# **State of Washington**

Washington State Snowy Plover Population Monitoring, Research, and Management: 2022 Nesting Season Research Progress Report

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Cover photo of snowy plover at Midway Beach by Scott F. Pearson

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# **TABLE OF CONTENTS**

OVERVIEW	1
INTRODUCTION	3
METHODS	4
Survey and Activity Areas	4
Site Occupancy	5
Adult Population Surveys	6
Nest Phenology and Success	7
Fledging Success	7
RESULTS	3
Winter Window Survey	8
Breeding Window Survey	8
Breeding Adult Surveys	8
Clutch Initiation Dates and Breeding Phenology1	1
Nest Success	1
Fledging Success	2
Nest Locations	2
Predator Management	2
Habitat Restoration and Vegetation Sampling1.	3
PROGRESS ON RECOVERY OBJECTIVES 13	3
Federal Recovery Objectives1.	3
Washington State Recovery Objectives14	4
2022 MANAGEMENT ACTIONS 15	5
Nest Site Protection	5
Clam Tides1.	5
Law Enforcement1.	5
Outreach10	6
Predator Management	6
Vehicle and Recreation Restrictions10	6
Habitat restoration10	6
DISCUSSION 17	7
ACKNOWLEDGMENTS17	7
LITERATURE CITED & REFERENCES 18	3

# **OVERVIEW**

During the 2022 western snowy plover (*Charadrius nivosus nivosus*) nesting season, we counted the number of nesting adult snowy plovers at potential nesting sites in Washington and, to a limited extent, monitored breeding phenology, nest success, and fledging success at Leadbetter Point. Field monitoring was conducted by Cyndie Sundstrom, William Ritchie, and Larissa Ritzman, with assistance from Anthony Novack, Marissa Cent, Kelsey Lotz, Richard Ashley, and others. Management activities included restricting human access to nesting sites and restoring nesting habitat. The following is a summary of some of our 2022 activities and results:

#### **Breeding Phenology**

- Nest searching efforts were conducted early May through late July.
- Detected clutches were initiated between 23 May and 24 July.
- Monitoring at Leadbetter point indicated several hatch year chicks late in the breeding season, though they could not be associated with specific nests.

### **Breeding Range**

- Twenty-five breeding surveys at nine sites in two counties were conducted between 23 May and 24 June 2022 to assess site occupancy status or to count the total number of adults detected.
- Snowy plover nests were observed at Conner Creek, Graveyard Spit, and Leadbetter Point.

### Number of Breeding Adults

- The mean 2022 Washington breeding adult population was 64 (range: 58-69), a decrease of 33 birds from the mean of 97 (range: 92-100) in 2021.
- Breeding adults were observed at Copalis Spit, Conner Creek, Midway Beach, Graveyard Spit, Leadbetter Point, and North Willapa Islands.

### Nest Success

- Forty-four nests were detected and monitored at Conner Creek, Graveyard Spit, and Leadbetter Point
- Nine (20%) of the 44 monitored nests hatched. All nest failures were likely attributed to predation.
- The proportion of nest failures increased in the last four years, with most observed failures attributed to nest predation by avian predators. Without intensive nest searching and monitoring at multiple sites, we do not know if this higher rate of failure represents a shift in predator abundance, an increase in nest predation rates, or some other dynamic driving this change.

### Fledging Success

The average number of chicks fledged per male has not been estimated since 2018.

### **Management Actions**

- Nesting Sites Protection from Human Activity
  - approximately 8.0 miles of upper beach and 1,500 feet of hiking trail at Leadbetter Point were signed to prohibit all public access.
  - Vehicle were prohibited north of Oysterville Road during the breeding season (8 miles) and north of the State Park boundary year-round (5.2 miles).
  - Approximately 2.7 miles of publicly owned (Washington State Parks Seashore Conservation Area) beach at Midway Beach were signed to restrict human access to critical nesting areas.
  - Beach access near the Copalis River was closed at Griffiths-Priday State Park.
  - Washington Department of Fish and Wildlife coordinated most law enforcement activities, especially during clam tides. Washington State Parks and US Fish and Wildlife Service provided additional law enforcement patrols.
  - No WDFW-managed recreational clamming occurred between May 8 and September 27.
- Predator Management
  - No predator management took place in 2022.
  - WDFW analyzed nest and brood survival data to evaluate the effectiveness of predator management, summarized in this report and full report appended to USFWS submittal.
- Habitat Restoration
  - Willapa National Wildlife Refuge: 150 acres were treated with herbicide and 170 acres were disked and bulldozed to treat *Ammophila* beachgrass.
  - Washington State Parks (Leadbetter Point State Park): 53 acres of *Ammophila* beachgrass was treated with herbicide.
  - No habitat restoration was conducted with Section 6 funds.
- Outreach
  - Willapa NWR social media posts included information about snowy plovers at Leadbetter Point.
  - Washington Department of Fish and Wildlife (WDFW), US Fish and Wildlife Service (USFWS), and Washington State Parks (WSP) produced an informational video about nesting snowy plovers on Washington beaches (https://www.youtube.com/watch?v=Gs-m-UCAPgA).
  - WDFW ran radio public service announcements to educate the public about how to minimize disturbance near nesting snowy plovers.

# **INTRODUCTION**

The Pacific coastal population of the western snowy plover (*Charadrius nivosus nivosus*) is listed as Threatened under the Endangered Species Act and is listed as Endangered by Washington State. The current Pacific coast breeding population extends from Copalis Spit, Washington to Bahia Magdalena, Baja California, Mexico. The snowy plover winters in coastal areas from southern Washington to Central America. This coastal population nests above the high tide line on a variety of beach and dune types including coastal beaches, sand spits, dune-backed beaches, sparsely vegetated dunes, beaches at creek and river mouths, and bluff-backed beaches (U.S. Fish and Wildlife Service 2007, Sundstrom et al. 2021). In winter, snowy plovers are found on many of the beaches used for nesting as well as on beaches where they do not nest (U.S. Fish and Wildlife Service 2007).

According to the U.S. Fish and Wildlife Service (2007), "Habitat degradation caused by human disturbance, urban development, invasive beachgrass (*Ammophila arenaria* and *A. brevigulata*), and expanding predator populations have resulted in a decline in active nesting areas and in the size of the breeding and wintering populations." In Washington specifically, predators eating snowy plover eggs or chicks, adverse weather, shoreline modification, dune stabilization, and disturbance caused by recreational activities have been attributed to reduced nest success and have been cited as the causes of local population declines (Washington Department of Fish and Wildlife 1995).

Washington and Oregon comprise Recovery Unit 1 in the federal Recovery Plan for the western snowy plover (U.S. Fish and Wildlife Service 2007). The primary recovery criterion for this unit is maintaining 250 breeding adults for 10 years and a 5-year average productivity of at least 1.0 fledged chick per adult male (U.S. Fish and Wildlife Service 2007). The federal recovery plan calls for the development and implementation of mechanisms to assure long-term protection and management of breeding, wintering, and migration areas in Recovery Unit 1 (U.S. Fish and Wildlife Service 2007). This report describes progress on all these criteria except the final one.

According to the Washington State Recovery Plan (1995) for the snowy plover, the plover will be considered for down-listing to Threatened when the state supports a 4-year average of at least 25 breeding pairs that fledge at least one young per pair per year at two or more nesting areas with "secure" habitat. Delisting will be considered when the "average" population reaches 40 breeding pairs at three or more secure nesting areas. A periodic status review was completed in 2022 (Stinson 2022).

Both the federal and state recovery plans require monitoring of breeding adults and monitoring of fledging success to assess progress toward these recovery goals. Monitoring is also necessary to evaluate the impact of conservation actions on snowy plover populations such as predator management and the effectiveness of habitat restoration efforts. To provide the information needed to assess recovery progress and to assess the effectiveness of conservation actions, the U.S. Fish and Wildlife Service (USFWS) is conducting demographic monitoring at Leadbetter Point and coordinating its population monitoring efforts with Washington Department of Fish and Wildlife (WDFW), the Shoalwater Bay Indian Tribe (SBIT), and the Oregon Biodiversity Information Center (ORBIC). This coordinated effort was initiated in 2006, although Washington-specific monitoring was initiated years before.

This report serves, in part, to meet our reporting obligations under Recovery Sub-permit, WNWR-15, Amendment 15 (SPITS TE-007497-15) and for USFWS Section 6 grant number WA F21AP00161.

The primary objectives of our monitoring and management in 2022 were to:

- Conduct winter-window surveys in conjunction with the range-wide survey effort.
- Conduct breeding-window surveys in conjunction with the range-wide survey effort and two subsequent breeding adult surveys at Ocean Shores, Copalis Beach, Leadbetter, Graveyard, and Midway Beaches.
- Conduct surveys of unoccupied potential breeding sites.
- Estimate current population size of adult snowy plovers in Washington.
- Estimate hatching success rates and sources of nest mortality during the egg laying/incubation stage for all nest locations at Leadbetter Point and Graveyard Spit.
- Attempt to increase nest success through habitat restoration efforts (Refuge-led and funded, not Section 6 funded).
- Minimize human disturbance to nesting plover to increase breeding success
- Produce a report that summarizes methodology, numbers of breeding adults, hatching success, and management actions.

This report summarizes progress on all these objectives, although hatching and fledging success data are limited.

### **METHODS**

## Survey and Activity Areas

During the 2007 and 2008 nesting seasons, three core sites were occupied by breeding snowy plovers, Leadbetter Point, Graveyard Spit, and Midway Beach. From 2009-2011, snowy plovers nested at two sites, Leadbetter Point and Midway Beach. During the 2012-2021 breeding seasons, snowy plovers once again nested at Leadbetter Point, Midway Beach, and Graveyard Spit. During this period, snowy plover nests have also been discovered on two separate islands north of Leadbetter Point, one in 2016 and the other in 2019. Long Beach (2018) and Conner Creek/Copalis Spit (2020) have recently become occupied by snowy plovers. See Table 1.

 Table 1. Approximate locations and land ownership/management of the snowy plover primary nesting localities in Washington.

Site	Approximate Location	Ownership/Management
Copalis Spit	47.121112, -124.183055	Griffiths-Priday State Park
Conner Creek	47.070556, -124.177222	WA State Parks Seashore Conservation Area
Midway Beach	47.758889, -124.096111	Garyland Beach State Park, State Parks SCA
Graveyard & Empire Spits	46.715833, -124.023611	Shoalwater Bay Indian Reservation (trust and fee land), DNR/State Parks, Private
Leadbetter Point	46.606667, -124.056944	Leadbetter Point State Park, State Parks SCA, Willapa National Wildlife Refuge
Long Beach	46.534167, -124.061111	WA State Parks Seashore Conservation Area

Leadbetter Point and Midway Beach are dune backed beaches and have exceptionally wide areas that are unvegetated or sparsely vegetated and are located between the mean high tide and the foredune. Snowy plovers also use the sparsely vegetated foredunes and areas behind the foredune. The snowy plover habitat at Midway Beach consists of swales, sparsely vegetated foredunes, and a large deflation plain with ephemeral dune ponds. Leadbetter Point is part of a very long sand spit or peninsula. The habitat at Leadbetter Point consists of unvegetated beach above the summer high tide line, sparsely vegetated foredunes, blowouts, and human-modified habitat of sand and oyster shell landward of the foredune (habitat restoration area or HRA).

Graveyard Spit and Empire Spit (formerly part of Graveyard Spit) are located on the north shore of Willapa Bay across from Leadbetter Point. The nesting habitat at these sites consist of a sparsely vegetated low-lying sand spit with hummocks and swales and unvegetated deflation plains adjacent to salt marsh communities. This sensitive sand spit has been heavily impacted by erosion, flooding, and sea level rise. In both 2012 and 2013, contractors working for the U.S. Army Corps of Engineers (USACE) dredged sand to construct a shoreline protection berm on Empire Spit. This proved to be a short-term fix, and an emergency renourishment/dune restoration project administered by USACE began in early July 2018 and was completed in September 2018. The shoreline of Empire Spit and surrounding beaches continued to retreat, and it was recognized that more intensive efforts were needed. Construction on the Shoalwater Bay Shoreline Erosion Repair began in July of 2022. Its purpose is to renourish the northern 4,000 feet of shoreline berm and place a dynamic revetment at the toe to repair the 2018 softshore berm construction failure.

Ocean Shores to Ocean City and Conner Creek are similar to other southwest Washington sandy, dune-backed beaches, but the width tends to be narrower than the beaches that lie south of Grays Harbor. Ocean Shores to Ocean City spans approximately 7 miles of shoreline between the two towns and is highly trafficked by the public. Conner Creek is located immediately to the north and spans approximately 3.3 miles from the Ocean City Beach Access (2<sup>nd</sup> Avenue) to the mouth of Conner Creek. Across the mouth of Conner Creek is Copalis Spit, which is formed and shaped by the outlet of Copalis Creek and currently extends approximately 1.5 miles. The beach here tends to be wider than the other shoreline beaches north of Grays Harbor.

While both Damon Point and Oyhut Spit were historically occupied by nesting snowy plovers, they no longer appear to provide adequate habitat to support snowy plovers. No plovers have been documented using these beaches in the winter or during breeding season since 2007. In recent years, we have scaled back our monitoring efforts at these beaches and now conduct one occupancy survey during the breeding season.

### **Site Surveys**

Wildlife species are rarely detected with perfect accuracy and non-detection does not necessarily mean that a species was absent from a site unless the probability of detecting the species (detectability) was 100%. This leads to a fundamental problem -- the measure of occupancy is confounded with the detectability of the species. Specifically, an observed "absence" occurs if either the species was present at the site but not detected or the species was truly absent. Pearson et al. (2008) recommended three to four visits to a site between early to mid-May and the end of the first week of July to determine if it is being used as a nesting site. Following that recommendation, there is an 96% - 99% probability of accurately determining site occupancy. If three or four visits is not feasible, two visits would yield a detection probability of 89% and one

visit (our current approach) a detection probability of 67%. We conducted surveys to assess site occupancy status at historically occupied sites where we previously failed to detect snowy plovers as these sites may become re-occupied due to suitable habitat and proximity to occupied sites. Table 2 provides sites, locations, survey types, survey effort and surveyors, and dates.

Site	Starting Point	Ending Point	Type of Survey(s) Conducted	# Surveys	# Surveyors	Walking or Driving	Survey Dates
Copalis Spit	47.12125, -124. 183306	47.137667, -124.182889	Breeding Adult/Window	3	1	foot	5/26, 6/13, 6/24
Connor Creek	47.070556, -124.173333	47.12125, -124.183306	Breeding Adult/Window	3	1-2	foot & drive	5/26, 6/13, 6/24
Ocean Shores/ Ocean City	47.070611, -124.177167	46.953528, -124.1755	Occupancy/Window	2	2	drive	5/26, 6/13
Oyhut	46.946333, -124.132667	46.940389, -124.154778	Occupancy/Window	1	1	foot	5/26
Damon Point	46.934722, -124.155	46.936389, -124.105	Occupancy/Window	1	1	foot	5/26
Midway Beach	46.793889, -124.098611	46.735278, -124.091389	Breeding Adult/Window	3	5-6	foot	5/24, 6/7, 6/22
Graveyard/Empire Spit	46.725833, -124.051944	46.706944, -124.01	Breeding Adult/Window	3	5	foot	5/25, 6/6, 6/23
Leadbetter Pt.	46.627972, -124.0715	46.647361, -124.053778	Breeding Adult/Window	3	6-8	foot & drive	5/23, 6/8, 6/21
Long Beach <sup>1</sup> (So. of Oysterville Rd.	46.548333, -124.061333	46.367722, -124.056778	Breeding Adult/Window	3	1	drive	5/25, 6/10, 6/22
Willipa Bay Islands	various	various	Occupancy/Window	1	1	foot	5/26
Benson Beach			Occupancy/Window	2	1	foot	5/22, 6/20

Table 2. Snowy plover surveys by site during the 2022 nesting season.

<sup>1</sup> This area includes both Long Beach and Benson Beach.

# **Adult Population Surveys**

#### Winter window survey

The winter window survey occurs annually in January along the entire U.S. Pacific coastline where snowy plovers nest, have historically nested, or where there is potentially suitable habitat between nesting sites. All sites are surveyed during a specific week selected by the USFWS each year. Participants follow the methods of Elliot-Smith and Haig (2006b). In 2022, the window surveys occurred from 16-22 January. We surveyed Copalis Spit, Connor Creek, Ocean Shores to Ocean City, Midway Beach, Graveyard Spit, Leadbetter Point, Long Beach, and Benson Beach.

#### Breeding window survey

The breeding window survey occurs annually in late May along the entire U.S. Pacific coastline where snowy plovers are known to nest. The specific dates for a particular year are selected by the USFWS and all participants follow the methods of Elliot-Smith and Haig (2006a). In 2022, the window survey occurred between 23 and 28 May. Connor Creek, Copalis Spit, Oyhut Spit, Damon Point, Ocean Shores/Ocean City, Midway Beach, Graveyard Spit, Leadbetter Point, and Long Beach were surveyed. Our primary intent during breeding window surveys was to count the adult population at recently occupied sites (Copalis Spit, Conner Creek, Midway Beach, Graveyard Spit, Leadbetter Point, Long Beach) and sites that were historically occupied (Connor Creek, Copalis Spit, Damon Point, Ocean Shores to Ocean City, Oyhut Spit, and Willapa Bay Islands).

### Breeding Adult Surveys and estimating breeding adult population

In addition to the rangewide breeding window survey, we conducted two additional surveys at all recently occupied sites (Copalis Spit, Conner Creek, Midway Beach, Graveyard Spit, Leadbetter Point, and Long Beach). We completed all surveys between 23 May and 24 June following the breeding window methods (USFWS 2007 Appendix J-1). These surveys are conducted at a time of year when there was the least amount of immigration and emigration into and out of the Washington breeding sites. We used the breeding window survey and two additional surveys to estimate observed breeding adult abundance. In the Results section, we present the average and the range of these three surveys. We rounded all estimates to the nearest whole bird.

## Nest Phenology and Success

WDFW biologists did not actively look for nests in 2022. Any nests located were found opportunistically during breeding adult surveys.

USFWS conducted nest searching at Leadbetter Point during the three breeding adult surveys and continued searching after the surveys were completed. Nests locations were marked with a GPS, and nests monitored until they hatched, failed, or was abandoned.

SBIT staff noted multiple nest losses to raven predation during the early and latter parts of the breeding season. A single raven or raven pair appeared to be tracking surveyors in order to locate nests. Following this realization, biologists halted nest searching and monitoring in areas outside of the construction zone. SBIT staff and the environmental consultants hired to oversee construction continued targeted surveys and nest monitoring within the construction zone but avoided directly approaching nests; therefore, egg floating (and thus nest initiation estimates) was only consistently performed on nests within the construction area.

Oregon continues their nest monitoring efforts, and their results are included in the *Progress on Recovery Objectives* section.

# **Fledging Success**

Snowy plover chicks are precocial, leaving the nest within hours after hatching to search for food. They are not capable of sustained flight until approximately 4 weeks after hatching. The Recovery Plan considers chicks fledged at 28 days post hatching (U.S. Fish and Wildlife Service 2007). Determining the number of young fledged requires following broods from hatch date to 28 days post hatching and determining their fate. Due to the great effort needed to estimate fledging success, Washington has not produced estimates since 2018. Oregon continues their efforts to monitor fledging success, and their results are included in the *Progress on Recovery Objectives* section.

# RESULTS

# Winter Window Survey

We counted 99 adult snowy plovers at four Washington sites during the January 2022 winter window survey: Conner Creek, Midway Beach, Graveyard Spit, and Leadbetter Point. This is substantially lower than the 2021 survey when 167 snowy plovers were observed (Ritchie et al. 2022). 2021 had the highest winter window count of any other year by more than 200%. We do not know the reason(s) for the surge in Washington's wintering plovers in 2021; 40% fewer plovers were observed in the 2022 winter window survey. Still, 99 observed snowy plovers is the second highest count for a Washington winter window survey. Ten years of nonbreeding survey count totals are reported by site in Table 3.

# **Breeding Window Survey**

We detected 58 adult snowy plovers in Washington during the 2022 rangewide breeding window survey, with an equal number of males to females and two unknowns. Numbers of breeding adults observed during the breeding window survey were substantially lower than they have been in recent years (Table 4).

## **Breeding Adult Surveys**

As indicated in Table 2, we conducted 25 total surveys at 11 sites between 23 May and 24 June 2022. Breeding adult surveys comprising three survey visits took place at six sites: Graveyard, Conner Creek, Copalis Spit, Leadbetter, Long Beach, and Midway. Benson Beach and Ocean Shores to Ocean City were surveyed twice. Damon Point, Oyhut Spit, and the Willapa Bay Islands were surveyed once. The habitat at Damon Point no longer appeared suitable for snowy plovers.

#### Site occupancy

We conducted occupancy surveys at five sites: Benson Beach, Damon Point, Ocean Shores to Ocean City, Oyhut, and Willapa Bay Islands (Table 2). One snowy plover was observed at Willapa Bay Islands, and no plovers were observed at the other four sites.

#### Estimating Number of Adult Snowy Plovers

We used the mean from three surveys conducted at each breeding site in 2022 to plot trends in the observed breeding adult population (Figure 1). Adult population counts declined from 2006 to 2011 and then began increasing. In 2011, the total population estimate began increasing until 2022, when we observed remarkably fewer plovers. Counts at Midway Beach were the lowest since 2014 and the lowest at Graveyard Spit since 2017. The observed number of plovers at Leadbetter Point did not change meaningfully from 2019 or 2021.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022	2 Survey	<sup>7</sup> Informat	ion
											Survey	Adult	Adult	Adult
Site											Date	Males	Females	Unk
Copalis Spit	0	0	0	0	0	0	0	0	0	0	18-Jan	0	0	0
Conner Creek	0	0	0	0	0	0	0	0	0	18	18-Jan	6	6	6
Ocean Shores/ Ocean City	-	-	-	-	4	10	0	9	0	0	18-Jan	0	0	0
Oyhut Spit	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Damon Point	0	0	0	0	0	0	0	0	-	-	-	-	-	-
Midway Beach	24	22	22	31	22	28	58	66	52	41	16-Jan	7	2	32
Graveyard Spit	0	0	0	0	0	0	0	0	0	1	20-Jan	0	0	1
Leadbetter Point	6	45	0	28	34	12	15	0	111	39	22-Jan	0	1	38
Long Beach	0	0	0	10	6	0	7	0	4	0	18-Jan	0	0	0
Benson Beach	-	0	ns	0	0	0	0	0	0	0	16-Jan	0	0	0
Total	30	67	22	69	66	50	80	75	167	99		13	9	77

#### Table 3. Washington snowy plover rangewide winter window survey adult counts by site and year.

 Table 4. Washington snowy plover rangewide breeding window survey adult counts by site and year.

											2022	2 Survey	Informati	on
											Survey	Adult	Adult	Adult
Site	2013	2014	2015	2016	2017	2018	2019	$2020^*$	2021	2022	Date	Male	Female	Unk
Copalis Spit	0	0	0	1	0	0	0	4	5	2	26-May	1	1	0
Conner Creek	0	0	0	0	0	0	0	4	2	5	26-May	2	3	0
Ocean Shores/ Ocean City	-	-	-	-	-	3	0	2	0	0	26-May	0	0	0
Oyhut Spit	0	0	0	0	0	0	0	0	0	0	26-May	0	0	0
Damon Point	0	0	0	0	0	0	0	0	ns	0	26-May	0	0	0
Midway Beach	24	9	20	39	35	23	28	37	29	20	24-May	13	7	0
Graveyard Spit	1	6	3	18	17	28	32	ns	35	22	25-May	9	13	0
No. Willapa Bay Islands	-	0	0	3	0	0	ns	ns	ns	1	26-May	1	0	0
Leadbetter Point	20	28	41	45	32	27	19	ns	17	8	23-May	2	4	2
Long Beach	0	0	0	0	0	0	19	ns	4	0	25-May	0	0	0
Benson Beach	-	0	ns	0	0	0	0	ns	0	0	22-May	0	0	0
Total	45	43	64	106	84	81	98	47*	92	58		28	28	2

\* Breeding population total for 2020 is considered a minimum count since several primary breeding sites were not surveyed due to corona virus pandemic restrictions.

				a	Å		it	Total
Midway Beach	Graveyard Spit	Leadbetter Point	Long Beach	No. Willap Bay Is.	Ocean Shores/ Ocean Cit	Connor Creek	Copalis Sp	
21 (14-28)	2 (0-5)	35 (26-45)	ns	ns	ns	ns	ns	59 (48-70) <sup>1</sup>
18 (14-21)	2 (0-4)	25 (20-30)	ns	ns	ns	ns	ns	44 (36-53)
14 (10-19)	1 (0-2)	32 (23-40)	ns	ns	ns	ns	ns	47 (33-60)
15 (13-17)	0	17 (10-24)	ns	ns	ns	ns	ns	31 (23-39)
14 (11-18)	0	21 (17-26)	ns	ns	ns	ns	ns	36 (33-38)
19 (8-30)	0	12 (6-19)	ns	ns	ns	ns	ns	31 (15-47)
14 (5-23)	2 (0-3)	18 (6-29)	ns	ns	ns	ns	ns	33 (15-52)
20 (16-24)	4 (1-6)	20 (19-20)	ns	ns	ns	ns	ns	43 (41-45)
11 (9-13)	7 (6-8)	24 (21-28)	ns	ns	ns	ns	ns	41 (40-43)
24 (19-33)	8 (3-11)	43 (34-54)	ns	ns	ns	ns	ns	77 (65-98)
37 (33-40)	21 (18-25)	33 (25-32)	2 (0-2)	3	0	0	1	97 (85-103)
36 (35-36)	21 (18-24)	21 (14-32)	0	0	0	0	0	78 (70-86)
31 (23-40)	35 (28-42)	21 (13-29)	1 (0-1)	0	1 (0-3)	1 (1-2)	0	87 (80-91)
33 (28-39)	31 (30-32)	16 (7-21)	11 (7-19)	1	1 (0-1)	0	0	93 (78-100)
33 (29-37)	33 (30-35)	ns	ns	ns	2	4 (3-4)	4 (2-6)	65 (47-76) <sup>2</sup>
33 (29-36)	41 (35-44)	14 (12-17)	1 (0-4)	ns	0	2 (2-3)	6 (5-7)	97 (92-100)
18 (15-20)	27 (22-36)	13 (8-21)	0	1	0	4 (3-5)	1 (0-2)	64 (58-69)
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 Table 5. Mean counts (range) of the breeding adults at nesting sites in Washington and the total population estimate for the State, 2006-2022.

<sup>1</sup> 2006 total includes 1 adult (range 0-2) encountered at Damon Point

<sup>2</sup> incomplete survey effort due to SARS CoV-2 pandemic restrictions

ns - indicates no survey conducted

Table does not include Benson Beach, Damon Point, or Oyhut Spit.





# **Clutch Initiation Dates and Breeding Phenology**

Clutch initiations and breeding phenology are typically calculated based on when the first and last nest is known to have begun and when the last hatched chick has fledged. Without consistent monitoring at any nesting site, which WDFW has not done since 2018, this information cannot be calculated. For previous clutch initiation and breeding phenology patterns, see Pearson et al. (2019).

### **Nest Success**

WDFW, USFWS, and the Shoalwater staff located 44 nests at three survey locations in Washington: Conner Creek, Empitre/Graveyard Spit, and Leadbetter Point (Table 6). Five nests were located at Conner Creek, though no successful nesting was confirmed. One nest failed due to predation and a second for unknown reasons, while the remaining three had unknown fates. Ten nests were located at Leadbetter Point, with four confirmed broods producing seven chicks. Of the six remaining nests, three failed due to weather, two failed for unknown reasons, and one nest's fate was undetermined.

Twenty-nine nests were located on Empire and Graveyard Spit with five nests successfully hatching a total of 13 chicks. Of the remaining 24 nests, one nest was abandoned, one had an unknown fate, and 22 failed due to predation. Of the predation failures, all were likely attributed to a single raven or raven pair. In addition to the nest predation events, this pair was observed predating a plover chick in August. Predator control was unavailable, as there was no active APHIS contract and for cultural reasons.

While adult snowy plovers were observed at Copalis Spit, Midway Beach, and North Willapa Bay Islands, no nests were located during surveys.

Table 6. Nest outcomes by snowy plover nesting locality in 2022. Outcomes include successful (hatched), failed, abandoned, or unknown outcome. Nests without exposure days (failed shortly after discovery or found after success or failure) cannot be used to calculate nest success.

				Outcon	ne	
Site	# Nests Located	Nests w/ Exposure Days	Hatch	Fail	Abandoned	Unknown
Conner Creek	5	-	0	2	0	3
Empire & Graveyard Spit	29	-	5	22	1	1
Leadbetter Point	10	-	4	5	0	1
Copalis Spit	0	-	0	0	0	0
Midway Beach	0	-	0	0	0	0
North Willapa Bay Islands	0	-	0	0	0	0
Totals	44	-	9	29	1	6

# **Fledging Success**

The Shoalwater Bay Tribal Biologists confirmed that two chicks at Empire Spit successfully fledged, and USFWS confirmed that two chicks at Leadbetter Point fledged. Biologists were unable to determine if any chicks at Conner Creek, Copalis Spit, Midway, or North Willapa Bay Islands fledged.

### **Nest Locations**

Active nest searching occurred at Graveyard Spit and Empire Spit. Nesting snowy plovers use the entire 3-mile area encompassing both spits. Nests were located both landward and seaward of the berm before and during construction. Nests were constructed within 50 yards of construction activity. Nests were in open sand and sparsely vegetated areas on both spits.

Birds nested at Leadbetter Point north of Oysterville Road. At Conner Creek, snowy plovers nested toward the northern end of the site near the mouth of the creek.

## **Predator Management**

No predator management took place in 2022.

To evaluate the effects of previous predator control efforts on snowy plover populations, WDFW Wildlife Program's Science Division, the Shoalwater Bay Indian Tribe, and the U.S. Fish and Wildlife Service analyzed nest and brood monitoring data from 2006-2018 at Midway Beach,

Leadbetter Point, and Graveyard Spit (now Empire and Graveyard Spit). WDFW prepared a separate report detailing data collection, analysis, and results (Amburgey et al. 2023, appended). Results indicate that nest survival initially increased with predator control but decreased in efficacy over years of implementation, potentially as predators acclimated to removal efforts. Brood survival did not benefit from predator control and was unexpectedly lower at sites with predator management. The authors discuss potential management recommendations to further consider when planning predator control.

# Habitat Restoration and Vegetation Sampling

Habitat restoration work funded and executed by USFWS and Washington State Parks took place at Leadbetter Point between 18 January and 22 March. On Willapa Refuge lands, 170 acres were disked and bulldozed, and 150 acres were treated with herbicide to control for invasive *Ammophila* beachgrass. At Leadbetter Point State Park, 53 acres were treated with herbicide. Areas scheduled for habitat restoration were searched several times during the 2-3 weeks prior to treatment, then inspected every one to two weeks during operations to minimize potential impacts. All major work occurred well outside of the breeding seasons of most resident wildlife.

# PROGRESS ON RECOVERY OBJECTIVES

# Federal Recovery Objectives

### Objective 1: 250 breeding adults in Recovery Unit 1

The 2022 Washington nesting population was 64 (range = 58-69), whereas the Oregon nesting population reached 508 (Lauten et al. 2022) for a total of 572 (range = 566-577) nesting adult snowy plovers in Recovery Unit 1 (Table 7). While breeding adult numbers have exceeded the Recovery Unit objectives since 2013, 2022's numbers are the lowest since 2015.

Table 7.	Estimated	number of	breeding	adult snowv	plovers in	Recoverv	Unit 1 b	ov vear.
	Listinated	mannoer or	Siecung	addie bilo i j	Provers m			J J Cull

2015	2016	2017	2018	2019	2020	2021	2022
526 (514-	622 (614-	546 (538-	589 (582-	595 (580-	532 (514-	623 (616-	572 (566-
547)	632)	554)	591)	602)	543)	628)	577)

### Objective 2: A 5-year average productivity of at least 1.0 fledged chick per adult male

In 2016, Oregon went to a sampling strategy to estimate fledging success. To account for this strategy, we used the total number of males from the sampled sites and the total number of chicks fledged from the sample sites to estimate fledging success for the recovery unit (rather than averages per site because of sample size differences between sites). Since 2019, fledgling success data has only been available for Oregon survey sites.

The average number of chicks fledged per adult male was 0.49 in 2022 compared to an average of 0.90 over the past five years (Table 8). Population modeling by Nur et al. (1999) indicates that productivity of 1.2 or more chicks fledged per breeding male should increase population size at a moderate pace. Note that the fledging success values since 2019 are derived solely from the Oregon portion of the population.

	2014	2015	2016 <sup>1</sup>	2017	2018	2019	2020	2021	2022
Chicks fledged/male	1.71 (1.68- 1.74)	1.55 (1.49- 1.57)	0.66	0.90	1.03	1.321	1.06 <sup>2</sup>	0.62 <sup>2</sup>	0.49 <sup>2</sup>

 Table 8. Estimated chicks fledged per breeding adult male, Recovery Unit 1 by year.

<sup>1</sup> In 2016, Oregon changed their methodology for estimating fledging success, moving to a sampling strategy.

<sup>2</sup> The number of chicks fledged per male since 2019 represents fledging per adult male only in Oregon, as data for Washington are not available.

## Washington State Recovery Objectives

Downlisting objective 1: A 4-year statewide average of at least 25 breeding pairs

We estimated there were 64 (range = 58-69) adult nesting snowy plovers in Washington during the 2022 nesting season and approximately 28-32 of these birds were males. Assuming all of these males were paired, we estimate there were 28-32 breeding pairs in Washington (Table 9). This recovery objective has been attained with a current four-year average for breeding pairs in Washington of 40. This average does not include 2020, as the survey effort was reduced on account of COVID-19 restrictions. Instead, the average was calculated using data from 2018, 2019, 2021, and 2022.

 Table 9. Estimated number of paired breeding males in Washington (2015-2021).

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Breeding males	23-27	35-55	43-57	28-51	34-37	36-62		47-53	28-32

Downlisting objective 2: Fledge at least one young per pair per year, at two or more nesting areas with secure habitat.

Table 10 presents the average number of young fledged per adult male in Washington until 2018, after which, fledging success monitoring was dicontinued. Data on the average number of chicks fledged in 2022 are not available, because monitoring was dicontinued.

 Table 10. Estimated number of chicks fledged per adult male in Washington (2013-2018).

	2013	2014	2015	2016	2017	2018
Fledge rate	1.04 (0.92-1.18)	1.88 (1.67-2.13)	1.74 (1.24-2.2)	0.96 (0.74-1.21)	1.70 (1.55-1.83)	0.76 (0.65-0.93)

Delisting objective 1: The average population reaches 40 breeding pairs at three or more secure nesting areas.

None of the current breeding areas have reached this objective population threshold. Without clear definition on what constitutes a "secure nesting area", the partners in plover recovery will need to clarify and document how to determine when this objective has been achieved.

# 2022 MANAGEMENT ACTIONS

Management actions that occurred in 2022 involved minimizing human activities near active snowy plover nesting sites during the nesting season and habitat restoration. Human-related disturbance negatively affects hatching success of snowy plovers (Warriner et al. 1986, Schulz and Stock 1993) and snowy plover chick survival by as much as 72% (Ruhlen et. al. 2003). Disturbances to wintering snowy plovers are 16 times higher at a public beach than at a protected beach. Humans, dogs, American crows and other birds are the main sources of disturbance (Lafferty 2001). In addition, snowy plover feeding rates decline in response to disturbance (Lafferty 2001). Human disturbance negatively affects hatching rates and chick survival for various plover species (Flemming et al. 1988, Buick and Paton 1989, Dowling and Weston 1999).

### **Nest Site Protection**

In an effort to protect nests from human activities, suitable habitat is closed to public entry during the breeding season.

- <u>Leadbetter Point</u>. Approximately 8.0 miles of public beach were demarcated with signs on PVC posts to restrict human access onto the upper, dry sand portions of the beach where plovers nest.
- <u>Midway Beach</u>. An estimated 2.7 miles were posted and signed to restrict human access on the upper portions of the beach.
- <u>Griffiths-Priday State Park</u>. Signs and symbolic fencing were installed to restrict beach access to plover nesting areas. The area protected encompasses approximately 27 acres.
- <u>Long Beach Peninsula</u> (one private access, one State Park access, one National Wildlife Refuge access). Symbolic fencing, totaling over 1,500 feet in length, was placed along three hiking trails that access the beach during a 26-week period.

### **Clam Tides**

- Washington Department of Fish and Wildlife coordinated most law enforcement activities, especially during clam tides.
- Washington State Parks and US Fish and Wildlife Service provided additional law enforcement patrols.
- No WDFW-managed recreational clamming occurred between May 8 and September 27.

### Law Enforcement

- Washington Department of Fish and Wildlife coordinated law enforcement activities with State Park rangers and U.S. Fish and Wildlife law enforcement officers.
- Refuge law enforcement patrols were conducted periodically during the nesting season.
- WDFW staff patrolled nesting areas during holidays and clam digging tides.

# Outreach

- Willapa NWR social media posts and website content included information about snowy the plover at Leadbetter Point.
- Trailside shorebird interpretive signs were installed at locations around the Long Beach Peninsula and Willapa Bay.
- WDFW paid for public service announcements leading up to Earth Day with information on how to avoid disturbing nesting snowy plovers while recreating on Washington beaches.
- USFWS, WDFW, and State Parks collaborated to produce an informational video about nesting snowy plovers on Washington beaches.

# **Predator Management**

- No predator management occurred in 2022. Funding via Willapa Refuge was discontinued. Existing contracts for predator management services at Midway lapsed, and the renewal process for partial coverage could not be completed before the most active portion of the nesting season (May/June) ended.
- WDFW analyzed nest and brood survival data to evaluate the effectiveness of predator management. A summary of the results is provided in this report and appended in Amburgey et al. (2023) with our Section 6 Final Performance Report.

## Vehicle and Recreation Restrictions

- Coastal beaches at Willapa NWR and Leadbetter Point State Park are closed to vehicle traffic year-round. However, driving is allowed on the wet sand portions of these beaches during spring and winter recreational razor clam harvests. Diving is restricted in the Seashore Conservation Area from Oysterville Road to Leadbetter Point State Park from 15 April to the day following Labor Day.
- The Midway Beach area is open to vehicle traffic year-round except during and preceding the July 4 holiday. There are vehicle beach access points at Cranberry Beach Road to the north and Warrenton-Cannery Road to the south.
- Motor vehicles are prohibited on Conner Creek beaches between 15 April and the day after Labor Day, except during authorized razor clam dig hours.
- Overnight camping and fires are prohibited on the Refuge and the State Park at Leadbetter Point. Fireworks are prohibited at Midway Beach during and preceding the July 4 holiday and always prohibited at Leadbetter Point. Campfires on State Park managed beaches are not permitted in driftwood or within 100 feet of the dunes.
- Dogs are not permitted within snowy plover nesting areas or anywhere on Refuge lands.

## Habitat restoration

• Willapa National Wildlife Refuge: 150 acres were treated with herbicide and 170 acres were disked and bulldozed to treat *Ammophila* beachgrass.

- Washington State Parks (Leadbetter Point State Park): 53 acres of Ammophila beachgrass was treated with herbicide.
- No habitat restoration was conducted with Section 6 funds.

### DISCUSSION

Since winter window surveys began, both the total number of snowy plovers observed and the distribution among sites has been variable. In 2022, the majority were split between Midway Beach and Leadbetter Point, however 18 plovers were also observed at Conner Creek. Though this is the first year that wintering plovers have been observed at this site, they have been regularly observed at the Ocean Shores to Ocean City site—directly south of Conner Creek—since surveys began there in 2017.

There was a remarkable drop in the number of breeding adults counted in 2022. This number of plovers counted during the breeding window survey was the lowest count since 2015 and the lowest total count of breeding adults since 2014—a phenomenon that was not observed in Oregon's population (Lauten et al. 2022). We don't know why Washington's adult population decreased. Potential factors include a surge in Highly Pathogenic Avian Influenza (HPAI), severe winter storms impacting overwinter survival, recruitment, and potentially immigration. Much of Washington's snowy plover population is recruited from Oregon; however, since Oregon is banding fewer plovers in recent years, it is difficult to determine if recruitment from Oregon has actually decreased.

If plovers are moving north or into areas beyond those currently surveyed (e.g., Willapa Bay and Grays Harbor), we could be missing part of the adult population during our surveys. To address this possibility, Washington surveying and monitoring partners should continue to look for and survey potential plover nesting locations outside of the currently monitored range.

We found the results of the predator management analysis to be an informative evaluation of the efficacy of our predator management efforts with respect to both nest and brood survival. We intend to further review the recommendations from this analysis to determine if finer-scale guidance to USDA specialists, seasonal or annual shifts in predator control efforts, or other alternate approaches are warranted to address our objectives of maximizing survival of Snowy Plover young.

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through her long career working with Snowy Plover in Washington, she helped build and maintain relationships with partners and the Shoalwater Bay Tribe, and was a steadfast voice moving snowy plover conservation forward in Washington for decades; she will be missed as an important conservation advocate in our shared work. Much of this work was funded by a USFWS Recovery Program Section 6 Grant (F21AP00161) and by WDFW and Willapa National Wildlife Refuge operating funds. Thank you all!

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