

# UC Santa Barbara

## Reports

### Title

2022 Final Report on the Western Snowy Plover

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The data associated with this publication are available upon request.

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**2022 Final Report on the Western Snowy Plovers**

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Coal Oil Point Reserve  
University of California  
Santa Barbara, CA

Cristina Sandoval, Jessica Gray, and Hanna Weyland  
Permit Number **TE073205-5**

Date of Preparation: February 7<sup>th</sup>, 2023



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.

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## ABSTRACT

In 2022, we monitored the Western Snowy Plover (WSP) population at Coal Oil Point Reserve as in previous years. The number of breeding adults was 52, higher than the average of 37 for our site. The wintering population size was 183, also above the average of 167. Skunk predation was the primary cause of nest failure. In response to the high levels of predation by skunks and the failure to trap them, all nests present on or laid after April 29<sup>th</sup> and before May 31<sup>st</sup> 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. 35 nests (34%) of nests this season were replaced using this method. The hatching and fledging success rates in this report reflect those that hatched and fledged naturally and exclude nests that had eggs replaced. Hatching rate (28%) was lower than average (53%) and the fledging rate (74%) was higher than average (62%). The number of fledged chicks per male (1.0) met our site's recovery goal of 1.0 fledged chicks per male. 92% of nests (94) were initiated on the beach, and 8% (8) 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 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). 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, and 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 40% of dog owners arrive to the beach with their dog off leash. 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. After docent communication, the total leash compliance rate increases from 60% to 90%.

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 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 2022, 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 (Photo 1).

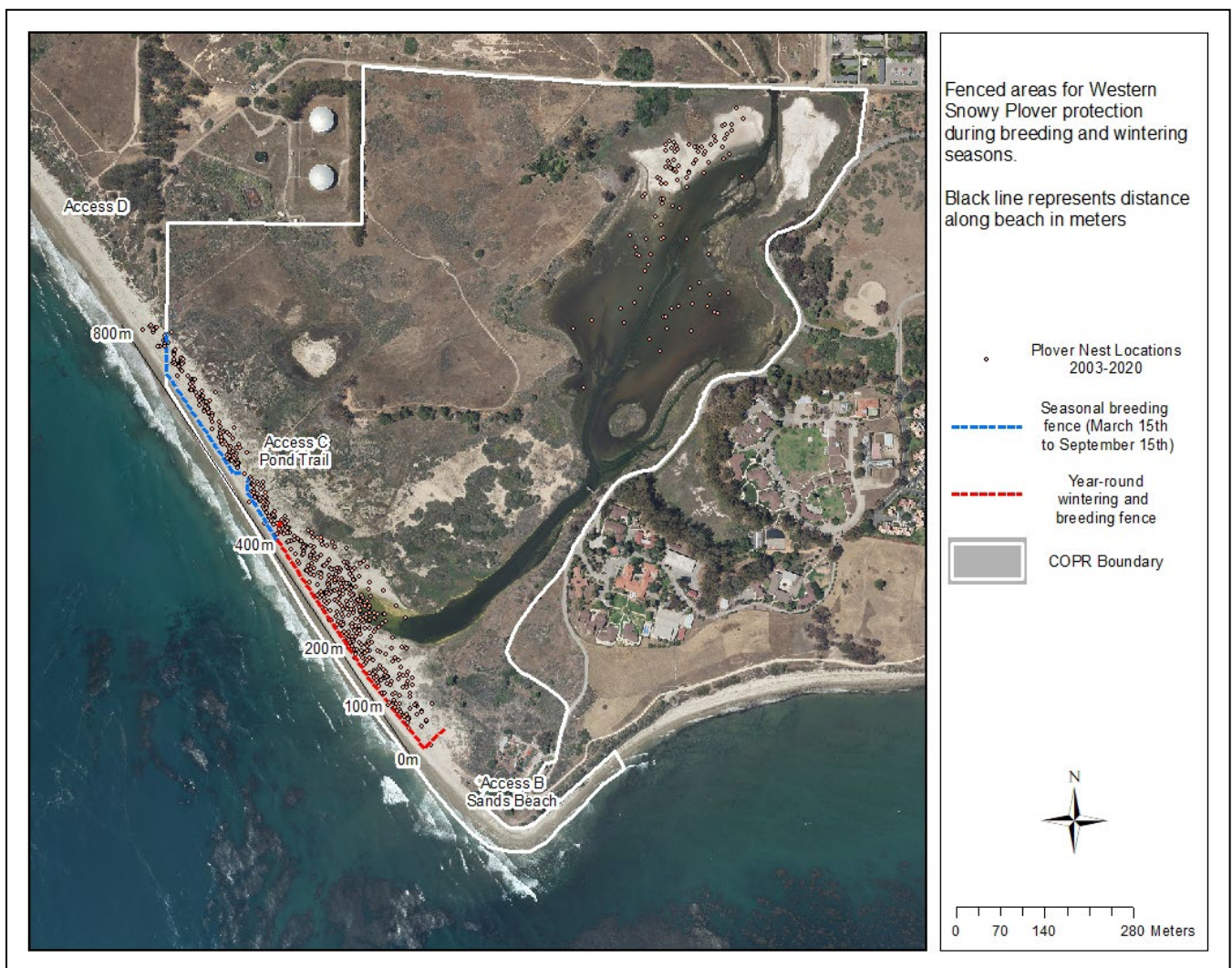


Figure 1. Location of the habitat protected by symbolic fencing for the Western Snowy Plovers at Coal Oil Point Reserve and location of nests since the recovery of the breeding population in 2001.



*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, 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 2022 winter window survey, observers recorded 183 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.



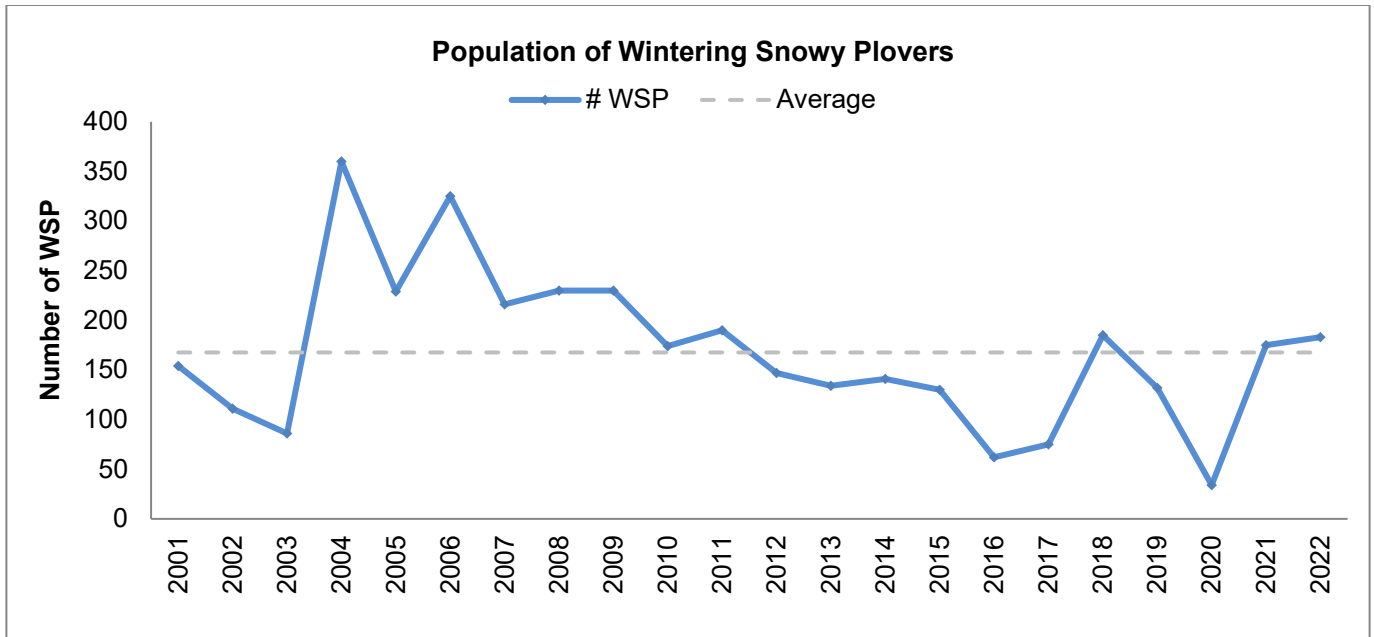


Figure 2. Results of winter window surveys at Coal Oil Point Reserve. *Average line represents the average from 2001-2021.*

### 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 52 WSP during the 2022 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 carrying capacity (Figure 3).

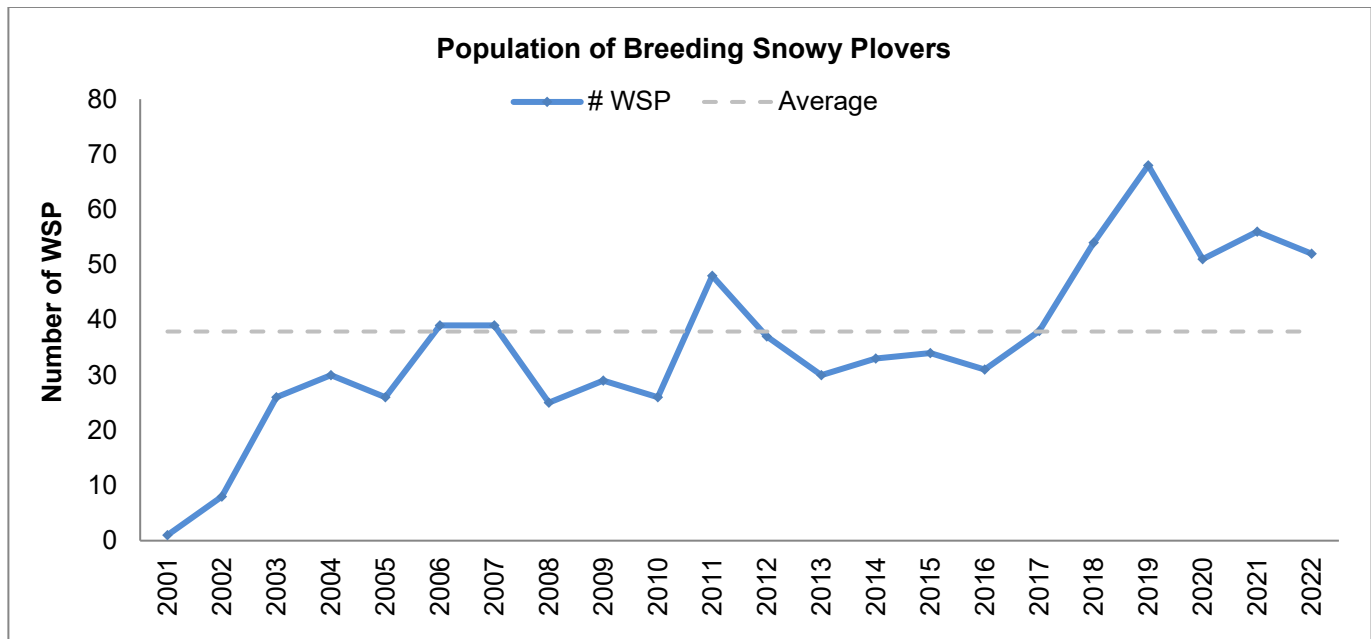


Figure 3. Number of adult Snowy Plovers recorded during breeding window surveys at Coal Oil Point Reserve. *Average line represents the average from 2003-2021. In 2001 and 2002, the breeding population was still beginning to grow. Note that these years are excluded from the calculation of all breeding 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 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. The reason for collecting abandoned eggs is to reduce attraction of crows and skunks, and incubate the eggs in captivity to determine viability. 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.

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. 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 2021-2022, 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.*

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%

## COPR WSP Report 2022

2005	26	64	16	25%	30	2.3	81%
2006*	39	43	22	51%	37	2	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	67%
2019*	68	97	27	28%	8	0.2	19%
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%
<b>COPR AVERAGE</b>	<b>37.9</b>	<b>65.7</b>	<b>32.3</b>	<b>53%</b>	<b>37.9</b>	<b>2.3</b>	<b>62%</b>
<b>COPR SD</b>	<b>12.1</b>	<b>18.1</b>	<b>11.9</b>	<b>15.5%</b>	<b>19.8</b>	<b>1.0</b>	<b>24.0%</b>

This year, 102 WSP nests were initiated at COPR and 19 of them hatched without egg replacement (28% hatching rate). An additional 14 nests hatched as the result of the egg replacement method. Figure 4 shows the number of nests laid and the number of nests hatched between 2001-2022.

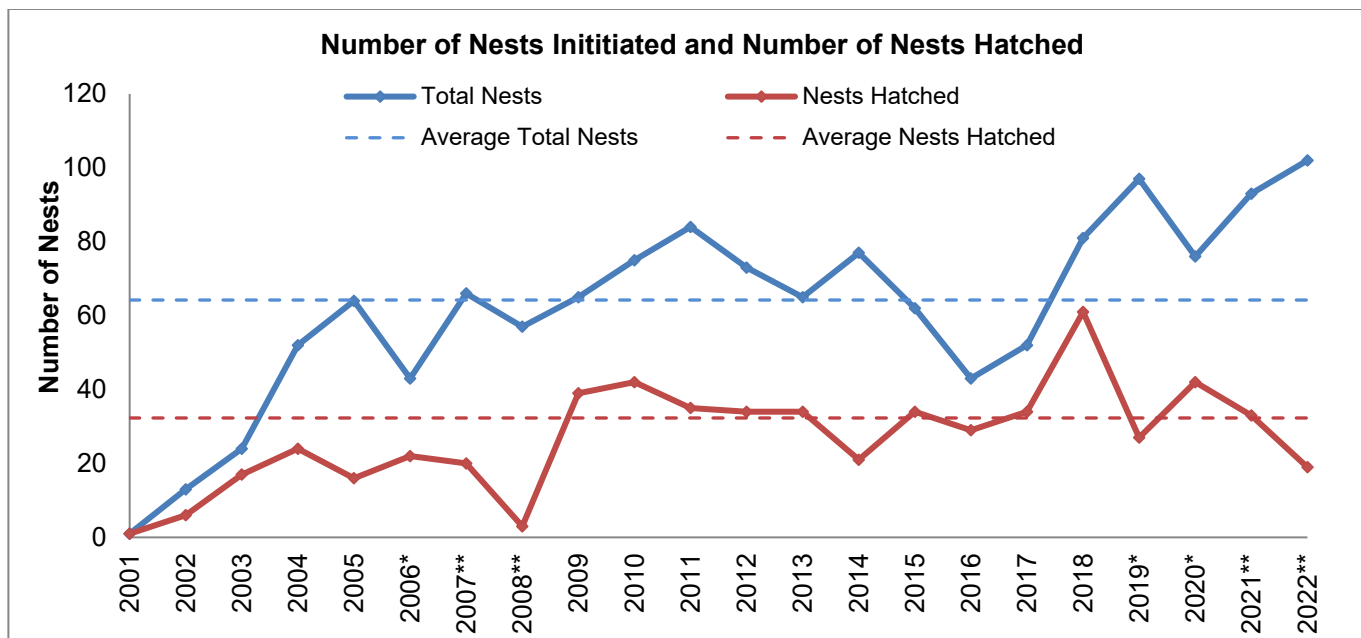


Figure 4. Nests initiated and hatched by year (total number of nests that had at least one egg vs. total number of nests that hatched at least one chick).

*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 2021-2022, 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.*

The primary causes of nest failure this year were predation by skunks and crows (Figure 5, Table 2).

Other predators were unknown predators and foxes. This was the first year that fox predation on nests was documented at our site.

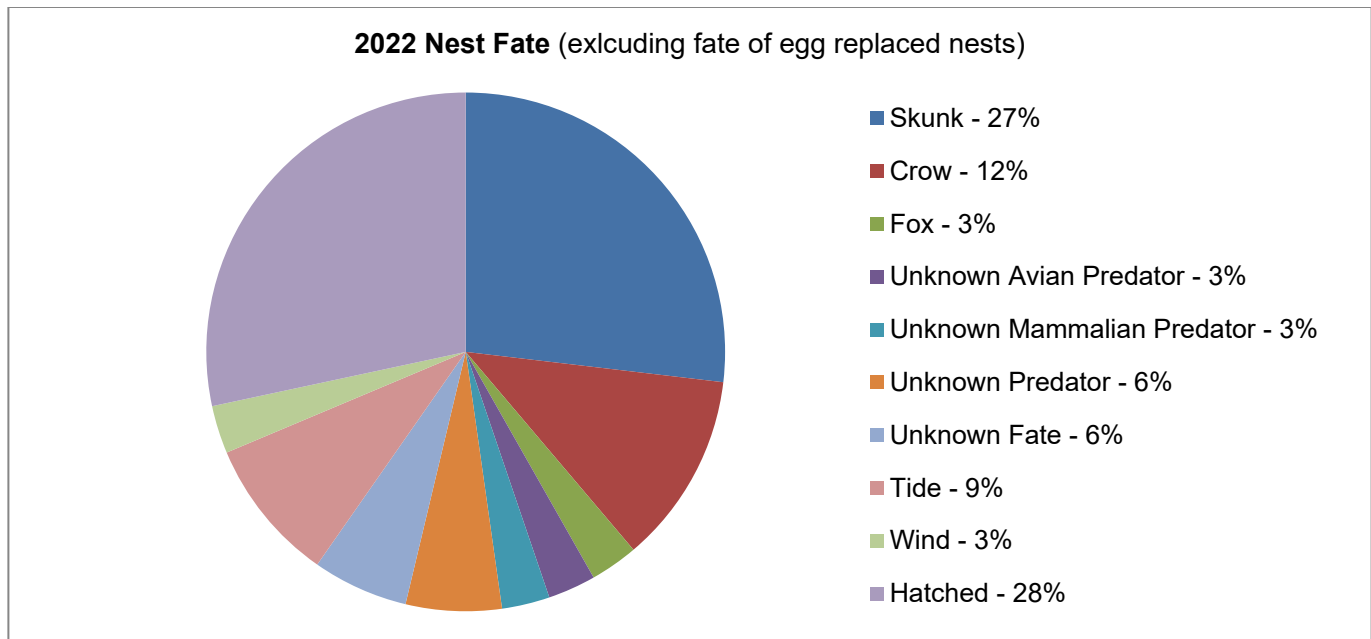


Figure 5. Nest fate at COPR in 2022, excluding the fate of the 35 nests that had eggs replaced. Each section in the graph shows the proportion of nests that failed by each cause and the proportion of nests that hatched (data is in Table 2 below).

Table 2. Number of nests lost by fate from 2002-2022.

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

\*\*Note that in 2007-2008 & 2021-2022, 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 **
<b>Total nests</b>	13	24	52	64	43	66	57	65	75	84	73	65	77	62	43	52	81	97	76	93	102
<b>Hatched</b>	6	16	20	16	22	20	3	39	42	35	34	34	21	34	29	34	61	28	42	33	19
<b>Skunk</b>	0	0	9	18	2	19	18	10	0	0	0	4	10	15	6	4	3	9	0	23	18
<b>Crow</b>	2	4	8	3	0	0	0	1	1	0	0	0	0	0	0	0	0	32	7	0	8
<b>Abandoned</b>	0	1	1	9	3	1	0	2	3	5	3	4	9	1	2	1	3	2	0	6	0
<b>Abandoned /Owl</b>	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Raccoon</b>	0	0	2	1	0	0	0	1	0	0	2	2	4	0	1	0	0	0	0	0	0
<b>Whimbrel</b>	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
<b>Gull</b>	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0
<b>Opossum</b>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Fox</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
<b>Dog</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

<b>Unknown Cause</b>	0	0	0	0	0	0	0	0	17	8	4	0	21	0	0	0	0	0	0	2	4
<b>Human</b>	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0
<b>Unknown Predator</b>	0	0	0	1	1	0	0	4	0	10	3	15	9	3	0	2	3	1	2	7	8
<b>Wind</b>	1	2	2	6	1	2	2	5	2	10	2	0	0	1	0	3	1	3	8	4	2
<b>Flooded/Tide</b>	0	0	4	5	2	1	6	2	5	12	16	6	3	5	2	8	6	17	16	6	6
<b>Flooded/Delta</b>	0	0	0	3	0	0	0	0	4	3	0	0	0	0	0	0	0	3	1	0	0
<b>Eggs Replaced</b>	0	0	0	0	0	11	23	0	0	0	0	0	0	0	0	0	0	0	0	9	35

**Nest Predation**

More than half of all nests failed due to predation. 12% of nests were predated by crows. USDA was contracted to remove crow nests near the plover habitat and remove crows (Appendix C). Of the 8 crow predations, 7 occurred in March and April prior to the implementation of crow traps and corvidicide treatment by USDA. Prior to using these methods, crow hazing techniques were implemented by using crow carcasses to deter the crows from the nesting area and harassing all crows on the beach by chasing them. Predator exclosures were also used briefly on 3 nests but were removed on April 29<sup>th</sup> after 7 nests were predated by skunks overnight. In previous years, skunks have also targeted exclosures and are able to enter the exclosure through the 2” x 4” mesh or by digging underneath.

The primary nest predator this year was skunks. USDA was contracted to trap and remove skunks however skunks remained a consistent problem predator for the entire length of the nesting season, from March through July. This problem persisted despite 20 active live traps during the season. Many traps had skunk footprint around the trap but not going into it. USDA personal commented that skunks at COPR appear to be trap shy, possibly as a result of being trapped in the neighborhood and released in the reserve.

Two techniques novel to COPR were implemented this year to attempt to deter skunks from predated nests. An electric fence with 4 wires was installed along the interior edge of the plover habitat, on the east side of Sands Beach (Photo 2). Camera trap videos showed some skunks avoiding the fence after touching it but some videos showed skunks walking under the lower wire without difficulty. Although electricity is very effective in deterring mammals, a specific problem of using it in sandy soils is that there is low humidity in the sand so the electricity does not travel along the ground when the animal touches the

positive wire. To improve this issue, we used alternative negative and positive wires but the skunk needs to touch both wires to receive a shock. When they go under the 1<sup>st</sup> negative wire, they are not shocked.



*Photo 2. Skunk outside of the electric fence.*

We also tried to create an avoidance behavior on the skunks by electrifying quail eggs (Photo 3-5). The electrified quail eggs were set up on a wooden board covered in dry sand to avoid shorting in wet sand. Each egg had one positive and one negative thin wire wrapped around, approximately 1 cm from each other. To ground the system, a long bolt was anchored in watered down sand. Skunk footprints were not seen near the electrified eggs in the following two days. Some eggs shorted due to the humidity of the night so it is possible that the skunks could hear and were deterred by the sound.





*Photo 3. Electric fence charge and 2 quail eggs with negative and positive wires.*



*Photo 4. Detail of electrified eggs.*



*Photo 5. Field placement of electrified quail eggs showing wet sand around the eggs to improve contact and dry sand under the eggs.*

Ultimately, the most successful strategy against skunk predation was egg replacement and skunk night capture with the USDA. Between April 29<sup>th</sup> and May 30<sup>th</sup>, all active nests were collected and replaced with fake wooden eggs. Real eggs were kept in an incubator at COPR (Photo 6) until it was time for them to start hatching and then were replaced so the chicks hatched under the parents.



*Photo 6. Western Snowy Plover eggs in the incubator while their nests on the beach have wood eggs.*

Eggs were replaced for a total of 35 nests (Table 3). Of those 2 nests failed in the incubator and one nest was abandoned by the parents. Five nests were predated by skunks when they were hatching, on the night that they were returned to the beach. 40% of the egg replaced nests hatched and were successfully returned to the beach, compared to the 28% hatching rate prior to implementing the egg replacement technique. Fourteen fake nests were destroyed by tide, wind or skunks, before the real eggs could be returned to the beach. The real eggs were moved to Santa Barbara Zoo to be hand-raised.

Table 3. Number and percentage of the fates of nests that had eggs replaced.

Nest Fate	Number of Nests	Percentage
Hatched and successfully returned to the beach	14	40%
Failed to hatch	2	6%
Real nest predated by skunk when the hatching eggs were returned to the beach, usually on the same day of returning them	4	11%
Fake nest destroyed by skunk (skunk attempted predation on wooden eggs resulting in nest abandonment)	5	14%
Tide (washed out wooden eggs; resulted in nest abandonment)	6	17%
Wind (buried wooden eggs; resulted in nest abandonment)	3	9%
Abandoned	1	3%
<i>Total</i>	35	100%

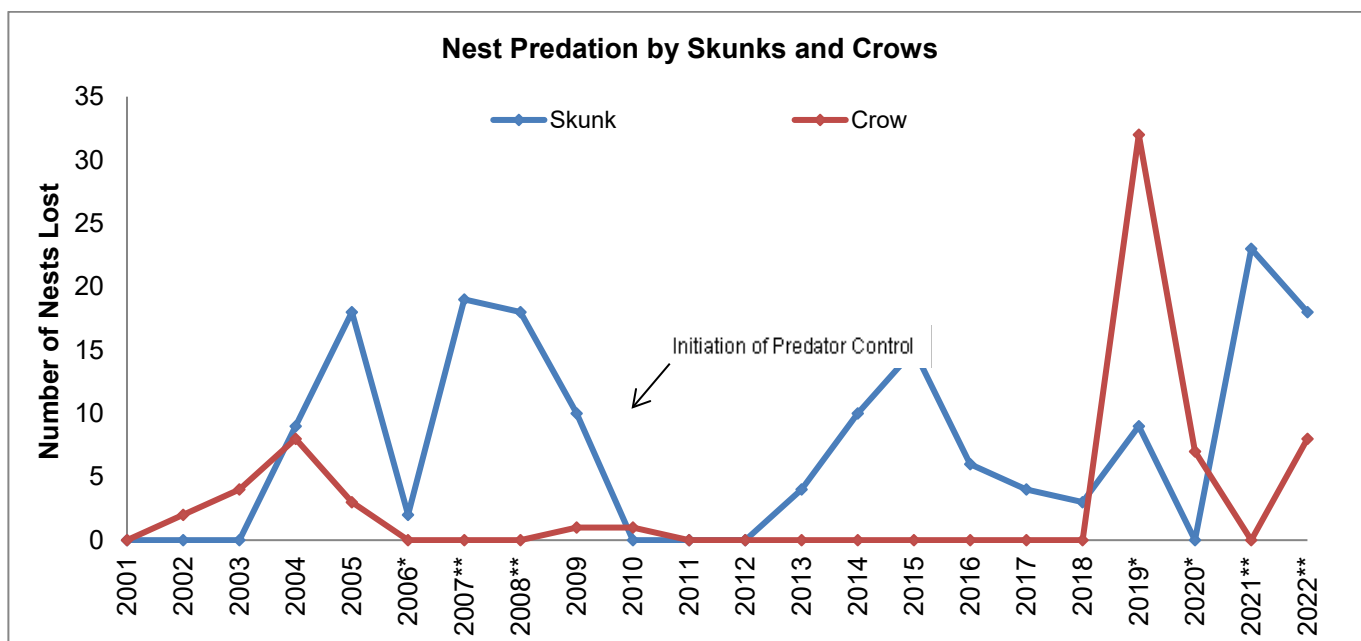


Figure 6. Skunk and crow predation by year.

*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, 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 2021-2022, 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.*

Crows were a problem in the beginning of the season but they were successfully controlled after the installation by USDA of 2 towers that were baited with corvidicide.

Predator control extended from April through August and focused on the common predators such as crows and skunks, and occasional predators such as opossums, raccoons, and red fox (see USDA report in appendix section).

**Chick Survival**

The survival rate of chicks (74%) was higher than average (62%) this year (Figure 7). In 2022, 26 WSP chicks fledged at COPR without intervention. An additional 21 chicks fledged on the beach after the eggs were incubated in an incubator and returned to the nest on the hatching day (Figure 8). This year, COPR plovers produced 1.0 fledged chicks per male, which meets the minimum expectation rate of 1 chick per year per male for a stable population (Table 1).

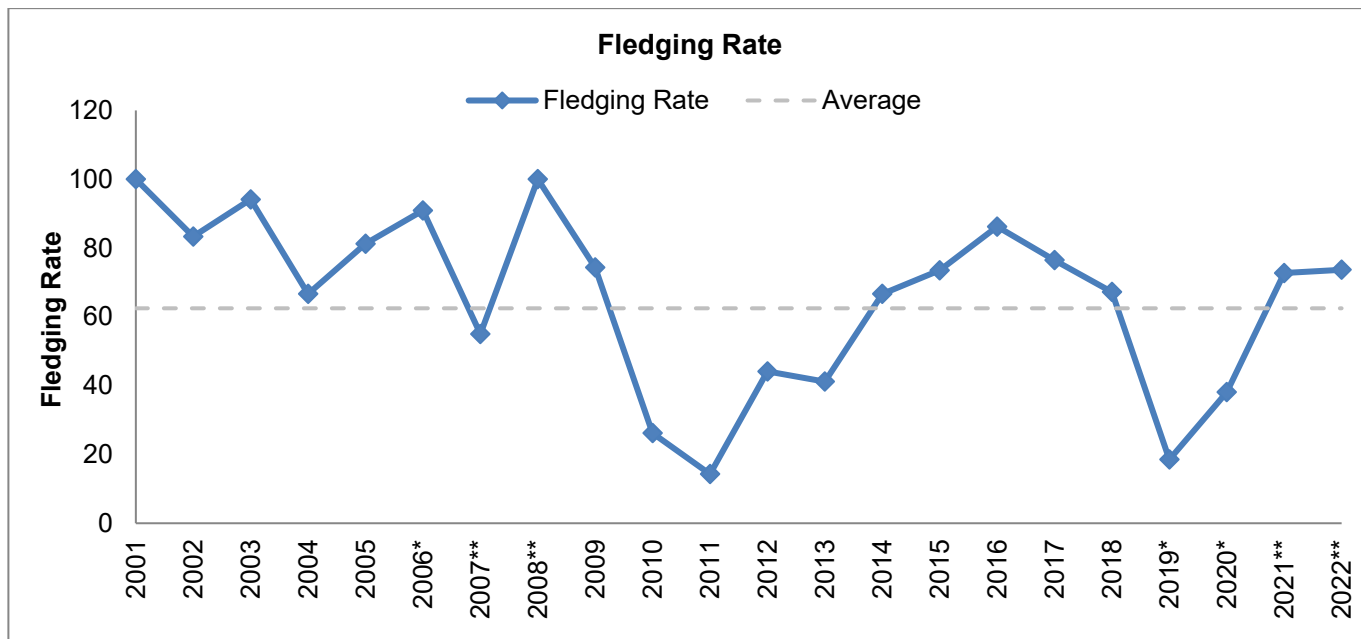


Figure 7. Fledging rate by year (# nests that fledged at least one chick/# total nests \*100).

*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.*

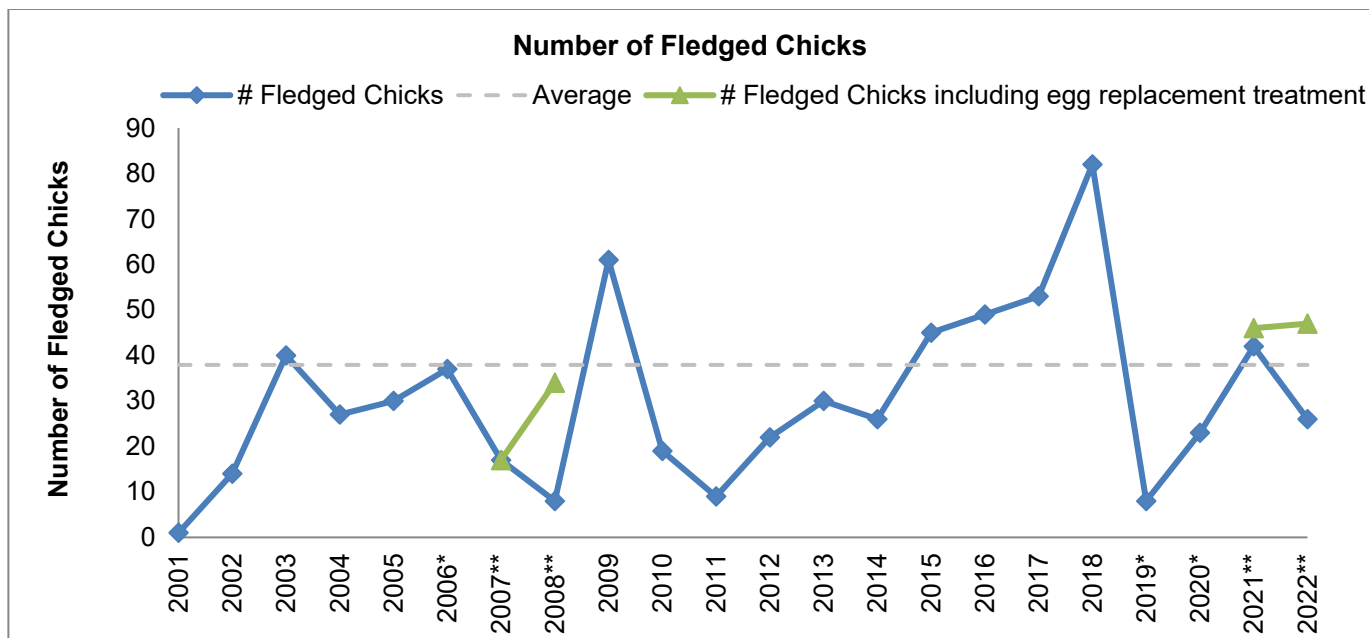


Figure 8. Number of chicks fledged by year.

*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.*

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*\*\*In 2007-2008 and 2021-2022, 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

There were no direct observations of predation on plover chicks. There were several instances in which artificially hatched chicks were replaced back into the nest in the evening and predated by skunks by the morning. Skunk prints were observed leading up to these nests, indicating that skunks may have eaten the very young chicks before the chicks had left the nest.

**Nest Phenology**

In 2022, the first nest was initiated on March 21<sup>st</sup>, the first chick fledged in July 27<sup>th</sup>, and the last chick fledged on August 27<sup>th</sup> (Table 4). Note that 21 chicks fledged prior to July 27<sup>th</sup> but are excluded because their survival was the result of egg replacement intervention. The peak nesting period fell between April 20<sup>th</sup> and April 26<sup>th</sup>. The total breeding season length was 159 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 5 days longer than the average. The dates of all nesting events in 2022 fell within the range of previous years' dates (Figure 9).

Table 4. Dates of nesting events in 2022

2022 Nesting Event	Date
First Nest Initiation	3/21/2022
Last Nest Initiation	7/18/2022
First Hatch	4/27/2022
Last Hatch	7/30/2022
First Fledge	7/27/2022
Last Fledge	8/27/2022

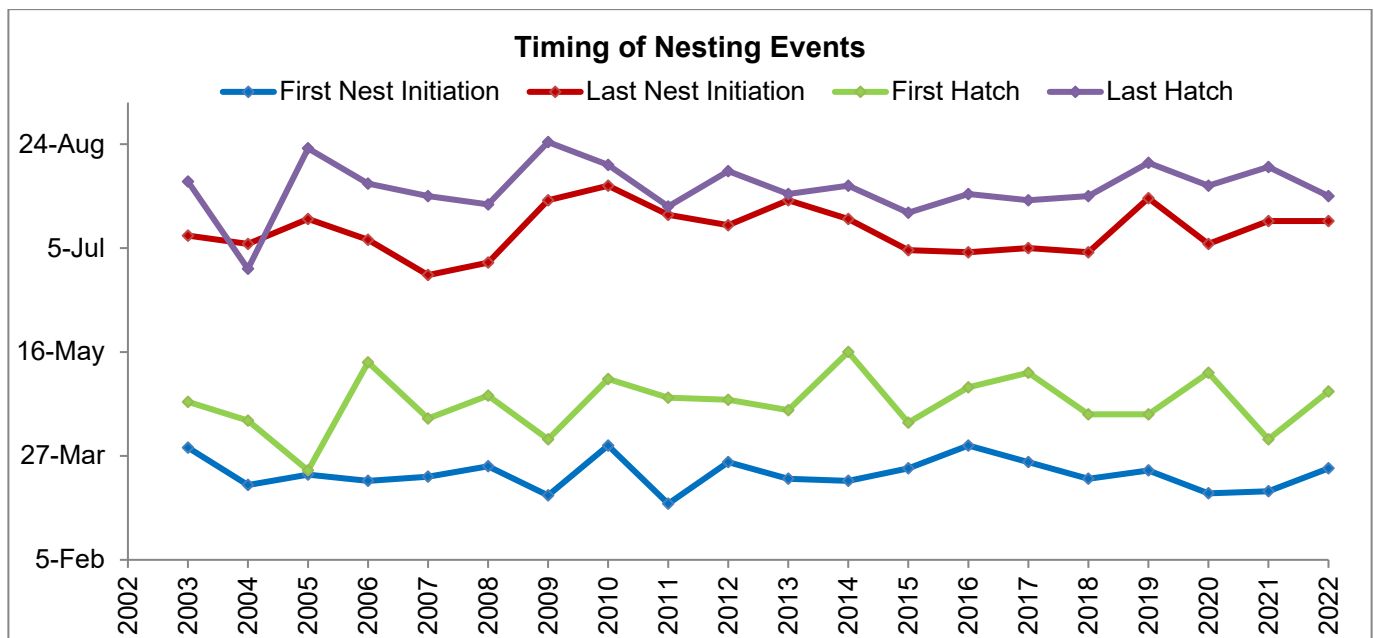


Figure 9. Timing of nest events by year.

*\*\*In 2007-2008 and 2021-2022, 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 2022, a total of 1 chick and 30 abandoned eggs were collected from Coal Oil Point Reserve (Table 5) to be transferred for viability testing and rehabilitation at Santa Barbara Zoo. The chick was rescued due to an issue with its leg. After the chick’s condition continued deteriorating despite veterinary care, the chick was euthanized.

Table 5. Number of eggs collected and taken to the Santa Barbara Zoo to be tested for viability, and then hand reared if they were viable.

Reason for collection	Number of eggs collected
Crow	3
Skunk	9
Tide	13
Wind	5
<i>Total eggs</i>	<i>30</i>

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 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 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 6). Each individual satisfied the USFWS requirements of age, health, and minimum size for release prior to the release date.

Four groups of captively reared chicks from COPR and other sites were released at COPR on the mornings of June 7<sup>th</sup>, July 5<sup>th</sup>, July 18<sup>th</sup>, and August 8<sup>th</sup>. 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 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 and 5' x 5' x 2'



for large groups of plovers. Pens were 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 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 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. One group of plovers remained in the pen after the door was opened so after 30 minutes, SB Zoo staff gently ushered them out of the pen. 23 of the 32 released chicks have been sighted at Coal Oil Point Reserve since their release. We continue to monitor the band sighting email list for sightings of these plovers at other sites.

Table 6. Band combinations for all plovers released at COPR in 2022. Sightings include surveys completed at COPR a minimum of 5 days after the release.

Release Date	Release Site	Bands Left	Bands Right	Origin	Sightings post-release
6/7/2022	COPR	py	ao	Ormond	Yes
6/7/2022	COPR	py	ay	Ormond	Yes
6/7/2022	COPR	py	yw	Ormond	Yes
7/5/2022	COPR	pa	ba	ODSVA	Yes
7/5/2022	COPR	py	ry	COPR	No
7/5/2022	COPR	py	gy	COPR	Yes
7/5/2022	COPR	py	pa	COPR	Yes
7/5/2022	COPR	none	none	COPR	n/a
7/5/2022	COPR	py	pg	COPR	Yes
7/5/2022	COPR	py	po	COPR	No
7/5/2022	COPR	pa	gw	ODSVA(?)	Yes
7/5/2022	COPR	py	ar	ODSVA(?)	Yes
7/5/2022	COPR	pa	gy	ODSVA(?)	Yes
7/5/2022	COPR	py	pw	COPR	Yes
7/5/2022	COPR	py	or	COPR	Yes
7/5/2022	COPR	py	gr	ODSVA	No
7/5/2022	COPR	pa	gg	ODSVA	Yes
7/18/2022	COPR	py	ro	COPR	Yes
7/18/2022	COPR	py	oy	COPR	No
7/18/2022	COPR	py	wo	COPR	No
7/18/2022	COPR	py	wr	COPR	No
7/18/2022	COPR	py	yo	COPR	Yes
8/8/2022	COPR	pa	nw	Carpinteria	No
8/8/2022	COPR	py	pv	ODSVA	Yes

8/8/2022	COPR	py	rg	ODSVA	Yes
8/8/2022	COPR	py	vy	ODSVA	Yes
8/8/2022	COPR	py	wv	COPR	No
8/8/2022	COPR	py	py	COPR	Yes
8/8/2022	COPR	py	av	COPR	Yes
8/8/2022	COPR	py	yy	COPR	Yes
8/8/2022	COPR	py	gv	COPR	Yes
8/8/2022	COPR	py	ya	COPR	Yes

**Rehabilitation of Oiled and Injured Plovers**

In 2022, eleven Snowy Plovers and one California Least Tern had significant enough oiling or injuries to warrant attempted trapping and a professional assessment of condition (Table 7). Three severely oiled adult WSP were successfully trapped and transported to Santa Barbara Wildlife Care Network and International Bird Rescue for cleaning and rehabilitation. This is the first year that we have observed plovers with this level of oiling, aside from one plover during the Refugio Oil Spill in 2015 that was not so oiled to require trapping. The fate of rescued plovers can be found in Table 9, Appendix B.

Two adult plovers and one chick were rescued due to injuries and transported to Santa Barbara Zoo, Santa Barbara Wildlife Care Network, and International Bird Rescue (Photos 7 and 8).



*Photo 7 and 8. Two oiled WSP that were rescued for cleaning and rehabilitation.*

**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, 92% of all nests (94 nests) were initiated on the beach and 8% (8) 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 west side and slough mouth (Table 7). 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 7. 2022 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	25%	100%
Slough Mouth	36	29%	71%
West Side	37	4%	0%
Delta	8	100%	75%

*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 mean the beach east or west of the slough mouth.*

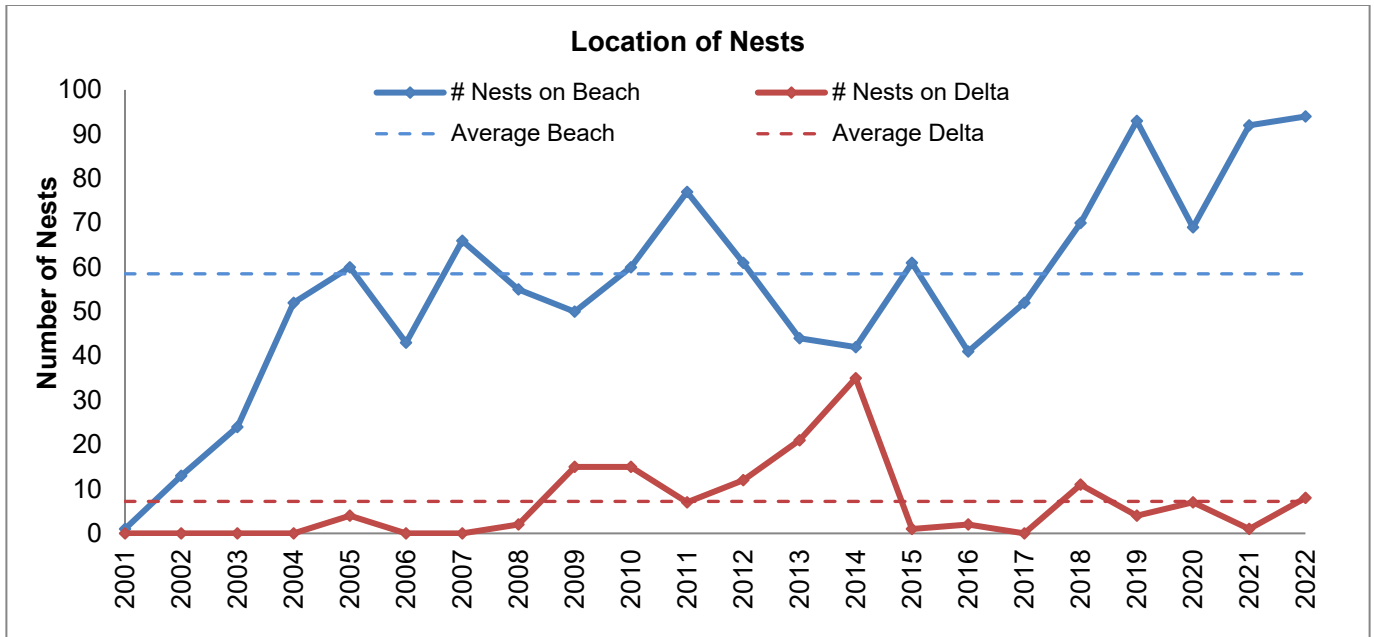


Figure 10. Number of nests on Sands Beach and the Devereux Slough mudflat between 2001-2022.

Figure 11. Location of Snowy Plover nests at Sands Beach in 2022 and their fates.



Figure 12. Map of Snowy Plover nest on the Devereux Slough mudflats in 2022. Note that this map does not represent every nest: 4 mudflat nests (fate: hatched) are excluded because coordinates were not collected.



### 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 2022, docent coverage averaged 64 hours per week (Figure 13).

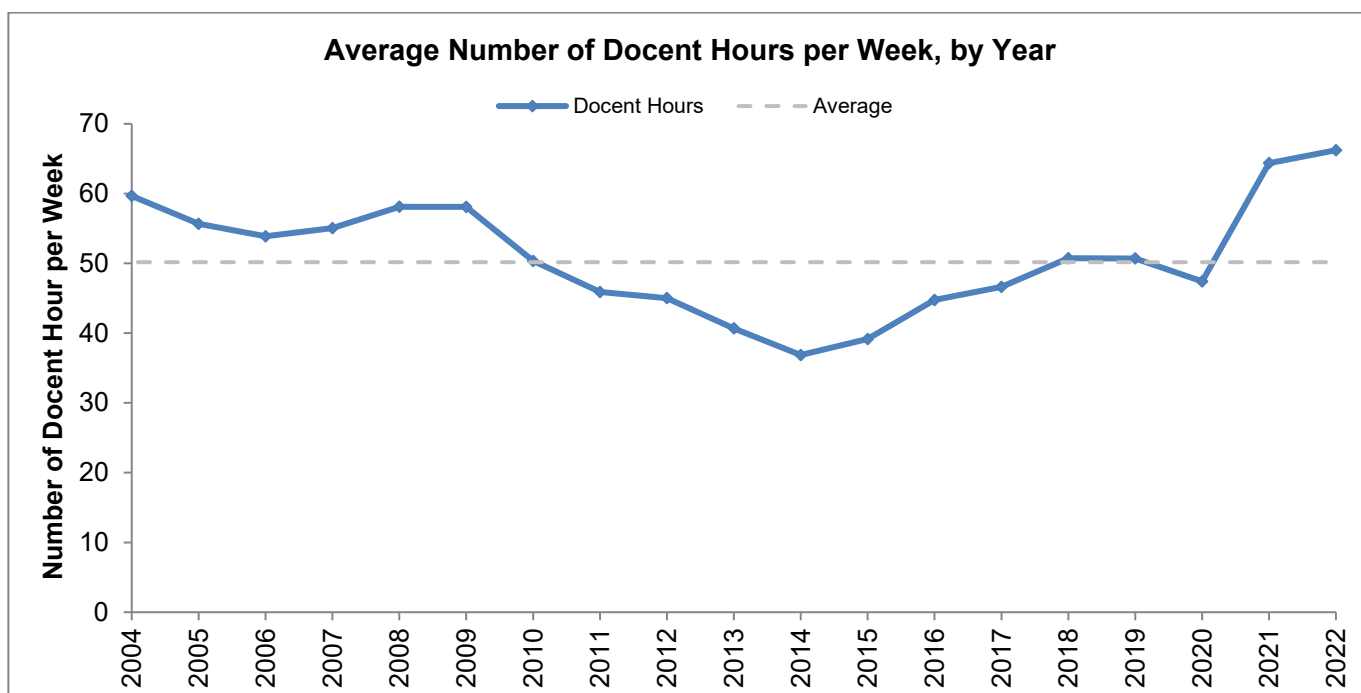


Figure 13. Average number of hours that Snowy Plover docents spent per week at Sands Beach (total number of docent hours/52 weeks). Note that in 2020, the docent program was inactive for 6 weeks due to Covid-19 restrictions, so the total number of hours for 2020 was divided by 46 weeks.

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

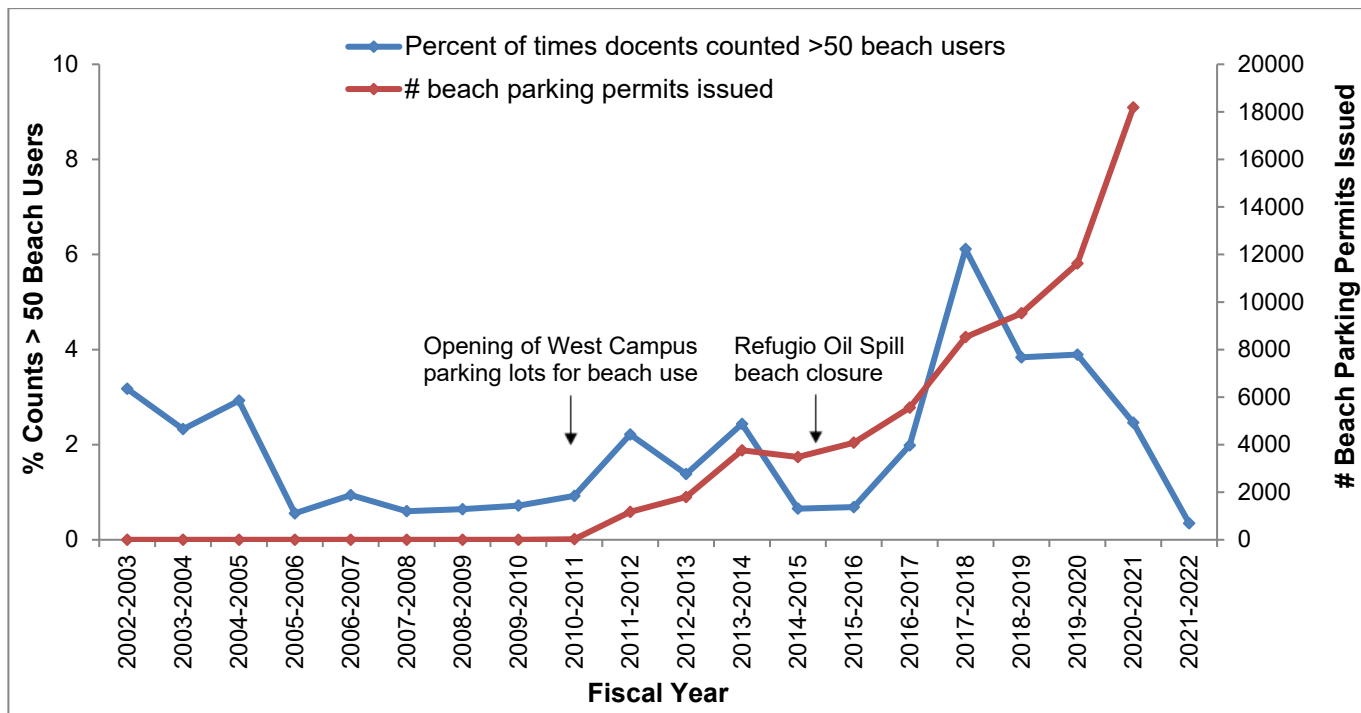


Figure 14. Percent of times that the docents counted more than 50 beach users during snapshot surveys (blue line, left axis). Number of beach parking permits issued on West Campus parking lot (red line, right axis).



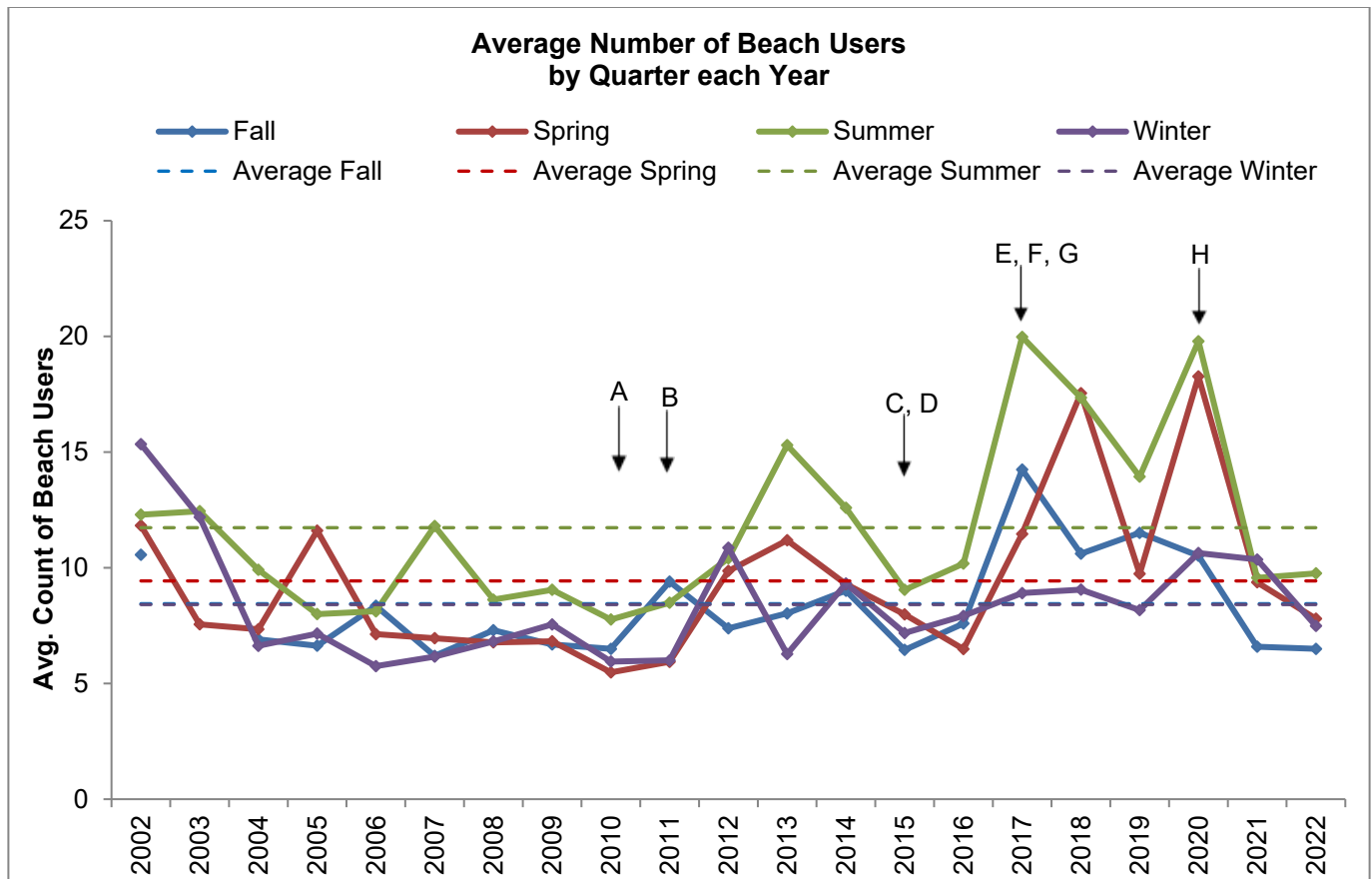


Figure 15. Average number of beach users counted by docents on snapshot surveys at Sands Beach. These data do not include people in the ocean.

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).

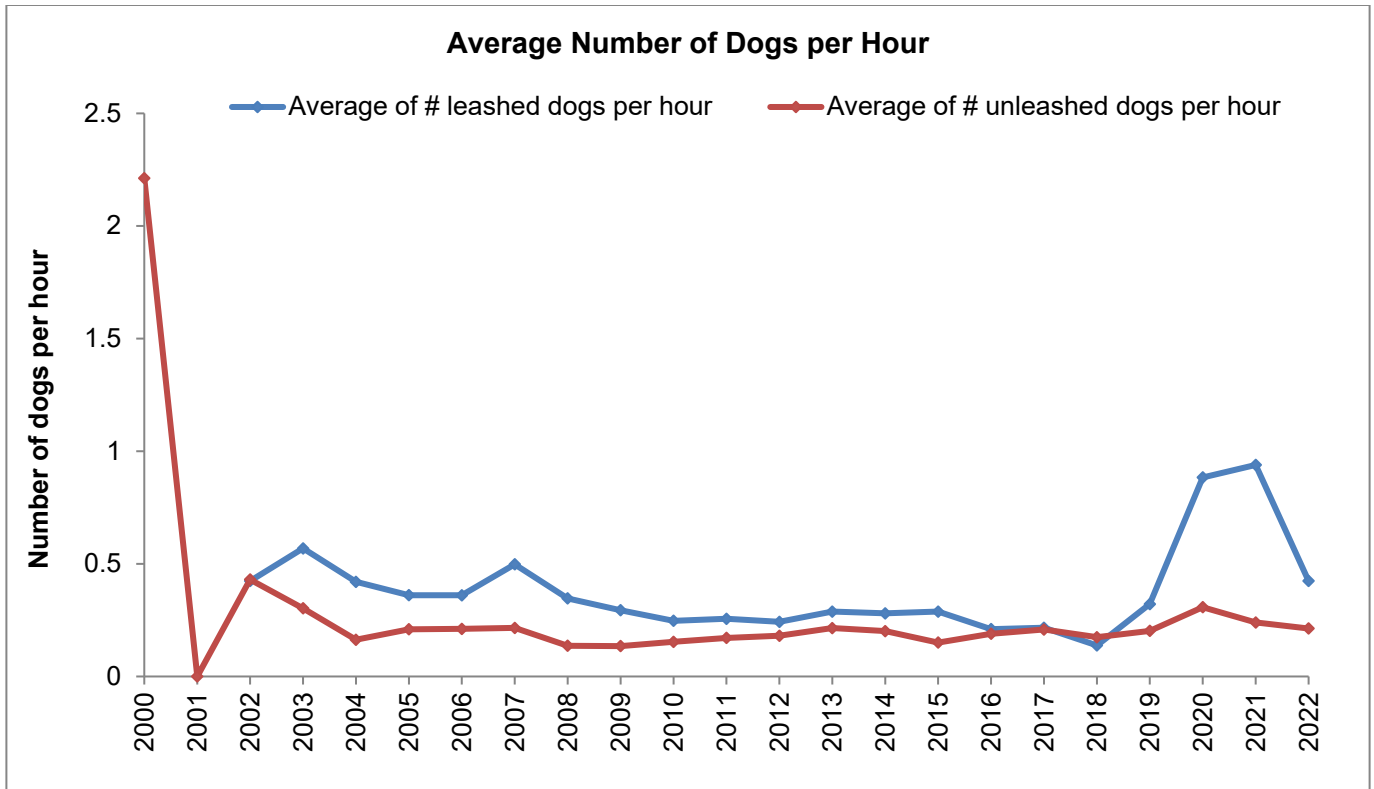


Figure 16. Average number of leashed and unleashed dogs per hour at Sands Beach. The docents record all the dogs that enter Sands Beach.

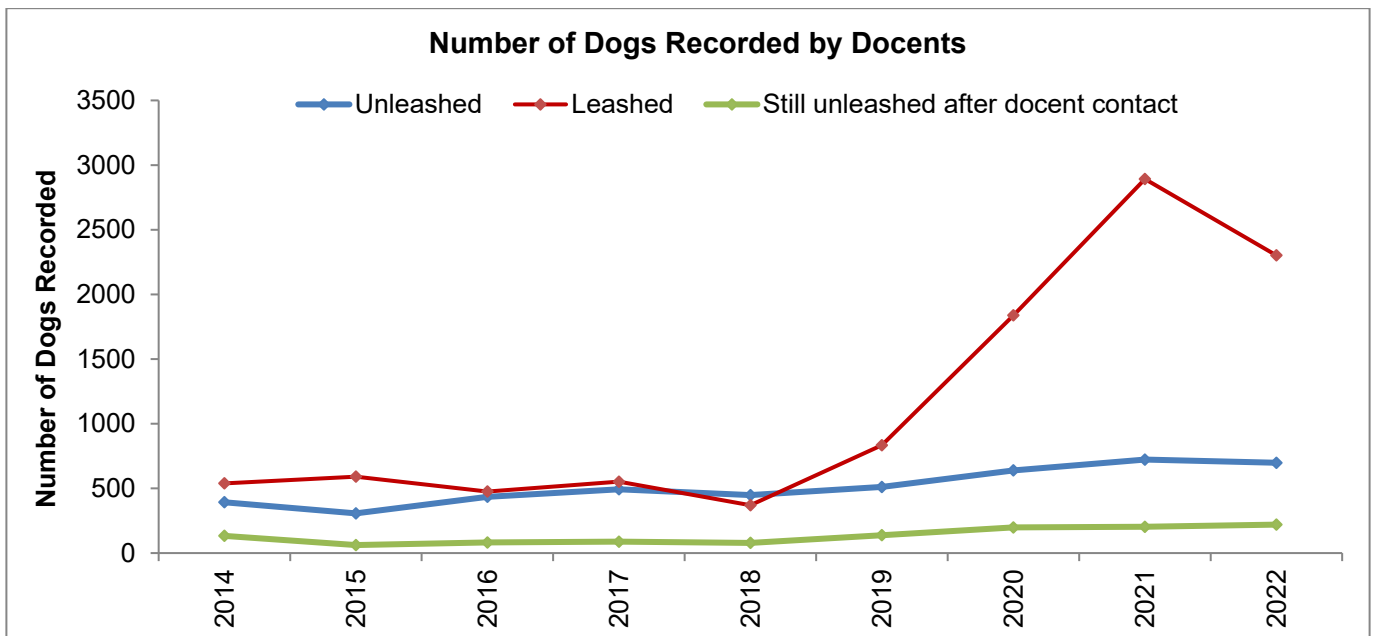


Figure 17. Total number of dogs recorded by docents per year, leashed, unleashed, and unleashed after the docent requested the dog owner to leash their dog.

Based on docent data, we estimate that there were 211 trespassing events in 2022, which is slightly less 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).

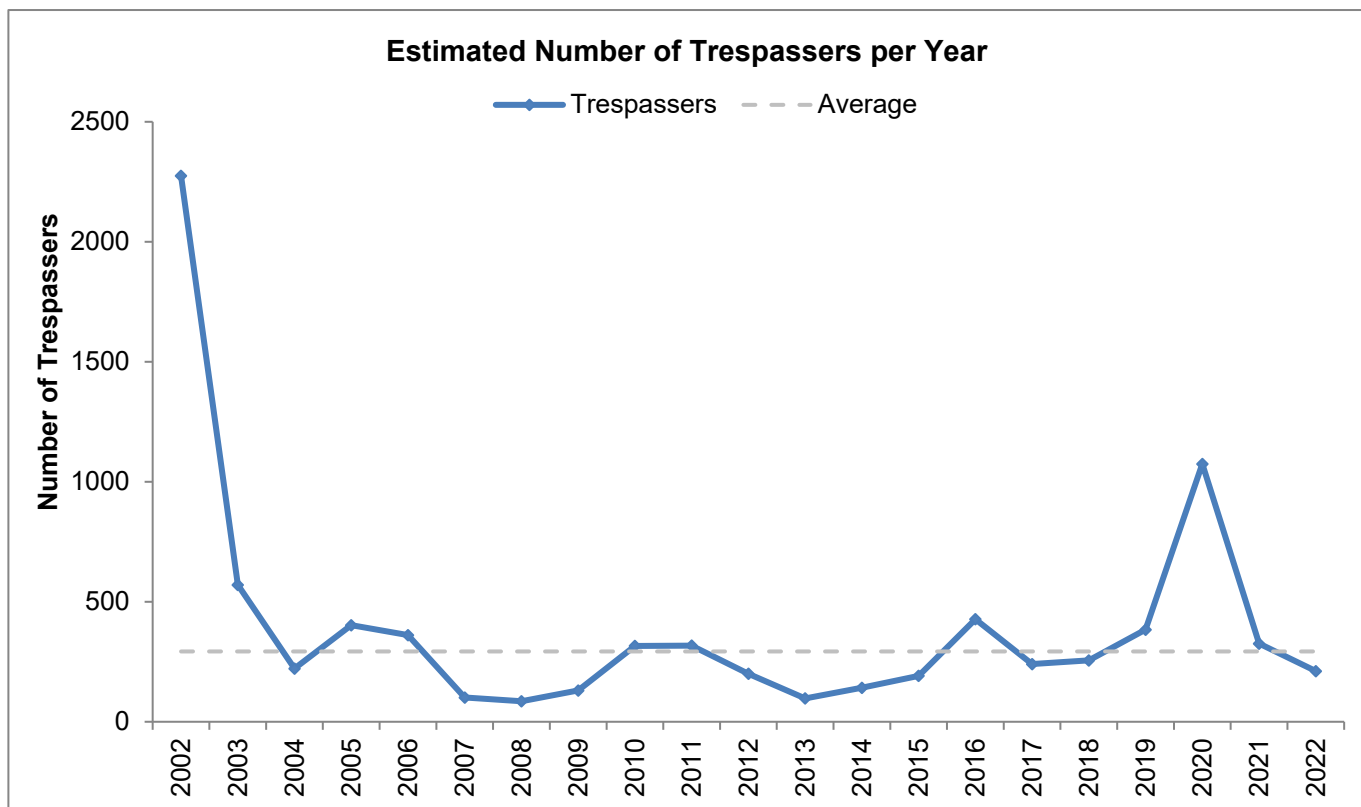


Figure 17. Estimated total number of visitors trespassing into protected habitat each year. Estimates based on the hourly rate of trespassers observed by docents ((# trespassers/hr)\*(12 hrs/day)\*(365 days/yr)).

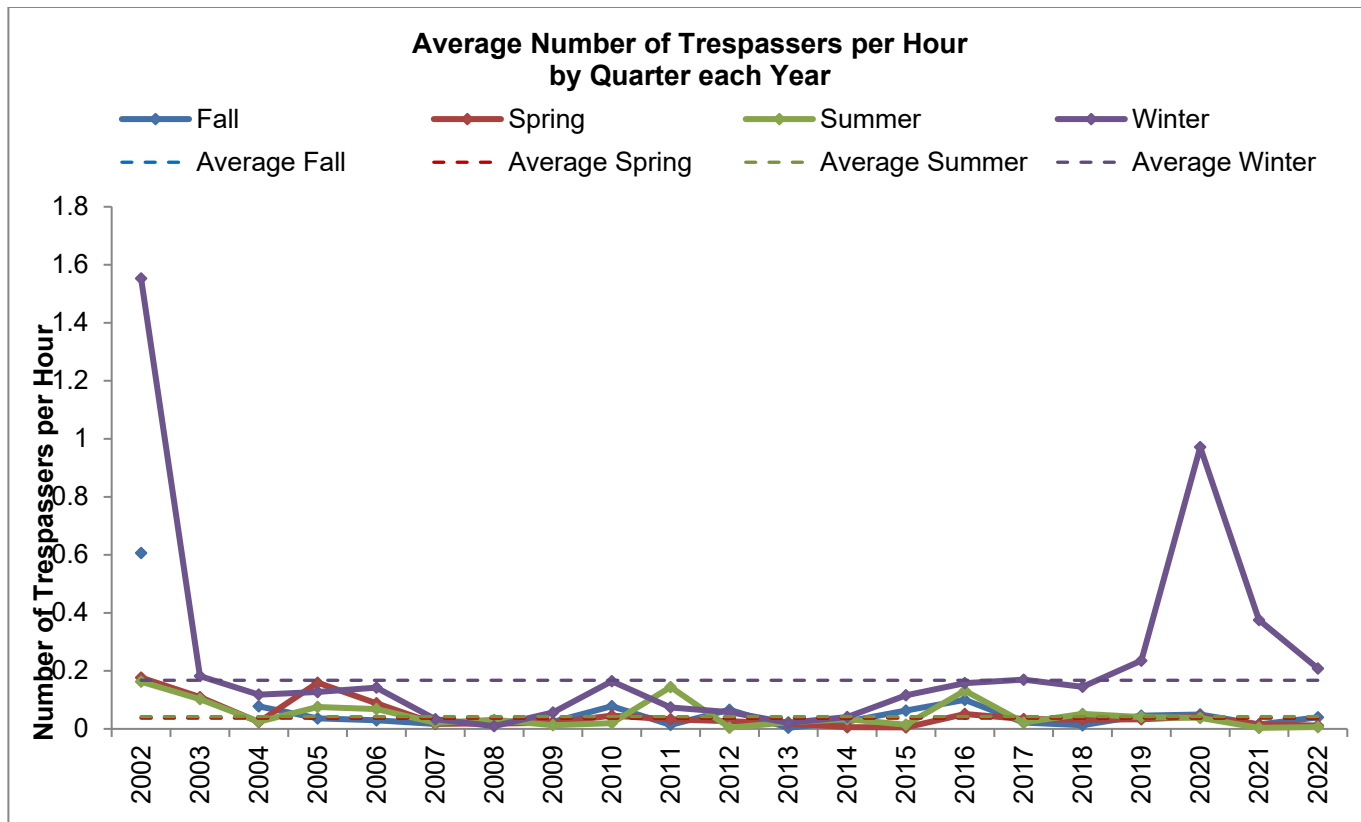


Figure 18. Average number of trespassers each quarter. Note that the peak in the number of trespassers is during the winter quarter when the symbolic fence is removed and the Snowy Plover habitat is marked only with signs.

### CONCLUSION

The breeding population of WSP at COPR has recovered since the implementation of a conservation 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 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. 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 for WSP and other birds that are preyed upon by crows. The use of predator exclosure may not be effective in improving hatching success when skunks are abundant because skunks are not excluded from the exclosures.

### **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 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.
- 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 beach access to Devereux Beach, by the jailhouse
- 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), Hanna Weyland (Western Snowy Plover Specialist), and Jessica Gray (Conservation Specialist) 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, 79 volunteers and interns over the course of 2022, maintained a presence at the beach every day of the year. Eric Covington (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:**

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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 8. Summary of banded WSP recorded at COPR by staff and docents in 2022

<b>Bands Left</b>	<b>Bands Right</b>	<b>Band Combo</b>	<b>Band Origin (if known)</b>	<b>Remarks</b>
ab	gp	abgp	unknown	likely misread of ak:gp
ak	gp	akgp	Eden Landing Ecological Reserve, Hayward (2022)	
an	ba	anba	VAFB - Surf North (2022)	Injured wing - taken to SBWCN, euthanized
an	ol	anol	VAFB (2020)	
An	rg	Anrg	unknown	Aqua band is above knee joint; could be misread of an:rg (VAFB, Surf Beach North (2016))
an	rw	anrw	VAFB (2014)	likely a misread; missing foot and "n" band on left leg,
av	gp	avgp	unknown	likely misread of ak:gp
aw	ba	awba	unknown	
aw	gp	awgp	unknown	could be misread of An:rg
aw	og	awog	unknown	
ay	rg	ayrg	unknown	likely misread of An:rg
bb	gb	bbgb	unknown	likely misread of bb:lb; see historic origin notes
bb	lb	bblb	ODSVRA (2019), raised at SBZ, released at COPR	
bb	po	bbpo	ODSVRA (2021)	
bb	rr	bbrr	unknown	could be misread of bb:po
by	pr	bypr	unknown	
ga	pb	gapb	ODSVRA (2017)	
Gb	kr	Gbkr	COPR (rescued 2022), Released at COPR (2022)	Oiled spill combo; rescued at COPR (2022), banded and released at COPR (2022) as an adult; Green-taped service band above the tarsal joint. Service number: 2851-06353
Gb	kw	Gbkw	COPR (rescued 2022), Released at COPR (2022)	Oiled 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
g	g/y/g	gg/y/g	unknown	
gg	ag	ggag	ODSVRA (2022)	only bird fledging with this combination
gg	pb	ggpb	ODSVRA (2012 or 2013)	likely misread
gg	wo	ggwo	ODSVRA (2022)	



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gn	oa	gnoa	VAFB - Surf North (2022)	could be misread of gn:ra
gn	or	gnor	VAFB (2020)	
gn	ra	gnra	VAFB - Wall Beach (2022)	
gy	or	gyor	unknown	likely misread of gn:or
gy	ra	gyra	unknown	likely misread of gn:ra
gy	rn	gyrn	unknown	likely a misread
lb	lb	lblb	unknown	likely a misread of bb:lb
ln	or	lnor	unknown	likely misread of gn:or
n/r/w	ny	n/r/wny	unknown	
nb	ba	nbba	VAFB - Surf North (2022)	
nb	pr	nbpr	VAFB (2020)	
no	oa	nooa	VAFB - Surf North (2022)	
nr	ny	nrny	VAFB (2016)	
nr	oa	nroa	VAFB - Shuman North (2022)	
nr	ra	nr-ra	VAFB - San Antonio (2022)	
nr	ry	nrry	unknown	likely misread
nr	ya	nrya	VAFB - Surf North (2022)	
nw	oa	nwoa	VAFB - San Antonio (2022)	
nw	or	nwor	unknown	likely misread
nw	ra	nwra	VAFB - Surf North (2022)	
ny	ba	nyba	VAFB - Surf South (2022)	
ny	pa	nypa	VAFB - Surf North (2022)	
ny	rv	nyrv	unknown	
ny	wg	nywg	VAFB (2017)	
or	oa	oroa	unknown	likely misread
oy	wb	oywb	unknown	
pa	ba	paba	ODSVRA (2022), raised at SBZ, released at COPR	
pa	bw	pabw	Carpinteria (2022), raised at SBZ, released at COPR	

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pa	gg	pagg	ODSVRA (2022), raised at SBZ, released at COPR	
pa	gv	pagv	unknown	likely misread of pa:gg
pa	gy	pagy	ODSVRA (2022), raised at SBZ, released at COPR	
pa	or	paor	COPR (2019), raised at SBZ, released at COPR	
pa	py	papy	unknown	likely misread of py:pa
pb	or	pbor	unknown	misread of pa:or
pg	gg	pggg	ODSVRA (2021)	
pg	pg	pgpg	unknown	likely a misread
pp	yp	ppyp	unknown	
pr	na	prna	unknown	
pv	gy	pvgy	ODSVRA (2018)	likely a misread
py	ag	pyag	ODSVRA (2021), raised at SBZ, released at COPR	
py	ao	pyao	Ormond beach (2022), raised at SBZ, released at COPR	
py	ar	pyar	Oceano (2022), raised at SBZ, released at COPR	
py	av	pyav	COPR (2022), raised at SBZ, released at COPR	
py	ay	pyay	Ormond beach (2022), raised at SBZ, released at COPR	
py	bw	pybw	unknown	likely a misread of py:vw
py	ga	pyga	ODSVRA (2021), SB Zoo 2021, released at COPR	
py	gg	pygg	Oceano (2021), raised at SBZ, released at COPR	
py	go	pygo	COPR (2021), raised at SBZ, released at COPR	
py	gv	pygv	COPR (2022), raised at SBZ, released at COPR	
py	gw	pygw	Oceano (2021), raised at SBZ, released at COPR	
py	gy	pygy	COPR (2022), raised at SBZ, released at COPR	
py	oa	pyoa	Ormond (2021), raised at SBZ, released at COPR	
py	or	pyor	COPR (2022), raised at SBZ, released at COPR	

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py	pa	pypa	COPR (2022), raised at SBZ, released at COPR	
py	pg	pypg	COPR (2022), raised at SBZ, released at COPR	
py	pv	pypv	Oceano (2022), raised at SBZ, released at COPR	
py	pw	pypw	COPR (2022), raised at SBZ, released at COPR	
py	py	pypy	COPR (2022), raised at SBZ, released at COPR	
py	ra	pyra	Oceano (2021), raised at SBZ, released at COPR	
py	rg	pyrg	Oceano (2022), raised at SBZ, released at COPR	
py	ro	pyro	COPR (2022), raised at SBZ, released at COPR	
py	rr	pyrr	Oceano (2021), raised at SBZ, released at COPR	
py	vr	pyvr	COPR (2021), raised at SBZ, released at COPR	
py	vv	pyvv	Oceano (2021), raised at SBZ, released at COPR	
py	vw	pyvw	Ormond (2021), raised at SBZ, released at COPR	
py	vy	pyvy	Oceano (2022), raised at SBZ, released at COPR	
py	wa	pywa	Oceano (2021), raised at SBZ, released at COPR	
py	wg	pywg	COPR (2021), raised at SBZ, released at COPR	
py	wv	pywv	COPR (2022), raised at SBZ, released at COPR	
py	ww	pyww	Oceano (2021), raised at SBZ, released at COPR	
py	ya	pyya	COPR (2022), raised at SBZ, released at COPR	
py	yo	pyyo	COPR (2022), raised at SBZ, released at COPR	
py	yr	pyyr	Oceano (2021), raised at SBZ, released at COPR	
py	yw	pyyw	unknown	
py	yy	pyyy	ODSVRA (2022), raised at SBZ, released at COPR	
r	a/r/a	ra/r/a	VAFB - Minuteman (2022)	
rv	ob	rvob	unknown	
vg	gg	vggg	ODSVRA (2022)	1 of 2 birds fledging with this combination

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vg	ra	vgra	ODSVRA (2022)	1 of 2 birds fledging with this combination
vv	yv	vvyv	Ormond (2019), raised at SBZ, released at COPR	
w/r/w	w	w/r/ww	VAFB (2020)	
wb	wp	wbwp	unknown	
wk	ao	wkao	unknown	
wy	rv	wyrv	unknown	likely misread of ny:rv
yr	yr	yryr	unknown	
yr	yy	yryy	Monterey Bay area (2022)	
yw	ba	ywba	unknown	
yy	rb	yyrb	unknown	could be misread of ny:rv
yy	rg	yyrg	unknown	could be misread of ny:rv
yy	v	yyv	unknown	unsure of right leg
yy	ww	yyww	Zmudowski State Beach (2022)	

**APPENDIX B**

**Rehabilitation of Oiled and Injured Plovers**

*Note: Acronyms are used as follows: Santa Barbara Zoo (SBZ), Santa Barbara Wildlife Care Network (SBWCN), International Bird Rescue (IBR)*

Table 9. Summary of WSP and CALT rescue and rehabilitation

Date Observed	Bird Description	Injury	Trapped	Action Taken	Outcome	Original Band Combo	Band Combo after Rehab
5/15/2022	WSP; few hours old (just hatched)	Foot/ankle injury	No	Transported to SBZ	Euthanized; condition was not improving; unable to use its left leg	n/a	n/a
8/1/2022	WSP; Adult, Male	Lump of tar/oil on breast feathers and feet	Yes	Taken to SBWCN; transported to IBR for cleaning	Issues waterproofing its feathers; released at COPR on 1/30/23.	n/a	n/a
8/12/2022	WSP; Adult	Tar/oil on breast feathers; sickly looking	No	Could not find after initial discovery	n/a	n/a	n/a
8/15/2022	WSP; Adult	Missing toes	No	No action; still walking, feeding, flying normally	n/a	n/a	n/a
8/22/2022	WSP; 28 days	Injured leg/foot	Yes	Transported to SBZ	Recovered; Released at COPR on 8/26/22	n/a	did not band due to recovery from leg injury
9/5/2022	Least Tern; Juvenile	Oiled	No	Could not find after initial discovery	n/a	n/a	n/a
9/9/2022	WSP; Adult, Female	Tar on chest area	Yes	Transported to SBWCN.	Made full recovery. Released at COPR on 10/19/22.	n/a	Gb:kw (green-taped service band: 2851-06352)
9/9/2022	WSP; Adult	Tar on chest area	No	Attempted trapping, but unsuccessful.	n/a	n/a	n/a
10/19/2022	WSP; Adult	Seagrass wrapped around/attached to body	No	Attempted trapping, but unsuccessful.	n/a	n/a	n/a
10/22/2022	WSP; Adult	Injured right leg	No	Did not warrant trapping	n/a	py:yy	n/a
10/22/2022	WSP; Adult	Severely oiled head to tail	Yes	Transported to SBWCN.	Made full recovery. Released at COPR on 11/20/22.	n/a	Gb:kr (green-taped service band: 2851-06353)
12/1/2022	WSP; Adult	Limp/broken left wing	Yes	Transported to SBWCN. Xrays showed possible coracoid fracture. SBWCN transported plover to IBR for further assessment and care (as of 12/6/22)	Euthanized; in consideration of the severity of the bird's injuries.	an:ba	n/a

**APPENDIX C**  
USDA Report

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22 December 2022

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 2022 nesting season. Predator removal activities began on 19 April 2022 and ended 11 August 2022. Predator removal activities were not consistent throughout this time period due to COVID-19 and limited funding.

Striped skunks, raccoons, Virginia opossums, red fox and American Crows were the target predators during the 2022 snowy plover nesting season. Trapping and night shooting with the use of thermal optics and spotlights were the methods used to remove mammalian predators. Traps used to capture mammalian predators were 10" X 12" X 32" Tomahawk cage traps and 1 ½ Oneida-Victor padded jaw leg-hold traps. Seven striped skunks, seven raccoons, one Virginia opossum and one red fox were removed by trapping during the 2022 Western Snowy Plover nesting season. Two additional skunks were removed by night shooting with the use of thermal optics and a spotlight (Table 1). The two skunks shot were removed 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. The thermal optics consisted of a Trijicon REAP-IR thermal scope that was used to locate the skunks. Once positive identification was made, a light was used to illuminate the skunks for removal.

During the 2021 nesting season, staff at Coal Oil Point Reserve were very successful in trapping American Crows in an Australian crow trap which proved to be a safer and more effective solution to crow depredation at this site than shooting. Attempts

were made again in 2022 to trap American crows with the Australian crow traps but were not as successful as in 2021.

The use of the avicide DRC-1339 was attempted at Coal Oil Point Reserve during the 2022 nesting season in an attempt to remove American Crows. Egg platforms were set up that consisted of a box that measures 12 inches by 12 inches by four inches high and placed on an eight-foot 2 X 4. A hole is dug in the sand that is two to three feet deep and the platform is installed into the hole, so the platform sits between five and six feet above the ground level. The box is filled with sand and hard-boiled chicken eggs are placed in the box on the sand. Fishing line or tie wire is used to secure the eggs in place so that ravens do not cache them in a different location. Camera traps are used to monitor the platforms for crow activity. Once it is determined that crows are feeding on the pre-bait eggs and no non-target birds are feeding on them, eggs treated with the avicide DRC-1339 are then secured on the platforms. Use of egg platforms is not required under the EPA label but is utilized on many Threatened and Endangered species sites to ensure its safe use and to limit its exposure to protected species.

DRC-1339 is a slow acting avicide that was developed by the former Denver Research Center, now the National Wildlife Research Center and is used in the control of several black-bird species, corvids, pigeons and gulls. It is registered with the Environmental Protection Agency under two restricted use labels for its use for managing birds causing damage. The label used for corvid control at Coal Oil Point Reserve is 56228-29. Use of DRC-1339 can only be performed by WS employees trained in bird control.

DRC-1339 is a very safe and efficient method of corvid control. The primary cause of death to target species is renal failure which causes lactic acid buildup in the body until death occurs within one to three days. Since monitoring began in the late 1980's there has only been one incident of secondary poisoning; a crow that was thought to have consumed the gut contents of a pigeon treated with DRC-1339. Studies have shown the risk to mammals is almost non-existent because mammals cannot eat enough to cause them harm. A typical site treated with DRC-1339 only contains .06 grams of product. DRC-1339 breaks down in direct sunlight and is no longer effective after seven days.

DRC-1339 powder is mixed with warm water to make a 4% solution. The solution is then injected into a boiled chicken, duck or turkey egg. Each egg is injected with .02 grams of DRC-1339 as per EPA label restrictions. A skull and crossbones or the word "Poison" is then put on each egg to help ensure unauthorized people don't touch them. A total of 0.58 grams of DRC-1339 was used at Coal Oil Point Reserve during the 2022 nesting season.

The use of DRC-1339 proved to be very successful during the 2022 season for American crow removal at Coal Oil Point Reserve. A minimum of 23 American

crows were removed with the use of DRC-1339 (Image 1).



*Image 1: American crows feeding on eggs treated with the avicide DRC-1339 at Coal Oil Point Reserve.*

Method	Striped Skunks	Raccoons	Virginia Opossums	Red Fox	American Crows
Cage Trap	7	6	1		
Padded Leg-hold Trap		1		1	
Shooting	2				
DRC-1339					23
Total	9	7	1	1	23

*Table 1: Total predator removal by species and method at Coal Oil Point Reserve during the 2022 nesting season.*

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

Wildlife Services spent 130.5 hours on predator removal activities, carcass disposal, and associated administrative duties at Coal Oil Point Reserve during the 2022





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season. A total of 1,933 trap nights with cage traps and 171 trap night with padded jaw leg-hold 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](#)

Continue the use of DRC-1339 to assist with crow removal as part of an integrated predator management plan. Trapping and shooting should also be used where it is safe and effective to do so.

Feel free to contact me or Barry Lowry if you have any questions.

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[https://www.aphis.usda.gov/wildlife\\_damage/directives/pdf/2.430.pdf](https://www.aphis.usda.gov/wildlife_damage/directives/pdf/2.430.pdf)

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

**APPENDIX D**  
 Nesting Data from WSP habitat adjacent to 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	# 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

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	# 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
	0	n/a	n/a	n/a	n/a

**APPENDIX E**  
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	.	.	.	.
2022	0	.	.	.	.