

Ormond Beach, California

Western Snowy Plover and California Least Tern

Nesting Outcome: 2017 Season

January 31, 2018

Season Summary

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Introduction

The abundance and productivity of the threatened western snowy plover (WSP) (*Charadrius alexandrinus nivosus*) and the endangered California least tern (CLT) (*Sternula antillarum browni*) was monitored at Ormond Beach in Oxnard, Ventura County, California from March 15, 2017 to September 15, 2017. Loss of habitat, predation pressures, and disturbance have caused the decline of the coastal population of the western snowy plover and led to the federal listing of the Pacific Coast Population of WSP as threatened under the ESA on March 5, 1993 (Federal Register 1993). Ormond Beach has been designated critical habitat for the WSP. The California least tern subspecies was federally listed as an endangered species in 1970 (USFWS 1985) and as endangered by the state of California in 1980 (USFWS 1985). Nesting of both species has been documented at Ormond Beach since the 1970's.

Executive Summary

Western Snowy Plover

A total of 36 WSP nests were located, of those 24 hatched (66.7%), 9 failed (25%) and 3 had unknown outcomes (8.3%). Of failed nests, 4 were depredated, 2 abandoned, 2 believed trampled and 1 failed for unknown reasons. One adult WSP was found dead of unknown causes. The calculated number of breeding WSP was 24. Sixty-four eggs hatched out of the 98 eggs that were produced.

| | |
|-------------------------|------------------|
| First Nest Initiation: | March 20 |
| First Hatch: | April 18 |
| Period of Peak Nesting: | April 14-April21 |
| Last Nest Initiation: | June 25 |
| Last Hatch: | July 16 |

Threats to WSP Nesting Success: Predators were a problem throughout the season. Depredation of nests by ravens and squirrels impacted nesting outcome, as did the presence of gulls in the salt panne where snowy plover chicks gathered, one chick was seen killed and eaten by a gull.

California Least Tern

Least terns first appeared at the north end of Ormond Beach on May 5. The population reached a peak of 65 adults in early July. The last CLT were seen on August 22. A total of 38 CLT nests were found, of those 27 hatched (71%), 9 failed (24%) and 2 had unknown outcomes (5%). The number of breeding pair was calculated to be 31. Two CLT chicks from different nests were found dead in the nest soon after hatching, the cause of death for both is unknown. Out of 69 eggs that were laid, 47 hatched and at least 20 fledged.

| | |
|--------------------------|---------|
| First Nest Initiation: | May 27 |
| First Hatch: | June 19 |
| Last Nest Initiation: | July 9 |
| Last Hatch: | Aug 1 |
| Date of first fledgling: | July 9 |

Threats to CLT Nesting Success: Squirrels had dens inside the nesting area and were observed in the colony being mobbed by adult terns on several occasions. At least 3 nests were predated by squirrels.

Site Description

Beach Ownership

Ormond Beach is owned by three landowners that jointly manage the property under a Memorandum of Understanding. The land owners are the California State Coastal Conservancy (SCC), the Nature Conservancy (TNC) and the City of Oxnard (the City). The northern portion of Ormond Beach is owned by the City. The center and southern portion of the dunes and an inland salt pan are owned by the SCC. Inland from the beach area is a large property owned by TNC. The boundaries of Ormond Beach are defined on the southeast by the Naval Base Ventura County Pt. Mugu, and on the northwest by the City of Port Hueneme.

Nesting of the western snowy plover occurs on land owned by the City and the SCC. There are records of California least terns nesting on the northwest end of Ormond Beach since the 1990's on land that is currently

owned by the City of Oxnard. Although they have not nested on SCC property recently, in the past (previous to 2012) they have established a nesting colony in the southeast end of Ormond Beach.

Inland on the north end is the former Halaco property, which was a scrap metal recycling operation designated an EPA superfund site in 2007. Southeast of the TNC property is a power plant owned and operated by NRG. This parcel is encircled by SCC land and fronts the beach dunes where WSP nest. Adjacent to the salt pan is a small parcel owned by the Ventura County Game Preserve. Just inland from this is the Agromin Composting and Soil Amendment Facility property, which processes yard waste and food scraps into compost (Figure 1).

Survey Area

The survey area is 2 miles in length and runs southeast along the coast covering approximately 200 acres. WSP nest in the dunes along the entire beach, and CLT have nested at the north and south

Figure 1. Property owners and neighbor properties



extremes of the beach. The survey area varies in width from 100' by Ormond Lagoon on the north end to over 1000' wide at the south end in the location of the salt pan. The northern end of the survey area begins at the boundary line between City of Port Hueneme and City of Oxnard. The beach in this area is relatively flat and backed by Ormond Lagoon that drains runoff from Oxnard and Port Hueneme. The foredunes have formed a 4-10' tall dune ridge that begins just south of the lagoon and extends along the entire length of the beach to the south. The beach seaward of the dune ridge is flat and varies from 50'-100' wide. The width varies seasonally due to erosion or accretion induced by wave and tide influences (Figure 2).

Figure 2. Survey Area



Facilities and Beach Access

There are two public entrances to Ormond Beach and one non-public access used illegally by trespassers on TNC property. One of the public access points is via Arnold Road on the south end. The road terminates in a parking lot near the beach and is the most popular access to Ormond Beach. A full-time docent, Walter Fuller, lives in a trailer in the parking lot provided by the City of Oxnard. Mr. Fuller is present most of the time and greets the public, collects metrics on visitors and hands out literature and educational material. He contacts local authorities in emergencies. The parking lot has portable toilets and trash cans maintained by the Oxnard Parks and Recreation Department. The parking lot has a gate that is closed by Mr. Fuller between dusk and dawn. A locked storage container

on site holds fencing materials, predator exclosures, signs and docent materials. The other main public access to Ormond Beach is via Hueneme Beach on the north end. Hueneme Beach is a popular recreational beach with several pay parking lots. Beach goers access Ormond Beach by walking south from Hueneme.

NRG made available the use of a private parking lot adjacent to their property for use by Ventura Audubon to access the middle of the beach. There is also a locked container in this parking lot that holds fencing materials, supplies and predator exclosures used for nest monitoring activities on the north end of Ormond Beach. The Nature Conservancy allowed us to use a private service road on their property that allowed us direct vehicle access to the rear of the north nesting habitat.

Ventura Audubon Shorebird Recovery Program

Ventura Audubon sponsors a Shorebird Recovery Program that addresses the problems identified in the USFWS recovery plan that have contributed to the decline and listing of the WSP and CLT. The three components of our conservation program at Ormond Beach:

1. Protection: We directly protect sensitive habitat with signage, fences and volunteers. We protect nests by utilizing data that we collect on the presence and impacts of predators. We work closely with USFWS and CDFW on the deployment of mandated federal and state recovery plans, and with land managers to guide management decisions. We collect data on nesting outcomes, threats to nesting success and provide biological expertise when called upon.
2. Outreach & Education: We train the next generation of environmental stewards, from grade school to university students, and mobilize a corps of volunteer naturalists to educate and interact with the public. The data we collect on breeding endangered shorebirds is used in our education and outreach work.
3. Advocacy: We communicate the needs of nesting shorebirds to land owners, government agencies and the general public. We present public programs and provide data to support policy and planning.

Nesting Habitat Fencing

Fence Types: Nesting areas are enclosed with two types of fencing;

- 1.) Black mesh Cintoflex-C fencing attached to metal T-posts ([Photo 1](#))
- 2.) Symbolic fencing - metal eye posts strung with cable wire ([Photo 2](#))

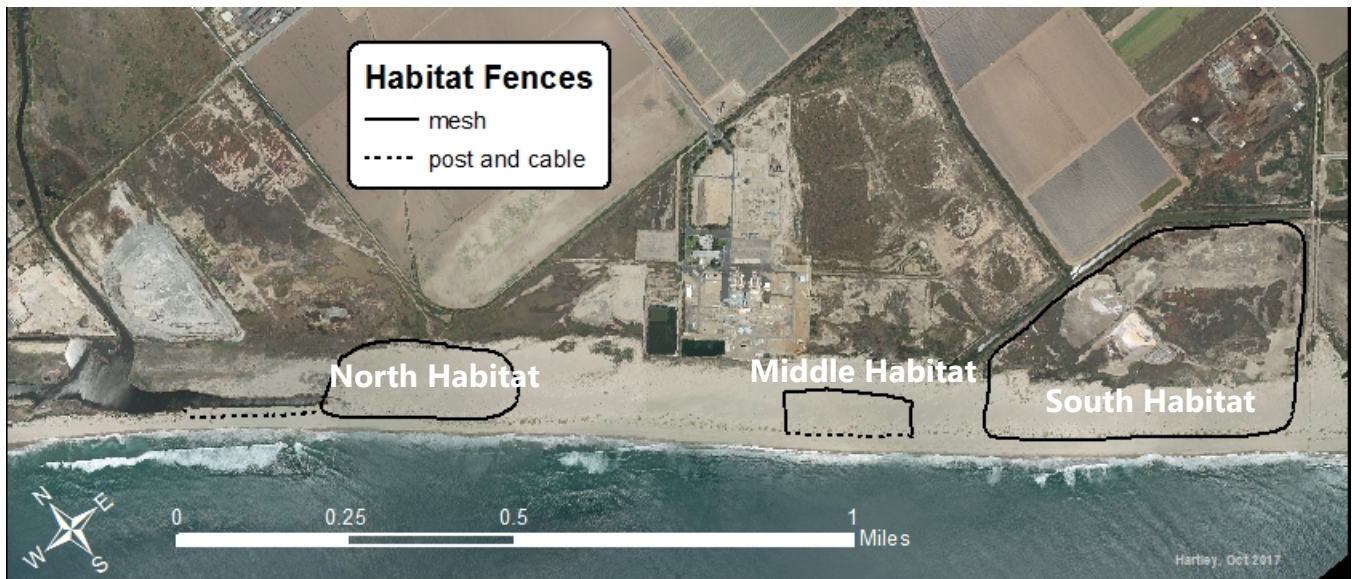
The mesh fencing has openings that are 1.75" square through which birds and small animals can easily move through. The T-posts are placed every 10-20'. The fence is intended as a visual demarcation of the nesting area, rather than a predator or human exclusion fence. It provides a physical barrier that is challenging, although not impossible, for humans to cross. The bottom of the fencing is not buried, so

natural openings occur depending on the topography of the beach. Larger mammals including sea lions, elephant seals and coyote are known to cross under the fence.

The symbolic fencing is strictly a visual barrier. It presents no barrier to animals, and humans can easily step over or under it. It is used by the lagoon where tidal over wash is prone to occur, which the symbolic fencing withstands much better than the mesh fencing. This year it was also used for the first time on the ocean facing side of the middle habitat fence on an experimental basis to determine the effectiveness of this method of fencing in the dunes.

Three areas of nesting habitat are protected with fences: On the south end of the beach, 1.4 miles of mesh fencing enclose 77 acres and is referred to as the "south habitat". In front and southeast of the power plant, 0.5 mile of fencing encloses 7.4 acres. The fencing facing the ocean is composed of post and cable while the sides and back are mesh. This is the "middle habitat". On the north end 0.7 miles of mesh fence encloses 18 acres, the "north habitat" (Figure 3).

Figure 3. Nest habitat fence boundaries in 2017



Signage

Seasonal closure signs in both English and Spanish were affixed to posts, as well as Audubon "Share the Shore" signs created by school children ([Appendix C- 1](#)).

Predator Exclosures for WSP

A 2'X2' square wire mesh cage design is used ([Photo 3](#)). Exclosures are made of galvanized wire with 2"X3" openings, wire spikes are attached to the top to discourage perching by other birds. A small sign is affixed to the exclosure to warn would-be vandals from moving or tampering with the exclosure ([Photo 4](#)). The exclosures are anchored to the ground with 6-inch landscape staples. Exclosures are used when threats from predators put nests at risk. Following placement of the exclosure adults are

observed to ensure they returned to brooding. Throughout the season several decoy exclosures (not on a nest) are left throughout the beach in an attempt to confuse predators.

Methods

Population Abundance

In order to thoroughly cover the entire 200-acre survey area the beach was divided into 3 areas that were surveyed once weekly on different days. These areas were the tide line in front of the dune ridge from the Mugu boundary line to Hueneme Beach, the south nesting habitat fence, salt pan and dunes in front of the power plant and the north nesting habitat fence. Areas were covered on sequential days when possible and count totals for the week were summed from the 3 areas.

A total of 25 nest surveys were conducted from March 15 through August 28. Monitoring in the dunes was conducted by walking wandering transects, the tideline was walked at the top of the wrack line. The entire beach was covered a minimum of once per week and nests were rechecked between 1-3 times per week. Nest re-checks were done from a distance when possible in order to minimize nest disturbance and to avoid attracting predators to the nest. All WSP observed were recorded by age and gender. Numbers of CLT adults and juveniles were recorded once weekly in a single effort.

Breeding Activity

Nest Fate

When a nest was found, it was approached to collect GPS coordinates. The date found and number of eggs was recorded. For WSP, the sex of brooding adult WSP was noted. Because of the presence of ravens, if an adult WSP was observed from a distance brooding a nest that had previously been marked it was not approached again. CLT nests were marked with a numbered <6" long piece of driftwood or other natural beach debris and placed no closer than 4 feet seaward from the nest. WSP nests that did not have exclosures were not marked. Instead an observation point 100-200' away from the nest was identified and that location was marked with a waypoint. Detailed notes were taken on nearby nest landmarks for re-sighting. If no adult was observed brooding from a distance, the nest was approached to check for the presence of eggs. Each nest was followed until hatching or failure. Once a nest no longer contained eggs, a 2-meter area around the nest was examined for eggshell fragments, egg yolk, tracks of birds or predators or any other disturbance. Next, the nest scrape was examined for prints and shell fragments. Nest hatching was determined by locating a pip shell (1-4 mm) within the hatched nest, by observing displaying behaviors of adults, noting whether footprints in the nest were from plovers or terns, or other animals, and locating chicks when possible (Mabee 1997). Any nest that had at least one egg was determined to have hatched and was categorized as successful.

If eggs remained in the nest for more than the expected gestation time after discovery (28 days for WSP, 21 days for CLT) and no adult was observed nearby it was tested for continued brooding by placing an egg on end and rechecking within 3-7 days to see if an adult was in attendance. If eggs

remained in the same position and no fresh plover/tern footprints could be found in the nest, the eggs were collected. For tern nests, eggs were determined to have hatched if eggs were gone, pips shells could be found, adult fecal matter was present, no large egg shell fragments or yolk were in the scrape, no other animal tracks near scrape, and chicks have been seen in the colony. Nests that had eggs disappear before the end of the full gestation period were determined to have failed if no signs of hatching were evident. Nests were determined to have unknown outcome if the eggs were gone after being brooded for the full gestation period, but did not have any signs of hatching. All unhatched eggs and one dead adult WSP were submitted to the Western Foundation of Vertebrate Zoology (WVZ) for analysis of incubation stage and for archive. One egg was deposited with the Santa Barbara Zoo for incubation.

Nest Initiation Date

Nest initiation dates were calculated for nests confirmed to have hatched by subtracting the expected gestation period for the species plus 2 days from the hatch date. Hatch dates for nests with a newly hatched chick inside the nest scrape were the same day as the chick observation. If chicks were observed after they left the nest and could be associated with a given nest, hatch date was estimated based on the age of the chick. If a nest was determined to have hatched but no chick(s) were observed, hatch date was estimated to be 2 days following the last date of observed brooding. For nests determined to have failed, nest initiation was estimated to be the first date the nest was observed minus 1 day.

Nest Fate Date

The date a nest hatched or failed was termed "fate date". For nests that hatched, the hatch date is the fate date. For nests that failed, the fate date was estimated to be one day after the last date the nest was observed active.

Active Nest Calculation

Number of active nests was calculated using a python script that totaled the number of nests using the initiation and fate dates for all nests.

Breeding Adults

Western Snowy Plover: Breeding adults are calculated from the survey that yielded the highest number of breeding adults, derived by attributing a male and female pair to each active nest and 1 breeding male to each clutch with at least 1 chick. This method is used because without a banding program at Ormond Beach individual birds cannot be tracked, so it is not possible to know how many birds actually re-nest. This method is essentially a window count for breeding adults and assumes that all the breeding adults captured on the count are representative of the entire nesting population. This method errs on the side of capturing the minimum breeding population and not over estimating reproducing WSP.

Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

California Least Tern: The method used to calculate breeding birds was Method II as described in Marschalek 2010. In the Marschalek report, the formula used June 20th as the cutoff for the second wave of nesting. Because the nesting season at Ormond started and ended weeks later than the season in the Marschalek report, a cutoff of June 30th was used instead. This date was derived from charting nest durations and selecting a clear break in nesting activity ([Figure 12](#)). The formula used was:

$$\text{Total Pairs} = \text{Total\# Nests} - (\# \text{ unsuccessful nests prior June 30th} + \# \text{ broods lost prior June 30})$$

Banded Birds

During weekly surveys birds were examined for leg bands through binoculars. CLTs were also monitored for bands and/or transmitters. Three female nesting WSP were banded: yr:gb (unknown origin), nr:gb (Vandenberg, Wall Beach 2015) and nw:pw (Vandenberg: Surf South 2015). Other banded birds that were observed foraging or roosting include: wr:wa (unknown origin), an:ny (male, Vandenberg Wall Beach 2015), w/k/w:g (Oregon, either South Overlook or Coos Bay). For detailed information on sightings see [Appendix A-1: WSP Band Data](#).

Chick and Fledgling Observations

Western snowy plover: All chick sightings were recorded with a GPS waypoint collected as close as possible to locations where chicks were either directly observed or reported by docents. Once a nest hatched, chicks were looked for each week and where possible observed weekly until fledging. Fledglings were determined to be from Ormond Beach if they had been observed for several weeks in the same area prior to reaching fledge age and if they were accompanied by a guarding adult. Hatch year chicks that did not meet these criteria were assumed to be from other beaches.

California least tern: Nests were checked a minimum of once per week. Chicks were re-sighted when possible and associated with nests. However, by the time they are dry and rested after hatching chicks move away from threats, so approaching nests during monitoring makes it difficult to document a downy chick on the nest. It also disrupts the colony and creates a threat to chicks by causing them to expend energy, move long distances from hiding places and makes them vulnerable to predators. Therefore, we observed the colony with a scope from dunes overlooking the nesting area as much as possible, and we scoped the nesting colony before walking it on weekly surveys. If we confirmed that a nest had hatched and a chick was present or still brooding with the scope, we did not approach the nest. We only approached on survey days if an adult was not present or we could not locate the nest with a scope. The general location of feathered and pre-fledging chicks and fledglings was also recorded. The number of fledglings were calculated by adding the daytime counts of fledglings every 3 weeks after the first fledgling observation, starting 2 weeks after the first fledglings were sighted (method 3WD from the CA Department of Fish and Wildlife report spreadsheet).

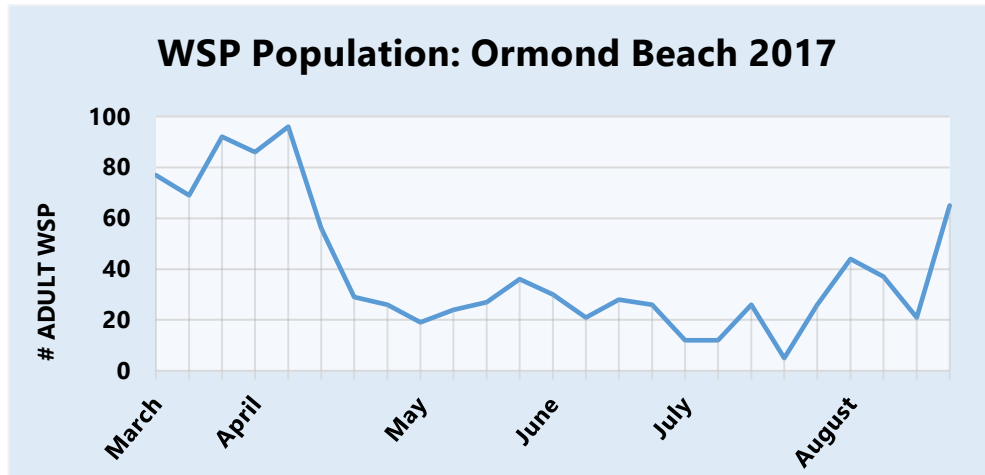
Results

Western Snowy Plover Breeding Outcome

Adult Population Abundance and Pair Estimate

Population abundance was greatest at the beginning of the season. During the first 5 weeks from mid-March to late April the population count was between 70 to 90 individual birds. After the fifth week of the season the population numbers dropped quickly, and within two weeks counts

Figure 4. WSP Population Counts



reached a steady level between 19- 30 adult WSP through the end of June. July had the lowest counts between 5 and 26 total adults on weekly surveys. Then in August numbers started to increase reaching a high of 65 WSP on the final survey of the season (Figure 4, above).

On the spring window count the week of May 23rd, Ormond Beach had a total of 17 males, 10 females and 6 chicks and 1 fledgling.

For detailed population counts, see [Appendix A-2](#).

Pair Estimate: The estimated number of breeding WSP adults was 24 individuals, which occurred on the April 23, 2017 survey. On this date there were 11 active nests, with 2 clutches on the beach. This was the survey with the highest number of calculated breeding birds, estimated between the number of active nests and observed clutches on the beach. This method is the most conservative way to estimate breeding adults and likely underestimates the total number since it assumes all birds at the peak count re-nest the rest of the season. If there were no re-nesting the number of breeding adults would be 72. Without banding it is not possible to know how many WSP re-nested. Therefore, the most conservative method is used to estimate the breeding population as there is complete confidence that this represents the breeding adults at the highest level of concurrent nesting activity.

Nest Fates

This year 36 nesting attempts were identified, with 24 nests successfully hatching, 3 with unknown outcomes and 9 failed (Figure 5, right)

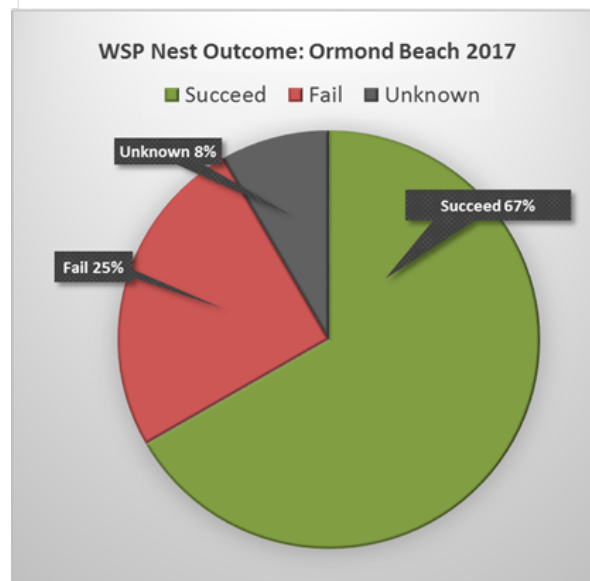
Failed Nests: Of the 9 nests that failed, 5 were depredated, 2 were likely trampled, and 2 were abandoned.

Depredated Nests: Two nest were lost to ravens, as evidenced by raven tracks, broken eggs shells and egg contents within the nest scrape ([Photo 5](#) and [Photo 6](#)). These nests were discovered after being depredated and did not have predator exclosures. A 3rd nest was probably depredated by a squirrel, despite being covered by a predator exclosure, the 4th nest was found with broken shells due to an unknown predator the 5th nest had all eggs disappear within 2 weeks of being established. This nest was in an area that had an active peregrine falcon and ravens searching for nests, so a number of predator encounters could have caused nest failure.

Trampled Nests: Two nests disappeared with no signs, so it's possible they may also have met some other fate. However, they were both established outside of nesting area fences in locations that had high levels of foot traffic and did not have exclosures or symbolic fencing. One nest was outside of and within feet of the south habitat fence where beach goers walk along the fence line. It disappeared within days of discovery and during a week of high winds. The other nest was in front of the power plant in an area with many human and dog foot prints. This nest also disappeared just after a moderate wind event (20mph gusts), but with many foot prints around the area of the scrape.

Abandoned: One nest in the south habitat was found with a single egg and a dead female WSP next to it. The female was salvaged and submitted to the WFWZ. It appeared to have a puncture wound between the right rear flank and abdomen, but it had also been dead long enough to have maggots. Cause of death is unknown. This female had a 50% ossified skull and granular ovaries, so it was a

Figure 5. Out of the 36 nests discovered, 24 nests hatched (67%), 9 nests failed (25%) and 3 nests (8%) had unknown outcomes.



young bird in it's first year. When the dead female and single egg was discovered, the egg was placed on end and re-checked 3 hours later. When re-checked the egg was still in the same position. No other WSP were in the vicinity and there were no plover foot prints near the nest. The egg was collected and taken to the Santa Barbara Zoo where it was candled and incubated. Candling showed that it was a fresh egg and it developed for 2 weeks in the incubator, but the embryo died before hatching. The other abandoned nest was brooded for 30 days, before the adults gave up. These eggs were salvaged and deposited at the WFVZ and found to have no development, so they were either infertile or non-viable ([Photo 7](#)).

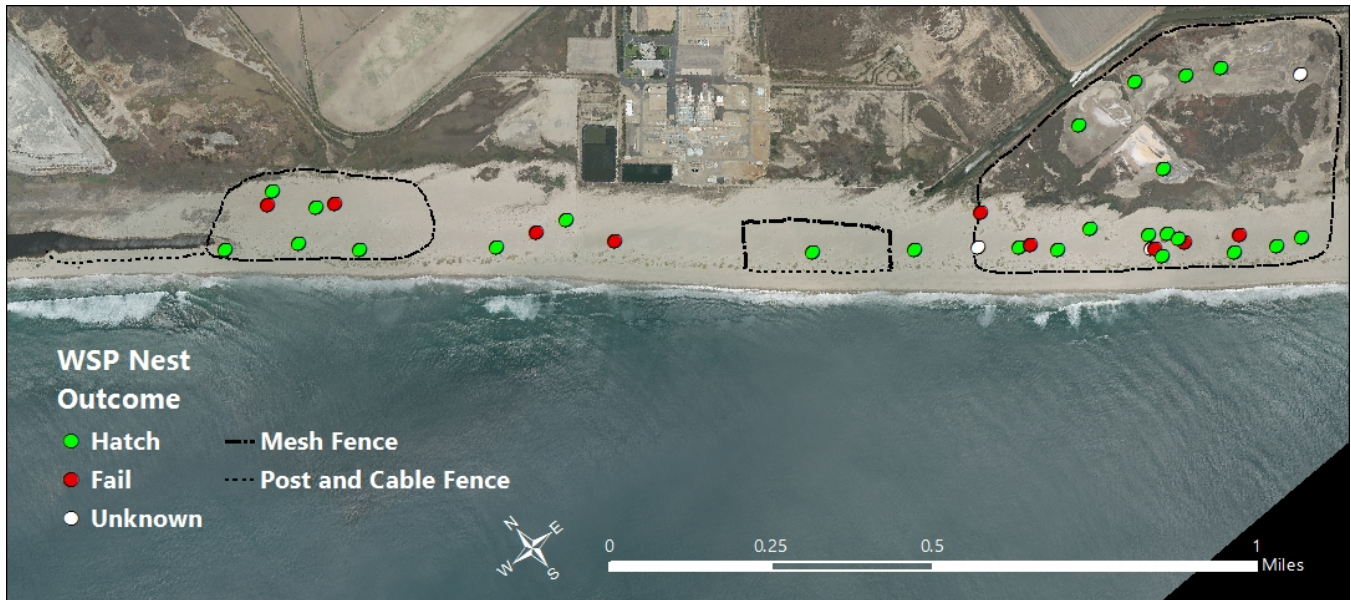
Non-viable eggs: Three nests had partial hatching. Two nests hatched 2 out of 3 eggs, and one nest hatched 1 out of 3 eggs. The eggs were salvaged and deposited at the WVVZ. They were determined to have no development. Therefore, these eggs were either infertile or non-viable.

Unknown Outcome: The 3 nests with unknown outcomes had predator exclosures. However, no evidence of hatching could be found, no pips could be found, nor were chicks ever sighted or defending adults found near the nest location. For a complete nest summary table, see [Appendix A-3](#) and [Appendix A-4](#)

Nest Locations

Nests were dispersed over the entire 2-mile length of Ormond Beach (Figure 6, next page). Twenty-three nests were in the south habitat, although one nest was located just outside of this fence and was most likely trampled. One nest was established inside the new middle fence and another nest just outside of this area. This outside nest was fitted with a predator exclosure, as much to protect it from predators as to keep it from being stepped on, and it successfully hatched. Seven nests were established in the north habitat fences. Four nests were in front of or just north of the power plant in the area where the habitat fences had been removed this year, despite no nest activity in this area for the past 4 years. None of these nests had predator exclosures or symbolic fencing. One was depredated by a raven before discovery, the other was likely trampled. The other two nests hatched, but were established early in the season before foot traffic increased in this area.

Figure 6. WSP nest locations on Ormond Beach



Season Chronology

The greatest amount of nesting activity occurred during the first half of the season in April and May, with a maximum number of 11 nests maintained through early May. From April through May, active nest numbers were steady, between 8-11 nests. Nesting activity dropped slightly in mid-May, then again in early June reaching a low of 4 nests. It is difficult to discern a pattern in terms of “nesting waves”, as nesting was steady through early June. Then a second wave appears to have occurred in late June with a peak of 10 nests. Then all nesting dropped off quickly in July (Figure 7).

Figure 7. WSP number of active nests on each survey date



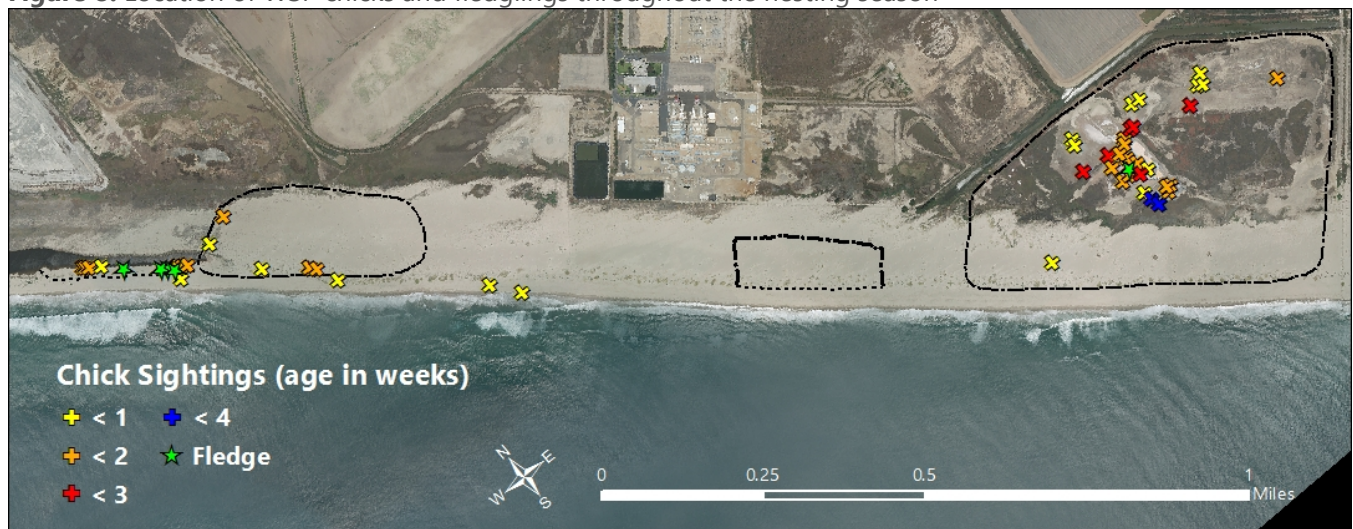
Chicks and Fledgling Observations

A total of 98 eggs are known to have been produced this season, of those 64 hatched. Consistent with past years, chicks on the north end of the beach gravitated to the lagoon edge. Chicks were often seen

by the lagoon edge behind the post and cable fencing, also moving back and forth from the lagoon edge to the north dunes behind the mesh fence.

New this year was the apparent movement of chicks from nests that hatched in the dunes in the south habitat to the salt panne. There were far more chicks on the lagoon ponds than nests in the salt panne. New clutches of chicks were often seen soon after a nest hatched in the dunes when there was no known nest in the salt panne. Also, unusual compared to other years is that no chicks were seen outside of the south fence on the ocean side. In keeping with past years, only a few very young chicks were sighted at the tideline in the middle portion of Ormond Beach soon after a nest hatched. Older chicks were never seen in the tideline, despite the presence of nests in the middle portion of the beach (Figure 8).

Figure 8. Location of WSP chicks and fledglings throughout the nesting season



Because of the new pattern of chicks gathering in the salt panne it was difficult to track locations of chicks. Early in the season water was present in all the ponds of the salt panne. Breeding American avocets and black necked stilts were present and aggressively defended nests and chicks, so it was difficult to approach areas with snowy plover activity without significant disturbance. The vegetation of the salt panne made it was easier for chicks to hide compared to the tide line. Three chicks are known to have fledged near the lagoon and at least one in the salt panne. Some older chicks close to flight age were seen in the salt panne that may have survived to fledge.

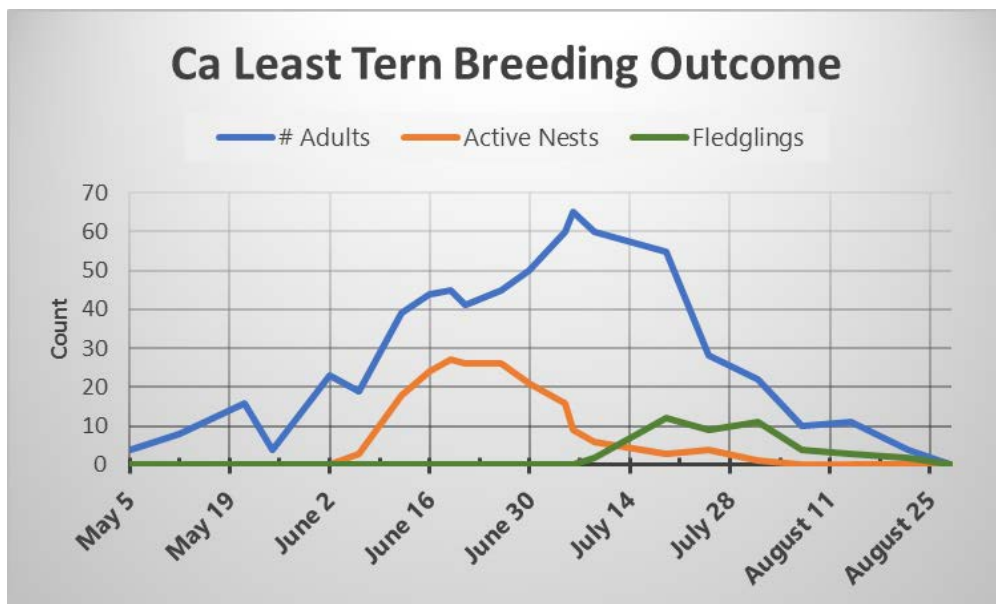
Beginning in late June, chick behavior in the salt panne changed after gulls moved in. Before this they clutches or 1-3 chicks could be observed actively foraging in the open. After the gulls started roosting in the salt panne, chicks hid more regularly in the vegetation and were very sensitive to disturbance. Due to the presence of the gulls, which were documented to be depredating chicks, eggs and chicks were observed from as far away as possible with a scope. The number of chicks in the salt panne decreased at the same time, possibly more chicks were eaten by gulls that had learned to predate snowy plover chicks.

California Least Tern Breeding Outcome

Adult Population Abundance and Pair Estimation

California least terns were observed flying over the north end of Ormond Beach from May 5 and the last CLT were seen on the August 22nd survey. The population varied from a low of 4 individuals to a maximum 65. (Figure 9, below).

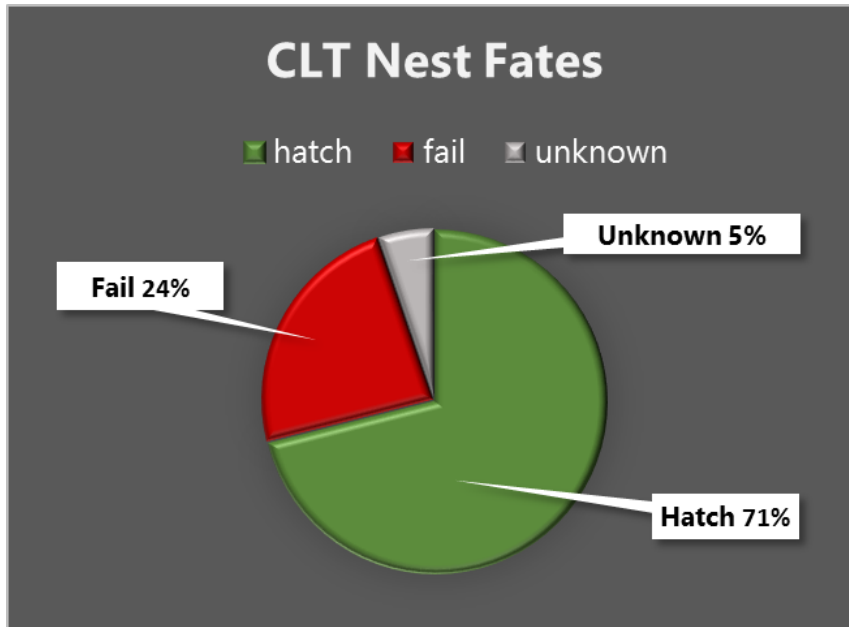
Figure 9. CLT season chronology; adult population counts, active nests and fledglings



Nest Fates

The first nests were found on June 2nd. A total of 38 nests were located, out of those 27 were determined to have hatched, 9 failed and 2 had unknown outcomes. Of the 27 successful nests, 18 were confirmed to have hatched based on observations of chicks in the nest. The remaining 9 nests were determined to be probable hatches (PH) due to the presence of various combinations of pip shells, feces, and defending adults (Figure 10, next page). Out of the 9 failed nests, 3 were depredated most likely by squirrels and 1 by an unknown predator, 4 were either abandoned or infertile, and one nest was lost to a high tide. Two chicks were found dead in the nest soon after hatching and appeared to have died from natural causes (failed to thrive). Both nests had fish in the nests as the adults apparently were attempting to feed the chicks. One chick was seen upon hatching and appeared to be weak and unresponsive.

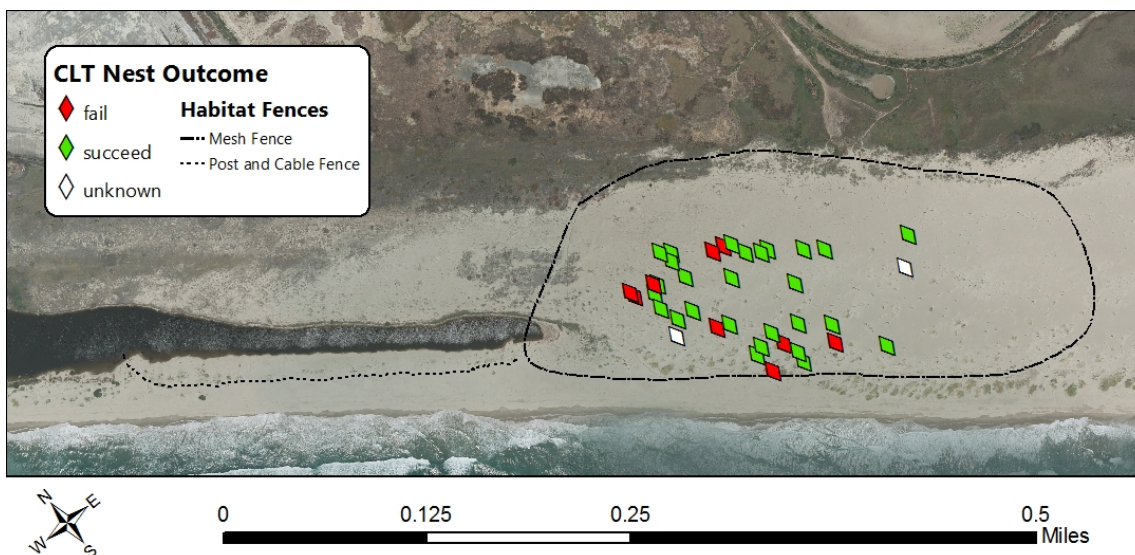
Figure 10. Out of 38 CLT nests, 27 hatched (71%) and 9 failed (24%) and 2 (5%) had unknown outcomes



Nest Locations

All California least tern breeding activity occurred on the north end of Ormond Beach by Ormond Lagoon where the adults foraged for fish in the lagoon and in nearshore waters. All nesting occurred inside the northern end of the north habitat fence (Figure 11). Occasionally a CLT was observed flying

Figure 11. Location of CLT nests on Ormond Beach

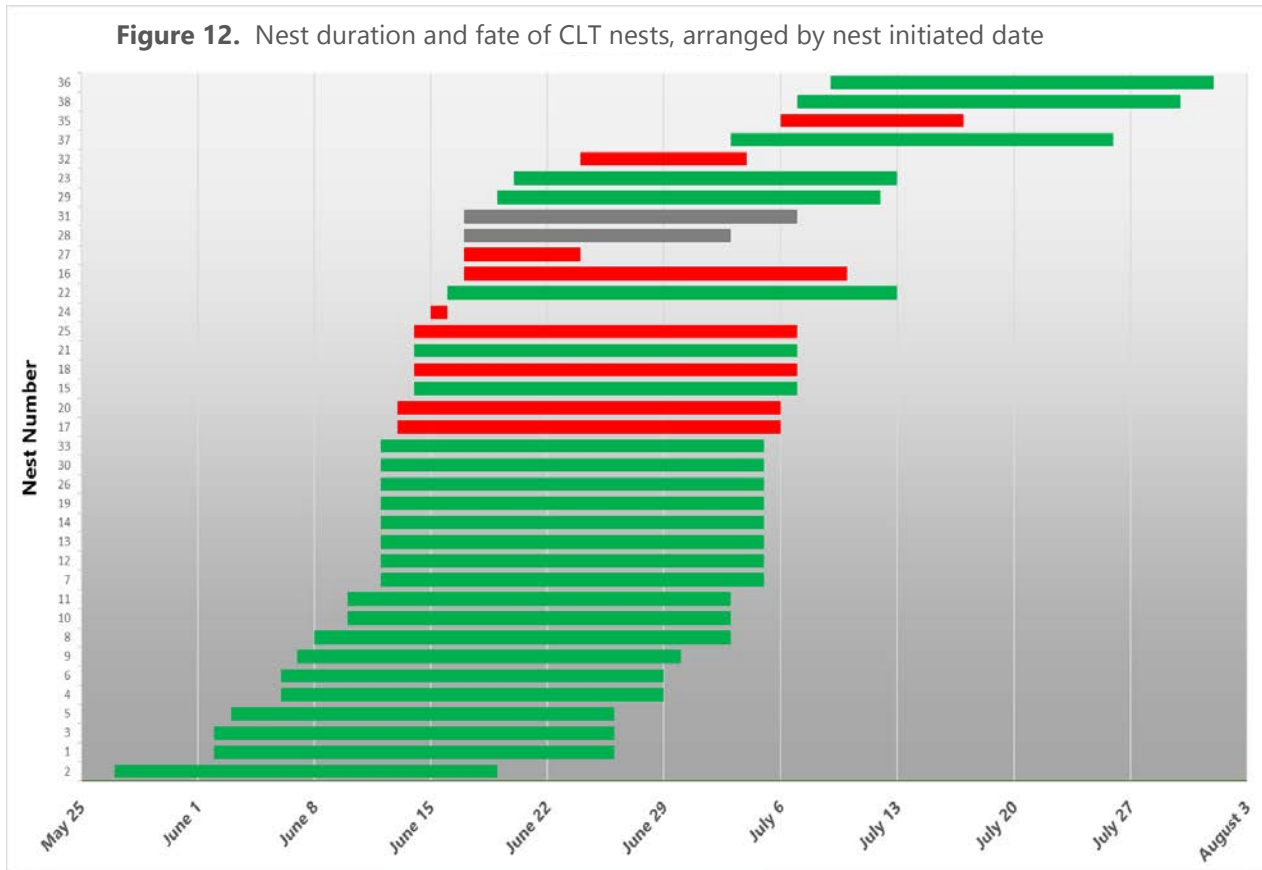


over the south habitat or foraging in the canal adjacent to the salt pan. However, at no time were CLT observed to land in the south habitat or show any interest in the area.

Season Chronology

Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

The first CLT were seen landing in the nesting area on May 12, the first nest was found on June 2nd. Based on hatch date the first nest is calculated to have been established on May 27. This first nest preceded any subsequent nests by a full week. Thereafter nesting gradually increased over the next week. Then in the third week the majority of the remaining nests were established. There was a small second wave of 4 nests after most of the other nests hatched or failed. There was Nests established in the first half of the nesting period were successful. Nests in the latter half of the season did poorly in comparison. The second wave of nesting appears to be the last 4 nests established, the cutoff date selected was June 30th (Figure 12).



Failed Nests: Of the 9 failed nests, 4 were depredated, 3 were abandoned pre-term, 1 was incubated full term but the eggs were non-viable and 1 was lost to flooding. Out of the depredated nests, there was strong evidence of squirrel depredation for 3 of them and the 4th nest was lost to an unknown predator. Of the 3 nests abandoned pre-term, 1 nest was in an area of heavy squirrel activity, 1 was located adjacent to the habitat fences and was subject to humans frequently walking by and flushing the adults and the 3rd “nest” had one egg that never appeared to be associated with a scrape and was never seen being tended by an adult. The eggs from the non-viable nest were determined to have no embryonic development by the WFVZ. The nest lost to high tides was flooded on 6/23, just 4 days after it was discovered. This same tide event washed out habitat fence nearby.

Pair Estimation:

Using method II (Marschalek, 2010) pairs were estimated using the formula below. The date used to delineate the two waves of nesting was June 30th. This method assumes the number of re-nesting pairs is equal to the number of bests lost prior to June 30th and that none of the failed nests in the second wave re-nested. There were no observed or inferred loss of entire broods, but it may have occurred in which case the estimate is high. This formula also does not account for unknown outcome nests.

$$\text{Total Pairs} = \text{Total\# Nests} - (\# \text{ unsuccessful nests prior June 30th} + \# \text{ broods lost prior June 30})$$

$$31 = 38 - (7+0)$$

Chick and Fledgling Observations

A total of 21 downy chicks were observed on 18 nests. There were an addition 9 nests that were determined to have hatched. Seven pre-fledgling chicks were seen. A total of 20 CLT are estimated to have fledged, calculated from weekly surveys (method 3WD, daytime counts of fledglings added up every 3 weeks beginning 2-3 weeks after the first fledgling observation).

For detailed CLT data, see [Appendix A-5](#), [Appendix A-6](#) and [Appendix A-7](#).

Predators

Many predators of WSP and CLT were observed during surveys. Eleven avian predators were observed. Both gopher and rattle snakes were directly observed. Several non-avian predators were present, primarily evident from tracks.

| | |
|--|---|
| American Crow (<i>Corvus brachyrhynchos</i>) | Northern Harrier (<i>Circus cyaneus</i>) |
| Common Raven (<i>Corvus corax</i>) | Red-tailed Hawk (<i>Buteo jamaicensis</i>) |
| Great Blue Heron (<i>Ardea herodias</i>) | Loggerhead Shrike (<i>Lanius ludovicianus</i>) |
| Great Egret (<i>Ardea alba</i>) | Turkey Vulture (<i>Cathartes aura</i>) |
| Snowy Egret (<i>Egretta thula</i>) | Western Gull (<i>Larus occidentalis</i>) |
| Peregrine Falcon (<i>Falco peregrinus</i>) | Opossum (<i>Didelphis virginiana</i>) - tracks |
| Coyote (<i>Canis latrans</i>) - tracks | Rattlesnake (<i>Crotalus atrox</i>) |
| Raccoon (<i>Procyon lotor</i>) - tracks | Gopher Snake (<i>Pituophis catenifer catenifer</i>) |
| California Ground Squirrel (<i>Otospermophilus beecheyi</i>) | |

Ravens were observed in the south habitat primarily in June and July and are known to have depredated 2 WSP nests. Raven tracks were even found at WSP nests that had previously hatched earlier in the season ([Photo 8](#)). Ravens were seen carrying eggs of other species (ducks and killdeer) over the salt panne and landing on the tall dunes backing the foredunes to consume the eggs.

Squirrels depredated 3 CLT nests and one WSP nest. A peregrine falcon appeared on site near the end of June and remained throughout the season. It was often seen perching on a radio tower just over the Mugu fence, although it was also seen by Ormond Lagoon perched on the lagoon fencing ([Photo 9](#)).

On the August 14 survey the peregrine flew by and flushed the WSP flock resting on the beach berm by the south fence.

In late June a large flock of mostly western gulls regularly gathered in the salt pan, at times there were as many as 100 gulls. On June 27 a western gull was observed to chase down, kill and eat a 2-week old snowy plover chick in the salt panne. Thereafter the number of WSP chicks in the salt panne diminished, and the any chicks that were observed were seen to be hiding in the vegetation. Previous to this, chicks had typically been seen foraging in the open.

Discussion

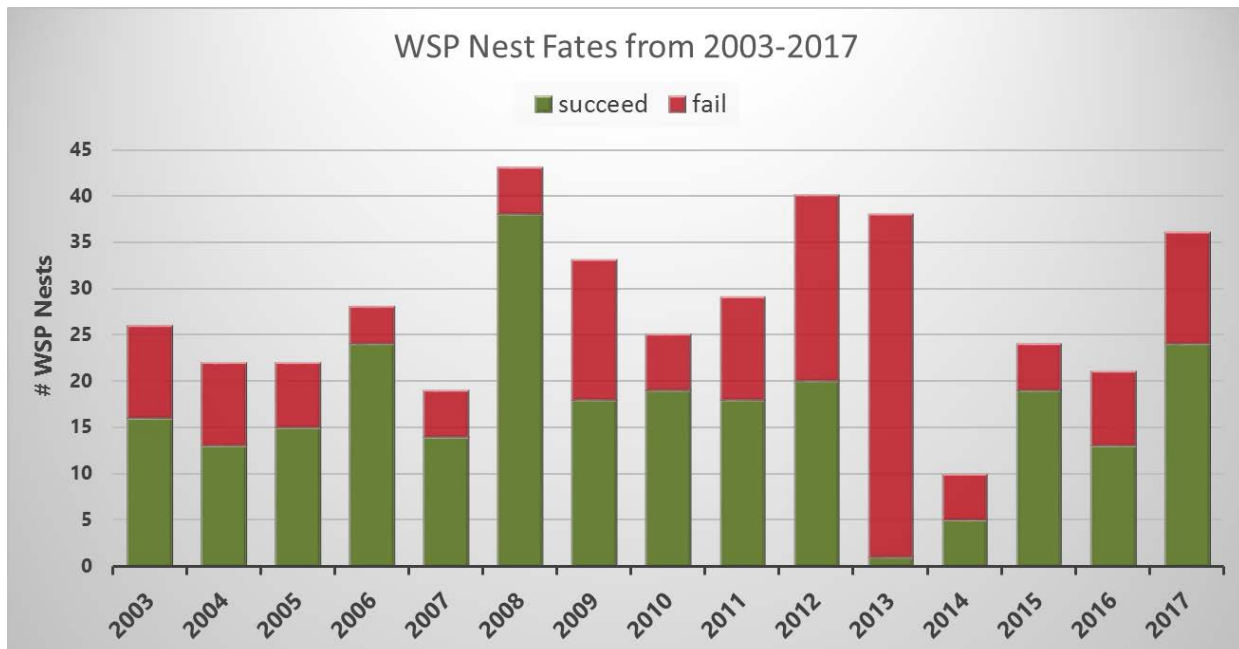
This year Ormond Beach had higher numbers of both WSP and CLT nests than has been recorded in the last 4 (WSP) or 6 (CLT) years. Nesting numbers and the number of nest hatches were not the highest recorded, although it is close. This could be a natural fluctuation, or it could be a benefit resulting from the Ormond Beach Ordinance. The next few years of nesting data will help discern if this is a long-term pattern or an overall improvement to nesting success.

Nesting Outcome and Trends

Western Snowy Plover

The number of nesting attempts in 2017 was the highest since 2014. There are only 3 other years on record since 2003 with higher number of WSP nesting attempts. Nesting success (# hatched nests) was greater only in 2008 (Figure 13). Although 2017 was only the first year of the Ormond Beach Ordinance, it is possible that the restriction on behaviors known to impact nesting success may have benefited nesting plovers already.

Figure 13. Comparison of WSP nest fates on Ormond from 2003-2017. Unknown nest outcomes included with failed nests.

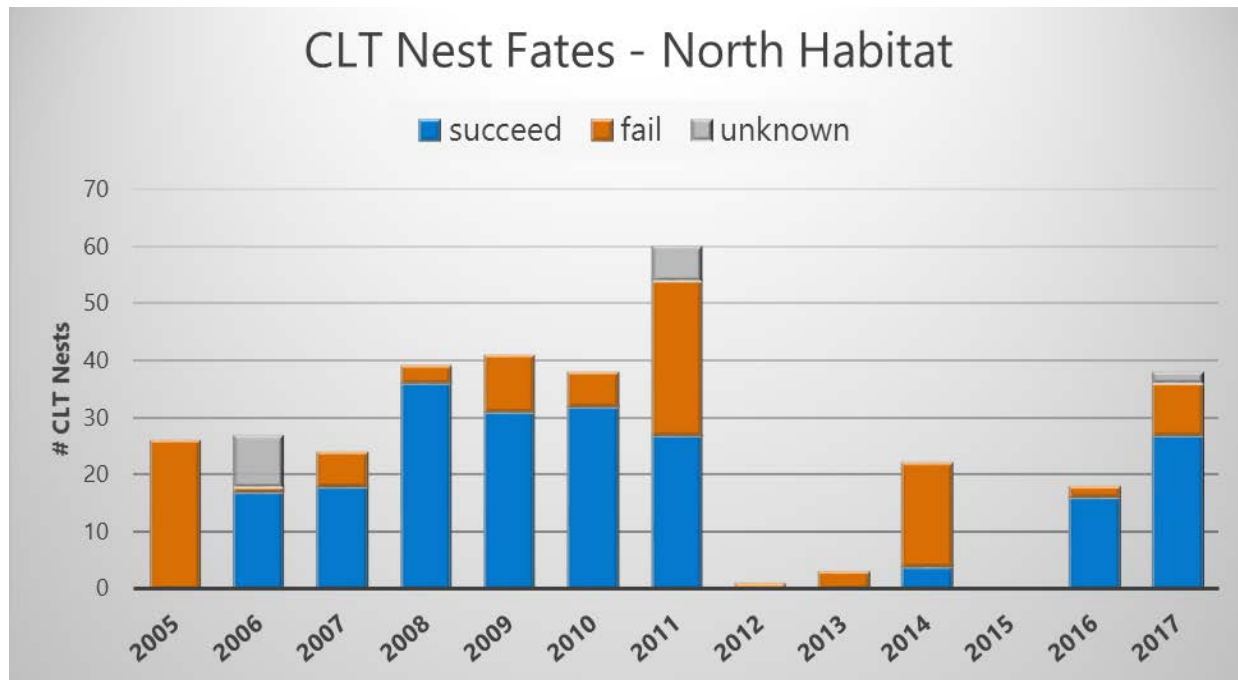


California Least Tern

In addition to observing the colony with a scope from dunes overlooking the nesting area at least twice a week, we circumnavigating the fence adjacent to the tern colony to observe nesting terns from a distance. We observed that once chicks left their nests, they moved in the direction of the lagoon. In general, we were unable to see many feathered or pre-fledge chicks because at this stage of development they were hidden in the low dunes southeast of the lagoon. After reaching flight age, fledglings moved out of the fences and gathered on the beach berm to the north of the habitat fences and were easier to observe and track.

The nesting season of 2017 was the most successful at Ormond Beach for CLT since 2011. Number of successful nests are comparable to nesting outcomes from the 6-year period previous to 2012 (Figure 14).

Figure 14. Comparison of nesting success in the north habitat from 2005-2017



Habitat Fence Re-routing, Changes in Nest Locations and Chick Movements

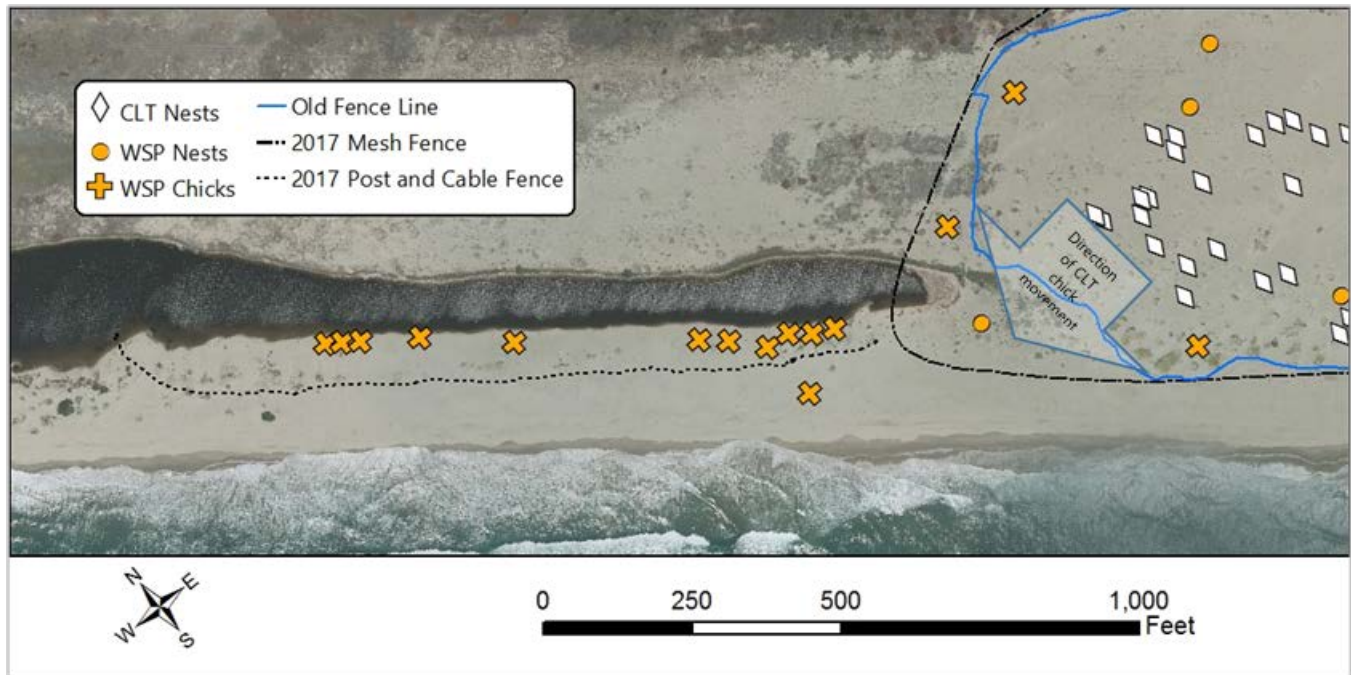
This year changes were made to the habitat fencing based on nesting patterns from the past 3-4 years. This had mixed success. Nesting patterns this year were not consistent in all locations with nesting patterns over the past 3 years.

Ormond Lagoon The lagoon area continues to be a very successful area for WSP chicks. Clutches that hatch in the north habitat gravitate to the lagoon within days of hatching. They move between the lagoon and the protection of the dunes behind the habitat fencing. Chicks easily move through the mesh fencing. This area benefited this year from better post and cable symbolic fencing. In 2015 wood stakes were erected with signage encouraging beach goers to stay back. In 2016 the wooden stakes were again erected, this time with a string linking the posts and signage. This year a more substantial metal post and cable fence was erected. This strategy worked well to protect snowy plover chicks and the post and cable fence is more durable to wash over from the tide and less prone to vandalism. However loose dogs still were present and passed through the fence.



The mesh habitat fence line was expanded by the lagoon before nesting season. This was done because in 2016 pre-fledging CLT chicks moved out of the fence into the unprotected open. This year pre-flight CLT chicks again moved to this area and had the benefit of protection from the fence. There was also a snowy plover nest established in the expanded fence area that successfully hatched (Figure 15).

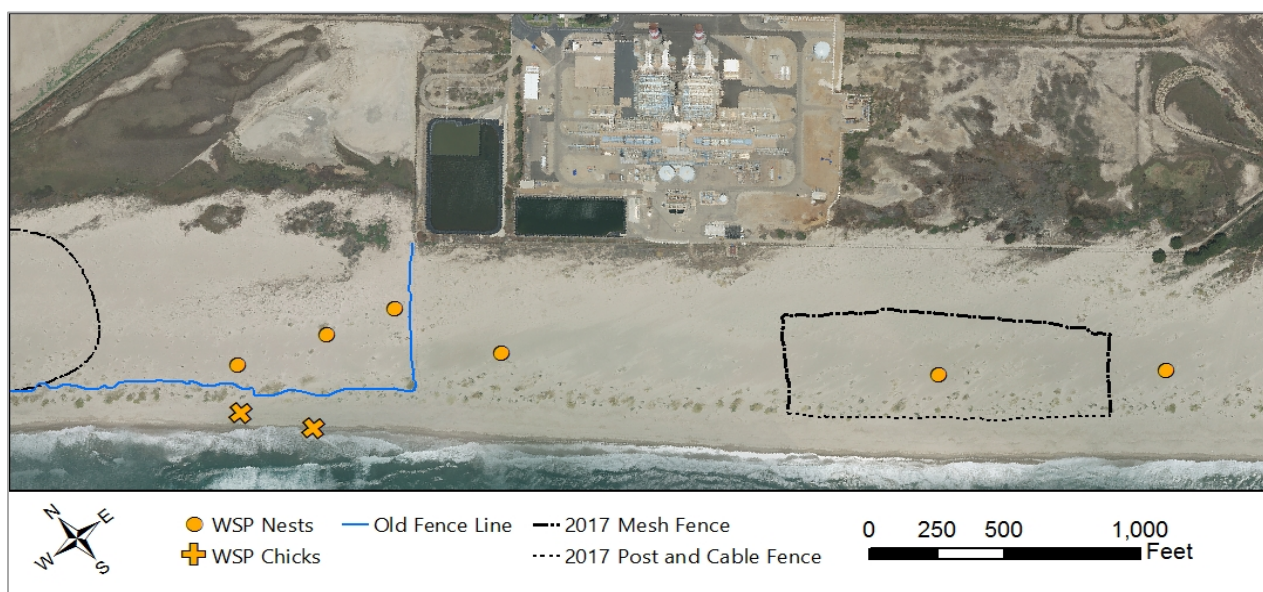
Figure 15. The new 2017 fence line better protected nests and chicks of the WSP and CLT at Ormond Lagoon



North Habitat: The north fence line was changed before the 2017 nesting season in an attempt to control trespassing, which has been a problem for over a decade. Nesting density has always been greatest on the northern end of the habitat near the lagoon, and very low on the southern end of the habitat. Trespassers have always cut through the middle of this area. So, the fenced area was terminated in the middle, leaving the south end unfenced. The hope was to encourage foot traffic to go around the fence, instead of through the middle, by creating a shorter path around. The fence line was established such that walkers going around the fence would not disturb nesting terns. This approach had mixed success. As hoped, there was regular use of the new path around the nesting area. However, this year there were 4 nests established in the newly unfenced area. Three of these would have been inside the old fence. This is a concern because in addition to walkers following the outside of the fence line, there was also considerable foot traffic in the middle of the dunes in the newly opened area. One nest, that would have still been outside the old fence, is suspected to have been trampled (Figure 16). There were also still one or two individuals who regularly trespassed through the middle of the fenced north end, despite the new shorter path around (Figure 18). One person was even seen crossing with a dog.

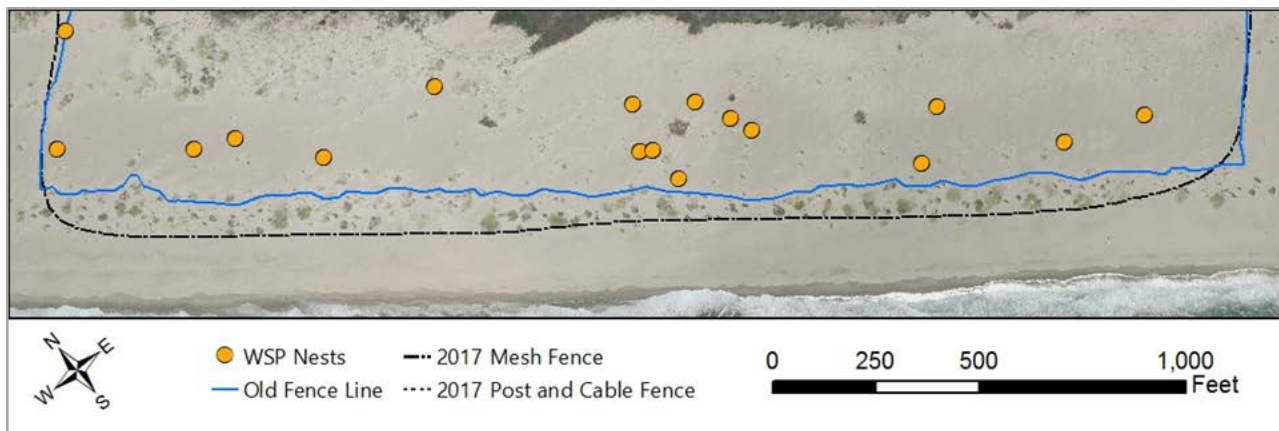
Middle Fence: A new middle fence was erected with mesh cinto flex on the back and sides, and post and cable in the front. This area has had an increase in WSP nests over the past 5 years, we typically have had 3-4 nests in this area over the past several years. This new fence also had mixed success. This year only one nest was established inside the new fence, when past years would have had several more nests. There was more pair activity and scraping in this area than there was nesting. One pair that had been scraping together for a couple weeks on the southern end of this fenced area eventually established a nest south of and outside of the fence. For the fence location and nests relative to the middle fence see Figure 16.

Figure 16. Changes to middle and north fences: Four WSP nests were established in the unfence area in front of the power plant, one inside the middle fence and one outside



South Habitat and Salt Panne: For the third year the salt panne and south habitat are enclosed completely in mesh cinto flex fencing. This has been very successful protecting the entire area from disturbance. Compliance with the fence perimeter by the public has been good. Before nesting season this year, the fence line was moved out to enclose the dune ridge seaward of the dune area. This provided a larger buffer to nests established near the dune ridge. It was also effective in keeping nude sun bathers from hiding in the dunes and flushing adults off of nests. This problem was addressed in 2016 by erecting additional symbolic fencing to keep beach goers off the fences near nests. This year there was no need to erect additional symbolic fencing (Figure 17).

Figure 17. South habitat fencing was moved seaward, providing better protection to WSP nests



Changes to chick movement in the south habitat in 2017: This was the first year we were unable to observe any chicks at the tideline in front of the south habitat. Chicks were only observed in the salt panne on the south end of the beach. Early in the year there were heavy rains that filled the area with water which provided more moisture and better forage throughout the year. Somehow plover clutches moved through the vegetation behind the dune area and made it to the salt panne ponds. Just before nesting season a large stand of cobweb bush was removed which may have helped open up access between the two areas.

Ormond Ordinance and Dogs on the Beach

In July of 2016 the Ormond Ordinance was passed. It prohibits many activities identified as a threat to CLT and WSP nest and chick survival. One of the provisions of this ordinance is a year-round ban on dogs. With the presence of Walter Fuller at Arnold Rd, compliance with the dog ban has been very high on this side of Ormond Beach (personal communication, Walter Fuller). In contrast the compliance on the north end of Ormond Beach has been poor, despite a dog ban on Hueneme Beach. There was little enforcement of either ordinance on the north end of Ormond and on Hueneme Beach. A student intern documented 60 dogs in 45 hours of observation. Dog owners were contacted and informed about the

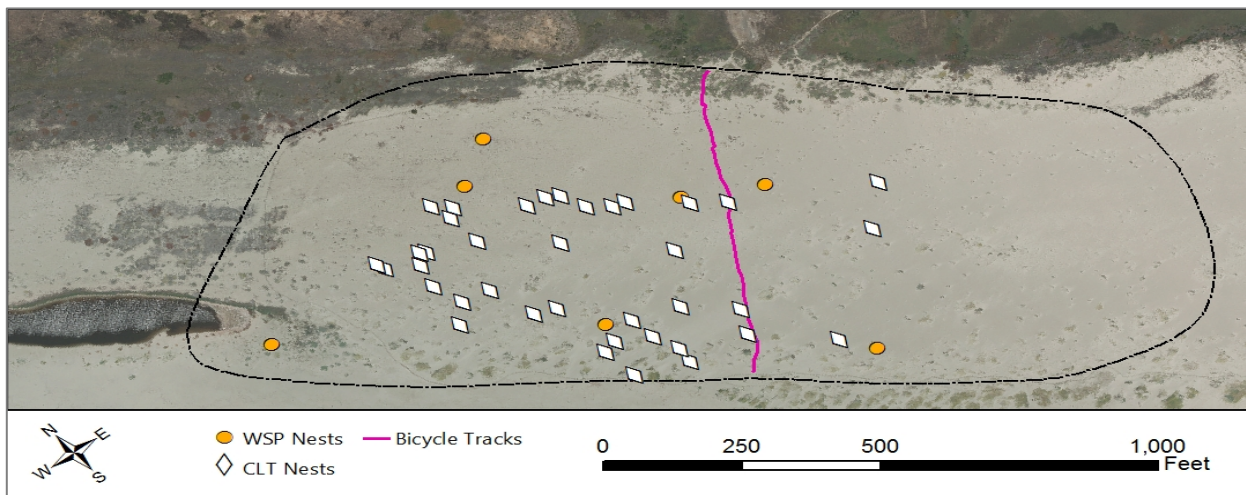


presence of nesting endangered birds, and given the “Dogs on the Beach” brochure with a list of beaches where dogs are allowed. However, without enforcement of the dog ban by authorities, voluntary compliance was poor. Furthermore, the student intern observed most dogs that make it to the nesting area are let off leash soon after leaving Hueneme Beach (Photo 10).

Trespassing in North Fence Habitat

Every year Ventura Audubon has collected nesting data at Ormond Beach, trespassing through the north fenced area has been a problem. Up until the mid-2000’s, the problem was with off road vehicles. For the past 10 years it has been someone crossing with a bicycle. This year, the habitat fence was cut open to allow easy entry of a bike (Photo 11). For the second year in a row a footpath with a bike track could be seen crossing within feet of several CLT nests (Photo 12). These trespassers routinely crossed the nesting area and had a well-worn path through the middle of the nesting habitat throughout the duration of CLT nesting (Figure 18, below). In May a person was observed crossing with a dog (Walter Fuller, personal communication). When CLT nesting season peaked, The Nature Conservancy made available an access road that allowed nest monitors to drive to the back of the tern colony. Not only did this allow easier access, but this enabled a more substantial presence in the nesting area. In early July, the same trespasser was intercepted 3 times crossing the nesting area within a two-week period.

Figure 18. Foot/bike trail across nesting area during CLT



Recommendations and Objectives for 2018 Nesting Season

1. Better protection for nests and chicks

Issue: Changes to the nesting fences have left some nesting areas unprotected by fences.

Solution: Fund new fence to encompass the nesting area north of the power plant.

Issue: Invasive plants growing between the salt panne and the dunes in the south habitat block movement of WSP clutches to ponds in the salt panne

Solution: Working with Oxnard City Corps and CSUCI students remove invasive plant material during the off season. Seek grant funding to support invasive plant removal.

2. Public Education

Issue: Many beach goers are unaware that there are federally listed nesting birds on the beach and that their activities can cause stress and reduced reproductive success. Also, they have little or no understanding of the VAS Shorebird Recovery efforts.

Solution: Continue to recruit, train and deploy volunteers from the community to greet visitors at Arnold Rd on weekend days during the summer. Reconfigure existing docent manual to make it more specific to Ormond Beach.

Issue: Dogs continue to enter Ormond Beach from Hueneme Beach, and there is limited enforcement resources available to ensure compliance with the ordinance.

Solutions:

- i. Collect data on the timing and numbers of dogs entering Ormond Beach beginning in February 2018 and continue data collection through the summer
- ii. Meet with Hueneme and Oxnard enforcement representatives and City of Oxnard before nesting season to communicate the need to enforce dog restrictions
- iii. Seek funding to hire a student to work as an intern to conduct outreach to beach goers on the Hueneme end of Ormond Beach
- iv. Continue Ventura Audubon's commitment to conduct public outreach through the Volunteer Naturalist program and CSUCI partnership

3. Predation

Issue: Predator pressure continues to impact nesting success

Solutions:

- i. Continue to use predator exclosures case by case, based on the nature of predators and nest locations.
- ii. Deploy trail cameras pre-season, on trails and on nests that are within the habitat fences to try to determine which predators are present and which are approaching nests and predating them.
- iii. Increase monitoring time in the colony. Seek funding to bring more student trainees into the program to monitor nests from a distance.

Acknowledgements

I would like to thank the 'Steward of Ormond Beach' Walter Fuller, Ventura Audubon President Bruce Schoppe, my field assistants Kaitlyn O'Dea, Jessica Maldonado, Emily Remedios, Jessica Ventrone and my student interns Rachael Cavanaugh and TJ Sullivan.

Our partners at Ormond Beach include the City of Oxnard, The Nature Conservancy and the California Coastal Conservancy. Thank you for your support throughout the year in so many ways. Thanks to the Western Foundation of Vertebrate Zoology for egg data analysis. I also want to thank the many outreach volunteers who greeted beach visitors and kept an eye on the beach and Ca State Parks for your partnership in our Volunteer Naturalist program.

Our work was funded by NRG Energy, the California Coastal Conservancy and the USFWS. NRG has supported our monitoring program with a PositiveNRG grant, the California Coastal Conservancy funds our outreach work with an Explore the Coast grant and the USFWS has provided grant funding for fencing, labor and signs. Oxnard City Corps has supplied labor to maintain and relocate fences.

NRG has made available access to their private contractor's parking lot which provides us safe access to the middle and north nesting habitats, as well as a storage container in the same parking lot for our north end supplies. The Nature Conservancy has made available use of an access road through their property that allows us safe passage and parking close to the least tern nesting area in the north habitat.

Finally, thank you to the Ventura USFWS office for your support and guidance as we navigate the complex landscape of Ormond Beach.

In memory of Reed Smith, our mentor and friend who began Ventura Audubon's work on Ormond Beach over 20 years ago.

Appendix A: Tables

Appendix A-1: WSP Band Data

| Date | Band Combo | Sex | Year Banded | Fledging Beach | Behavior | Additional Info |
|-----------|------------|--------|-------------|--|------------|--|
| 4/14/2017 | yr:gb | female | | unknown | incubating | brooding nest #17; Saw this female on the nest several times and confirmed band combo. Nest hatched, very young 2 chicks were seen nearby nest; may have even fledged a chick by lagoon. |
| 4/14/2017 | wr:wa | | | unknown | foraging | |
| 4/27/2017 | an:ny | male | 2015 | Vandenberg: Wall Beach | foraging | |
| 4/30/2017 | an:ny | male | 2015 | Vandenberg: Wall Beach | foraging | at tide line in front of south fence |
| 6/2/2017 | an:ny | male | 2015 | Vandenberg: Wall Beach | foraging | near Ormond Lagoon |
| 6/6/2017 | nr:gb | female | 2015 | Vandenberg: Wall Beach | incubating | on nest #25 in north habitat, Nest successfully hatched, but never spotted chicks. |
| 6/19/2017 | nw:pw | female | 2015 | Vandenberg: Surf South | foraging | near lagoon |
| 6/23/2017 | nw:pw | female | 2015 | Vandenberg: Surf South | incubating | on nest #30, south habitat - Nest successfully hatched, but never spotted chicks. |
| 7/5/2017 | wr:wa | | | unknown | roosting | by lagoon |
| 8/14/2017 | w/k/w:g | | 2015 | Coos Bay or South Overlook Douglas Cty, Oregon | roosting | by lagoon - possibly w/b/w:g instead, if so Oregon and there are 2 birds with same band combo |

Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Appendix A-2. WSP population data and survey dates

| Week # | Last survey of week | Total: adults | Total: all ages | Males | Females | Unknown | Chicks | Juveniles |
|--------|---------------------|---------------|-----------------|-------|---------|---------|--------|-----------|
| 1 | 3/17/2017 | 77 | 77 | 40 | 35 | 2 | 0 | 0 |
| 2 | 3/24/2017 | 69 | 69 | 39 | 30 | 0 | 0 | 0 |
| 3 | 4/2/2017 | 92 | 92 | 49 | 39 | 4 | 0 | 0 |
| 4 | 4/7/2017 | 86 | 86 | 44 | 42 | 0 | 0 | 0 |
| 5 | 4/15/2017 | 96 | 96 | 46 | 50 | 0 | 0 | 0 |
| 6 | 4/23/2017 | 56 | 61 | 28 | 28 | 0 | 5 | 0 |
| 7 | 4/30/2017 | 29 | 33 | 17 | 12 | 0 | 4 | 0 |
| 8 | 5/6/2017 | 26 | 26 | 20 | 6 | 0 | 0 | 0 |
| 9 | 5/12/2017 | 19 | 24 | 9 | 10 | 0 | 5 | 0 |
| 10 | 5/21/2017 | 24 | 39 | 13 | 9 | 2 | 12 | 3 |
| 11 | 5/26/2017 | 27 | 34 | 17 | 10 | 0 | 6 | 1 |
| 12 | 6/2/2017 | 36 | 42 | 19 | 17 | 0 | 2 | 4 |
| 13 | 6/6/2017 | 30 | 33 | 14 | 12 | 4 | 1 | 2 |
| 14 | 6/16/2017 | 21 | 31 | 11 | 10 | 0 | 4 | 6 |
| 15 | 6/23/2017 | 28 | 39 | 15 | 10 | 3 | 5 | 6 |
| 16 | 6/28/2017 | 26 | 34 | 13 | 7 | 6 | 4 | 4 |
| 17 | 7/14/2017 | 12 | 19 | 7 | 5 | 0 | 7 | 0 |
| 18 | 7/21/2017 | 26 | 31 | 5 | 5 | 16 | 1 | 4 |
| 19 | 7/26/2017 | 5 | 8 | 3 | 2 | 0 | 1 | 2 |
| 20 | 8/2/2017 | 26 | 27 | 7 | 0 | 19 | 0 | 1 |
| 21 | 8/7/2017 | 44 | 44 | | | 44 | 0 | |
| 22 | 8/14/2017 | 37 | 37 | | | 37 | 0 | |
| 23 | 8/22/2016 | 21 | 21 | | | 21 | 0 | |
| 24 | 8/28/2017 | 65 | 65 | | | 65 | 0 | |

Peak Nesting Activity

Spring Window

Appendix A-3. WSP Nest Summary – page 1, nests 1-22

| Nest # | Location | calc intitiation | Estimated hatch/fail | #Eggs Laid | #Eggs Hatched | Outcome | Reason for failure | Comments | Egg Report | HY |
|--------|----------------|---------------------|-------------------------|---------------|------------------|---------|----------------------------|--|---|----|
| 17OB01 | south | 3/24/2017 | 3/29/2017 | 3 | 0 | fail | no trace of nest | unknown, suspect trampling | | |
| 17OB02 | unfenced north | 3/27/2017 | 4/24/2017 | 3 | 3 | hatch | | Two chicks, days old | | 2 |
| 17OB03 | north | 3/26/2017 | 4/25/2017 | 3 | 2 | hatch | | Two chicks, days old. 1 egg did not hatch, submitted to WFVZ | No development, egg was infertile | |
| 17OB04 | south | 4/2/2017 | 5/2/2017 | 3 | 3 | hatch | | | | |
| 17OB05 | south | 3/28/2017 | 4/25/2017 | 3 | ? | unknown | | nest evidence blown away | | |
| 17OB06 | south | 4/7/2017 | 5/7/2017 | 3 | 3 | hatch | | found with 2 eggs | | |
| 17OB07 | unfenced north | 4/10/2017 | 5/9/2017 | 3 | 3 | hatch | | saw adult alarming,near | | |
| 17OB08 | south | 4/10/2017 | 4/25/2017 | 3 | ? | unknown | unknown | nest scrape blown away, not known to be active long enough, but had an exclosure | | |
| 17OB09 | middle | 4/16/2017 | 5/14/2017 | 3 | 3 | hatch | | | | |
| 17OB10 | north | 3/20/2017 | 4/18/2017 | 3 | 3 | hatch | | undiscovered nest- chicks by lagoon and scrape found with pips | | 1 |
| 17OB11 | south | 4/13/2017 | 5/12/2017 | 3 | 3 | hatch | | | | |
| 17OB12 | south | 4/28/2017 | 5/20/2017 | 3 | 0 | fail | predated | never saw chicks -large egg shells near nest | | |
| 17OB13 | south | 4/21/2017 | 5/20/2017 | 3 | 3 | hatch | | found pips, never saw young chicks but older chicks spotted in panne (3wks) | | |
| 17OB14 | south | 4/3/2017 | 5/1/2017 | 3 | 3 | hatch | | eggs gone 2 weeks after discovery, all signs of hatching present | | |
| 17OB15 | unfenced north | 4/29/2017 | 5/12/2017 | 3 | 0 | fail | no trace of nest | no trace of nest, suspect trampled then blown by winds | | |
| 17OB16 | south | 5/5/2017 | 6/3/2017 | 3 | 3 | hatch | | found with 1 egg, all evidence of hatching, but never saw chicks | | |
| 17OB17 | south | 5/7/2017 | 6/5/2017 | 3 | 3 | hatch | | saw nest hatching | | |
| 17OB18 | north | 5/7/2017 | 6/5/2017 | 3 | 3 | hatch | | saw inj adult with chick at nest | | |
| 17OB19 | middle | 4/28/2017 | 5/27/2017 | 3 | 3 | hatch | | saw adult alarming,near - all signs of hatching present | | |
| 17OB20 | south | 5/24/2017 | 5/24/2017 | 1 | 0 | fail | abandoned and adult killed | Adult female dead at nest- egg taken to SB zoo. Female's skull 50% ossified, granular ovaries - 1st year female. Unknown cause of death. | egg incubated, started to develop but embryo died after 2 weeks of incubation | |
| 17OB21 | salt panne | 5/24/2017 | 6/7/2017 | 3 | 0 | unknown | unknown | eggs vanished early despite being in exclosure, suspect peregrin predated adult and/or eggs predated. Nest was harassed by ravens, but probably after fate | | |
| 17OB22 | south | 5/8/2017 | 6/6/2017 | 3 | 2 | hatch | | 2 eggs were gone and found pip shell | | |

Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Appendix A-4. WSP Nest Summary – page 2, nests 23-36

| Nest # | Location | calc intitiation | Estimated hatch/fail | #Eggs Laid | #Eggs Hatched | Outcome | Reason for failure | Comments | Egg Report | HY |
|--------|----------------|---------------------|-------------------------|---------------|------------------|---------|-----------------------|--|---|----|
| 17OB23 | south | 5/30/2017 | 6/6/2017 | 3 | 0 | fail | predated | eggs vanished early, peregrin in area, and raven activity - prints around | | |
| 17OB24 | north | 5/28/2017 | 6/26/2017 | 3 | 1 | hatch | | mean chick by lagoon - 2 eggs did not hatch, WFFVZ | 2 eggs, no development, infertile or nonviable | 1 |
| 17OB25 | north | 5/16/2017 | 6/14/2017 | 3 | 3 | hatch | | chick the right age by the lagoon. No other hatches in the area. | | |
| 17OB26 | salt panne | 5/28/2017 | 6/26/2017 | 3 | 3 | hatch | | saw < week old chick nearby; saw HY that was probably this chick on 7/21/17 | | 1 |
| 17OB27 | salt panne | 6/7/2017 | 7/6/2017 | 3 | 3 | hatch | | found nest hatching | | |
| 17OB28 | unfenced north | 6/10/2017 | 6/15/2017 | 1 | 0 | fail | predated | found predated egg, raven prints on this nest and throughout south habitat | | |
| 17OB29 | north | 6/17/2017 | 7/19/2017 | 2 | 0 | fail | abandoned | Abandoned. Brooded longer than 4 weeks. One egg broke, the other egg submitted to WFFVZ | No development, likely both eggs were infertile or nonviable | |
| 17OB30 | south | 6/17/2017 | 7/16/2017 | 3 | 2 | hatch | | all signs hatching, 1 egg did not hatch, take to WFFVZ | No development, egg infertile or non- viable | |
| 17OB31 | north | 6/25/2017 | 7/7/2017 | 3 | 0 | fail | predated | suspect squirrel predation, had an exlclosure but squirrel probably got through. Nearby CLT nests also predated, saw at least 3 squirrels in nest area being mobbed by terns | | |
| 17OB32 | south | 6/8/2017 | 7/7/2017 | 3 | 3 | hatch | | pips | | |
| 17OB33 | south | 6/24/2017 | 6/26/2017 | 1 | 0 | fail | predated | found predated egg shell, large hole in it and dried yolk. Evidence of ravens in the area | | |
| 17OB34 | salt panne | 6/12/2017 | 7/11/2017 | 3 | 3 | hatch | | pips, chicks seen with male near nest | | |
| 17OB35 | salt panne | 6/15/2017 | 7/14/2017 | 2 | 2 | hatch | | 2 chicks seen just after hatch, still drying in nest | | |
| 17OB36 | salt panne | ? | ? | 1 | 1 | hatch | | pips - Undiscovered nest | | |

Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Appendix A-5. California Least Tern Nest and Chick Summary : page 1, nests 1-15

| Date | # Adults | # Fledglings | # chicks off nests | Predator Sightings | Nest# | | | | | | | | | | | | | | |
|---|----------|--------------|--------------------|--|--------|--------|-----|-----|-------|-----|-----|---------|--------|-----|-----|--------|-------|-----|-----|
| | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 5-May-17 | 4 | | | | | | | | | | | | | | | | | | |
| 12-May-17 | 8 | | | | | | | | | | | | | | | | | | |
| 21-May-17 | 16 | | | | | | | | | | | | | | | | | | |
| 25-May-17 | 4 | | | | | | | | | | | | | | | | | | |
| 2-Jun-17 | 23 | | | 1 Horned Lark/1 American Crow/Domestic Cat (tracks) | 1 E | 2 E | 1 E | | | | | | | | | | | | |
| 6-Jun-17 | 19 | | | 1 Great Egret | 2 E | 2E | 1 E | 1E | 2 E | 1 E | | | | | | | | | |
| 12-Jun-17 | 39 | | | 2 Western Gull | 2 E | 2E | 1 E | 2E | 1E/1U | 2E | 2E | 2E | 2E | 2E | 2E | 1 E | 1 E | | |
| 16-Jun-17 | 44 | | | 2 Western Gull | 2 E | 2E | 1 E | INC | 1E | | | | | | 2E | 2E | 2E | 1E | 1E |
| 19-Jun-17 | 45 | | | 1 /6 Western Gull | 2 E | 1E/1C | 1E | 2E | 1E | 2E | 2E | 2E | 2E | 2E | 2E | 2E | 1E/1U | 2E | 1E |
| 21-Jun-17 | 41 | | | 1 Common Raven /2 California ground squirrel /1 Gull | | | | | INC | INC | | | | INC | | INC | | INC | |
| 26-Jun-17 | 45 | | 1CF | 2 Western Gull/6 Horned Lark | 1C/1PH | 1PH/1H | 1C | 2E | 1C | 2E | INC | INC | INC | 2E | 2E | 2E | 1E | INC | INC |
| 30-Jun-17 | 50 | | 1CF | | | | | | | | | | 1C/1PH | | | | INC | INC | INC |
| 5-Jul-17 | 60 | | 2CF/1PF | 20 Western Gull/2 Horned Lark/2 California ground squirrel | 1H | | 1H | 2PH | 1H | INC | 2C | 1PH/1DC | 1H | 2PH | 2PH | 1C/1PH | 1C | 2C | 1PH |
| 6-Jul-17 | 65 | | | | | | | | | | | | | | | | | | |
| 9-Jul-17 | 60 | 2FY | | | | | | | | | | | | | | | | | |
| 13-Jul-16 | 50 | | 5CF/2PF | 2 California ground squirrel | | | | | | 2PH | 2H | | | | | 1H | 1H | 2H | |
| 14-Jul-17 | 55 | | | | | | | | | | | | | | | | | | |
| 19-Jul-17 | 55 | 5FY/7FO | 6CF/4PF | 1 Osprey | | | | | | | | | | | | | | | |
| 22-Jul-17 | 50 | | | 1 Osprey | | | | | | | | | | | | | | | |
| 25-Jul-17 | 28 | 4FY/5FO | | | | | | | | | | | | | | | | | |
| 26-Jul-17 | | | | | | | | | | | | | | | | | | | |
| 1-Aug-17 | 22 | 5FY/6FO | 1CF | | | | | | | | | | | | | | | | |
| 7-Aug-17 | 10 | 4FY/2FO | | | | | | | | | | | | | | | | | |
| 14-Aug-17 | 11 | 3FO | 3PF | | | | | | | | | | | | | | | | |
| 22-Aug-17 | 4 | 1FY/1FO | | | | | | | | | | | | | | | | | |
| 28-Aug-17 | 0 | | | | | | | | | | | | | | | | | | |
| Egg Codes POE = put on end E = egg NV = non-viable H = hatch PH = probable hatch D = damaged egg A = abandoned nest Chick Codes C=chick-downy CF=chick-feathered PF=pre-fledge FY=fledge-young FO=fledge-old DC= dead chick | | | | | | | | | | | | | | | | | | | |

Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Appendix A-6. California Least Tern Nest and Chick Summary: page 2, nests 15-24

| Date | # Adults | # Fledglings | # chicks off nests | Predator Sightings | Nest # | | | | | | | | | |
|---|----------|--------------|--------------------|--|--|-----|-----|-----|--------|--------|-------|-----|--------|----|
| | | | | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 5-May-17 | 4 | | | | | | | | | | | | | |
| 12-May-17 | 8 | | | | | | | | | | | | | |
| 21-May-17 | 16 | | | | | | | | | | | | | |
| 25-May-17 | 4 | | | | | | | | | | | | | |
| 2-Jun-17 | 23 | | | 1 Horned Lark/1 American | | | | | | | | | | |
| 6-Jun-17 | 19 | | | 1 Great Egret | | | | | | | | | | |
| 12-Jun-17 | 39 | | | 2 Western Gull | | | | | | | | | | |
| 16-Jun-17 | 44 | | | 2 Western Gull | 1E | 2E | 2E | 2E | 1E | 1E | 2E | 1E | 1D | 1E |
| 19-Jun-17 | 45 | | | 1 /6 Western Gull | 1E | 2E | 2E | 2E | 1E | 1E | 2E | 2E | 1E | 1E |
| 21-Jun-17 | 41 | | | 1 Common Raven /2 California ground squirrel /1 Gull | | | INC | INC | INC | INC | INC | | INC | |
| 26-Jun-17 | 45 | | 1CF | 2 Western Gull/6 Horned Lark | INC | 2E | 2E | 2E | 2E | INC | 1E/1U | INC | INC | 1E |
| 30-Jun-17 | 50 | | 1CF | | INC | INC | INC | INC | INC | INC | INC | INC | INC | |
| 5-Jul-17 | 60 | | 2CF/1PF | 20 Western Gull/2 Horned Lark/2 California ground | 1PH | 2E | 2E | 2E | 1C/1PH | INC | INC | INC | INC | 1A |
| 6-Jul-17 | 65 | | | | | INC | | | | | | | | |
| 9-Jul-17 | 60 | 2FY | | | | INC | | | | | | | | |
| 13-Jul-16 | 50 | | 5CF/2PF | 2 California ground | | 2P | 2P | 2E | 1H | 1E | 2PH | 2C | 1PH/1C | |
| 14-Jul-17 | 55 | | | | | | | 2NV | | | | | 1DC | |
| 19-Jul-17 | 55 | 5FY/7FO | 6CF/4PF | 1 Osprey | | | | | | 1E POE | | 2H | | |
| 22-Jul-17 | 50 | | | 1 Osprey | | | | | | | | | | |
| 25-Jul-17 | 28 | 4FY/5FO | | | | | | | | 1 NV | | | | |
| 26-Jul-17 | | | | | | | | | | | | | | |
| 1-Aug-17 | 22 | 5FY/6FO | 1CF | | | | | | | | | | | |
| 7-Aug-17 | 10 | 4FY/2FO | | | | | | | | | | | | |
| 14-Aug-17 | 11 | 3FO | 3PF | | | | | | | | | | | |
| 22-Aug-17 | 4 | 1FY/1FO | | | | | | | | | | | | |
| 28-Aug-17 | 0 | | | | | | | | | | | | | |
| Egg Codes POE = put on end E = egg NV = non-viable H = hatch PH = probable hatch D = damaged egg A = abandoned nest | | | | | Chick Codes C=chick-downy CF=chick-feathered PF=pre-fledge FY=fledge-young FO=fledge-old DC= dead chick | | | | | | | | | |

Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Appendix A-7. California Least Tern Nest and Chick Summary: page 3, nests 25-38

| Date | # Adults | # Fledglings | # chicks off nests | Predator Sightings | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|----------|--------------|--------------------|--|--|-----|----|-----|-----|--------|-----|-----|-----|-----|----|--------|--------|--------|
| 5-May-17 | 4 | | | | | | | | | | | | | | | | | |
| 12-May-17 | 8 | | | | | | | | | | | | | | | | | |
| 21-May-17 | 16 | | | | | | | | | | | | | | | | | |
| 25-May-17 | 4 | | | | | | | | | | | | | | | | | |
| 2-Jun-17 | 23 | | | 1 Horned Lark/1 American | | | | | | | | | | | | | | |
| 6-Jun-17 | 19 | | | 1 Great Egret | | | | | | | | | | | | | | |
| 12-Jun-17 | 39 | | | 2 Western Gull | | | | | | | | | | | | | | |
| 16-Jun-17 | 44 | | | 2 Western Gull | 1E | 1E | | | | 2E | | | | | | | | |
| 19-Jun-17 | 45 | | | 1 /6 Western Gull | 1E | 1E | 2E | 2E | 1E | 2E | 2E | | | | | | | |
| 21-Jun-17 | 41 | | | 1 Common Raven /2 California ground squirrel /1 Gull | INC | | | | INC | | | | | | | | | |
| 26-Jun-17 | 45 | | 1CF | 2 Western Gull/6 Horned Lark | INC | INC | 2F | INC | INC | 2E | INC | 2E | 2E | | | | | |
| 30-Jun-17 | 50 | | 1CF | | INC | INC | | INC | INC | INC | INC | INC | INC | | | | | |
| 5-Jul-17 | 60 | | 2CF/1PF | 20 Western Gull/2 Horned Lark/2 California ground | 1E | 1C | | 2U | INC | 1C/1PH | 2E | 2E | 2C | 1PH | | | | |
| 6-Jul-17 | 65 | | | | | | | | INC | | | | | | 1E | | | |
| 9-Jul-17 | 60 | 2FY | | | | | | | INC | | | | | | 1E | | | |
| 13-Jul-16 | 50 | | 5CF/2PF | 2 California ground | 1P | 1H | | | 2PH | | 2U | 2P | 2H | | 2E | 2E | | |
| 14-Jul-17 | 55 | | | | | | | | | | | | | | | | | |
| 19-Jul-17 | 55 | 5FY/7FO | 6CF/4PF | 1 Osprey | | | | | | | | | | | 2A | 2E | | |
| 22-Jul-17 | 50 | | | 1 Osprey | | | | | | | | | | | | 2E | 2E | 2E |
| 25-Jul-17 | 28 | 4FY/5FO | | | | | | | | | | | | | | 2E | 2E | 2E |
| 26-Jul-17 | | | | | | | | | | | | | | | | 2E | 1C/1E | 2E |
| 1-Aug-17 | 22 | 5FY/6FO | 1CF | | | | | | | | | | | | | 1C/1PH | | 1E/1PH |
| 7-Aug-17 | 10 | 4FY/2FO | | | | | | | | | | | | | | 1H | 1H/1PH | 1NV |
| 14-Aug-17 | 11 | 3FO | 3PF | | | | | | | | | | | | | | | |
| 22-Aug-17 | 4 | 1FY/1FO | | | | | | | | | | | | | | | | |
| 28-Aug-17 | 0 | | | | | | | | | | | | | | | | | |
| Egg Codes POE = put on end E = egg NV = non-viable H = hatch PH = probable hatch D = damaged egg A = abandoned nest | | | | | Chick Codes C=chick-downy CF=chick-feathered PF=pre-fledge FY=fledge-young FO=fledge-old DC= dead chick | | | | | | | | | | | | | |

Appendix B: Photographs

Photo 1. Habitat Fencing



Photo 2. Symbolic Fencing, middle habitat fence



Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Photo 3. Predator Exclosure on a WSP nest



Photo 4. CSUCI students building a predator exclosure



Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Photo 5 Raven depredated WSP egg, nest #33



Photo 6. Raven depredated WSP egg; nest#28



Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Photo 7. Dead adult female by nest (right), egg (left) was taken to Santa Barbara Zoo for incubation (bottom)



Photo 8. Raven foot prints near nest 6, a month after it hatched



Photo 9. Peregrine falcon perched on lagoon fencing, Sept 2017

Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Photo 10. Dog tied to Ormond Ordinance sign, after crossing Hueneme Beach, which also has a complete dog ban (Left)
Nest monitor explaining to dog owner with off leash dogs how they impact the nearby tern colony (top right)
Dog owners with their off-leash dogs walking next to nesting area and CLT fledglings on the beach berm (bottom right)



Western Snowy Plover and California Least Tern, Ormond Beach 2016: Season Summary

Photo 11. Cut habitat fence



Photo 12. Foot/bike path next to active CLT



Appendix C: Nesting Area Signs

Appendix C- 1. "Symbolic Fence Closed" sign in English and Spanish, and Audubon "Share the Shore"



References

- Federal Register. (1993). Determination of Threatened Status for the Coast Population of the Western Snowy Plover. Vol. 58, No. 42, pp. 12864-12874.
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