

**State of California  
Natural Resources Agency  
Department of Fish and Wildlife  
Wildlife Branch**

**The Western Snowy Plover in Los Angeles and Orange Counties,  
California: July 2014 to June 2015**

**By**

**Thomas Ryan, Stacey Vigallon,  
and Cheryl Egger**

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**Nongame Wildlife Program, 2015**

# **Draft Report**

To

State of California  
Department of Fish and Wildlife  
South Coast Region  
3883 Ruffin Road  
San Diego, CA 92123

## **The Western Snowy Plover in Los Angeles and Orange Counties, California: July 2014 to June 2015**

**Thomas Ryan, Stacey Vigallon,  
and Cheryl Egger**

Los Angeles Audubon  
P.O. Box 411301  
Los Angeles, California 90041

Prepared October 7, 2015

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**ABSTRACT**

Here we report on monitoring, research, and community outreach activities performed between July 2014 and June 2015. Project biologists and volunteers conducted county-wide surveys of all suitable roosting habitats in September, January, March, and May. Project biologists conducted surveys of the main roost sites and nearby beaches in October, November, and December, February, April, and June. The January and May surveys corresponded to the U.S. Fish and Wildlife Service's (USFWS) winter and breeding season window surveys. The population of Snowy Plovers in coastal Los Angeles County (LAC) has declined from a peak of 326 in 2012 to just 151 in 2014-15. LAC supports 18.6% of Recovery Unit (RU)-6 and 3.7% of the California non-breeding Snowy Plovers. The population in Orange County (OC) declined slightly from 252 in 2013-14 to 208 in 2014-15. OC supports 23% of RU-6 and 4.5% of California non-breeding Snowy Plovers. Overall, declines were detected in LAC and OC. This was also seen in Ventura County. However, Snowy Plover populations in recovery units in Central and Northern California increased and the non-breeding winter window survey counts increased overall in the State of California in 2014-2015. It appears that at previously large roosts at Zuma, Malibu, Huntington State Beach and Balboa Beach, Snowy Plovers returned in similar numbers to 2013 in the fall of 2014, but then departed again between October and December.

It is difficult to determine if conditions in Central and Northern California attracted the Snowy Plovers to those locations or if local events may have caused these movements. At Zuma a berm and volleyball court were installed within the main roosting area about the time of the abandonment of the roost. At Malibu, a strong hurricane season in the late summer and fall left the sand spit in front of the lagoon very narrow in the fall and early winter. At Huntington State Beach there were commercial film shoots and large commercial beach parties held near the traditional roost, and at Balboa Beach the City of Newport Beach built a 300 ft. walkway into one of their traditional roosting areas.

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**2014-2015 Snowy Plover Volunteers**

Los Angeles County Volunteers		
Alice Hsieh	Jane Beseda	Morgan Edel
Allison Brandin	Jess Morton	Okoy Dillon
Amber Lessing	Jim Beseda	Pam Prichard
Amelia Demery	Jonathan Hardin	R. Brody
Andrea Ascencio	Joyce Realegeno	Richard Philibosian
Brenda Ramirez	Judith Thompson	Ron Melin
Carina Jimenez	Katelyn Harrington	Rosaline Gould
Carolyn Canterbury	Larry Loehner	Ryan Oh
Cassandra Strizak	Laura Moser	Sandra Albers
Catalina Brody	Laurel Jones	Sandy Summer
Chris Lord	Leticia Hernandez	Shirley Imsand
Christina Van Oosten	Linda Levine	Sidney Brody
Daniel Perez	Lu Plauzoles	Stacia Hassett
Darcy Gonzales	Malina Loehner	Tania Asef
Dorothy Steinicke	Mara Thompson	Tara Treiber
Duly Gonzalez	Martha Balkan	Tommye Hite
Emily Bertrand	Martin Fletcher	Victoria Rosenfield
Emily Cobar	Mary Jo Johnson	Walter Lamb
Erica Gaeta	Michelle Black	Zehava Purim-Adimer
Grace Murayama	Mimi DeMatteo	
Hank Borenstein		
Jamie Lowry		
Orange County Volunteers		
Amber Herredia	Erin Johnston	Patricia Knight
Arash Kamalizad	Francois Primeau	Peter Fuhrer
Babs Levitan	Hal Sheakley	Rheanna Fraser
Adam Levitan	Heather Brashear	Ryan Winkleman
Barbara Swanson	Holly Fuhrer	Sally Menzel
Bettina Eastman	Jahan Khalili	Scott Thomas
Bob Hodgins	James Stacy	Shirley Reynolds
Bob Holcomb	Janet Yeutter	Siegmund Grozinger
Brandon Simpson	Jason Vu	Star Howard
Brett Schiller	Jeanette Bates	Susan Sheakley
Brian Sandstrom	Joan Miller	Travis McGill
Bruce Aird	Julie Hall	Trude Hurd
Cheryl Egger	Juno Hsu	Vaji Khalili
Chris Stoughton	Kate Grabenstein	Vic Leipzig
Christina VanOosten	Keyan Khalili	Vivian Valenzuela
Chuck George	Lana Nguyen	Winter Bonin
Claire Grozinger	Lauren Dorough	Zehava Purim-Adimer
Colleen Nell	Maia Nguyen	

Cris Whetstone	Maile Tanaka	
Dana Lee	Marchia Morey	
David Pfersich	Maria Nguyen	
Deborah Koken	Marissa Andalaro	
Denise Gellene	Mary Joseph	
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Doug Lithgow	Nancy Kenyon	
Elisa Yang	Nora Papian	
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## INTRODUCTION

Here we report on monitoring, research, and community outreach activities performed by the Los Angeles County Snowy Plover Research Team between July 2014 and June 2015. 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, and 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/>).

**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, Western Foundation for Vertebrate Zoology 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).

In Orange County (OC), Snowy Plovers nested at Anaheim Landing, Sunset Beach Bay Fill, Sunset Beach, Bolsa Chica Beach, Bolsa Chica Salt Flats, Newport Beach, and Balboa Beach prior to 1940 (Page and Stenzel 1981). During their 1979-78 survey, Page and Stenzel (1981) found that Orange County supported 2% of the pairs on the mainland coast, all at the Bolsa Chica Oil Fields (previously Bolsa Chica Salt Flats). As in LAC, they concluded that the only other likely nesting location was at the Sunset Aquatic Park and that the lack of nesting Snowy Plovers elsewhere was due to beach raking and heavy human use (Page and Stenzel 1981).

**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). Critical Habitat for the Snowy Plover was revised in June 2012. The USFWS now lists six beaches in LAC and three beaches (and the Bolsa Chica Reserve - Subunits CA46 B-F) in OC as critical habitat for the Snowy Plover (USFWS 2012). These include Zuma Beach (Unit CA 43), Malibu Beach (Unit CA 44), Santa Monica Beach (Subunit CA 45A), Dockweiler North (Subunit CA 45B), Dockweiler South (Subunit CA 45C), Hermosa State Beach (Subunit CA 45D), Bolsa Chica State Beach (CA 46A), Santa Ana River Mouth (Subunit CA 47), and Balboa Beach (Subunit 48) (USFWS 2012). All roosts, except for Dockweiler State Beach (DSB) 58 and Hermosa in LAC and Surfside and Salt Creek in OC are now located within designated Critical Habitat (USFWS 2012). These beaches are protected as wintering habitat (USFWS 2012). It

should be noted that activities that have a federal nexus are subject to Federal Review. Relevant sections, including Unit/Subunit descriptions and maps can be found in Appendix 4.

A Recovery Plan was completed by USFWS in 2007 and LAC and OC are 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 (2005-2009 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 salt pans 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 and OC, we suggest that the main problems are daily beach grooming in LAC and occasional grooming at Salt Creek, 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 June 2014 to August 2015.

**Summary of Previous Study Findings.** Prior to beginning this study, little was known about the wintering Snowy Plovers in LAC and OC. We summarize the prior data collected in OC in this report. Observations for LAC have been published in reports from 2009, 2010, 2011, and 2014 (Ryan and Vigallon 2009, 2010 and 2011, Ryan et al. 2014). We found that in coastal 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 (WVZ, LAC Breeding Bird Atlas, unpubl. data). In Orange County, Ross Griswold has been conducting surveys of the roosts at Bolsa Chica State Beach, Huntington State Beach and Balboa Beach since February 2012.

During the non-breeding season (July-March) between 196 to 334 Snowy Plovers occur in LAC and approximately 119-203 Snowy Plovers occur in OC. This is approximately 45% of wintering Snowy Plovers in RU-6 and 10% of the California population (USFWS unpubl. data 2010). Snowy Plover populations in LAC have declined in recent years. This was mostly due to declines at Zuma LT9 in winter 2005-2006 and all beaches except Malibu in winter 2006-2007. 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. Winter window surveys indicate that the OC population is either stable or increasing (USFWS unpubl. data).

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 in meeting the recovery goals for the Snowy Plover in Recovery Unit 6 (USFWS 2007).



We find that LAC and OC are important non-breeding areas 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 (Ryan and Vigallon 2010). 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 during those years. Since 2009, we have maintained a core of 45-60 community volunteers, with new volunteers joining each year to assist with monitoring, enclosure set-up, and outreach efforts. In addition to volunteer participation, establishing a formal docent program has 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 Snowy Plover enclosures, development of a beach-driver handout, guided beachwalks for the public, and a field trip program for public school students. 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, the major accomplishments of the project include:

1. The involvement of over 300 community volunteers and an outreach program that has reached hundreds more.
2. Current, up-to-date knowledge of the location and population status of 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 Snowy 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 Snowy 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 and OC 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 and OC; and (4) management recommendations for protecting winter roosts and creating conditions by which nesting may return.

## METHODS

### Population Status at Winter Roosting Sites

**Countywide Surveys.** In September 2014, January 2015, March 2015 and May 2015, project volunteers and biologists conducted county-wide surveys of all suitable roosting habitats (Ryan et al. 2010). 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, 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 Point Blue Conservation Science (formerly Point Reyes Bird Observatory), 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. 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 Google Earth.

**Roost Surveys.** Project biologists conducted surveys of just the main roost sites and nearby beaches in October, November, and December 2014, and February, April, and June 2015. No surveys were conducted in July and August of 2014 due to a gap in project funding. 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 and mapped using Trimble Navigator Outdoors (version 5.6.16) or Google Earth. This was accomplished by walking the perimeter of the colony at a distance that did not cause disturbance to the birds (typically 20-30 ft). 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. No nest surveys were conducted.

### Disturbance, Threats, Predation and Mortality

During the countywide surveys and the roost and nesting surveys, the volunteers and biologists recorded adjacent beach use information and recorded any events that occurred near the roosts that could potentially harm the Snowy Plovers, disturb the Snowy Plovers, or result in the mortality of Snowy Plovers. They noted any dead birds found on the beach.

## **Education and Outreach**

During volunteer training sessions, volunteers received training in both monitoring protocol and in ways of speaking with the public about Snowy Plover conservation. In addition, Los Angeles Audubon staff worked with the Dockweiler Youth Center and Annenberg Community Beach House to establish a series on beach walks for the public, and collaborated with Los Angeles Unified School District public schools to facilitate in-school presentations and field trips to view Snowy Plovers at Dockweiler Beach. High school students from Los Angeles Audubon's Baldwin Hills Greenhouse Program received docent training and led elementary students through a Snowy Plover-themed curriculum during select field trips. Additional funding for outreach activities during this report period was provided by the Disney Worldwide Conservation Fund.

In Orange County, Sea and Sage Audubon and the City of Newport Beach provide education and outreach programs regarding Snowy Plover conservation. The City of Newport Beach provides guided walks, in-class presentations, and docent activity at Snowy Plover roosting sites. Sea and Sage Audubon's 2015 summer Marsh Camp included a new bi-annual Coastal Camp session on threatened species, featuring the Western Snowy Plover and California Least Tern.

## RESULTS AND DISCUSSION

### Population Status: Los Angeles County

<b>Table 1. Results of Countywide Surveys in Los Angeles County 2014-2015.</b>					
<b>No.</b>	<b>Beach Name(s)</b>	<b>Sept 2014</b>	<b>Jan 2015</b>	<b>Mar 2015</b>	<b>May 2015</b>
1	Leo Carrillo State Beach/Nicholas Cyn CB	0	0	0	0
2	El Sol, El Pescador, La Piedra SB	0	0	0	0
3	El Matador, Lechuza Beach	0	7	0	0
4	Zuma Beach	39	0	0	0
5	Zuma Beach (Morning View to Pt Dume)	0	0	10	0
6	Dume Cove, Paradise Cove, Escondido B.	0	0	0	0
7	Dan Blocker CB, Puerco Beach	0	0	0	0
8	Malibu Bluffs SP, Amarillo B, Malibu B.	0	0	0	0
9	Malibu Lagoon, Carbon Beach	40	0	0	0
10	La Costa B., Las Flores B., Big Rock B.	0	0	0	0
11	Las Tunas CB, Topanga CB	0	0	0	0
12	Castle Rock B	0	0	0	0
13	Will Rogers SB North	0	0	0	0
14	Will Rogers SB South	0	0	0	0
15	Santa Monica State Beach North	64	32	38	0
16	Santa Monica State Beach South	0	0	0	0
17	Venice City Beach North	0	0	0	0
18	Venice City Beach South	0	9	6	2
19	Dockweiler Beach North	29	16	9	0
20	Dockweiler Beach Central	0	0	0	0
21	Dockweiler Beach South	0	25	27	0
22	El Segundo & Manhattan Beach	16	9	2	0
23	Hermosa Beach North	48	46	34	0
24	Hermosa Beach South & King Harbor	3	3	0	0
25	Redondo County Beach North	0	0	0	0
26	Redondo CB South & Torrance CB	0	0	0	0
30	Portuguese Bend	0	0	0	0
32	Point Fermin & Cabrillo Beach	ns	4	0	0
35	Alamitos & Junipero Beach	0	0	0	0
36	Belmont Shore & Peninsula Beach	4	0	0	0
	Total Observed	243	151	126	2

<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>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Leo Carrillo State Beach/Nicholas Cyn CB	0	0	0	8	0	0	0	0	0	0	0	0
Zuma Beach	130	133	213	52	32	82	80	86	85	80	73	7
Zuma Beach South	0	0	0	0	48	0	0	0	0	0	0	0
Dume Cove, Paradise Cove, Escondido B.	0	0	0	6	0	0	0	0	0	0	0	0
Dan Blocker CB, Puerco Beach	0	0	0	23	0	0	0	0	2	9	0	0
Malibu Lagoon, Carbon Beach	33	28	12	34	37	36	67	47	78	60	25	0
La Costa B., Las Flores B., Big Rock B.	0	ns	ns	2	0	0	0	0	0	0	0	0
Will Rogers SB North	0	0	ns	2	0	0	0	0	0	0	0	0
Will Rogers SB South	0	0	ns	0	0	1	0	ns	0	0	0	0
Santa Monica State Beach North	32	40	42	16	30	40	41	58	58	47	37	32
Venice City Beach North	ns	0	ns	0	0	1	0	0	0	0	0	0
Venice City Beach South	ns	0	ns	2	0	0	0	8	4	2	0	9
Dockweiler Beach North	12	34	23	9	10	20	6	34	33	29	45	16
Dockweiler Beach Central	0	0	0	0	0	4	6	0	0	5	0	0
Dockweiler Beach South	13	0	0	4	11	15	16	23	13	3	0	25
El Segundo & Manhattan Beach	0	0	0	0	3	0	4	0	0	2	4	9
Hermosa Beach North	33	41	36	23	29	26	11	44	49	40	60	46
Hermosa Beach South & King Harbor	0	0	0	8	0	2	0	0	0	0	0	3
Redondo County Beach North	0	0	0	0	0	ns	0	0	0	0	0	0
Point Fermin & Cabrillo Beach	13	9	8	7	0	6	5	2	0	0	7	4
<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>326</b>	<b>277</b>	<b>251</b>	<b>151</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>9</b>	<b>10</b>	<b>8</b>	<b>7</b>

**Countywide & Window Surveys.** From 2012 to 2014 the population of Snowy Plovers in coastal LAC has declined from a peak of 326 in 2012 to just 151 in 2015 (Tables 1 & 2). This is lower than populations following the previous decline in 2006-2007. No Snowy Plovers were detected during the winter window survey at Malibu Lagoon, and only 7 were observed at Zuma, which in recent years has supported 73-86 individuals (Table 2). Population levels have remained stable at Zuma, but still well below the pre-2006 levels. Fewer Snowy Plovers were detected at the enclosure at Dockweiler North, but 25 were detected at Dockweiler South, where they had not been seen for most of the previous year. Counts were lower, but closer to normal at Santa Monica and Hermosa Beach. Plovers were detected at El Segundo and Hermosa Beach

South, where they have only occasionally occurred in previous years. Overall, in 2014-15 LAC supported just 18.4% of wintering Snowy Plovers in RU-6 (down from 23% in 2013-14) and 3.7% of California non-breeding Snowy Plovers (down from 6% in 2014) (USFWS unpublished data 2015). This indicates a large decline in the wintering population of Snowy Plovers in LAC.

Range-wide in 2015, there appears to be a general trend of higher than normal numbers of Snowy Plovers in Northern California in Recovery Units 2, 3 and 4. Recovery Unit 5 was stable, but within the unit, San Luis Obispo County was higher, Santa Barbara County was relatively stable and Ventura County was also lower. Within RU-6, there was an overall decline, but the largest portion of that decline came in Los Angeles County, with a small decrease in Orange County and relatively stable numbers in San Diego County. Interestingly, in both Los Angeles and Orange Counties, beachwide counts in September were higher than in January. Roost survey data (Table 3b, below) indicates that the movement occurred between the November and December 2014 surveys. It appears that Snowy Plovers that originally migrated into Southern California may have moved north later in the winter for unknown reasons.

**Roost Surveys.** The roost surveys showed that the numbers of Snowy Plovers present in October and November 2014 were similar to numbers observed in these months in 2012 and 2013. However, beginning in December the numbers declined at Zuma and none were observed at Malibu Lagoon (Table 3c). By February 2015 none were present at Zuma, Malibu or Hermosa Beach (Table 3c). In both 2013 and 2014 they remained at these beaches in February, with most departing by the April survey. This year, it appears that they began departing beaches in Los Angeles County as early as December 2014 (Table 3c).

<b>Table 3a. Results of Roost Surveys in 2012-2013.</b>								
<b>Beach Name(s)</b>	<b>Jul 12</b>	<b>Aug 12</b>	<b>Oct 12</b>	<b>Nov 12</b>	<b>Dec 12</b>	<b>Feb 13</b>	<b>Apr 13</b>	<b>Jun 13</b>
Zuma Beach	32	43	53	88	8	75	0	0
Malibu Lagoon	3	34	6	75	64	52	0	0
Santa Monica North	12	32	59	56	54	43	0	0
Dockweiler Beach North	28	4	43	49	62	44	0	0
Dockweiler Beach South	0	6	57	0	12	0	0	0
Hermosa Beach North	0	13	36	6	56	47	0	0
Total Observed	74	132	254	274	256	261	0	0
No. of Beaches	4	6	6	5	6	6	0	0

<b>Beach Name(s)</b>	<b>Jul 13</b>	<b>Aug 13</b>	<b>Oct 13</b>	<b>Nov 13</b>	<b>Dec 13</b>	<b>Feb 14</b>	<b>Apr 14</b>	<b>Jun 14</b>
Zuma Beach	0	39	35	5	91	67	ns	0
Malibu Lagoon	1	38	51	0	8	24	0	0
Santa Monica North	0	31	22	74	48	18	8	0
Dockweiler Beach North	53	85	71	61	39	36	0	0
Dockweiler Beach South	0	0	0	0	0	0	0	0
Hermosa Beach North	3	33	79	28	43	40	4	0
Total Observed	57	226	228	254	209	185	12	2*
No. of Beaches	3	5	5	4	5	5	2	1

\*observed in front of the tern enclosure on Venice Beach South.

<b>Beach Name(s)</b>	<b>Jul 14</b>	<b>Aug 14</b>	<b>Oct 14</b>	<b>Nov 14</b>	<b>Dec 14</b>	<b>Feb 15</b>	<b>Apr 15</b>	<b>Jun 15</b>
Zuma Beach	ns	ns	24	58	42	0	0	0
Malibu Lagoon	ns	ns	52	60	2	0	0	1
Santa Monica North	ns	ns	41	39	65	39	0	0
Dockweiler Beach North	ns	ns	43	32	6	13	1	0
Dockweiler Beach South	ns	ns	0	0	0	17	0	0
Hermosa Beach North	ns	ns	58	56	42	0	0	0
Total Observed			218	245	157	82	1	1
No. of Beaches			5	5	5	3	1	1

ns-no survey conducted



**Population Status: Orange County  
Countywide & Window Surveys.**

<b>Table 4. County-wide Plover Surveys 2014-15.</b>				
<b>Beach</b>	<b>Sept 2014</b>	<b>Jan 2015</b>	<b>Mar 2015</b>	<b>May 2015</b>
Seal Beach	0	0	0	0
Surfside	14	16	2	0
Sunset	0	9	1	2
Bolsa Chica SB	45	55	28	1
Huntington City Beach	0	0	4	0
Huntington SB	21	12	6	0
Newport Beach	0	3	0	0
Balboa Beach	130	48	19	0
Corona Del Mar	0	0	0	0
Crystal Cove State Park	3	27	36	0
Laguna Beach	0	0	0	0
Salt Creek	0	35	36	0
Doheny SB	0	0	0	0
Capistrano	0	0	0	0
San Clemente City Beach	0	0	0	0
San Clemente SB	0	0	26	0
<b>Total Observed</b>	<b>213</b>	<b>208</b>	<b>158</b>	<b>3</b>

Countywide surveys detected a peak of 213 Snowy Plovers in September, with a similar count of 208 Snowy Plovers in January, declining to 158 by March, with only three detected in May (Table 4). We detected more Snowy Plovers in September 2014 than in 2013 (181 Snowy Plovers) (Table 4) (Ryan et al. 2014), but much fewer at the traditional peak of the population in January 2014 than 2013 (252) (Table 4) (Ryan et al. 2014). Interestingly, we had a large count of Snowy Plovers at Balboa Beach in September 2014 and few at Crystal Cove and Salt Creek, however in January, there were fewer at Balboa Beach and flocks had established at both Crystal Cove and Salt Creek. A question for future study might be whether these are the same Snowy Plovers? Plovers were detected at several beaches not thought to have traditional roosts including Sunset, Huntington City Beach, and Newport Beach. Since the 2014 report showed detections at Crystal Cove, this beach is being reported on in our roost surveys (see below).

Comparing the 2015 winter window survey to prior years is difficult due to incomplete survey data from all beaches prior to 2014. There were fewer Snowy Plovers at the Orange County Beaches in 2015 than 2014, but more than had been counted previously (Table 5). For beaches where surveys have been relatively consistent since 2004, the 2015 numbers appear to be within the normal ranges at Surfside, Bolsa Chica State Beach, Balboa Beach, and Salt Creek (Table 5). They were lower than previous years at Huntington State Beach and higher than previous years at Crystal Cove (Table 5). Overall, there appears to be a pattern of lower wintering numbers at beaches in Southern California and higher wintering numbers at beaches in Northern California,

see discussion above (USFWS unpublished data 2015). The decline between 2014 and 2015 was not as severe in Orange County as it was in Los Angeles County (Tables 4 and 5). Overall, approximately 23% of Snowy Plovers in RU-6 and 4.5% of Snowy Plovers on the west coast wintered in Orange County.

<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>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Seal Beach	NS	2	NS	0	NS	0	NS	NS	NS	NS	2	0
Seal Beach NWS	NS	11	0	0	NS	14	0	0	NS	NS	0*	0*
Surfside	0	0	17	10	11	17	15	4	5	0	10	16
Sunset	NS	0	0	0	NS	NS	0	0	NS	7	16*	9
Bolsa Chica SB	11	47	43	16	23	9	26	39	44	36	31	55
Bolsa Chica ER/Wetlands	0	9	0	34	17	26	0	NS	NS	3	23*	0*
Huntington City Beach	0	0	NS	0	NS	NS	NS	0	0	0	0	0
Huntington SB	NS	0	26	23	30	13	13	81	21	20	21	12
Newport Beach	0	0	NS	NS	NS	NS	NS	NS	NS	NS	1	3
Balboa Beach	NS	12	25	9	24	77	63	40	63	64	125	48
Corona Del Mar	NS	0	NS	NS	NS	NS	NS	NS	NS	NS	0	0
Crystal Cove State Park	20	19	2	0	NS	0	2	0	10	NS	7	27
Laguna Beach	NS	0	0	NS	NS	NS	NS	NS	NS	NS	0	0
Salt Creek	38	30	48	0	NS	0	0	0	46	45	16	35
Doheny SB	0	0	0	0	NS	0	0	0	0	0	0	3
Capistrano	NS	0	NS	NS	NS	NS	NS	NS	NS	NS	0	0
San Clemente City Beach	NS	0	NS	NS	NS	NS	NS	NS	NS	NS	0	0
San Clemente SB	0	0	0	0	NS	0	NS	NS	NS	NS	0	0
<b>Total Observed</b>	<b>69</b>	<b>130</b>	<b>161</b>	<b>92</b>	<b>105</b>	<b>156</b>	<b>119</b>	<b>164</b>	<b>189</b>	<b>175</b>	<b>252</b>	<b>208</b>
<b>No. of Sites (N)/Surveyed</b>	<b>3/9</b>	<b>7/18</b>	<b>6/12</b>	<b>5/13</b>	<b>5/5</b>	<b>6/11</b>	<b>5/10</b>	<b>4/10</b>	<b>6/8</b>	<b>6/9</b>	<b>9/18</b>	<b>9/18</b>

\*USFWS unpublished data.

**Roost Surveys.** Roost Surveys in Orange County detected a relatively stable population of Snowy Plovers within Orange County between October 2014 and December 2014, then declining through February to April as they dispersed to nesting areas (Table 6c). Unlike Los Angeles County (Table 3c), there did not appear to be a decline between November and December (Table 6c). In 2014-2015 we added two beaches to the roost surveys, Crystal Cove and Doheny State Beaches. We found that there is an active roost at Crystal Cove State Beach. The Snowy Plovers show a similar pattern to Salt Creek, arriving somewhat later in the fall, and remaining through April. We did not detect Snowy Plovers at Doheny State Beach during any of the roost surveys, although some were present during the winter window survey. We will stop surveying this beach as part of the roost survey program going forward and re-evaluate if Snowy Plovers are detected on two consecutive beachwide surveys in the future.

<b>Table 6a. Results of Roost Surveys in 2012-2013*.</b>								
<b>Beach Name(s)</b>	<b>Jul 12</b>	<b>Aug 12</b>	<b>Oct 12</b>	<b>Nov 12</b>	<b>Dec 12</b>	<b>Feb 13</b>	<b>Apr 13</b>	<b>Jun 13</b>
Surfside	ns	15	18	11	22	ns	ns	ns
Bolsa Chica SB 2	0	29	6	43	12	0	19	3
Huntington SB	0	34	50	81	152	55	10	0
Balboa Beach 2	19	76	106	43	12	71	1	0
Salt Creek	ns	ns	ns	ns	ns	ns	0	0
Trestles	ns	ns	ns	ns	ns	ns	28	0
Total Observed	19	139	162	167	176	126	58 (30)	3 (3)
No. of Beaches	1	4	4	4	4	2	3	1

<b>Table 6b. Results of Roost Surveys in 2013-2014*.</b>								
<b>Beach Name(s)</b>	<b>Jul 13</b>	<b>Aug 13</b>	<b>Oct 13</b>	<b>Nov 13</b>	<b>Dec 13</b>	<b>Feb 14</b>	<b>Apr 14</b>	<b>Jun 14</b>
Surfside	ns	ns	21	16	15	10	0	0
Bolsa Chica SB 2	27	22	47	36	31	42	2	1
Huntington SB	16	17	93	101	25	21	32	0
Balboa Beach 2	65	93	67	72	110	89	1	0
Salt Creek	0	0	0	3	26	0	0	ns
Trestles	0	0	0	39	67	41	0	ns
Total Observed	108 (108)	132 (132)	207 (207)	251 (209)	259 (166)	203 (162)	35 (35)	1 (1)
No. of Beaches	3	3	4	6	6	5	3	1

\*The roosts at Salt Creek and San Clemente State Beach/Trestles were not regularly surveyed until April 2013; counts without these roost numbers are provided below in parenthesis so that population trends can be compared.

<b>Table 6c. Results of Roost Surveys in 2014-2015.</b>								
<b>Beach Name(s)</b>	<b>Jul 14</b>	<b>Aug 14</b>	<b>Oct 14</b>	<b>Nov 14</b>	<b>Dec 14</b>	<b>Feb 15</b>	<b>Apr 15</b>	<b>Jun 15</b>
Surfside	ns	ns	11	1	9	1	0	0
Bolsa Chica SB 2	ns	ns	34	5	34	10	0	0
Huntington SB	ns	ns	21	11	5	18	2	0
Balboa Beach 2	ns	ns	52	63	44	39	8	0
Crystal Cove	ns	ns	8	21	44	39	8	0
Salt Creek	ns	ns	0	30	31	37	4	0
Doheny	ns	ns	0	0	0	0	0	0
Trestles	ns	ns	76	52	63	48	0	0
Total Observed			203	183	211	153	16	0
No. of Beaches			6	6	6	6	3	0

## Roosting Sites – Los Angeles County

**Zuma County Beach.** Zuma was previously the largest roost and supported 41% of the population from 2004-2010 (Ryan et al. 2010). The flock here declined between 2006 and 2007 and remained between 70-90 Snowy Plovers until 2013-14. In 2014-15 this area supported 13.3% of the LAC non-breeding Snowy Plover population. In fall 2014, a maximum of 58 Snowy Plovers were detected. Between the December 2014 and January 2015 surveys the roosting area near Lifeguard Tower 9 was abandoned and not re-occupied for the remainder of the 2015 non-breeding season (Figures 1 and 2). Between 10 and 13 individuals moved to a roosting area near the mouth of Zuma Creek (Figure 2), and were observed here from February-March 2015.

In October 2014 observers noted the presence of a new volleyball court installed by Los Angeles County Beaches and Harbors within the area that had previously supported the main roost of Snowy Plovers at Zuma Beach (Figure 1, Photo 1 and 2). Plovers remained in the vicinity, but were only detected along the shoreline in October 2014 and moved north of their typical roosting area, closer to Lifeguard Tower 10 in November and December 2014. In December 2014 heavy equipment placed a large berm within the previous main roosting area at Zuma (Photo 2). Also in December a large commercial film shoot was occurring, with a large number of vehicles and crew staged in the parking lot directly behind the Snowy Plover roost. This coincided with the complete abandonment of the roost. In past years heavy equipment was used to place this berm both north and south of the main roosting area, but avoided the roosting area itself. Additionally during the summers of 2014 and 2015 as many as three beach camps were placed within and adjacent to the area recommended as a special protection zone for the Snowy Plovers (Figure 1). These camps are regularly attended by large numbers of children. A Google Earth image taken on May 1, 2015 clearly shows as many as 21 surfboards and three large easy ups placed within the recommended special protection zone (SPZ) at Zuma (Figure 1). During roost surveys in June-August 2015 observers noted the presence of the camps and also large numbers of gull and crow tracks (potential predators) in the camp's footprint, likely attracted to food left by the campers.

The camps, volleyball court and the berm are contrary to recommendations made in past reports (Ryan et al. 2014) and modified here (see below) and by the USFWS in a letter sent to the Los Angeles County Department of Beaches and Harbors (LACBH) by Chris Dellith of the USFWS on September 26, 2013 and responded to by LACBH staff on January 23, 2014, as well as the discussion that occurred between USFWS agents, State Parks, LA County Fire, and LACBH during their meeting at Malibu Lagoon on September 16, 2013. These recommendations specifically state that efforts to protect wintering Snowy Plovers on LAC beaches should be implemented between July and April-May within an area 250 x 500 ft. from the known roost location and within SPZs (below, Figure 1). Recommendations include avoiding recreational events in these areas and limiting the use of vehicles and heavy machinery in these areas.

Here we specifically recommend 1) requesting the surf camps operate outside the SPZ shown in Figure 1, 2) moving the volleyball court outside of the SPZ, and 3) only creating berms at locations where they were placed in previous years, using data provided in this and previous reports to determine potential Snowy Plover roosting areas and avoiding them, as well as the use

of monitors and best management practices to avoid harassing the Snowy Plovers during the installation and removal of these berms.

**Malibu Lagoon.** Malibu is the fourth largest roost and typically supports about 16% of the county population (Ryan et al. 2010), and in 2014-15 it supported 12.7%. In 2014, between 40 and 60 Snowy Plovers were present between November and December, when only two were detected during the roost survey (Table 3c). From December to March, their presence at Malibu Lagoon remained somewhat irregular, with none detected during the single-day roost surveys, but local birders detecting and reporting 3-24 in January, 1-2 in February, and none between March and May (ebird 2015). The sand spit at Malibu was very narrow in the fall and early winter of 2014-15 due to wave erosion from an unusually active hurricane season in the central Eastern Pacific (Photo 3). This removed much of the sand from their normal roosting area on the east side of the lagoon and continued to deteriorate between October and January, over washing completely during the December high tides. Interestingly, we detected a very early returning Snowy Plover on June 26, 2015. This was an early record for the site. Each spring, we coordinate with California State Parks to set up a symbolic enclosure at this site. In 2015, enclosure set-up occurred in mid-April and additional maintenance was conducted in mid-July (Figure 3).

We observed a lifeguard on a quad parked within 40 ft. of the Snowy Plover roost in October 2014 (Photos 4 and 5), despite discussion regarding limiting the use of quads near the Snowy Plovers in September 2013. We are also concerned about the placement of the Surf Camps at Malibu Lagoon each summer. These camps enroll large numbers of children and involve a large number of beach activities such as soccer, Frisbee, and other popular beach activities. In the past several years, one has been placed immediately outside the Snowy Plover enclosure on the LAC portion of the west side of the beach. We strongly suggest that any permits issued for these camps place them at least 300 ft from the boundary of Snowy Plover roosts. If allowed to remain in its current location, we recommend outreach activities to the staff and participants to make them aware of the Snowy Plovers and help reduce their impacts. The Snowy Plovers return in July and the camps run through August.

**Santa Monica State Beach.** The roost at Santa Monica usually supports about 8% of the countywide wintering population of Snowy Plovers (Ryan et al. 2010), but supported 26% of the population in 2014-15, with 32-65 Snowy Plovers observed during the peak non-breeding months. We observed between 54-59 Snowy Plovers here in 2012-2013 and 22-74 in 2013-2014 (Ryan et al. 2014). The number of roosting Snowy Plovers has been stable at this site since 2010 and this trend has continued into 2014-15. The City of Santa Monica installed the protective enclosure in October 2014. It was 285 x 130 feet in 2014-15 and shifted slightly south of its location in 2013-14. However, as Figure 4 shows, as in 2014-15, the Snowy Plovers have often been found outside of the current enclosed area, but within and adjacent to the previous enclosed area. We continue to recommend that the City of Santa Monica consider increasing the size of the enclosure to its previous dimensions of 600 x 100 ft. and shift it north to cover areas frequented by the Snowy Plover.

In 2014, site expert Lu Plauzoles suggested the possibility of a year-round enclosure. He noted that, "The location this year seemed to be well-chosen for the needs of the birds. Even when they were flushed by encroaching vehicles, they seemed to eventually return and there were far more

observations of the birds inside the enclosure than in previous years. Some lifeguards were suggesting to me the enclosure could be deeper without endangering their operations.” Lu provided the following recommendations:

1. Measuring the summer gap from edge to fence at 12 feet would leave room for a lifeguard vehicle, but would discourage the County/City water testing pickup trucks from crossing the roost;
2. Immediately erecting the fence extension to the berm edge after Labor Day would provide the best protection from vehicles and joggers;
3. Adding a “No Vehicles except on emergency calls” with a seaward arrow at the end of the fencing would further protect the birds; and
4. Allowing, and in fact encouraging, dune building inside the enclosure that seems to attract the birds to the area. “Dunelets” only a foot high mimic an ungroomed beach and in windy situations provide welcome roosting shelter for the birds.

We are also concerned about the placement of the Surf Camps each summer. This year a camp was placed immediately north of the enclosure site prior to its construction. We strongly suggest that any permits issued for these camps place them at least 300 ft. from the boundary of Snowy Plover roosts. If allowed to remain in its current location, we recommend outreach activities to the staff and participants to make them aware of the Snowy Plovers and help reduce their impacts. The Snowy Plovers return in July and the camps run through August. Additionally sunbathers were observed within the enclosure in November.

On November 21 Lu Plauzoles reported also seeing a lifeguard vehicle pass through the Snowy Plover roosting flock, missing one by 20 inches. Captain Scott Grigsby responded that he would discuss the matter with his employees. However, on November 28, a lifeguard vehicle (129949) drove through the roosting Snowy Plovers at well over 15 mph with no emergency lights at 13:26. Plovers flushed and none were struck, but the vehicle came close to one. This is still occurring despite agreements made at the meeting at Malibu in September 2013.

**Venice Beach.** In 2014-15, 6-9 Snowy Plovers were again observed at Venice Beach in January and March 2015. Volunteers monitoring Least Terns at this site also observed 1-2 Snowy Plovers seaward of the tern colony enclosure in May 2015.

**Dockweiler State Beach.** In 2014-15 the northern roost near **Lifeguard Tower 47 (LT 47)** was the second largest Snowy Plover roost in LA County. It supported between 13-43 Snowy Plovers, which is lower than the 29-71 Snowy Plovers in 2013-14. However, it appears that some Snowy Plovers from this roost may have reoccupied the roost at LT 58 (below) in January 2015, leading to slightly lower numbers here. Overall 12% of the LAC winter roosting population overwintered here, a lower percentage than previous surveys (Ryan et al. 2010, Ryan et al. 2014, Table 2). However, when combined with the birds that likely relocated to LT58 (below), it represented 17.8% of the LAC total. On August 14, 2010 a wooden-slat fence replaced the snow fencing and it remained in place through the entire 2014-2015 season (Figure 5).

Los Angeles Audubon, USFWS, and LACBH have all worked as a team to maintain the fence and pick up trash. There was no vandalism to the fence and during most clean-up visits trash has

been minimal and invasive plant removal (sea rocket [*Cakile maritima*]) and iceplant [*Carpobrotus edulis*]) was easily completed. There are four native coastal strand/dune plant species that are voluntarily colonizing the enclosure area. These include *Atriplex leucophylla* [beach saltbush] *Abronia maritima* [red sand verbena], *Ambrosia chamissonis* [silver beachweed or silver beach burr], and *Camissonia cheiranthifolia* [beach primrose]. In spring 2015 LACBH requested that all vegetation, both native and non-native, be removed from the enclosure. During the summer of 2015, after photo-documenting the site, vegetation was removed by hand, with the goal of keeping site topography and root systems in tact within the enclosure. Well-established plants, like *Ambrosia chamissonis*, quickly re-sprouted after being cut back due to the July rainfall. Evidence of fossorial small mammals was observed repeatedly, as well as the presence of active ant colonies, numerous other unidentified invertebrate species, and one instance of a western side-blotched lizard (*Uta stansburiana elegans*).

Observers did note the presence of vehicle tracks in front of the enclosure, especially during months when the beach widens. We recommend that vehicles avoid this area to the extent possible because the Snowy Plovers are often located between the enclosure and top of the beach slope. We also observed dog tracks in the enclosure and support enforcement of existing dog regulations on this beach.

At the southern roost, north of **Lifeguard Tower 58 (LT 58)** (Figure 6), we detected 17-27 Snowy Plovers between January and March 2015, where none had been detected during surveys since January 2013. This site supported 5.6% of the LAC population (Ryan et al. 2014). These individuals may have relocated from LT47, accounting for some of the reduction in the number of Snowy Plovers there. This roost is not protected and is regularly groomed and driven through. A berm to protect nearby infrastructure and fire pits placed in front of the adjacent RV park is installed and removed annually north of the Snowy Plover roosting area. The berm was installed in the same location in December 2014. 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. 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. A dead oiled sooty shearwater was found during the June 2015 survey and reported to Caltip. Nine additional beach-cast seabirds (cormorants and grebes) were noted by a volunteer during the January 2015 survey, though these birds were not oiled.

**Hermosa Beach.** In 2014-15 we detected between 34-58 Snowy Plovers from October to March, or 23% of the LAC non-breeding population. This is somewhat lower than the 28-79 Snowy Plovers at this roosting site in 2013-14 (Ryan et al. 2014). As in past years, the location of the roost was variable (Figure 7), mostly from 22<sup>nd</sup> Street to 28<sup>th</sup> Street. The reason for this movement 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).

**Other Beaches.** Snowy Plovers were also reported from Leo Carrillo State Beach (SB), El Matador/Lechuza Beach, Ballona Creek Channel, El Segundo & Manhattan Beach, Hermosa Beach South & King Harbor, Torrance Beach, Cabrillo Beach and Belmont Shore (Table 1, ebird 2015).

## **Roosting Sites – Orange County**

**Surfside.** Surfside Beach supported a small roost of 1-16 Snowy Plovers between July 2012 and April 2014. This represents about 4% of non-breeding Snowy Plovers in OC. The population here appears to be stable when compared with winter window survey data (USFWS unpublished data 2014, and observations made by Ryan and Hamilton 2009). Plovers were observed from 14<sup>th</sup> Street to north of Anderson Street (Figure 8). This beach is not formally groomed, but the local homeowners remove kelp from the beach. This beach also has a large number of off-leash dogs. In 2009, a dog captured a Snowy Plover and it was brought to a wildlife rehabilitation facility (P. Knapp pers. comm. *in* Ryan and Hamilton 2009). A berm was installed in December 2014.

**Bolsa Chica State Beach.** Bolsa Chica SB supports the third largest roost in the county and is immediately adjacent to the main nesting area in OC, the Bolsa Chica Wetlands Ecological Reserve. We observed between 10 and 49 Snowy Plovers; this represents 14% of non-breeding Snowy Plovers in OC. This is similar to the previous year. Most Snowy Plovers were observed on the broad beach north of the Bolsa Chica tidal inlet (Figure 9). This is a broad sandy beach, with fire pits and a public parking lot backing it. It is very popular with beachgoers during the summer months. A berm was installed in December 2014.

**Huntington State Beach.** We observed 5-22 Snowy Plovers at Huntington SB in 2014-15, 7% of non-breeding Snowy Plovers in OC. This is far fewer than 2013-14 when it was the second largest roost in the county and we observed between 21-152, which represented 32% of observations. The Snowy Plovers were observed at the southern end of this beach, between Magnolia and the Santa Ana River outlet (Figure 9). This is a broad sandy beach, with fire pits and a public parking lot backing it. It is very popular with beachgoers during the summer months. During the course of the year this area hosts music festivals, one occurred in July 2015 and another is scheduled for September 2015. It is also a popular beach for commercial filming.

Given the recent decline at this roost, we would suggest that State Parks consider moving these types of events to another section of the beach, closer to the Magnolia or Newland entrances and instituting a SPZ (Figure 10) at the main roosting location. If this is not possible, then we suggest that a monitor observes the Snowy Plovers during these events and documents any changes in behaviors, observing the roost 3-5 days prior to the set-up of the event, during set-up operations, during the event itself and then 3-5 days following the event. We suggest that the observers should record roost numbers and locations hourly, the number, duration, and if necessary distance of flushing events and observed causes (if any). These data should be analyzed and recommendations made regarding minimizing disturbance to roosting Snowy Plovers on the beach.

**Balboa Beach.** Balboa Beach supports the largest roost in the county and is immediately adjacent to a large residential area on the Balboa Peninsula (Figure 11). In 2014-15 we counted between 15 and 127 Snowy Plovers; this represents 29% of non-breeding Snowy Plovers in OC. This is similar to the 12-125 Snowy Plovers detected in 2013-15. However in 2013-14 this represented 42% of observations. In 2014 we counted 127 Snowy Plovers in September, this declined to between 39 and 52 Snowy Plovers for the remainder of peak of the non-breeding season. This is much lower than the consistent 90-125 detected here the previous year. Similar to several beaches in Los Angeles County, the fall migration brought normal or near normal



numbers, but many appeared to move to other locations during the course of the non-breeding season.

In the fall the City of Newport Beach constructed a 300 foot long sidewalk adjacent to the fence at the Balboa Beach Snowy Plover roost, extending from E Street (Figure 12). This ran immediately adjacent to a fenced Snowy Plover area and directly into one of the main Snowy Plover roosting areas from 2014 (Ryan et al. 2014) (Figure 12). This disturbance likely flushed the Snowy Plovers from this roosting area in 2015 and likely contributed to the reduced numbers here. Additionally, this beach became narrower during the fall months due to beach erosion from late summer/fall hurricanes in the central Eastern Pacific. This is a broad sandy beach, with residential homes backing it. It is very popular with beachgoers during the summer months. It also supports a 1.24 hectare dune restoration area where a pair of Snowy Plovers has nested in recent years. This is the only known beach nesting Snowy Plover pair on the mainland in LAC or OC, although they did not nest here in 2015.

**Crystal Cove State Park.** The Snowy Plover had been listed as “occasional” during the fall, winter and spring months on the park’s bird checklist (Bales, unknown date). In 2013-14, volunteers detected 7 Snowy Plovers here during the January 2014 beach-wide survey. Based on this information, we included Crystal Cove State Park in the 2014-2015 roost surveys and surveyed it year-round.

We detected between 0-31 Snowy Plovers here between September 2014 and April 2015, the only month we failed to detect any was February. During most months, between 20 and 30 Snowy Plovers were present, representing 9% of the OC nonbreeding population (Figure 13). This appears to be an important non-breeding roost and we will continue to survey the site as part of the roost surveys. Beach grooming does not occur at this site. It is a popular beach during the summer months.

**Salt Creek.** In 2014-15 we detected 30-37 Snowy Plovers at Salt creek (Figure 14), representing 13% of the OC population. It was the fourth largest roost in the county. This beach is very popular throughout the year. It is visited by guests at the adjacent Ritz Carlton Hotel and the Monarch Bay Club, as well as public access through the Salt Creek Beach Park. It is well-patrolled and off-leash dogs were not observed. Part of the beach is regularly groomed and the outlet of Salt Creek is occasionally opened using machinery.

**San Juan Creek/Doheny State Beach.** Plovers were detected here during the January 2015 beach wide survey and have been occasionally detected by local bird watchers (ebird 2015). We included this beach as part of our roost surveys for the remainder of 2015, but did not detect any additional Snowy Plovers here during those surveys. Local birders reported them from September to February 2015 (only 1 individual seen in February) in the vicinity. Given the lack of consistent observations, we suggest that this may be an ephemeral roost and will continue to survey during the beach wide surveys, but suspend roost surveys at this beach unless additional consistent observations are made.

**San Clemente State Beach/Trestles.** In 2014-15 between 48 and 76 Snowy Plovers were detected at Trestles/San Clemente State Beach, representing 19% of the OC population (Figure 15). They were not detected by the State Beach Surveyors during the January winter window survey. However, Sea & Sage Audubon observers detected 38 here on 20 January 2015. These

birds appear to shift their roosting area during the year and sometimes move south of our survey area and onto Marine Corps Base Camp Pendleton's Green Beach. This is a similar count to the 39-67 individuals counted in 2013-14. This beach is heavily used by surfers throughout the year. However, most of the year the surfers tend to transit the area used by roosting Snowy Plovers, minimally disturbing them (Figure 15). During the summer months it can fill-up with beachgoers.

**Other Beaches.** Snowy Plovers were also reported from Aliso Creek Beach (January 2015) (ebird 2015).

### **Nesting**

No nesting was detected on Los Angeles or Orange County Beaches in 2014-15.

### **Recommendations for Special Protection Zones.**

We recommend that all non-breeding Snowy Plover roosts in LA and OC be considered as Special Protection Zones (Ryan et al. 2010). On the attached figures these are represented by black polygons. We would suggest that efforts to protect these Snowy Plovers be implemented within 90 m (300 ft) perpendicular from the coast from the high tide line and within the 400 feet of the central roost location parallel to the coast. These are based on measurements made in the roost size study above. These measures should be implemented from the arrival of the first returning birds in July until they depart in April to May each year. We suggest that these areas be referred to as "**Special Protection Zones**" and provided management and maintenance differently from adjacent areas of beaches without roosting Snowy Plovers. We suggest the following to avoid further intentional and unintentional take of Snowy Plovers within Special Protection Zones.

#### **Routine Operation of Vehicles and Heavy Machinery**

1. All drivers of vehicles and machinery that are operated on sections of beach where Snowy Plovers occur should be trained in Snowy Plover avoidance annually.
2. Vehicles should avoid operating within Special Protection Zones, with the exception of essential activities such as lifeguard rescue, essential patrols, trash pick-up and other activities deemed essential and agreed to by Wildlife Agencies. Vehicles simply transiting between points should not be allowed within these areas.
3. Visible markers, possibly with signage should be placed within 100 feet of the top of the beach slope and at the inland corners of the Special Protection Zones to remind vehicle operators of their presence.
4. When essential activities must occur, vehicles should remain below a maximum 10 mile per hour speed limit and if birds are encountered, the driver should back up 50 feet and alter their route to avoid flushing Snowy Plovers.

#### **Beach Maintenance and Clean up**

5. Regular sand grooming should be discontinued within Special Protection Zones. This activity both flushes the birds and removes important foraging resources. We recommend that these small areas be cleaned by hand crews, trained in Snowy Plover avoidance.

6. If mechanical clean-up is necessary, it should be done in the presence of a qualified Snowy Plover monitor who will locate the roosting Snowy Plovers and ensure that machinery does not flush or disturb them.
7. We recommend the construction of berms occur away from Snowy Plover roosting areas.

### Recreational Activities

8. We suggest that activities such as walking, jogging, surfing, and sunbathing do not pose as much of a threat to the Snowy Plovers as fast moving vehicle strikes and removal of foraging habitat and that these continue normally within these areas.
9. We suggest that “refuge areas” be created using symbolic fencing or another barrier deemed suitable for this use during periods of extremely high beach use at popular beaches in July, August, and September. We recommend that these be erected in a 200 foot diameter (or other configuration suitable for the beach, but roughly 200 feet long) around the traditional center of the Snowy Plover’s roosting areas on popular beaches such as Zuma, DSB 58, and Hermosa. Signage should be placed on the barrier such as has been done at Malibu using signs made by local school children.
10. Large-scale recreational activities including things like triathlons, surf camps, beach volleyball camps, etc. should not be permitted within the Special Protection Zones. Docents should visit camps adjacent to the Special Protection Zones to talk to participants about Snowy Plovers.
11. Increased enforcement of existing regulations for off-leash dogs within the Zones.

### Education and Outreach

**Volunteer participation in the Snowy Plover monitoring program.** From September 2014 through May 2015, 56 individuals volunteered to monitor Snowy Plovers in Los Angeles County, contributing over 251 person-hours to the project. Of these 56 people, over half participated in more than one survey, and 30% participated in all 4 surveys. In Orange County, 63 individuals volunteered to monitor Snowy Plovers, contributing over 541 person-hours to the project. Of these 63 people, over half participated in more than one survey, and 30% participated in all 4 surveys. Orange County trained 26 new volunteers, conducting in-classroom training on September 13, 2014, January 10, 2015, and March 7, 2015. In-classroom training in March was supplemented with field training at Huntington State Beach. When needed, field training was provided when in-classroom training was not available.

**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 continues to work with Dockweiler Youth Center (LACBH) and the Annenberg Community Beach House to lead a series of Snowy Plover-focused beach walks for the general public, and to coordinate public school presentations and visits to observe Snowy Plovers (Table 6). From fall 2014 to summer 2015, 12 volunteers collectively spent over 60 hours working directly with the public through field trips, walks and presentations (Table 6). Through outreach activities, we have worked to establish community connections that will provide volunteers for both data collection and docent activities.

## **Orange County Outreach**

In Orange County in 2014-2015, team leaders volunteered over 200 person hours to complete administrative tasks, surveys, volunteer training, and outreach. Outreach was aimed at recruitment of surveyors and public awareness of the survey and Snowy Plovers. The survey was announced at every Sea and Sage Audubon General Meeting (9 per year), every 4<sup>th</sup> Tuesday Conservation Lecture (7 per year), and various events throughout the year. Sea and Sage Audubon's Science Committee Chair contacts nearby universities and colleges to recruit students to the program and our Facebook Chair posts every survey multiple times. Flyers, posters and business cards are placed at various venues and email announcements are sent to science/conservation interest lists.

A total of 6 long-term volunteers from the City of Newport Beach volunteer program participated in surveys in Orange County. This contributed 125 person-hours to monitoring efforts. The volunteers with the City of Newport Beach also performed docent and enforcement activities. These efforts include reporting "dogs off leash" to Newport Beach Animal Control Service as well as distributing interpretive materials to beach users.

Sea and Sage Audubon's Education Project Director introduced into its summer Marsh Camp program, a bi-annual Coastal Camp session on threatened species, featuring the Western Snowy Plover and California Least Tern. Twenty-four campers, ages 11 to 17 years, participated. A 30-minute interpretive and informative program on the biology and status of the species was followed by one hour of hands-on activity creating posters on, "How to protect and save the Snowy Plover and Least Tern." These posters will be posted on Sea and Sage Audubon's website and are being used in our promotional and outreach materials.

## **Orange County Outreach, Future Plans**

Beginning September 2015, Sea and Sage Audubon will give a 15-minute illustrated talk at Audubon chapters general meetings. The talk, which is aimed at adults, describes the OC survey and provides information about the Snowy Plover. Using the list we have compiled of possible additional venues for the program, both conservation and non-conservation groups, we hope to book additional talks. We plan to adapt the children's program for offsite San Joaquin Wildlife Sanctuary and will seek suitable venues for it. We plan to conduct Snowy Plover beach field trips, starting with one on Balboa Peninsula in October 2015, to which we hope to attract nearby residents.

**School Outreach Program.** We explored multidisciplinary ways to engage young, inner-city students in Snowy 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 3,900 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. Our online gallery has garnered over

6,000 web hits since it was posted in the summer of 2010.

Since August 2010, the Snowy 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 Snowy 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. Dorsey High School students in Los Angeles Audubon’s Baldwin Hills Greenhouse Program developed a Snowy Plover-themed environmental science curriculum, received docent training, and subsequently led elementary school students on field trips to Dockweiler Beach. This same group of students was also responsible for setting up and implementing a bilingual Snowy Plover and tern information table at public school events in the May 2015 that drew hundreds of community members. Through a grant from the Disney Worldwide Conservation Fund in 2014-2015, we were able to expand our field trip and presentation outreach programming, serving students from 10 schools within Los Angeles Unified School District during the school year. See Table 6 for a complete list of all outreach activities conducted.

**General Public Outreach.** Since the fall of 2010, we have coordinated with the Dockweiler Youth Center to provide a series of guided beach walks for the public. In February of 2012, we began collaborating with the Annenberg Community Beach House in Santa Monica to provide a similar program at their facility. We participated in eco-fairs and meetings from fall 2014 to summer 2015 to provide the public with information about Snowy Plover conservation in Los Angeles County (Table 6). Capitalizing on our strong partnership with California State Parks at Malibu Lagoon, we collaborated with this agency to provide an enclosure of symbolic fencing with interpretive signage from April through October 2015, and we aim to continue coordinating a small site-specific core of volunteers to help monitor this site and establish permanent interpretive signage.

**Table 6. Outreach and education activities in Los Angeles County conducted from summer 2014 through summer 2015, including presentations, tabling events, beach walks, and fieldtrips.**

Activity	Date	Location	Demographic	No. Attending
Dockweiler Youth Center (beach walks)	16-Nov-14 7-Dec-14 11-Jan-15 24-Jan-15	Dockweiler Beach	General public	25

<b>Activity</b>	<b>Date</b>	<b>Location</b>	<b>Demographic</b>	<b>No. Attending</b>
Annenberg Community Beach House (beach walks)	28-Dec-14 18-Jan-15	Santa Monica Beach	General Public	119
Public School Field Trips	5-Feb-15 21-Feb-15 23-Jan-15 27-Feb-15 21-Feb-15 19-Feb-15 30-Jan-15 13-Feb-15	Dockweiler State Beach	Los Angeles Unified Public School students	Est. 440
Public school Presentations	1-Oct-14 29-Jan-15 19-Feb-15 15-Jan-15 3-Jun-15 25-Feb-15 19-Feb-15 26-Jan-15 28-Jan-15 12-Feb-15 22-Jan-15 9-Feb-15 26-Mar-15	Various Los Angeles Unified School District campuses ( <i>many of the same students attended the field trips as well</i> )	Public school students	Est. 760
Professional Presentations	3-Feb-15	Beach Ecology Coalition (Pepperdine University)	Science professionals; Beach management professionals; upper division college students	Est. 60

Activity	Date	Location	Demographic	No. Attending
Eco-fairs and other tabling events	18-Apr-15 1-May-15 27/28 June 15 21-Jul-15	Cabrillo Marine Aquarium, Los Angeles County Natural History Museum, Conservation Art Show (Politi Elementary), Debs Park Audubon Center	General public	Estimated at over 1000

**Creation of public displays.** As mentioned above, we worked with elementary school students to create Snowy Plover conservation posters in 2010. The public may view this artwork online at the Los Angeles Audubon website. During the 2014-2015 school year we collaborated with three Los Angeles Unified School District (LAUSD) schools to display Snowy Plover-themed artwork and outreach activities developed by students at a public event. We will continue to collaborate with other organizations to provide venues in which to display interpretive information about Snowy 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](http://losangelesaudubon.org)). Volunteer materials, annual reports, updates, maps of Snowy Plover locations from volunteer observations, and student conservation posters have been posted to this site. Since we set it up in 2008, the main webpage containing Snowy Plover conservation information received over 8,900 page views, and our gallery of student conservation posters received over 6,000 page views since 2010.

Sea and Audubon hosts a Snowy Plover website for Orange County within its general website ([seaandsageaudubon.org](http://seaandsageaudubon.org)), created and maintained by volunteer staff. General Snowy Plover information is available as well as information about this survey. All volunteer materials are available for download including a list of beach segments with downloadable maps. In the weeks before and after a survey, this site becomes the active place for volunteer surveyors to select their beach segment. It displays which segments are available. It also displays which segments have completed their survey and turned in their data.

**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 as well as in laminated form and were used again at the seasonal enclosure at Malibu Lagoon March through October 2014 and April through October 2015.

**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 Snowy 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, and we have provided materials to California State Parks and Sea and Sage Audubon as well.

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

The following recommendations range from sustaining existing programming to greatly expanding aspects of outreach and education. All are contingent on future funding opportunities and staff availability. Opportunities to seek collaborative funding with colleges and universities, beach management agencies, beach-oriented non-profit organizations, and other coastal Audubon chapters appear to be the best way to move forward with these ideas.

- Continue to work towards sustainability in docent and outreach programs. Expansion to more public schools and interested groups throughout Los Angeles and Orange Counties is an ultimate goal. However, the project team feels that it is extremely important to maintain 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 Snowy 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 Snowy 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.
- 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 Snowy 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 Snowy Plover beaches. The packet should include a DVD of the public service announcement as well as resources regarding dogs on the beach and general Snowy Plover conservation awareness.


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## APPENDIX 1: ROOST MAPS

### Legend for Maps


Recommended Special Protection Zones (SPZ):  black polygon


Enclosures:  red polygon or lines


July 2014: no survey

August 2014: no survey

September 2014: no map data from OC

October 2014:  pink polygon LA/● black dots OC

November 2014:  blue polygon

December 2014:  light green polygon

January 2015: ● pink dots

February 2015:  orange polygon

March 2015: ● yellow dot

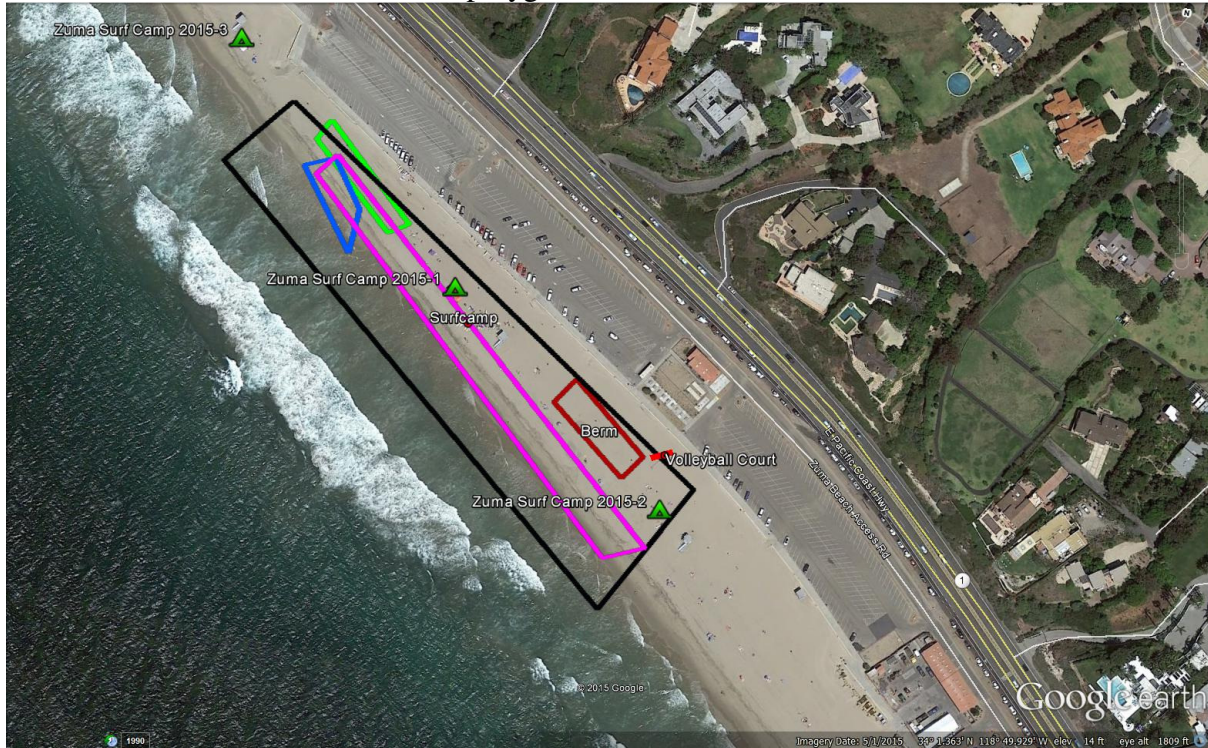
April 2015: brown dot

May 2015: no map data reported

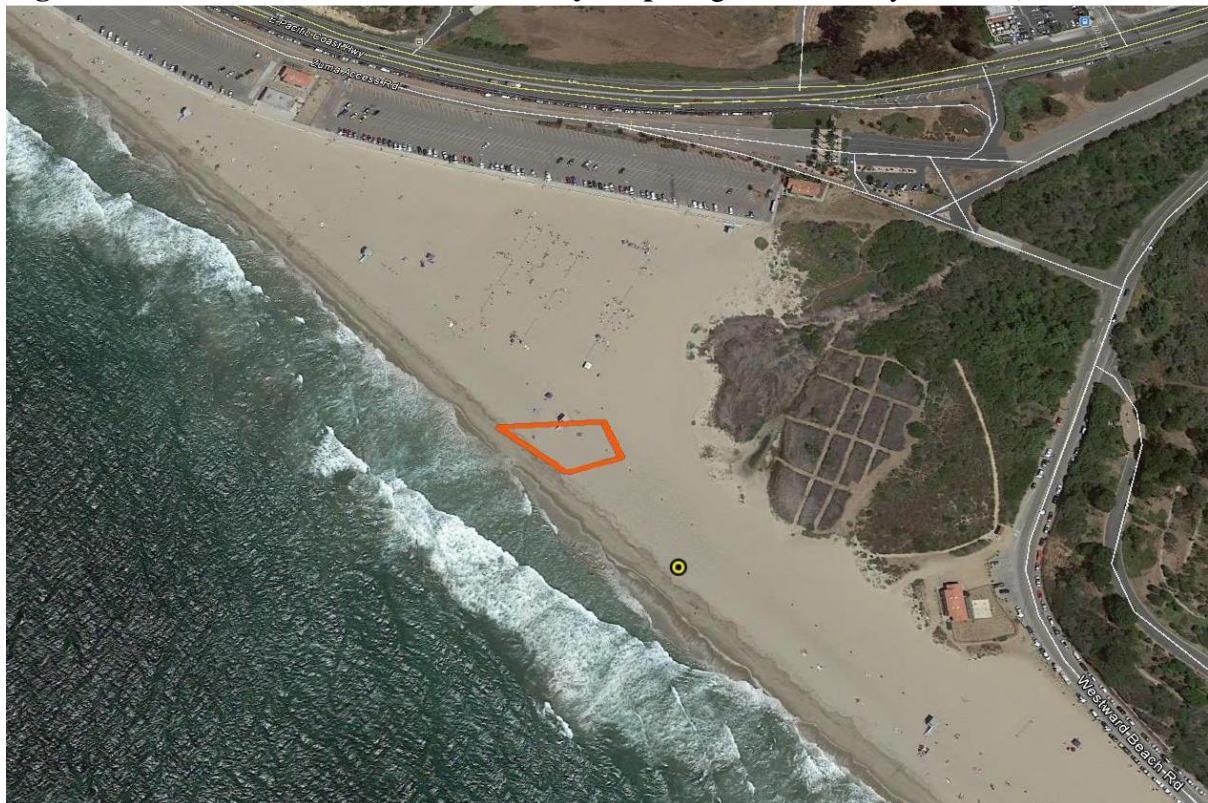
June 2015: no map data reported



**Figure 1. Zuma Beach Roost Map.** Legend: SPZ: [ ]; October 2014: [ ]; November 2014: [ ]; December 2014: [ ]; Berm: dark red polygon



**Figure 2. Zuma Beach South Roost Survey Map.** Legend: February 2015: [ ]; March 2015: [ ]

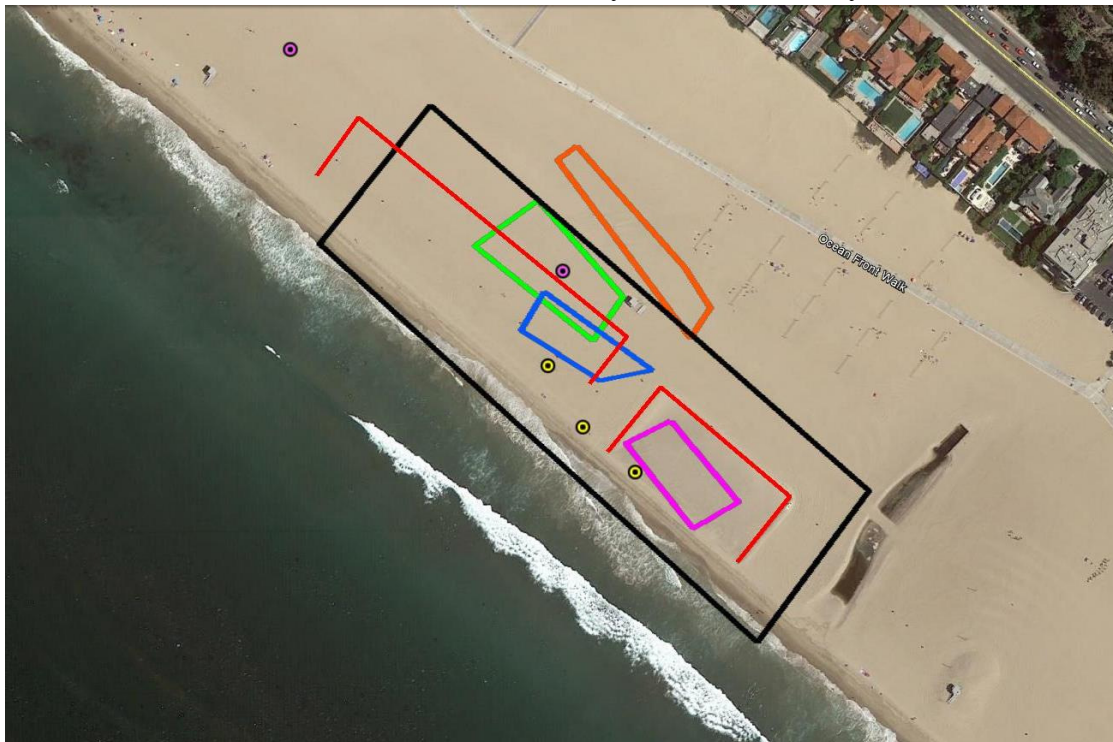




**Figure 3. Malibu Beach Roost Survey Map.** Legend: Enclosures: [red outline]; October 2014: [magenta outline]; November 2014: [blue outline]

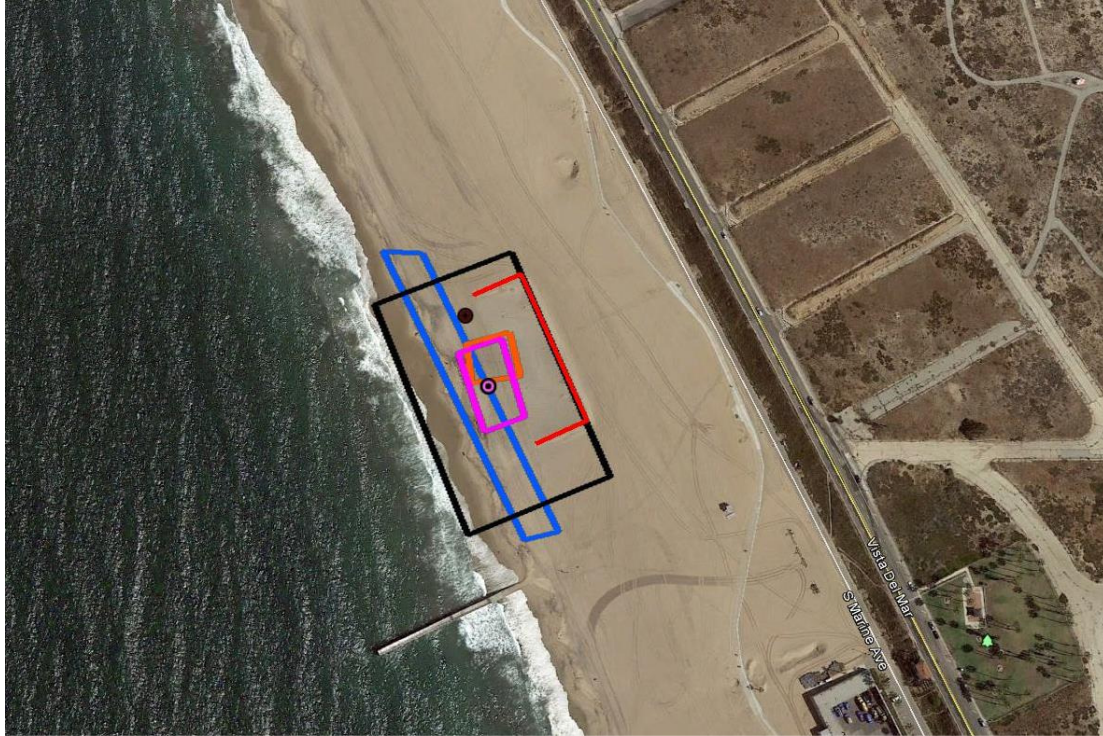


**Figure 4. Santa Monica Roost Survey Map.** Legend: SPZ: [black outline]; Enclosures: [red outline]; October 2014: [magenta outline]; November 2014: [blue outline]; December 2014: [green outline]; January 2015: [purple circle]; February 2015: [orange outline]; March 2015: [yellow circle]

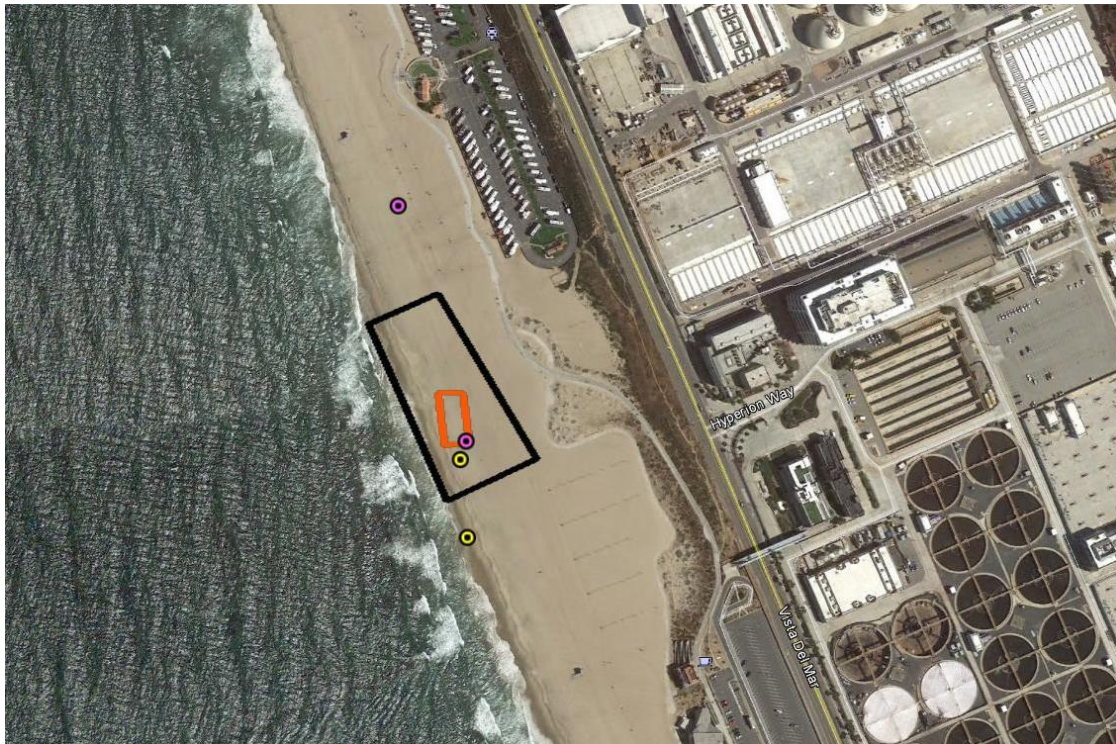




**Figure 5. Dockweiler LT 47 Roost Survey Map.** Legend: SPZ: [ ]; Enclosures: [ ]; October 2014: [ ]; November 2014: [ ]; January 2015: ●; February 2015: [ ]; brown dot April 2015

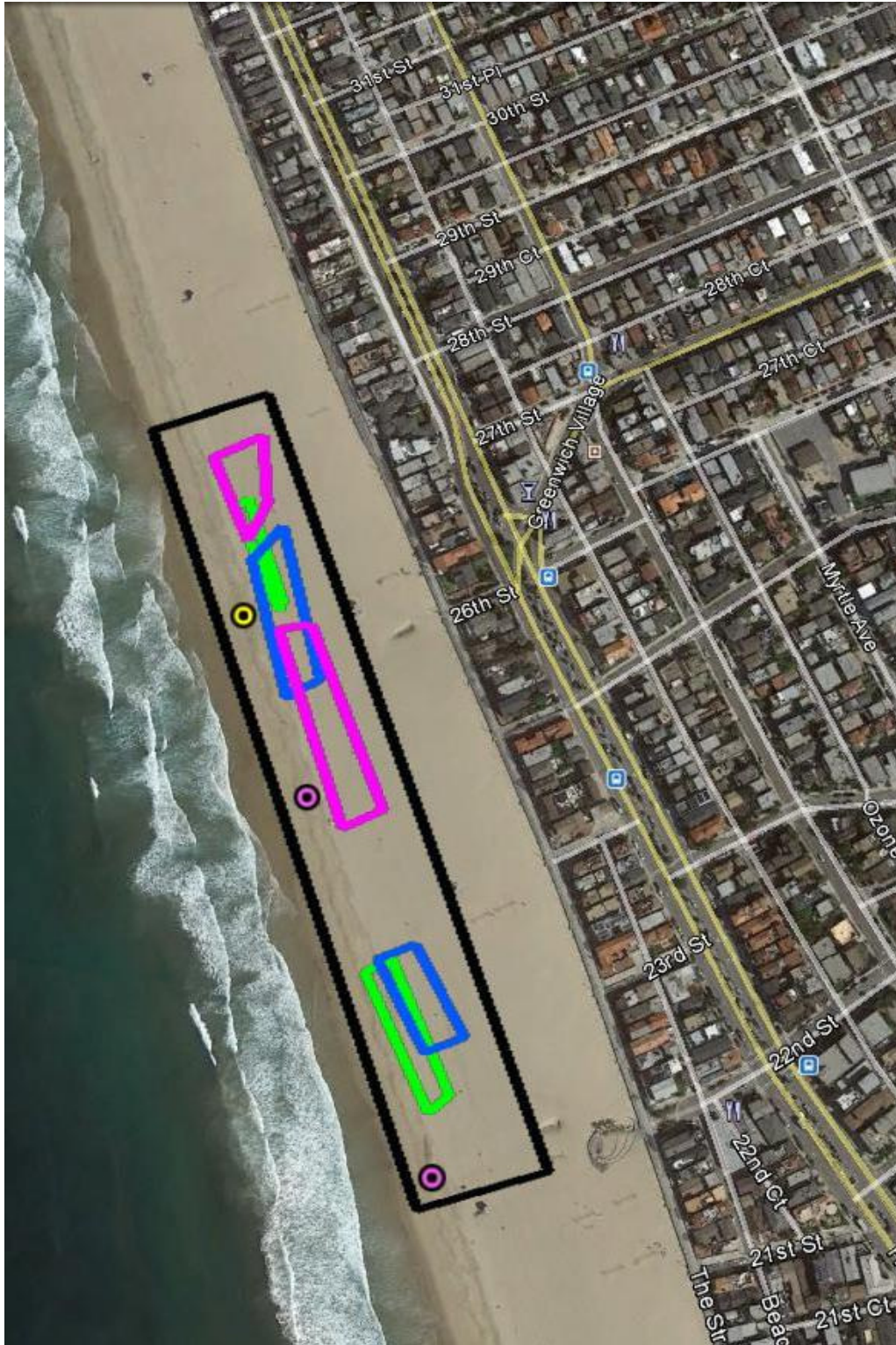


**Figure 6. Dockweiler LT 58 Roost Survey Map.** Legend: SPZ: [ ]; January 2015: ●; February 2015: [ ]; March 2015: ●



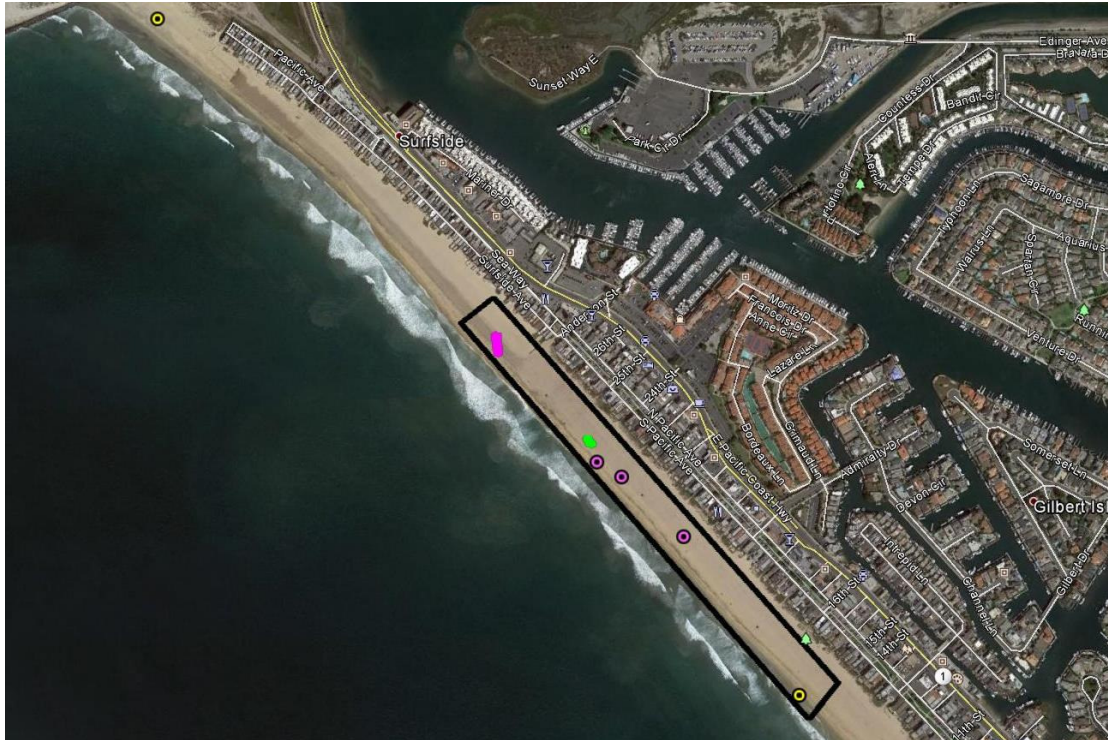


**Figure 7. Hermosa Beach Roost Survey Map.** Legend: SPZ: [ ]; October 2014: [ ]; November 2014: [ ]; December 2014: [ ]; January 2015: [ ]; March 2015: [ ]





**Figure 8. Surfside/Sunset Roost Survey Map.** Legend: SPZ: [ ]; October 2014: [ ]; December 2014: [ ]; January 2015: ●; March 2015: ●



**Figure 9. Bolsa Chica State Beach Roost Survey Map.** Legend: SPZ: [ ]; October 2014: ●; December 2014: [ ]; January 2015: ●; February 2015: [ ]; March 2015: ●





**Figure 10. Huntington State Beach Roost Survey Map.** Legend: SPZ: [ ]; October 2014: ●; November 2014: [ ]; January 2015: ●; February 2015: [ ]; March 2015: ●

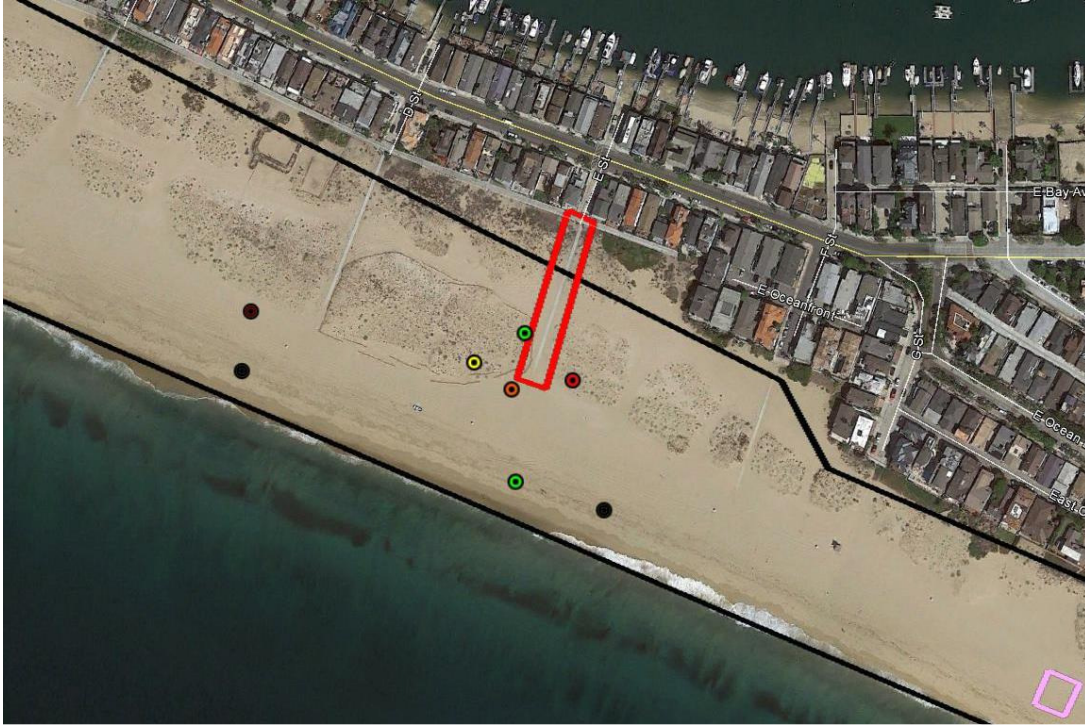


**Figure 11. Balboa Beach Roost Survey Map.** Legend: SPZ: [ ]; October 2014: ●; November 2014: [ ]; December 2014: [ ]; February 2015: [ ]





**Figure 12. Balboa Beach Roost Map showing 2013-15 roost locations and new walkway (inside red polygon). Legend: SPZ: [ ]; October 2014: ●; March 2015: ●**

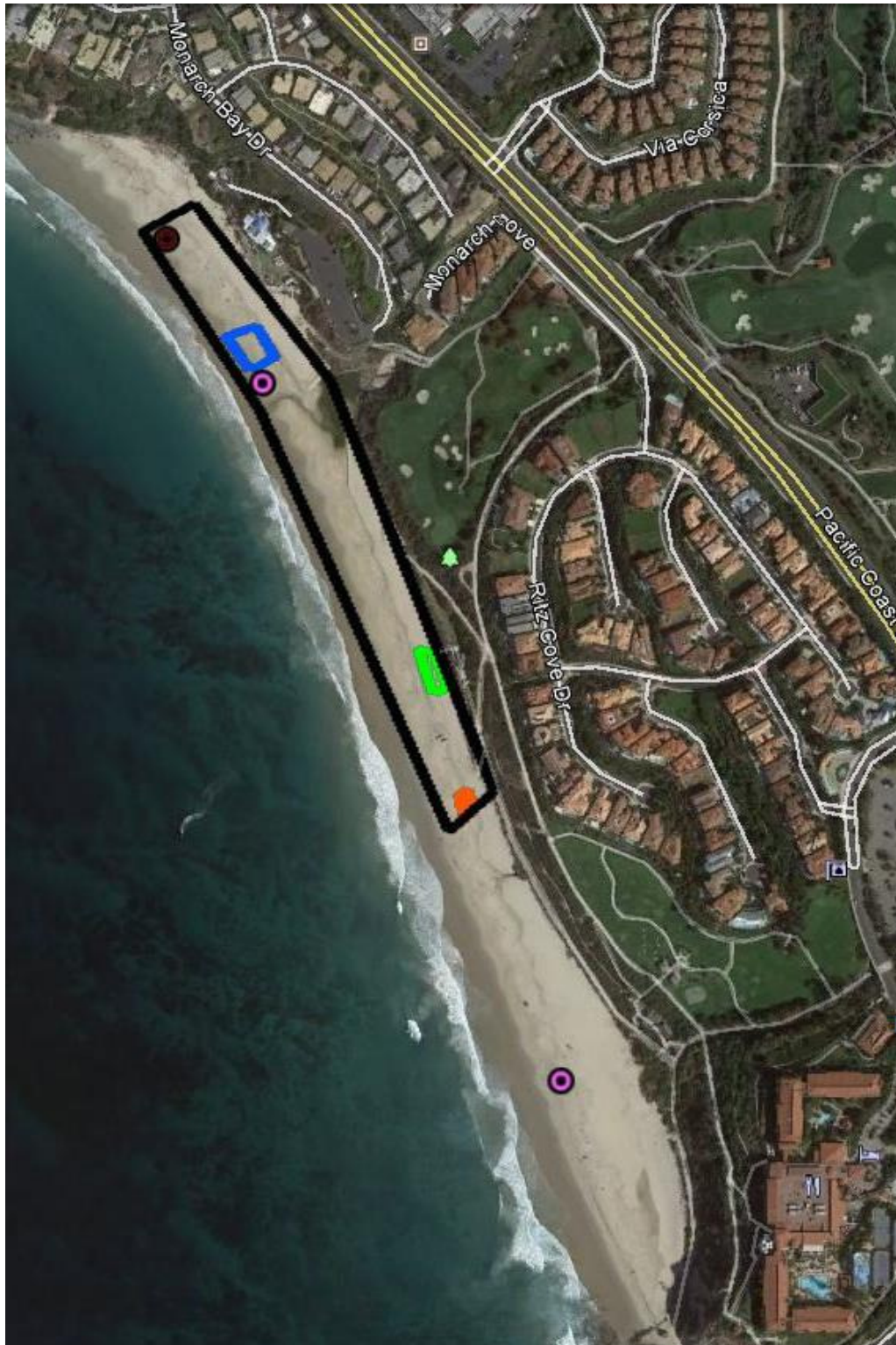


**Figure 13. Crystal Cove State Park Roost Survey Map. Legend: SPZ: [ ]; October 2014: ●; December 2014: [ ]; January 2015: ●; brown dot April 2015**





**Figure 14. Salt Creek Roost Survey Map.** Legend: SPZ: [ ]; November 2014: [ ]; December 2014: [ ]; February 2015: [ ]; January 2015: ●; brown dot April 2015







**APPENDIX 2. PHOTOS FROM PLOVER SURVEYS IN 2012-2014**

**Photo 1. Volleyball court placed at the location of historic plover roost at Zuma LT9.**



**Photo 2. Berm, volleyball court and off-leash dog north of Zuma LT9.**



**Photo 3. Malibu lagoon sand spit narrowed by wave action in December 2014.**



**Photo 4. Lifeguard on quad approx. 40 feet from roosting plovers (see Photo 5).**





**Photo 5. Quad tracks (foreground) from Lifeguard quad (see photo 4), with plovers roosting approximately 40 ft away (background).**





**Photo 6. Overwash from December high tides in the enclosure at Santa Monica.**



**Photo 7. Tuna crabs at Bolsa Chica SB in June 2015.**





### APPENDIX 3. PHOTOS FROM OUTREACH EVENTS IN 2014-2015

Photos taken during public school field trips to Dockweiler Beach during winter/spring 2015.

