

State Beaches Rare Plant Surveys by California Native Plant Society Rare Plant Survey Committee, Spring 2011

Frank Landis, PhD

August 16, 2011

SUMMARY

Between March 18 and May 6, 2011, California Native Plant Society (CNPS) volunteers, led by Dr. Frank Landis, searched for sensitive, rare, and endangered plants at Silver Strand State Beach, Black's Beach, Torrey Pines State Reserve, and Cardiff State Beach. This search was part of a larger 2011 effort to find rare coastal dune plants in San Diego County, focusing on beaches that had not been recently surveyed. CNPS volunteers collectively spent 70.6 person-hours on the surveys.

Volunteers mapped twenty occurrences of five sensitive plant species:

- Brand's phacelia (*Phacelia stellaris*) a CDFG list 1B species. Between 4,358 and 4,458 plants were found at Silver Strand State Beach.
- Nuttall's lotus (*Lotus nuttallianus* or *Acmispon prostratis* in the upcoming Jepson Manual revision), a CDFG list 1B species. Between 18,939 and 24,939 were found at Silver Strand State Beach, Torrey Pines State Reserve, and Cardiff State Beach.
- Coast woollyheads (*Nemacaulis denudata* var. *denudata*), a CDFG list 1B species. Between 518,494 and 719,494 plants were found at Silver Strand State Beach and Torrey Pines State Reserve.
- Red sand verbena (*Abronia maritima*), a CDFG list 4 species. Between 300 and 320 were found at Black's Beach.
- Woolly seablite (*Suaeda taxifolia*), a CDFG list 4 species. Between 800 and 850 were found at Black's Beach.

All data collected (including a kmz file for Google Maps) are available from Frank Landis, as is contact information for the volunteers, in case this is needed for volunteer effort reports.

The document below details the survey methods and results by location.

INTRODUCTION

The Rare Plant Committee of the San Diego chapter of the California Native Plant Society performs annual surveys of rare, sensitive, or endangered plants, as its name suggests. Its mission is to find species and populations that are "falling through the cracks," plants that have not been recently surveyed or that occur in areas where systematic sampling or specimen collection is difficult. In these surveys, we fill a valuable role, checking on rare plants that are not typically monitored.

All work is performed by volunteers, led and supervised by Dr. Frank Landis, a trained botanist and plant ecologist. The survey protocol is basic: volunteers are recruited and trained to identify the plants under field conditions, and populations are either counted or numbers estimated, depending on what is found. The data are recorded on forms from the California Natural Diversity Database (CNDDDB) of the Department of Fish and Game (DFG). Data are shared with the landowner, state CNPS, CNDDDB, CDFG, and other interested parties on request.

In 2011, the Rare Plant Survey Committee chose to survey dune plants, because there was a consensus among informed participants that we had insufficient information on a number of species. In contacting landowners and studying existing records, the committee narrowed down potential survey locations to Silver Strand State Beach, Silver Strand Elementary School Beach, Fiesta Island, Black's Beach, Torrey Pines State Reserve, San Elijo Lagoon, Cardiff State Beach, and Batiquitos Lagoon.

This document details the surveys on State Parks Land. The sites include Silver Strand State Beach, Black's Beach, Torrey Pines State Reserve, and Cardiff State Beach

Silver Strand State Beach

Silver Strand State Beach was surveyed on March 18 and 20, 2011. On March 18, the following volunteers spent three hours surveying: Frank Landis, James Soe Nyun, Mike Gonzales, Tim Chumley, D. Gail Delalla. On March 20, another survey crew spent three hours surveying the rest of the beach. This second crew included: Frank Landis, Kye Ok Kim, Zarina Hackney, Cindy Burrascano, Tim Chumley, Frank Landis, David Varner, Marty Blake-Jacobson. Contact information for these volunteers is available from Frank Landis.

Survey methods differed by species, due to the number of plants present. In most areas, we counted Brand's phacelia (Table 1, Figure 1), except for 0318C, where the population was estimated as described below. Both Nuttall's lotus (Table 2, Figure 2) and coast woollyhead (Table 3, Figure 3) were either estimated or counted, depending on area. Estimates were created by counting the number of plants in a square foot in repeated areas, calculating an average density, and calculating the size of the polygon. For Nuttall's lotus (0320A), the plants occurred both as individuals and as contiguous mats composed of multiple plants. We visually estimated the area of the mats, then estimated the number of plants assuming four plants per square meter. In general, multiple volunteers worked in each polygon, each person working on a separate species.

In general, all three species occurred in areas that were not covered by non-native plants, often in areas that had been gently disturbed by human activity. Brand's phacelia most often occurred around park benches, along logs, and clustered around similar microtopographic relief. Nuttall's lotus also occurred

most often between park benches, and at the northern end of 0320E, around the boats. Coast woollyheads occurred throughout, on open sand where few or no other plants were present.

Table 1. *Phacelia stellaris* at Silver Strand State Beach

Scientific Name	Map ID	Number Found	Habitat Description
<i>Phacelia stellaris</i>	0318C	100-200	Location is Silver Strand state beach, bay side, picnic area east of Hwy 75 and south of access tunnel. 75% of <i>Phacelia</i> flowering. Habitat is coastal back dune in and around picnic area. Vegetative cover variable. Common species include <i>Lotus nuttallianus</i> , <i>Cakile maritima</i> , <i>Camissoniopsis cheiranthifolia</i> , <i>Nemacaulis denudata</i> var. <i>denudata</i> , non-native myoporum and palms around picnic tables. Major threats are trampling and <i>Carpobrotus edulis</i> .
<i>Phacelia stellaris</i>	0318G	606	Location is Silver Strand State Beach, bay side, area between the paved road and the dirt road closer to the least tern area. ~85% of <i>Phacelia</i> flowering. The other two edges were defined by sight lines that line up with the northern and southern boundaries of the nesting site. Habitat is beach, fairly open, low cover of annuals. The main plant in that area was <i>Medicago (lupulina)</i> , plus some <i>Camissoniopsis cheiranthifolia</i> and small numbers of other species. Trampling may be keeping the vegetation open and allowing plants to persist. The major threats are weeds, especially <i>Carpobrotus edulis</i> , and possible soil issues (too many nutrients).
<i>Phacelia stellaris</i>	0320A	3290	Location is Silver Strand State Beach, bay side, picnic area north of access tunnel. Area around picnic benches, fairly loose sand, covered densely with <i>Lotus nuttallianus</i> , <i>Nemacaulis denudata</i> var. <i>denudata</i> , <i>Erodium</i> sp., and other plants. Trampling may be keeping the vegetation open and allowing plants to persist. The major threats are weeds, especially <i>Carpobrotus edulis</i> , and possible soil issues (too many nutrients).
<i>Phacelia stellaris</i>	0320D	362	Location is Silver Strand State Beach, bay side. ~60% of <i>Phacelia</i> are flowering. Habitat is flat sandy beach, with a mix of open plants, patches of <i>Medicago</i> sp., <i>Camissoniopsis cheiranthifolia</i> , and similar plants. The major threats are trampling, weeds such as medicago, possible soil issues (too many nutrients)

Fig. 1. Polygons surveyed for *Phacelia stellaris* at Silver Strand State Beach

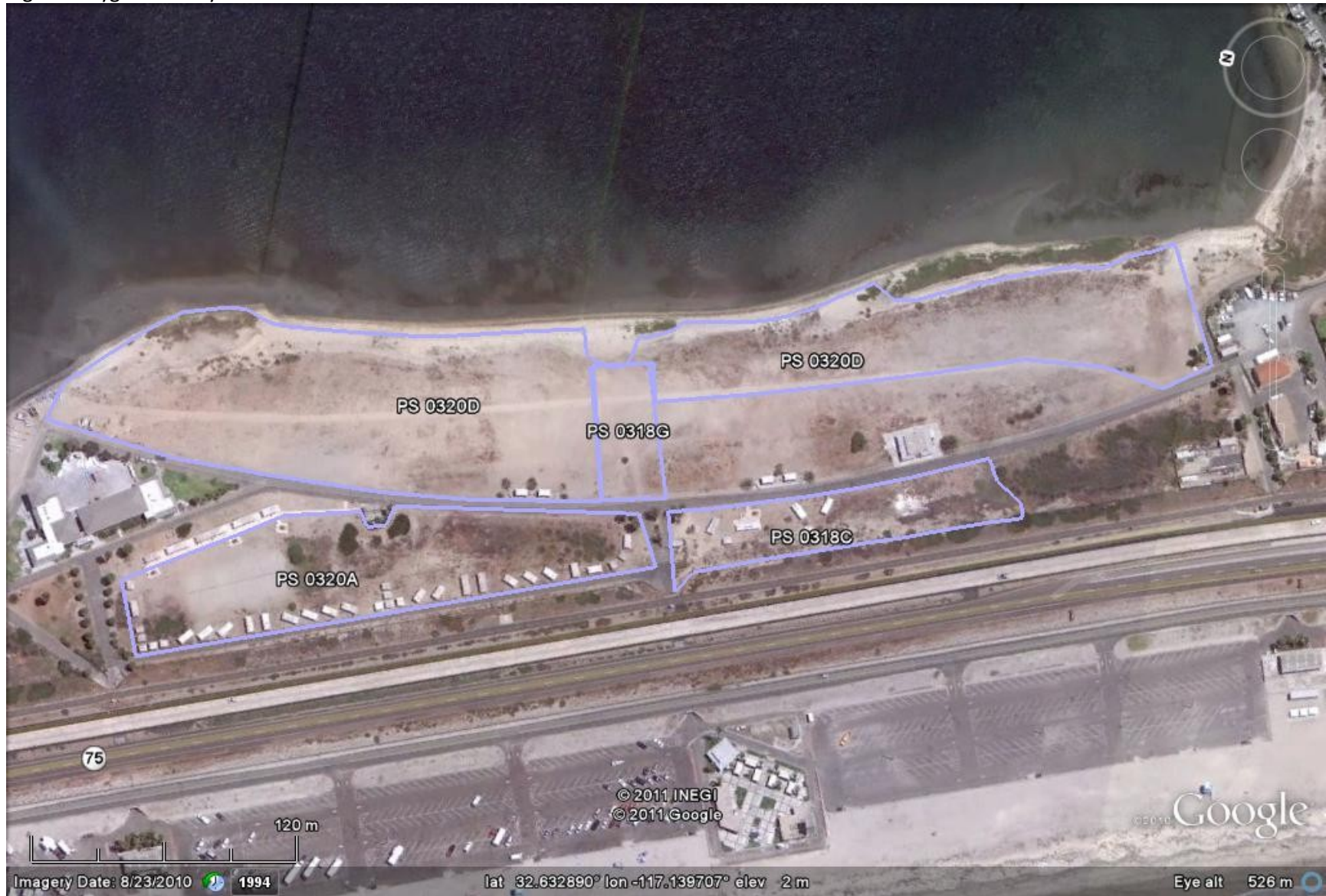


Table 2. *Lotus nuttallianus* at Silver Strand State Beach

Scientific Name	Map ID	Number Found	Habitat Description
<i>Lotus nuttallianus</i>	0318B	325	Location is Silver Strand State Beach, picnic area with dune scrub, on loose sandy soil possibly disturbed by foot traffic. 90 percent of <i>Lotus</i> flowering. Veg cover low, <10%. Other plants include <i>Nemacaulis denudata</i> , <i>Distichlis spicata</i> , <i>Cakile maritima</i> , <i>Camissoniopsis cheiranthifolia</i> , and <i>Medicago</i> sp.
<i>Lotus nuttallianus</i>	0318E	9	Location is Silver Strand State Beach, bay side, area roped off for least tern/snowy plover breeding by beach. All <i>Lotus</i> flowering. Area was surveyed from outside rope. Habitat is east-facing sandy slope in roped-off area 15 feet above high tide line along bay. Other species include <i>Batis maritima</i> , <i>Frankenia</i> sp., <i>Limonium californicum</i> , <i>Camissoniopsis cheiranthifolia</i> , <i>Nemacaulis denudata</i> . Trampling may be keeping the vegetation open and allowing plants to persist. Major threats are weeds, especially <i>Carpobrotus edulis</i> , and possible soil issues (too many nutrients).
<i>Lotus nuttallianus</i>	0318F	23	Location is Silver Strand State Beach bay side, area between the paved road and the dirt road closer to the least tern area. ~95% of <i>Lotus</i> flowering. The other two edges were defined by sight lines that lined up with the northern and southern boundaries of the nesting site Beach. Habitat is fairly open, low cover of annuals. The main plant in that area was the <i>Medicago</i> (lupulina), plus some <i>Camissoniopsis cheiranthifolia</i> and smaller numbers of a few other species. Trampling may be keeping the vegetation open and allowing plants to persist. Major threats are weeds, especially <i>Carpobrotus edulis</i> , and possible soil issues (too many nutrients).
<i>Lotus nuttallianus</i>	0320B	378	Location is Silver Strand State Beach, bay side, picnic area north of access tunnel. See polygon on accompanying map Area around picnic benches, fairly loose sand, covered densely with <i>Lotus nuttallianus</i> , <i>Nemacaulis denudata</i> var. <i>denudata</i> , <i>Erodium</i> sp., and other plants. Trampling may be keeping the vegetation open and allowing plants to persist. The major threats are weeds, especially <i>Carpobrotus edulis</i> , and possible soil issues (too many nutrients).
<i>Lotus nuttallianus</i>	0320E	18,000-24,000	Location is Silver Strand State Beach, bay side. ~80% of <i>Lotus</i> are flowering. Habitat is flat sandy beach, with a mix of open plants, patches of <i>Medicago</i> sp., <i>Camissoniopsis cheiranthifolia</i> , and similar plants. The major threats are trampling, weeds such as medicago, possible soil issues (too many nutrients)

Figure 2. Polygons surveyed for *Lotus nuttallianus* at Silver Strand State Beach



Table 3. *Nemacaulis denudata* var. *denudata* at Silver Strand State Beach

Scientific Name	Map ID	Number Found	Habitat Description
<i>Nemacaulis denudata</i> var. <i>denudata</i>	0318A	10,000-20,000	Location is Silver Strand State Beach, bay side, around picnic tables south to wet spot bordered by <i>Juncus acutus</i> . All plants seedlings, no plants flowering. Habitat is picnic area with dune scrub, on loose sandy soil possibly disturbed by foot traffic. Vegetative cover low, <10%. Other plants include <i>Lotus nuttallianus</i> , <i>Distichlis spicata</i> , <i>Cakile maritima</i> , <i>Camissoniopsis cheiranthifolia</i> , <i>Medicago</i> sp. Trampling may be keeping the vegetation open and allowing plants to persist. Rare plants are common around picnic tables. Major threat is weeds, especially <i>Carpobrotus edulis</i> .
<i>Nemacaulis denudata</i> var. <i>denudata</i>	0318D	455	Location is Silver Strand State Beach, bay side, area roped off for least tern/snowy plover breeding by beach. Area was surveyed from outside rope. No <i>Nemacaulis</i> flowering. Habitat is east-facing sandy slope in roped-off area 15 feet above high tide line along bay. Other species include <i>Batis maritima</i> , <i>Frankenia</i> sp., <i>Limonium californicum</i> , <i>Camissoniopsis cheiranthifolia</i> , <i>Lotus nuttallianus</i> . Trampling may be keeping the vegetation open and allowing plants to persist. Major threats are weeds, especially <i>Carpobrotus edulis</i> , and possible soil issues (too many nutrients).
<i>Nemacaulis denudata</i> var. <i>denudata</i>	0318H	2614	Location is Silver Strand State Beach bay side, area between the paved road and the dirt road closer to the least tern area. The other two edges were defined by sight lines that lined up with the northern and southern boundaries of the nesting site. No <i>Nemacaulis</i> flowering. Habitat is beach, fairly open, low cover of annuals. The main plant in that area was the <i>Medicago (lupulina)</i> , plus some <i>Camissoniopsis cheiranthifolia</i> and small numbers of other species. Trampling may be keeping the vegetation open and allowing plants to persist. The major threats are weeds, especially <i>Carpobrotus edulis</i> , and possible soil issues (too many nutrients).
<i>Nemacaulis denudata</i> var. <i>denudata</i>	0320C	15,000-16,000	Location is Silver Strand State Beach, bay side, picnic area north of access tunnel. No <i>Nemacaulis</i> flowering. Plants in area around picnic benches. Habitat is fairly loose sand, covered densely with <i>Lotus nuttallianus</i> , <i>Nemacaulis denudata</i> var. <i>denudata</i> , <i>Erodium</i> sp., and other plants. Trampling may be keeping the vegetation open and allowing plants to persist. The major threats are weeds, especially <i>Carpobrotus edulis</i> , and possible soil issues (too many nutrients).
<i>Nemacaulis denudata</i> var. <i>denudata</i>	0320F	500,000-700,000	Location is Silver Strand State Beach, bay side. No <i>Nemacaulis</i> are flowering. Habitat is flat sandy beach, with a mix of open plants, patches of <i>Medicago</i> sp., <i>Camissoniopsis cheiranthifolia</i> , and similar plants. The major threats are trampling, weeds such as <i>medicago</i> , possible soil issues (too many nutrients)

Fig. 3. Polygons surveyed for *Nemacaulis denudata* var. *denudata* at Silver Strand State Beach



Black's Beach

A section of Black's Beach was surveyed on April 29, 2011, by three CNPS volunteers (Dr. Frank Landis, Neil Bouscaren, and Margaret Filius) working for three hours. We surveyed from the stairs to the gliderport north to the northern end of the beach (Figure 4), looking for sensitive species as we walked north, then counting as we walked back south. We found two species, red sand verbena (*Abronia umbellata*) and woolly seablite (*Suaeda taxifolia*) (Table 4). Red sand verbena grew in the sand dunes at the base of the bluff, whereas woolly seablite grew at the base of the bluffs, below coastal sage scrub on the bluffs and above the dunes. Although the survey was linear, the species occupied a narrow polygon, as shown (Figure 4).

Our preliminary, northbound reconnaissance showed that there were too many plants of both species to keep an easy count, especially over a long distance. Therefore, we adopted a simple sampling strategy of walking four minutes at an ordinary pace, then spending one minute counting and walking at the same pace, with each person counting a separate species (a third plant we counted turned out to be a misidentified common species). We multiplied the number of plants we counted by five to derive the population estimates given in Table 4.

Table 4. Sensitive plants counted at Black's Beach

Scientific Name	Map ID	Number Found	Habitat Description
<i>Abronia maritima</i>	0429A	300-320	Location is Black's Beach, north of the access stairs to the gliderport. 20% of plants vegetative, 80% in fruit. Habitat is beach dunes along the base of bluffs. Cover is low, other plants include <i>Carpobrotus edulis</i> and <i>Camissoniopsis cheiranthifolia</i> . The major threats are <i>Carpobrotus</i> , human trampling, possibly weeds like <i>Melilotus</i> and <i>Bromus diandrus</i> .
<i>Suaeda taxifolia</i>	0429B	800-850	Location is Black's Beach, north of the access stairs to the gliderport. Habitat is bounded between beach and bluff. Upper edge is coastal sage scrub with <i>Encelia californica</i> , and <i>Artemisia californica</i> , lower edge is <i>Carpobrotus edulis</i> , <i>Camissoniopsis cheiranthifolia</i> , <i>Distichlis spicata</i> , <i>Bromus diandrus</i> , and other non-natives. Threats include human trampling, possibly weeds like <i>Melilotus</i> and <i>Bromus diandrus</i> .

Figure 4. Survey polygon for Black's Beach



Torrey Pines State Reserve

Volunteers surveyed two areas of Torrey Pines State Reserve. The bigger survey involved six volunteers (Frank Landis, Neil Bouscaren, James Soe Nyun, Margaret Filius, and Paul Hormick), who worked for four hours on May 6, 2011. This group covered two areas: the small sand dune across the highway from the main entrance, and the area around the sign at the main entrance (Figure 5). Margaret Filius (a volunteer at the reserve as well as a CNPS member) acted as our liaison with State Parks.

Because both areas were small, we counted plants in teams. Two sensitive species (Nuttall's lotus and coastal woollyheads) were counted, with the lotus occurring at both sites and the woollyheads occurring at one (Table 5).

The smaller survey took place on May 1, 2011. Frank Landis and Marty Blake-Jacobsen spent 2.3 hours surveying the area north of the northern parking lot for Torrey Pines state beach. We found approximately 10,000 yellow pincushion (*Chaenactis glabriuscula*), of which perhaps ten percent were identified by Dr. Landis as var. *orcuttiana*. Several weeks later, Fred Roberts visited the site, and thought that the percentage of var. *orcuttiana* was substantially higher. Both botanists agreed that many of the plants were intergrades between var. *glabriuscula* and var. *orcuttiana*. In the absence of consensus on the identity of the plants, these data were dropped from the overall survey.

Table 5. Survey results for Torrey Pines State Reserve.

Scientific Name	Map ID	Number Found	Habitat Description
<i>Nemacaulis denudata</i> var. <i>denudata</i>	0506A	425	Location is Torrey Pines State Beach, small dune across road from main entrance. 50% of <i>Nemacaulis</i> in flower. Habitat is small sand dune, 50-75% cover, with <i>Abronia umbellata</i> , <i>Pluchea sericea</i> , <i>Camissoniopsis cheiranthifolia</i> , and <i>Lotus nuttallianus</i> . Major threats are invasive grasses, such as <i>Ehrharta</i>
<i>Lotus nuttallianus</i>	0506B	152	Location is Torrey Pines State Beach, small dune across road from main entrance. 51% of <i>Lotus</i> in flower, 37% in fruit. Habitat is small sand dune, 50-75% cover, with <i>Abronia umbellata</i> , <i>Pluchea sericea</i> , <i>Camissoniopsis cheiranthifolia</i> , and <i>Heterotheca grandiflora</i> . Major threats are invasive grasses, such as <i>Ehrharta</i>
<i>Lotus nuttallianus</i>	0506C	23	Location is Torrey Pines State Beach, by main entrance sign, along path from bus terminal to edge of road. 95% of <i>Lotus</i> in flower or fruit. Habitat is weedy margin of trail on both sides, but 22 between trail and road on east, plus 1 on west side. Other plants include <i>Distichlis</i> , <i>Hordeum</i> , <i>Ehrharta</i> , <i>Isocoma menziesii</i> , <i>Plumbago</i> , and <i>Datura</i> . Major threats are invasive grasses, such as <i>Ehrharta</i> , and trampling

Figure 5. Survey polygons for Torrey Pines State Reserve at main entrance.



Cardiff State Beach

On May 6, 2011, David Varner of the San Elijo Lagoon Ecological Reserve escorted a group small group of CDFG personnel, plus Dr. Landis to a remnant dune on the east side of the Coast Highway, across from Cardiff State Beach where we all parked. On the way back, we noticed that 29 Nuttall's Lotus were growing along the edge of the highway, on the State Beach. MR. Varner and Dr. Landis spent 30 minutes counting them (Figure 6 and Table 6).

Figure 6. *Lotus nuttallianus* found at Cardiff State Beach.

Scientific Name	Map ID	Number Found	Habitat Description
<i>Lotus nuttallianus</i>	0502A	29	Location is Cardiff State Beach, immediately north of parking lot. All plants in fruit. Habitat is long strip between path and highway, on gently sloping west facing berm/back dune to cobble-sand upper beach area. 25% vegetation cover. Common species include <i>Camissoniopsis cheiranthifolia</i> , <i>Carpobrotus edulis</i> , <i>Medicago</i> sp (<i>lupulina</i> or <i>polymorpha</i>). Threats include foot traffic, bicycles, and <i>Carpobrotus edulis</i> .

Figure 6. Location of *Lotus nuttallianus* at Cardiff State Beach



Discussion and Conclusions

In performing these surveys, the biggest issue was the size of the population surveyed. Where there were few plants, a direct count was effective. However, where there were more than a few hundred plants, we resorted to estimation. As volunteers, we had limited time to undertake a direct count. In some cases, such as the coast woollyheads population at Silver Strand State Beach, there were too many plants to count accurately in a reasonable time.

To date, the best simple sampling method for large numbers of coast woollyheads and Nuttall's lotus was created when we surveyed outside Silver Strand Elementary School. On that beach, Brand's phacelia was the primary target species, and quite rare. While searching for phacelias, the survey team counted its paces. Every 50 steps, the surveyor spread their arms and circled in place, approximating a circle with one meter radius. All coast woollyheads and Nuttall's lotus within the circle were counted. From these samples, we calculated a mean density, and multiplied it by the surveyed area. Given the speed of this sampling method, we recommend it for future large-population surveys. The five minute survey rounds at Black's Beach worked well along the edge of the bluff.

While the survey wasn't specifically designed to study the ecology of the species counted, in general, it appeared that Brand's phacelia, Nuttall's lotus, and coast woollyheads were most numerous in areas of somewhat disturbed sand, especially in areas that were not dominated by non-native species. These areas particularly included the picnic tables at Silver Strand State Beach. Brand's phacelia in particular appeared to occur around the edges of benches and similar obstacles. At Cardiff State Beach and Torrey Pines, Nuttall's lotus was found co-occurring with weeds such as *Carpobrotus edulis*. However, these plants were rooted in semi-disturbed sand, and had grown over adjacent non-natives.

The CNPS rare plant survey committee is looking forward to performing these surveys again in the future. We are happy to provide data from these work, and any additional information that is required.