks hatched from the 21 successful nests. Ten of the nests hatched 3 chicks, nine nests hatched 2 chicks, and two nests hatched 1 chick. The number of chicks hatched from 2001 through 2013 - excluding 2006 - is compiled in Figure 3.

**Figure 3. Number of chicks hatched 2001 through 2013.***




*Data not available for 2002, or reported in 2006.
** At least 100 and possibly as high as 104 chicks hatched in 2009.

A total of 819 nests have been documented on RGDP over the past 12 monitored breeding seasons (Table 4). Of these, 324 have hatched at least 1 chick, resulting in an overall hatch rate of 40%. The depredation rate for this period was 36%; 8% percent were destroyed by unknown causes, 9 % were abandoned, 1% were lost to wind, 0.5% were lost to river flooding, 0.3% were destroyed by cattle, 0.3% were destroyed by human activities and 0.1% were destroyed by surf wash. The fates of 4% of the total nests were undetermined.

**Table 4. The combined number of snowy plover nests and their fates from 2001 through 2013.***

| Years | Hatch | Dest. Pred. | Dest. Unk. | Aband | Dest. Wind | Dest. River | Dest. Cattle | Dest. Human | Dest. Surf | Unk. Fate | Total Nests |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2001-2013 | **324** | **297** | 61 | 68 | 9 | 4 | 2 | 2 | 1 | **35** | 819 |
| Percent | 40% | 36% | 8% | 9% | 1% | 0.5% | 0.3% | 0.3% | 0.1% | 4% | |

* No snowy plover monitoring was conducted in 2002.

## Brood Movement and Fledging

Because of the large size of the Preserve and the caution of the parents, broods are difficult to track. A few broods were in evidence however. Both new and older chicks were observed on at least 10-12 occasions during the breeding season. It is likely the ravens preying on nests were also preying on

chicks. In addition to ravens; northern harrier, coyotes, raccoons, red-tailed hawks, great horned owls and gulls were present and may have accounted for some chick loss. Broods were observed, in the nest area shortly after hatching, near the beach north and south of the parking lot, in the mid-dunes south of the parking lot and north near the estuary, in the back dunes near the Gordon Sand Plant, and south of Preserve boundary closer to Mussel Rock. The earliest expected 2013 fledge date was approximately June 5 and the last was expected to occur about September 2. Unbanded fledglings were first observed in small numbers in early July. Fledglings were most often sighted south of the beach parking lot with small flocks of adult plovers.

## Predators

Predators destroyed at least 11 (27.5%) of the 40 nests of known fate this season (Table 5). Common raven (*Corvus corax*) was the predominant observed and documented predator species. Ravens destroyed 8 nests (20%). Coyotes destroyed 1 nest (2.5%). Two nests were lost to unknown predators, however, ravens were especially active hunting the Preserve during these periods.

Ravens were first observed in RGDP breeding habitat on Friday April 26. A raven nest was located on Brown Road about 1.2 miles W of Hwy 1, southeast of RGDP. Two ravens from this nest were lethally removed on Friday morning 3 May apparently by predator control hired by Oceano State Vehicle Recreation Area (OSVRA). Evidence of ravens were not seen again until the first documented nest lost to the species on 24 May. One to 2 ravens or their tracks were observed regularly through May and June, then not at all for the first 2 weeks of July, but then again fairly regularly through the last 2 weeks in July and the first 2 weeks of August. A raven nest may have been removed near Pt. Sal by VAFB personnel in early July.

In response to the raven sightings, nest exclosures were installed on all nests that were found before hatching or being preyed on. A total of 22 exclosures were installed and 28 nests went without exclosures. Of 21 nests that hatched successfully, 20 nests were protected by exclosures. The 21$^{st}$ nest was found as it was hatching. Ravens were also problematic in 2011 and 2012.

Four exclosed nests were abandoned. Five were single egg nests and 2 were 2-egg nests. Four unexclosed nests, each with one egg, were also abandoned. One nest was lost when a coyote dug under the exclosure, and 1 egg from an exclosed nest was preyed on when it rolled down hill out of the exclosure.

Coyote tracks were observed throughout breeding habitat on all surveys, and individuals, including pups were observed on a number of occasions. Track evidence showed that coyotes traveled the shoreline, back-dunes and river flats regularly.

Additional potential 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 herodius*), *g*reat 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*).

**Table 5. Number of plover nests lost to predators on RGDP, 2001 through 2013.***

| Species | Number Lost | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2001 |
| Raven | 8 | 19 | 11 | 1 | 0 | 0 | 6 | 0 | 0 | 20 | 16 | 0 |
| Coyote | 1 | 1 | 0 | 6 | 7 | 8 | 10 | 10 | 4 | 7 | 14 | 0 |
| Gull | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 1 | 2 | 0 | 4 | 0 |
| Crow | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 4 |
| Unidentified Corvid* | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Harrier | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unk. Avian Predator | 0 | 3 | 6 | 4 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unidentified Species | 2 | 4 | 2 | 10 | 8 | 14 | 5 | 5 | 2 | 9 | 28 | 14 |
| Total lost to Predators | 11 | 27 | 20 | 24 | 27 | 26 | 22 | 16 | 8 | 36 | 64 | 18 |
| Total number of nests** | 40 | 61 | 60 | 66 | 79 | 76 | 53 | 54 | 47 | 70 | 100 | 74 |

* Raven or crow. ** Known-fate nests only.

## Least Terns

Since 2001, least terns have nested on RGDP 6 of the 12 monitored breeding seasons. Nesting has 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 and observed multiple nesting least terns and chicks in that area. In 2003, Applegate observed a roosting tern and a scrape in the area but no nest was known to be initiated. Terns did not nest on RGDP in 2003, 2006, 2008, 2011 or 2012.

Least tern breeding activity was observed on RGDP during the 2013 breeding season. At least one pair was observed several times daily from 25 May – 8 June, in flight with fish over previously used nesting area, on the ground, and numerous copulations (7 times in one day on Friday 7 June). This is typical behavior for terns establishing a nesting territory. The area used by the terns was not entered by the monitor to eliminate potential disturbance. Following this activity was a period of very high winds. In addition, ravens and coyotes were present in breeding habitat. When the site was surveyed after the period of high wind to determine if there were active tern nests, no terns were observed. But terns may have established nests only to lose them to wind or predators before they could be documented.

Least terns continued to be observed at RGDP but no breeding activity was documented. From 10 July through August terns began to be observed foraging in the Santa Maria River on a regular basis. Adults and fledglings roosted on the sandspit and fed in the river. The exact number of terns using the river was difficult to determine, but from 2 to 14 terns were usually observed, and at least 20 on one occasion. This was the highest amount of late season tern activity observed by Applegate during his monitoring on site. The river mouth had remained closed most of the 2013 breeding season which may have increased the density of prey fish for the terns. The closed river mouth was not typical and usually opens several times during a breeding season; for example it broke 9 times in 2012, but has broken only 3 times in 2013: 6 March, 4 June, 20 September. .

## Human Activities affecting Plovers and Terns

Vehicle access to the beach parking lot at RGDP was open seven days a week all year except for 22 days when the Park was closed for a full or half day to clear sand from the road.

Visitor access and habitat closures remained the same as in previous years. Visitors were restricted to the access road, parking area, and the beach west of a symbolic fence line. The symbolic fence consisted of a single strand of yellow nylon rope stretched between posts. Habitat closure signs were mounted on approximately every fifth post. Signs, written in English and Spanish, informed visitors of seasonal restrictions. The fence ran a short distance above the mean high tide line along the beach from the north to the south boundary, and was moved east or west throughout the breeding season as the beach width and habitat changed. The fence also lined both sides of the access road, all but the west side of the beach parking lot, and the south boundary of RGDP. The signs and rope remained in place from March 1 through September 30.

County staff maintained a presence on RGDP during open hours throughout the breeding season. One of their tasks was to monitor beach users and prevent them from entering the closed breeding habitat. Even with their presence, 20 incidents of trespassing occurred. Most trespassing occurred along the access road, onto the washed out road remains, and close to the parking lot. Trespassing also occurred over the entire west boundary, and areas of the south boundary. Some visitors were issued citations for trespass this season.

Most incidents of trespass were relatively minor with no known damage done. Two incidents however, were more potentially serious and occurred in the absence of a monitor. The first was the nighttime occurrence of small tire tracks that led from the main road diagonally through the habitat south to Mussel Rock and back. A timely phone call from County Detective Mark Valencia asking about unusual activity in the Park suggested the tracks may have been associated with drug activities along the coast. The second incidence was the result of a County employee being given permission, without the knowledge of a permitted monitor, to drive an ATV on the beach from the parking lot to Mussel Rock and back. Both these incidents occurred in mid-July.

There were no known incidents of human-caused loss of nests, chicks or adult plovers on RGDP in 2013.

## Discussion

The 2013 distribution of nesting and flocking snowy plovers on RGDP was consistent with previous years. Forty-one of the 50 nests (82%) were located between the mid-dune and the shoreline, and from the Santa Maria River to the southern Park boundary. Seasonal sand flats along the Santa Maria River were minimal and largely revegetated in 2013 and no nests were initiated in the River. Two nests were initiated near or directly beside the access road, and the remainder were scattered in the back-dunes. None were found on the "Ten Commandments" site.

The 2013 nest total decreased by 12 nests over the 2012 breeding season, although the hatch total of 21 was greater than 20 in 2012; but there were 5 fewer chicks produced this year. In the 12 recent monitoring years, only 2012 and 2003 had lower hatch totals. Ravens again were a factor although depredation help from Oceano SVRA and VAFB helped immensely. Nest exclosures were not used in 2003, and only one nests without exclosure (it was found while hatching) hatched this season. The 2013 nest total on RGDP was likely higher than was documented. Ravens this season, as always were very efficient at finding nests, and a 4-5 day per week monitoring schedule - it is likely that they found and destroyed some nests before they could be documented.

We believe that snowy plover productivity in 2013 was better than last year on RGDP. Several chicks were seen after hatching and some older chicks were observed during the breeding season. Heavy depredation by ravens was likely a leading cause. Gulls have not been observed predating chicks or nests; northern harriers sometimes hunt the dunes but spend most of their time hunting in the river; evidence of coyote predation was found at only one nest; tracks of Great Horned Owls are frequently seen in the dunes.

Mini nest exclosures were used when possible, but some nests were lost before exclosures could be installed. While exclosures are effective in reducing depredation, other issues such as adult plover mortality (Persons et al. 2003) and nest abandonments (Hardy and Colwell, 2008) have been attributed to their use. Four of the 8 nest abandonments were in exclosures. In addition, coyotes are sometimes attracted to exclosures and either pull them up or undermine them as on RGDP in 2010 and 2012 (Applegate Pers. Obs).

Predators remain 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. Over the last 12 monitored seasons, the mean percent lost to predators is 37%. This season a reduced 27.5% of nests destroyed by predators was undoubtedly due to depredation help from Oceano SVRA and VAFB. But depredation would have been even higher without the use of nest exclosures. At this time the County is not permitted to employ other predator management measures at the Park such as the removal of problem individuals. The County intends to pursue a depredation permit or an effective cooperative agreement with a permitted person or agency to deal with future problem predators.

The plover and tern breeding habitat on RGDP is generally of high quality, but encroachment of ice plant threatens to degrade habitat. Spreading ice plant facilitates the unnatural growth of high dunes

south of the parking lot, and large areas of iceplant are found on the north and south sides of the road just east of the beach parking lot. Park staff began removing ice plant, black mustard, Hottentot fig and other invasive plants by hand in 2011. Removal of these species from the Park should be considered a management priority. European beach grass has been eliminated on RGDP, but the site should be monitored closely for its reintroduction. If this species is found, immediate action should be taken to remove it. Veldt grass and narrow leaf ice plant are invasive in scrub habitat on RGDP, but do not appear to be causing a significant loss of breeding habitat at this time. These species should be monitored on a yearly basis and action should be taken if they begin to spread. Pampas grass was discovered on RGDP in 2011 and was removed by Park staff.

## Management Recommendations

Monitoring conducted since 2001 has shown that RGDP 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 affecting 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 passive recreational use by the public.

RGDP provides important nesting habitat for snowy plovers and least terns, has relatively light human use (31239 vehicles and 60874 people in 2013), and also has the ability to direct management goals toward habitat improvements that may increase overall western snowy plover and California least tern 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 closure signs and symbolic fence. Have the fence and signs in place from March 1 through September 30 each year. We recommend added measures to discourage trespass into protected areas: park staff should be present at the beach during all hours that RGDP is open to the public, with the priority of monitoring and educating visitors; and preventing collection of shells and driftwood, and damage to dune vegetation. Appropriate signage prohibiting collection of natural materials would be beneficial.

*2. Trespass* – Trespass into breeding habitat continues to put plovers and terns in danger. We recommend that the County continue using 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.

*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, including the use of mini nest exclosures when needed, 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 such as the ravens this season could be removed.

Park staff should continue to practice good predator management activities such as daily removal of garbage from the beach area. 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.

*4. 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) encouraging 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. Invasive plants reduce and degrade breeding habitat: iceplant is overtaking more suitable plover and tern nesting habitat each year. Park staff was unable to equal the quantity of invasive plants removed in 2012, however, a group 16 volunteers from the Cal Poly Student Sierra Hikers Coalition was recruited with help from the Dunes Center. They filled 27 30-gallon trash bags with ice plant from the fore dunes just north of the parking lot. This is a prime plover nesting and brooding area. In addition, another 30 bags of Veldt Grass were removed from the roadsides. We recommend encouragement of more volunteers to help with invasive removal and a continued aggressive winter eradication program to attempt 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 that may affect snowy plover and least tern productivity. 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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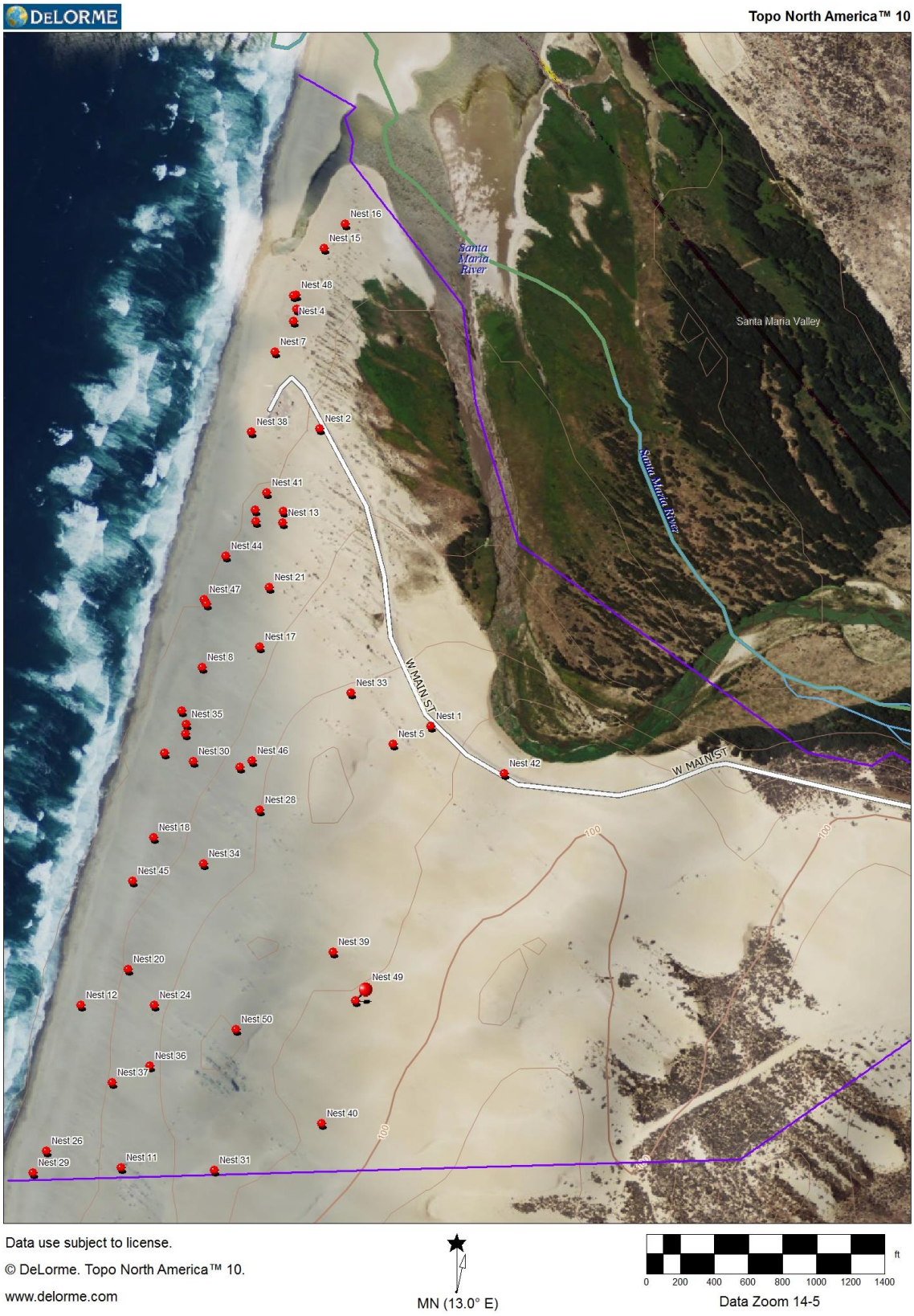
**Appendix 1. Snowy plover nest locations during the 2013 breeding season.**



**Appendix 2. Other species or their sign observed on RGDP during 2013**

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 (*Felis concolor)*
Mourning dove (*Zenaida macroura)*
Osprey (*Pandion haliaetus*)
Pocket gopher (*Thomomys* sp.)
Red-necked phalarope (*Phalaropus lobatus)*
Redwinged blackbird (*Agelaius phoeniceus*)
Royal tern (*Sterna maxima*)
Sanderling (*Calidris alba*)
Sea lion *(Zalophus califonianus)*
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 semipamatus*)