
2023 Final Report on the Western Snowy Plover

Coal Oil Point Reserve
University of California
Santa Barbara, CA

Cristina Sandoval, Jessica Gray, and Armando Aispuro
Permit Number **TE073205-5**

Date of Preparation: February 9th, 2024



Site: Sands 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 wintering season 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 Areas5
 Monitoring of the Wintering Population.....7
 Monitoring of the Breeding Population8
 Monitoring Nest and Chick Fate9
 Nest Predation18
 Chick Survival.....19
 Nest Phenology24
 Rehabilitation of Eggs and Chicks25
 Location of Nests26
 Enforcement30
 Docent Program and Beach Use30
CONCLUSION35
RECOMMENDATIONS36
ACKNOWLEDGEMENTS36
California Least Terns.....37
Bibliography.....37
APPENDIX A. Band sightings at the reserve.....38
APPENDIX B. USDA Report.....41
APPENDIX C. Plover Necropsy Report.....44
APPENDIX D. Nesting data from adjacent WSP habitats47
APPENDIX E. California Least Tern nesting data at COPR48

ABSTRACT

In 2023, we monitored the Western Snowy Plover (WSP) population at Coal Oil Point Reserve (COPR) as in previous years. The management potential for the number of breeding adults at COPR is 25. At the breeding window survey, the number of breeding adults was 44, higher than the average of 38 for our site. At the wintering survey, the population size was 219, also above the average of 168. Flooding from high tides was the primary cause of nest failure. Hatching rate (63%) was higher than average (53%) and the fledging rate (60%) was close to average (63%). The number of fledged chicks per male (2.5) met our site's recovery goal of a minimum 1.0 fledged chicks per male. Nearly all nests (69) were initiated on the beach, while one was initiated on the mudflats of the slough (delta).

INTRODUCTION

Sands Beach at Coal Oil Point Reserve (COPR; Figure 1) is part of the University of California Natural Reserve System. The entire reserve including Sands Beach is designated as an Environmentally Sensitive Area 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). Additionally, the Audubon Society has deemed it as an “Important Bird Area” because of the many migrating, wintering and breeding shorebirds that use it. Sands Beach sustains an average wintering population of 168 WSP and an average breeding population of 38. The lower beach is open to the public all year. 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 reestablishment 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 supported reestablishment of nesting at Sands Beach, was the elimination of recreational public use on the upper beach habitat. This is the primary area used by WSP for resting and nesting. Additionally, in 2001, a docent program was initiated to help inform visitors about the restricted areas and other reserve regulations. The docents provide direct communication with beach goers. Together with signs, media, and lectures, docents

encourage 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. Over the last 10 years, an average of 64% of dog owners arrive to the beach with their dog on a leash and after docents communicate with owners whose dogs are unleashed, the total leash compliance rate increases from 64% to 91%.

Enforcement of the Santa Barbara County leash law has been sporadic and citations are rarely given. Compliance with the leash law will likely 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.

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 2023, we continued the same management practices established in the 2020 Snowy Plover and Beach Access Management Plan (Sandoval, 2020). Figure 1 shows the location of the plover habitat, all plover nests since the reestablishment of the breeding population, 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 (Photo 1).

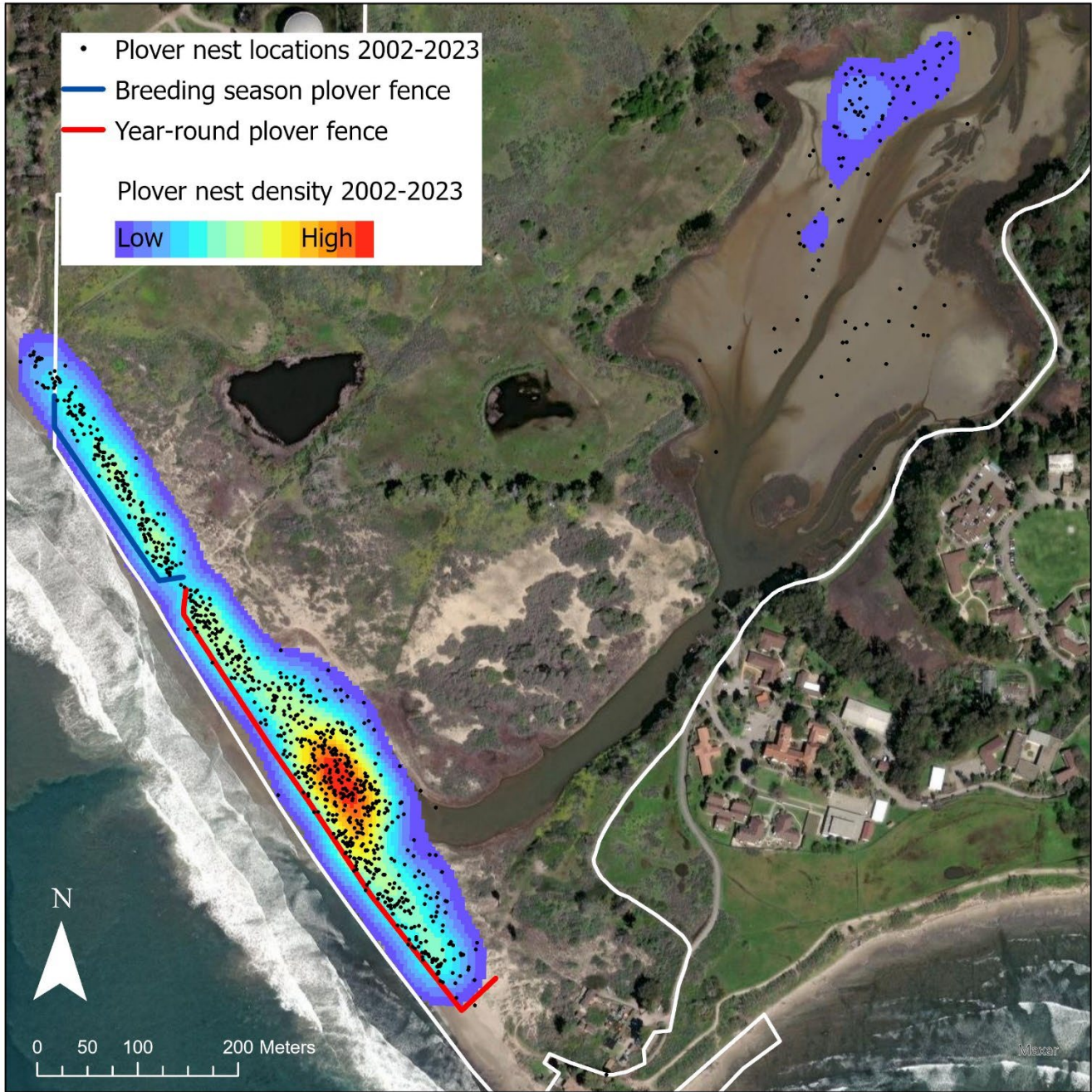


Figure 1. Critical habitat protected by symbolic fencing for the Western Snowy Plovers at Coal Oil Point Reserve and location of nests since the reestablishment of the breeding population in 2001. The heat map illustrates the density of nests from all the years.



Photo 1. Signs along the protected area inform the visitors where to walk when on Sands Beach.

Monitoring of the Wintering Population

During the wintering season, COPR staff count wintering WSP and check for banded individuals once a week. To count WSP, observers walk along the wet sand from the eastern to western boundaries of Sands Beach recording all individuals seen with binoculars. On the way back, observers look for color bands by approaching WSP just enough for them to stand up making the legs visible. During the 2023 winter window survey, observers recorded 219 WSP (Figure 2). The average count of WSP during the winter window survey at COPR since 2001 is 168 individuals.

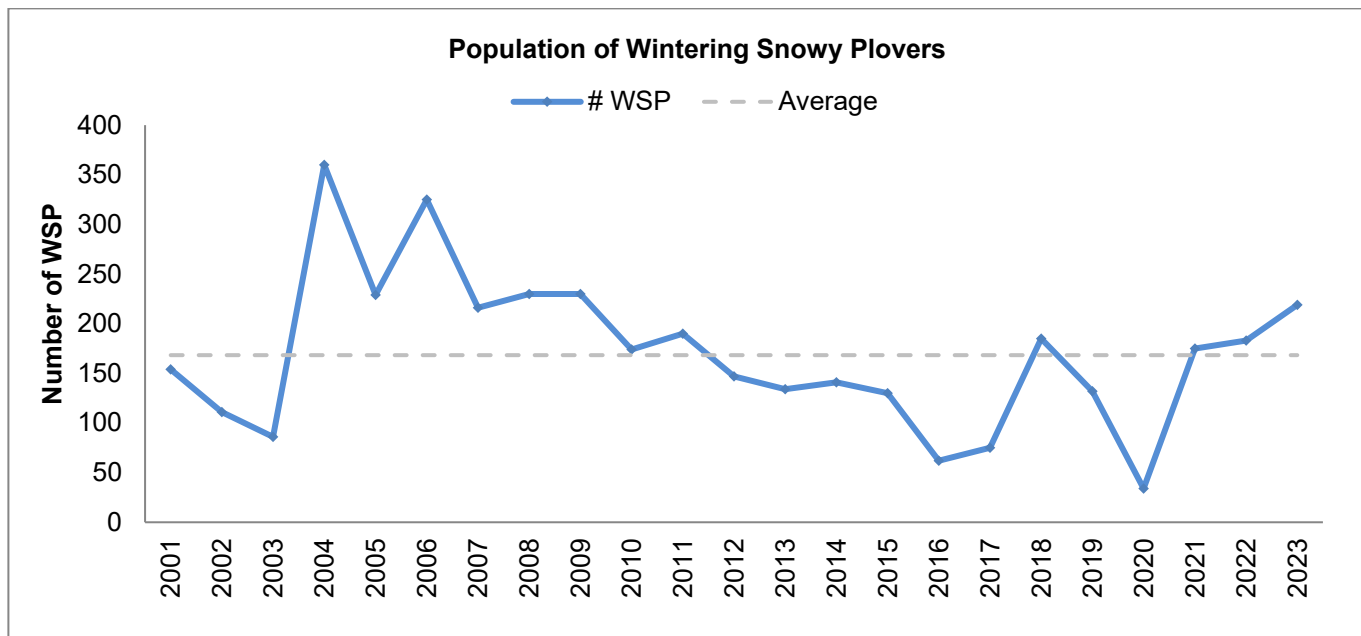


Figure 2. Counts of Snowy Plovers during the winter window surveys at Coal Oil Point Reserve. Average line represents the average from 2001-2022.

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. Observers recorded 44 WSP during the 2023 breeding window survey, which is higher than the average (38) 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 38 adults since 2001 (Figure 3).

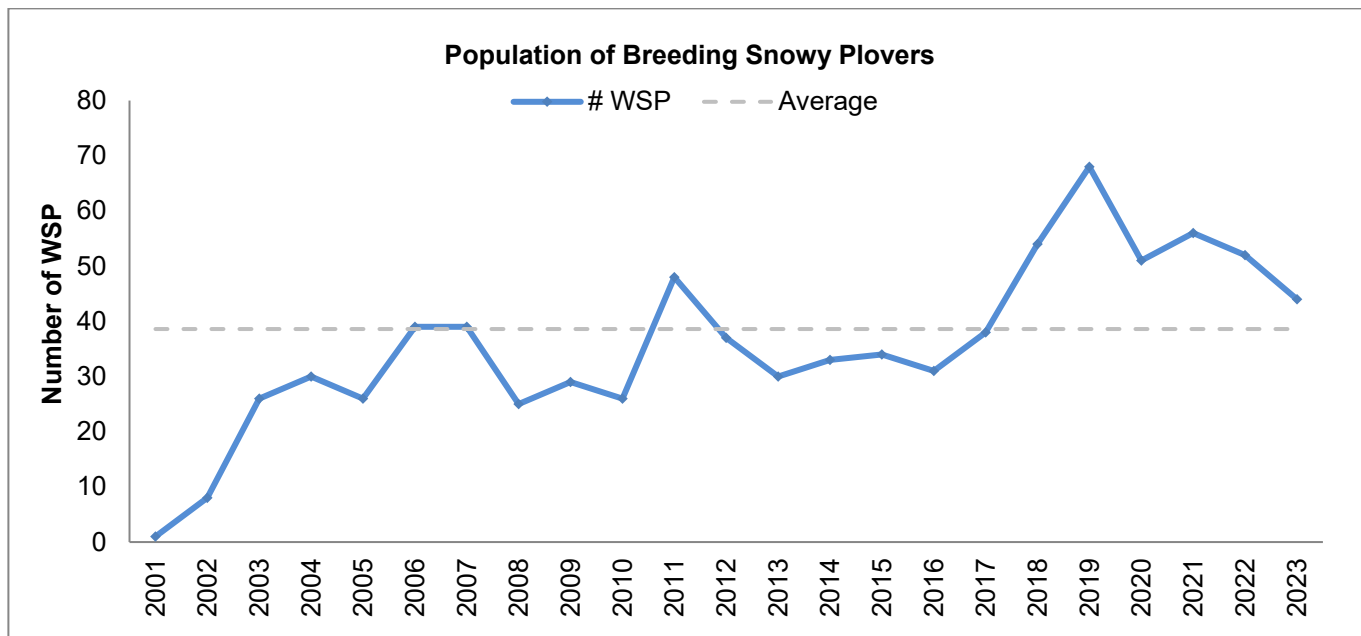


Figure 3. Counts of Western Snowy Plovers during the breeding window surveys at Coal Oil Point Reserve. *Average line represents the average from 2003-2022. In 2001 and 2002, the breeding population was still beginning to grow. Note that these years are excluded from the calculation of all breeding averages.*

Monitoring of Nest and Chick Fate

During the breeding season, observers monitor WSP a minimum of three 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 fence 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 12” 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, predated, or affected by weather. Eggs are determined to be abandoned if the adults do not return to the nest for at least 2 days once incubation has started and there are no new footprints of adults going to the nest. If eggs have been abandoned, monitors collect the eggs. If the nest has been predated, observers look for footprints to determine the type of predator. If the nest has been washed out by tide or buried by wind, monitors conduct a search for the eggs and replace eggs in the nest location. If the parent does not return to the nest to incubate, the eggs are collected. The reason for collecting abandoned eggs is to reduce attraction of crows and skunks, and incubate the eggs in captivity to raise the chicks and release them back into the wild.

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. *In 2001 and 2002, the breeding population was still beginning to grow. These years are excluded from the calculation of all breeding averages.*
**In 2006 and 2019-2021, enclosure cages were used to protect nests from crows. These years are excluded from the calculation of average hatching and fledging rates.*
***In 2007-2008 and 2021-2023, some nests were collected, incubated in the nursery, and returned to the nest prior to hatching. These nests were not included in the calculation of hatched nests and fledged chicks.*

Year	Breeding Window Survey (BWS)	# Nests	# Nests Hatched	Apparent 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%	12	2.4	83%
2003	26	24	17	71%	40	3.3	94%
2004	30	52	24	46%	27	1.8	71%
2005	26	64	16	25%	29	2.2	81%
2006*	39	43	23	53%	39	2	91%
2007*	39	66	21	32%	17	0.9	52%

COPR WSP Report 2023

2008*	25	56	3	5%	8	0.7	100%
2009	29	65	39	60%	58	4	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	66	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	59	73%	82	3	70%
2019*	68	97	28	29%	8	0.2	18%
2020*	51	76	42	55%	23	0.9	38%
2021**	56	93	33	39%	42	1.5	73%
2022**	52	102	19	28%	26	1	74%
2023**	44	70	46	63%	55	2.5	60%
COPR AVERAGE	38.6	61.4	32.2	53%	37.6	2.3	63%
COPR SD	12.2	15.9	11.5	15.3%	19.6	1.0	24.1%

In 2023, 70 nesting attempts were recorded; 54 were nests discovered by observers, and 16 additional broods were observed with newborn chicks but their nests were not located. There was a total of 38 hatching events on Sands Beach in 2023. To calculate the apparent hatching rate, we did not include 16 bonus nests. Of the 54 nests, five were replaced with wooden eggs before a high tide event. This leaves 49 nests, out of which 31 hatched for an estimated 63% apparent hatching rate. Two nests were temporarily collected when the high tide touched the nests and was predicted to be larger the next day. Wood eggs were placed in the nests so the parents would continue to incubate and after the risk of a high tide passed, the eggs were returned to the nest and hatched. Another 3 nests that were collected for the same reason had to be hatched in captivity because the nests were destroyed by the tide.

Figure 4 shows the number of nests laid and the number of nests hatched between 2001-2023.

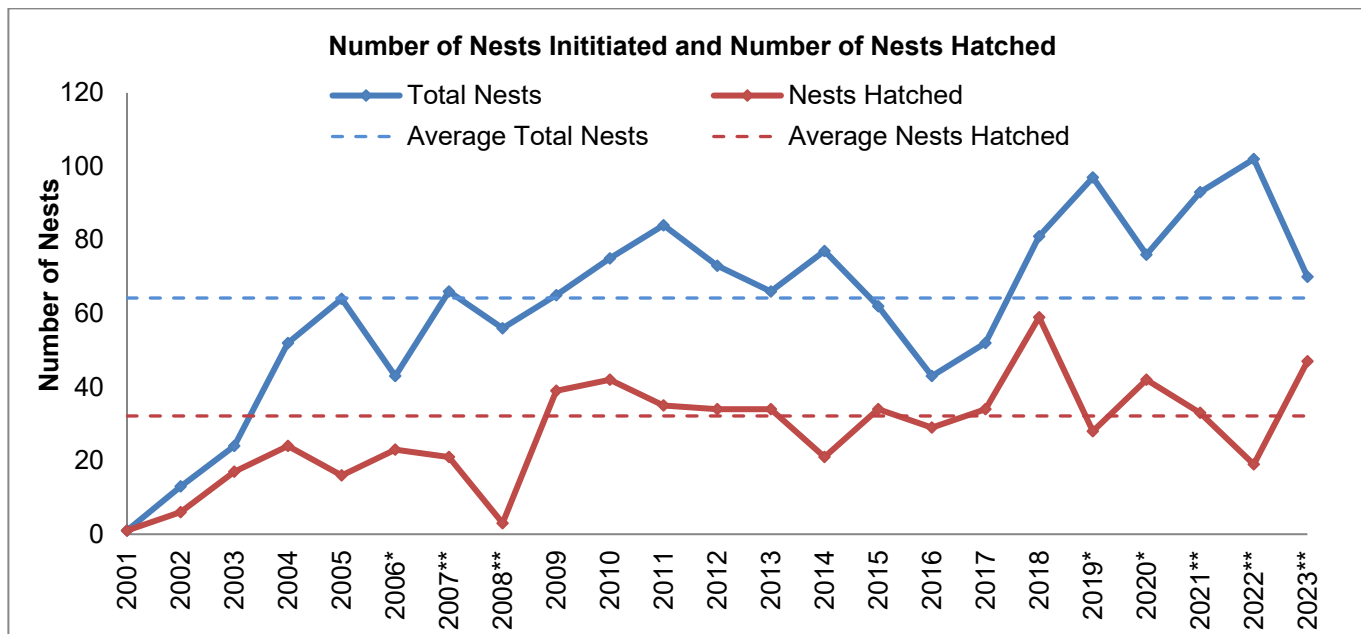


Figure 4. Nests initiated and hatched by year (total number of nests that had at least one egg vs. total number of nests that hatched at least one chick).
In 2001 and 2002, the breeding population was still beginning to grow. These years are excluded from the calculation of all breeding averages.
**In 2006 and 2019-2021, exclosure cages were used to protect nests from crows. These years are excluded from the calculation of average hatching and fledging rates.*
***In 2007-2008 and 2021-2023, some nests were collected, incubated in the nursery, and replaced to the nest prior to hatching. Numbers for hatched nests and number of fledged chicks exclude those that hatched and fledged in the nursery.*

The primary cause of nest failure this year was flooding by high tides (Table 2, Figure 5). Skunks were the primary nest predator.

Eggs were replaced for a total of 5 nests (Table 3). Four of the five wooden nests were affected by humans and/or tide. Any real eggs that were unable to be returned to the original nest due were transferred to Santa Barbara Zoo to be hand-raised.

On 5/10/2023, monitors recorded evidence of nest loss and nest abandonment resulting from a beach bonfire party that occurred on the night of 5/9/2023 within the plover habitat (Photos 2-7). A total of 4 nests were impacted by this single human disturbance. Two nests were abandoned, and the eggs went missing from the other two nests. The Ventura USFWS office was notified of the incident. On 6/5/2023, there was another bonfire party inside the plover habitat. The trash left behind may have attracted a raccoon that predated the nest as raccoons do not typically hunt in the dune habitat at our site.

Table 2. Number of nests lost by fate from 2002-2023. Note: this table does not include data on chick mortality; which is shown in Table 4.

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

**Note that in 2007-2008 & 2021-2023, some nests were collected, replaced with decoy eggs, incubated in the nursery, and replaced prior to hatching. The fate of these nests is listed as “Eggs Replaced.”

Year 20-XX	'02	'03	'04	'05	'06 *	'07 **	'08 **	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19 *	'20 *	'21 **	'22 **	'23 **	
Total nests	13	24	52	64	43	66	56	65	75	84	73	66	77	62	43	52	81	97	76	93	102	70	
Hatched	6	17	24	16	23	21	3	39	42	35	34	34	21	34	29	34	61	28	42	33	19	47	
Skunk	0	0	9	18	2	19	18	10	0	0	0	4	10	15	6	4	3	9	0	23	18	2	
Crow	2	4	7	3	0	0	0	1	1	0	0	0	0	0	0	0	0	32	7	0	8	0	
Abandoned	0	1	1	9	3	0	0	2	3	5	3	4	9	1	2	1	4	2	0	6	0	1	
Abandoned /Owl	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Raccoon	0	0	2	1	0	0	0	1	0	0	2	2	4	0	1	0	0	0	0	0	0	0	1
Whimbrel	0	0	1	0	0	0	0	0	0	1	0	0	0	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	0	0	0
Opossum	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Dog	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Unknown Cause	0	0	0	0	0	0	0	0	17	8	3	0	21	0	0	0	0	0	0	0	0	0	0
Unknown Fate	0	0	0	1	3	12	4	1	0	0	9	0	0	3	0	0	3	2	0	2	4	1	
Human	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	3	0	1	
Unknown Predator	0	0	0	1	1	0	0	4	0	10	3	15	9	3	0	2	3	0	1	4	4	0	
Wind	1	2	2	6	1	2	2	5	2	10	2	0	0	1	0	3	1	3	8	4	2	1	
Tide	0	0	4	5	2	1	6	2	5	12	16	6	3	5	2	8	6	17	16	6	6	10	
Flooded by Slough	0	0	0	3	0	0	0	0	4	3	0	0	0	0	0	0	0	3	1	0	0	0	
Eggs Replaced	0	0	0	0	0	11	23	0	0	0	0	0	0	0	0	0	0	0	0	9	35	5	

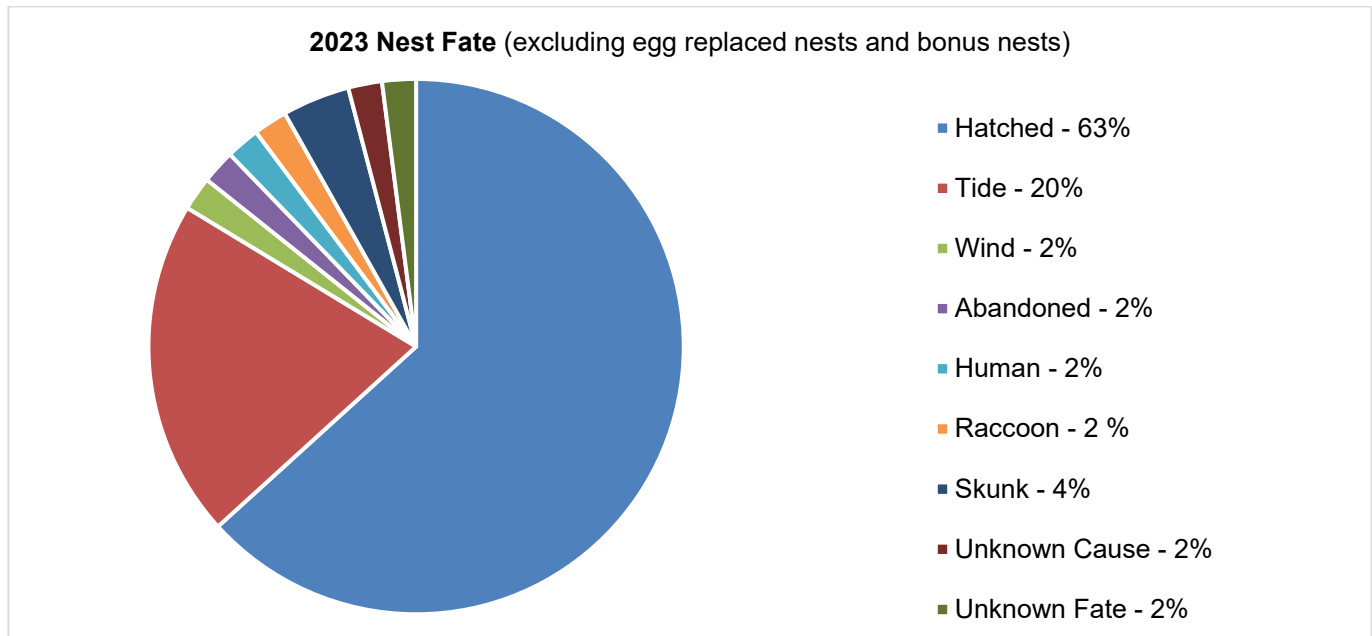


Figure 5. Nest fate at COPR in 2023, excluding the 5 nests that had eggs replaced and the 16 nests that were discovered as hatched broods. Each section in the graph shows the proportion of nests that failed by each cause and the proportion of nests that hatched (data is in Table 2 below).

Table 3. Fates of the nests in which eggs were replaced with wooden eggs in 2023.

Nest Number	Nest Fate	Number of eggs returned to the beach
1351	Tide washed out wooden eggs; Human disturbance then resulted in abandonment of the second set of wooden eggs; real eggs transferred to SB Zoo	0
1354	Human disturbance resulted in abandonment of wooden eggs; real eggs transferred to SB Zoo	0
1357	Human removed one wooden egg during bonfire party; female remained to incubate 2 remaining wooden eggs; real eggs hatched and successfully returned to the beach	2
1367	Real eggs hatched and successfully returned to the beach	3
1371	Tide (washed out wooden eggs; resulted in nest abandonment); real eggs transferred to SB Zoo	0



Photo 2. Monitoring assistant, Oscar Martinez Saldivar, trying to smolder the burning bonfire logs.



Photo 3. Marshmallows and beer cans left behind from the bonfire party.



Photo 4. Nest 1357 in which one of three wooden replacement eggs was missing the morning after the bonfire party. See human footprints on left and in front of plover. Female plover remained to incubate the remaining 2 wooden replacement eggs.



Photo 5. Nest 1360 in which all three of the real eggs were missing from the nest on the morning after the bonfire party.



Photo 6. Nest 1354 (under shadow of the long stick) in which three eggs were abandoned by incubating plovers after the bonfire party. See human footprints along the left side of nest.



Photo 7. Nest 1351 in which three eggs were abandoned by previously incubating plovers after the bonfire party. See human footprints to the left of nest.

Nest Predation

Our site had low levels of predation on nests this year. Out of 70 nesting attempts, 2 nests were predated by skunks and 1 nest was predated by a raccoon. We attribute low levels of predation to the initiation of USDA-contracted predator control early in the season. Predator control extended from March through July and focused on the common predators such as crows and skunks, and occasional predators such as opossums, raccoons, and red fox. USDA was contracted to remove skunks and crows near the plover habitat and remove crows through the implementation of traps and corvidicide treatment (see USDA report in Appendix C).

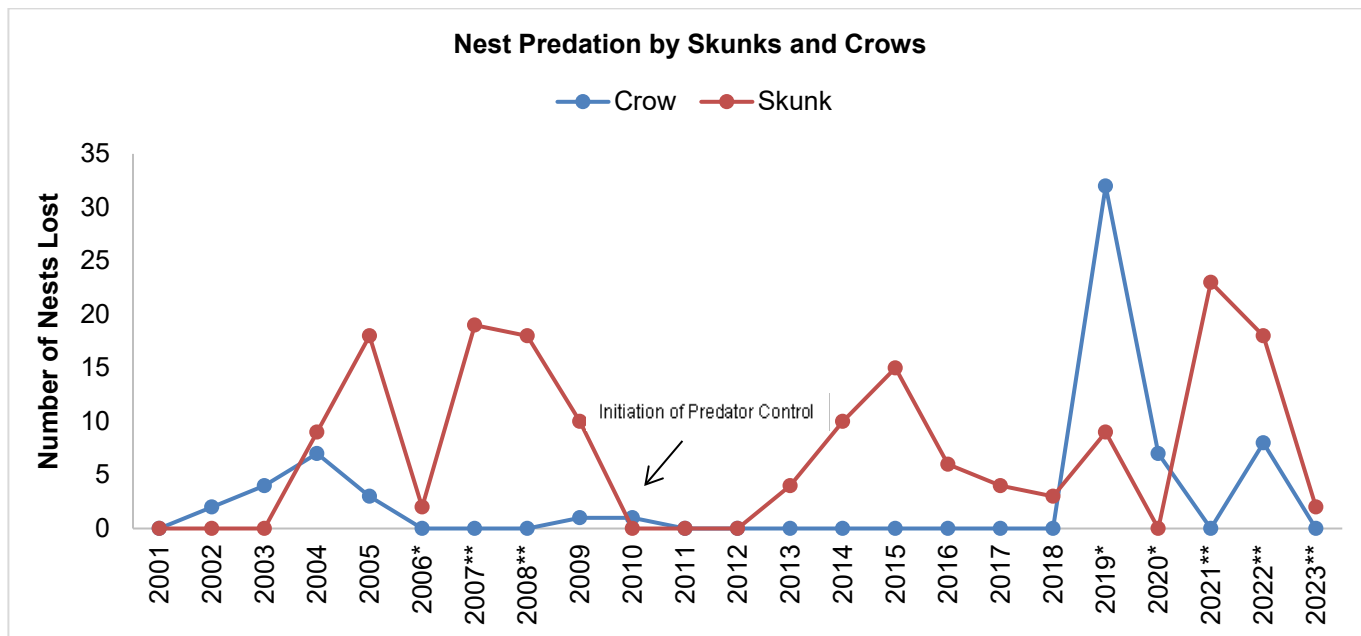


Figure 6. Skunk and crow predation by year.

See footnote on other figures about the exclusion of some nests from the calculations when the staff assisted with hatching success.

Chick Survival

The survival rate of chicks (60%) was near the long-term average this year (Figure 7). In 2023, 55 WSP chicks fledged at COPR without intervention. An additional four chicks fledged on the beach after the eggs were incubated in an incubator and returned to the nest after the risk of high tide passed (Figure 8). This year, COPR plovers produced 2.5 fledged chicks per male, which exceeds the minimum goal of one chick per year per male to maintain a stable population (Table 1).

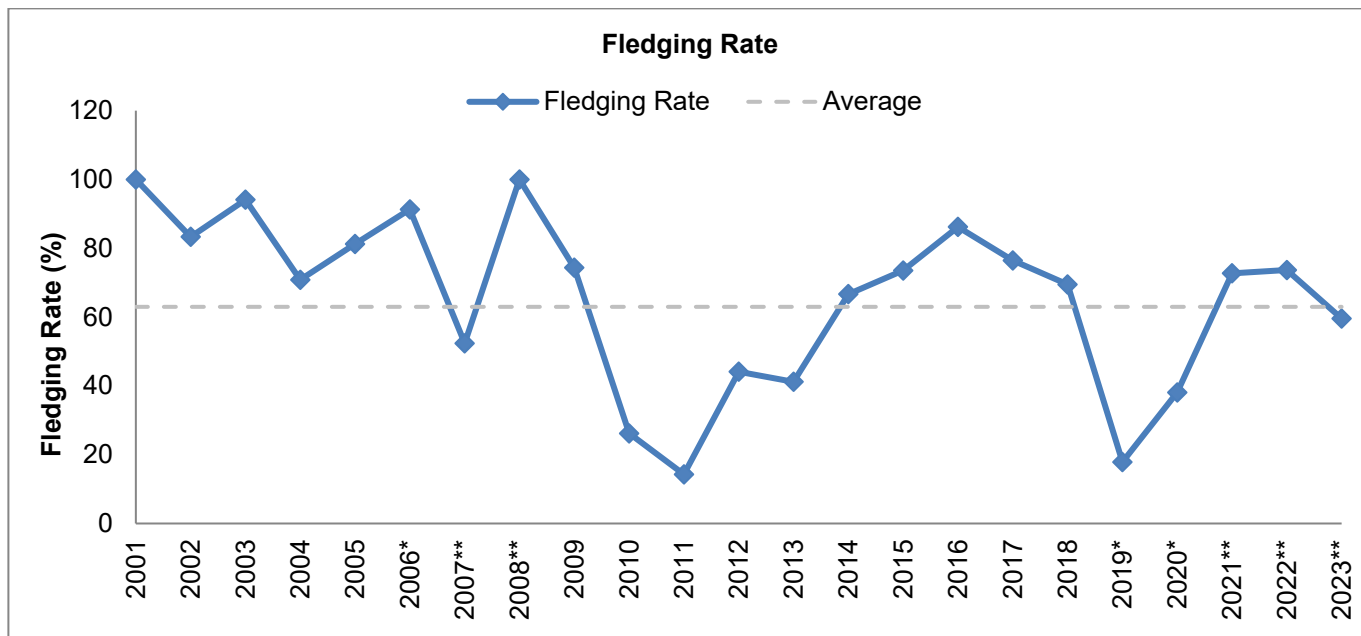


Figure 7. Fledging rate by year (# nests that fledged at least one chick/# total nests *100).

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.

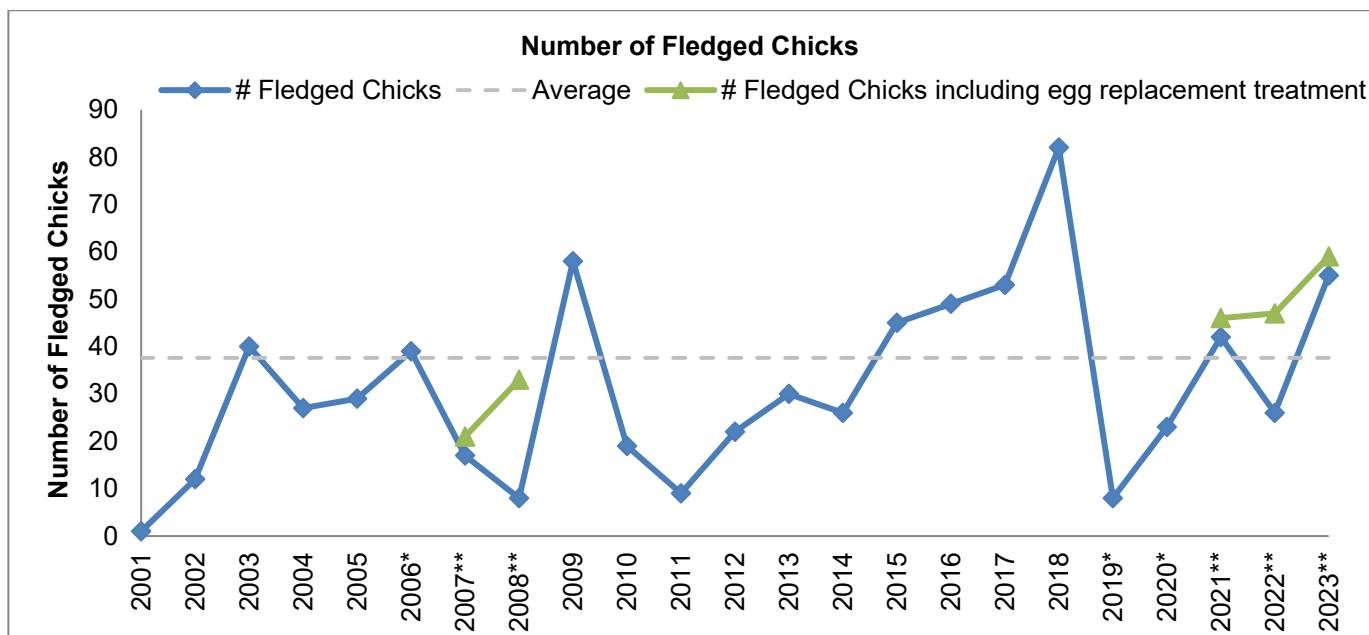


Figure 8. Number of chicks fledged by year.

See footnote on previous figures about exclusion of some data from the statistics

There were no direct observations of predation on plover chicks. One dead adult plover was discovered on March 24th and two dead plover chicks were discovered on July 1st and July 7th (Photo 8). None of the

individuals displayed obvious signs of predation or trauma. Two of the plovers were submitted for necropsy and HPAI testing, but only one plover's condition was suitable for the analyses. This individual tested negative for HPAI and was determined to have died as the result of acute severe crush trauma (refer to CDFW report in Appendix C). This trauma suggests a possible attack by a dog or a natural predator. We suspect it to be a dog because natural predators don't leave the prey behind. There was also one observation by a docent, Fletcher Hozven, of a Peregrine Falcon predating a shorebird that – based on the shorebird's size, plumage, and location – was likely a Snowy Plover.

Direct observations of predation and other take on chicks and adult can be difficult to document. Table 4 lists the reported causes of chick and adult mortality since 2001. Table 5 and Figure 9 summarizes all documented take of Snowy Plovers by humans and dogs.



Photo 8. Plover chick carcass discovered on July 7th, 2023.



Photo 9. Adult shorebird predated by Peregrine Falcon on July 22nd, 2023. Photo credit: Fletcher Hozven.

Table 4. Documented cause of chick and adult mortality. Almost half of the chicks that hatch die, but it is difficult to observe the cause of chick and adult mortality because they are mobile and predation events happen fast. “C” means chick mortality and “A” means adult mortality.

Year 20-XX	01	02	03	04	05	06 *	07 **	08 **	09	10	11	12	13	14	15	16	17	18	19 *	20 **	21 **	22 **	23 **	Total	
Total # chicks hatched	2	16	45	56	40	62	48	9	90	95	79	59	81	57	80	74	83	136	71	105	85	41	113	1527	
Red- Tailed Hawk	0	0	0	13 C	0	0	0	0	0	0	0	0	0	0	0	0	2 C	0	0	0	0	0	0	15	
Wind	0	0	1 C	4 C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Dog	0	0	1 C	0	0	0	0	0	0	0	0	0	0	0	1 C	0	0	0	0	0	0	0	2 C	0	4
Crow	1 C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 C	2 C	0	0	0	0	4
Western Gull	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3 C 4 A	0	0	0	8
Peregrin e Falcon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1 A	0	2
Tar	0	0	1 C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Table 5. Documented take of nests and chicks by humans and dogs.

Year	Take by Dogs	Take by Humans
2001	0	0
2002	0	0
2003	1 chick	0
2004	0	0
2005	0	0
2006	0	0
2007	0	0
2008	0	0
2009	0	0
2010	0	1 nest
2011	0	0
2012	0	1 nest
2013	0	0
2014	0	0
2015	1 chick	0
2016	1 nest	0
2017	0	0
2018	0	0
2019	0	0
2020	0	0
2021	0	3 nests
2022	0	0
2023	2 chicks	4 nests

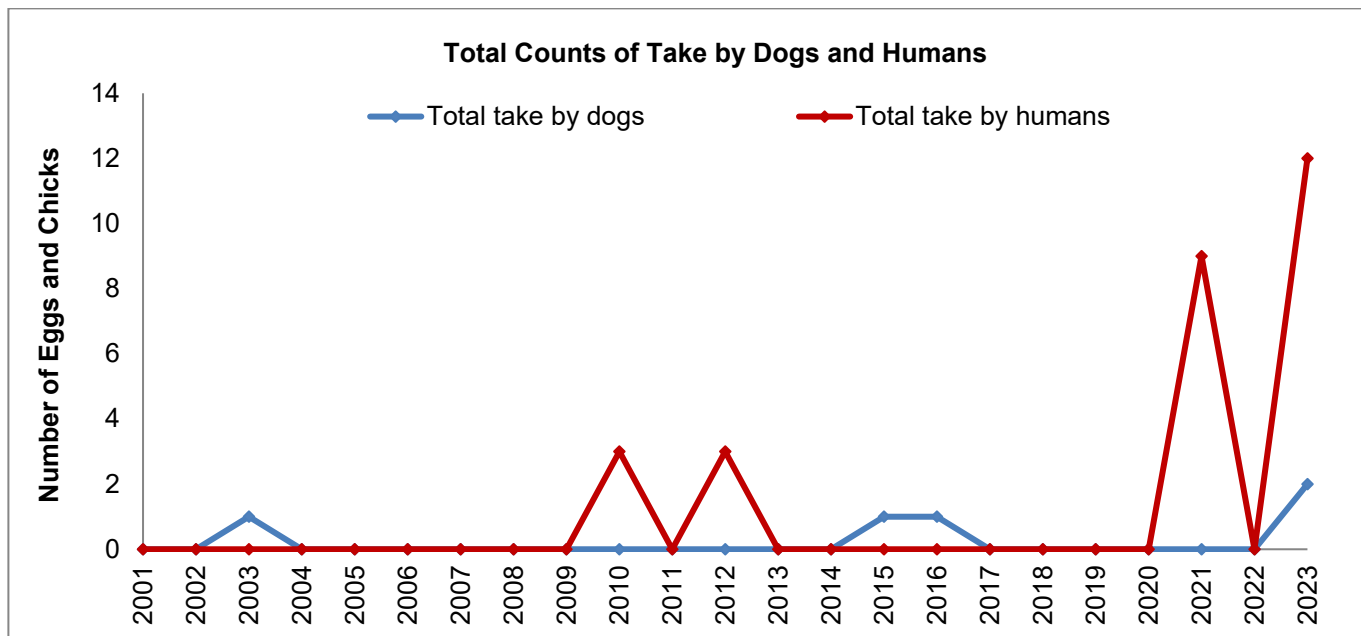


Figure 9. Number of eggs (each nest has 3 eggs) and chicks of Snowy Plovers taken by dogs or people trespassing in the nesting area (note: all human take happened at night).

Nest Phenology

In 2023, the nesting season began almost one month later than average for our site, likely due to significant beach erosion and big storms that continued through the end of March. The first nest was initiated on April 10th and the last chick fledged on August 28th (Table 6), for a total breeding season length of 140 days (defined by the number of days between first nest initiation and last observed chick or nest). This year's breeding season was 14 days shorter than the average for Coal Oil Point Reserve. The peak nesting period fell between May 26th and June 2nd. The dates of all nesting events in 2023 fell within the range of previous years' dates (Figure 10).

Table 6. Dates of nesting events in 2023

2023 Nesting Event	Date
First Nest Initiation	4/10/2023
Last Nest Initiation	7/7/2023
First Hatch	5/29/2023
Last Hatch	7/31/2023
First Fledge	6/26/2023
Last Fledge	8/28/2023

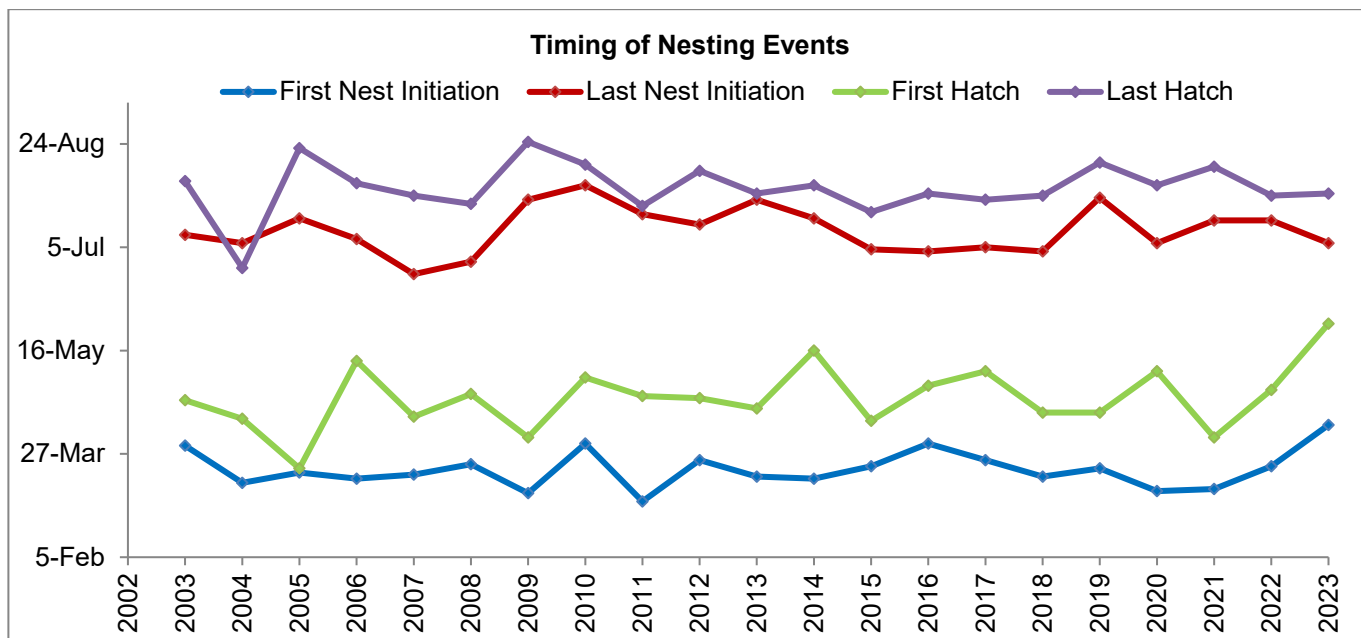


Figure 10. Timing of nest events by year.

***In 2007-2008 and 2021-2023, some nests were collected, incubated in the nursery, and replaced prior to hatching. This was a change from the standard protocol at this site. Hatch and fledge dates reported are for nests that hatched and fledged in the wild without intervention.*

Rehabilitation of Abandoned Eggs and Chicks

In 2023, one chick and 17 eggs were collected from Coal Oil Point Reserve (Table 7) to be transferred for viability testing and rehabilitation at Santa Barbara Zoo (SBZ). Of these eggs, eight were eventually released as chicks at COPR in addition to two additional chicks rescued as eggs from other sites (Oceano Dunes and unknown origin).

Table 7. Number of eggs collected from COPR and taken to the Santa Barbara Zoo to be tested for viability, and then hand reared for release if they were viable.

Reason for collection	Number of eggs collected	Number of chicks released
Tide	12	7
Abandoned	5	1
<i>Total eggs</i>	<i>17</i>	<i>8</i>

The collected eggs were placed in an incubator at 98.5 F, with a water dish to achieve adequate humidity. As soon as possible, they were transported to the zoo in a dish with warm 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 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. Each individual satisfied the USFWS requirements of age, health, and minimum size for release prior to their release date.

Three groups of captively reared chicks from COPR and other sites were released at COPR on the mornings of June 29th, July 19th, and August 14th. 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 one hour in release pens on the beach before the scheduled release time to allow them time to acclimate to their new environment before they were fully released. The pens were constructed out of chicken wire with 1" x 1.5" mesh size. The dimensions of the pens were 3' x 2' x 2' for small groups of plovers. Pens were secured to the ground with rebar posts in each corner. In order to supplement the plovers while they acclimated, kelp wrack and beach hoppers were added to the pens.

The chicks were observed 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 in 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, the side of the pen facing the fenced plover habitat was opened. Some released chicks took flight within five minutes of opening the holding pen, while others calmly walked out and remained as a group in the area.

Unfortunately, the released chicks were not banded this year so we are unable to monitor their presence, condition, behavior or future nesting activities.

Location of Nests

GPS coordinates were recorded for each individual WSP nest. We used the location of nests to look for spatial patterns in hatching and fledging success. This year, 99% of all nests (69 nests) were initiated on the beach and 1% (1) was initiated on the delta (mudflat) of Devereux Slough (Figure 11). 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 and west side (Table 8). 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. This year, large storms transported a significant amount of debris up into the northwest corner of the slough mouth. This area was the location of a high density of plover nests that were very well camouflaged and successful in hatching. The map of nest location and fate is shown below Figures 11 and 12.

Table 8. 2023 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 of slough mouth	7	57%	100%
Slough mouth	36	69%	44%
West of slough mouth	26	65%	76%
Delta	1	100%	0%

Nests that hatched and fledged as the result of egg replacement are included in the number of nests initiated, but excluded from the calculation of hatching and fledging rates. East and west sides refer to the beach east or west of the slough mouth.

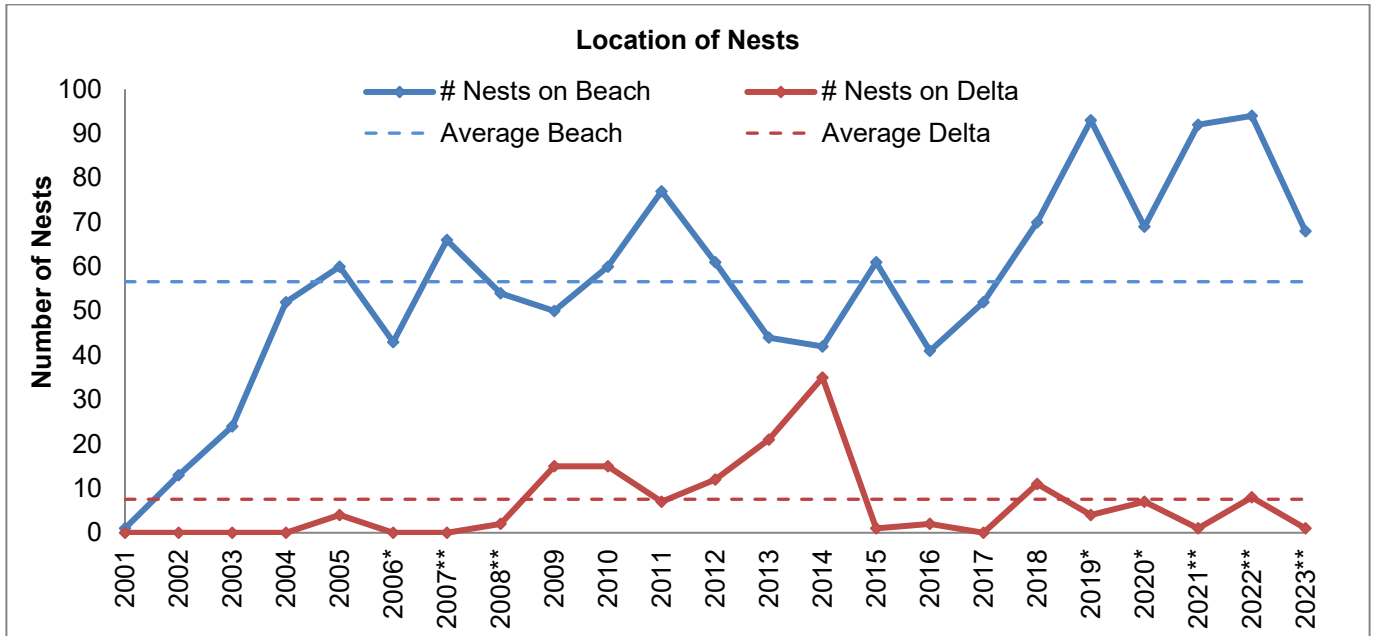


Figure 11. Number of nests on Sands Beach and the Devereux Slough mudflat between 2001-2023.

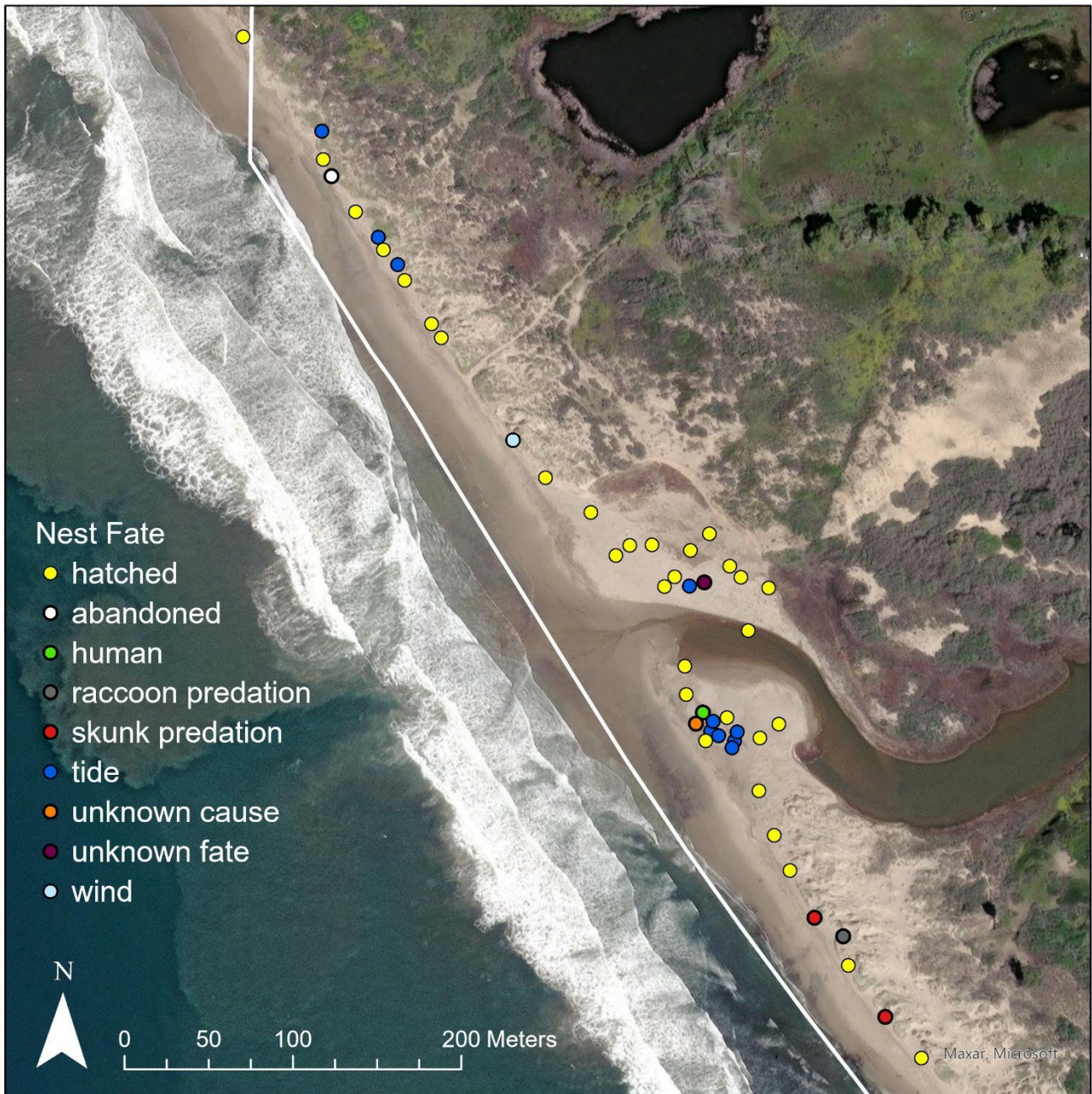


Figure 12. Locations of Snowy Plover nests color-coded by their fates at Sands Beach in 2023.

Enforcement of Beach Regulations

COPR policies are not enforced by ranger. In 2020, officers from UCSB Police Department communicated to the COPR staff that they would not enforce the leash law at COPR. 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 yet been implemented. The COPR advisory committee met in 2021 and recommended the implementation of the dog prohibition and provided alternatives for parking and beach access to reduce the number of people recreating on Sands Beach.

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 2023, docent coverage averaged 71 hours per week (Figure 13), the highest in the history of the program.

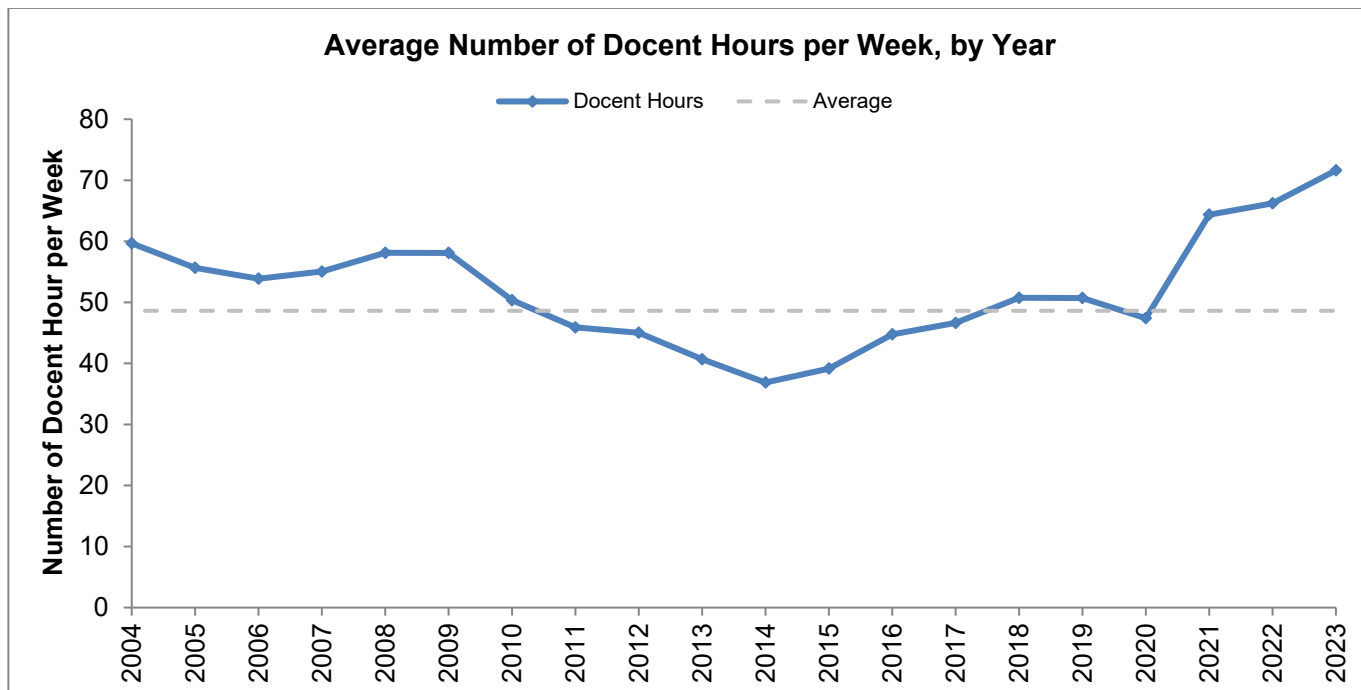


Figure 13. Average number of hours that Snowy Plover docents spent per week at Sands Beach (total number of docent hours/52 weeks). Note that in 2020, the docent program was inactive for 6 weeks due to Covid-19 restrictions, so the total number of hours for 2020 was divided by 46 weeks.

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. Docents recorded a total of 6,242 interactions with beach visitors (Figure 14).

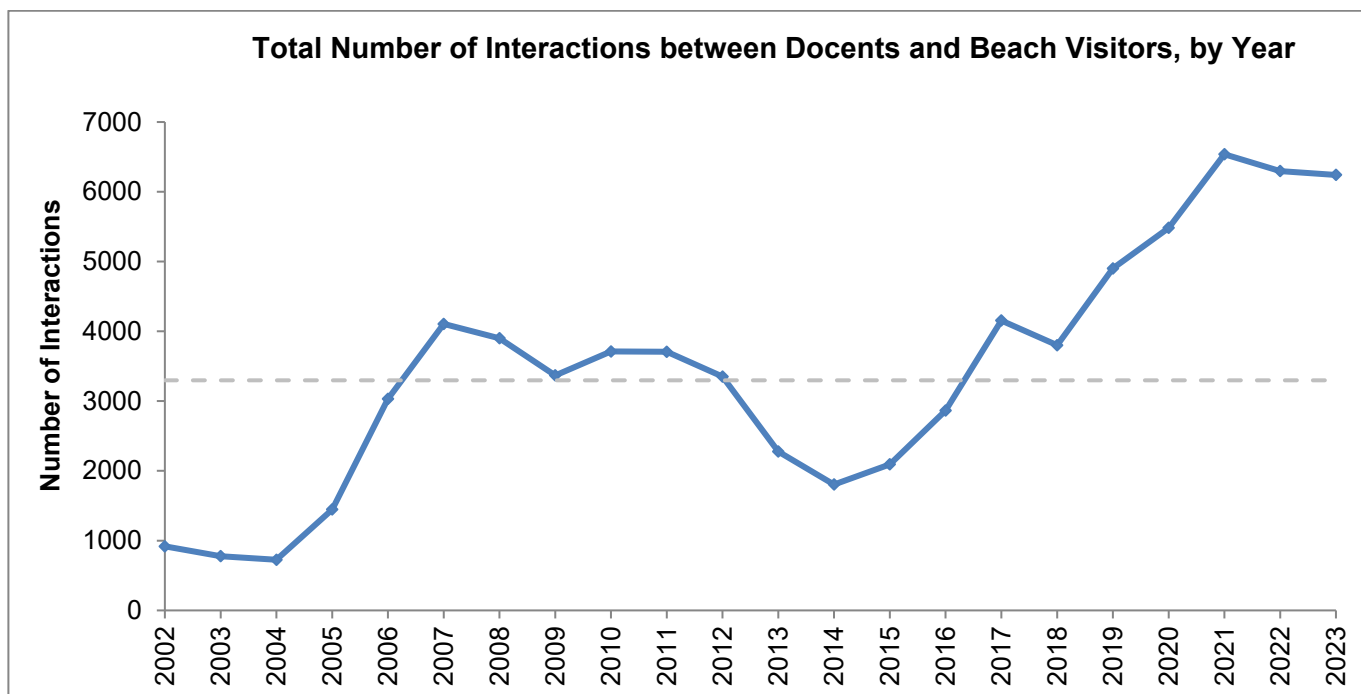


Figure 14. Number of interactions between docents and beachgoers each year.

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 and private donors.

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 and trespass. 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. Spring and summer are the quarters when the beach is most busy.

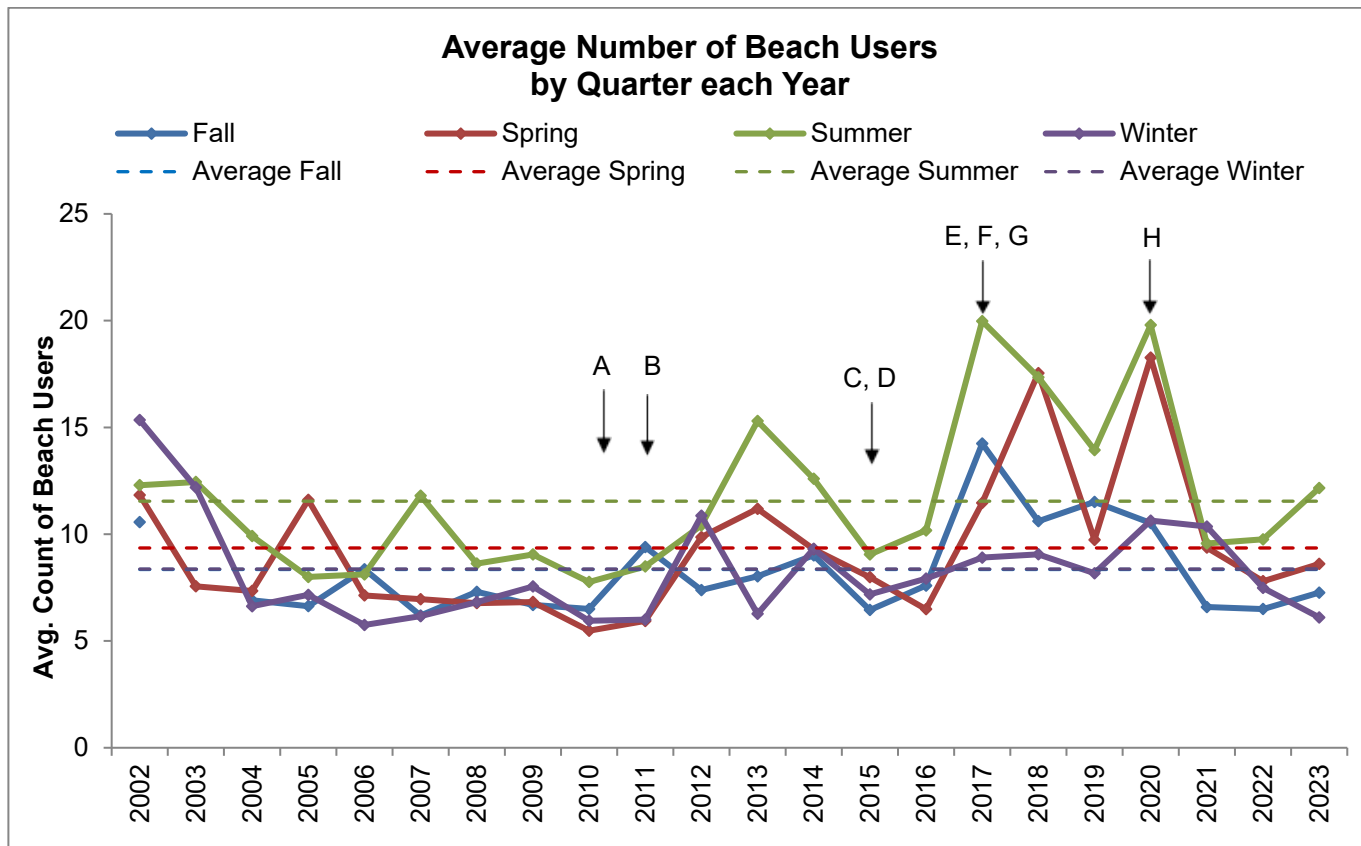


Figure 15. Average number of beach users counted by docents on snapshot surveys at Sands Beach. These data do not include people in the ocean. The number of beach users was counted at the beach on snapshot surveys. These data do not include people surfing. This graph shows the frequency of “busy beach” days by quarter, since 2002. The arrows correspond to various events that may have influenced changes in beach use: (A) 2010: A gate was installed at the end of Slough Road to reduce illegal beach parking, (B) 2011: A new beach parking lot (Lot 45) opened on West Campus, (C) Summer 2011: UCSB started offering Summer sessions, (D) Summer 2015 Oil spill closed the beach for 4 weeks, (E) Fall 2015: Opening of Sierra Madre Dormitory, 506 students, (F) Fall 2017: Opening of San Joaquin Dormitory, 1,300 students, (G) Fall 2017: Opening of Sierra Madre Apartments, 36 units, and (H) 2017 Opening of Santa Catalina renovations, 1,500 students.

The total number of dogs visiting Sands Beach has increased in the last 4 years (Figure 16). The docents significantly influence dog owners to leash their dog after contact, increasing overall leash law compliance from 64% to 91% (Figure 17).

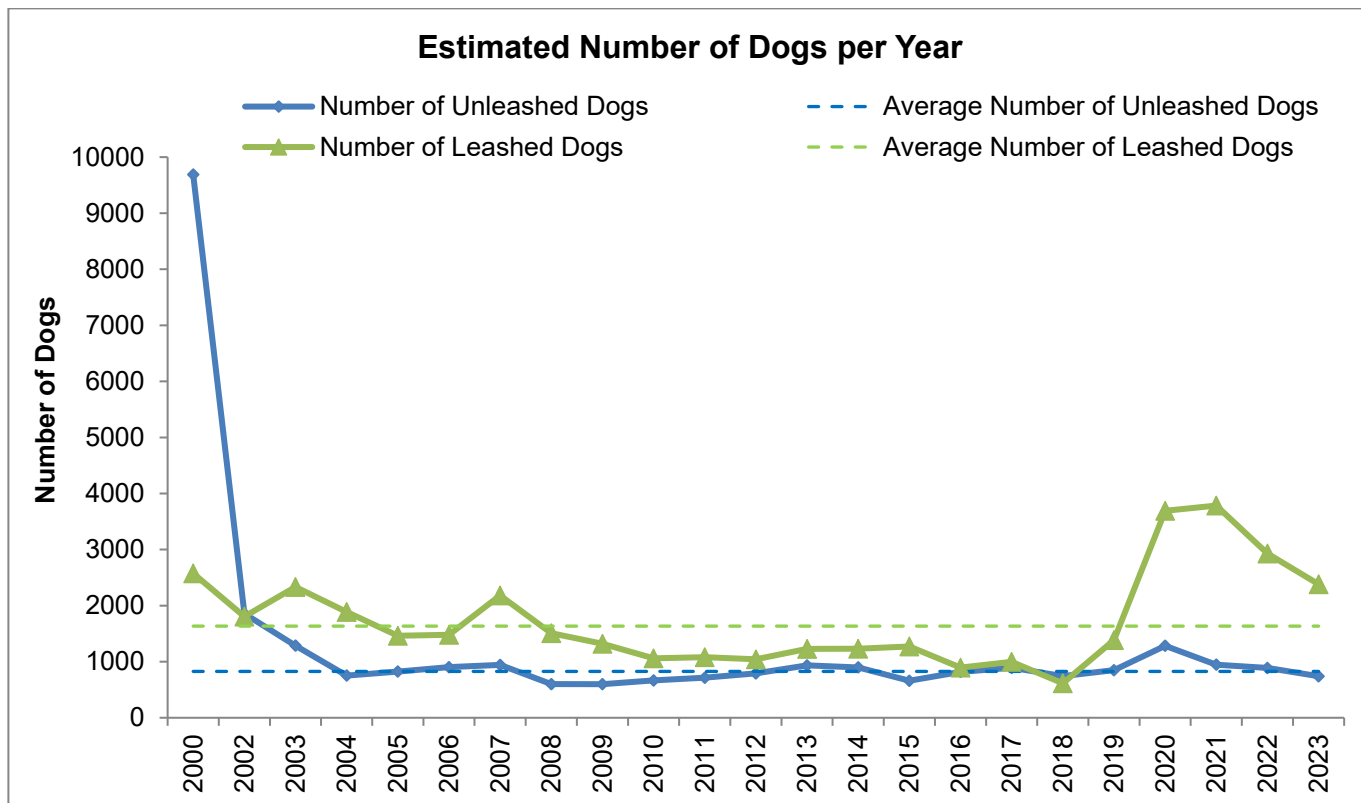


Figure 16. Estimated total number of dogs at the reserve each year. Estimates based on the hourly rate of dogs observed by docents ((# dogs/hr)*(12 hrs/day)*(365 days/yr)).

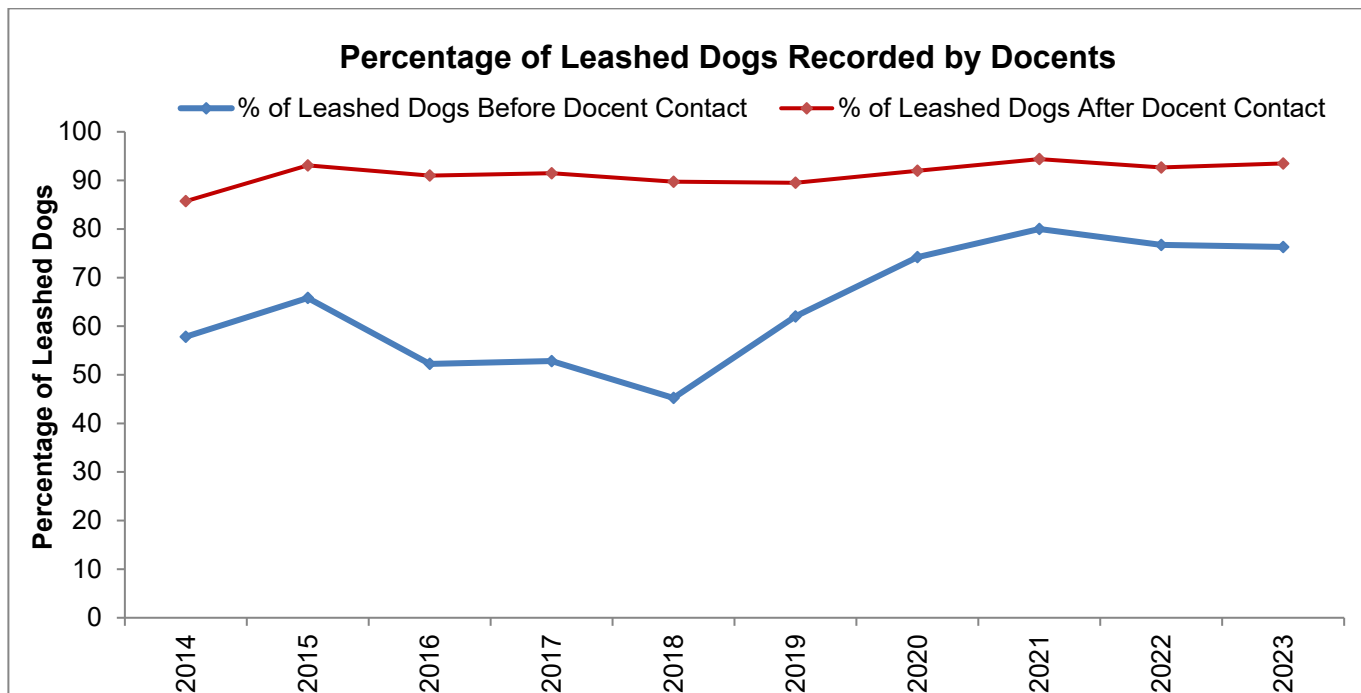


Figure 17. Percentage of leashed dogs before and after docent contact.

Based on docent data, we estimate that there were 552 trespassing events in 2023, which is higher than average and likely a result of the additional time that the symbolic fence was absent from the beach (Figure 18). Typically, the symbolic fence is installed in early March, however this year it was not installed until mid-April due to the late season storms. The fence was also removed from the beach fairly early this fall in mid-October. The majority of trespassing occurs when the fences are removed due to storms (Figure 19). This explains the elevated rate of trespassing in winter, spring, and fall, but it is unclear why there was also a higher rate of trespassing during the summer when the fence was in place.

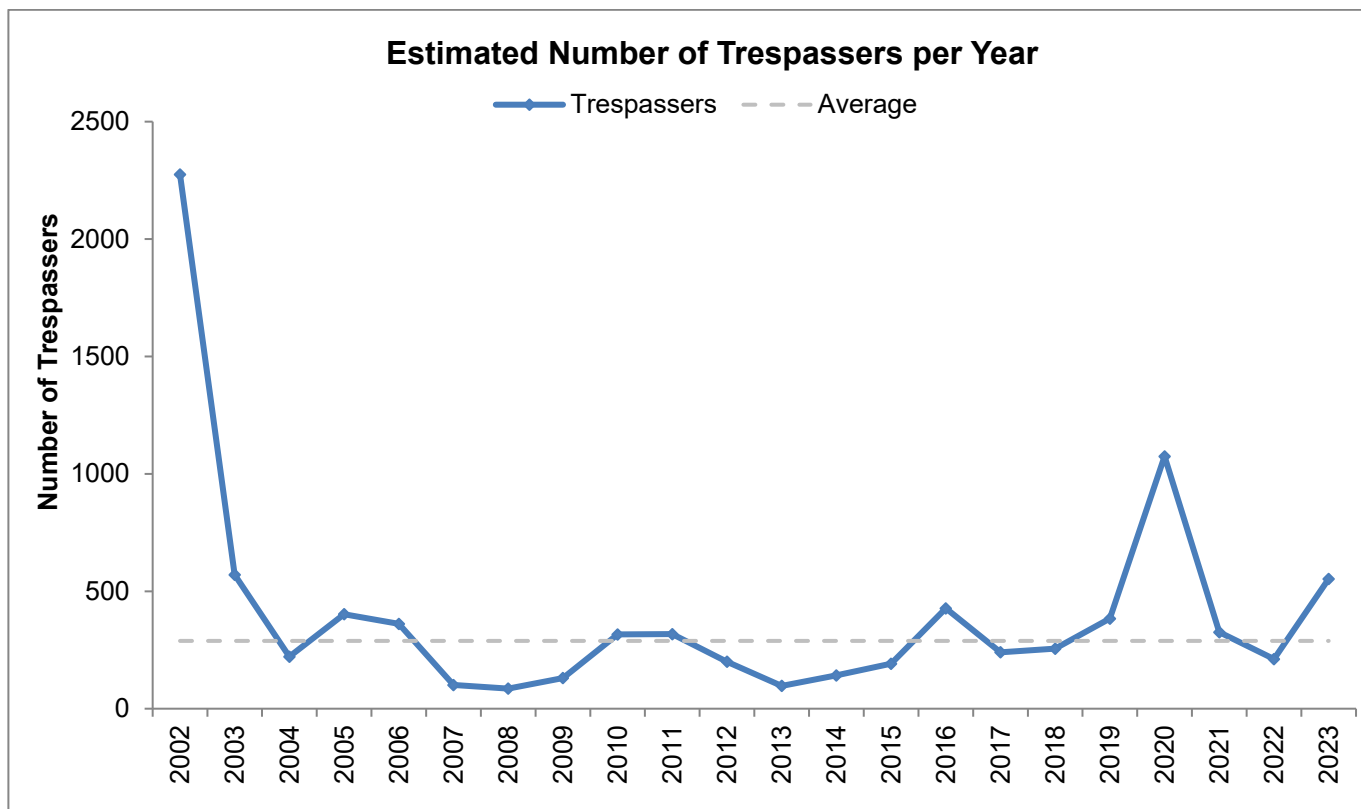


Figure 18. Estimated total number of visitors trespassing into protected habitat each year. Estimates based on the hourly rate of trespassers observed by docents ((# trespassers/hr)*(12 hrs/day)*(365 days/yr)).

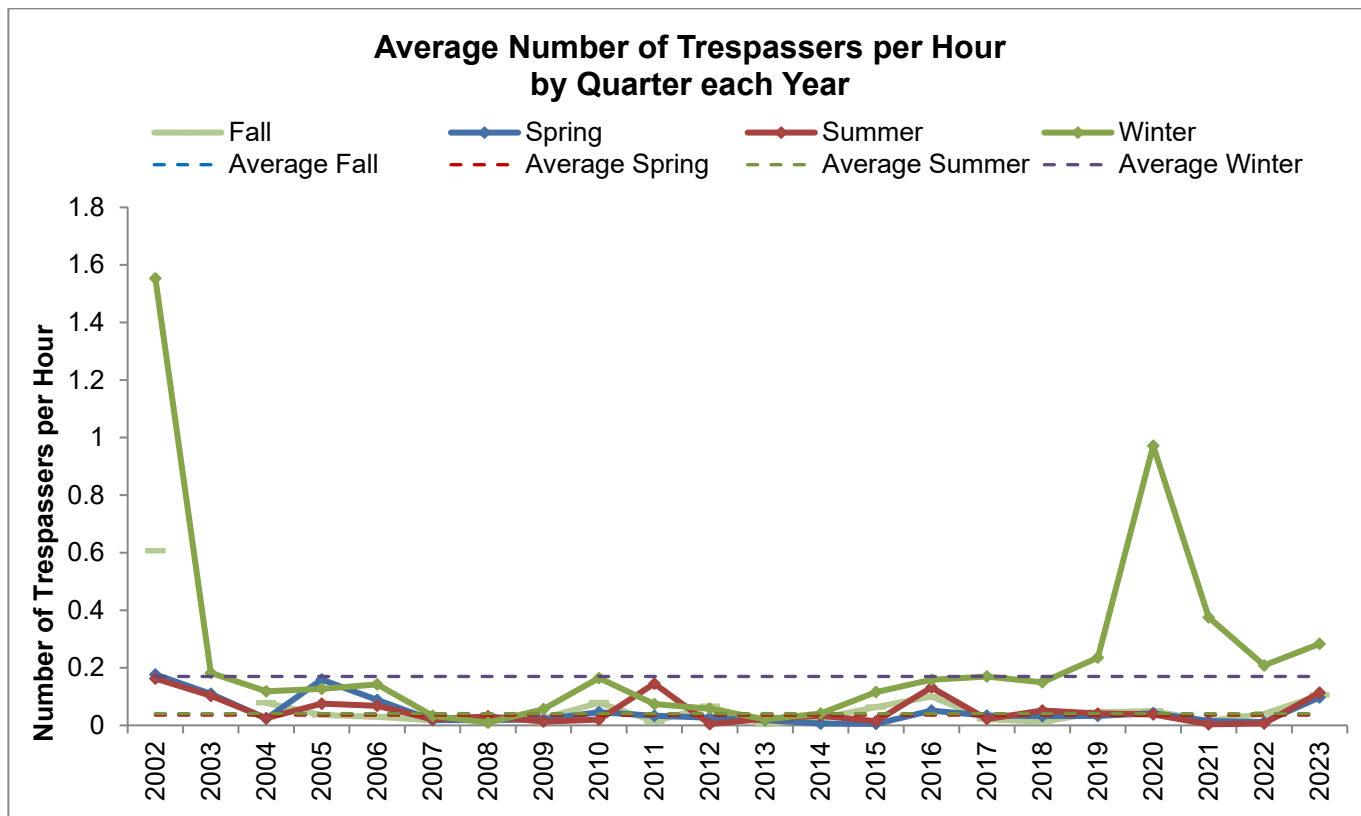


Figure 19. Average number of trespassers each quarter. Note that the highest numbers of trespassers are during the winter quarter when the symbolic fence is removed and the Snowy Plover habitat is marked only with signs.

CONCLUSION

The breeding population of WSP at COPR has recovered since the implementation of a conservation plan in 2001. The wintering population at the reserve this year was above average for this site and the number of breeding adults has been above average over the last five years. The docent program continues to be an effective conservation strategy 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 the great benefits that signs, fences, and docents contribute towards improving compliance of beach regulations by beach goers, the total amount of disturbances can still increase as the number of people on the beach increases. 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 both leashed and

unleashed dogs has increased at Sands Beach. This pattern shows the importance of capping the number of people on beaches that are habitats for sensitive wildlife such as Snowy Plovers. The development of beach parking lots and beach access trails has potential impacts on 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 of plovers. 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.

RECOMMENDATIONS

- The predator control program needs to be funded with more trap hours and in perpetuity.
- Other means to deter skunks should be explored, as exclosures and trapping have not always been effective in protecting nests from skunks. Skunks are an urbanization problem and may be improved if dog and cat food in local neighborhoods were not left outdoor at night.
- The dog prohibition at Sands Beach should be implemented as soon as possible.
- An alternative beach access and parking is needed for Devereux Beach to offer options to reduce recreational pressure at Sands Beach and protect the WSP.
- On West Campus, parking lots for beach recreation should be limited and shifted southeast to encourage people to use Devereux Beach.

ACKNOWLEDGEMENTS

Cristina Sandoval (Reserve Director), Armando Aispuro (Resource Manager), and Jessica Gray (Conservation Specialist) conducted plover monitoring. Jessica managed the docent program. We are very thankful to Rick Fellows and Bill Boelcke who each 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, 66 volunteers and interns over the course of 2023,

maintained a presence at the beach every day of the year. Barry Lowry, Arthur Young and Tony 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 12).

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.
- 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 7. Summary of banded WSP recorded at COPR by staff and docents in 2023.

Left leg	Right leg	Band Origin (if known)	Remarks
aa	kr	unknown	
ab	gb	unknown	possible misread of ab:ga (Salinas River State Beach, 2022)
ak	gp	Eden Landing Ecological Reserve, Hayward (2022)	
an	ko	VSFB - Wall Beach (2023)	
an	kr	unknown	
ay	gn	unknown	"n" band faded, hard to tell, possible misread of an:gn
b	kb	unknown	
b	v/g	VSFB - Surf North (2023)	
b	vb	unknown	
bb	lb	SBZ (2019), rescued at ODSVRA, released at COPR	
bb	rg	ODSVRA (2023)	
bb	vb	ODSVRA (2011,2013 or 2014)	possible misread (last seen at another site 11/3/2021)
bb	xg	unknown	
Bg	og	unknown	
ga	go	ODSVRA (2023)	
Ga	kw	unknown	
ga	pb	ODSVRA (2017)	
ga	po	ODSVRA (2023)	
gb	ak	unknown	
Gb	bw	unknown	
Gb	kb	unknown	
Gb	kw	COPR (banded as adult in 2022 after rehab)	Oil spill combo - female; rescued at COPR (2022), banded and released at COPR (2022) as an adult; Green-taped service band above the tarsal joint. Service band 2851-06352
gg	ag	ODSVRA (2022)	
gg	bg	unknown	
gg	br	ODSVRA (2023)	
gg	pv	ODSVRA (2021)	
gg	vw	unknown	
gg	wo	ODSVRA (2022)	
gg	yy	ODSVRA (2023)	
gn	ra	VSFB - Wall Beach (2022)	
l/g/l	k	unknown	
ll	al	unknown	

COPR WSP Report 2023

In	or	unknown	possible misread of gn:or (VAFB 2020)
nb	ba	VSFB - Surf North (2022)	
no	wo	VSFB - Shuman South (2023)	
nr	oa	VSFB - Shuman North (2022)	
nw	ba	unknown	
nw	ow	unknown	
nw	ra	VSFB - Surf North (2022)	
ny	rg	unknown	
ny	ro	VSFB - Shuman South (2023)	
ny	rv	unknown	
ny	wg	VSFB (2017)	
o/r	g/r/g	unknown	
o/r	gg	unknown	nest 1388
og	py	unknown	
oo	rb	Salinas River State Beach (2023)	
op	p	unknown	
pa	gy	SBZ (2022), rescued at ODSVRA, released at COPR	
pa	ly	unknown	possible misread of pa:gy
pa	vy	unknown	
pb	gy	unknown	female
pg	aa	unknown	
pg	oo	ODSVRA (2023)	
Pp	pp	unknown	
pv	vy	ODSVRA (need year)	
py	a/r/a	unknown	nest 1388
py	ao	SBZ (2022), rescued at Ormond Beach, released at COPR	
py	ar	SBZ (2022), rescued at ODSVRA, released at COPR	
py	av	SBZ (2022), rescued at COPR, released at COPR	
py	bo	unknown	
py	go	SBZ (2021), rescued at COPR, released at COPR	unsure of orange band
py	gr	unknown	
py	gw	SBZ (2021), rescued at ODSVRA, released at COPR	
py	kv	unknown	
py	kw	unknown	
py	no	unknown	docent unsure of "n" band
py	pa	SBZ (2022), rescued at COPR, released at COPR	
py	pv	SBZ (2022), rescued at ODSVRA, released at COPR	
py	py	SBZ (2022), rescued at COPR, released at COPR	
py	ra	SBZ (2021), rescued at ODSVRA, released at COPR	
py	rg	SBZ (2022), rescued at ODSVRA, released at COPR	

COPR WSP Report 2023

py	rl	unknown	unsure of "l" leg, could be "g"
py	rv	unknown	
py	ry	SBZ (2022), rescued at COPR, released at COPR	
py	v	SBZ (2021), rescued at ODSVRA, released at COPR	could be "py:vv" that was seen last year
py	va	SBZ (2021), rescued at COPR, released at COPR	
py	vg	SBZ (2021), rescued at Ormond Beach, released at COPR	
py	vr	SBZ (2021), rescued at COPR, released at COPR	
py	vv	SBZ (2021), rescued at ODSVRA, released at COPR	
py	vw	SBZ (2021), rescued at Ormond Beach, released at COPR	
py	vy	SBZ (2022), rescued at ODSVRA, released at COPR	
py	wa	SBZ (2021), rescued at ODSVRA, released at COPR	
py	wa/r/a	unknown	
py	wg	SBZ (2021), rescued at COPR, released at COPR	
py	ww	SBZ (2021), rescued at ODSVRA, released at COPR	
py	xx	unknown	
py	ya	SBZ (2022), rescued at COPR, released at COPR	
py	yw	SBZ (2022), rescued at Ormond Beach, released at COPR	
py	yy	SBZ (2022), rescued at ODSVRA, released at COPR	
r	ara	VSFB - Minuteman (2022)	
[S]b	bb	unknown	
Silver b	kb	unknown	
vg	vv	unknown	
vv	ab	unknown	
vv	yv	unknown	
w	v/a/v	VSFB - Surf South (2023)	
w/g/w	k	unknown	
w/r/w	w	VSFB (2020)	
wb	aw	Fort Ord State Beach, 2020	
ww	wa	Centerville Beach, Humboldt, banded as adult female on nest in 2021	
xb	kb	unknown	with chicks
xr	ka	unknown	
xy	rv	unknown	docent unsure of left leg top band
y	rk	unknown	
y	rv	unknown	
yb	aa	unknown	y may be gold or tan?
yv	ao	unknown	y is metallic or gold?, 430 meters
yv	v	unknown	possibly "vv" on right leg, that plover was here last breeding season
Yy	wg	Zmudowski Beach, Humboldt, banded as adult male on nest in 2018	

APPENDIX B
USDA Report



United States Department of Agriculture

Animal and Plant Health Inspection Subject: Coal Oil Point Reserve Predator Management Report for Fiscal Year 2023

Service Date: 10/24/2023

Wildlife Services To: Cristina Sandoval

3419A Arden Way Coal Oil Point Reserve
Sacramento, Natural Reserve System
CA 95825 University of California
916.979.2675

This report covers predator management activities conducted by USDA Wildlife Services between October 1st 2022 and September 30th, 2023 at Coal Oil Point Reserve. The main objective of this project is to protect the Federally Endangered Western snowy plover (*Charadrius nivosus*) from mammalian and avian predation. Predator removal was conducted by USDA Wildlife Services District Supervisor Barry Lowry, Assistant District Supervisor Arthur Young, and Wildlife Specialist Tony Jennings. A breakdown of the hours worked on the project can be found in Table 1.

Table 1. Hours worked

Task	Hours
Field work	67
Office duties	10.5
Equipment Maintenance	0
Travel	0
Total	77.5

Control methods used were DRC-1339 avian pesticide, cage traps, and padded jaw leg hold traps to remove a total of 65 target predators. Fifty-seven American crows (*Corvus brachyrhynchos*), three striped skunks (*Mephitis mephitis*) one red foxes (*Vulpes vulpes*), one Virginia opossums (*Didelphis virginiana*), and three raccoons (*Procyon lotor*) were removed during this time period (Table 2). All mammals were euthanized by shooting. Predator carcasses were disposed of according to WS directives, and all applicable state and federal laws and regulations. Traps were mostly set along the exclusion fence on the southern part of reserve. DRC-1339 was deployed at three nest towers (Map 1).

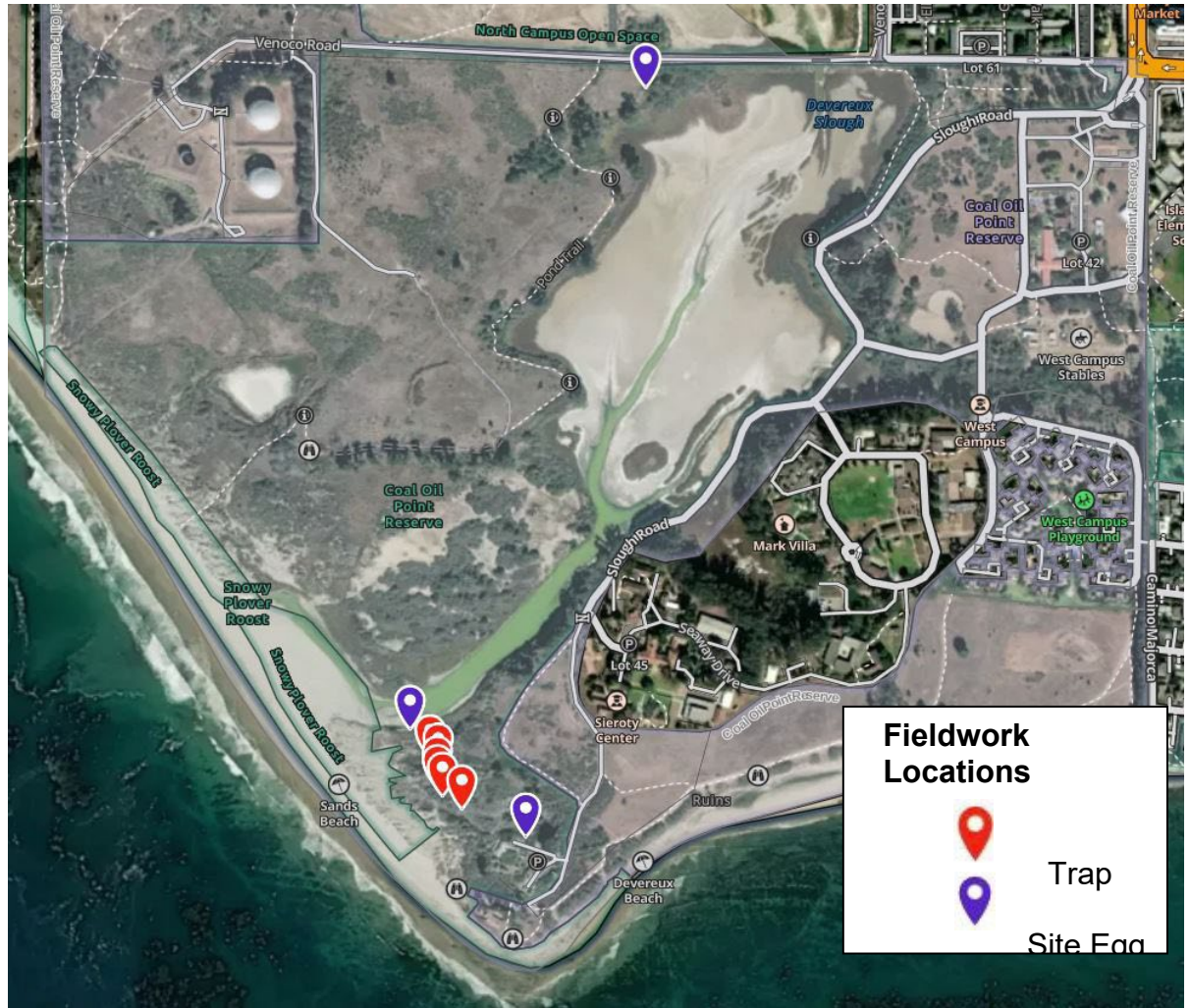
Table 2. Predators captured and methods employed

Method	Red Fox	Opossum	Raccoon	Crow	Skunk	Total
Cage Trap	0	1	2	0	2	5
DRC-1339	0	0	0	57	0	57
Padded Foot hold	1	0	1	0	1	3
Total	1	1	3	57	3	65

Table 3. Timeline of Predator Removal

Date	Method	Species	#
3/29/2023	Padded Leghold	Raccoon	1
3/29/2023	Padded Leghold	Skunk	1
3/30/2023	Padded Leghold	Red Fox	1
4/5/2023	DRC-1339	Crow	5
4/14/2023	DRC-1340	Crow	12
4/20/2023	DRC-1341	Crow	15
6/1/2023	DRC-1342	Crow	10
6/6/2023	DRC-1343	Crow	15
7/7/2023	Cage Trap	Opossum	1
7/11/2023	Cage Trap	Raccoon	2
7/11/2023	Cage Trap	Skunk	2

Map 1. Locations of predator control fieldwork



An Equal Opportunity Provider and Employer

Prepared by: Arthur Young
Assistant District Supervisor

APPENDIX C
Plover Necropsy Report



California Department of Fish and Wildlife, Office of Spill Prevention and Response Marine Wildlife Veterinary Care and Research Center, 151 McAllister Way, Santa Cruz, CA 95060

Seabird Mortality Event Necropsy Report

NECROPSY NUMBER: 23-0119

OTHER IDENTIFICATION: N/A

COMMON NAME: Snowy Plover

SCIENTIFIC NAME: *Charadrius nivosus*

DATE FOUND: 3/24/2023

COUNTY: Santa Barbara

STATE: CA

NECROPSY DATE: 6/16/2023

REPORT DATE: 6/28/2023

NECROPSY BY: Corinne Gibble

Event Background

Three snowy plovers were found dead in the same area (Sands Beach at the slough mouth) of Coal Oil Point Natural Reserve within 3 weeks. Two of the three birds were collected and saved frozen by Cris Sandoval, and the third was in the water and inaccessible. Only one out of the two collected birds was in good enough postmortem condition for examination via gross necropsy.

Necropsy Summary

Due to the ongoing outbreak, this bird was tested for Highly Pathogenic Avian Influenza (HPAI) at the California Animal Health and Food Safety Laboratory in Davis, CA (CAHFS) prior to gross necropsy. Test results confirmed that the bird was negative for HPAI.

Postmortem radiographs revealed slight lateral displacement of the keel. During external examinations, this bird was found to be in fair condition with signs of decomposition but no scavenging. There were abrasion wounds to the lower right abdomen wall and the upper left portion of the back. There was blood

and sand found at the bill and the left eye was proptosed (pushed out of the socket). The right eye was deeply sunken.

Internal examination confirmed lateral displacement of the keel, and acute subcutaneous and intramuscular hemorrhage of the pectoral muscle. Moderate acute hemorrhage was present surrounding the heart and in the lungs. The liver was dorsoventrally compressed, with small hepatic ruptures throughout. The bird was in good nutritional condition with subcutis, and pericardial adipose

present, and the pectoral muscle complex projected above the keel, with no discernable pectoral muscle atrophy. The skull was grossly intact, however there was hemorrhage throughout the brain, with a large area of hemorrhage at the back of the head in the occipital region and behind the eyes.

The presumptive cause of death is acute crush trauma. No gross evidence of pre-existing disease or postmortem scavenging was found.

Completed Tests and Procedures

1. Gross photographs
2. Radiographs
3. Gross Necropsy

Gross Findings

Acute severe crush trauma, characterized by:

- Abrasion to lower right abdominal wall, and left upper back
- Keel displacement
- Multifocal acute hemorrhage and bruising
- Dorsoventral compression of liver
- Occipital hemorrhage, eye proptosis

Final Diagnoses

Presumptive cause of death: acute crush injury

Samples Saved

Carcass

Images

2



Figure 1. Abrasion to lower right abdominal wall



Figure 2. Hemorrhage behind the eyes and at the occipital regio

APPENDIX D
Nesting Data from WSP habitat adjacent to COPR

Table 9. 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	# nests fledged
2018	1	0	0	1	0
2019	3	0	2	1	0
2020	1	1	0	0	0
2021	0	n/a	n/a.	n/a.	n/a
2022	3	2	unknown	unknown	2
2023	0	n/a	n/a.	n/a.	n/a

Table 10. WSP nesting data from Ellwood Beach, Goleta. First nest observed in 2019.

Year	# nests	# nests hatched	# nests predated by skunks	# nests predated by crows	# nests fledged
2019	1	0	0	1	n/a
2020	0	n/a	n/a	n/a	n/a
2021	0	n/a	n/a	n/a	n/a
2022	0	n/a	n/a	n/a	n/a
2023	2	2	0	0	2

APPENDIX E
California Least Tern Nesting Data from at COPR

Table 11. 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	n/a	n/a	n/a	n/a
2010	0	n/a	n/a	n/a	n/a
2011	1	0	0	0	1
2012	0	n/a	n/a	n/a	n/a
2013	0	n/a	n/a	n/a	n/a
2014	0	n/a	n/a	n/a	n/a
2015	0	n/a	n/a	n/a	n/a
2016	0	n/a	n/a	n/a	n/a
2017	0	n/a	n/a	n/a	n/a
2018	0	n/a	n/a	n/a	n/a
2019	0	n/a	n/a	n/a	n/a
2020	0	n/a	n/a	n/a	n/a
2021	0	n/a	n/a	n/a	n/a
2022	0	n/a	n/a	n/a	n/a
2023	0	n/a	n/a	n/a	n/a