2011 and 2012 Final Report on the Western Snowy Plovers

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 2011 and 2012 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 seasons and the loss of nests from skunk predation was greatly reduced. However, chick predation from unknown predators was higher than normal. The beach was the narrowest we have observed during the breeding since 2001, and the number of nests lost to tide during 2012 was the highest on record. Hatching success on the mudflats 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

We continued in 2011 and 2012 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.

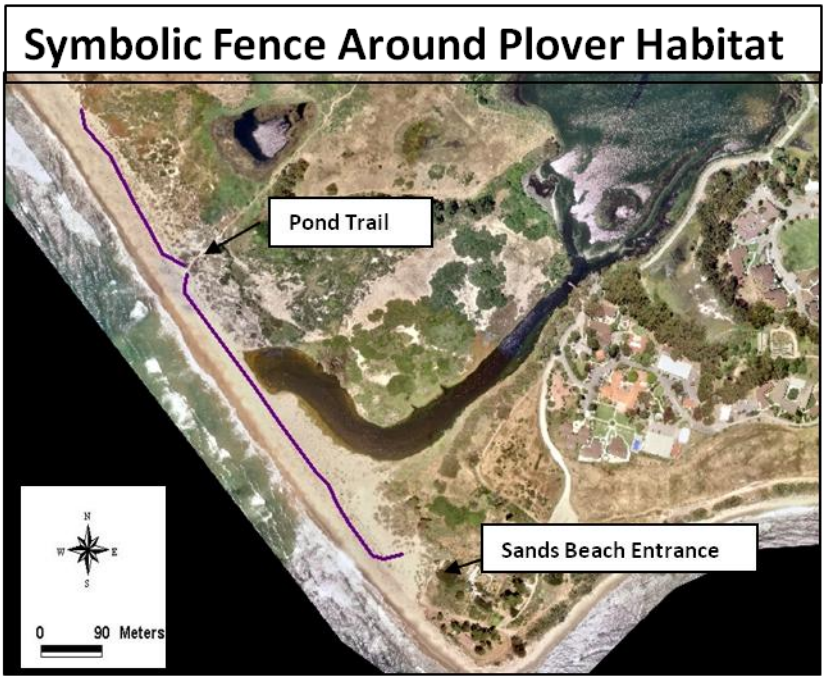

Figure 1. Location of the habitat protected for the Western Snowy Plovers (year round) on Sands beach at Coal Oil Point Reserve. The mudflats not shown in this photo area also protected. The fence is shown in purple above.

WINTERING POPULATION

To count individuals of the WSP, we walk along the wet sand from the eastern boundary of Sands beach to the western boundary of the Reserve and observe all individuals with binoculars. On the way back, we stop 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 last 3 years (Figure 2). We do not know what accounts for this trend.

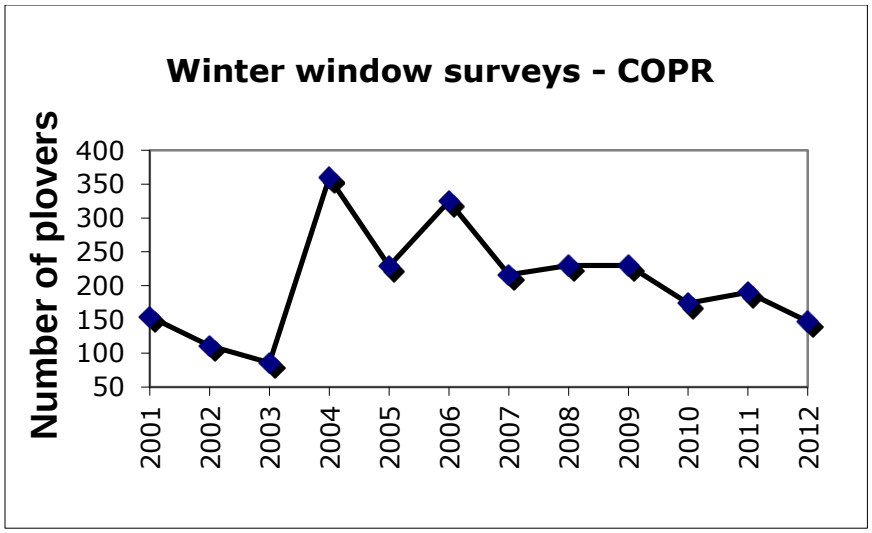

Figure 2. Winter window surveys of snowy plovers at Coal Oil Point Reserve.

BREEDING POPULATION

We measured the breeding population in the same way as the wintering population. The breeding window survey in 2011 showed the highest number of plovers in the last decade (47 individuals). Figure 3, below, shows the breeding population window surveys between 2001 and 2012. 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 35 adults after 2003.

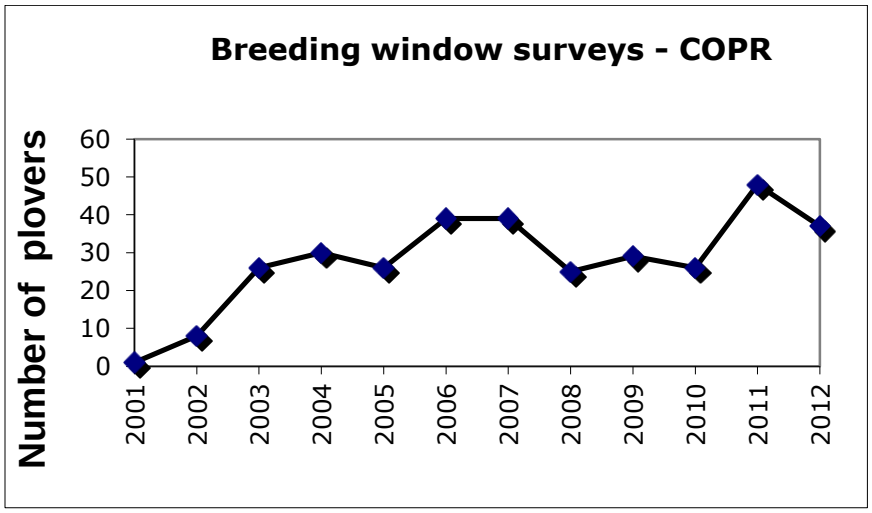

Figure 3. Counts of adult snowy plovers at Coal Oil Point Reserve in the breeding window surveys.

Nesting

During the nesting season in 2011 and 2012, the numbers and locations of adult plovers, nests, and chicks were counted 3 times per week by Cristina Sandoval and Pat Walker (and April Price in 2012). 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 Nests that fledged at least one chick/nests that hatched at least one chick
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%

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

Nest Fate and Predation

In 2011, there were 84 nests laid at COPR. In 2012, there were 73 nests laid.

In 2011, 35 (42%) of the nests hatched. In 2012, 34 (47%) of the nests hatched. Figures 4 and 5 show the number of nests laid and the number of nests hatched between 2001-2012.

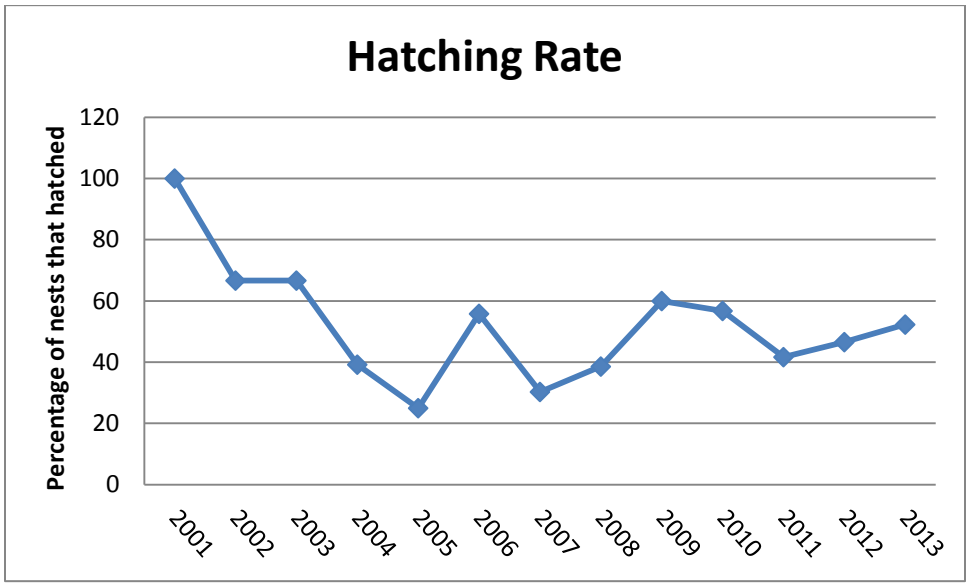

Figure 4: Hatching Rate

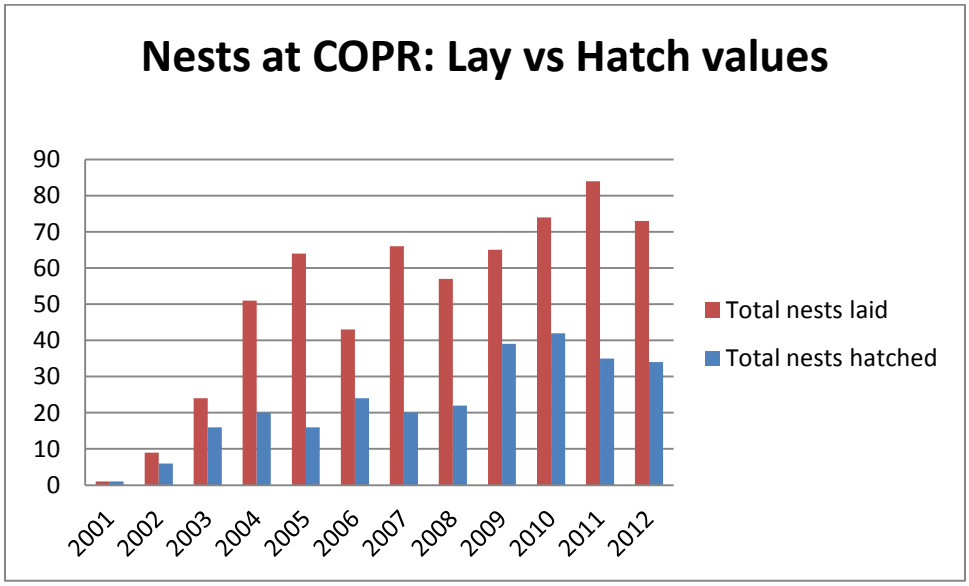

Figure 5. Total number of nests laid and hatched at Coal Oil Point Reserve.

The figures above also demonstrates jump in nest survival (nests hatched) between 2008 and 2009, which coincides with the initiation of out predator control program.

Historically, skunks and crows have been the major nest predators at COPR, but in 2009, skunk predation levels dropped significantly after the initiation of a USDA predator control program(Figure 6). There was no documented nest failure due to either crow or skunk between 2010 and 2012. Although crows are not specifically targeted by the USDA traps, we continue to harass crows on the beach, using slingshots.

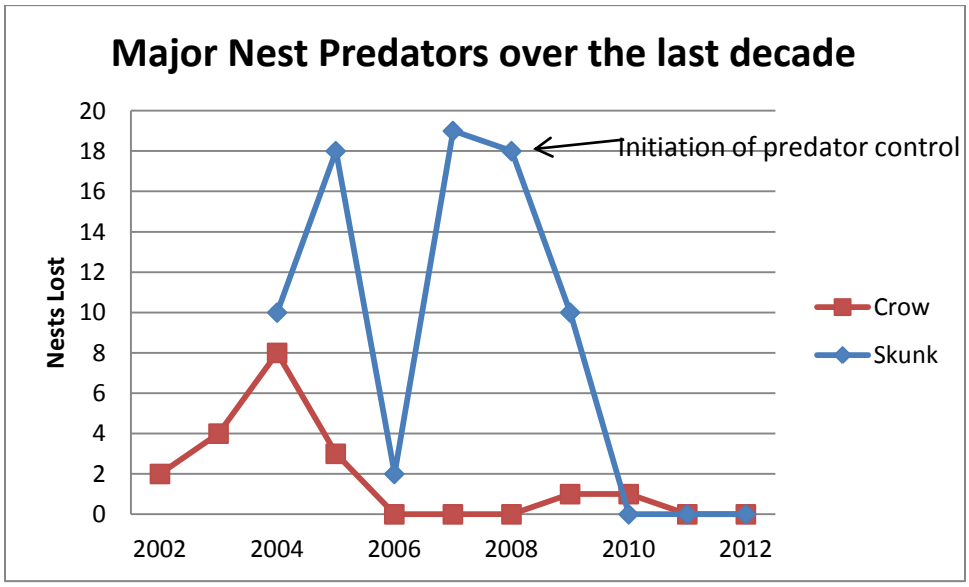

Figure 6. Crow and Skunk predation between 2002 and 2012.

In 2011 and 2012, The majority of failed nests were lost to high tides and high wind events. Figure 7 below summarizes the nest fate in 2012.

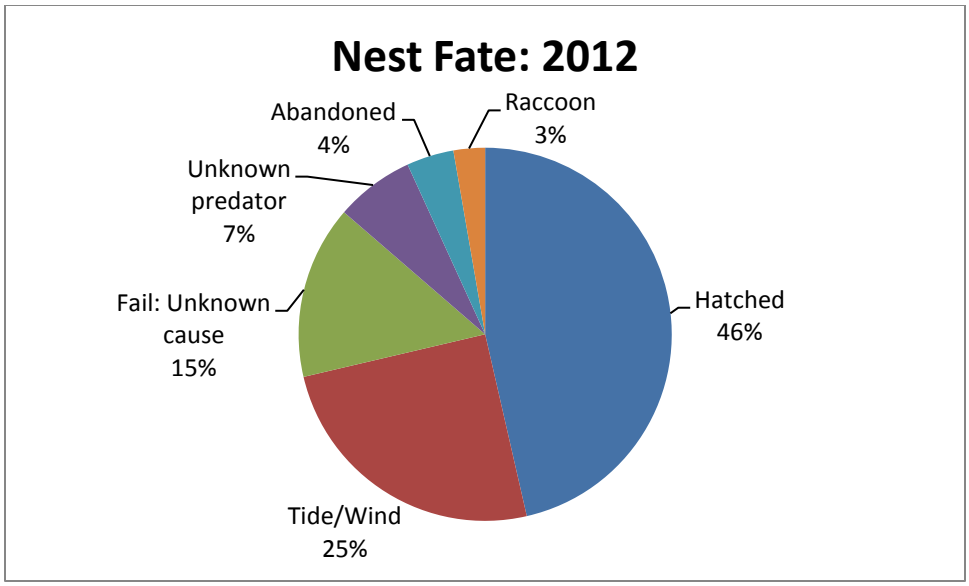

Figure 7. Nest fate at COPR in 2012.

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

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total nests
Total nests	**9**	**24**	**51**	**64**	**43**	**66**	**57**	**64**	**74**	**84**	**73**	**609**
Hatched	**6**	**17**	**20**	**16**	**25**	**30**	**22**	**39**	**42**	**35**	**34**	**286**
Skunk			10	18	2	19	18	10	0	0	0	**77**
Crow	2	4	8	3	0	0	0	1	1	0	0	**19**
Wind	1	3	2	6	1	1	2	5	2	10	2	**35**
Tide			5	5	2	0	7	1	5	12	16	**53**
Abandoned			0	9	3		0	1	3	5	3	**24**
Abandoned Owl	0	0	0	0	6		0		0		0	**6**
Flooded			0	3	0		0		4	3	0	**3**
Raccoon			2	1	0		0	1	0	0	2	**6**
Whimbrel			1	0	0		0		0	1	0	**1**
Gull	0	0	0	0	1		0		0	0	0	**1**
Opossum				1	0		0		0	0	0	**1**
Unknown cause			0	1	3	11			15	8	11	**15**
Unk pred				1	1	1		4	0	10	5	**22**
Unk fate						4	4	2	0	0		**8**

Table 2. Number of nests lost by fate in 2012 and previous years.

In 2012, twenty two percent of the nests at COPR were lost to either an unknown cause or an unknown predator (Figure 7). In June and July of 2012, we placed motion sensor cameras on several nests to monitor predator and plover activity, and to address this uncertainty. We used 4 Moultrie Game Spy I-35 cameras, and placed them about 8 feet away from active nests. Unfortunately, most of our footage was inconclusive. We captured footage of 2 raccoons eating the eggs of a nest of the mudflats, but did not capture any other predator activity. Aside from the nest eaten by the raccoons, all of the monitored nests hatched. We captured some images of chicks and adult plovers, but were not able to use these images to determine what happened to the chicks that hatched but did not fledge from the monitored nests. We only captured a few images of plovers , suggesting that the cameras were not sensitive enough to pick up most plover activity.

Chick survival

The average number of WSP chicks fledged each year at COPR since 2001 is 27. The fledgling numbers have varied between one individual in 2001 and 61 in 2009 (Figure 8). In 2011, nine WSP chicks fledged at COPR, the lowest number since the initiation of the WSP conservation program in 2001. In 2012, 22 chicks fledged.

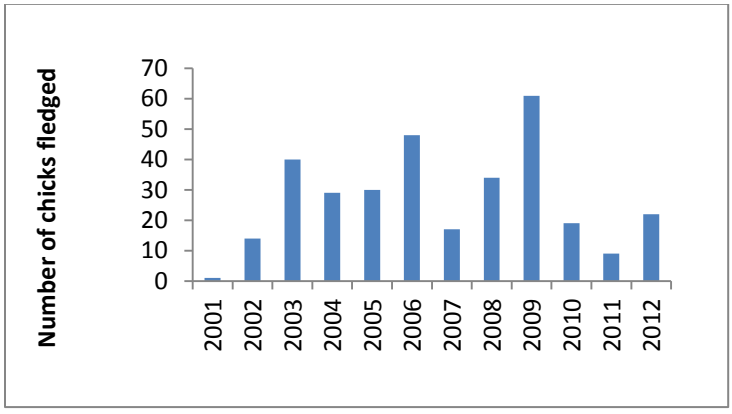

Figure 8. Number of chicks fledged at Coal Oil Point Reserve.

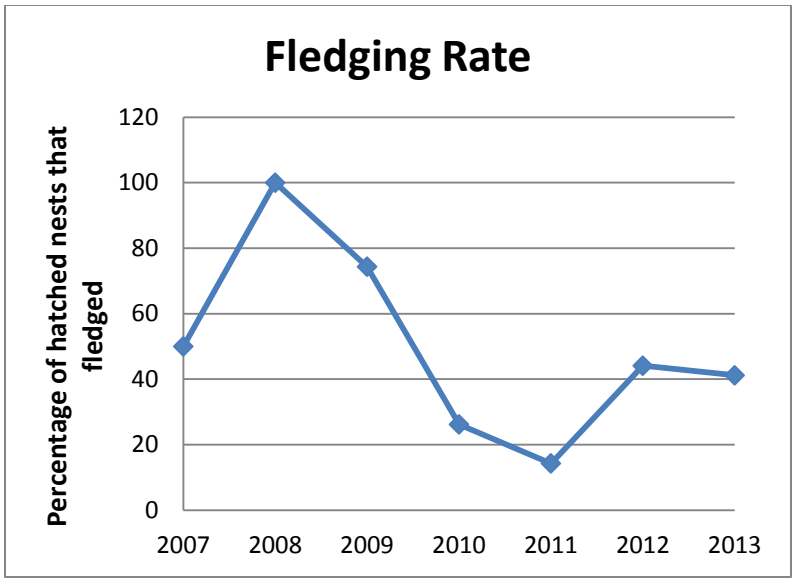

Figure 9: Fledging Rate

The low fledgling rate (14%) in 2011 was due to high chick predation, which we suspected to be from great horned owls. The fledgling rate in 2012 was 44%. Many chicks were lost before fledging in 2012 due to unknown causes.

In 2011, chick loss was especially high, with only 9 fledglings for the season (Figure 8). Due to the nocturnal disappearance of the chicks, we believe that owls were the main predators in 2011. We trapped and released 4 great horned owls and 1 barn owl (USDA Predator Report, Annex 2). The 9 plover fledglings were all hatched after the capture of the owls.

In 2012, chick loss occurred throughout the season, but never at the extreme levels of 2011. In 2011, chicks were predated at such high levels, that at several times during the season there were no chicks left on the beach, despite high hatching success (42 percent hatching success, figure 5). In 2012, although there were times of high chick predation, there were consistently chicks on the beach throughout the breeding season. Based on the reduced severity of chick predation, and lack of direct evidence (tracks, etc.), we did not target owls in our predator management actions.

In 2012, The Moultrie Game Spy I-35 cameras were also placed near broods, to assist in monitoring the chicks and determining their fates. However, the cameras did not capture any chick predation events. Without photographic evidence, we were left to use track analysis to infer predation events in 2012. When chicks went missing in 2012, we analyzed the area surrounding the last place that the bird had been seen. We recorded all of the tracks that we could identify in an approximate ten foot radius of the last place we had seen the bird. We saw many gull prints near disappeared chicks, but are hesitant to draw any conclusions from this data, based on the high mobility of the broods and the fact that our beach is covered with gull prints. We did not identify any other patterns in the tracking analysis.

Monitoring Priorities

We investigated the possibility of using the number of nests hatched as a predictor of the number of chicks hatched. Until 2009 the correlation was high (Figure 9) but in 2010, 2011, and 2012, 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.

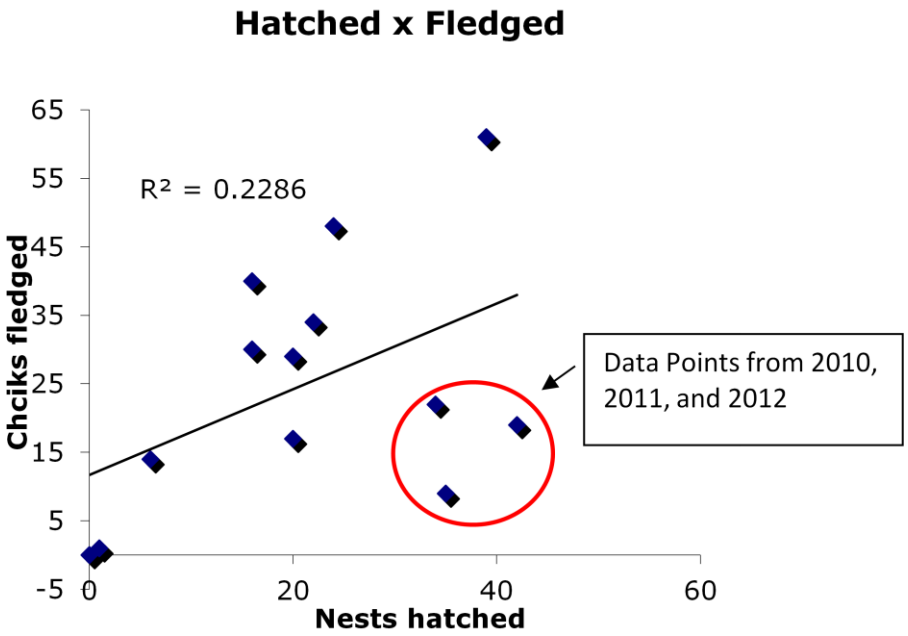

Figure 10. Regression of the number of chicks fledged each year and the number of nests that hatched. Points from 2010-2012 show a deviation from the correlation that we witnessed in the past.

To increase the monitoring success of the chicks, we plan to train our docents to identify possible plover predators. We will encourage our docents to look for signs of irregular gull behavior, in order to identify potential individual gull predators. We will also train docents to identify common raptors, and to keep records of raptors on the beach.

Enforcement

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

Location of nests

The location of nests was estimated using the numbered posts along the beach but we did not obtain GPS coordinates to avoid disturbing nets.

In 2012, the highest number of nests hatched on the mud flats on record. The hatched mud flat nests also had higher fledge rates than the beach nests (Figure 3). Although the absolute numbers of mud flat nests were lower than beach nests, about 30 percent of the hatched beach nests fledged, in comparison with about 70 percent of the delta nests.

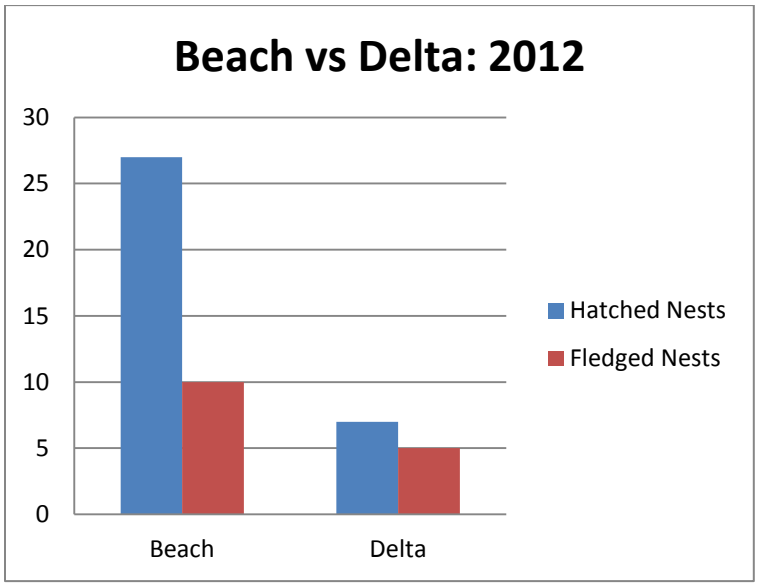

Figure 11: Hatching and Fledging success on the beach and mud flat habitats.

Docent program

The docent program continues at the same level as in 2010. The docents have been very instrumental in reducing the impact of beach users to the Snowy Plovers. The docents main duties include showing and 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 used 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.
- The chick nursery. We need to obtain a banding permit for a local biologist because it was not feasible to borrow plover banders from other locations as their were busy during the breeding season.

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 2011 or 2012.

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

12/31/2006	169	BS:YL (L has lost all tape)	WO:OA	RR:AR	PW:BB	YL:WA	BB:WG	PV:BA	TY:RB	YG:RG	XS:XX
1/7/2007	149	BS:YL (L has lost all tape)	WO:OA	YG:RG	TY:RB	BB:YY					
1/14/2007	201	BS:YL (L has lost all tape)	WO:OA	YG:RG	BB:WG	RR:AR	P?:BA	YL:WA			
1/21/2007	155	BS:YL (L has lost all tape)	PW:BB	BB:YY	RR:AY	YL:WA	YG:RG	BB:WG	TY:RB		
1/28/2007	194	BB:YY	RR:AR	YG:RG	BB:WG	PW:BB					
2/4/2007	200	BS:YL (L has lost all tape)	WO:OA	BB:WG	RR:AR	TY:RB	PV:BA	RG:RG	PW:BB	BB:YY	XS:XX
2/11/2007	194	PW:BB	WO:OA	BB:YY	BB:WG	RR:AR	BS:YS	PV:BA	TY:RB	YG:RG	XS:XX
2/18/2007	123	PW:BA	RR:AR	YG:RG							
2/25/2007	177	BS:YL (L has lost all tape)	RR:AR	SS:K/MAUV	XS:XX	BB:WG	WO:OA	BB:YY	PW:BB	YG:RG	
3/4/2007	155	BS:YL (L has lost all tape)	YG:RG	PW:BB	XS:XX	RR:QY	BB:WG	SS:K/MAUVE			
3/11/2007	155	BS:YL (L has lost all tape)	WO:OA	BB:WG	RR:AR	YG:RG	YS:WA	BB:YY			
3/18/2007	160	YA:GY	BB:WG	WO:OA	YS:WA ♀						
3/24/2007		BS:YL (L has lost all tape)	BB:YY ♂	PW:BB ♂	YS:WB	YB:YP	YO:YG				
3/25/2007	157	BS:YL (L has lost all tape)	BB:YY ♂	BB:WG	RR:AR	YS:WA	S:K/MAUVE ♀				
4/1/2007	100	BB:YY	S:K/MAUVE								
4/15/2007	80	S:K/MAUVE	XS:XX								
4/22/2007	75	S:K/MAUVE	XS:XX								
4/29/2007	60		XS:XX								
5/6/2007	50										
5/13/2007	42	S:K/MAUVE	XS:XX								
5/20/2007	44	S:K/MAUVE	RR:AR ♂								
5/20/2007	52										
6/3/2007	36	S:K/MAUVE	XS:XX	RR:AR ♂							
6/10/2007	30		XS:XX	RR:AR ♂							
6/17/2007	50		XS:XX	RR:AR ♂							
12/16/2007	180	BS:YL (L has lost all tape)	PW:BB	TY:RB	YL:WL?	YY:GY	RR:AR	GG:GG			

Above: In BS:YL (L has lost all tape)

APPENDIX 2. USDA Reports from 2011 and 2012

Eric Covington
Jack Velasquez
USDA Wildlife Services
San Luis District
PO Box 957
Taft, CA 93268

Cristina Sandoval
Director, Coal Oil Point Reserve
Marine Science Institute
University of California
Santa Barbara, CA 93106

26 September 2011

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 2011 nesting season. Predator removal began on 3 March 2011 and ended 19 August 2011.

Striped skunks, raccoons, Virginia opossums, American crows, Barn owls and Great-horned owls 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. All target mammals captured in traps were given an injection of sodium pentobarbital as a means of euthanasia. A total of nine skunks, seven raccoons and five Virginia opossums were captured in padded leg-hold traps and euthanized. A total of six skunks, one raccoon and one Virginia opossum were captured in cage traps and euthanized as well.

Pole traps were used to capture avian predators with the exception of the American crow which was captured in a cage trap. Pole traps are #1 ½ padded jaw traps modified with springs from Victor rat traps and a perch secured to the pan. The trap is then placed on a pole in a location where it is thought the offending owls are located. A total of four Great-horned owls and one Barn owl were captured and removed from Coal Oil Point Reserve during the 2011 nesting season. All owls captured were inspected for injury and relocated once it was determined injuries did not exist. The American crow was euthanized upon capture.

Wildlife Services spent 215 hours on predator removal activities, carcass disposal, and associated administrative duties at Coal Oil Point Reserve during the 2011 season. A total of nine hundred eighty three padded leg-hold trap nights, two hundred eighteen cage trap nights and three hundred pole trap nights were spent trapping and removing

United States Department of Agriculture

Animal and Plant Health Inspection Service

Wildlife Services

San Luis District

P.O. Box 957, Taft, CA 93268-0957

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 2012. 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 me if you have any questions.

Eric Covington
USDA Wildlife Services
San Luis District Supervisor
(661)765-2511

Eric Covington
Jack Velasquez
USDA Wildlife Services
San Luis District
PO Box 957
Taft, CA 93268

Cristina Sandoval
Director, Coal Oil Point Reserve
Marine Science Institute
University of California
Santa Barbara, CA 93106

17 October 2012

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 2012 nesting season. Predator removal began on 15 March 2012 and ended 28 September 2012.

United States Department of Agriculture

Animal and Plant Health Inspection Service

Wildlife Services

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P.O. Box 957, Taft, CA 93268-0957

Striped skunks, raccoons and Virginia opossums 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. All target mammals captured in traps were given an injection of sodium pentobarbital as a means of euthanasia. A total of nine skunks and four raccoons were captured in padded leg-hold traps and euthanized. A total of three skunks, one raccoon and 15 Virginia opossums were captured in cage traps and euthanized as well.

No avian predators were targeted during the 2012 nesting season.

Wildlife Services spent 173 hours on predator removal activities, carcass disposal, and associated administrative duties at Coal Oil Point Reserve during the 2012 season. A total of one thousand eight hundred fifty seven padded leg-hold trap nights and eight hundred seventeen 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 2013. 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.

Eric Covington
USDA Wildlife Services
San Luis District Supervisor
(661)765-2511

Jack Velasquez
USDA Wildlife Services
Santa Barbara County Wildlife Specialist
(805)681-5619