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**2013 Final Report on the Western Snowy Plovers**

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Coal Oil Point Reserve  
University of California  
Santa Barbara, CA

Cristina Sandoval and April Price  
Permit Number TE-073205-0



Site: Sand's Beach, Coal Oil Point Reserve (COPR)

Location: RU5, Santa Barbara, CA

Lat-Long: 34 25 00 N, 119 52 30 W

USGS maps: Goleta 7.5, Dos Pueblos Canyon 7.5, Goleta 15

Jurisdiction: Owned and managed by the University of California Santa Barbara.

Climate: Avg precp 14-21 in/year, avg min temp 42 F, avg max temp 75 F

Total linear beach length: 1,200 m

Protected linear beach length: 300-400 m during Winter and fall and 800 m during the breeding season

Protected area during breeding season: 30,700 sq meters or 7.6 acres

Docent program? Yes, all year, most daylight hours

Interpretive and regulatory signs? Yes, at beach entrances and fences

Management Plan? Yes

Enforcement? Docents request compliance with leash law and restricted areas. Officers are called when problem is not solved.

Monitoring: Yes, weekly in the winter and Fall and daily in the spring and Summer.

Predator management: harassment of crows, fencing to prevent skunk, predator control.

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### **ABSTRACT**

In 2013 we continued with the monitoring of the WSP population at Coal Oil Point Reserve as in previous years. We had predator control during most of the breeding season and the loss of nests from mammalian predators was low. However, chick predation from unknown predators was high. Nesting on the mud flats was also the highest on record.

### **INTRODUCTION**

Sands beach at Coal Oil Point Reserve (COPR) has a wintering populations of about 250 individuals and a breeding population of about 20 pairs of the Western Snowy Plover. The beach is open to the public all year, but a portion of the dry sandy beach, which is the plover habitat, has been protected since Spring 2001.

### **METHODS AND RESULTS**

In 2013, we continued with the same management practices established in 2004 (Sandoval, 2004). Figure 1 shows the location of the plover habitat and the symbolic fences. The exact location of the fences varies based on tides and season, and whether the slough mouth is open. When the slough mouth is open, a portion of the fencing is removed to prevent it from being washed away.

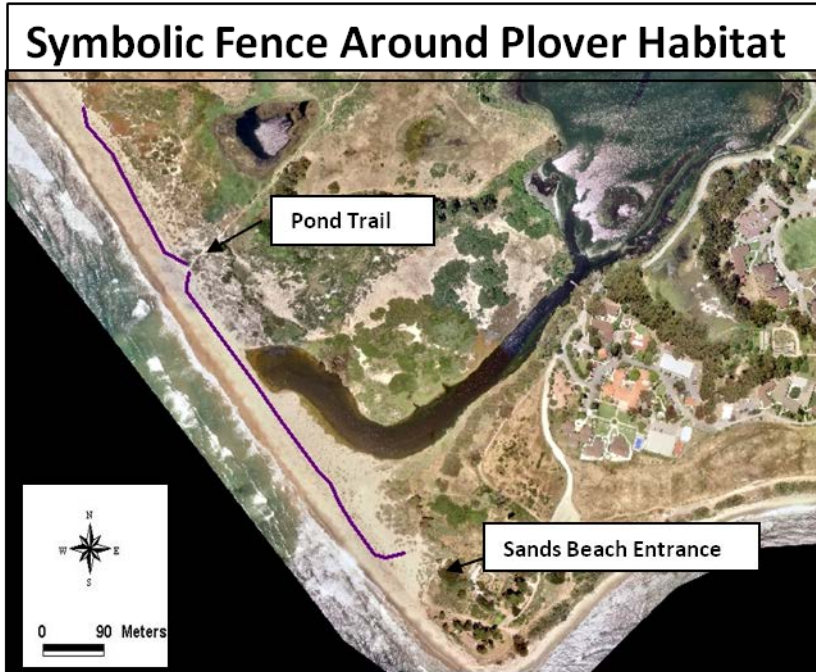


Figure 1. Location of the habitat protected for the Western Snowy Plovers (year round) on Sands beach at Coal Oil Point Reserve. The mudflats not shown in this photo area also protected. The fence is shown in purple.

#### WINTERING POPULATION

To count individuals of the WSP, we walked along the wet sand from the eastern boundary of Sands beach to the western boundary of the Reserve and observed all individuals with binoculars. On the way back, we stopped at groups of individuals to look for color bands on the legs.

The number of wintering plovers at the reserve has been lower than average for the last 4 years (Figure 2). We do not know what accounts for this trend.

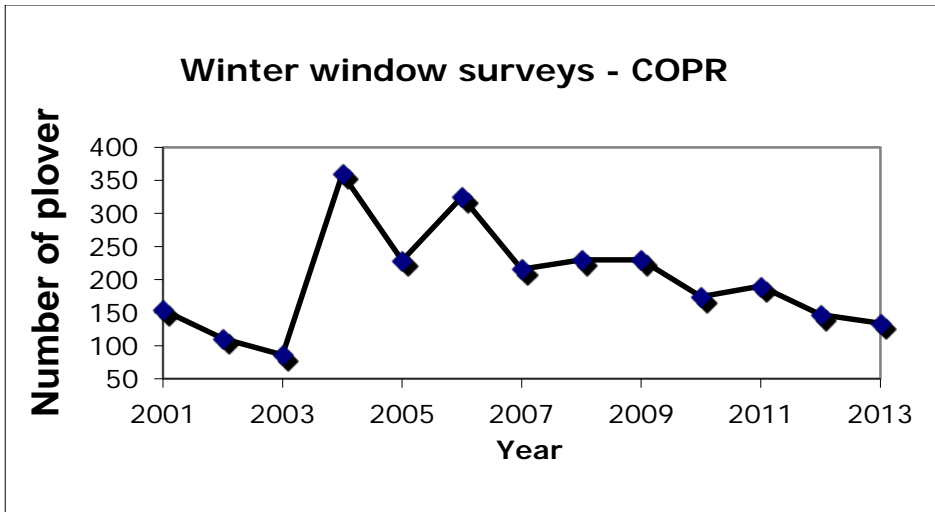


Figure 2. Winter window surveys of snowy plovers at Coal Oil Point Reserve.

### BREEDING POPULATION

We measured the breeding population in the same way as the wintering population. We counted 30 WSP during the 2013 breeding window survey. Figure 3, below, shows the breeding population window surveys between 2001 and 2013. The graph also shows that the number of adults increased right after the implementation of the management plan in 2001 and reached a mean of about 32 adults after 2003.

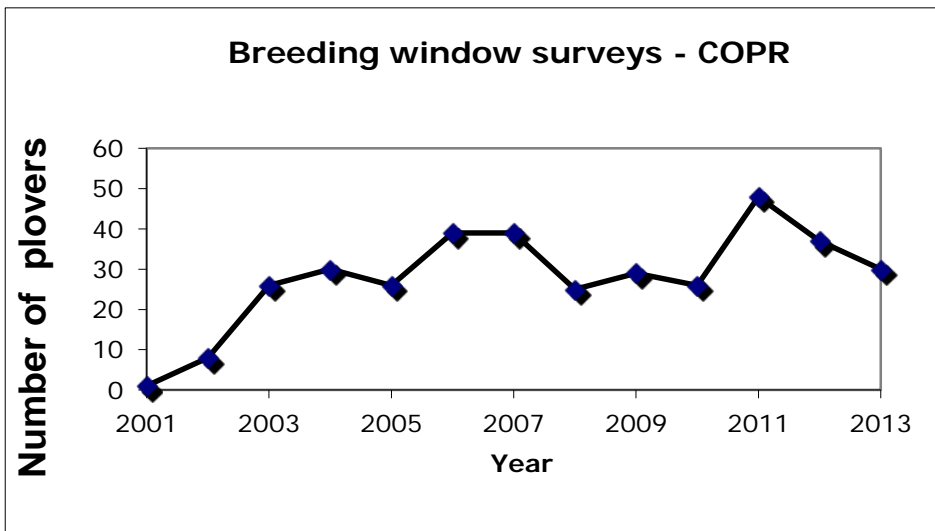


Figure 3. Counts of adult snowy plovers at Coal Oil Point Reserve during the breeding window surveys.

### Nesting

During the nesting season in 2013, the numbers and locations of adult plovers, nests, and chicks were counted 3 times per week by April Price and Pat Walker. Table 1, below, summarizes the results of these observations. The number of males for the estimation of fledged chicks/male is estimated based on half of the adult number counted in the breeding window survey. Because males can move around within a season, the number of males may be underestimated.

Detailed discussion of nest and chick fate follow below.

Year	Breeding survey #	Nests	Nests Hatched (Nests hatched/#nests)	Chicks Fledged (Fledged/male)	Fledgling Rate <small>Nests that fledged at least one chick/nests that hatched at least one chick</small>
1970-2000	few	~2-4/30yr	none	none	none
2001	1	1	1 (100%)	1 (1)	N/A
2002	8	9	6 (67%)	14 (2.8)	N/A
2003	26	24	16 (67%)	40 (3.3)	N/A
2004	30	51	20 (39%)	27 (1.9)	N/A
2005	26	64	16 (25%)	30 + 17 (2.3)	N/A
2006	39	43	24 (56%)	48 + 11 (2.5)	N/A
2007	39	66	20 (30%)	?	50%
2008	25	57	22 (38%)	39 (2.8)	100%
2009	29	64	39 (60%)	61 (+3)	74%
2010	26	74	42 (57%)	19 (1.5)	26%
2011	48	84	35 (42%)	9 (0.4)	14%
2012	37	73	34 (47%)	22 (1.2)	44%
2013	30	65	36 (55%)	30 (2.0)	41%

Table 1. Changes in breeding variables at Coal Oil Point since 2001.

### Nest Fate and Predation

In 2013, there were 65 nests laid at COPR and 34 (52%) of the nests hatched. Figures 4 and 5 show the number of nests laid and hatched between 2001-2012.

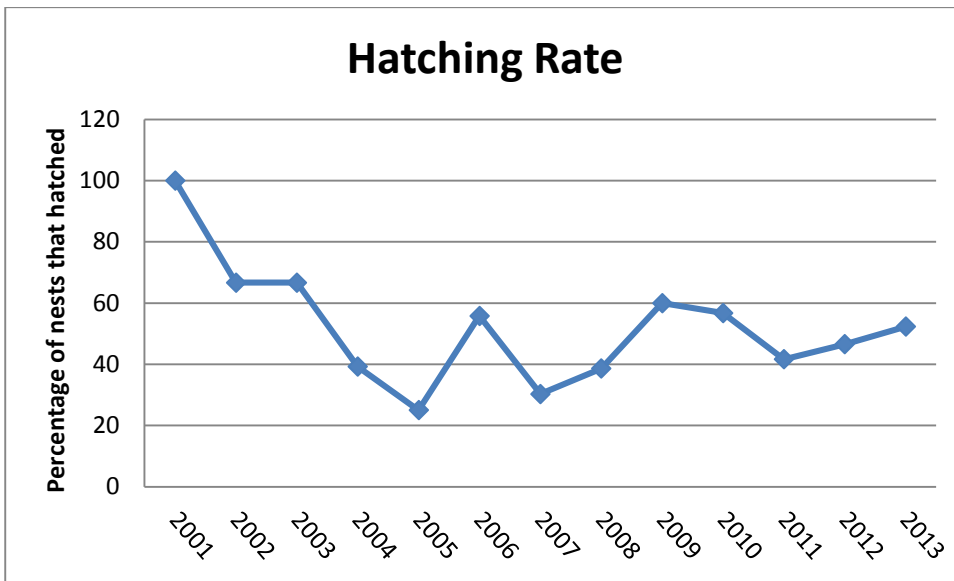


Figure 4: Hatching Rate: Percentage of all nests that hatched at least one chick.

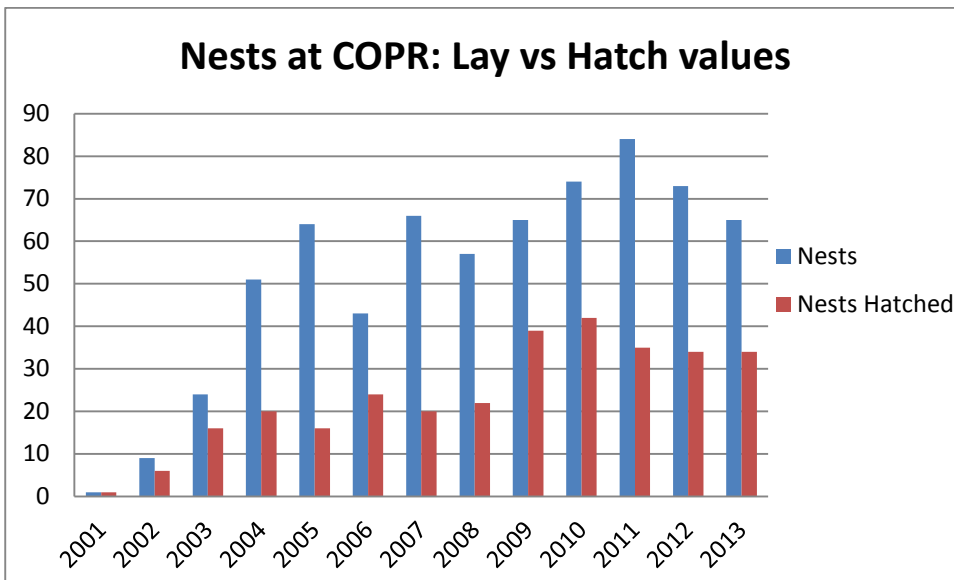


Figure 5. Total number of nests laid and hatched at Coal Oil Point Reserve.

Figures 4 and 5 show an increase in nest survival (nests hatched) between 2008 and 2009, which coincides with the initiation of our predator control program.



Historically, skunks and crows have been the major nest predators at COPR. In 2009, skunk predation levels dropped significantly after the initiation of a USDA predator control program(Figure 6). In 2013, there were four documented nest failures due to skunk predation, the first in three years. There were no documented crow nest failures. USDA predator control captured and euthanized a total of ten skunks, four raccoons, four opossums, and two crows in 2013 (USDA appendix).

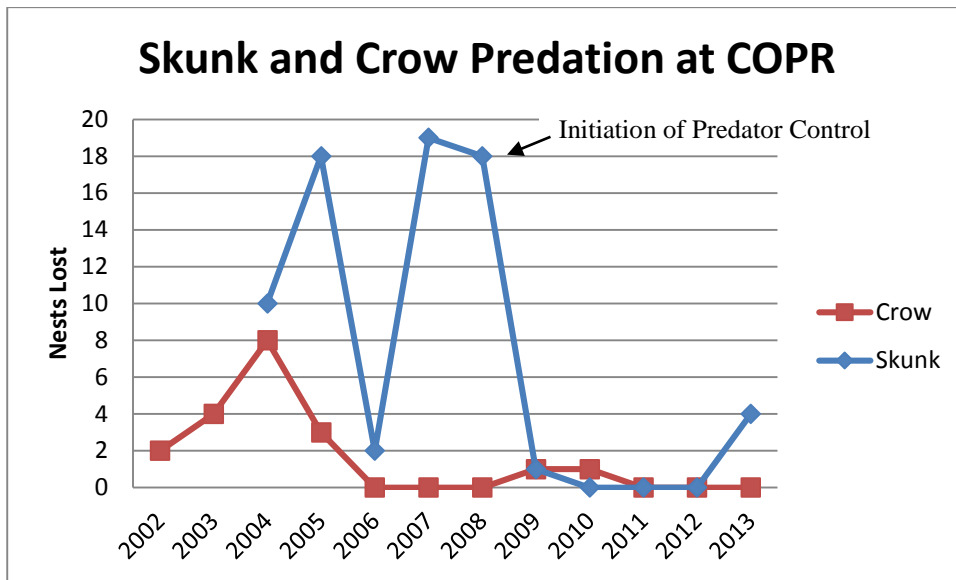


Figure 6. Crow and Skunk predation between 2002 and 2012.

In 2013, The majority of failed nests were lost to unknown predators. Figure 7 below summarizes the nest fate in 2013.

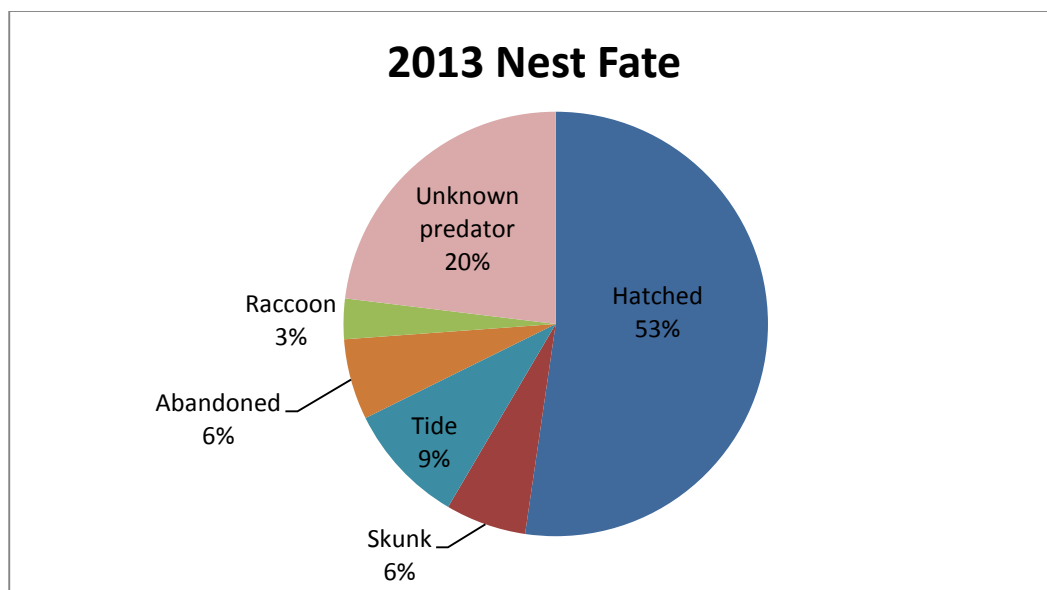


Figure 7. Nest fate at COPR in 2013.

Table 2, below, shows a complete representation of nest fate over the years.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total nests
<b>Total nests</b>	9	24	51	64	43	66	57	64	74	84	73	65	536
<b>Hatched</b>	6	17	20	16	25	30	22	39	42	35	34	34	252
<b>Skunk</b>			10	18	2	19	18	10	0	0	0	4	77
<b>Crow</b>	2	4	8	3	0	0	0	1	1	0	0	0	19
<b>Wind</b>	1	3	2	6	1	1	2	5	2	10	2	0	33
<b>Tide</b>			5	5	2		7	1	5	12	16	6	37
<b>Abandoned</b>			0	9	3		0	1	3	5	3	4	21
<b>Abandoned Owl</b>	0	0	0	0	6		0		0		0	0	6
<b>Flooded</b>			0	3	0		0		4	3	0	0	3
<b>Raccoon</b>			2	1	0		0	1	0	0	2	2	4
<b>Whimbrel</b>			1	0	0		0		0	1	0	0	1
<b>Gull</b>	0	0	0	0	1		0		0	0	0	0	1

<b>Opossum</b>				1	0		0		0	0	0	0	<b>1</b>
<b>Unknown cause</b>			0	1	3	11			15	8	11		<b>15</b>
<b>Unknown predator</b>				1	1	1		4	0	10	5	15	<b>17</b>
<b>Unknown fate</b>						4	4	2	0	0	0	0	<b>8</b>

Table 2. Number of nests lost by fate in 2013 and previous years.

In 2013, twenty percent of the nests at COPR were lost to an unknown predator (Figure 7). In an attempt to identify the predators, we placed a Moultrie Game Spy I-35 camera about 8 feet from one of the nests on the beach. We had plans to use more cameras later in the season in places where they could be camouflaged well. The first camera disappeared from the beach within a week, even though it was partially buried with sand and dried kelp. Because of this disappearance, we did not put other cameras out on the beach.

In 2012, we used 4 Moultrie Game Spy I-35 cameras on the beach, using the same protocol described above. We were looking to identify avian predators, but did not capture any images of birds, other than WSP.

In the future we may invest in more sensitive camera equipment to track avian predation, but we will need to weigh the costs and benefits of using expensive equipment on a public beach, where it can be stolen. Cameras may be safer on the mudflats, where there is little human activity, but we worry about the impact of placing the cameras near the nests on the mudflats because of the potential to attract predators to cameras.

**Chick survival**

The average number of WSP chicks fledged each year at COPR since 2001 was 27. The fledgling numbers have varied between one individual in 2001 and 61 in 2009 (Figure 8). In 2013, 30 WSP chicks fledged at COPR.

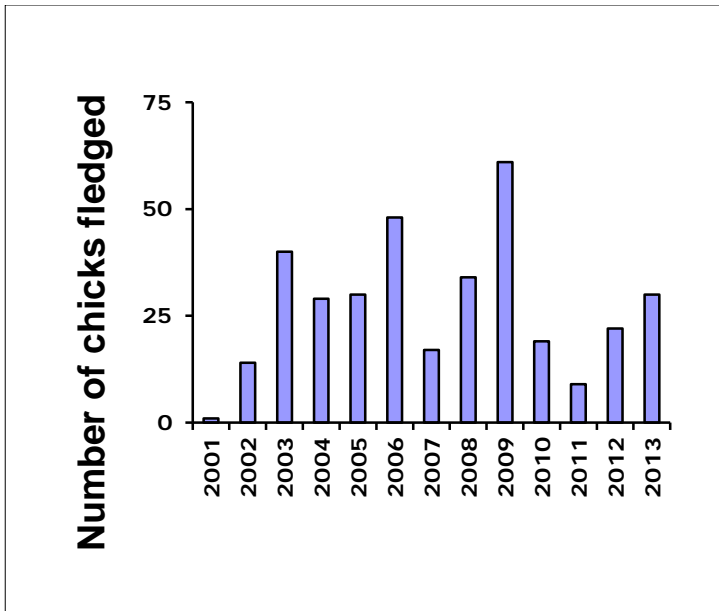


Figure 8. Number of chicks fledged at Coal Oil Point Reserve.

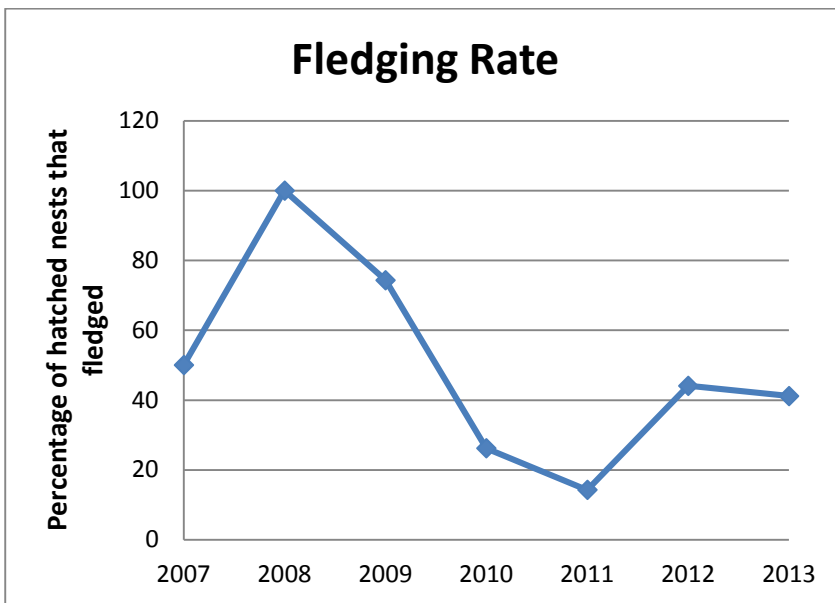


Figure 9. Percentage of hatched nests that fledged one or more chicks.

The fledgling rate in 2013 was 41% (Table 1). Many chicks were lost before fledging in 2013 due to unknown causes. At the beginning of the season, most of our chicks fledged, but as the season progressed, chick predation increased. The most intense period of predation occurred at the end of the season. For example, on July 30th, there were 20 chicks on the beach and the delta. All of those chicks disappeared by August 7th.

We have tried to identify chick predators by using cameras and human observation hours. In 2012 we placed 4 Moultrie Game Spy I-35 motion-activated cameras near broods for 2 week periods, but did not capture any predator activity. In 2013, we encouraged docents to monitor predator activity during their two hour shifts on the beach. Docents were trained to identify common avian chick predators (raptors and gulls) and asked to report suspicious activity. The docents did not report any predation events, or "suspicious" activity.

In the future, we plan to increase our chick predator monitoring. We may use blinds to watch for predation events in 2014.

### Monitoring Priorities

We investigated the possibility of using the number of nests hatched as a predictor of the number of chicks fledged. Until 2009 the correlation was high (Figure 9) but in 2010, 2011, 2012, and 2013 the number of chicks fledged was much lower, despite high hatching success. Therefore we will continue to attempt to count chick fledging rate, even though we don't band the chicks.

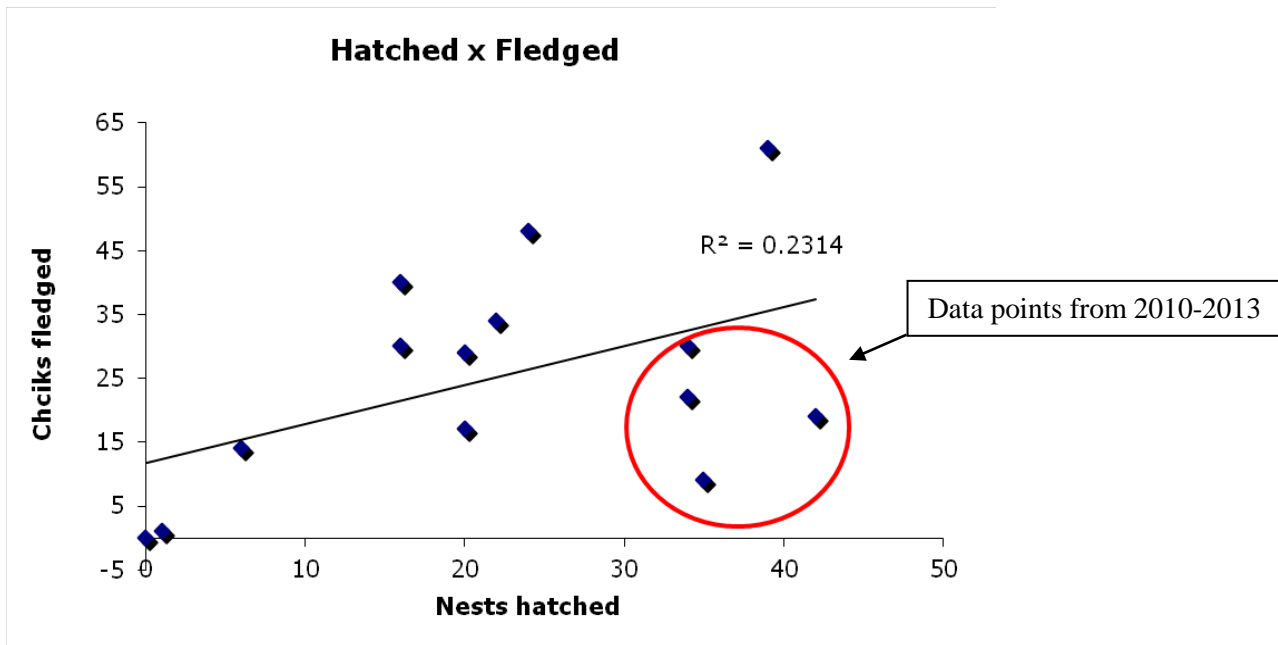


Figure 10. Regression of the number of chicks fledged each year and the number of nests that hatched. The grouped points from 2010-2013 indicate a weaker correlation between hatching and fledging rates than we have seen in the past.

### **Rehabilitation**

#### *Egg from McGrath State Beach*

On August 6th, 2013, a state park employee rescued a plover egg from the power plant outlet channel at McGrath State Beach. The other eggs in the nest sloughed into the widening channel, and couldn't be retrieved. The state park employee brought the rescued egg to Coal Oil Point Reserve. Cristina Sandoval incubated the egg at 99.5 degrees F. The egg hatched on August 10th.

The chick was kept in an open-top plastic terrarium with a heat lamp. We provided the chick with beach hoppers, collected from the wrack at COPR. When the chick was 3 weeks old, we transferred it to the Wildlife Care Network, to utilize their outdoor aviary facility. On September 6th, Plover biologist Doug George, from PRBO, banded the chick as PA:YY.

On September 13th, we released the chick in front of the slough mouth at Coal Oil Point Reserve, next to a large flock of WSP. As soon as we released him, he took off flying, but after a quick flight, he came right back to the beach. He ignored the other plovers on the beach and stayed close to the group of people and his empty cage.

Since his release, we have looked for PA:YY three times a week. In the three weeks following his release, we saw him regularly. PA:YY was observed approaching people on the beach. The last confirmed sighting was on October 14th, 2013.

### **Enforcement**

Officers enforce the leash law and other pertinent ordinances at COPR when they are called by the docents .

### Location of nests

The location of nests was estimated using the numbered posts along the beach for monitoring purposes. We also took the GPS coordinates of all of the nests on the beach. For the nests on the mudflats, we used detailed descriptions to identify location, but did not take GPS coordinates to avoid walking on the sensitive mudflat habitat. We worried that walking to each nest in the mudflat area would attract predators to the nests.

In 2013, we observed a high level of nesting activity on the mud flats. Figure 10, below, shows the nesting activity on the delta and beach over the past seven years. In 2013, 32 percent of the nests were laid on the delta, as compared to an average of 12 percent between 2007 and 2012. The high nesting rate on the delta may be correlated to the low rain fall in 2013. Because of the dry year, the mudflats were available for nesting early in the season, and were not inundated by water throughout the nesting season.

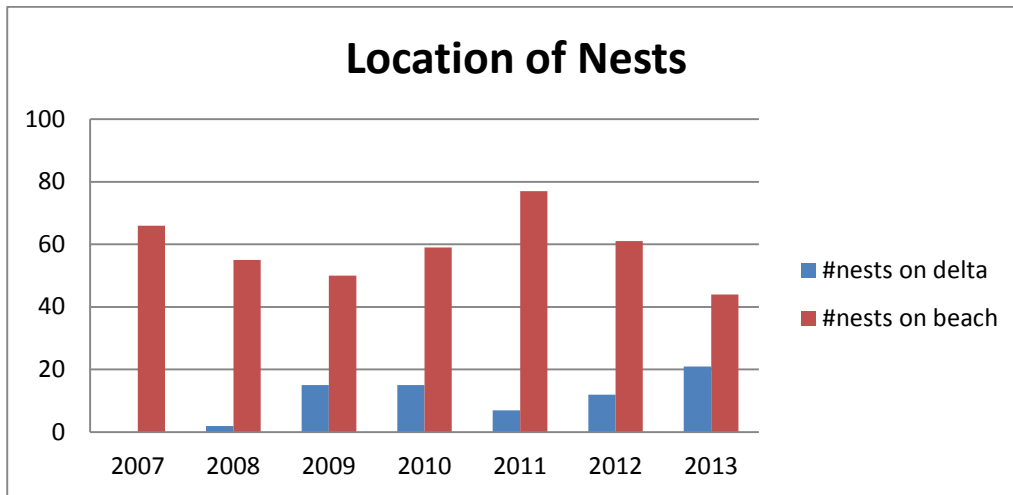


Figure 11: Nesting on the beach and delta between 2007-2013

On the beach, we tracked the location of nests using a hand held Garmin GPS device. We used this data to look for spatial patterns in hatching and fledging success. The map of nest location on the beach is shown below (Figure 11). In 2013, all of the identified skunk predation events happened on the east end of the beach. We may identify other patterns as we continue to collect GPS data over several years.



Figure 12: Nest Map



### **Docent program**

The docent program continues at the same level as in 2012. The docents have been instrumental in reducing the impact of beach users to the Snowy Plovers. The docents main duties include educating people about the plovers, requesting compliance to the leash law, requesting people stay away from the symbolic fence, requesting people to move around the plover flock, and scaring away crows.

### **CONCLUSION**

The plover breeding and population at COPR appear to have recovered since the implementation of a management plan in 2001. The control of skunks has become a management priority to improve hatching success. Because the density of nests is relatively high compared to other beaches, a nest predator can cause a large impact in a single night. We concluded that we cannot use the hatching success as a predictor of fledgling success, thus we will continue to count the number of chicks until fledgling age. The wintering population at the reserve is in a downward trend and we do not have an explanation. The docent program continues to be an effective way to reduce human impact on the plovers.

### **RECOMMENDATIONS**

- The USDA trapping program worked well and should be continued.
- The mud flats should be included as part of the plover nesting habitat and be regularly monitored.
- Predator monitoring should be increased during the breeding season. Docents should watch for predators, both from the beach and potentially from blinds.

### **ACKNOWLEDGEMENTS**

We are very thankful to Pat Walker who helped count plovers, locate nests and determine their fate and constructed and maintained the fences. April Price, the docent coordinator, managed the docent program. Steve Ferry also continued to assist with fence maintenance. The docents, too many to count, kept a presence at the beach every day of the year.

## California Least Terns

No pairs were observed at COPR in 2013.

### **Bibliography of other Snowy Plover studies at COPR:**

Lafferty, K.D. 2000. **Status, trends and conservation of the western snowy plover with a focus on the Devereux Slough population at Coal Oil Point Reserve, Santa Barbara County, CA**, Museum of Systematics and Ecology, University of California, Santa Barbara, Santa Barbara, CA.

Lafferty, K.D. 2001a. **Birds at a southern California beach: seasonality, habitat use and disturbance by human activity**. Biodiversity and Conservation 10: 1-14.

Lafferty, K.D. 2001b. **Disturbance to wintering western snowy plovers**. Biological Conservation 101: 315-325.

Kevin D. Lafferty, Darcie Goodman and Cristina P. Sandoval 2005. **Restoration of breeding by snowy plovers following protection from disturbance**. Biodiversity and Conservation. Online at: <http://www.kluweronline.com/issn/0960-3115>

## APPENDIX 1. Band sightings banding at the reserve

Date	Total Number	# of banded birds					
07/26/13	115	1	RR: AR				
07/27/13	98	4	RR: AR	OR: OR	NY: OR	NB: RB	
07/28/13	120	4	RR: AR	WY: YY	BW: OY	BB: VB	
07/30/13	64	4	NY: OR	BB: VB	Blue: Violet - Lime	GG: GG	
07/31/13	62	2	OR: OR	RR: AR			
08/11/13	91	2	VV: VB	GG: GG			
08/14/13	79	2	RR: AR	GG: GG			
08/21/13	132	2	RR: AR	Blue_Violet - Lime			
08/28/13	121	2	GA: WB	L: RG?			
09/01/13	102	5	Blue-White stripe:	Silver: Y-Silver	YA: RW	GO: AR	GG: GG
09/04/13	78	1	GG: GG				
09/18/13	85	1	NO: PW				
09/25/13	122	1	RR: R				
09/29/13	105	4	RR: R	NO: PW	NY: RB	PA: YY	
10/02/13	67	2	NO: PW	PA: YY			
10/09/13	110	2	GG: YW	PA: YY			
10/23/13	88	1	GG: YW				
11/13/13	112	3	GG: YW	RO: RY	Lime: Silver/white		
11/20/13	155	4	GG: YW	RO: RY	YR: AB	Lime: Silver/white	

## **APPENDIX 2. USDA Report from 2013**

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28 October 2013

Report of Predator removal for Coal Oil Point Reserve:

Predator management activities were conducted on the Coal Oil Point Reserve in an effort to protect the threatened Western Snowy Plover against predation by mammalian and avian predators during the 2013 nesting season. Predator removal began on 28 March 2013 and ended 16 August 2013.

Striped skunks, raccoons, Virginia opossums and American Crows were the target predators. Trapping was the method used to remove the predators. Traps used to remove mammalian predators were Victor #1½ padded jaw traps and Tomahawk cage traps. Pole traps were used to remove American Crows. Pole traps consist of a 1 ½ padded jaw leg-hold trap that have had the springs replaced with springs from a rat trap. The trap is placed on a wooden block on top of a pole. All target mammals captured in traps were given an injection of sodium pentobarbital as a means of euthanasia with the exception of one raccoon that was transferred to UCSB. A total of three skunks, one raccoon and one opossum were captured in padded leg-hold traps and euthanized. A total of seven skunks, three raccoons and three Virginia opossums were captured in cage traps and euthanized as well. Two American Crows were captured in pole traps and euthanized by cervical dislocation.

Wildlife Services spent 166 hours on predator removal activities, carcass disposal, and associated administrative duties at Coal Oil Point Reserve during the 2013 season. A total of one thousand two hundred twenty one padded leg-hold trap nights and six hundred ninety four cage trap nights were spent trapping and removing predators. A trap night is where one trap is set for one night. Two traps set for one night would be two trap nights, etc.

Wildlife Services recommends beginning predator removal activities prior to pairing and breeding season in 2014. Each year the cost of conducting predator removal increases. Coal Oil Point Reserve should consider this and secure enough funding to conduct the

desired amount of predator removal. Spotlight and scent station surveys should be conducted during the non-nesting season to identify predator species that inhabit the nesting area. Predator management should be continued each year to help ensure fledging success of the threatened Western Snowy Plover.

Feel free to contact Jack or myself if you have any questions.

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