

UC Santa Barbara

Reports

Title

2021 Final Report on the Western Snowy Plover

Permalink

<https://escholarship.org/uc/item/1007w59b>

Authors

Sandoval, Cristina

Gray, Jessica

Publication Date

2022-01-20

Data Availability

The data associated with this publication are available upon request.

2021 Final Report on the Western Snowy Plovers

Coal Oil Point Reserve
University of California
Santa Barbara, CA

Cristina Sandoval and Jessica Gray
Permit Number **TE073205-5**

Date of Preparation: January 20th, 2022



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, predator exclosures as needed.

TABLE OF CONTENTS

ABSTRACT4
INTRODUCTION4
METHODS AND RESULTS5
 Protected Areas6
 Monitoring of the Wintering Population7
 Monitoring of the Breeding Population.....7
 Monitoring Nest and Chick Fate.....8
 Nest Predation 12
 Infertility..... 13
 Chick Survival..... 15
 Nest Phenology 17
 Location of Nests 18
 Rehabilitation of Eggs and Chicks 20
 Enforcement 23
 Docent Program and Beach Use 23
CONCLUSION 29
RECOMMENDATIONS 29
ACKNOWLEDGEMENTS 30
California Least Terns 30
Bibliography 30
APPENDIX A. Band sightings at the reserve 32
APPENDIX B. USDA Report35
APPENDIX C. Nesting data from adjacent WSP habitats..... 37
APPENDIX D. California Least Tern nesting data at COPR38

ABSTRACT

In 2021, we continued with the monitoring of the Western Snowy Plover (WSP) population at Coal Oil Point Reserve as in previous years. The number of breeding adults this year (56) was higher than the average (37) for our site. The wintering population size (175) was just over the average (167). This year, predation was the primary cause of nest failure. There were three cases of take by people on Sands Beach. The eggs from 3 nests were removed and in 2 of the nests that had exclosures, the exclosure was removed and vandalized. Implementation of Australian crow traps this year prevented crow predation. However, one quarter of all nests were predated by skunks and an additional 8% were lost to unknown predators. In response to the high levels of predation by skunks, all nests present on or laid after July 13th were collected, incubated until near the hatching date, and then returned to the parents. The real eggs were replaced with wooden eggs so that the parents would continue incubating. COPR had a lower than average hatching rate (35%) and a high fledging rate (72%) (this analysis excludes the 8 out of 8 nests that hatched with the egg replacement technique). The number of fledged chicks per male (1.5) was below average for our site but exceeded our site's recovery goal of 1.0 fledged chicks per male. 99% of nests (92) were initiated on the beach, and 1% (1) were initiated on the mudflats of the slough (delta).

INTRODUCTION

Sands Beach at Coal Oil Point Reserve (COPR) is part of the University of California Natural Reserve System. The entire reserve including Sands Beach has an Environmentally Sensitive Area designation by the California Coastal Commission. Sands Beach was also designated a "critical habitat" in the recovery of the threatened WSP (USFWS Western Snowy Plover Recovery Plan). Sands Beach is an important habitat for many species of shorebirds and is considered an Audubon "Important Bird Area." Currently, Sands Beach has an average wintering population of Western Snowy Plover (WSP) of 167 individuals and an average breeding population of 37. The lower beach is open to the public all year, but most of the dry sandy upper beach, where plovers nest and congregate while resting, is protected by a symbolic fence.

Parts of Sands Beach are open to the public for passive recreation (sunbathing, walking, and surfing). Managing public access to the beach has been essential in protecting the wildlife resources of Sands

Beach in perpetuity. Active management to protect the Western Snowy Plovers began in 2001 and resulted in the recovery of a breeding population of WSP that had been lost for decades and a general increase in the wintering population. The most significant action that led WSP to start nesting at Sands Beach again was to eliminate recreational public use on the upper beach habitat, used by WSP for resting and nesting. A docent program was initiated in 2001 to inform people of restricted areas and other reserve regulations. The docents provide direct communication with beach goers and, together with signs, media, and lectures, they encourage most beach goers to avoid sensitive areas and follow the posted beach regulations. This program resulted in the return of a breeding population at COPR and an increase in awareness by beach goers. There is still some trespassing and non-compliance with the leash law, which have resulted in 3 cases of “take” of chicks and eggs. Approximately 60% of dog owners arrive to the beach with their dog on leash. After communications by docents, up to 90% of dog owners leashed their dogs. Of the dog owners that arrive at the reserve with their dog off leash, 76% choose to leash their dog after contact by a docent.

Enforcement of the Santa Barbara County leash law has been sporadic and citations are rarely given. It seems that the compliance with the leash law will not improve unless citations are issued on a regular basis at Sands Beach. In 2017, the California Coastal Commission approved an amendment to the UCSB LRDP to prohibit dogs at Sands Beach. This prohibition was an attempt to eliminate the chronic issue of unleashed dogs at Sands Beach. This policy has not yet been implemented or enforced as per the request of UCSB’s administration.

METHODS AND RESULTS

The reserve staff monitors the WSP population and several aspects of the public use of the beach such as the number of people on the beach and in the ocean and the number of trespassers and dogs per hour. Standard protocols were established at the beginning of 2001 to ensure that staff and regulatory agencies can rely on the data to understand trends, measure performance standards and goals, and evaluate the need for new actions. In summary, COPR staff uses a scientific approach to gather data and uses these data to guide an adaptive management approach that best protects the WSP and other wildlife in conformance with the UC Natural Reserve System’s mission of stewardship and conservation. The protection of

natural resources at Sands Beach is described in detail in the [COPR Beach Access Management Plan](#) (Sandoval, 2019).

Protected Areas

In 2021, we continued with the same management practices established in the 2004 and 2015 Snowy Plover Management Plans (Sandoval, 2004 & 2015). 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 several years, the entire fence had to be removed in the winter due to beach erosion. In these cases, protection of the upper beach habitat from trespassers is provided by a few signs on the dunes and the docents, who request trespassers to leave the area behind the signs.

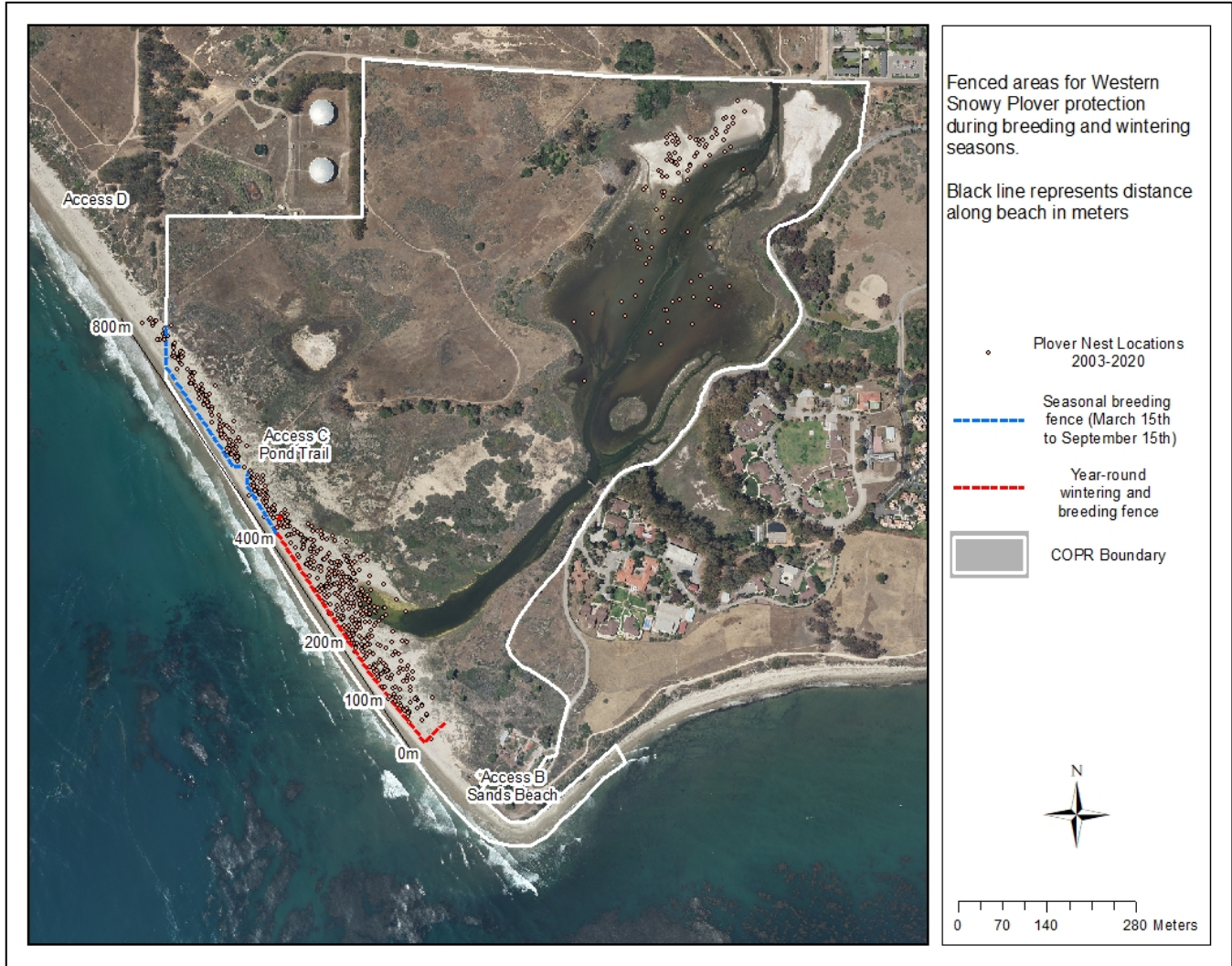


Figure 1. Location of the habitat protected by symbolic fencing for the Western Snowy Plovers at Coal Oil Point Reserve and location of nests since the recovery of the breeding population in 2001.

Monitoring of the Wintering Population

During the wintering season, observers count wintering WSP and check for banded individuals once a week. To count WSP, observers walk along the wet sand from the eastern boundary of Sands Beach to the western boundary of the reserve and record all individuals seen with binoculars. On the way back, observers stop at groups of individuals to look for color bands on the legs, approaching WSP just enough for them to stand up with legs visible. During the 2021 winter window survey, we counted 175 WSP (Figure 2). The average number of wintering WSP at Coal Oil Point Reserve since 2001 is 167 individuals. The general trend in the decrease of the wintering population at COPR since 2004 (Figure 2) it not well understood.

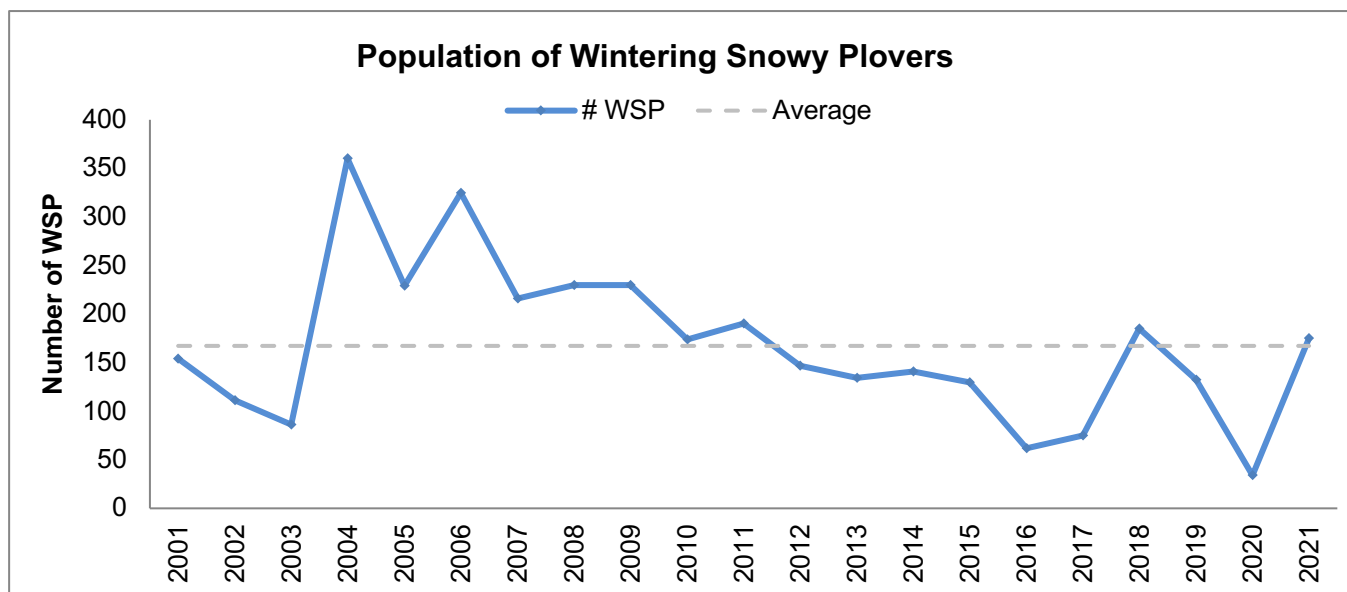


Figure 2. Results of winter window surveys at Coal Oil Point Reserve. *Average line represents the average from 2001-2020.*

Monitoring of the Breeding Population

For the annual breeding window survey, observers count WSP using the same method as for the wintering season window survey. We counted 56 WSP during the 2021 breeding window survey, which is higher than the average (37) for COPR. The graph below shows that the number of breeding adults increased right after the implementation of the management plan in 2001 and has reached a mean of 37 adults since 2001 (Figure 3). The breeding population at COPR may still be growing, suggesting that the nesting habitat hasn't reached its carrying capacity (Figure 3).

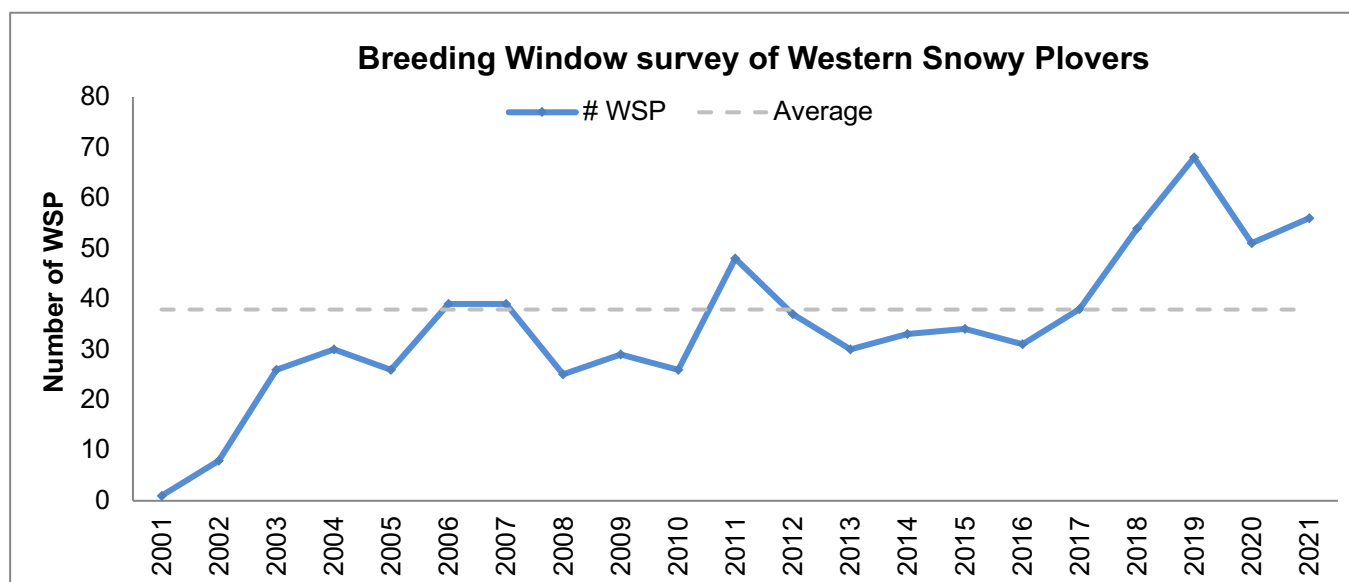


Figure 3. Number of adult Snowy Plovers recorded during breeding window surveys at Coal Oil Point Reserve. *Average line represents the average from 2003-2020. In 2001 and 2002, the breeding population was still beginning to grow. Note that these years are excluded from the calculation of all breeding averages.*

Monitoring of Nest and Chick Fate

During the breeding season, observers monitor WSP a minimum of 3 times per week using binoculars and a spotting scope. Observers record the number of adults, the number of nests, and the fate of nests and chicks. Band combinations are also recorded.

The observations are conducted from outside of the symbolic as described in the Snowy Plover Management Plan). Observers first look for signs of territoriality and breeding behavior and attempt to find the nest from a distance. Once a nest is identified, observers enter the fence and approach the nest carefully to count the number of eggs, place a marker (a 6” piece of twig found on the beach) 3 ft in front of the nest, and take the GPS location of the nest. The purpose of the marker is to easily locate and monitor the nest from a distance during the incubation period. Once the chicks hatch, observers monitor individual broods and record the number of chicks in each brood until the chicks fledge. WSP chicks at Coal Oil Point Reserve are not banded, with the exception of captive reared chicks.

If the adult plover is not seen on the nest before the hatching date, observers approach the nest to see if the eggs were abandoned or predated. Eggs are determined to be abandoned if the adults do not return to the

COPR WSP Report 2021

nest for at least 2 days once incubation has started and there are no new footprints of adults going to the nest. The reason for collecting abandoned eggs is to reduce attraction of crows and skunks and to determine their viability. If predated, observers look for footprints to determine the type of predator.

Table 1 summarizes the results of the breeding success each year. The number of males for the estimation of fledged chicks/male was calculated based on half of the adult number counted in the breeding window survey. Because males can arrive at COPR throughout the season, the number of males per season using the window survey count is likely to be underestimated.

Detailed discussion of nest and chick fate follow below (Table 1).

Table 1. Breeding success estimates of WSP at Coal Oil Point Reserve since 2001 until present.

Year	Breeding Window Survey (BWS)	# Nests	# Nests Hatched	Hatching Rate	# Chicks Fledged	# Fledges Per estimated Male (BWS)	Fledging Rate
				(# nests hatched / # nests*100)			(# 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	13	6	46%	14	2.8	83%
2003	26	24	17	71%	40	3.3	94%
2004	30	52	24	46%	27	1.8	67%
2005	26	64	16	25%	30	2.3	81%
2006*	39	43	22	51%	37	2.0	91%
2007*	39	66	20	30%	17	0.9	55%
2008*	25	57	3	5%	8	0.7	100%
2009	29	65	39	60%	61	4.2	74%
2010	26	75	42	56%	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	34	52%	30	2	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	34	65%	53	2.8	77%
2018	54	81	61	75%	82	3.0	67%
2019*	68	97	27	28%	8	0.2	19%
2020*	51	76	42	55%	23	0.9	38%

COPR WSP Report 2021

2021**	51	76	42	55%	23	0.9	38%
COPR AVERAGE	36.1	63.5	32.3	53%	37.9	2.3	62%
COPR SD	11.4	17.6	11.9	15.5	19.8	1.0	24.0

In 2001 and 2002, the breeding population was still beginning to grow. Note that these years are excluded from the calculation of all breeding averages.

**In 2006, & 2019-2021, enclosure cages were used to protect nests from crows. This was a change from the standard protocol at this site and may have affected nest fates. These years are excluded from the calculation of average hatching and fledging rates.*

***In 2007-2008 and 2021, some nests were collected, incubated in the nursery, and replaced prior to hatching. This was a change from the standard protocol at this site. Numbers reported for number of hatched nests and number of fledged chicks are those that hatched and fledged in the wild without intervention, and exclude those that hatched and fledged in the nursery. These years are excluded from the calculation of average hatching and fledging rates.*

In 2021, 93 WSP nests were initiated at COPR and 33 of them hatched (35% hatching rate). An additional 10% hatched as the result of the egg replacement method. Figure 4 shows the number of nests laid and the number of nests hatched between 2001-2021.

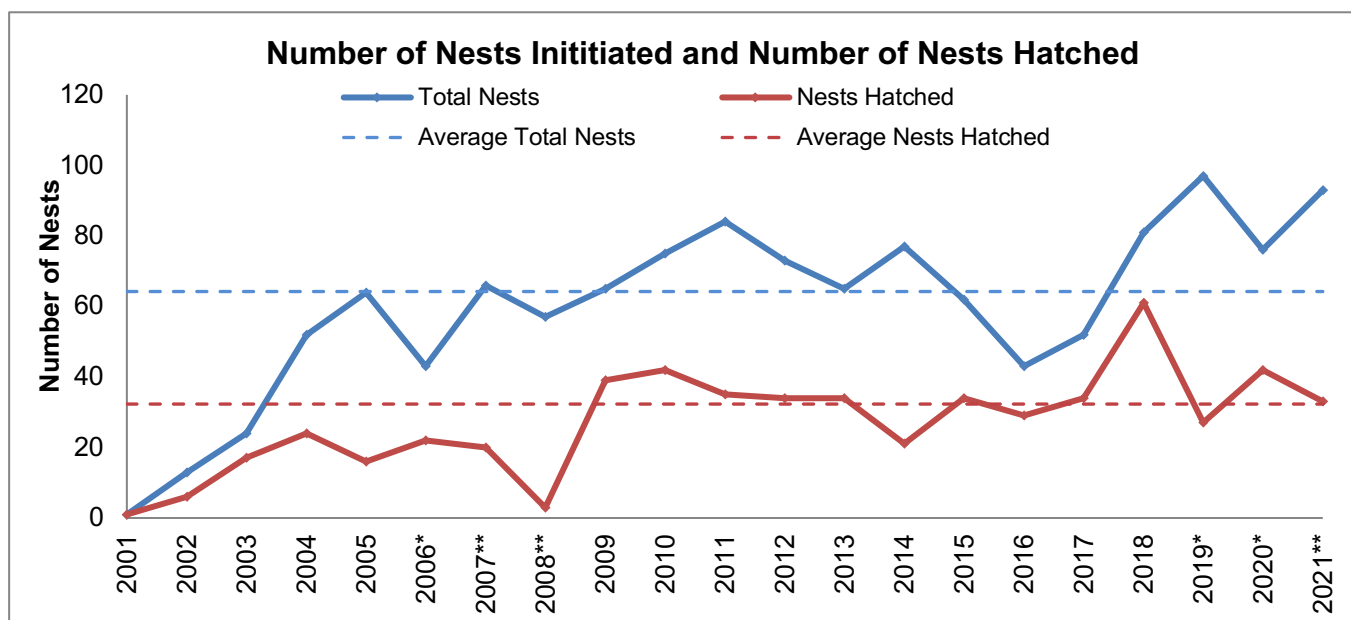


Figure 4. Nests initiated and hatched by year (total number of nests that had at least one egg vs. total number of nests that hatched at least one chick).

In 2001 and 2002, the breeding population was still beginning to grow. Note that these years are excluded from the calculation of all breeding averages.

**In 2006, & 2019-2021, enclosure cages were used to protect nests from crows. This was a change from the standard protocol at this site and may have affected nest fates. These years are excluded from the calculation of average hatching and fledging rates.*

***In 2007-2008 and 2021, some nests were collected, incubated in the nursery, and replaced prior to hatching. This was a change from the standard protocol at this site. Numbers reported for number of hatched nests and number of fledged chicks are those that hatched and fledged in the wild without intervention, and exclude those that hatched and fledged in the nursery. These years are excluded from the calculation of average hatching and fledging rates.*

are those that hatched and fledged in the wild without intervention, and exclude those that hatched and fledged in the nursery. These years are excluded from the calculation of average hatching and fledging rates.

The primary cause of nest failure this year was predation by skunks, other unknown predators and high tides (Figure 5, Table 2). Unusual nest fates for our site were due to human disturbance and abandonment. This year we also recorded 3 nest losses due to human vandalism in which the nest enclosure was lifted up and bent, eggs went missing from the nest and the only tracks leading to the nest were human prints. 6% of nests laid were abandoned.

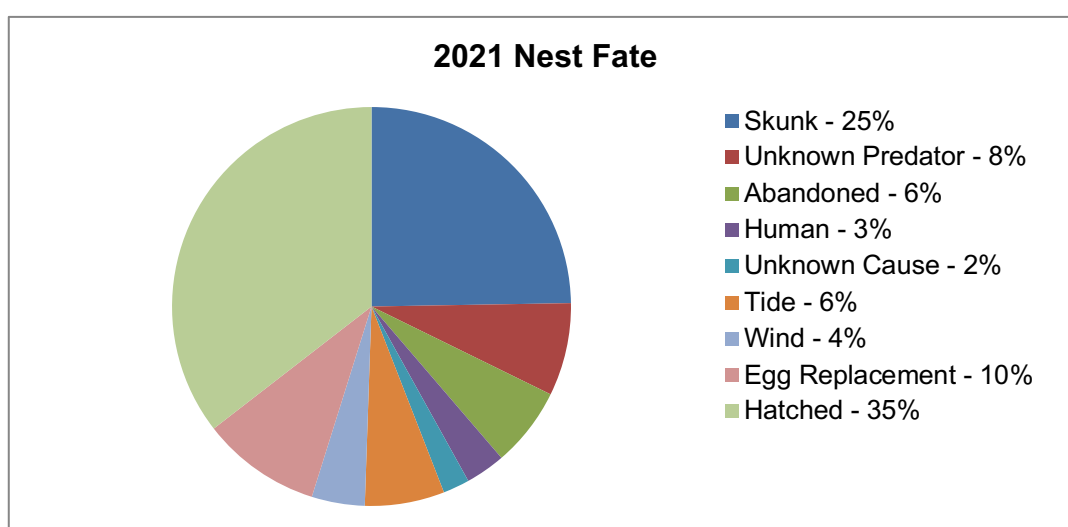


Figure 5. Nest fate at COPR in 2021. Each section in the graph shows the proportion of nests that failed by each cause and the proportion of nests that hatched (data is in Table 2 below).

Table 2. Number of nests lost by fate from 2002-2020.

Year 20-XX	'02	'03	'04	'05	'06 *	'07 **	'08 **	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19 *	'20 *	'21 **
Total nests	13	24	52	64	43	66	57	65	75	84	73	65	77	62	43	52	81	97	76	93
Hatched	6	16	20	16	22	20	3	39	42	35	34	34	21	34	29	34	61	28	42	33
Skunk	0	0	9	18	2	19	18	10	0	0	0	4	10	15	6	4	3	9	0	23
Crow	2	4	8	3	0	0	0	1	1	0	0	0	0	0	0	0	0	32	7	0
Abandoned	0	1	1	9	3	1	0	2	3	5	3	4	9	1	2	1	3	2	0	6
Abandoned/Owl	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

COPR WSP Report 2021

Raccoon	0	0	2	1	0	0	0	1	0	0	2	2	4	0	1	0	0	0	0	0
Whimbrel	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Gull	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0
Opossum	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dog	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Unknown Cause	0	0	0	0	0	0	0	0	17	8	4	0	21	0	0	0	0	0	0	2
Human	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3
Unknown Predator	0	0	0	1	1	0	0	4	0	10	3	15	9	3	0	2	3	1	2	7
Wind	1	2	2	6	1	2	2	5	2	10	2	0	0	1	0	3	1	3	8	4
Flooded/Tide	0	0	4	5	2	1	6	2	5	12	16	6	3	5	2	8	6	17	16	6
Flooded/Delta	0	0	0	3	0	0	0	0	4	3	0	0	0	0	0	0	0	3	1	0

**Note that in 2006, & 2019-2021, predator exclosure cages were used which may have affected nest fate.*

***Note that in 2007-2008 & 2021, some nests were collected, replaced with decoy eggs, incubated in the nursery, and replaced prior to hatching which may have affected nest fate.*

Predation on eggs

Crow predation on nests and chicks was very high in 2019 and 2020 (Figure 6). In 2021, COPR started using Australian crow traps in February, prior to the start of the nesting season and until May.

Additionally, we implemented crow hazing techniques using crow carcasses to deter the crows from the nesting area and harassed all crows on the beach by chasing them. USDA was contracted to remove crow nests near the plover habitat and remove crows (Appendix C) but the opportunities for removal were rare because COPR is a public beach. There was no predation from crows observed in 2021.

Table 3. Number of crows trapped using Australian crow traps.

2021	Number of crows caught in the Australian crow trap
February	21
March	27
April	13
May	4
June	.
July	.
August	.
Total	65

We also used predator exclosures to protect the nests from crows given the high predation on previous years. For more details on the design and the monitoring protocol for exclosure deployment, refer to [COPR's 2019 Final Report on WSP](#). In 2019 and 2020, there were no signs of changes in nesting behavior as a result of the cages. In 2021, we observed abandonment of 6 caged nests with a single egg, where the parents did not return to lay more eggs (Table 4). It is not known if the nests were abandoned because parents were predated or if the parents rejected the exclosure. Predator exclosures reduced predation by crows but not by skunks and overall, exclosures had no effect on hatching success (Table 3) .

Table 4. Number of nests hatched, failed due to predation, or abandoned, on nests without any treatment or with exclosures. Also shown is the result of using fake eggs in place of real eggs on hatching success and nest abandonment.

	Hatched	Failed (predation)	Abandoned
No treatment	13	15	0
Exclosure	20	18	6
Egg replacement	8	1	0

We attempted to improve the hatching success at the end of the breeding season by replacing the real eggs with fake wood eggs. We kept the real eggs in an incubator until it was time for them to start hatching and replace them back so the chicks hatched under the parents. We replaced eggs from a total of 8 nests (Table 3). Seven of the 8 hatched after being returned to the parents. One nest still with fake eggs was abandoned after a skunk attempted to eat the fake eggs and moved them a few feet from the nest. The real eggs that were in the incubator were brought to the Santa Barbara Zoo for rehabilitation and the chicks were released at COPR.

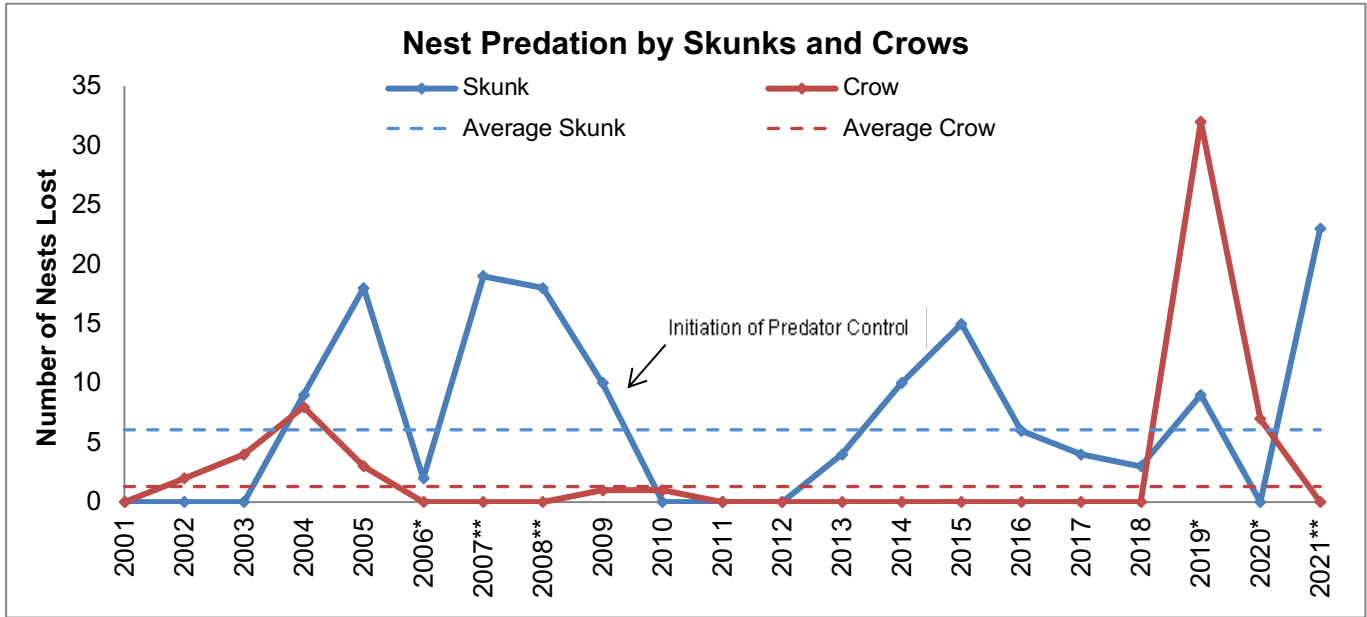


Figure 6. Skunk and crow predation by year. Average line represents the average from 2003-2005, 2009-2018.

In 2001 and 2002, the breeding population was still beginning to grow. Note that these years are excluded from the calculation of all breeding averages.

**In 2006, & 2019-2021, enclosure cages were used to protect nests from crows. This was a change from the standard protocol at this site and may have affected nest fates. These years are excluded from the calculation of average hatching and fledging rates.*

***In 2007-2008 and 2021, some nests were collected, incubated in the nursery, and replaced prior to hatching. This was a change from the standard protocol at this site. Numbers reported for number of hatched nests and number of fledged chicks are those that hatched and fledged in the wild without intervention, and exclude those that hatched and fledged in the nursery. These years are excluded from the calculation of average hatching and fledging rates.*

Predator control extended from February through August and focused on the common predators such as crows and skunks, and occasional predator such as Western gull and raccoons (see USDA report in appendix section).

In 2021, we started using Australian crow traps to trap crows and were very successful in reducing the crow predation of eggs and chicks that occurred in previous years. In addition to the trapping, we used the euthanized crow carcasses as effigies in the nesting area and on the roofs of the structures near the nesting area.

Chick Survival

The survival rate of chicks was higher than average this year. In 2021, 42 WSP chicks fledged at COPR as compared to the average of 37 (Figure 7). The fledge rate of individual chicks was 49% (Figure 8). This year, COPR plovers produced 1.5 fledged chicks per male, which is above the expected rate of 1 chick per year per male (Table 1).

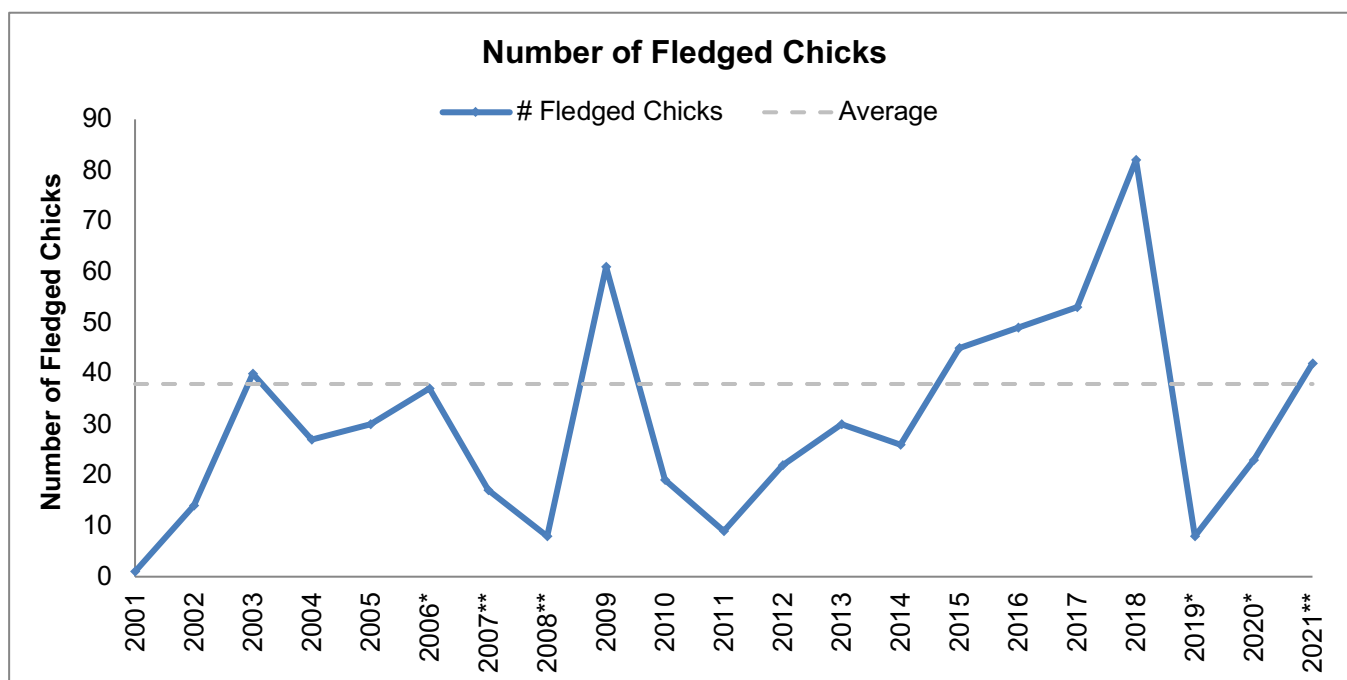


Figure 7. Number of chicks fledged by year.

In 2001 and 2002, the breeding population was still beginning to grow. Note that these years are excluded from the calculation of all breeding averages.

**In 2006, & 2019-2021, exclosure cages were used to protect nests from crows. This was a change from the standard protocol at this site and may have affected nest fates. These years are excluded from the calculation of average hatching and fledging rates.*

***In 2007-2008 and 2021, some nests were collected, incubated in the nursery, and replaced prior to hatching. This was a change from the standard protocol at this site. Numbers reported for number of hatched nests and number of fledged chicks are those that hatched and fledged in the wild without intervention, and exclude those that hatched and fledged in the nursery.*

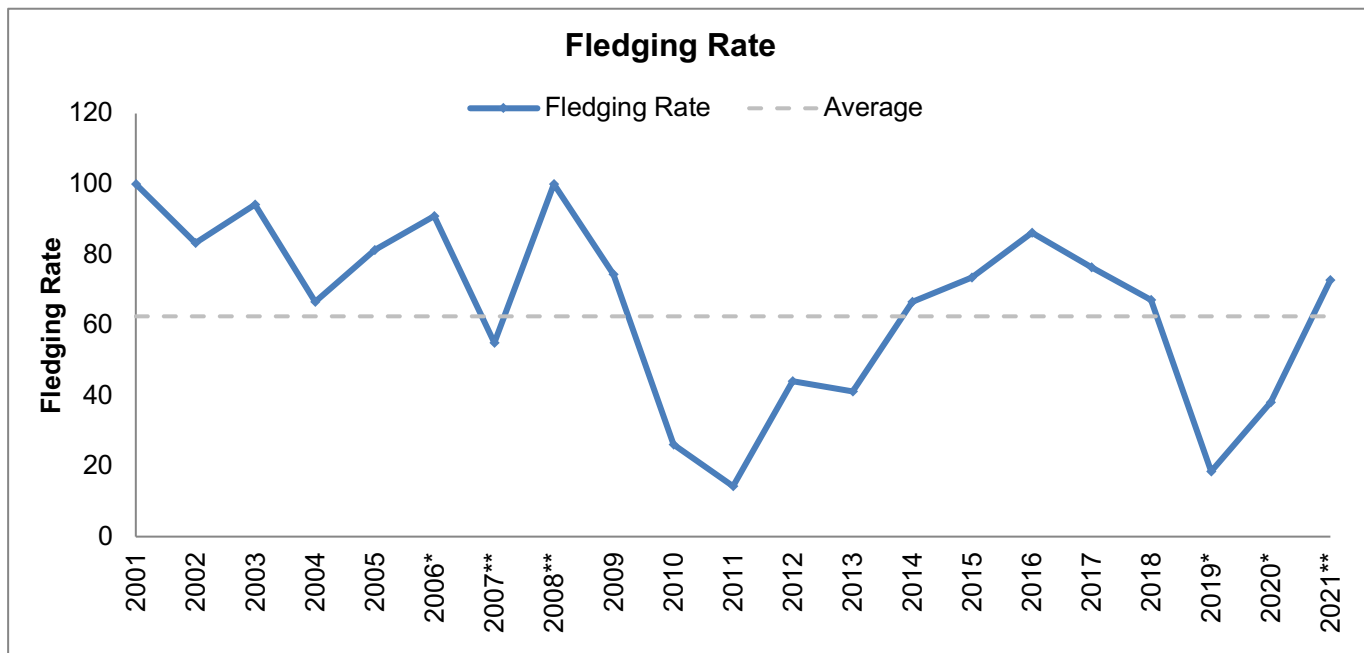


Figure 8. Fledging rate by year (# nests that fledged at least one chick/# total nests *100).

In 2001 and 2002, the breeding population was still beginning to grow. Note that these years are excluded from the calculation of all breeding averages.

**In 2006, & 2019-2021, exclosure cages were used to protect nests from crows. This was a change from the standard protocol at this site and may have affected nest fates. These years are excluded from the calculation of average hatching and fledging rates.*

***In 2007-2008 and 2021, some nests were collected, incubated in the nursery, and replaced prior to hatching. This was a change from the standard protocol at this site. Numbers reported for number of hatched nests and number of fledged chicks are those that hatched and fledged in the wild without intervention, and exclude those that hatched and fledged in the nursery. These years are excluded from the calculation of average hatching and fledging rates.*

Predation on chicks

This year, Western Gulls and Peregrine Falcons were confirmed as predators of plover chicks by visual observation (see Photos A & B). USDA was contracted to remove a confirmed problem gull from the nesting area in August (Appendix C). In September, we observed a second problem gull hunting several adult Snowy Plovers and other shorebirds (see Photo C) but did not have an opportunity for removal due to the unpredictable schedule of this individual gull.

We did not observe predation on chicks by crows and this may be due to the success of trapping crows with Australian crow traps.



Photos A & B. Documentation of a Peregrine Falcon hunting in the plover nesting habitat. At another event, C. Sandoval observed the Peregrine Falcon eating a newborn chick as it moved from the nest. Photo credit: David Blue (7/23/2021).



Photo C. Screenshot of Western Gull eating an adult WSP. [Full video link here.](#) Video credit: Thomas Sander (9/17/2021).

Nest Phenology

In 2021, the first nest was initiated on March 10th and the last chick fledged on July 20th (Table 3). Note that 4 additional chicks fledged between July 20th and September 20th, but are excluded because their survival was the result of egg replacement intervention. The peak nesting period fell between May 5th and May 11th. The total breeding season length was 132 days (defined by the number of days between first nest initiation and last observed chick or nest). The length of this year's breeding season was 23 days shorter than the average at COPR due to impacts of skunk predation on nests at the end of the season. The dates of all nesting events in 2021 fell within the range of previous years' dates (Figure 9).

Table 5. Dates of nesting events in 2021

2021 Nesting Event	Date
First Nest Initiation	3/10/2021
Last Nest Initiation	7/18/2021
First Hatch	4/4/2021
Last Hatch	8/13/2021
First Fledge	6/9/2021
Last Fledge	7/20/2021

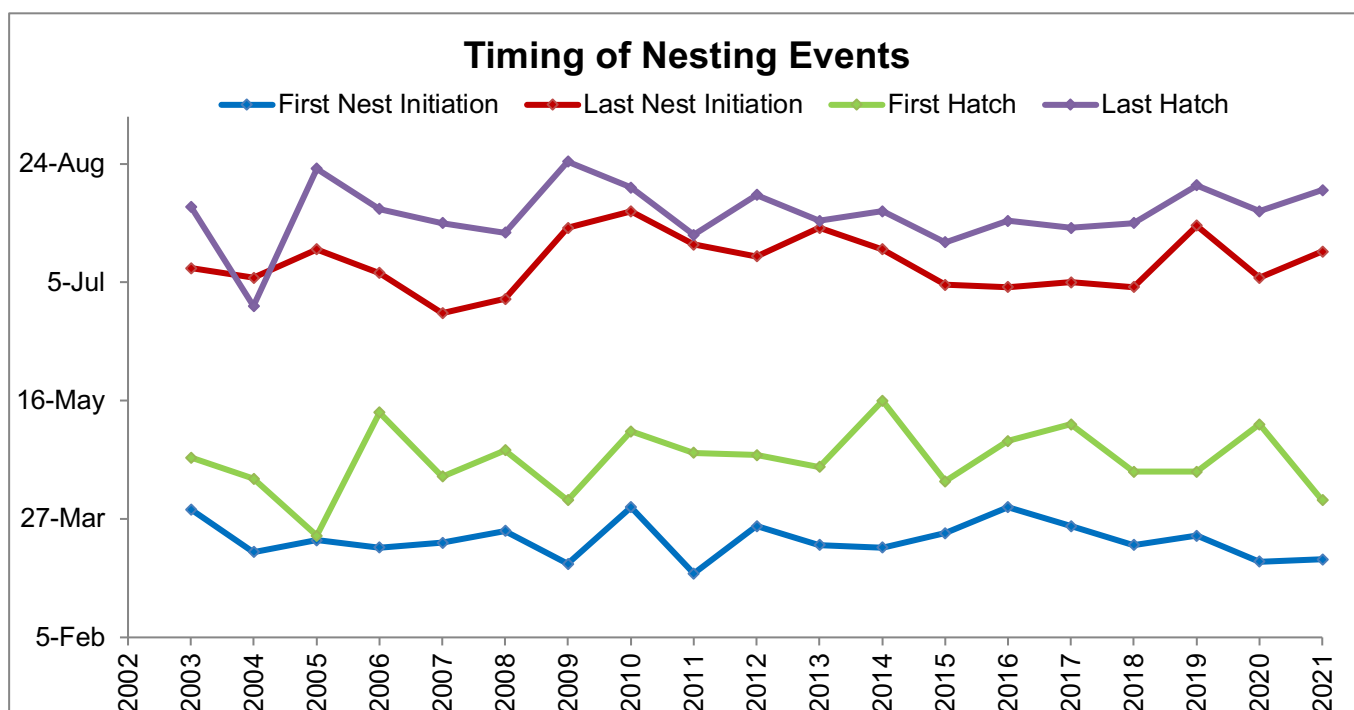


Figure 9. Timing of nest events by year

Location of Nests

GPS coordinates were recorded for each individual WSP nest. We used the mapping data to look for spatial patterns in hatching and fledging success. This year, 99% of all nests (92 nests) were initiated on the beach and 1% (1) on the delta (mudflat) of Devereux Slough (Figure 10). The low level of nesting on the delta may be attributed to the consistent presence of a large population of crows at Devereux Slough and adjacent North Campus Open Space.

The majority of the nests were concentrated on the slough mouth of the beach (Table 6). Each winter, the slough has been breaking farther west and widening the slough mouth. This has created a large nesting habitat for plovers in the slough mouth and has also resulted in the establishment of increased vegetation and the development of nascent dunes on the east half of the slough mouth where the slough no longer breaks through. The map of nest location and fate is shown below Figures 11 and 12.

Table 6. 2021 hatching rate and fledging rate by location.

Location at COPR	Total Nests Initiated	Hatching Rate	Fledging Rate
	# nests	(# nests that hatched / # nests *100)	(# nests that fledged / #nests that hatched *100)
East Side	21	43%	67%
Slough Mouth	40	35%	57%
West Side	31	29%	100%
Delta	1	100%	100%

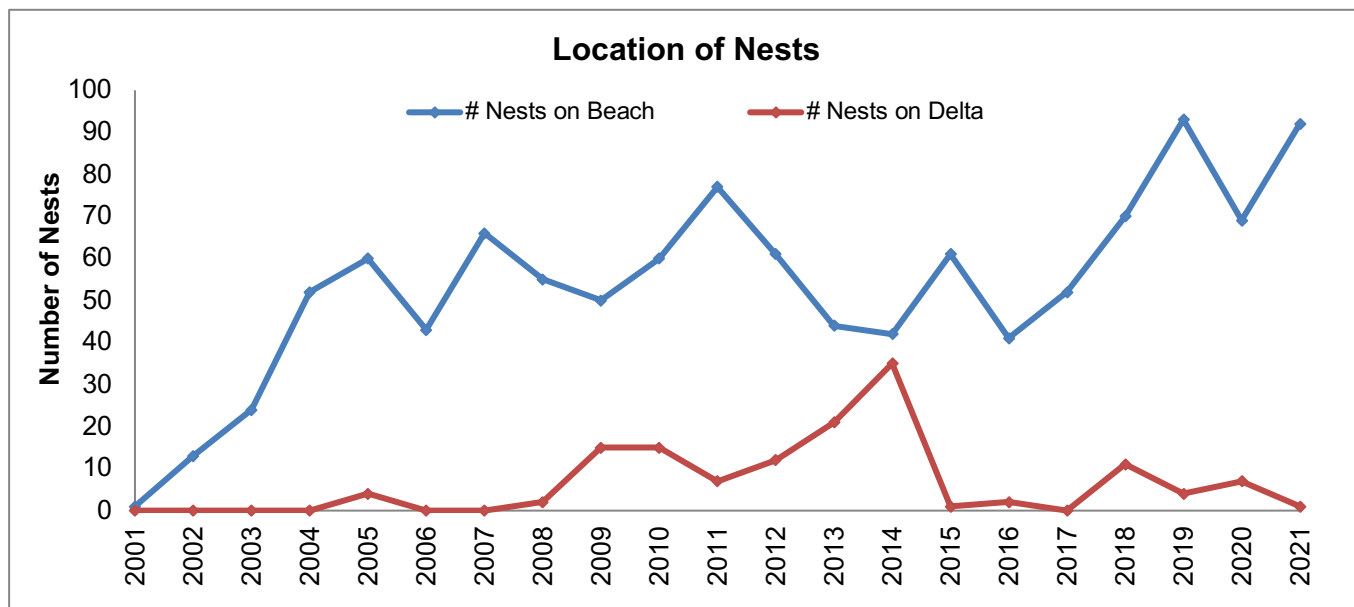


Figure 10. Number of nests on Sands Beach and the Devereux Slough mudflat between 2001-2021.

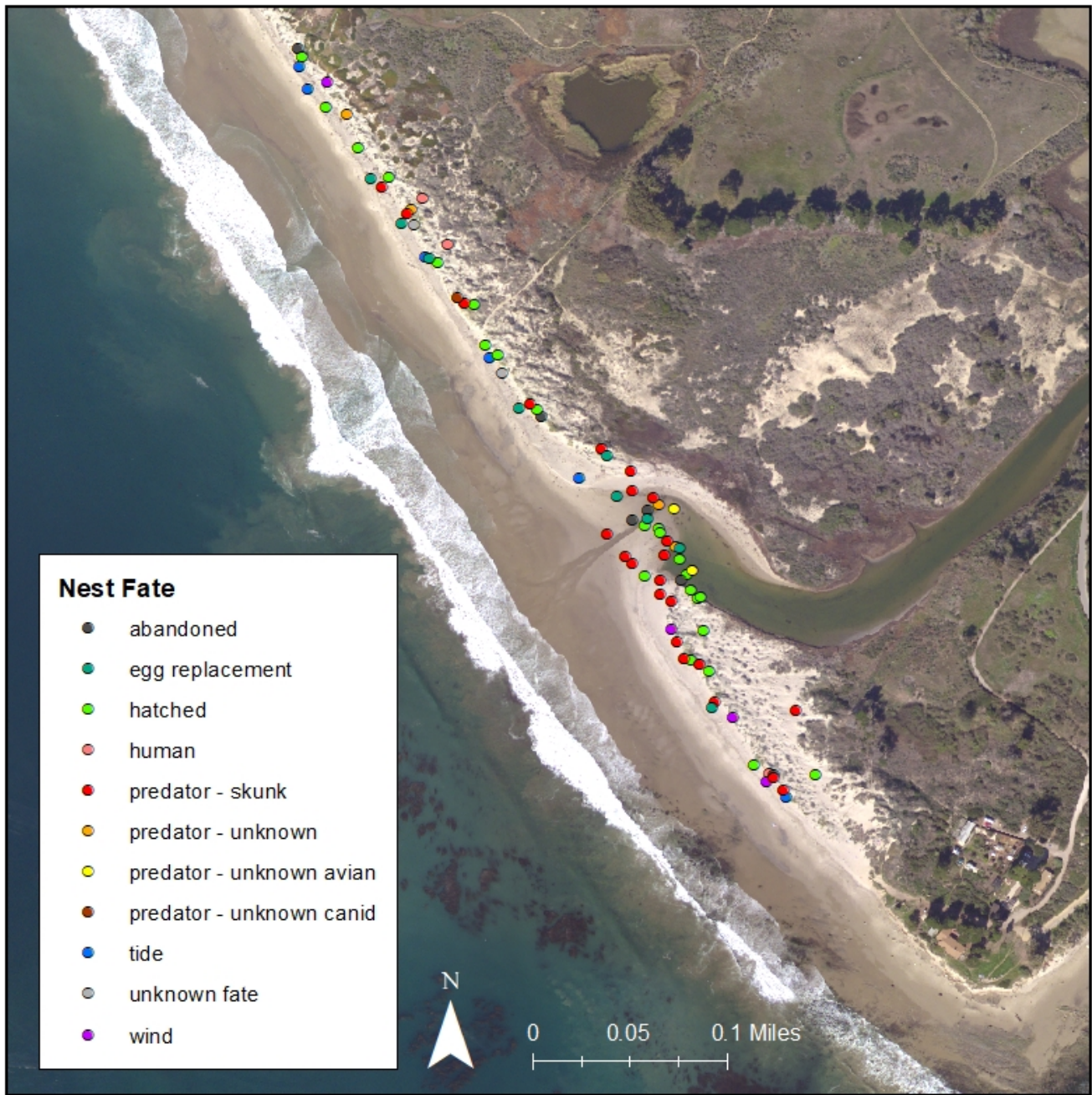


Figure 11. Location of Snowy Plover nests at Sands Beach in 2021 and their fates.



Figure 12. Map of Snowy Plover nest on the Slough mudflats in 2021.

Rehabilitation of Abandoned Eggs and Chicks

In 2021, a total of 2 chicks and 38 eggs were collected from Coal Oil Point Reserve to be transferred for rehabilitation and testing for viability at Santa Barbara Zoo. Both chicks were rescued on separate occasions as the result of adult plovers harassing and attacking them. In one case, the parent was still

caring for the chick but the chick was showing signs of malnourishment and dehydration. The chick, unable to walk, kept falling over with shaking legs, and was noticeably smaller than its siblings. In the second case, the chick was separated from its brood and showing signs of hypothermia. Table 7 summarizes the reason for the collection of the eggs.

Table 7. Number of eggs collected and taken to the Santa Barbara zoo to be tested for viability, and then hand reared in they were viable.

Reason for collection	Number of eggs collected	Number of eggs hatched
Abandoned (1 egg nest with 3 eggs and 5 nests with 1 egg)	8	0
Human vandalism	1	0
Egg left behind after chicks hatched	10	4
Skunk	3	3
Tide	6	2
Wind	10	1
Total eggs	38	38

The collected eggs were placed in the incubator at 98.5 F, with a water dish to achieve adequate humidity. As soon as possible they were transported to the zoon a dish with sand (to avoid rolling over). Once hatched, SBZ staff fed the chicks a diet of bloodworms, pinhead crickets, mini mealworms, and beach hoppers. Special care was taken to keep the chicks 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 the chicks' release, plover biologist Doug George, from Point Blue, banded each chick with a unique band combination (Table 8). Each individual satisfied the USFWS requirements of age, health, and minimum size for release prior to the release date.

Three groups of captively reared chicks from COPR and other sites were released at COPR on the mornings of June 21st, July 19th, and September 20th. They were released outside of any current nest or brood territories (~200 m west of the start of plover fence). The fledged plover chicks spent two hours in a release pen on the beach before the scheduled release time to allow them time to acclimate to their new

environment before full release. The pen was constructed out of chicken wire with 1" x 1.5" mesh size. The pen was 5' x 5' x 2' and secured to the ground with rebar posts in each corner. We supplemented the pen with kelp wrack and beach hoppers so that the plovers could feed. We covered the top of the pen with blankets for a few minutes to prevent plovers from attempting to fly up into the lid of the pen when first released into the pen from the pet carriers.

We observed the chicks in the pen while they acclimated to ensure normal behaviors and to ensure that the chicks were not disturbed by predators or humans. All chicks exhibited normal behaviors within minutes of being released into the pen, alternating between feeding, standing, walking, and stretching wings. Wild plovers in the area approached the pen and did not display any territorial behavior toward the chicks. At release time, we opened up one side of the pen facing toward the fenced plover habitat. Some released chicks successfully took flight within five minutes of opening the holding cage. Most calmly walked out of the pen, but remained in the area in a group on the sand. All released COPR chicks have been sighted at Coal Oil Point Reserve since the release with the exception of one (banded py:yg). We continue to monitor the band sighting email list for sightings of this plover at other sites.

Table 8. Band combinations for all captive reared and released plovers rescued from COPR in 2021.

Bands Left	Bands Right	Release Date	Release Site	Sightings post-release
PY	OG	7/19/2021	COPR	Yes
PY	VR	7/19/2021	COPR	Yes
PY	OO	7/19/2021	COPR	Yes
PY	AW	7/19/2021	COPR	Yes
PY	VO	7/19/2021	COPR	Yes
PY	GO	9/20/2021	COPR	Yes
PY	WG	9/20/2021	COPR	Yes
PY	YG	9/20/2021	COPR	No
PY	VA	9/20/2021	COPR	Yes
PY	RW	9/20/2021	COPR	Yes

Enforcement of beach regulations

There is no regular police presence at Sands Beach. In 2020, officers from UCSB Police Department communicated to the COPR staff that they would not enforce the leash law at COPR. Instead, they decided to focus on communication and hope that their presence would be sufficient to have people

comply with the leash law. In addition, UCSB PD made a determination that the beach below the symbolic fence, where the WSP feed and rest, is not part of their jurisdiction and therefore they would not enforce laws in that area. In December 2017, the California Coastal Commission approved an LRDP amendment that prohibits dogs at COPR. However, this new policy has not been implemented as UCSB Administration requested that COPR explore alternative options. The COPR advisory committee met in 2021 and recommended the implementation of the dog prohibition.

Docent Program and Beach Use

The docent program continues to be crucial to the success of Western Snowy Plover recovery at Coal Oil Point. In 2021, docent coverage averaged 64 hours per week (Figure 13).

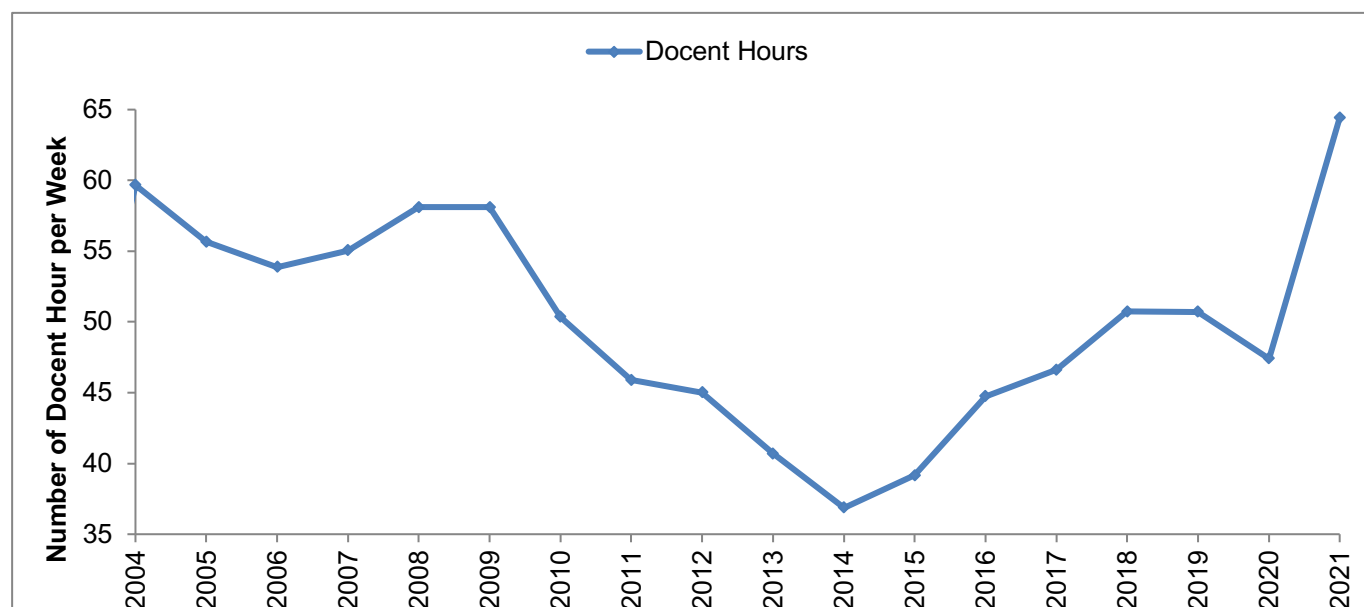


Figure 13. Average number of hours that Snowy Plover docents spent per week at Sands Beach (total number of docent hours/52 weeks). Note that in 2020, the docent program was inactive for 6 weeks due to Covid-19 restrictions, so the total number of hours for 2020 was divided by 46 weeks.

The docents teach people about the plovers, request compliance to the leash law, request people to stay away from the symbolic fence and avoid ball games on the beach, request people to move around the plover flock, scare away crows, and inform the staff about birds of prey observed around the nesting area. During each shift, the docents collect data on the numbers of people, dogs, and trespassers, as well as other data on beach use.

The most important times for a docent presence on the beach are the breeding season (March 15-September 15), holidays, and weekends. These are precisely the most difficult times to find available volunteers. As a result, the COPR staff pays UCSB student interns to fill in these gaps. The interns are paid through grants provided by UCSB Coastal Fund.

The area where sunbathing is permitted on Sands Beach has space for approximately 50 beachgoers. When the number of people on the beach exceeds this threshold, sunbathers are more likely to overflow into the plover feeding area. Since 2011 when a new parking lot for recreation opened on West Campus, the docents have recorded more days when the beach exceeds 50 people at Sands Beach (Figure 14).

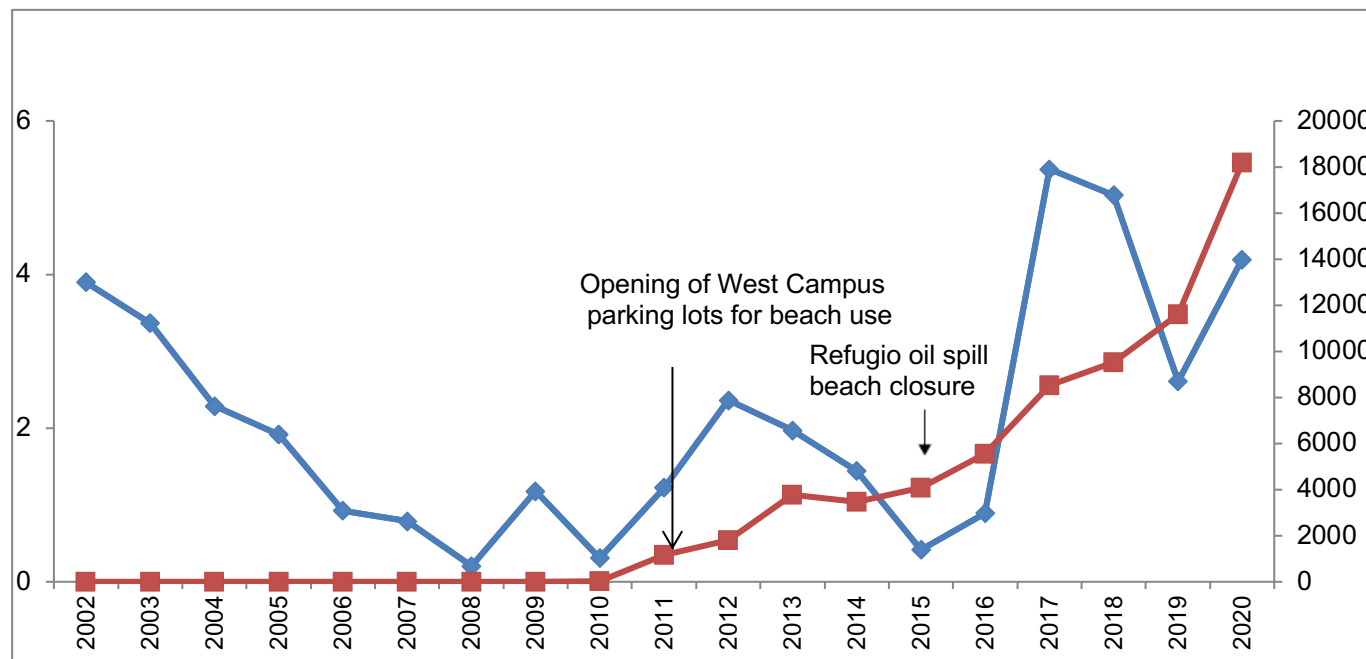


Figure 14. Percent of times that the docents counted more than 50 beach users during snapshot surveys (blue line, left axis). Number of beach parking permits issued on West Campus parking lot (red line, right axis).

Spring and Summer are the quarters when the beach is most busy (Figure 15).

Figure 15. Average number of beach users counted by docents on snapshot surveys at Sands Beach. These data do not include people in the ocean.

The total number of dogs at Sands Beach, leashed and unleashed, has increased in the last 4 years (Figure 16 and 17). The docents significantly influence dog owners to leash their dog after contact (Figure 17).

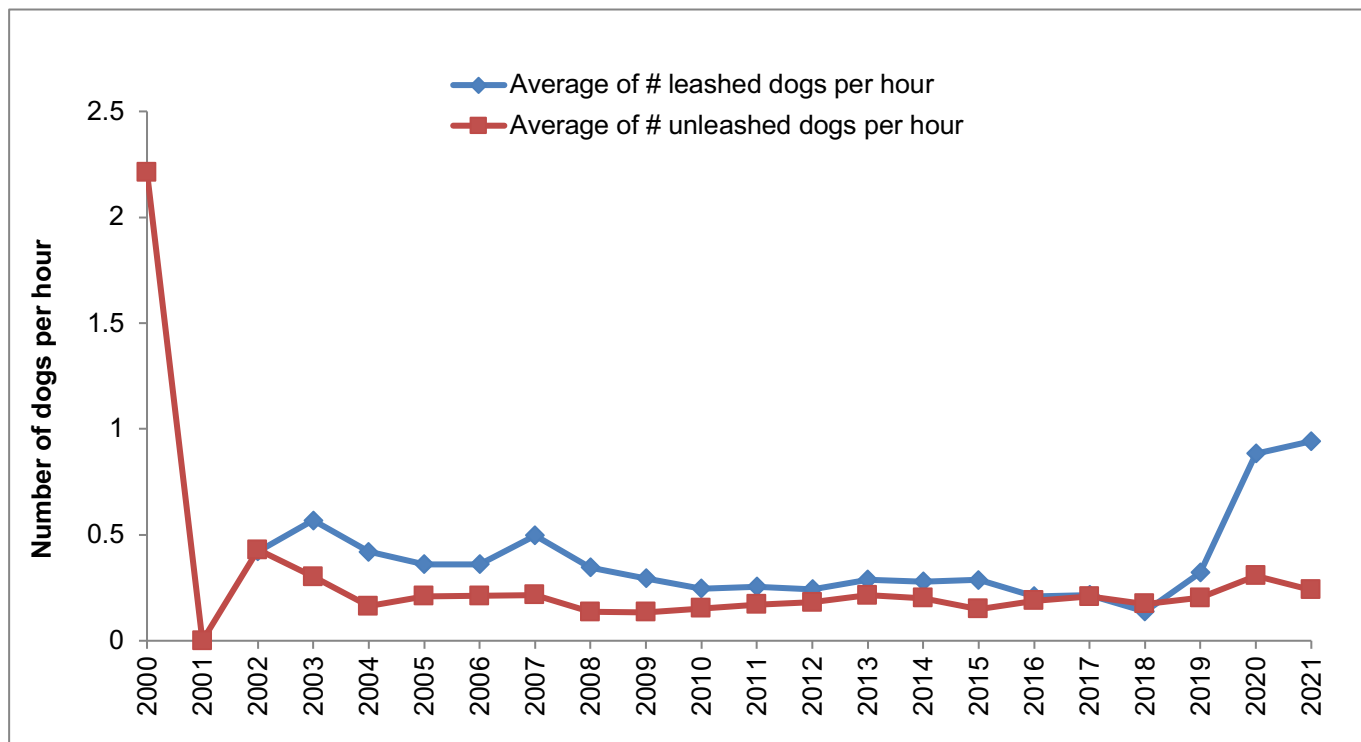


Figure 16. Average number of leashed and unleashed dogs per hour at Sands Beach. The docents record all the dogs that enter Sands Beach.

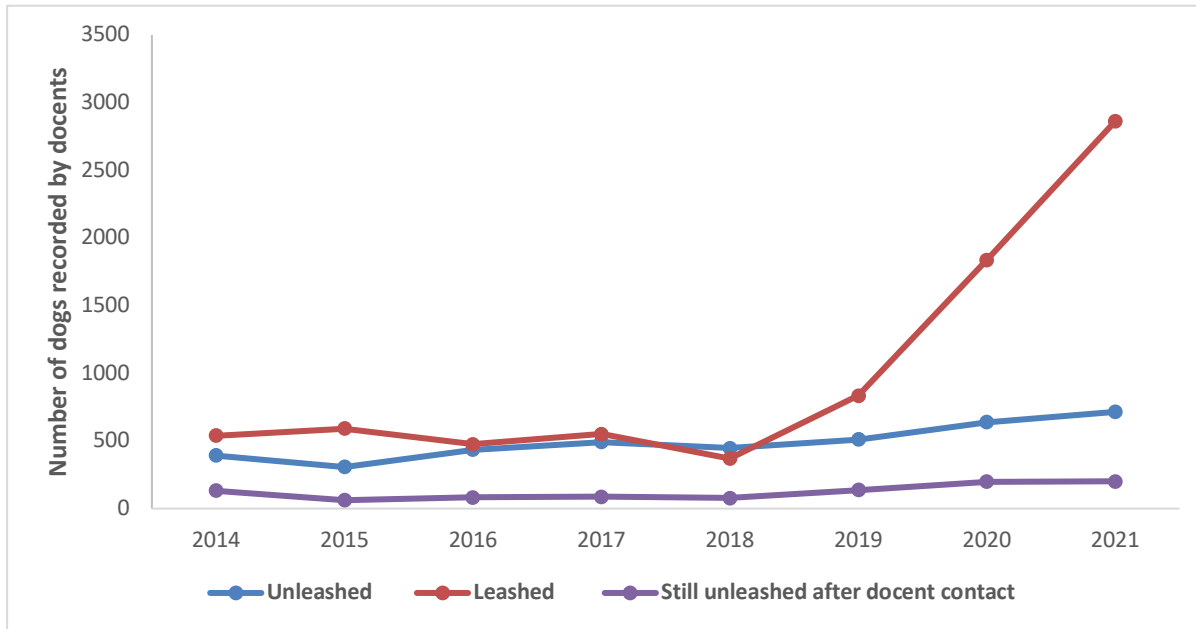


Figure 17. Total number of dogs recorded by docents per year, leashed, unleashed, and unleashed after the docent requested the dog owner to leash their dog.

Based on docent data, we estimate that there were 325 trespassing events in 2021, which is slightly more than average but less than one third of the high levels of trespassing that occurred in 2020 (Figure 17). The majority of trespassing occurs during the winter when the fences are removed due to storms (Figure 18).

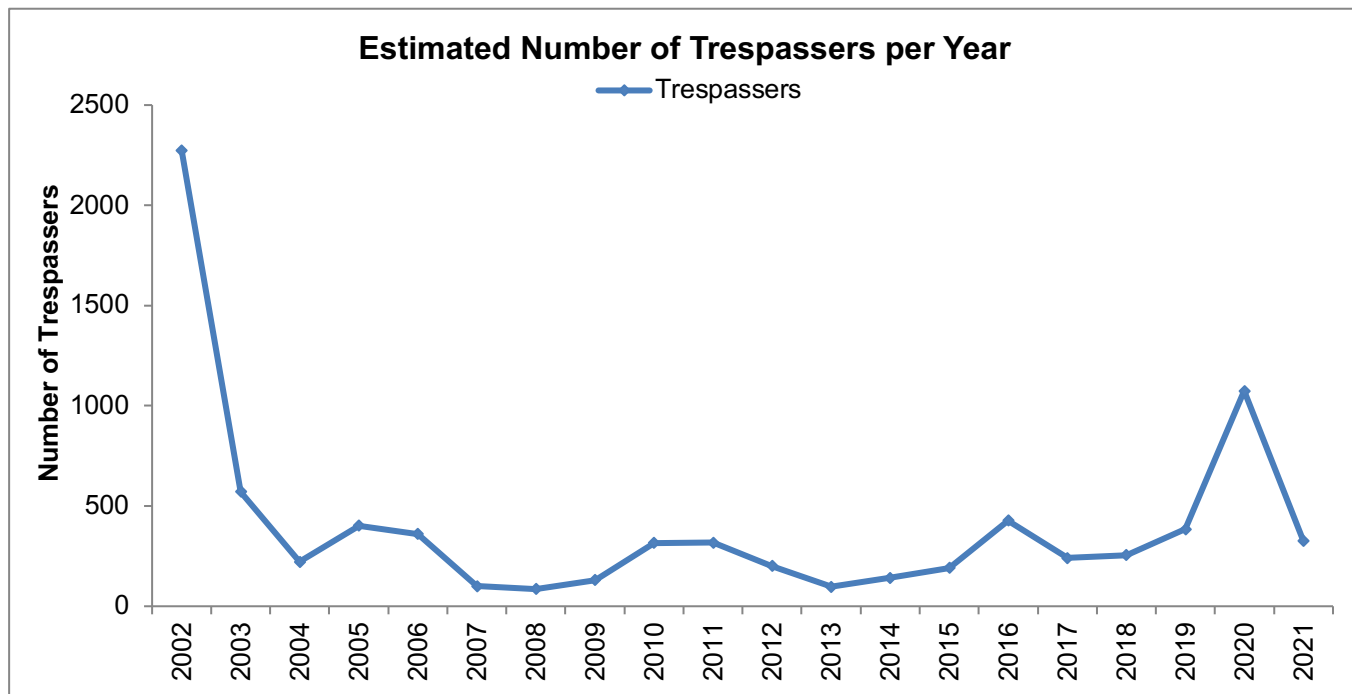


Figure 17. Estimated total number of visitors trespassing into protected habitat each year. Estimates based on the hourly rate of trespassers observed by docents ($(\# \text{ trespassers/hr}) \times (12 \text{ hrs/day}) \times (365 \text{ days/yr})$).

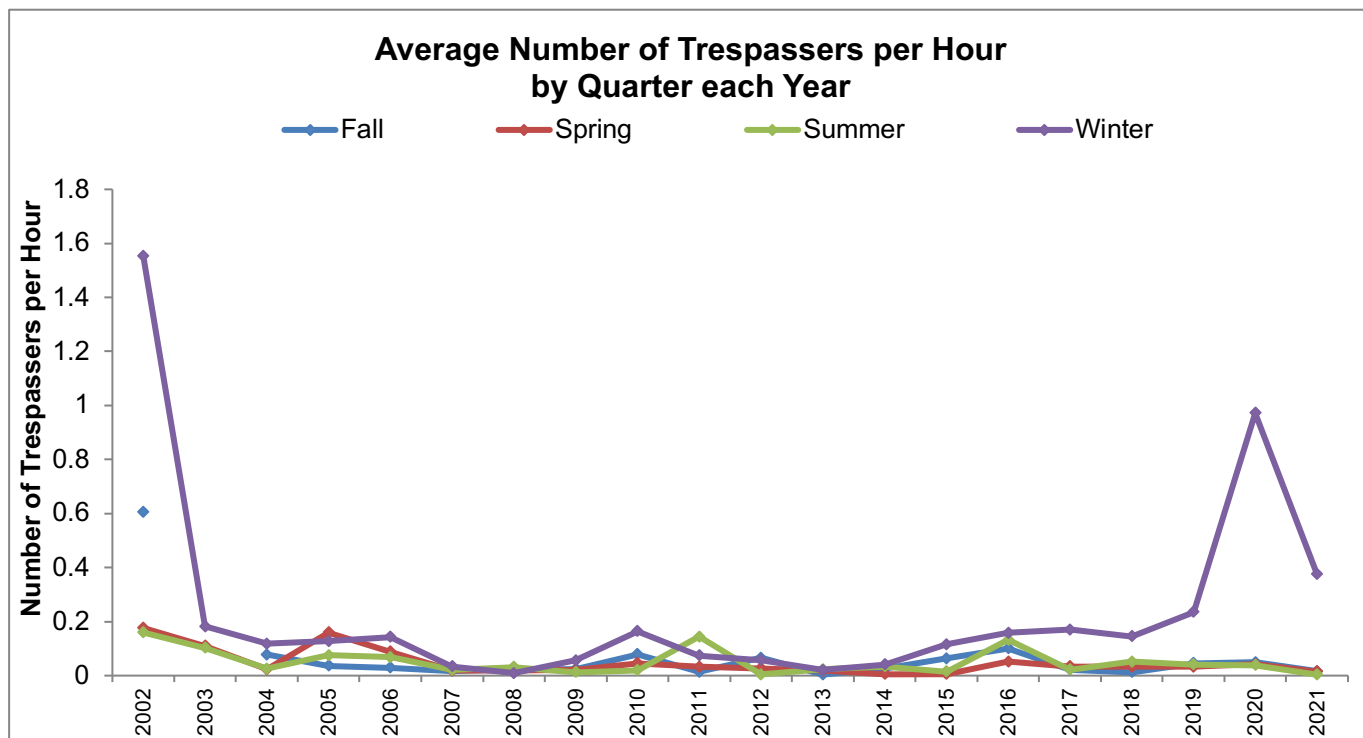


Figure 18. Average number of trespassers each quarter. Note that the peak in the number of trespassers is during the winter quarter when the symbolic fence is removed and the Snowy Plover habitat is marked only with signs.

CONCLUSION

The breeding population of WSP at COPR has recovered since the implementation of a management plan in 2001. The wintering population at the reserve this year was slightly above the average for this site, but the number of breeding adults has reached record highs over the last 4 years. The docent program continues to be an effective way to reduce human disturbance on the plovers. However, pressure from increasing human population using the beach, a university owned parking lot with approximately 120 visitor spaces on West campus, and a reduction in beach area from sea level rise, are making it more challenging for docents to protect the plovers from human disturbance. Despite a great success that signs fences, and docents achieved in improving the compliance of beach regulations by beach goers, with a larger number of people on the beach, the total amount of disturbances can still increase. A great example is the problem of dogs off leash. More people are complying with the leash law now than ever, but still, the number of unleashed dogs has increased because the total number of leashed and unleashed dogs has increased at sands Beach. This data shows the importance of capping the number of people beaches that habitat for sensitive wildlife such as the Snowy Plovers. The development of beach parking lots and beach access trails have potential impacts to sensitive resources and should require careful planning to avoid beach overuse and deterioration of natural resources. Relocating parking lots to less sensitive areas and reducing the number of parking spaces may be a way to improve the impacts of beach overuse.

The control of urban predators such as skunks, crows, and gulls has become a management priority to improve both hatching and fledging success. COPR has not yet secured recurrent funds for predator control and thus employs a minimum number of USDA staff hours each year. It continues to be crucial to initiate predator control prior to the plover nesting season, or as soon as there is evidence of potential predators in the vicinity of the nesting area. The Wildlife Care Network raises and releases 200-300 crows each year. Despite good intentions, this effort unfortunately creates additional problems to WSP and other birds that are preyed upon by crows. The use of predator enclosure may not be effective in improving hatching success when skunks are abundant because skunks are not excluded from the enclosures.

RECOMMENDATIONS

- The predator control program needs to be funded with more trap hours and in perpetuity.
- Other means to deter skunks, such as electric fences should be explored, as exclosures and trapping have not been effective in protecting nests from skunks.
- The dog prohibition at Sands beach should be implemented as soon as possible.
- A new beach access plan is needed to offer options to reduce recreational pressure at Sands beach and protect the WSP. For example, through the installation of a beach access to Devereux Beach, by the jailhouse
- On West Campus, parking lots for beach recreation should be limited and shifted south east to encourage people to use Devereux Beach.

ACKNOWLEDGEMENTS

Jessica Gray (Conservation Specialist) and Cristina Sandoval (Reserve Director) conducted plover monitoring. Jessica managed the docent program. We are very thankful to Rick Fellows who 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, 65 volunteers and interns over the course of 2021, maintained a presence at the beach every day of the year. Alexa Kerr completed a senior thesis project modeling the effects of sea level rise on WSP habitat at COPR. Eric Covington and Anthony Jennings (USDA) implemented predator management during the breeding season. The Santa Barbara Zoo conducted all captive rearing of WSP rescued from COPR.

California Least Terns

Several adult and juvenile California Least Terns were observed flying over and stopping through COPR but they did not nest. We did not observe any courtship or mating behavior this year. There has not been confirmed nesting of Least Terns at COPR since 2011 (Table 9).

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.
- 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>
- Nielsen, J., Hampton, S. & Sandoval, C. 2017. "Cooperation between Response Crews and Land Managers Protects Snowy Plovers during the Refugio Oil Spill." *International Oil Spill Conference Proceedings*. 2017. 618-633. 10.7901/2169-3358-2017.1.618.
- Sandoval, C.P. 2019. COPR Beach Access Management Plan and Snowy Plover Management Plan. Coal Oil Point Reserve, University of California Santa Barbara.
- Sandoval, C.P. 2004. COPR Snowy Plover Management Plan. Coal Oil Point Reserve, University of California Santa Barbara.
- Sandoval, C.P. 2015. COPR Snowy Plover Management Plan. Coal Oil Point Reserve, University of California Santa Barbara.
- US Fish and Wildlife Service, 2007. Recovery plan for the Pacific coast population of the Western Snowy Plover (*Charadrius alexandrinus nivosus*).

APPENDIX A

Band sightings by COPR staff at Sands Beach

Note: "X" represents unknown band, i.e. when plover is standing on one leg and observer can only view bands on exposed leg.

Table 9. Summary of banded WSP recorded at COPR by staff and docents in 2021

Bands Left	Bands Right	Band Origin (if known)	Notes
a	a/r	unknown	
a	ll	unknown	
ab	gg	Salinas River SB (2021)	
ab	gy	Pajaro Spit, Monterey (2021)	
an	ar	unknown	
an	g/w/g	unknown	
an	ol	VAFB (2020)	
an	po	unknown	
an	rg	VAFB (2016)	
an	rv	VAFB (2021)	
an	rw	VAFB (2014)	
an*	wy	VAFB (2017)	*bands on left leg (an) were removed during rehabilitation
av	ba	Point Reyes National Seashore (2021)	
av	ga	unknown	
av	gy	unknown	
ay	gw	Sand City/Del Monte (2021)	
ay	gy	unknown	This combo is not currently in use
bb	gg	Oceano (2013 or 2014)	
bb	lb	Oceano (2019)	
bb	po	Oceano (2021)	
bb	ry	Oceano (2021)	
bn	rv	unknown	
bw	wg	unknown	
bx	pg	unknown	
by	rv	Salinas River (2017)	
ga	pb	Oceano (2017)	
gg	or	COPR (2019), raised at SBZ, released at COPR	
gg	pb	unknown	
gn	bv	unknown	
gn	nr	VAFB (2017)	
gn	or	VAFB (2020)	nested at COPR in 2021
gn	pw	unknown	
gv	gy	unknown	possible misread of vg:yg (Oceano 2012/2013)
gw	gg	unknown	possible misread of gk:gg with black tape faded to silver
gy	or	unknown	likely gn:or
kb	wb	Naval Base Coronado (2017)	blue anodized band on left leg faded to silver
ko	gr	pond A22, Warm Springs Unit of Don Edwards NWR, Fremont (2021)	
lg	rg	Naval Base Coronado (2021)	
lg	yr	unknown	
ly	op	Naval Base Coronado (2021)	
n/r/w	ny	unknown	
nb	pr	VAFB (2020)	
no	gv	VAFB (2021)	
no	no	VAFB (2019)	
nr	ny	VAFB (2016)	
nr	yy	unknown	possible misread of nr:ny

COPR WSP Report 2021

nv	pr	unknown	
nw	by	unknown	
ny	og	unknown	
ny	ry	unknown	
ny	wg	VAFB (2017)	
ny	wl	unknown	possible misread of ny:wg
o	w/k	unknown	
og	an	unknown	
pa	or	COPR (2019), raised at SBZ, released at COPR	nested at COPR in 2021
pa	yb	COPR (2019), raised at SBZ, released at COPR	nested at COPR in 2021
pb	or	unknown	possible misread of pa:or
pg	ba	Oceano (2021)	
pg	gg	Oceano (2021)	
pg	vv	Oceano (2021)	
po	aa	unknown	
po	gg	unknown	
po	vw	unknown	
pv	bg	unknown	
pv	ra	unknown	Likely a misread. One of Oceano's combos, but hasn't been used yet.
pv	vr	COPR (2021), raised at SBZ, released at COPR	
py	aa	Oceano (2021), raised at SBZ, released at COPR	
py	ab	unknown	
py	ag	Oceano (2021), raised at SBZ, released at COPR	
py	aw	COPR (2021), raised at SBZ, released at COPR	
py	bb	unknown	
py	bw	unknown	
py	gg	Oceano (2021), raised at SBZ, released at COPR	
py	go	COPR (2021), raised at SBZ, released at COPR	
py	gw	Oceano (2021), raised at SBZ, released at COPR	
py	oa	Ormond (2021), raised at SBZ, released at COPR	
py	ob	unknown	possible misread of py:oa
py	og	COPR (2021), raised at SBZ, released at COPR	
py	oo	COPR (2021), raised at SBZ, released at COPR	
py	ow	Oceano (2021), raised at SBZ, released at COPR	
py	py	unknown	
py	ra	Oceano (2021), raised at SBZ, released at COPR	
py	rr	Oceano (2021), raised at SBZ, released at COPR	
py	rw	Oceano (2021), raised at SBZ, released at COPR	
py	va	COPR (2021), raised at SBZ, released at COPR	
py	vb	unknown	possible misread of py:vv
py	vg	Ormond (2021), raised at SBZ, released at COPR	
py	vo	unknown	
py	vr	COPR (2021), raised at SBZ, released at COPR	
py	vv	Oceano (2021), raised at SBZ, released at COPR	
py	vw	Ormond (2021), raised at SBZ, released at COPR	
py	vx	unknown	2nd band not visible
py	wa	Oceano (2021), raised at SBZ, released at COPR	
py	wg	COPR (2021), raised at SBZ, released at COPR	
py	wp	unknown	
py	ww	Oceano (2021), raised at SBZ, released at COPR	
py	wy	Oceano (2021), raised at SBZ, released at COPR	
py	xg	unknown	
py	xx	unknown	
py	yr	Oceano (2021), raised at SBZ, released at COPR	
r	or	unknown	
rw	ao	Fort Ord State Beach (2021)	
rw	ny	unknown	
S	G	unknown	green band was flagged with code "BZ" (possibly code "B7", "8Z", or "Z8")

COPR WSP Report 2021

uu	y	RU2 - likely Humboldt County	
uu	yg	unknown	
va	or	unknown	
vb	ra	Stone Lagoon, Humboldt State Park (2021)	
vb	rb	South Spit, Humboldt Bay (2021)	
vg	uu	Oceano (2020), raised and released at COPR	
vg	vg	Oceano (2018)	
vv	yv	Ormond (2019), raised at SBZ, released at COPR	nested at COPR in 2021
vy	vy	Oceano (2020), rescued from Oceano, released at COPR	
w/r/w	w	VAFB (2020)	
wa	ow	Moss Landing (2019)	
wb	ow	Salinas River NWR (2021)	
wb	pr	unknown	
wg	or	unknown	Monterey Bay combination not known to be alive.
wg	yr	North Fort Ord, Monterey (2018)	
wr	ry	Salinas River NWR (2021)	
wy	yy	unknown	Monterey Bay combination not known to be alive.
yg	wl	Marina State Beach (2016)	
yo	xx	Monterey Bay area (year?)	
yw	po	unknown	
Yy	yy	Zmudowski State Beach (2020)	

Eric Covington
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

9 December 2021

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 avian and mammalian predators during the 2021 nesting season. Predator removal activities began on 1 April 2021 and ended 20 August 2021. Predator removal activities were not consistent throughout this time period.

Striped skunks, raccoons, Western Gulls and American Crows were the target predators during the 2021 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. No padded jaw leghold traps were set this season. Five striped skunks and two raccoons were removed by trapping during the 2021 Western Snowy Plover nesting season.

Attempts were made by WS during the 2021 nesting season to remove American Crows with a 22-caliber pellet rifle. Staff at Coal Oil Point Reserve were very successful in trapping American Crows in an Australian crow trap which proved to be a better solution to crow depredation at this site than shooting. No American Crows were removed by WS this season.

Visitors to Coal Oil Point Reserve observed a Western Gull preying on Western Snowy Plover Chicks in August. One Western Gull was removed on August 20th with a Ruger 22 caliber rifle shooting non-lead CCI Short Range Green ammunition. 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 conducted in accordance with all applicable Wildlife Services Directives, all state and local policies and the



United States
Department of
Agriculture

Animal and
Plant Health
Inspection
Service

Wildlife Services

San Luis District

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

American Veterinary Medical Association's Guidelines for the Euthanasia of Animals: 2020 Edition (See references at the end of the report).

Wildlife Services spent 58 hours on predator removal activities, carcass disposal, and associated administrative duties at Coal Oil Point Reserve during the 2021 season. A total of 160 trap nights with cage traps were spent trapping and removing mammalian 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 2022. 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.

Continue utilizing the Australian crow trap for removing large numbers of crows. If possible, attempt to secure a decoy crow prior to nesting season to increase trapping success. If attempts to secure a decoy crow are unsuccessful, consider purchasing an electronic crow decoy such as the Mojo Crow or similar device (see link below for crow decoys).

[Amazon.com : Mojo Decoys HW2402 Mojo Crow : Hunting Decoys : Sports & Outdoors](https://www.amazon.com/Mojo-Decoys-HW2402-Mojo-Crow-Hunting-Decoys-Sports-Outdoors/dp/B078888888)

Feel free to contact me if you have any questions.

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

References:

<https://www.avma.org/sites/default/files/2020-01/2020-Euthanasia-Final-1-17-20.pdf>

https://www.aphis.usda.gov/wildlife_damage/directives/pdf/2.430.pdf

https://www.aphis.usda.gov/wildlife_damage/directives/pdf/2.505.pdf



https://www.aphis.usda.gov/wildlife_damage/directives/pdf/2.515.pdf

https://www.aphis.usda.gov/wildlife_damage/directives/pdf/2.615.pdf

[https://govt.westlaw.com/calregs/Document/ICDB9D4B2F75F4D8D9CA4BD408AD7C38A?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=\(sc.Default\)](https://govt.westlaw.com/calregs/Document/ICDB9D4B2F75F4D8D9CA4BD408AD7C38A?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default))

21 CFR 1308 – Schedules of Controlled Substances, Section 1308.03 – Administration
Controlled Substances Code Number, Sections 1308.11 – 1308.15 Schedules I-V.

APPENDIX C
Nesting Data from WSP habitat adjacent to the COPR

Table 10. WSP nesting data from UCSB North Campus Open Space (NCOS). First nest observed in 2018.

Year	# nests	# nests hatched	# nests predated by skunks	# nests predated by crows
2018	1	0	0	1
2019	3	0	2	1
2020	1	1	0	0
2021	0	.	.	.

Table 11. WSP nesting data from Ellwood Beach, Goleta. First nest observed in 2019.

Year	# nests	# nests hatched	# nests predated by skunks	# nests predated by crows
2019	1	0	0	1
2020	0	.	.	.
2021	0	.	.	.

APPENDIX D
 California Least Tern Nesting Data from at COPR

Table 12. LETE nesting data from COPR. First nest observed in 2006.

Year	# nests	# nests hatched	# nests predated by skunks	# nests predated by crows	# nests abandoned
2006	5	4	0	0	1
2007	6	1	5	0	0
2008	1	0	1	0	0
2009	0	.	.	.	.
2010	0	.	.	.	.
2011	1	0	0	0	1
2012	0	.	.	.	.
2013	0	.	.	.	.
2014	0	.	.	.	.
2015	0	.	.	.	.
2016	0	.	.	.	.
2017	0	.	.	.	.
2018	0	.	.	.	.
2019	0	.	.	.	.
2020	0	.	.	.	.
2021	0	.	.	.	.