
2017 Final Report on the Western Snowy Plovers

Coal Oil Point Reserve
University of California
Santa Barbara, CA

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Permit Number TE-73205-4

Date of Preparation: February 1, 2018



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 precip 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 3-4 times per week in the spring and summer.

Predator management: Crow deterrence, fencing to prevent skunk, predator control.

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ABSTRACT

In 2017, we continued with the monitoring of the Western Snowy Plover population at Coal Oil Point Reserve as in previous years. The count of wintering plovers was the second lowest recorded since monitoring began in 2001. The breeding population remained stable at approximately 20 pairs and the number of chicks that fledged was higher than average. This year, weather affected nest fate more than predation. The rate of infertile eggs was higher than average. All plover nesting activity occurred on the beach. For the first time since 2007, there were no nests on the mudflats of the slough.

INTRODUCTION

Sands beach at Coal Oil Point Reserve (COPR) has an average wintering population of 182 individuals and an average breeding population of about 20 pairs of the Western Snowy Plover (WSP). The beach is open to the public all year, but most of the dry sandy beach, where plovers congregate while resting, has been protected by a symbolic fence since spring 2001.

METHODS AND RESULTS

In 2017, we continued with the same management practices established in the 2004 Snowy Plover Management Plan (Sandoval, 2004). Figure 1 shows the location of the plover habitat and the maximum extent of 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. In the last few years, the entire fence had to be removed in the winter due to beach erosion.

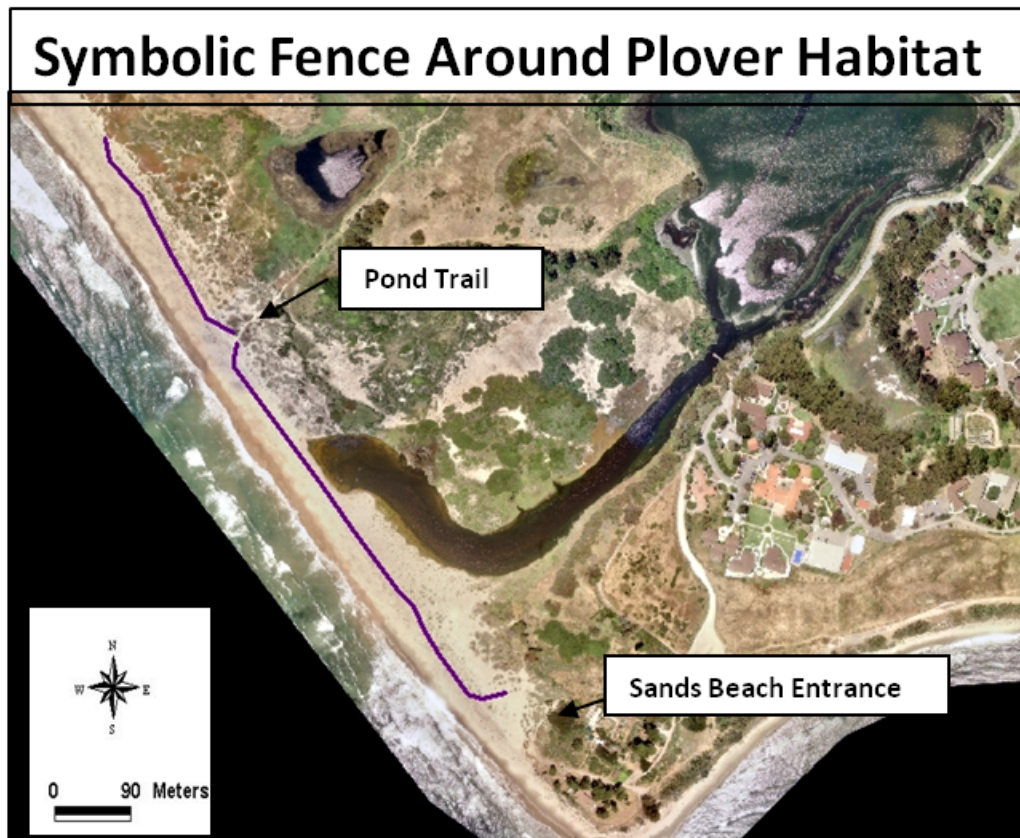


Figure 1. Location of the habitat protected for the Western Snowy Plovers (year round) on Sands beach at Coal Oil Point Reserve. The mudflats not shown in this photo area also protected. The fence is shown in purple.

Wintering Population

To count WSP, we walked along the wet sand from the eastern boundary of Sands beach to the western boundary of the Reserve and recorded all individuals seen with binoculars. On the way back, we stopped at groups of individuals to look for color bands on the legs. During the 2017 winter window survey, we counted 75 WSP. The average number of wintering WSP at Coal Oil Point Reserve since 2003 is 182 individuals. The number of wintering plovers at the reserve has been lower than average for the last 8 years (Figure 2). We do not know why the wintering population is decreasing, but we suspect that this year's low wintering population was partially the result of significant beach and dune erosion over the years, which has reduced the availability of beach habitat suitable for roosting. According to a recent LIDAR study, the beach at Coal Oil Point Reserve erodes at an average of 1.85 m per year.

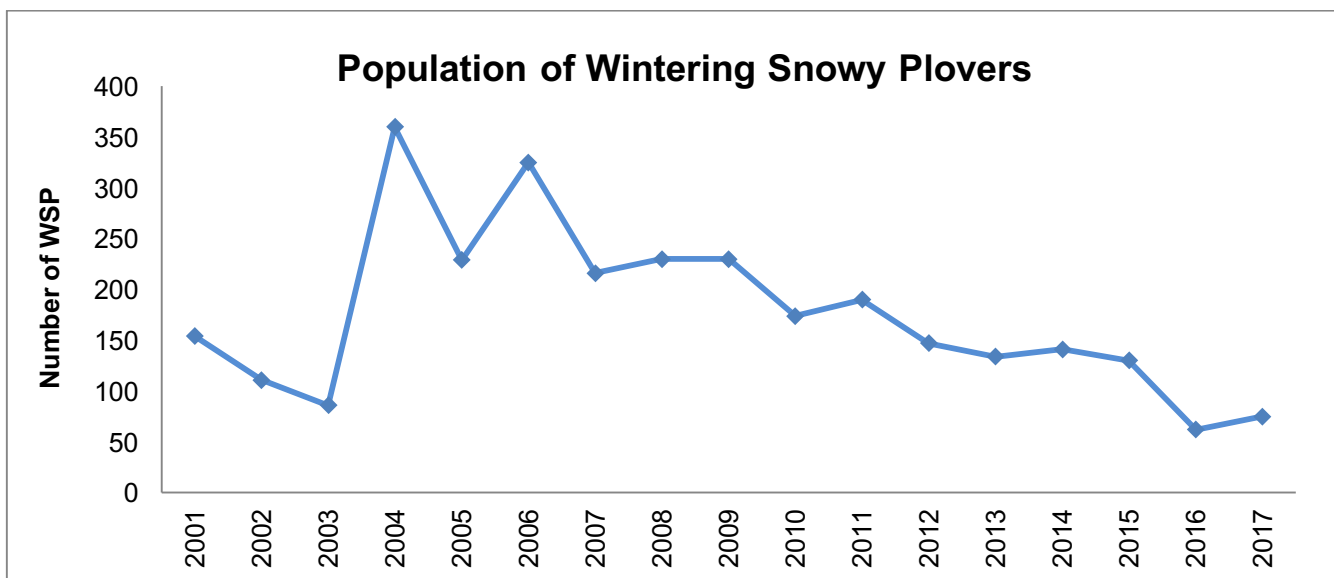


Figure 2. Results of winter window surveys at Coal Oil Point Reserve

Breeding Population

We surveyed the breeding population in the same way as the wintering population. We counted 38 WSP during the 2017 breeding window survey. The graph below shows that the number of adults increased right after the implementation of the management plan in 2001 and has reached a mean of about 33 adults since 2003 (Figure 3).

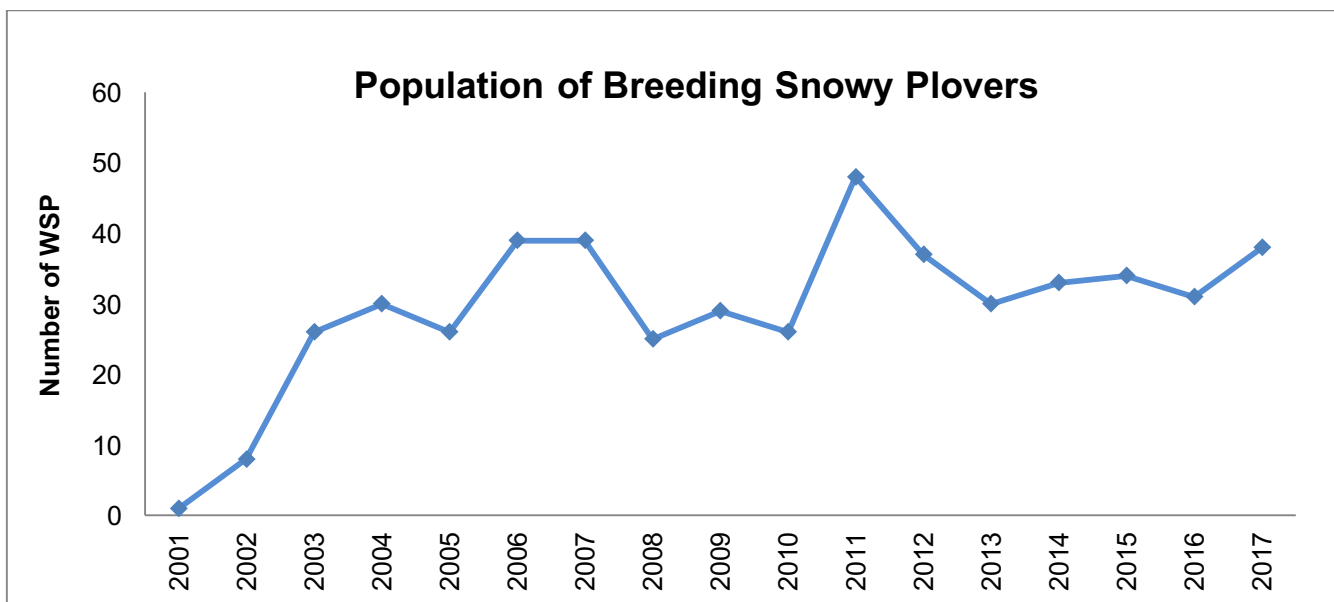


Figure 3. Results of breeding window surveys at Coal Oil Point Reserve

Nesting

During the nesting season in 2017, the numbers and locations of adult plovers, nests, and chicks were counted 3-4 times per week by Jessica Nielsen and Katelyn Nyberg. Table 1, below, summarizes the results of observations each year. The number of males for the estimation of fledged chicks/male is calculated based on half of the adult number counted in the breeding window survey. Because different males can arrive to COPR within a season, the number of males may be underestimated.

Detailed discussion of nest and chick fate follow below.

Year	Breeding Population	# Nests	# Nests Hatched	Hatching Rate (nests hatched/#nests*100)	# Chicks Fledged	# Fledges Per Male	Fledging Rate (nests that fledged /nests that hatched *100)
1970-2000	few	~2-4/30yr	none	0	none	none	none
2001	1	1	1	100%	1	1	100%
2002	8	9	6	67%	14	2.8	83%
2003	26	24	16	67%	40	3.3	94%
2004	30	51	20	39%	27	1.9	67%
2005	26	64	16	25%	30	2.3	81%
2006	39	43	24	56%	48	2.5	96%
2007	39	66	20	30%	17	0.9	50%
2008	25	57	22	38%	39	2.8	100%
2009	29	64	39	60%	61	4.2	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%
2014	33	77	21	27%	26	1.6	67%
2015	34	62	34	55%	45	2.7	74%
2016	31	43	29	67%	49	3.2	86%
2017	38	52	35	67%	53	2.8	74%

Table 1. Changes in WSP fitness estimates at Coal Oil Point Reserve since 2001.

Nest Fate

In 2017, 52 WSP nests were initiated at COPR and 35 of them hatched. Figure 5 shows the number of nests laid and the number of nests hatched between 2001-2017. This year, COPR had an above-average hatching rate of 65%. For nests that failed, the contributing factors in order of importance were tide, skunks, wind, unknown predators, and abandonment (Figure 6). This was the first year we observed evidence of possible nest vandalism. One of the eggs from a nest disappeared with the remaining two eggs intact in the nest. Footprints were observed all around the nest as well as the name "SAM" written in the sand dunes behind the nest.

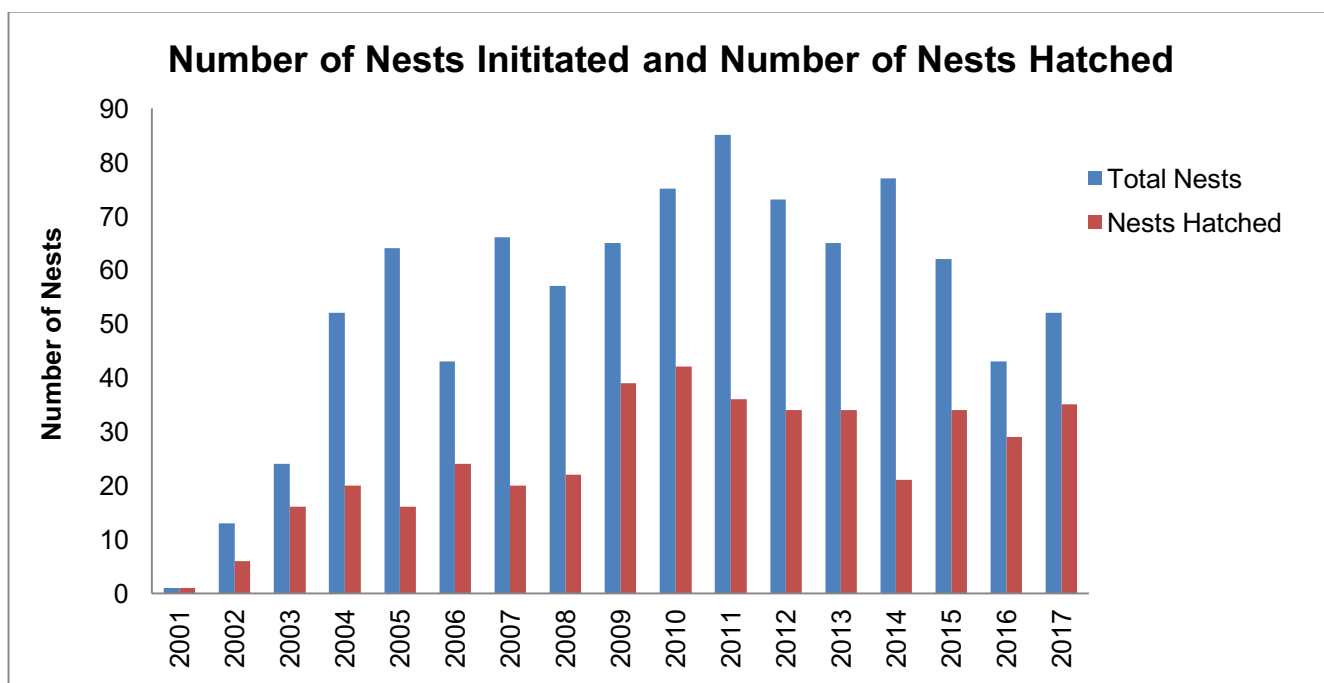


Figure 5. Nests initiated and hatched by year (total number of nests that had at least one egg vs. total number of nests that hatched at least one chick).

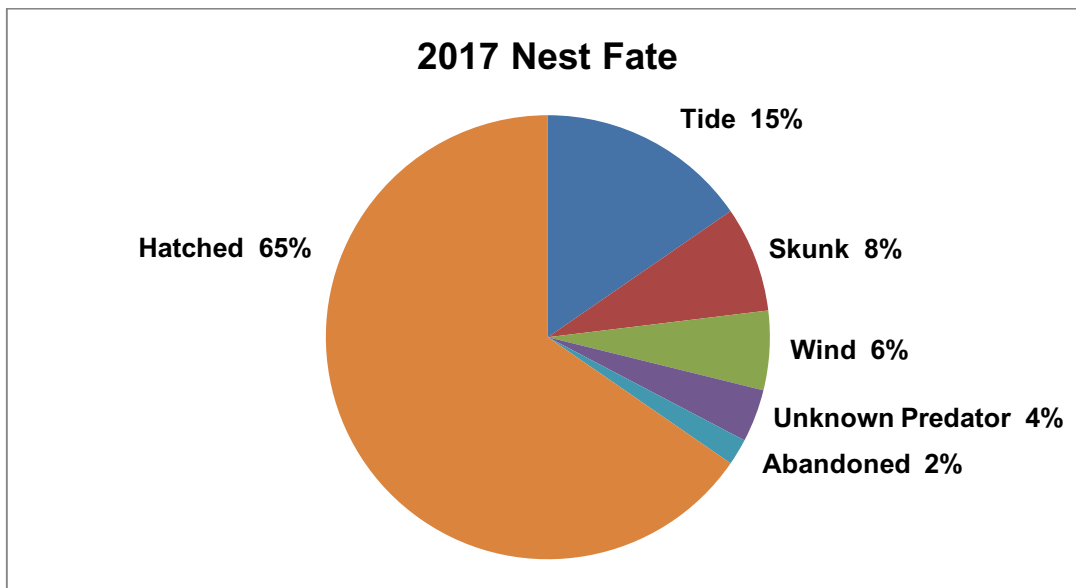


Figure 6. Nest fate at COPR in 2017

Year 20-XX	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17
Total nests	9	24	51	64	43	66	57	64	74	84	73	65	77	62	43	52
Hatched	6	17	20	16	25	30	22	39	42	35	34	34	21	34	29	34
Skunk	0	0	10	18	2	19	18	10	0	0	0	4	10	15	6	4
Crow	2	4	8	3	0	0	0	1	1	0	0	0	0	0	0	0
Wind	1	3	2	6	1	1	2	5	2	10	2	0	0	1	0	3
Tide	0	0	5	5	2	0	7	1	5	12	16	6	3	5	2	8
Abandoned	0	0	0	9	3	0	0	1	3	5	3	4	9	1	2	1
Abandoned Owl	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
Flooded	0	0	0	3	0	0	0	0	4	3	0	0	0	0	0	0
Raccoon	0	0	2	1	0	0	0	1	0	0	2	2	4	0	1	0
Whimbrel	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
Gull	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0
Opossum	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Dog	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Unknown Cause	0	0	0	1	3	11	0	0	15	8	11	0	21	3	0	0
Unknown Predator	0	0	0	1	1	1	0	4	0	10	5	15	9	3	0	2
Unknown Fate	0	0	0	0	0	4	4	2	0	0	0	0	0	0	0	0

Table 2. Number of nests lost by fate from 2002-2017

Predation

In spring 2017, there was a noticeable increase in the crow population on North Campus and Coal Oil Point Reserve during the grading for restoration of the North Campus Open Space. The largest population of crows seen at one time on the beach during the 2017 breeding season was 30 individuals. Immediate implementation of predator control in this area helped to prevent any predation of nests by crows. In 2017, there were 4 documented nest failures due to skunk predation (Figure 7). The first nest predated by a skunk was predated in April and the other 3 nests were predated in July. Immediate implementation of skunk trapping resolved this issue for the remainder of the breeding season. Thus, it is crucial to maintain the skunk fence and begin predator control as soon as there is evidence of predation.

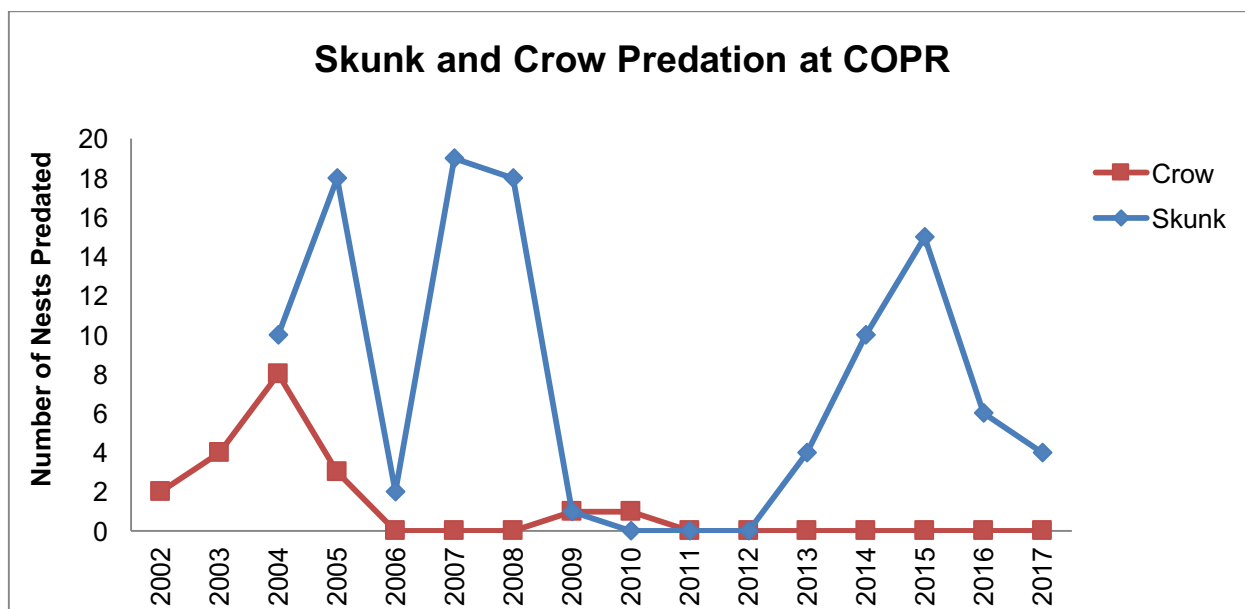


Figure 7. Crow and skunk predation by year

Infertility and embryo mortality

All unhatched and abandoned eggs were collected and incubated to determine viability. Of the collected eggs that did not hatch in 2017, 6 were infertile and 7 had dead embryos (Figure 9, Figure 11). One of the dead embryos was from an egg that was washed out by the tide. The other 6 dead embryos had no exposure to salt water. Before 2017, we had only observed embryo mortality in eggs that were exposed to

salt water such as when the nest is washed by the tide. This is the first year that dead embryos were found in eggs not exposed to salt water. Figures 10 and 11 below excludes eggs that had contact with salt water.

The rate of infertile eggs fluctuates from year to year (Figure 8). At 3.95% the 2017 rate of egg infertility was higher than average (Figure 8, Figure 9). The increased levels of infertile eggs and dead embryos may represent continued effects of the 2015 Refugio Oil Spill. During the first breeding season after the oil spill, in 2016, the egg infertility rate (9.56%) was more than four times the average at COPR. Previous studies have shown a negative relationship of external oiling of Santa Barbara crude oil on long-term fertility in shorebirds (Fry et al. 1986).

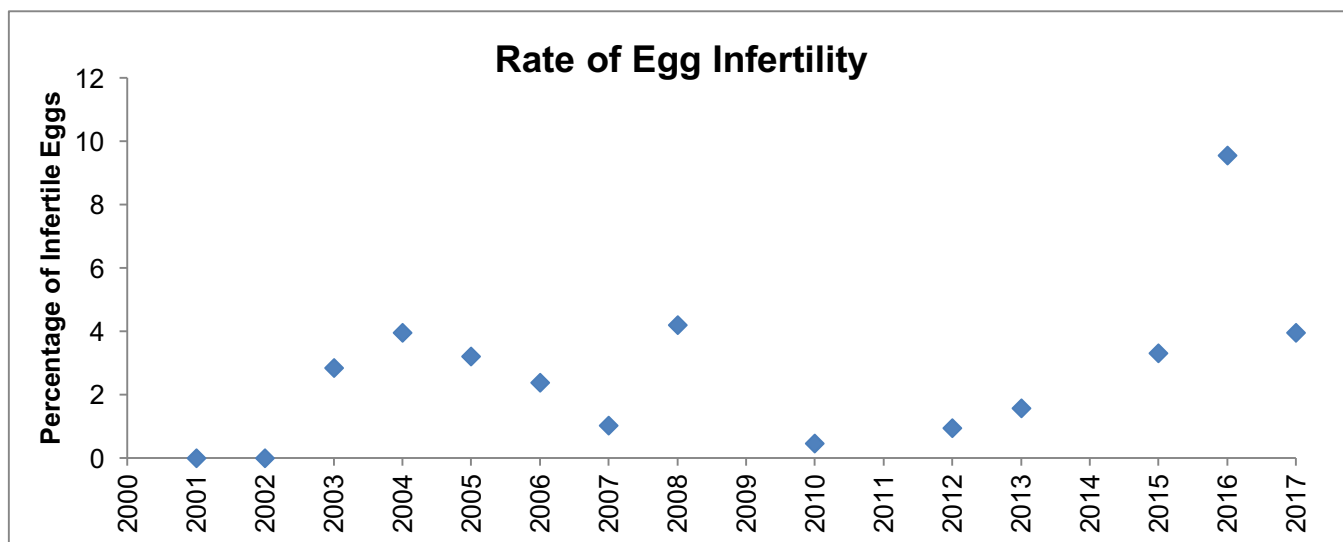


Figure 8. Percentage of infertile eggs by year ($\# \text{ infertile eggs} / \# \text{ total eggs} * 100$). *Infertility data were not collected during the years 2009, 2011, and 2014.*

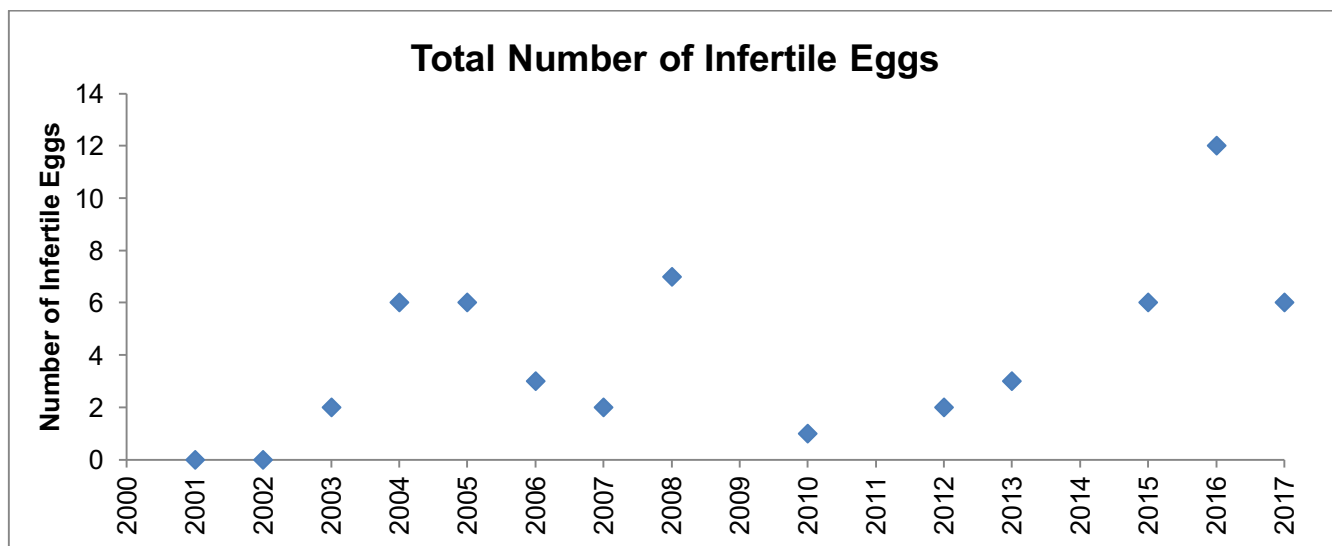


Figure 9. Total number of infertile eggs by year. *Infertility data were not collected during the years 2009, 2011, and 2014.*

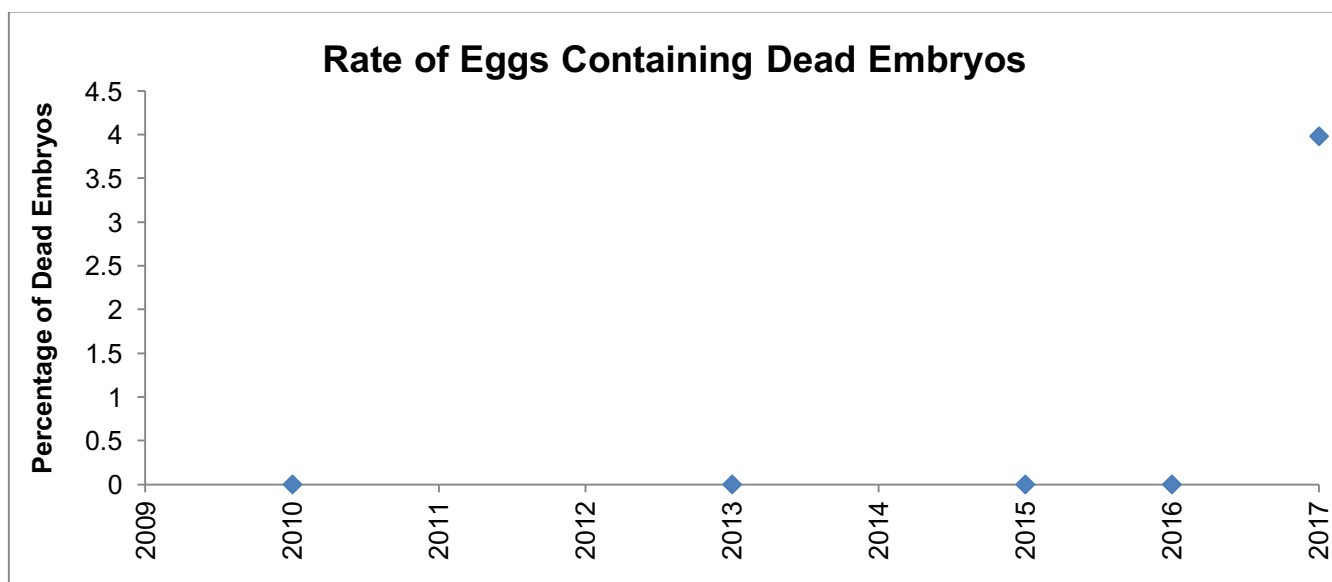


Figure 10. Percentage of eggs containing dead embryos by year. *Dead embryos were excluded from calculations if affected by tide. Data from years prior to 2008 were excluded as a standardized protocol for egg incubation was not implemented until 2009. Dead embryo data were not collected during the years 2009, 2011, and 2014.*

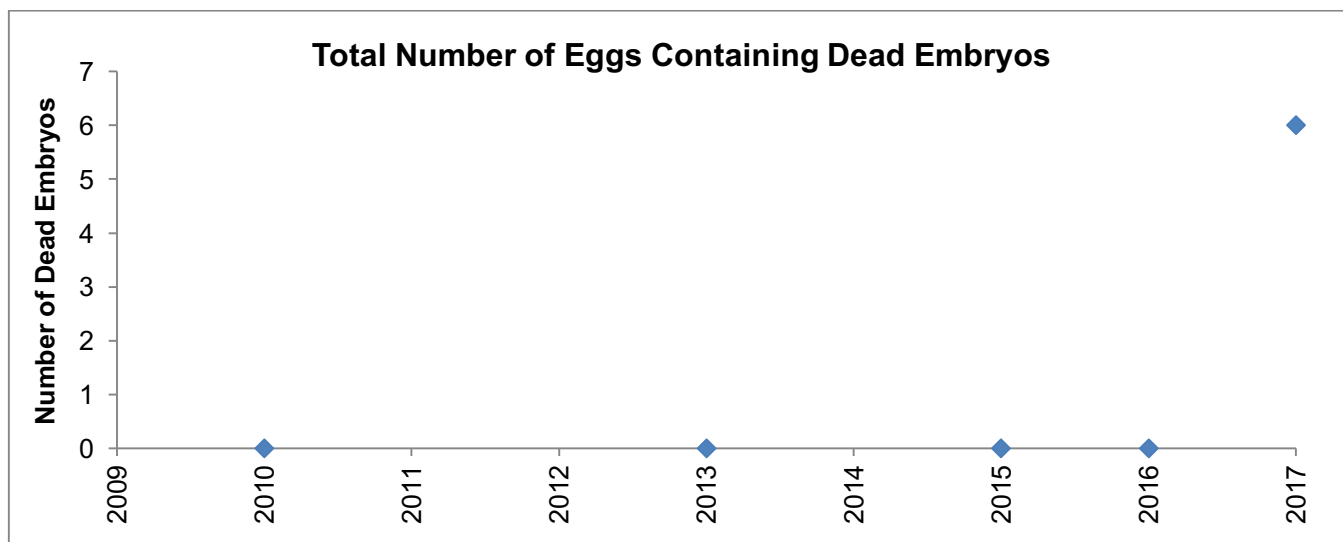


Figure 11. Number of eggs containing dead embryos by year. *Dead embryos were excluded from calculations if affected by tide. Data from years prior to 2008 were excluded as a standardized protocol for egg incubation was not implemented until 2009. Dead embryo data were not collected during the years 2009, 2011, and 2014.*

Chick Survival

The average number of WSP chicks fledged each year at COPR since 2001 is 31 and has ranged between 1 individual in 2001 (beginning of the WSP management program) to 61 in 2009 (Figure 12). In 2017, 53 WSP chicks fledged at COPR. The fledging rate number of (nests that fledged at least one chick/number of nests that hatched at least one chick) was 74% (Figure 13). This year, COPR had 2.8 chicks fledged per male (Table 1).

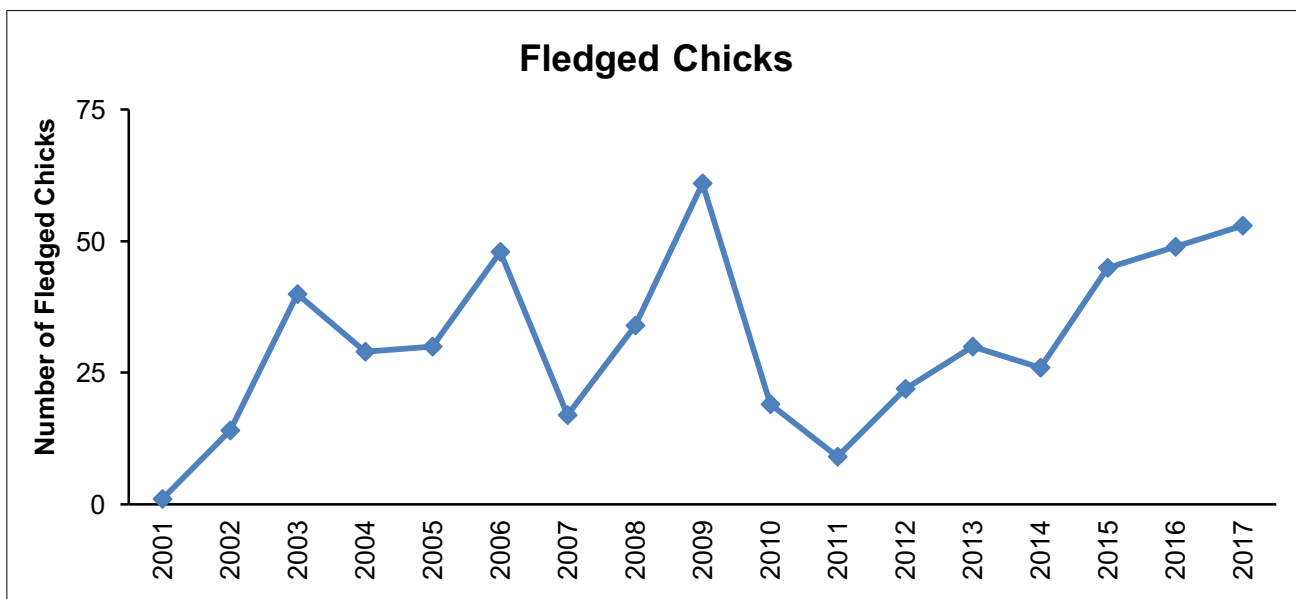


Figure 12. Number of chicks fledged by year

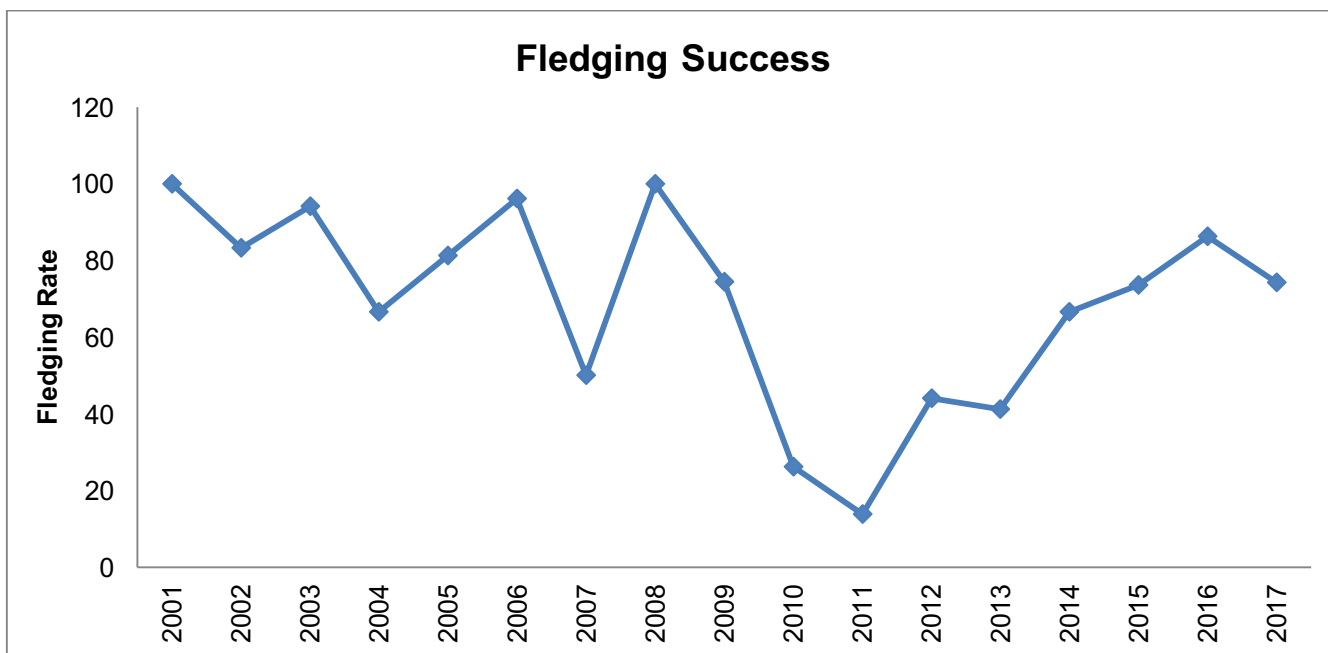


Figure 13. Fledging rate by year (# nests that fledge one chick/# total nests *100)

Timing of Nests

In 2017, the first nest was initiated on March 24th and the last chick fledged on August 25th for a total breeding season length of 154 days (Table 3). The length of this year's breeding season was about 3 days

longer than the average at COPR. The dates of all nesting events in 2017 fell within the range of previous years' dates (Figure 14).

2017 Nesting Event	Date
First Nest Initiation	3/24/17
Last Nest Initiation	7/13/17
First Hatch	5/6/17
Last Hatch	7/31/17
First Fledge	6/3/17
Last Fledge	8/25/17

Table 3. Dates of nesting events in 2017

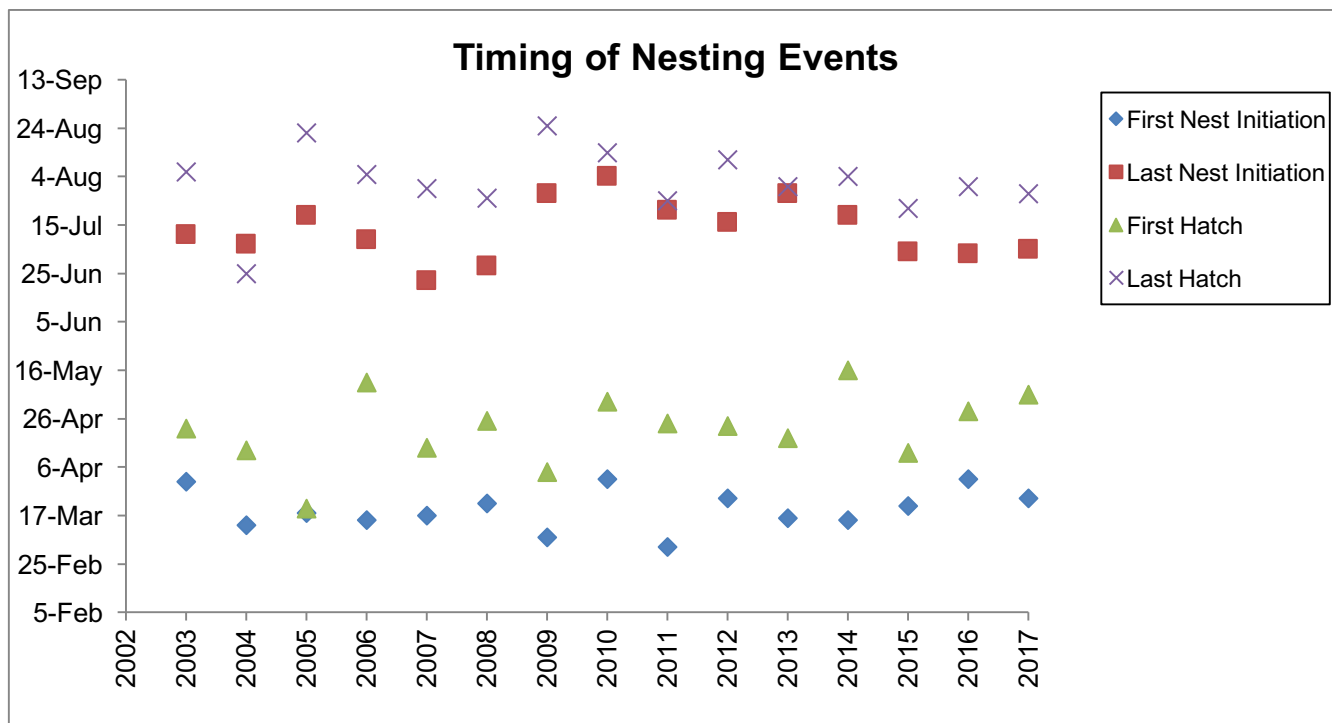


Figure 14. Timing of nest events by year

Location of Nests

GPS coordinates were taken for each individual WSP nest. We used the mapping data to look for spatial patterns in hatching and fledging success. Contrary to previous years when the majority of the nests on the beach were concentrated on the slough mouth, this year most beach nests were recorded on the west side of the slough mouth. This year was the first year since 2007 that there was no plover nesting activity

on the mudflats of the slough (delta). Over the last 3 years, the plover nesting activity on the delta has been much lower than in previous years (Figure 15). The lack of nests on the delta may be influenced by the presence of potential predators. There is an active Great Blue Heron rookery on a Eucalyptus tree that overlooks the slough and an increased level of crow activity on the delta. The map of nest location and fate is shown below (Figure 16). Supplemental maps in Appendix A show nesting areas in more detail.

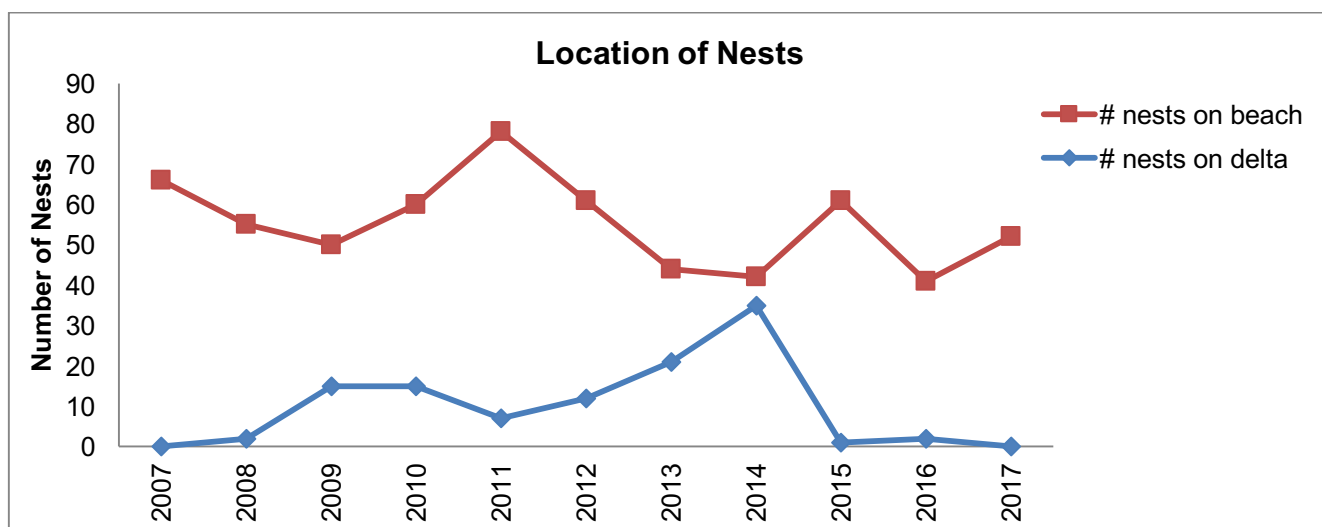


Figure 15. Number of nests on the beach and delta between 2007-2017



Figure 16. Map of nest fate on beach in 2017

Rehabilitation

In 2017, a total of 1 chick and 20 eggs were collected from Coal Oil Point Reserve (Table 4). The chick was collected after having been observed hypothermic and without an adult or brood nearby. Half of the eggs collected were abandoned eggs. In most cases of abandonment, the first two chicks of the clutch hatched and the parent did not return to the nest to care for the remaining egg. 40% of collected eggs were buried in the sand by wind. 10% of collected eggs were washed out of the nest by high tide. 5% (1 egg) were discovered in the middle of the beach far from any nests.

While under the care of COPR, each egg was placed in an incubator. The chick was kept in an open-top plastic terrarium with a heat lamp. Staff at COPR collected live beach hoppers from the kelp wrack at Sands Beach and fed chicks every 1-2 hours during the day. Meals were supplemented with mini

mealworms. Once transferred to Santa Barbara Zoo, staff fed the chicks a diet of bloodworms, pinhead crickets, and mini mealworms. Special care was taken to keep the birds from imprinting on humans; the terrarium was placed in an isolated area of the zoo's veterinary hospital and plover care was limited to only the SBZ bird team. When the chicks reached about 14 days old, they were moved from the terrarium to a flight pen.

Prior to their release, plover biologist Doug George, from Point Blue, banded each chick with a unique band combination (Table 4). Each individual had satisfied the USFWS requirements for release.

The chicks were released outside of any current nest or brood territories (~100 m west of the start of plover fence). Each chick successfully took flight within five minutes of release and each individual was observed in the plover habitat at Coal Oil Point Reserve following the release.

Nest #	Life Stage at Collection	Date of Collection	Reason for Collection	Hatch Date	Release Date	Band Combo	Notes
853	Egg	4/10/2017	wind- buried in sand	5/7/2017	7/6/2017	Pa:WR	Last observed by COPR staff on 7/18/2017
856	Egg	4/28/2017	wind- buried in sand	5/16/2017	7/6/2017	Pa:WW	Last observed by COPR staff on 8/9/2017
856	Egg	4/28/2017	wind- buried in sand	5/17/2017	7/6/2017	Pa:WB	Last observed by COPR staff on 7/6/2017
856	Egg	4/28/2017	wind- buried in sand	5/17/2017	7/6/2017	Pa:BY	Last observed by COPR staff on 7/7/2017
863	Egg	4/27/2017	wind- buried in sand	5/20/2017	7/6/2017	Pa:WY	Last observed by COPR staff on 7/13/2017
851	Egg	4/28/2017	tide - washed out nest	5/6/2017	N/A	N/A	Deceased.
852	Chick	5/9/2017	abandoned - hypothermic	5/7/2017	N/A	N/A	Deceased.
853	Egg	4/10/2017	wind- buried in sand	5/7/2017	N/A	R11 (blue)	Non-releasable due to sight issues
862	Egg	5/15/2017	abandoned	did not hatch	N/A	N/A	Did not hatch
862	Egg	5/15/2017	abandoned	did not hatch	N/A	N/A	Did not hatch
862	Egg	5/15/2017	abandoned	did not hatch	N/A	N/A	Did not hatch
863	Egg	4/27/2017	wind- buried in sand	did not hatch	N/A	N/A	Did not hatch
863	Egg	4/27/2017	wind- buried in sand	did not hatch	N/A	N/A	Did not hatch
869	Egg	6/5/2017	abandoned	did not hatch	N/A	N/A	Did not hatch
876	Egg	6/5/2017	abandoned	did not hatch	N/A	N/A	Did not hatch
879	Egg	6/15/2017	abandoned	did not hatch	N/A	N/A	Did not hatch
884	Egg	7/12/2017	tide - washed out nest	did not hatch	N/A	N/A	Did not hatch
885	Egg	7/13/2017	abandoned	did not hatch	N/A	N/A	Did not hatch
887	Egg	7/21/2017	abandoned	did not hatch	N/A	N/A	Did not hatch

896	Egg	7/31/2017	abandoned	did not hatch	N/A	N/A	Did not hatch
unknown	Egg	7/13/2017	unknown	did not hatch	N/A	N/A	Did not hatch

Table 4. Description of collected plover eggs and chicks in 2017.

Enforcement

There is no regular enforcement of Sands beach. Officers enforce the leash law and other pertinent ordinances at COPR when they are called by the docents.

Docent program

With an increase in beach use this year (Appendix C), the docent program continues to be crucial to the success of Western Snowy Plover recovery at Coal Oil Point. 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 to stay away from the symbolic fence, requesting people to move around the plover flock, scaring away crows, and informing the staff of birds of prey observed around the nesting area. This year, docent coverage averaged approximately 45 hours per week. However, we observed a large increase in students visiting the beach as a result of new dorms that host 4,000 new students near the reserve. The docents have commented that it is difficult to handle large crowds of people on the beach.

CONCLUSION

The plover population at COPR has 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. In previous years we concluded that we cannot use hatching success as a predictor of fledging success, thus we will continue to count the number of chicks until fledging age. The wintering population at the reserve is in a downward trend and we do not have an explanation for this pattern. The docent program continues to be an effective way to reduce human impact on the plovers, but the increase of human population in the area needs to be addressed to prevent an impact to the plover population at Sands Beach.

RECOMMENDATIONS

- The USDA trapping program worked well and should be continued.
- The mudflats should be included as part of the plover nesting habitat and be regularly monitored.
- Predator control should be increased during the breeding season. Docents should watch for predators, both from the beach and potentially from blinds.
- A designated ranger would be useful in enforcement of the dog leash law at COPR and Ellwood.
- The university and COPR should work together to start implementing the prohibition of dogs at COPR, as per the new LRDP amendment by the California Coastal Commission.

ACKNOWLEDGEMENTS

Jessica Nielsen, the Conservation Specialist, and Cristina Sandoval, Reserve Director, conducted plover monitoring. Jessica managed the docent program. We are very thankful to Katelyn Nyberg and Pat Walker who helped count plovers, locate nests and determine their fate. David Hyon assisted with constructing and maintaining the skunk fence and symbolic fence. Rick Fellows donated over 200 hours towards the Snowy Plover Docent Program this year, in addition to countless additional hours spent conducting restoration work and maintaining the reserve. The docents, over 50 volunteers and interns over the course of 2017, maintained a presence at the beach every day of the year.

California Least Terns

Several California Least Terns migrated through COPR during the breeding season but they did not nest. We did not observe any courtship or mating behavior this year.

References

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Bibliography of other Snowy Plover studies at COPR:

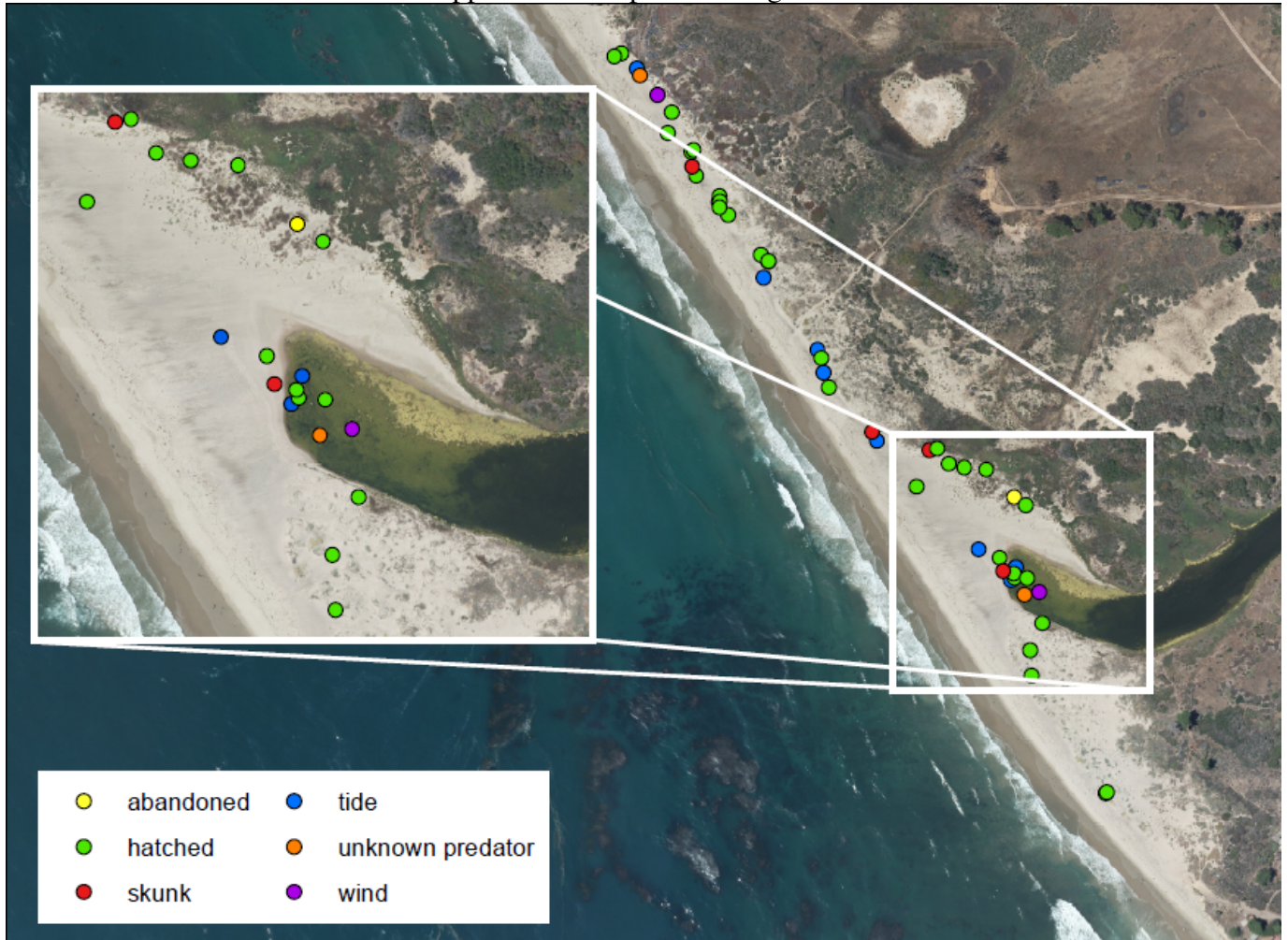
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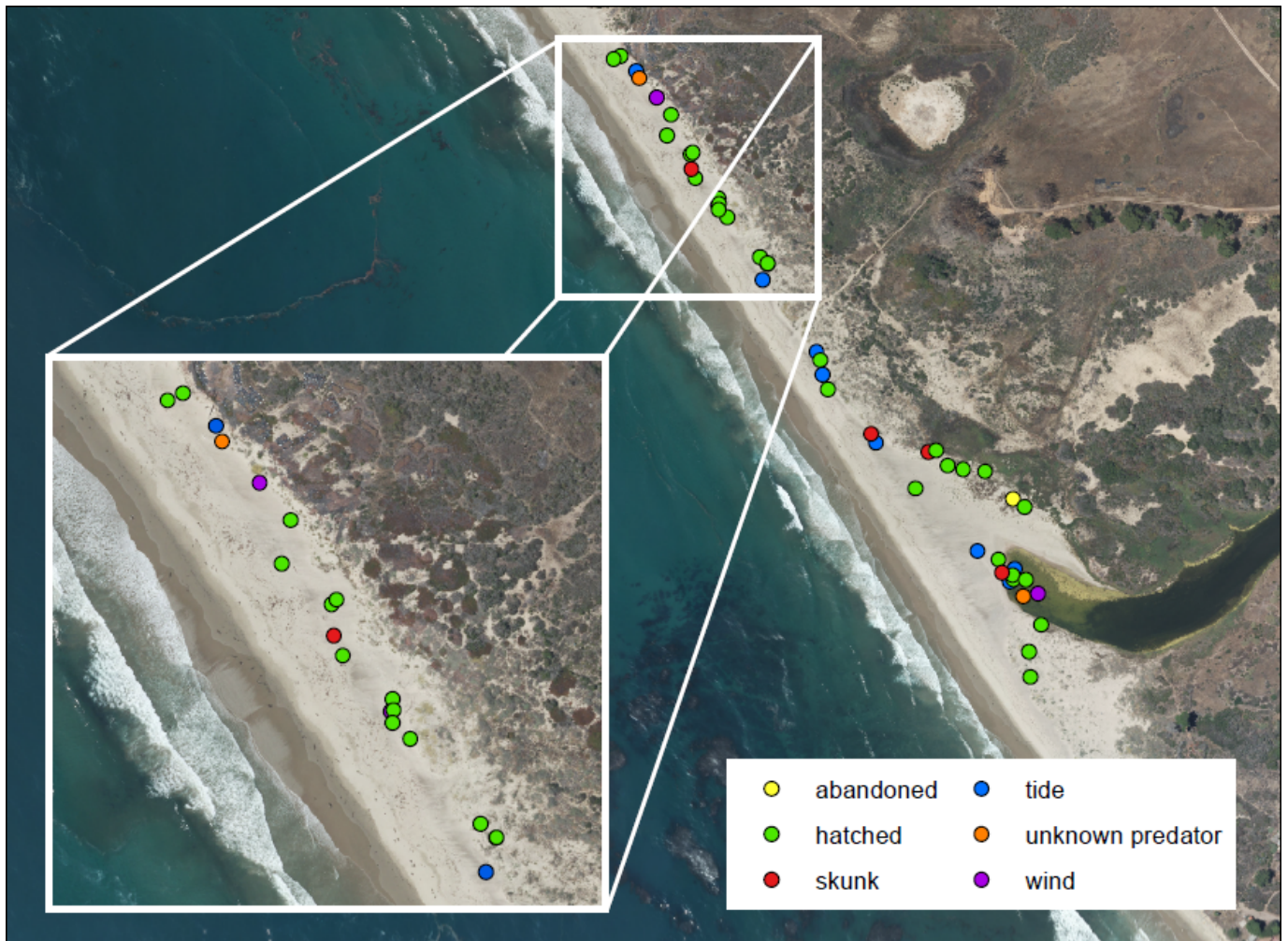
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Lafferty, K.D., Goodman, D., & Sandoval, C.P. 2005. "Restoration of breeding by snowy plovers following protection from disturbance." *Biodiversity and Conservation*. Online at: <http://www.kluweronline.com/issn/0960-3115>

APPENDIX A.
Supplemental maps of nesting areas.

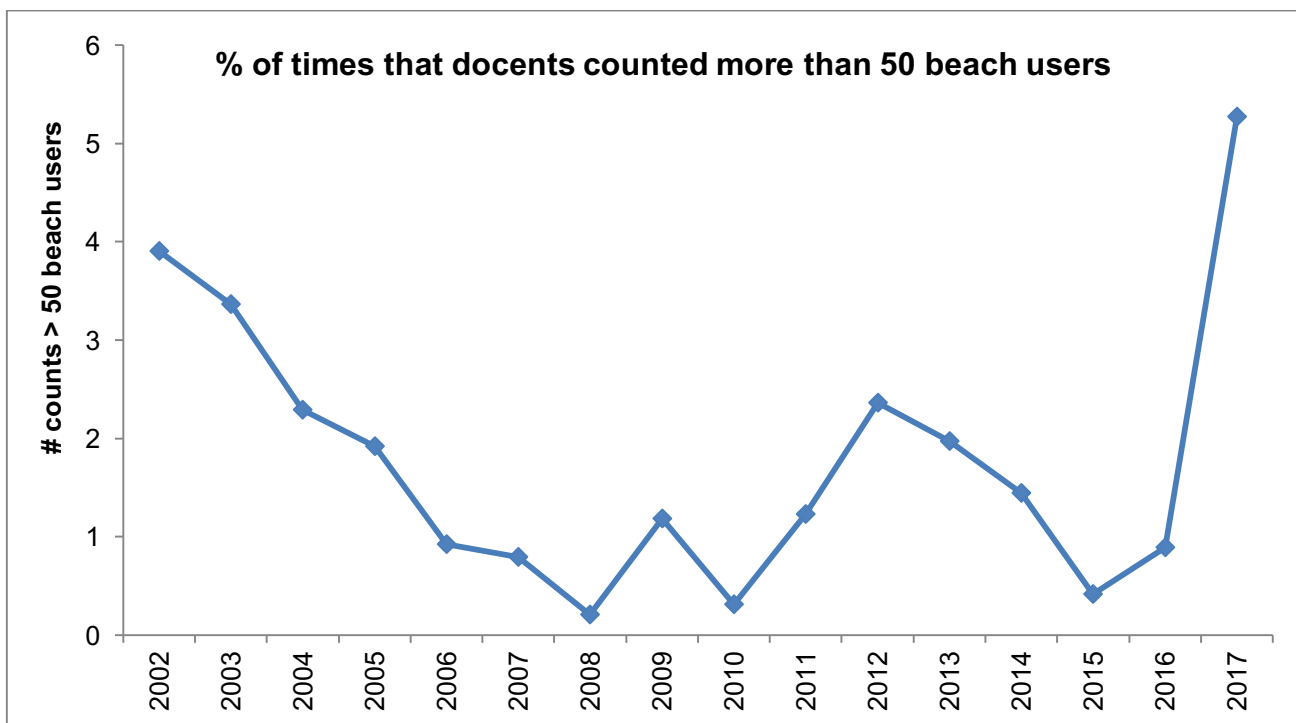
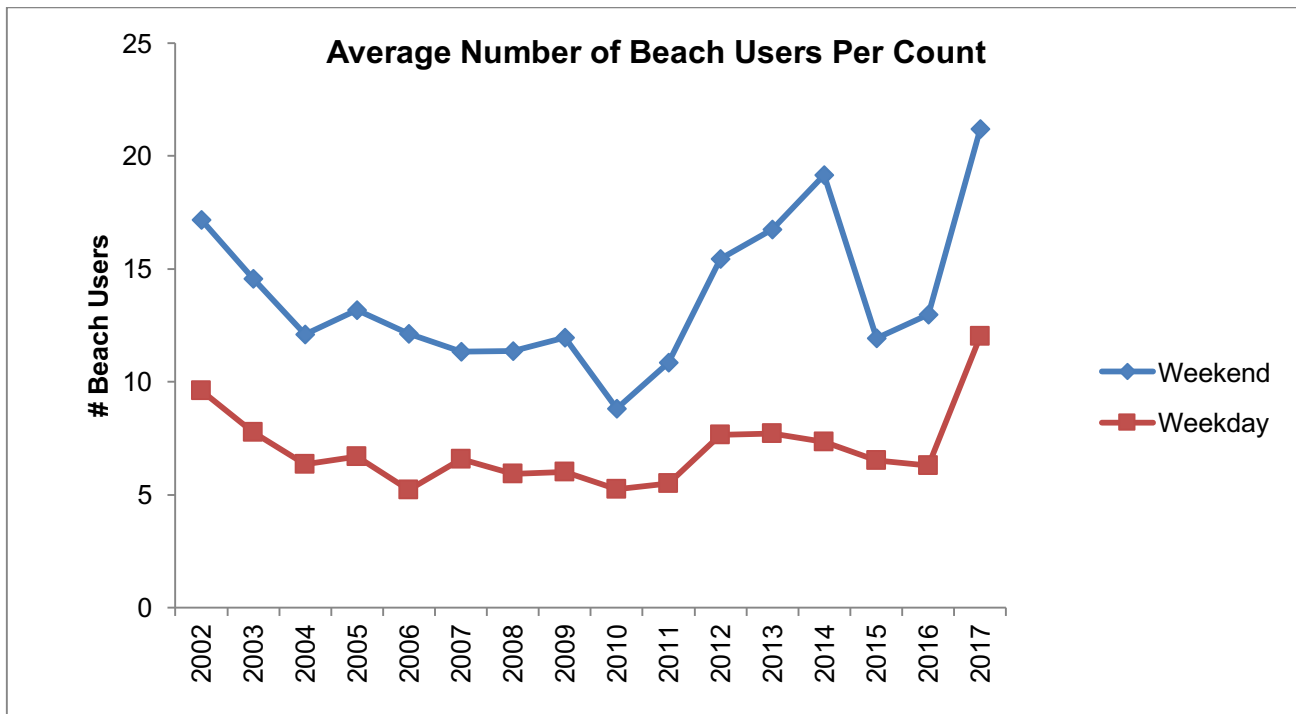




APPENDIX B.
Band sightings at the reserve

Date	Band Sightings										
1/11/2017	AN:RG										
1/24/2017	NY:NW										
2/8/2017	AN:RW										
3/7/2017	Pa:RR	WB:LB									
3/15/2017	Pa:RR										
3/22/2017	Pa:RR										
4/8/2017	P:GWG	NA:RW	Na:RR								
4/12/2017	WB:GB										
4/16/2017	Pa:RR	AN:RW	NW:NW	A:GW	NB:YR						
4/18/2017	NA:RW										
4/20/2017	AN:RW										
5/5/2017	AN:RW	WB:GB									
5/7/2017	Pa:RR	WB:GB									
5/15/2017	RW:AN										
5/20/2017	WB:GB	NB:YR	PV:RB	Pa:RR	NW:PA						
5/23/2017	Pa:RR										
6/10/2017	PV:RB	NB:YR	WB:GB	WW:Pa	Pa:RR						
6/14/2017	WW:Pa	AW:YR									
6/26/2017	Pa:RR										
6/28/2017	Pa:RR	NB:YR									
7/7/2017	Pa:WR	Pa:BY	OG:BL	BB:RR	Pa:RR	WW:Pa					
7/11/2017	GL:AV	Pa:WY	Pa:BG	Pa:RR	WB:GB						
7/13/2017	PV:RB	Pa:BG	Pa:WY	Pa:WW	Pa:RR	NB:YR	WB:GB				
7/17/2017	Pa:WR	Pa:BG									
7/18/2017	Pa:WR	Pa:BG	WB:GB								
7/25/2017	WW:Pa										
7/26/2017	PV:RB	WW:Pa	Pa:RR	Pa:WW							
7/31/2017	GA:VB	Pa:WW									
8/2/2017	WB:GB										
8/4/2017	AT:RG										
8/7/2017	PV:RB	YB:YR	AB:PP	WG:B?	Pa:RR						
8/9/2017	PV:RB	Pa:WW	AN:RW								
8/11/2017	YR:YV										
8/15/2017	NB:YR	Pa:RR									
8/17/2017	LL:PR	Pa:RR	AN:RW								
8/22/2017	Pa:RR	AN:RW									
8/25/2017	Pa:RR										
9/25/2017	OO:WV	PV:OB	PV:PL	LL:AW	PV:YL	WB:GB					
10/18/2017	PV:VW	PV:PG	AN:RW	NB:LL	Pa:RR	Pa:WG					
10/26/2017	AN:RW										
10/31/2017	Pa:WG										
11/8/2017	OO:WV	GN:NR	Pa:RR	PV:OB	NY:NW	BB:AR	AN:YW	A:L/O/L	GY:BY	L:W/B/W	
11/28/2017	Pa:RR	PV:OB	LN:BY	PV:YL	PV:PL	AN:YW	LA:RY	NY:WL			
12/13/2017	KA:WA										
12/20/2017	P:OB										

APPENDIX C.
Data on beach use at the reserve



APPENDIX D.



**United States
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Animal and
Plant Health
Inspection
Service

Wildlife Services

San Luis District

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10 August 2017

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 predators during the 2017 nesting season. Predator removal began on 3 April 2017 and ended 3 August 2017.

Striped skunks, raccoons and American Crows were the target predators during the 2017 snowy plover nesting season. Trapping was the method used to remove mammalian predators. Traps used to capture mammalian predators were 10" X 12" X 32" Tomahawk cage traps. All target mammals captured in traps were given an injection of sodium pentobarbital as a means of euthanasia or a lethal shot was administered with an emphasis on shot placement for a safe, quick, humane kill. Seven striped skunks and two raccoons were removed by trapping during the 2017 Western Snowy Plover nesting season.

Lethal doses of sodium pentobarbital were administered through the use of a syringe or syringe pole. The injections were placed in the intraperitoneal cavity. The typical dosage rate is 1 cc for every 10 pounds of body weight. The effects of sodium pentobarbital are rapid unconsciousness, followed by a reduction of respiration and central nervous system activity, and ending with cardiac arrest. When injected into the heart, the results are almost instantaneous. Sodium pentobarbital is a schedule II controlled substance whose use is monitored by the U.S. Drug Enforcement Administration. Use of sodium pentobarbital by WS employees is restricted to those that have received training and are certified in its use

Sixteen American Crows were removed during the 2017 nesting season. Two American crows were removed by using a predator call to entice them close enough that they could be removed by shooting. The remaining 14 crows were removed by shooting. All American



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Crows removed were removed with a suppressed 22 caliber rifle. Shooting was focused mainly on human safety and humane euthanasia. All Wildlife Services employees must go through rigorous training in the safe and proper use of firearms before using them in the field.

All euthanasia of wildlife conducted by Wildlife Services is done in accordance with the American Veterinary Medical Association's Guidelines for the Euthanasia of Animals: 2013 Edition. These guidelines can be found at <https://www.avma.org/KB/Policies/Documents/euthanasia.pdf>.

Wildlife Services spent 88 hours on predator removal activities, carcass disposal, and associated administrative duties at Coal Oil Point Reserve during the 2017 season. A total of 308 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 2018. Each year the cost of conducting predator removal increases. Coal Oil Point Reserve should consider this and secure sufficient 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 Kevin or myself if you have any questions.

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