

**DRAFT ANNUAL REPORT:  
THE WESTERN SNOWY PLOVER IN LOS ANGELES COUNTY, CALIFORNIA:  
JULY 2010 TO AUGUST 2011.**

Prepared for:

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## FOREWARD

Here we report on monitoring, research, and community outreach activities performed by the Los Angeles County Snowy Plover Research Team between Summer 2010 and Summer 2011. We provide an annual update to the summary of efforts compiled in *The Western Snowy Plover in Los Angeles County* (Ryan et al 2010). For complete information on the species background, project background, methods, all beach maps, status and distribution prior to 2009, origins and site fidelity, complete recommendations, conservation background, regulatory framework, outreach and education, handouts, datasheets please refer to this report. It is available for sale at the Los Angeles Audubon bookstore and can be downloaded free, along with other study materials, from the Los Angeles Audubon website (<http://losangelesaudubon.org/>). Additionally, beginning in 2010, we switched from an annual report that goes from January 1 to December 31 to one that goes from July 1 to June 30. This better matches the snowy plover's biology on Los Angeles County beaches, where they tend to arrive in July from their breeding grounds, and then depart in April, with few seen in May and June. It will then also provide us with a better summary of the prior year's population and activities when we meet with beach managers, agency staff, and local biologists in October.

## INTRODUCTION

**History.** Prior to 1945, the Western Snowy Plover (*Charadrius nivosus nivosus*) (Snowy Plover) nested on beaches throughout Los Angeles County (LAC) (Grinnell and Miller 1944, WFVZ unpubl. data). Historically, Snowy Plovers have nested at Redondo, Ballona (Venice/Marina Del Rey), Los Angeles, and Malibu Beaches (LA Breeding Bird Atlas Data, Unpublished). However, increased human use of sandy beaches brought with it disturbance from beachgoers, lifeguards, maintenance staff, introduced predators, and sand grooming, reducing the ability of Snowy Plovers to nest on LAC beaches. In 1949, the last active nest of a Snowy Plover on LAC beaches was reported at Manhattan Beach (Stager 1949 in Page and Stenzel 1981). Since 1949, there have been no documented cases of a Snowy Plover nesting within LAC, although no systematic survey of suitable LAC beaches had been conducted since the 1970s (Gary Page pers. comm.). Despite the lack of documentation since 1949, Snowy Plovers have continued to overwinter on LAC beaches. The Santa Monica Bay Audubon Society (SMBAS) conducted surveys between 2004 and 2006 and found between 260-334 wintering Snowy Plovers (USFWS Unpubl. data, SMBAS Unpubl. data). Approximately 7% of Snowy Plovers wintering in California occur on LAC beaches (USFWS unpubl. data).

**Status.** The Snowy Plover is a species of conservation concern. The Pacific coast population of the Western Snowy Plover was listed as federally threatened in 1993 (USFWS 1993). The USFWS lists five beaches in LAC as critical habitat for the Snowy Plover (USFWS 2005). These beaches are protected as wintering habitat (USFWS 2005). A Recovery Plan was completed by USFWS in 2007 and LAC is within Recovery Unit 6, whose goals include protecting wintering Snowy Plovers and increasing the breeding population to 500 breeding individuals from the current level of 243 (2005-09 average) (USFWS unpubl. data, USFWS 2007). The Snowy Plover is also considered a Bird Species of Special Concern by California (Shuford and Gardali 2008).

**Biology.** For the Pacific coast population of the Snowy Plover, the nesting season extends from February through late September. On the California coast, where breeding tends to occur a few weeks earlier, nests usually appear by the third week of March (Page et al. 2009). Primary nesting habitats include sand spits, dune-backed beaches, beaches at creek and river mouths, and saltpans at lagoons and estuaries (Stenzel et al. 1981). Nests generally consist of a shallow scrape lined with beach debris and typically occur in flat, open, sandy areas with little vegetation (Widrig, 1980, Stenzel et al. 1981). Multiple pre-nest scrapes may be dug, with one selected as the nest; these typically begin to appear in late January-early February. Driftwood, kelp, and dune plants provide cover for chicks and harbor invertebrates, an important food source (Page et al. 2009). Nests are usually found within 100 meters (328 feet) of water, whether ocean, lagoon, or river mouth (Page and Stenzel 1981, Page et al. 2009). In addition to nest scrapes, Snowy Plovers build roost scrapes throughout the year; these are typically shallower, with no materials placed inside, and are often made from scraped-out footprints in the sand.

**Threats.** While several factors contribute to the degradation of winter roosting habitat and the disappearance of nesting Snowy Plovers in LAC, we suggest that the main problems are daily beach grooming, development of upper beach habitats such as dunes, heavy recreational use, vehicular traffic, domestic animals, and predators attracted to human refuse. Daily beach grooming removes many of the favorable nesting habitats described above, harms food resources, and likely destroys nest scrapes and eggs of Snowy Plovers (Page et al. 2009). Because grooming also removes naturally occurring kelp as well as trash, it has been shown to drastically reduce the invertebrate population that has adapted to break down kelp, including prey items favored by Snowy Plovers (Dugan et al. 2003, Page et al. 2009). Dugan and Hubbard (2003) found that Snowy Plover abundance on southern California beaches was positively correlated with the mean cover of wrack and abundance of wrack-associated invertebrates. Further, Dugan and Hubbard (2009) demonstrated that grooming increases rates of beach erosion, increasing the need for beach replenishment. Development of upper beach habitat removes cover and foraging resources and increases the presence of domestic animals and predators. Vehicular traffic is known to cause mortality, crush foraging resources (kelp, vegetation and wrack), and regularly flush resting Snowy Plovers from their roosts. There are over 50 million visitors to LAC beaches annually (County of Los Angeles 2009); their activities, including sunbathing, swimming, dog walking, and sports, require support services such as police and lifeguard patrols, water quality monitoring, erosion control, and trash pick-up, which also cause an increase in vehicles on the beach. Furthermore, human activity and local

residences attract predators such as cats, dogs, and American Crows by providing food in the form of refuse and outdoor pet food.

**Outreach and Education.** Public awareness of and support for Snowy Plover conservation in Los Angeles County is essential to species recovery. During both the 2007 and 2008 meetings of the Los Angeles County Snowy Plover Working Group a large part of the dialogue centered on how to combat lack of public awareness. The 3-year report published in early 2010 summarized in detail the volunteer/outreach activities from 2007-2009. In this report, we summarize volunteer/outreach activities completed from Fall 2010 to mid-August 2011 and outline activities scheduled to take place September through December 2011.

**Summary of Study Findings.** Prior to beginning this study, little was known about the wintering Snowy Plovers in LAC. We found that in coastal Los Angeles County (LAC), the Snowy Plover annually inhabits seven roosting sites at Zuma LT9/Zuma Lagoon, Malibu Lagoon, Santa Monica, Dockweiler State Beach near Tower 47 (DSB LT47), Dockweiler State Beach near Tower 58 (DSB LT58), Hermosa Beach, and Cabrillo Beach. They occasionally use sites at Leo Carrillo State Beach, Paradise Cove, Dan Blocker County Beach, Big Rock Beach, Will Rogers State Beach, Venice Beach, central Dockweiler State Beach, El Segundo Beach, Manhattan Beach, Redondo Beach, and Terminal 400 in LA Harbor. We found that 96% of all detections were at the main roosting sites. Of these, six, Zuma LT9, Malibu Lagoon, Santa Monica, DSB LT47, DSB LT58, and Hermosa Beach consistently support the largest numbers of Snowy Plovers. We suggest that conservation efforts be focused on six locations that make up approximately 1.9 km (1.2 miles) or approximately 1.6% of the linear coastline and 3.4 % of broad, sandy beaches in LAC. We found that they have inhabited roughly the same locations all six years of the study. Historic records find that they have likely been found at these locations for most of the past century (WFVZ, LAC Breeding Bird Atlas, Unpubl. data).

Approximately 196 to 334 Snowy Plovers overwinter in LAC each year. This is approximately 28.5% of wintering Snowy Plovers in RU-6 and 7.3% of the California population. Snowy Plover populations in LAC have declined in recent years. This was mostly due to declines at Zuma LT9 in winter 2005-06 and all beaches except Malibu in winter 2006-07. All beaches have appeared to recover except Zuma, which has still seen over a 50% decline during the study period. This is especially significant because this is the largest roost in LAC with approximately 42% of the population.

The Snowy Plovers that roost at LAC beaches create large numbers of scrapes, at least throughout the winter and spring months. These scrapes are used as resting areas and provide protection from wind and aid in hiding Snowy Plovers from predators. Scrapes outside of protected enclosures are destroyed on a regular basis by beach grooming, vehicle traffic, and pedestrians. If nesting attempts are being made, evidence is likely removed by the above disturbances and egg predators prior to discovery. In other areas, protection of winter roosts has led to establishment of nesting areas (Lafferty et al. 2006). We suggest that this would likely occur in LAC if these areas were protected. This would aid meeting the recovery goals for the Snowy Plover in Recovery Unit 6 (USFWS 2007).

We find that LAC is an important non-breeding area for Snowy Plovers from breeding colonies throughout California and Oregon based on observations of color-banded individuals. We suggest that individuals show high site fidelity and have observed individuals returning to LAC to the same beach for as many as six years. There is some movement of individuals among the Zuma LT9, Malibu, and Santa Monica roosts. However, we have not detected intra- or inter-year movements among the northernmost and southernmost roosts. Individuals have been recorded up to seven years old, with an average age of 2.8 years.

We have documented mortality by vehicle strikes and capture by dogs at nearby beaches. We suggest that these may be regular causes of mortality and normally go undocumented due to a lack of observers and the likelihood that Snowy Plover carcasses are scavenged or removed by beach grooming prior to discovery.

We find that there are many threats to the wintering Snowy Plovers. These likely threaten the current non-breeding roosting Snowy Plovers and prevent nesting on LAC beaches as well.

Threats include:

1. a lack of public awareness of the presence of Snowy Plover roosts and a lack of information about how to avoid disturbing the Snowy Plovers while enjoying the beach,
2. lack of training and information on locations of Snowy Plover roosts among some staff that drive and operate equipment on the beaches,
3. regular disturbance, removal of foraging resources, and occasional mortality resulting from beach grooming, operation of heavy equipment, and regular vehicular traffic,
4. regular disturbance and occasional mortality from off-leash dogs,
5. beach management practices that remove kelp and associated arthropods,
6. recreational activities and occasional large events that flush Snowy Plovers from roosts and leave large amounts of refuse near roosts, and
7. native and non-native predators drawn in unusually large concentrations to human refuse on and near the beach and pet food placed outside at nearby residences.

We believe that public awareness of and support for Snowy Plover conservation in Los Angeles County is essential to species recovery, such that developing education and outreach strategies has been concurrent with meeting the scientific goals of this study. With outreach initially targeted at colleges and universities we were able to increase volunteer participation in the monitoring program from 37 people in 2007 to 158 by the end of 2009, and volunteers contributed 1,681 hours over the course of the study. In addition to volunteer participation, initial steps towards establishing a formal docent program have included a public service announcement video, development of a conservation brochure as well as docent and classroom materials, creation of a website, drafting signage for plover enclosures, and development of a beach-driver handout. Maintaining positive relationships with beach management agencies and collaborating with other conservation-oriented organizations will be key in establishing a sustainable outreach program.

In summary, over the past five years the major accomplishments of the project include:

1. The involvement of over 200 community volunteers and an outreach program that has reached hundreds more.
2. Current, up-to-date knowledge of the location and population status of the Western Snowy Plovers.
3. Knowledge of details of their habits and biology, including migration timing, origins, and age structure.
4. Knowledge of the location and area requirements for adequate roosting space on beaches they currently occupy.
5. Detailed recommendations for the restoration of protected areas for roosting wintering plovers and a plan for steps to be taken if breeding occurs
6. Ongoing outreach to and discussions with local beach management agencies that will allow for greater protection of plovers while agencies continue to perform their vital duties.

**Study Goals.** This study was designed to provide year-round information on the Snowy Plovers on LAC beaches to determine (1) year-round attendance patterns at the main roosting areas, (2) the size and location of these roosts, (3) the overall population and distribution in LAC, (4) whether Snowy Plovers are currently attempting to nest, and (5) management recommendations for protecting winter roosts and creating conditions by which nesting may return.

## METHODS

### Population Status at Winter Roosting Sites

**Countywide Surveys.** From Fall 2010 to Spring 2011, project biologists and volunteers conducted county-wide surveys of all suitable roosting habitat (Ryan et al. 2010) in September 17-23, January 9-14, March 14-20, and May 22-28. The January and May surveys corresponded to the USFWS' winter and breeding season window surveys. All volunteers used a consistent survey method adapted from the Western Snowy Plover Winter Window Survey Protocol (Elliott-Smith and Haig 2006). All Snowy Plover counts were made in a single pass. On broad beaches, surveyors walked alongside each other and/or zigzagged during surveys. Field data were collected on a datasheet (Appendix 2), and surveyors marked the presence of Snowy Plovers and the area covered on a map or aerial photograph. Surveyors observed the birds for color bands. These were reported to the PRBO Conservation Science, who then provided information on origin and banding date. Data sheets were submitted to the survey coordinator. Data collected for each survey location included the number, location, and sex of all Snowy Plovers, color band combinations, the time, and weather conditions of each survey, and a general and specific habitat description of each beach and Snowy Plover sighting (Appendix 2). Surveyors also observed and recorded the level of human activity at each beach, such as presence of walkers, joggers, and individuals engaged in other recreational activities, the presence of on- and off-leash dogs, as well as the presence of vehicles and beach grooming equipment. In addition, surveyors recorded the presence of potential predators. During the breeding season surveys, volunteers noted breeding behaviors such as copulation, nest construction, incubation, or signs of agitation such as a broken wing display. All detections of Snowy Plovers and their nests were mapped from volunteer drawings and GPS locations using ArcView and overlaid on aerial photographs of the beaches.

**Roost & Nesting Surveys.** Project biologists conducted surveys of just the roost sites and nearby beaches in August, October, November, December, February, April, and June. No weekly roost surveys were conducted in 2011 due the lack of a contract from CDFG until after the Snowy Plover nesting season. Counts also followed protocols described by Elliott-Smith and Haig (2006). During these surveys, all snowy plovers were counted and the roosting area recorded on a GPS. This was accomplished by walking the perimeter of the colony at a distance that did not cause disturbance to the birds (typically 30-50 m). During and immediately after the roost survey, the biologist scanned the roost to determine if birds were sitting on the sand. Observations of potential breeding behaviors, such as calling, aggressive displays, territorial displays and male-female paired individuals, were also noted. If sitting birds or nesting behaviors were detected, the biologist walked the entire roosting area searching for scrapes, nests, eggs, and chicks. This was done as quickly as possible to minimize disturbance to the Snowy Plovers.

### Disturbance, Threats, Predation and Mortality

During the County-wide surveys and the roost and nesting surveys, the volunteers and biologists recorded adjacent beach use information (see data sheet, Appendix 2) and recorded



any events that occurred near the roosts that could potentially harm the plovers, disturb the plovers, or result in the mortality of plovers. They noted any dead birds found on the beach. Additionally, California State University, Los Angeles Graduate Student Lauren Tingco conducted an in-depth study of disturbance of Snowy Plovers on Los Angeles County Beaches (Tingco In Prep).

### **Education and Outreach**

A core of volunteers received training to serve as both monitors and docents at the Dockweiler enclosure and Malibu Lagoon from Fall 2010 to Spring 2011. Volunteers at these sites gathered data on Snowy Plover behavioral response to disturbance, thereby assisting CSULA graduate student Lauren Tingco with her study. These volunteers also interacted with beachgoers and beach agency staff while monitoring roost sites. In addition, Los Angeles Audubon staff and volunteers worked with the Dockweiler Youth Center to establish a series on beach walks for the public, and with Los Angeles Unified public schools to facilitate in-school presentations and field trips to view Snowy Plovers at Dockweiler Beach.

## RESULTS AND DISCUSSION

### Population Status

<b>Beach No.</b>	<b>Beach Name(s)</b>	<b>Sept</b>	<b>Jan</b>	<b>Mar</b>	<b>May</b>	<b>Total</b>
1	Leo Carillo State Beach/Nicholas Cyn CB	0	0	0	0	0
2	El Sol, El Pescador, La Piedra SB	0	0	Ns	0	0
3	El Matador, Lechuza Beach	0	0	Ns	0	0
4	Zuma Beach	54	86	47	0	187
5	Zuma Beach (morning view to pt dume)	0	0	0	0	0
6	Dume Cove, Paradise Cove, Escondido B.	0	0	0	0	0
7	Dan Blocker CB, Puerco Beach	0	0	0	ns	0
8	Malibu Bluffs SP, Amarillo B, Malibu B.	0	0	0	0	0
9	Malibu Lagoon, Carbon Beach	41	47	38	0	126
10	La Costa B., Las Flores B., Big Rock B.	0	0	0	ns	0
11	Las Tunas CB, Topanga CB	0	0	0	0	0
12	Castle Rock B	0	ns	0	0	0
13	Will Rogers SB North	0	0	0	0	0
14	Will Rogers SB South	0	0	0	0	0
15	Santa Monica State Beach North	39	58	50	0	147
16	Santa Monica State Beach South	0	0	0	0	0
17	Venice City Beach North	0	0	0	0	0
18	Venice City Beach South	0	8	0	1	9
19	Dockweiler Beach North	28	34	14	0	76
20	Dockweiler Beach Central	0	0	0	0	0
21	Dockweiler Beach South	28	23	21	0	72
22	El Segundo & Manhattan Beach	0	0	0	0	0
23	Hermosa Beach North	22	44	0	0	66
24	Hermosa Beach South & King Harbor	0	0	8	0	8
25	Redondo County Beach North	0	0	0	0	0
26	Redondo CB South & Torrance CB	0	0	0	0	0
30	Portuguese Bend	0	ns	0	0	0
32	Point Fermin & Cabrillo Beach	6	2	0	ns	8
35	Alamitos & Junipero Beach	0	0	0	ns	0
36	Belmont Shore & Peninsula Beach	0	0	0	ns	0
	Total Observed	218	302	178	1	699
	No. of Beaches	7	8	6	1	22
	Average Roost size	31.1	37.8	25.4	1	30.4
	SEM	5.81	9.68	7.44	0	4.55
	Standard Dev	15.4	27.4	19.7	0	21.8
	sqrtN	2.65	2.82	2.64	1	4.79

**Countywide Surveys.** Countywide surveys detected a peak of 302 plovers in January 2011 (Table 1). This is the highest total since before the population decline observed in 2007 (Table 2). Monthly average detections (Table 3) were slightly lower in the summer and fall (July to October), but then higher in the winter and spring months (November to April). The average roost size is increasing, but still lower than it was prior to the 2006-07 declines (Table 2). We suggest that the population is still recovering from whatever caused the large decline between 2006 and 2007 (Ryan et al. 2010). Roost populations at Malibu, Santa Monica, Dockweiler, and Hermosa have mostly recovered to pre-decline levels. However, Zuma remains just over half its previous size.

**Table 2. Annual Detections of Snowy Plovers during Winter Window Surveys 2004-10.**

<b>Beach</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Leo Carrillo State Beach/Nicholas Cyn CB	0	0	0	8	0	0	0	0
Zuma Beach	130	133	213	52	32	82	80	86
Zuma Beach South	0	0	0	0	48	0	0	0
Dume Cove, Paradise Cove, Escondido B.	0	0	0	6	0	0	0	0
Dan Blocker CB, Puerco Beach	0	0	0	23	0	0	0	0
Malibu Lagoon, Carbon Beach	33	28	12	34	37	36	67	47
La Costa B., Las Flores B., Big Rock B.	0	ns	ns	2	0	0	0	0
Will Rogers SB North	0	0	ns	2	0	0	0	0
Will Rogers SB South	0	0	ns	0	0	1	0	ns
Santa Monica State Beach North	32	40	42	16	30	40	41	58
Venice City Beach North	ns	0	ns	0	0	1	0	0
Venice City Beach South	ns	0	ns	2	0	0	0	8
Dockweiler Beach North	12	34	23	9	10	20	6	34
Dockweiler Beach Central	0	0	0	0	0	4	6	0
Dockweiler Beach South	13	0	0	4	11	15	16	23
El Segundo & Manhattan Beach	0	0	0	0	3	0	4	0
Hermosa Beach North	33	41	36	23	29	26	11	44
Hermosa Beach South & King Harbor	0	0	0	8	0	2	0	0
Redondo County Beach North	0	0	0	0	0	ns	0	0
Point Fermin & Cabrillo Beach	13	9	8	7	0	6	5	2
<b>Total Observed</b>	<b>266</b>	<b>285</b>	<b>334</b>	<b>196</b>	<b>200</b>	<b>233</b>	<b>244</b>	<b>302</b>
<b>No. of Sites (N)</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>14</b>	<b>8</b>	<b>11</b>	<b>9</b>	<b>8</b>
<b>Average Roost Size</b>	<b>38.0</b>	<b>47.5</b>	<b>55.7</b>	<b>14.0</b>	<b>25.0</b>	<b>21.2</b>	<b>27.1</b>	<b>37.8</b>
<b>Std. Error</b>	<b>15.8</b>	<b>17.8</b>	<b>29.6</b>	<b>3.9</b>	<b>5.5</b>	<b>7.4</b>	<b>10.0</b>	<b>9.68</b>

**Table 3. Monthly detections of Snowy Plovers at roosts 2004-2009 vs. 2010-2011.**

<b>Month</b>	<b>2004-2009 Average Obs.</b>	<b>SEM</b>	<b>2010-2011 Average Obs.</b>	<b>SEM</b>
Jul	9.1	1.29	1	0
Aug	24.3	2.95	20.0	3.5
Sep	32.8	4.64	31.14	-
Oct	42.8	6.3	42.2	14.2
Nov	39.5	5.36	39.8	7.84
Dec	44.2	6.56	45.7	9.55
Jan	31.1	5.59	37.8	9.68
Feb	30	6	41.3	8.85
Mar	24.3	6.86	25.4	7.44
Apr	9.2	1.55	16.5	0
May	1.7	0.33	1	0
Jun	0	0	1	0

**Table 4. Snowy Plovers observed at roosts during each survey 2004-2011. \*Surveys in 2010 are from January to June.**

<b>Year</b>	<b>Average Observed</b>	<b>SEM</b>	<b>Total Counted</b>	<b># Surveys</b>
2004	42.3	7.9	1014	24
2005	55.6	15.5	778	14
2006	43.2	7.8	1426	35
2007	18.5	2.5	1164	63
2008	21.9	2.4	1619	74
2009	26.0	2.9	1868	71
2010*	23.3	4.1	745	32
2010-2011	32.1	2.6	1859	155

**Roost Surveys.** The roost surveys conducted by project biologists agree well with the counts made by volunteers. As was noted in Ryan et al. 2010, most plovers attend the roosts until mid to late-March, departing in late March-early April, with a few plovers remaining into early May. Most are gone by the time the USFWS breeding window is scheduled during the third week of May.

Beach	Beach Name(s)	Jul	Aug	Oct	Nov	Dec	Feb	Apr	Jun	Total	Avg	Freq
4	Zuma Beach	0	23	85	68	78	71	18	0	343	57.2	6
9	Malibu Lagoon,	0	35	61	47	63	52	9	0	267	44.5	6
15	Santa Monica North	0	14	16	40	56	55	17	0	198	33.0	6
19	Dockweiler Beach North	0	10	41	47	19	27	22	0	166	27.7	6
21	Dockweiler Beach South	1	19	0	0	26	12	0	0	58	14.5	4
23	Hermosa Beach North	0	19	8	23	32	31	0	0	113	22.6	5
	Total Observed	1	120	211	225	274	248	66	0	1145	139.3	
	No. of Beaches	1	6	5	5	6	6	4	0		33	
	Average Roost size	1	20	42.2	45	45.7	41.3	16.5	0		34.7	
	SEM	0	3.52	14.2	7.22	9.55	8.85	0	0		3.92	

## Roosting Sites

**Zuma County Beach.** Zuma is the largest roost and supports approximately 41% of the county population (Ryan et al. 2010), but only supported 28.5% of the population in 2011. At Zuma, the flock remained north of Lifeguard Tower 9, and as in 2010, frequently the flock would spread to the north along the top of the beach slope following beach grooming at their main roosting location (Figure 2). The winter survey window showed an increase over the 2010 count from 80 to 86 plovers (Table 2). Their population remained high until February, decreasing by about half by March (Tables 1 and 5). This roost is not protected and is regularly groomed and driven through. As discussed here and above, this roost remains at about half its previous population. Additionally, in 2008 a large proportion of the flock moved south to near the lagoon (Ryan et al. 2010). In 2010 and 2011, they were widely scattered north of their historic roost location. We do not know why this occurs here, but one possibility is the regular disturbance by vehicles and large numbers of beach-goers during their migratory period in July and August. On January 12, 2011 work by tractors and trucks was being conducted near Trancas Creek and an observer noted berms along much of the survey route.

**Malibu Lagoon.** Malibu is the second largest roost and typically supports about 16% of the county population (Ryan et al. 2010). In 2010, it supported 21% of the population. The population fluctuated from 41 to 63 throughout the winter, declining slightly to 38 in March and then 9 in April. Overall, despite the low count during the winter survey window of 47, we suggest that the population was stable here between 2010 and 2011, with over 60 birds being regularly counted. This represents an overall increase from surveys conducted between 2004 and 2009 (Ryan et al 2010, Table 2). As was done in the early spring of 2008, 2009, and 2010, an enclosure was installed on March 25, 2011. The plovers used it intermittently, preferring to use a segment of beach west of the enclosure, and retreat to it when the beach becomes crowded (Figure 3). The enclosure was well respected, one sign was broken and a small segment of rope was removed, likely for use by the local homeless population rather than as an act of vandalism. This beach is not groomed and there was a large accumulation of kelp following several large wave events. Additionally, what had formerly been a large sand bar behind the main beach became an island and snowy plovers were observed roosting and foraging here. On September 23, 2010 a volunteer noted that two large islands had formed within the lagoon, taking many birds off the beach. The highly dynamic nature of this site can make it a challenge to implement protective measures on a consistent basis.

**Santa Monica State Beach.** The roost at Santa Monica usually supports about 8% of the countywide wintering population of plovers (Ryan et al. 2010), but supported 18.5% of the population in 2011. We observed between 39 and 58 plovers here between September and March, declining to 17 in April. This is more than was detected here during the 2004-09 surveys (Ryan et al. 2010, Table 2). In 2011, the plover flock moved its roosting site to an area south of the existing enclosure, by late winter, they had moved even further south, south of lifeguard tower 6 (Figure 4). The enclosure was placed in this area later in the season than normal. In 2011, the enclosure was reduced in size to approximately 150 ft long and placed farther from the shoreline than normal (Figure 4). As a result, it was rarely used by the plovers. We recommend that in Fall 2011-Winter 2012, the enclosure be at least 100 ft x 300 ft and placed around the location being used by the plovers.

One likely explanation for the shift south is the presence of temporary summer surf camps on top of the plover's traditional roost sites when they arrive in July and August. There is one operated by Quicksilver-Roxy that is placed on the exact spot where the plovers roosted and the enclosure was placed until 2009 (Figure 4) (UTM 11S 361508 m N, 3764671 m E). In checking the Camp's website (<http://www.perfectdaysurfcamp.com/surfing/summer-camp.html>) we found that it operates from June 13 to September 9 from 9 am to 4 pm. It is for ages 5-17. We observed approximately 60 campers and councilors at the site. Activities include playing games like volleyball, prisoner, capture the flag, dodge ball, soccer, stand up paddle boarding & boogie board. They appeared to spread out south of Lifeguard tower 6. We recommend that whoever issues the permit for this camp should restrict their activities to north of Tower 6 in future years. It is likely that the reason the roost has moved to the south is that this camp is operational when plovers arrive from migration and for approximately the first seven weeks that they are present in the late summer (mid July to early September).

**Venice Beach.** In 2011, the snowy plovers were frequently observed on a small point at Venice Beach. Fourteen were there in November, eight in January, and one individual was observed in May and June. If individuals are detected here in January 2012, it will become part of our 2011-12 roost survey program.

**Dockweiler State Beach.** In 2011 the northern roost near **Lifeguard Tower 47 (LT 47)** supported between 19 and 47 plovers from September to April (Table 1 and 5). The winter window count of 34 plovers tied the highest winter count on record from 2005 (Table 2). Overall 13% of the Los Angeles County winter roosting population overwintered here. We attribute these increases to the presence of an enclosure that has protected the core roosting area since 2009. On August 14, 2010 a wooden-slat fence replaced the snow fencing and it remained in place through the entire 2010-2011 season (Figure 5).

Los Angeles Audubon, USFWS, and LACBH have all worked as a team to maintain the fence, pick up trash, and remove invasive plant species. There was no vandalism to the fence and during most clean-up visits, only a few pieces of trash are recovered. As noted by Dan Cooper in an August 4, 2011 email, there are now four native coastal strand/dune plant species that are voluntarily colonizing the enclosure area. These include *Atriplex leucophylla* [beach saltbush] (7 individuals, all in the "upper wrack line"), *Abronia maritima* [red sand verbena] (3 individuals, a CNPS rare species), *Ambrosia chamissonis* (2) [silver beachweed or silver beach burr], and *Camissonia cheiranthifolia* (2) [beach primrose]. He further commented that he was unaware of, "any other site in the county (mainland) that supports *Atriplex leucophylla*. *Abronia maritima* is almost as rare in the area."

Observers did note the presence of vehicle tracks in front of the enclosure and we recommend that vehicles avoid this area to the extent possible. We also observed dog tracks in the enclosure and support enforcement of existing dog regulations on this beach. Based on frequent monitoring of the enclosure site by volunteers from September 2010 to April 2011, it should be noted that there is a near-constant presence of large aircraft passing directly over the enclosure as flights leave Los Angeles International Airport.

At the southern roost, north of **Lifeguard Tower 58 (LT 58)**, (Figure 6) we detected 12-28 plovers between September and March, with a high count of 28 by volunteers in September. This is more than the 10-15 detected here in 2010 and the winter window count was the highest recorded (Ryan et al. 2010, Table 2). This roost is not protected and is regularly groomed and driven through. We recommend that an enclosure be considered for this location as it is between the Dockweiler Youth Center and the RV park in an area not often used by the beach-going public. However, on March 19, 2011 volunteers noted the presence of over 350 people along this survey route who were watching sports events. This roost site also has great educational value, as it is the focus of the beach walks jointly coordinated by Los Angeles Audubon and Dockweiler Youth Center.

**Hermosa Beach.** We detected between 8 and 32 plovers at these roosting areas from August to February, none were detected here in March or April (Tables 1 and 5). This is an increase over 2010, but similar to numbers observed here from 2004 and 2009 when between 23 and 41 plovers were present (Ryan et al. 2010). They also departed early in 2010. As in 2010 the location of the roost was highly variable (Figure 7). They moved regularly, but were mostly observed adjacent to 20<sup>th</sup> to 22<sup>nd</sup> Streets. The reason for this movement and unusually early departure is unknown. However, this roost is regularly groomed, patrolling vehicles regularly pass through it, and dog tracks are regularly observed in the area. We have also seen movements like this at Zuma, another beach with heavy disturbance at the roost site (Ryan et al. 2010).

## **Nesting**

During the monthly roost surveys, as usual we detected scrapes at sites that had not recently been groomed. Due to a lack of contract, we were unable to conduct weekly surveys of the roosts during this time. Individuals were noted in May and June at Venice Beach South, near and within the Least Tern nesting area, but no nests were detected here. We did not detect any eggs or chicks in 2011. However, we did note nesting behaviors including calling, aggressive displays, and male-female pairings.

## **Disturbance, Threats, Predation and Mortality**

For complete summary as well as complete recommendations, please refer to Ryan et al. 2010. There is additional, detailed information that will be available shortly through CSU Los Angeles Graduate Student Lauren Tingco's Master's Thesis.

**Lack of Public Awareness.** In Fall 2010 through mid-August 2011, our community outreach program continued to reach Los Angeles County beachgoers of all ages. However, the majority of beach users are completely unaware that snowy plovers are present and are unaware of things that they can do to minimize their impact on plovers. We plan to continue our volunteer recruitment and training and to expand our docent program, classroom visitations, and other public outreach events.

**Sand Grooming/Beach Raking.** We have not been informed of, or observed, any changes in the LACBH beach grooming policy. We were told that grooming is taking place earlier in the morning than it had previously. Grooming equipment continues to pass through plover roosts, flushing plovers and removing roosting scrapes between February and April at Zuma, Dockweiler LT 58, and Hermosa Beach. We did note that, as in 2010, the groomer operator on Santa Monica State Beach attempted to avoid the area that the plovers relocated to south of the enclosure on most days. We recommend that the beach groomers avoid plover roosting areas at these other beaches as well.

**Vehicles Driving on Beaches.** As in 2010, most vehicles we observe on the beaches near the roosts are moving considerably slower than they had in the past. Both slow-moving and fast-moving vehicles continue to drive through the roosting areas, flushing plovers, and removing



roosting scrapes. In 2011, we did observe some vehicles exceeding the recommended speeds, but this has become increasingly rare due to efforts by LA County Lifeguards and LACBH. Our Dockweiler Enclosure volunteers noted 26 vehicles and 15 pieces of heavy equipment during their observations, none were observed speeding. Our County-wide survey volunteers counted 96 vehicles, 3 ATVs, and 26 pieces of heavy equipment. Of these 13 vehicles were noted as exceeding 15 mph. Of these 13 vehicles, eight were LA County Lifeguard, four were from Beaches & Harbors, and one from the City of Santa Monica. The observations were made at Zuma (1), Santa Monica (2), Venice Beach North (2), Venice Beach South (1), Dockweiler State Beach North (1), and El Segundo/Manhattan Beach (6).

We recommend continued training of new beach drivers and reminders to all beach drivers by all agencies that drive on the beach and to maintain the increased enforcement by supervisory staff.

**Dogs.** We continue to observe off-leash dogs near all roosting areas. We suspect that one reason the plovers may not be using the enclosure at Malibu is because of dog owners who arrive early in the morning prior to rangers and lifeguards. We regularly observed dog tracks within the enclosure and on the beach. However, this is true of all beaches and continues to be an on-going problem. We recommend increased public outreach and the enforcement of existing dog regulations at public beaches.

**Camps & Planned Recreational Events.** We have noted an increase in the number of surf and volleyball camps, including one that occurs within the known roosting area of the non-breeding flock at Santa Monica. Additionally, numerous one-time events are held near existing roosts. Because these camps and many of the special events occur during the summer, and the plovers begin to migrate back into the area in July, the presence of these large groups of people may disturb their settlement patterns, forcing them to alternate locations. We recommend that the roost maps contained in this report and in *The Western Snowy Plover in Los Angeles County, California* (Ryan et al. 2010) be consulted when issuing permits for these camps and events and the events be held at least 500 ft away from known roosting areas. When this distance is not practicable, we recommend that a monitor be present to direct participants away from the roosting area.

**Predators.** We did not detect any direct predation on plovers in 2011. However, numerous potential predators were observed. These include a gopher snake, red-tailed hawks, peregrine falcon, American kestrel, western gull, American crow, common raven, raccoon, domestic dogs, and domestic cats. We recommend putting lids on all trash cans.

## **Education and Outreach**

**Volunteer participation in the Snowy Plover monitoring program.** From September 2010 to May 2011 37 individuals volunteered to monitor plovers in Los Angeles County, contributing over 240 person-hours to the project.

**Formalized Docent Program.** The project team secured funding in 2008 to develop a Snowy

Plover docent program, and brochures and interpretive materials aimed at the general public have been created. The project team is currently working with Dockweiler Youth Center (LACBH) to conduct docent activities at the plover roost at Dockweiler North (Beach 19), to lead a series of plover-focused beach walks for the general public, and to coordinate public school visits to observe plovers (Table 6). From October 2010 to mid-August 2011, eleven volunteers collectively spent 38 hours working directly with the public through beach walks and field trips. Through outreach activities, we have worked to establish community connections that will provide volunteers for both data collection and docent activities. From September 2010 to mid-April 2011, six volunteers (five of whom also help conduct the county-wide surveys) collectively made 58 visits to roost sites at the Dockweiler 19 enclosure and Malibu Lagoon, combining docent activities with data collection. Their frequent presence at this site has contributed to establishing a positive relationship with lifeguards in the area and provided an on-site resource for the public should they have questions.

**School Outreach Program.** We explored multidisciplinary ways to engage young, inner-city students in plover conservation. In 2008, we worked with Dorsey High School to create a public service announcement about Snowy Plover conservation. Since its creation, it has been viewed over 2,400 times on youtube.com and is also being used as part of the Ventura Audubon chapter's outreach efforts. Snowy Plover conservation posters created by elementary school students in the spring 2010 continue to draw viewers to Los Angeles Audubon's online gallery (<http://losangelesaudubon.org/education-mainmenu-194/science-illustration-mainmenu-244/624-snowy-plover-gallery>), and these signs have been used at both the Malibu Lagoon seasonal enclosure and the Dockweiler Youth Center display case. We hope to continue working with Dockweiler Youth Center to find other venues for this student artwork.

We coordinated with graduate student Lauren Tingco at CSU Los Angeles to have volunteers assist with her collection of disturbance data, and Ms. Tingco herself volunteered at two of our field trips for public school students. We have begun to establish connections at CSU Channel Islands and Loyola Marymount University, with the goal of providing more volunteer and docent opportunities for university students.

During the 2010-2011 school year, three Los Angeles Unified public schools at the elementary, middle, and high school level participated in field trips to view plovers in their native habitat at Dockweiler Beach (Table 6). Since August 2010, the plover enclosure at Dockweiler Beach 19 has proven to be an outstanding resource for education/outreach as well as conservation. Access to restrooms and parking is conveniently located nearby, offering a safe and spacious staging area before volunteers lead students on a short walk to view plovers at the enclosure. Los Angeles Audubon has also begun to integrate coastal issues, like Snowy Plover conservation, into its education programs at upland sites within the Los Angeles basin. We plan to continue these activities for the 2011-2012 school year as well.

**General Public Outreach.** In the fall of 2010 and the late winter/early spring months of 2011 we coordinated with the Dockweiler Youth Center to provide a series of guided beach walks for the public. In April 2011, we participated in Cabrillo Aquarium's Earth Day Bird Fest, helping to lead

a beach walk and providing an information table, and gave a presentation at the Beach Ecology Coalition meeting (table 6). Capitalizing on our strong partnership with California State Parks at Malibu Lagoon, we aim to collaborate on a plan this winter that would provide greater protection for plovers through symbolic fencing, establish a small site-specific core of volunteers to help monitor this site, and establish a possible location for permanent interpretive signage.

**Table 6. Outreach and education conducted from August 2010 through August 2011, including presentations, tabling events, beach walks, and fieldtrips.**

<b>Activity</b>	<b>Date</b>	<b>Location</b>	<b>Demographic</b>	<b>No. Attending</b>
Dockweiler Youth Center Programming ( <i>beach walks and enclosure clean-up events</i> )	2010: Aug 12, 19, 21; Sept 2, 11, 16, 23, 30; Oct 7, 16, 21; Nov 4, 13  2011: Jan 22; Feb 5, 12; Mar 12, 26	Dockweiler State Beach	General public	2010: 34  2011: 14
Dockweiler Youth Center Public School Visits	2010: Sept 8; Oct 21, 24  2011: Jan 21, 28, 29; Aug 31	Dockweiler State Beach	Inner-city public school students	2010: 110  2011: 174
Beach Ecology Coalition Meeting	Apr 21, 2011	Dockweiler Youth Center	Beach management professionals, wildlife management agencies, aquarium and museum staff	~35
Cabrillo Aquarium Earth Day Bird Fest	Apr 23, 2011	Cabrillo Aquarium	General public	ukn
In-school presentation	Jan 14, 2011	New Los Angeles Charter	Inner-city public school students (middle school)	~120

**Creation of public displays.** As mentioned above, we worked with elementary school students to create Snowy Plover conservation posters. The public may view this artwork online at the Los Angeles Audubon website. We will continue to collaborate with other organizations to provide venues in which to display interpretive information about plover conservation on both a temporary and permanent basis.

**Creation and maintenance of a website.** Los Angeles Audubon currently hosts a Snowy Plover website within its general website (losangelesaudubon.org). Volunteer materials, annual reports, updates, maps of plover locations from volunteer observations, and student conservation posters have been posted to this site. Between December 2010 and September 2011, the main webpage containing Snowy Plover conservation information received over 700 page views, and our gallery of student conservation posters received over 550 page views.

**Create signage for the winter and breeding season fencing.** The project team secured funding for the creation of signage for the enclosure at Dockweiler, and signs were installed in August 2010. In addition, conservation posters created by elementary school students were printed on durable plastic and were used at the seasonal enclosure at Malibu Lagoon in spring 2011.

**Create and implement a beach driver-training program.** The project team created an informational handout to be provided to all lifeguards and included in their training program. It covers information about identifying, detecting and avoiding Snowy Plovers and provides maps to the plover roosting areas. This was also provided to LACBH for inclusion in their training program. The project team has offered to provide presentations to both groups upon request.

#### **Recommendations for future Education and Outreach:**

- Continue to work towards sustainability in docent and outreach programs. Expansion to more public schools and interested groups throughout Los Angeles County is an ultimate goal. However, the project team feels that it is extremely important that the immediate goal of the next two to three years be to first establish a solid, consistent training program for volunteers and develop strong, sustainable relationships with the agencies charged with managing sites where the docent program will be conducted.
- Continue to link Snowy Plover outreach efforts to other conservation programs. Los Angeles Audubon also coordinates volunteers for monitoring and habitat restoration of the Venice Beach Least Tern colony. Recent outreach presentations have addressed the similar conservation needs of both species, and a concerted effort to link volunteer recruitment between the two programs could greatly benefit both. In addition, connecting these avian programs to grunion conservation efforts could help promote sandy beach conservation in general.
- Create a questionnaire for beachgoers at sites in need of additional protections.

Questionnaires should be provided to local residents and tourists during both the winter “off season” and “peak use” summer months, inquiring about feelings on sharing the beach with plovers, types of beach use, what part of the beach is used by the public and when (time of day and time of year), and preferences for different types and placement of protections for the plover. The answers gathered could then be considered in the design and placement of protective measures, including enclosures, and could also help direct and refine outreach efforts. The project team believes that to develop a public survey with genuine scientific credibility it will be important to partner with a university graduate program or other professional organization with expertise in the social sciences to design and implement the questionnaire. A similar survey was conducted by Heal the Bay (Stevenson et al. 2011) to gain insight into subsistence angler opinions about marine protected areas. We hope to learn from Heal The Bay’s process and potentially propose a similar collaborative project to address plover conservation.

- Continue to establish organizational partnerships. In Los Angeles County, a large number of government and non-profit organizations maintain sites or conduct events at or near the beach. Establishing positive collaborations with organizations like California State Parks, the Annenberg Community Beach House, the Dockweiler Youth Center, local aquaria, and Heal The Bay to develop public displays and events will help integrate Snowy Plover conservation outreach into a broader ecological context, give it a wider audience, and provide greater funding opportunities.
- Continue to establish academic partnerships. The project team should continue to find ways to integrate undergraduate students from local colleges and universities in community-based science and docent programs. In addition, securing funding to attract graduate students to the project would be an excellent way to expand the ecological and sociological aspects of the study while maintaining the core efforts of monitoring and outreach.
- Continue to improve signage and place signage near enclosures and plover roost sites when possible. This is needed to inform the public about the enclosures and why protecting the Snowy Plover is important.
- Create a media packet for local business and homeowner associations that operate near plover beaches. The packet should include a dvd of the public service announcement as well as resources regarding dogs on the beach and general plover conservation awareness.

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## **APPENDIX 1: ROOST MAPS**

Figure 1. Map of Study Area.

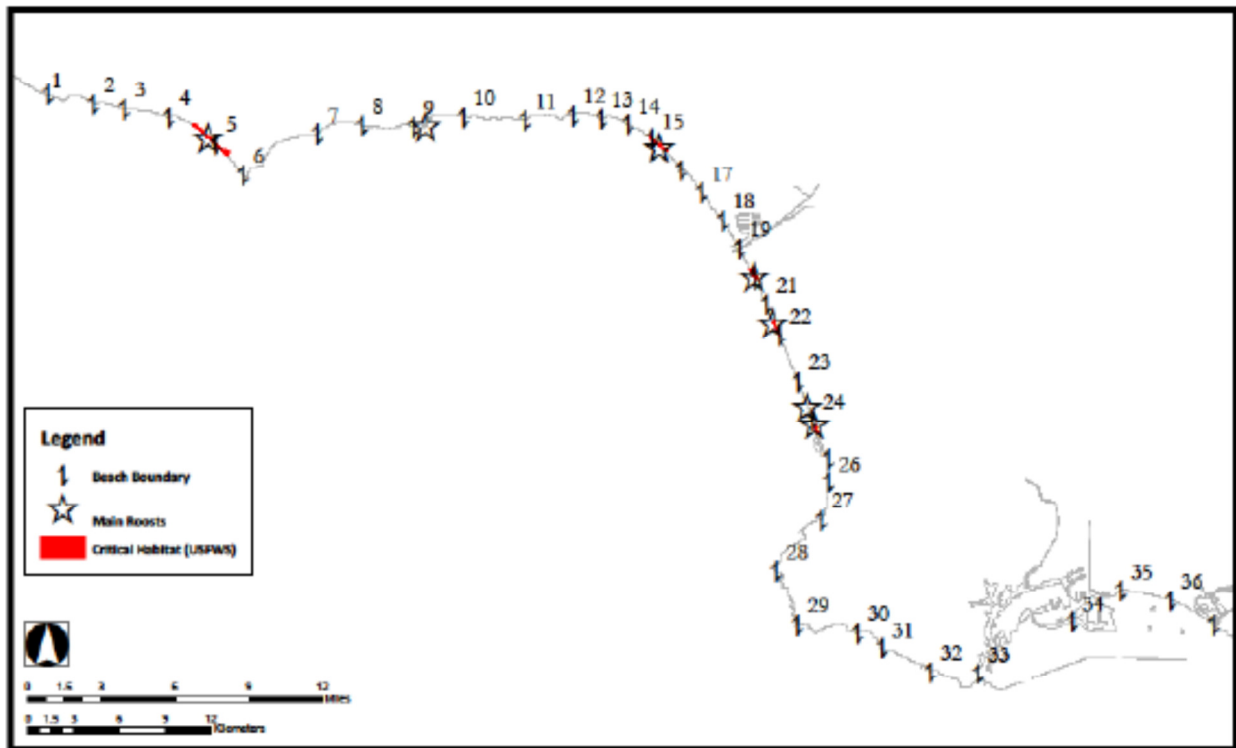


Figure 2. Zuma Beach Roost Survey Results.

### Roost Map: Zuma County Park Beach



#### Legend

- |             |   |           |
|-------------|---|-----------|
| Zuma Beach  | — | 27 DEC 10 |
| Survey Date | — | 23 FEB 11 |
|             | — | 03 SEP 10 |
|             | — | 23 AUG 11 |
|             | — | 20 OCT 10 |



Author: Bryan M Solis Plegadis LLC

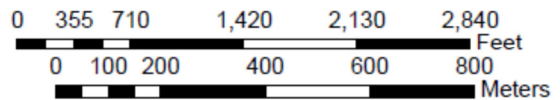


Figure 3. Malibu Beach Roost Survey Results.



Figure 4. Santa Monica Roost Survey Results.

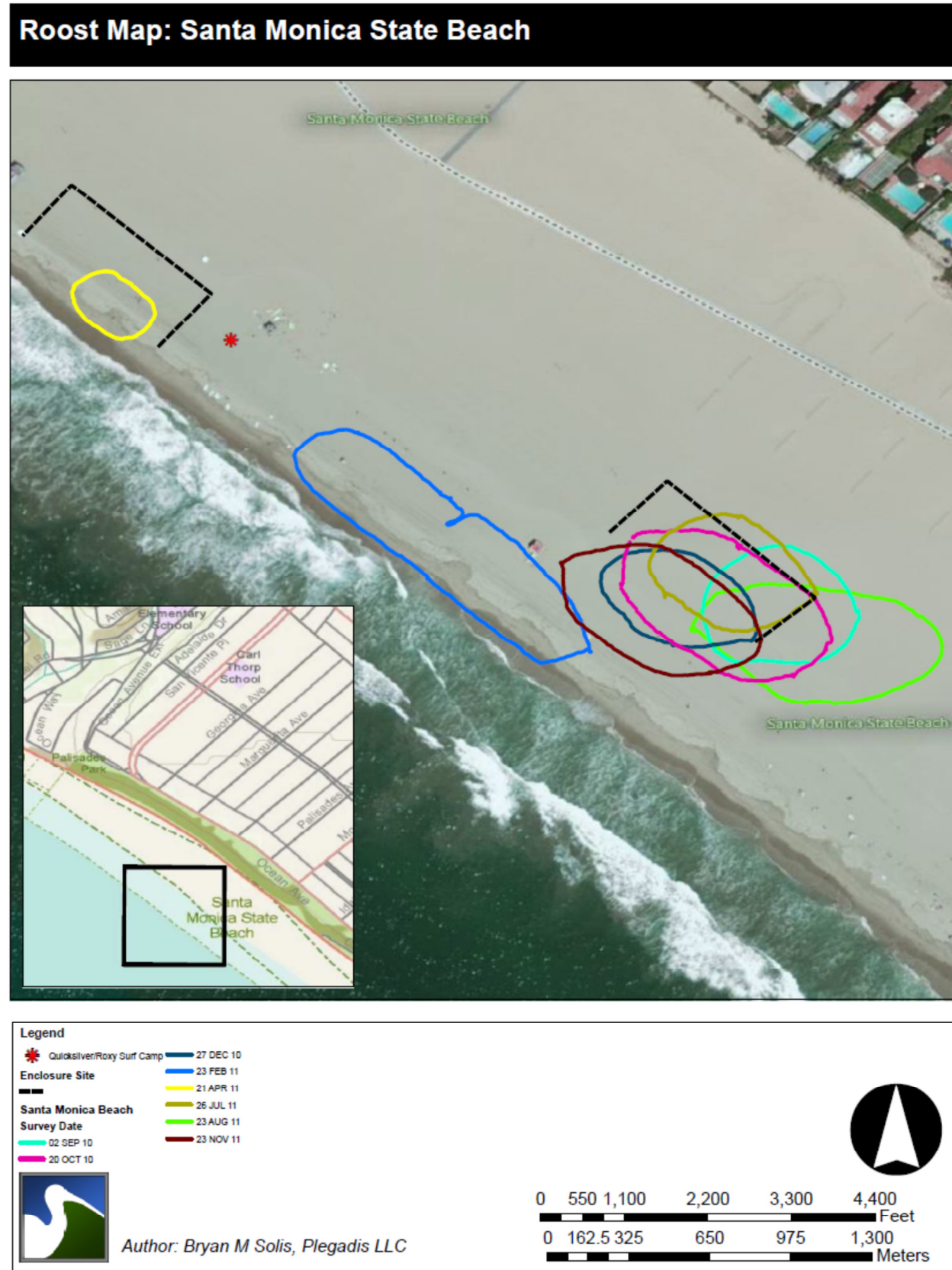


Figure 5. Dockweiler LT 47 Roost Survey Results.

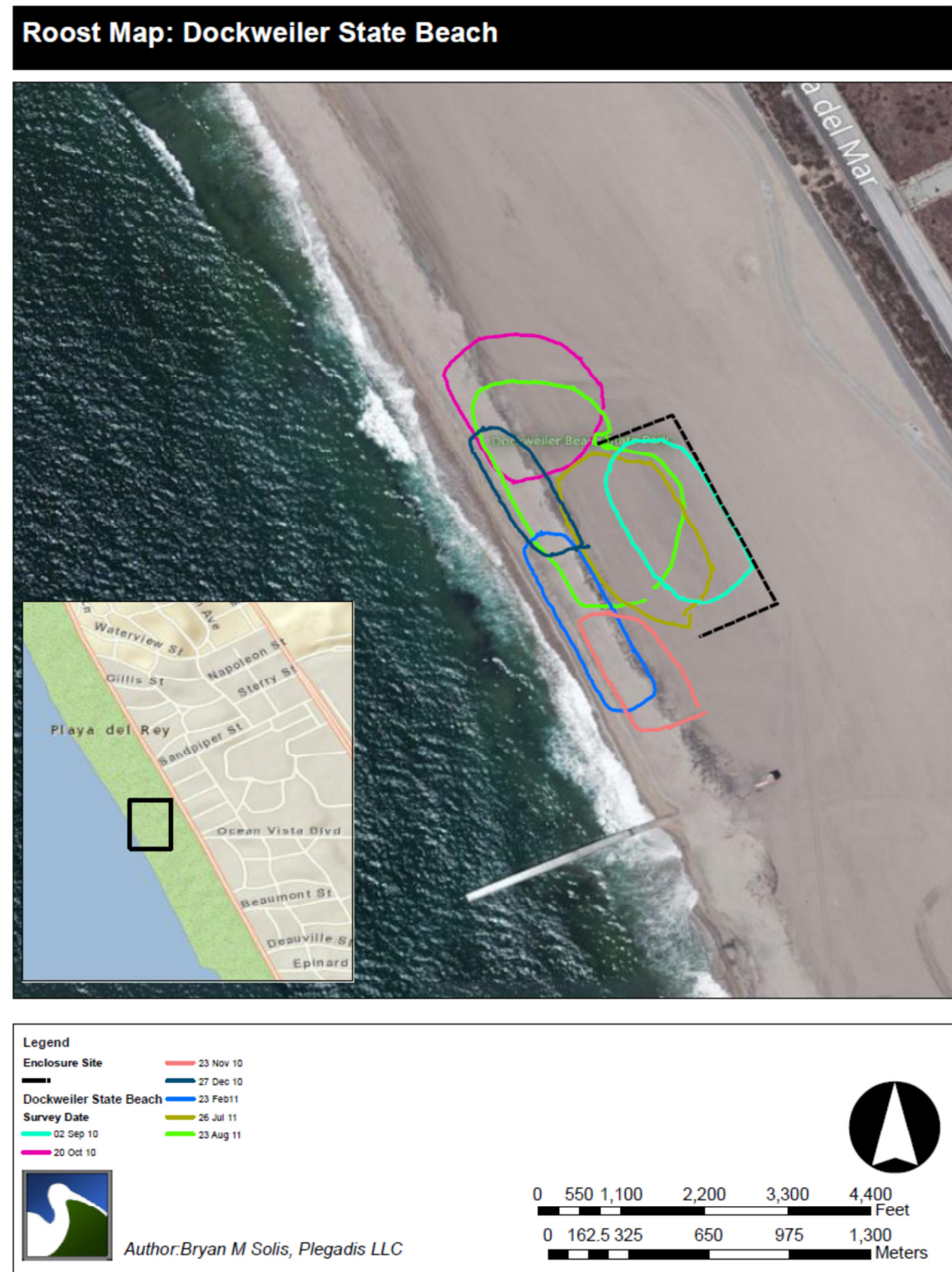


Figure 6. Dockweiler LT 58 Roost Survey Results.

**Roost Map: Dockweiler State Beach Figure 2.**



Figure 7. Hermosa Beach Roost Survey Results.

## Roost Map: Hermosa Beach

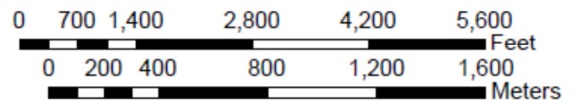


### Legend

- HERMOSA** — 23 NOV 10
- Survey Date** — 27 DEC 10
- 02 SEP 10 — 26 JUL 11
- 20 OCT 10 — 23 AUG 11



Author: Bryan M Solis, Plegadis LLC





Appendix 2. Data Sheet used in 2011.

LOS ANGELES COUNTY  
Western Snowy Plover Field Survey Form 2011

Page \_\_\_ of \_\_\_

Survey Location \_\_\_\_\_ Month \_\_\_\_\_ Day \_\_\_\_\_ Year \_\_\_\_\_  
 Observer Name (s): \_\_\_\_\_  
 Start Time \_\_\_\_\_ Stop Time \_\_\_\_\_ Total Time \_\_\_\_\_ Prep Time \_\_\_\_\_ Weather conditions: \_\_\_\_\_  
 Temperature: \_\_\_\_\_ Cloud Cover: \_\_\_\_\_ Precipitation: \_\_\_\_\_ Wind: (mph) \_\_\_\_\_ (direction) \_\_\_\_\_  
 Tides: \_\_\_\_\_ Cloud Cover: 0 = 0%, 1 = 33%, 2 = 66%, 3 = 100% Precipitation: N = None, R = Rain, F = Fog, D = Drizzle

SECTION 1: SNOWY PLOVER SIGHTINGS:

Number of Snowy Plovers seen? \_\_\_\_\_ Ad: Juv: Mt: F: Survey Complete? \_\_\_\_\_ (if no, circle area surveyed on map)

# of SNPL Seen	Time	Map #	Gen. Habitat & Location <sup>1</sup>	Bands	Sex, Age	Nest, Eggs, Chicks	Behaviors Observed

<sup>1</sup> Wet sand, wrackline, mid-beach, foredune, linear beach, estuary mouth, overwash, HRA (habitat restoration area), barrier island/peninsula  
 Behavior Codes: R = roosting F = foraging S = sitting as if on nest O = other (specify in notes) Nest Status Codes: C/N = copulation and nest construction I = incubation H = hatching F = fledging O = other (specify in notes)

SECTION 2: BEACH USE & PREDATOR MONITORING:

Walking	Jogging	Sitting	Sports	Bicycle	Fires	Fishing	Vehicle	ATV	Equipment
Dog OffL	Dog OnL	Coyote	Fox	Cat	Crow	Raven	Raptor	Horse	Other

Speeding Vehicles (time, make & model, decals, license plate, or other markings):

Describe Other:

Other wildlife species detected (especially potential predators): \_\_\_\_\_

SECTION 3: HABITAT INFORMATION:

Changes from Previous Survey:

Percentage of shoreline > 50 m wide \_\_\_\_\_ if 0%, then maximum shoreline width: \_\_\_\_\_

What general habitat types<sup>2</sup> are present at this site? \_\_\_\_\_

**Recording band combos:** Record colors for the bird's left leg first, right leg second. Separate the colors on the left leg and right leg with a colon (:). Record colors from the top to bottom for each leg. Read T ↓ R, R ← L if the bird is facing you.  
 Underlined letter is code for color: Aqua Blue Green Black Brown Lime Orange Pink Red Silver Violet White Yellow. \* Record un-banded birds as X:X.  
 Example: A bird that has no bands on its left leg and one yellow band on its right leg is X:Y. A bird with a left band on top (orange) left bottom (red) and a right band on top (green) right bottom (red) would be OR:GR. A bird with only one band (red) on the left and one band (white) on the right would be RW.  
 Sex: Mate, Female, Unknown Age: Addult, Juvenile (Young capable of flight), Chick (incapable of flight), Unknown

**Appendix 3. Photos from outreach events conducted in 2010 and 2011.**



High school students work with elementary school students and their families at Dockweiler Beach.



Elementary school students in third- through fifth-grade visit the DSB LG47 enclosure.



Dockweiler Youth Center located near the DSB LG58 plover roost.



Student-created signage at the Malibu Lagoon seasonal enclosure.