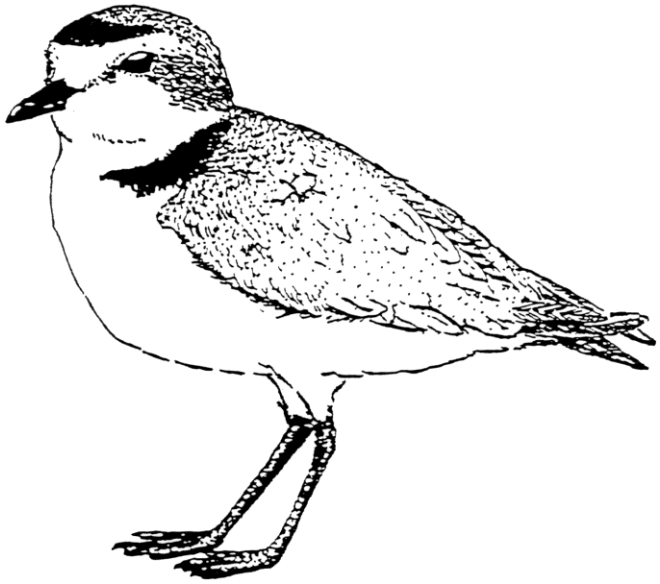


NAVAL BASE VENTURA COUNTY POINT MUGU SNOWY PLOVER MONITORING REPORT 2014

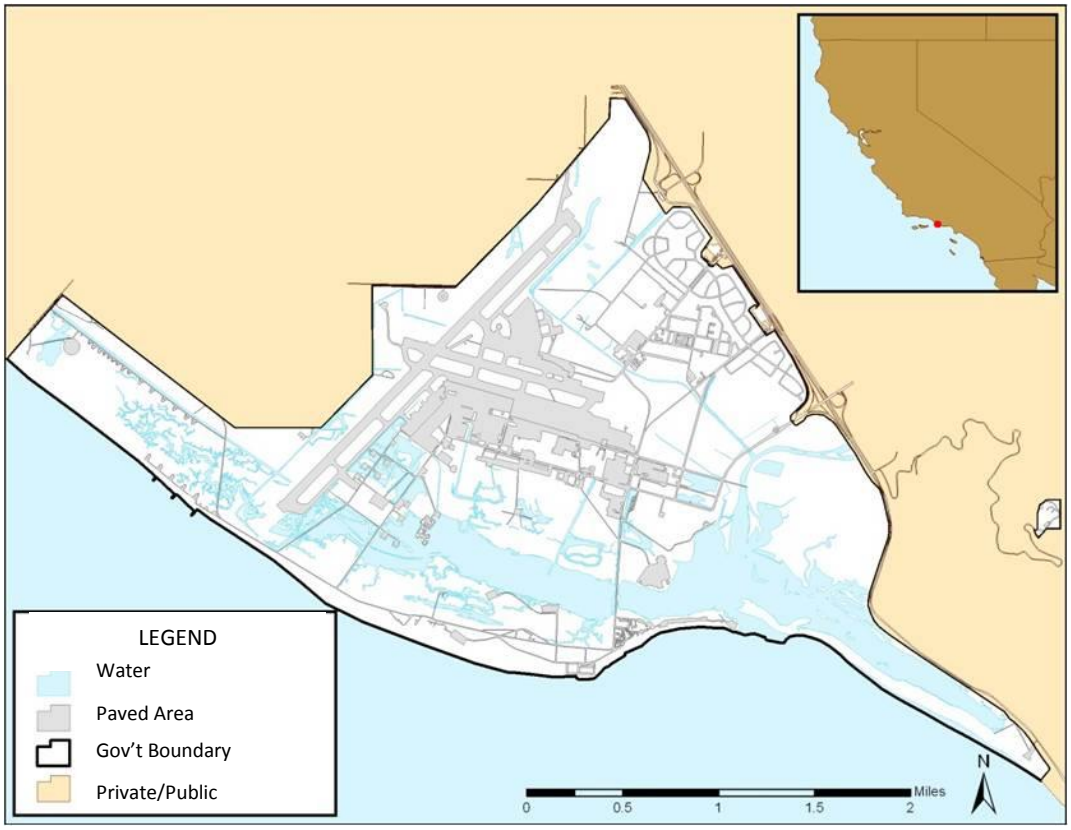
February 2015

INTRODUCTION

The information in this report was taken from Naval Base Ventura County Point Mugu's 2014 annual monitoring report for federally listed species as required under the Endangered Species Act of 1973, as amended, Programmatic Biological Opinion (1-8-99-F-24) of June 6, 2001 concerning routine operations and maintenance at the Naval Base Ventura County [NBVC] Point Mugu and the Biological Opinion for the Bird/Animal Aircraft Strike Hazard Program at NBVC Point Mugu (1-8-06-F-13). Information regarding the western snowy plover (*Charadrius alexandrinus nivosus*) was selected from this report to have a snowy plover report that can be readily shared amongst other plover researchers and biologists.

NBVC Point Mugu (Figure 1) is comprised of 4,490 acres on the coast of southern California, eight miles southeast of Port Hueneme, California. There are approximately 2,200 acres of jurisdictional delineated wetlands, including the largest functioning salt marsh in coastal southern California. Mugu Lagoon, an estuarine coastal salt marsh, provides food, nesting, sheltering, breeding, and nursery habitat for numerous invertebrate, fish, bird, and plant species. These habitat types are composed of intertidal mudflats and sand flats, intertidal salt marsh, tidal creeks, and salt pannes. Approximately 6.5 miles of coastline provides nesting habitat for beach nesting birds. Other habitats found on NBVC Point Mugu include drainage ditches, uplands, disturbed, and developed areas (Keeny, 1998).

Figure 1 Installation Map – Naval Base Ventura County, Point Mugu, California.



In 1993, the western snowy plover was listed by the USFWS as threatened and by the California Department of Fish and Wildlife [CDFW] (formerly California Department of Fish and Game [CDFG]) as a species of special concern (Service 2006, 2007). Snowy plovers are year-round at NBVC Point Mugu. The Service designated the coastal population of snowy plovers as threatened in 1993, with critical habitat designated in 1995. Designation of critical habitat at NBVC Point Mugu was exempted in 2005, as an Integrated Natural Resource Management Plan provided appropriate protection to their habitat.

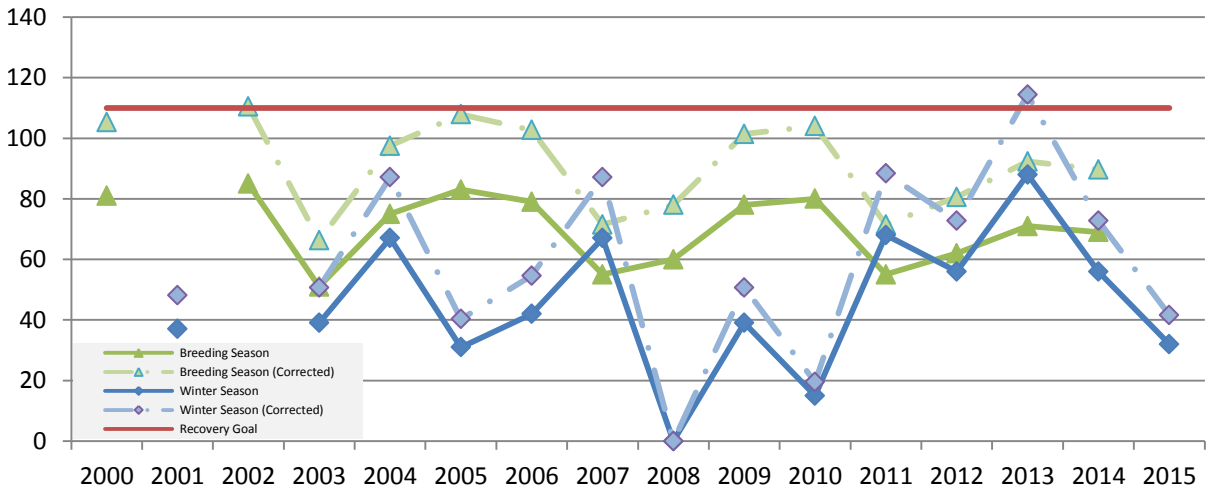
Window Surveys

Winter and breeding season window surveys are conducted in conjunction with the annual Western Snowy Plover Recovery Unit 5 surveys.

Window surveys may not detect all birds and are not directly comparable to intensive studies conducted on color-banded populations. A correction factor can be applied to the data in order to account for differences in survey efficiency. Currently, the best rangewide estimate of the correction factor is 1.3 (Service 2007). The recovery plan goal for NBVC Point Mugu is 110 breeding individuals (Service 2007). When the correction factor is applied, the breeding season window survey totals are very close to the recovery goal (Figure). However, when the uncorrected window survey data is compared to estimated pairs based on total peak active nests, they are both typically in the 60-80 individuals range. This suggests that most breeding adults are being counted during the summer window survey.

Meanwhile, the wintering population is highly variable (Figure). As they are not tied to nesting beaches, wintering plovers may spend more time foraging or roosting in Mugu Lagoon, making it more difficult to obtain accurate estimates of their abundance. In this case, it may be more useful to apply the correction factor.

Figure 2. Western Snowy Plover Adults Observed during Annual Recovery Unit Surveys, NBVC Point Mugu.



Standard window surveys (*n* = 13) throughout the year resulted in an (uncorrected) mean of 60.5 adult western snowy plovers present at NBVC Point Mugu in 2014. A peak of 135 individuals was documented on 15 Sept and a low of 17 plovers was observed on 18 February.

Band Sightings

Plovers with colored leg-bands were identified on 18 occasions in 2014 (
Table). Five individuals were successfully matched with banding records. Three sightings were not confirmed, due to only partial combinations being reported and/or difficulty in determining colors of bands. One individual [YS:RR] was matched with a band from Bolsa Chica. Typically, banded birds at NBVC Point Mugu are from more northern beaches, so it is unusual to see one that hatched to the south. The combination of band colors on was difficult to read on this individual, therefore, it is possible it was misidentified.

A male plover [RR:AR] was seen throughout the year and has been regularly observed since 2011. While suspected of breeding at NBVC Point Mugu, it was not previously confirmed. On 10 Jul 2014, he was observed as part of a pair of plovers displaying in defense of three newly hatched chicks at Mad Road. There were no other nests in the vicinity.

Table 1. Sightings of banded Western snowy plovers, NBVC Point Mugu, 2014.

Date Observed	LL	RR	Sex	Observation Location	Year Banded	Age Banded	Location Banded
3 Feb 2014	RR	AR	Male	Ormond East	2010	Chick	Oceano Dunes
3 Mar 2014	AA	BB	Female	Holiday Beach	2013	Chick	Marina SB, Monterey County
5 Mar 2014	AA	BB	Female	Holiday Beach	2013	Chick	Marina SB, Monterey County
24 Apr 2014	BB	RB	Male	Holiday	2010	Chick	Oceano Dunes
12 May 2014	BB	RB	Male	Holiday	2010	Chick	Oceano Dunes
12 May 2014	RR	AR	Male	Ormond East	2010	Chick	Oceano Dunes
7 Jul 2014	BB	RB	Male	Holiday	2010	Chick	Oceano Dunes
10 Jul 2014	RR	AR	Male	Mad Road	2010	Chick	Oceano Dunes
1 Oct 2014	OB	WG		Family Beach	2014	Chick	Fort Ord
1 Oct 2014	AA	BB	Female	Holiday Beach	2013	Chick	Marina SB, Monterey County
6 Oct 2014	AA	BB	Female	Holiday Beach	2013	Chick	Marina SB, Monterey County
6 Oct 2014	RR	AR	Male	Eastern Arm	2010	Chick	Oceano Dunes
6 Oct 2014	YS	RR		Ormond East	2014	Chick	Bolsa Chica
4 Nov 2014	RR	AR	Male	Eastern Arm	2010	Chick	Oceano Dunes
8 Dec 2014	AA	BB	Female	Holiday Beach	2013	Chick	Marina SB, Monterey County

Reproductive Success

Nests searches were performed at least once per week by two to seven nest searchers spreading out over the beach, walking slowly in a serpentine pattern (zigzag), looking for nests. Nests were also located during plover window surveys. Once nests were found, the coordinates were mapped with ArcPad using an AshTech Mobile Mapper 10 and the nest was marked with a numbered tongue

depressor. Nest searches began on 17 March 2014; the last nest search occurred on 18 August 2014. Nests were re-visited 1-3 times a week until hatching.
Plovers nested on Holiday Beach, Ormond East, Eastern Arm, Mad Road, Pad Bravo, two salt pannes, and the airfield (Figure). Mad Road is a mix of salt marsh, shallow ponds, and small salt pannes almost a mile from the beach. Plovers did not nest on Family Beach, Pad Alpha or on the north ramp of the runway in 2014.

The first snowy plover nest was found on 24 March 2014, the first hatched on 16 April 2014, the last hatched on 18 August 2014. A minimum of 123 plover nests were initiated during the 2014 season. Of those, 63 hatched (51.2%), 36 were predated (29.8%), 17 were abandoned (13.8%), 6 washed out (4.9%), and 1 had an unknown fate (0.8%) (Table). Differences in 2014 compared to previous years can be seen in Appendix A.

Predation

In the past several years, aerial predators have been a greater risk to both western snowy plovers and California least terns than terrestrial predators.

Common ravens were responsible for over 70% of predated snowy plover nests (*n* = 41) in 2012 and for 32% of predated nests (*n* = 47) in 2013. A group of 28 ravens was observed in 2009, but they moved on within a day. In 2012 and 2013, groups of up to 20 ravens were regularly sighted for longer periods of time. In 2014, the number of ravens observed and the length of the time spent on base was lower than the two years previous.

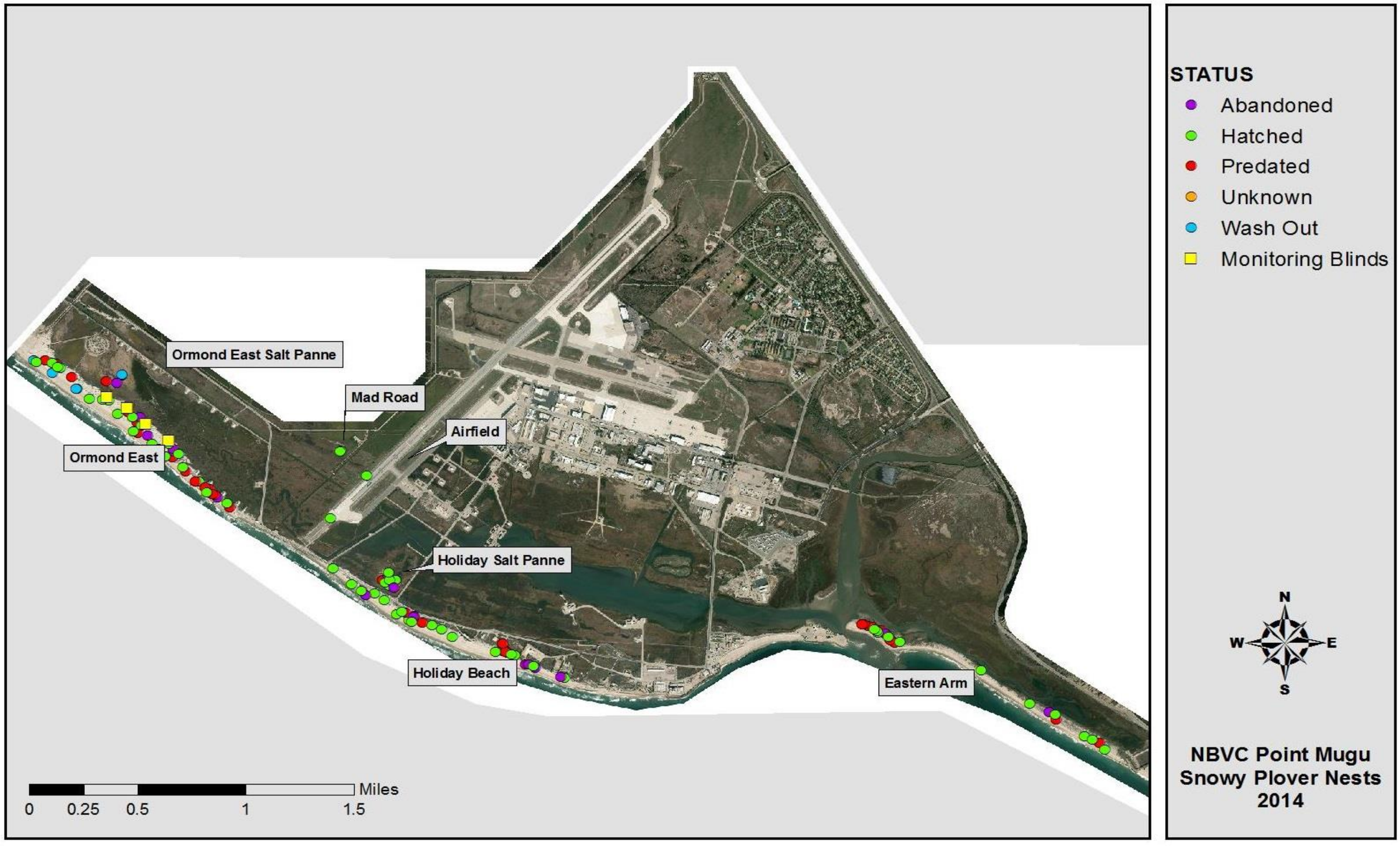
USDA Wildlife Services was contracted to provide full-time predator management at NBVC Point Mugu during the 2014 breeding season. Due to contracting delays, predator management did not begin until May, instead of March as is typical. In addition to shooting, trapping, and hazing, USDA is the only agency permitted to use the corvicide DRC-1339. Pre-baited platforms (*n* = 7) were erected in areas with documented raven activity or predation. If ravens consumed the pre-bait (*n* = 4), eggs containing the DRC-1339 were wired onto the platform, which was closely monitored. A total of eight ravens were removed using DRC-1339 and other predator control methods during the breeding season. Of 36 snowy plover nests predated in 2014, only 9, or 25% (Table), were consumed by ravens, a decline compared to 32% of predated nests in 2013. Ideally, the amount of predation will be further reduced in the coming years, particularly considering the late start in 2014. Additionally, in previous years, predator management was a seasonal effort, but has now transitioned to a year-round program.

In 2012 and 2013, northern harrier numbers began to increase, along with their predation upon western snowy plovers and California least terns. In 2012, at least three individuals were documented regularly hunting on the beaches, primarily taking California least tern chicks. In 2013, the harriers mainly consumed eggs; but there were very few the chicks on the beaches that season. Northern harriers leave fewer tracks and little evidence compared to common ravens. They were only identified once trail cameras were deployed. Unknown predators were responsible for 30 of 47 predated nests in 2013, but up to 14 of these were suspected to have been consumed by harriers.

Table 2. Western snowy plover nest fates, NBVC Point Mugu, 2014.

			EGG FATE							NEST FATE						PREDATOR TYPE						
Snowy Plover Nest Location	Total Nests	Total Eggs	Hatch	Abandon	Wash Out	Unknown	Human Loss	Predated	Chicks Seen	Nest Hatch (Full or Partial)	Abandon	Wash Out	Unknown	Human Loss	Predated	Raven	Northern Harrier	Gull	Unknown Avian	Coyote	Opossum	Unknown
Ormond East	46	115	48	16	12	1	0	38	17	21	5	5	0	0	15	2	6	0	6	0	0	1
Ormond East Salt Panne	4	10	0	2	3	0	0	5	0	0	1	1	0	0	2	0	0	0	0	0	0	2
Holiday Beach	33	87	49	19	0	2	0	17	18	20	7	0	0	0	6	0	0	1	1	1	1	2
Holiday Salt Panne	9	22	15	3	0	0	0	4	0	5	2	0	0	0	2	2	0	0	0	0	0	0
Runway	3	9	6	0	0	3	0	0	5	2	0	0	1	0	0	0	0	0	0	0	0	0
Mad Road	2	6	6	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0
Eastern Arm	26	73	38	5	0	0	0	30	2	13	2	0	0	0	11	5	0	0	3	3	0	0
Total	**123**	**322**	**162**	**45**	**15**	**6**	**0**	**94**	**45**	**63**	**17**	**6**	**1**	**0**	**36**	**9**	**6**	**1**	**10**	**4**	**1**	**5**
Percent of Total			**50.31%**	**13.98%**	**4.66%**	**1.86%**	**0%**	**29.19%**	**13.98%**	**51.22%**	**13.82%**	**4.88%**	**0.81%**	**0%**	**29.27%**							

Figure 3. Western snowy plover nest locations and fates, NBVC Point Mugu, 2014.

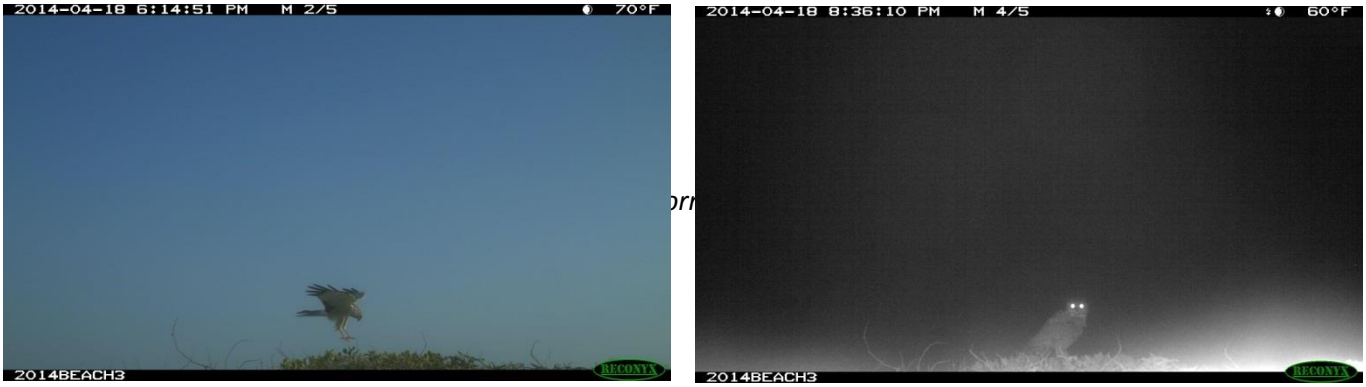


In April 2014, harriers predated six plover nests on Ormond East Beach (Table). After April, there was no additional suspected or confirmed predation by northern harriers and no sightings on nesting beaches. Conditions were poor in southern California for nesting raptors in 2014; the harriers most may have moved on if breeding was not attempted.

A total of ten nests were lost to unknown avian predators in 2014. Whimbrel (*Numenius phaeopus*) tracks were observed near one predated nest. They have been suspected of consuming eggs in the past, but definitive confirmation has not been obtained. Great-horned owls are year-round residents which breed on base and potentially hunt on the nesting beaches for eggs, young, and adults. Possible owl tracks were noted at a least one nest, and a trail camera captured an image of a great-horned owl landing on a dune were a plover nest had been located (

Figure). A northern harrier predated the same nest earlier in the same evening.

Figure 4. Trail Camera Images of Western Snowy Plover Nest Predators, NBVC Point Mugu, 2014.



Tidal Barricades

Inevitably, each year snowy plover nests are washed out by high tides, sometimes only days before hatching. Since 2011, nests close to the tideline considered in danger of being washed out have been barricaded and their fates tracked with the goal of minimizing these losses and boosting productivity. Barricades typically require 5 minutes to assemble and consist of large pieces of driftwood placed 5-10 feet away from the nest. The driftwood is generally placed in a U-shape to direct water around and away from the nest. Once Natural Resources staff vacates the area, plovers have been observed to quickly resume normal incubation of their nests.

A total of 45 nests were barricaded from 2011-2014 (Table); including 15 in 2014. In 2014, 11 (73.3%) of the barricaded nests hatched at least one egg. In total, 23 (51.1%) of the barricaded nests have hatched. While 8 of 16 barricaded nests were predated in 2013, there is no evidence to suggest these nests are targeted by predators at a higher proportion than non-barricaded ones. The high take in 2013 appears to be a function of the overall high predation pressure during that season. The 51.1% hatch rate of barricaded nests is higher than the overall hatch rate of 45.4% in the same time period (n = 463).
Although barricades are unlikely to save nests during the most severe storm-related surges, they appear to be useful in minimizing loss associated with the normal variation in tides. Often, slowing down the water only slightly can mean the difference between success and failure. After a wash out event, adults have, including at least three instances in 2014, relocated some, or all, of their eggs from barricaded

nests and continued to incubate. In these cases the barricades may have stopped enough of the water to allow the adults to recover their eggs. Given the right conditions, plover eggs can remain viable and can hatch despite being exposed to tidal action and being washed out of nest.

Table 3. Fates of Barricaded Western Snowy Plover Nests, NBVC Point Mugu.

Year	# Barricaded	# Hatched	# Washed Out	# Predated	# Abandoned
2011	6	5	0	1	0
2012	8	3	1	1	3
2013	16	4	4	8	0
2014	15	11	4	0	0
TOTAL	**45**	**23**	**9**	**10**	**3**

Two pairs of plovers each successfully hatched their entire clutches after their nests were washed out. At one of these nests, an egg was separated by several feet from the other two after being washed out. The adults continued to attempt to incubate all three despite being in two different scrapes. The pair may have eventually abandoned the third egg due to the challenges incubating in two locations, but once the situation became clear, the isolated egg was placed in the same scrape as the other two and all hatched. A third pair of plovers relocated two of three washed out eggs; successfully hatching one of them.

Snowy plovers face many challenges to the recovery of their population; barricading is a simple, useful, and non-invasive tool in preventing nest loss due to tidal action which also has the potential to increase fledgling rates. There is some concern that providing assistance to plovers that have chosen poor nesting locations will only encourage them to continue to select sub-optimal sites in upcoming seasons. While that remains a possibility, barricades are a management action which carries very little risk to the either the adult plover or their current clutch of eggs and has resulted in eggs hatching which may not have otherwise.

Navy-Related Impacts

Mortalities of two adult western snowy plovers were documented at NBVC Point Mugu in 2014.

On 1 May 2014, an adult snowy plover collided with an aircraft on Runway 3. The Service was notified via telephone and e-mail on 2 May 2014. An active nest was recorded on the shoulder of Runway 3 on 28 April 2014 and initially there was concern that the plover was part of this pair. The nest successfully hatched on 23 May 2014. It is unlikely that a single adult incubated the eggs for more than three weeks; therefore the plover that died was presumably not associated with the nest.

On 19 November 2014, the carcass of an adult snowy plover that had been hit by a vehicle was found between Family Beach and the mudflats of Mugu Lagoon. While snowy plovers do not nest on Family Beach, flocks are regularly observed roosting on the beach during the winter and plovers can often be seen foraging in exposed mudflats during low tides in Mugu Lagoon. The dead plover was on the road separating these two locations. The road has intermittent but generally quite slow traffic (below 25 mph) due to its narrowness. Plovers are not typically on the road as they transit between Family Beach and Mugu Lagoon because it is bordered by concrete K-rails on one side and by marsh vegetation on the other. Vehicle mortalities not generally expected in this area; the most likely scenario is the plover was hit while flying close to the ground to or from the beach. The Service was immediately notified via e-mail

of the mortality. Although the location will be assessed to determine if any additional signage or other measures should be undertaken to further minimize the risk, the likelihood of future vehicle mortalities in this area is considered low.

Summary

The results of the 2014 snowy plover breeding season were an improvement compared to the previous two years. Chicks are not banded at Point Mugu; therefore, the actual number of chicks fledged per male is unknown, however the hatch rate of 51.22% exceeded 50% for the first time since 2011.

The improvement is likely due to a combination of factors. Firstly, there were no extreme wind events, which can often result in nest abandonment. Secondly, predation pressure, particularly by ravens, was lower compared to the previous years. Fewer large groups of ravens were spending long periods of time on base. By the time the new USDA predator manager was in place in early May, snowy plovers had already been nesting 6-8 weeks. Despite having minimal predator control at the beginning of the season, only 10 nests were predated before 1 May 2014; 6 by northern harriers. Typically, early season nests fair more poorly: 36% of nests initiated before May (n = 39) hatched, in the previous two years, only 23-28% of early season nests hatched. Overall, nests initiated later tend to be more successful. The increase in hatch success usually coincides with the arrival of California least terns nesting on the same beaches. Snowy plovers nesting in proximity to least terns tend to benefit from the latter's vigorous nest defense and from the abundance of neighboring nests in the area.

Finally, new predator control methods, including the use of the DRC-1339, served to further improve hatch rates. While the overall predation rate was still higher than desired, it is not unexpected given the delay in predator control early in the breeding season and the management challenges caused by avian predators. Further reducing predation rates will be an ongoing challenge; particularly since avian predators have been responsible for more than two-thirds of nests taken in the past three breeding season.

PREDATOR MANAGEMENT

In fulfillment of the NBVC Point Mugu Predator Management Plan for protection of listed species, USDA-APHIS Wildlife Service conducted predator management on the installation in 2014 under the terms and conditions of Cooperative Agreement #55159 and NBVC's federal depredation permit (MB-117501-0). Due to delays implementing the new agreement, work did not commence until 2 May 2014. The breeding season ended in August after the last western snowy plover nest hatched, but predator management and associated activities continued into the non-breeding season as it has transitioned in to a year-round program.

Management activities primarily included the monitoring and removal of known and potential predators for the protection of the California least tern, the western snowy plover, and the light-footed Ridgway's Rail. Wildlife Services removed potential and documented avian and mammalian predators from tern and plover nesting sites, through the selective use of various traps and other removal techniques. These efforts were undertaken in areas designated sensitive habitat or identified as corridors. Any captured non-target animals that did not pose a realistic threat, based on observations by the predator manager and

NBVC Natural Resources staff were released. Any predator trapped and considered a realistic threat was dispatched or relocated.

The principal equipment and techniques used during this project included: cage traps, conibear traps, body gripping devices, pole traps, bal-chatri traps, shooting, harassment/effigies, and Compound DRC-1339 avicide. Placement and usage were based on predator observations and sign found, including tracks, trails, droppings and predation events. All trapping activities were in accordance with all applicable laws and regulations, which include the Endangered Species Act (16 U.S.C. §1531-44), the Migratory Bird Treaty Act (16 U.S.C. §703-712) (Migratory Bird Depredation Permit number MB189470-1 and amendments), Title 14, section 465.5 of the California Code of Regulations and Wildlife Services Directive 2.450, sections 3a through 3d. A summary is provided below in Table .

Table 4. Results of Predator Management Activities, NBVC Point Mugu, 2014.

Species	Holiday Beach / Salt Panne	Ormond East / Salt Panne	Eastern Arm	Mad Road	Total
California Ground Squirrel ***(Spermophilus beecheyi)***	36	1	0	19	**56**
Virginia Opossum ***(Didelphis virginiana)***	15	30	0	1	**46**
Raccoon ***(Procyon lotor)***	1	10	0	1	**12**
Feral cat* ***(Felis domesticus)***	2	1	0	0	**3**
Coyote ***(Canis latrans)***	1	0	2	0	**3**
Cottontail rabbit^ ***(Sylvilagus audubonii)***	0	0	0	12	**12**
American Crow ***(Corvus brachyrhynchos)***	1	0	0	0	**1**
Common Raven ***(Corvus corax)***	1	0	6	2	**9**
American Kestrel# ***(Falco sparverius)***	0	2	0	0	**2**
Western Gull ***(Larus occidentalis)***	0	1	0	0	**1**
*to Ventura County Animal Services | ^released on site | #relocated					

ADDITIONAL ENDANGERED SPECIES PERMIT INFORMATION

- ✓ No snowy plover eggs were floated by any individual during 2014.
- ✓ No predator exclosures were placed over snowy plover nests in 2014.

BIRD AIRSTRIKE HAZARD (BASH) PROGRAM

This section covers the reporting requirement of the Biological Opinion for the Bird/Animal Aircraft Strike Hazard Program at NBVC Point Mugu (1-8-06-F-13). No snowy plovers were observed to be disturbed or incidentally harassed due to Bird Airstrike Hazard [BASH] program activities during 2014.

Notable bird strikes during 2014 include:

- ✓ 1 May 2014: an adult western snowy plover was struck and killed by an unknown aircraft (See Two pairs of plovers each successfully hatched their entire clutches after their nests were washed out. At one of these nests, an egg was separated by several feet from the other two after being washed out. The adults continued to attempt to incubate all three despite being in two different scrapes. The pair may have eventually abandoned the third egg due to the challenges incubating in two locations, but once the situation became clear, the isolated egg was placed in the same scrape as the other two and all hatched. A third pair of plovers relocated two of three washed out eggs; successfully hatching one of them.

Snowy plovers face many challenges to the recovery of their population; barricading is a simple, useful, and non-invasive tool in preventing nest loss due to tidal action which also has the potential to increase fledgling rates. There is some concern that providing assistance to plovers that have chosen poor nesting locations will only encourage them to continue to select sub-optimal sites in upcoming seasons. While that remains a possibility, barricades are a management action which carries very little risk to the either the adult plover or their current clutch of eggs and has resulted in eggs hatching which may not have otherwise.

- ✓ Navy-Related Impacts in western snowy plover section).

A total of three snowy plover nests were found on the airfield in 2014; two on the overrun and one the shoulder of Runway 3 (Figure). The two nests hatched and the third had an unknown fate. As part of the BASH program red-tailed hawks (8), barn owls (3), great horned owls (4), American kestrels (16), and a white-tailed kite (1) were captured and relocated away from the airfield.

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Appendix A

Snowy Plover 6-year Comparison

Western Snowy Plovers

	Current	Previous 5 years				
	2014	**2013**	**2012**	**2011**	**2010**	**2009**
First Scrapes	-	5-Mar	27-Feb	21-Feb (OE)	18-Mar	-
First Nest	24-Mar (OE/Hol)	26-Mar (OE)	29-Mar (OE/Hol)	30-Mar (OE) 4-Apr (Hol/EA)	29-Mar	31-Mar
First Chicks	16-Apr (EA: H) 24-Apr (Hol: CH)	2-May (OE)	3-May (OE)	25-Apr(EA) 6-May(H)	28-Apr	4-May
Peak # Active Nests	32	29	35	33 (to 38)	30 (to 40)	28 (to 33)
Date Peak Active Nests	27-May / 2-Jun	10-June	10-May	22-Apr		4-Jun
Total Nest Attempts	123	116	111	113	135	86
Total (%) Hatched	63 51.22%	44 37.9%	45 40.50%	58 51%	66 49%	54 63%
Total Predated	36	47	41	28	36	12
Total Abandoned	17	9	14	11	13	4
Total Washed Out	6	14	6	9	8	10
Total Unknown Fate	1	1	5	7	12	7
Human Loss	0	1	0	0	0	0
Total Eggs Produced	322	313	290	312	371	243
Total Eggs Hatched	162	117	123	159	171	148
Total Eggs Predated	94	127	103	79	97	36
Total Eggs Abandoned	45	22	38	34	45	6
Total Eggs Washed Out	15	42	11	22	18	25
Total Eggs Unknown Fate	6	3	15	20	41	22
Total Eggs Human Loss	0	2	0	0	0	0
Total Chicks Seen	45	25	34	30	32	31
Last Hatch	18-Aug	31-July	3-Aug	15-Aug	-	-