Black Oystercatcher (*Haematopus bachmani)*
Reproductive Success
California Central Coast, Monterey Bay Region
2024

Northern Monterey County
(Point Lobos State Natural Reserve to City of Monterey)
and
Northern Santa Cruz County to Southern San Mateo County
(Natural Bridges State Beach to Pescadero State Beach)

J.L. Parkin

Prepared by

Jennifer L. Parkin, Judith S. Romero and Herrick E. Hanks

Prepared for

Monterey Audubon Society

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SUMMARY OF 2024 REPRODUCTIVE SUCCESS

During the 2024 Black Oystercatcher breeding season in the **Monterey Bay region**, a total of 81 Black Oystercatcher territories were monitored and 68 territorial pairs were identified, but only 42 pairs (62%) were observed nesting for a total of 52 nesting attempts (42 breeding pairs + 10 re-nesting attempts, also referred to as "replacement clutches"). From the observed breeding pairs (also referred to as "nesting pairs"), there were at least 115 eggs laid, 56 chicks hatched, and 19 chicks fledged, for an **overall reproductive success rate** (also referred to a "pair productivity") **of 0.45 per pair,** with 15 of the 42 breeding pairs (37%) producing fledglings. The 0.45 reproductive success per pair for the Monterey Bay region is below the modeled average productivity rate of ~0.50 rate necessary to maintain a stable population (Weinstein et al. 2024).

In the Monterey Bay **South Coast** study area, a total of 20 Black Oystercatcher breeding pairs and four re-nesting attempts were recorded, for a total of 24 nesting attempts. A minimum of 52 eggs and 18 chicks were produced, with a total of four fledglings from four breeding pairs, resulting in a reproductive success of 0.20 per pair.

In the Monterey Bay **North Coast** study area, a total of 22 Black Oystercatcher breeding pairs and six re-nesting attempts were recorded, for a total of 28 nesting attempts. A minimum of 63 eggs and 38 chicks were produced, with a total of 15 fledglings from 11 breeding pairs, resulting in a reproductive success of 0.68 per pair. More than half (n=10) or 53% of the Monterey Bay region's fledglings were from the San Mateo monitoring section alone.

INTRODUCTION

Monterey Bay Region & Study Areas

The Monterey Bay region runs from Point Lobos State Natural Reserve in the south to Pescadero State Beach in the north, covering coastal sections in three counties and approximately 160 kilometers (100 miles) of coastline. The Monterey Bay region is separated into two study areas: Monterey Bay South Coast (northern Monterey County) and Monterey Bay North Coast (northern Santa Cruz County and southern San Mateo County) (Figure 1). The separation of the Monterey Bay region into two study areas was done for the following reasons: (1) there is a large stretch of sandy shoreline of about 55 kilometers (34 miles) that separates the two study areas; (2) one side of the coast had more monitoring history; and (3) the separation allows for a clear comparison of the productivity between the two study areas.

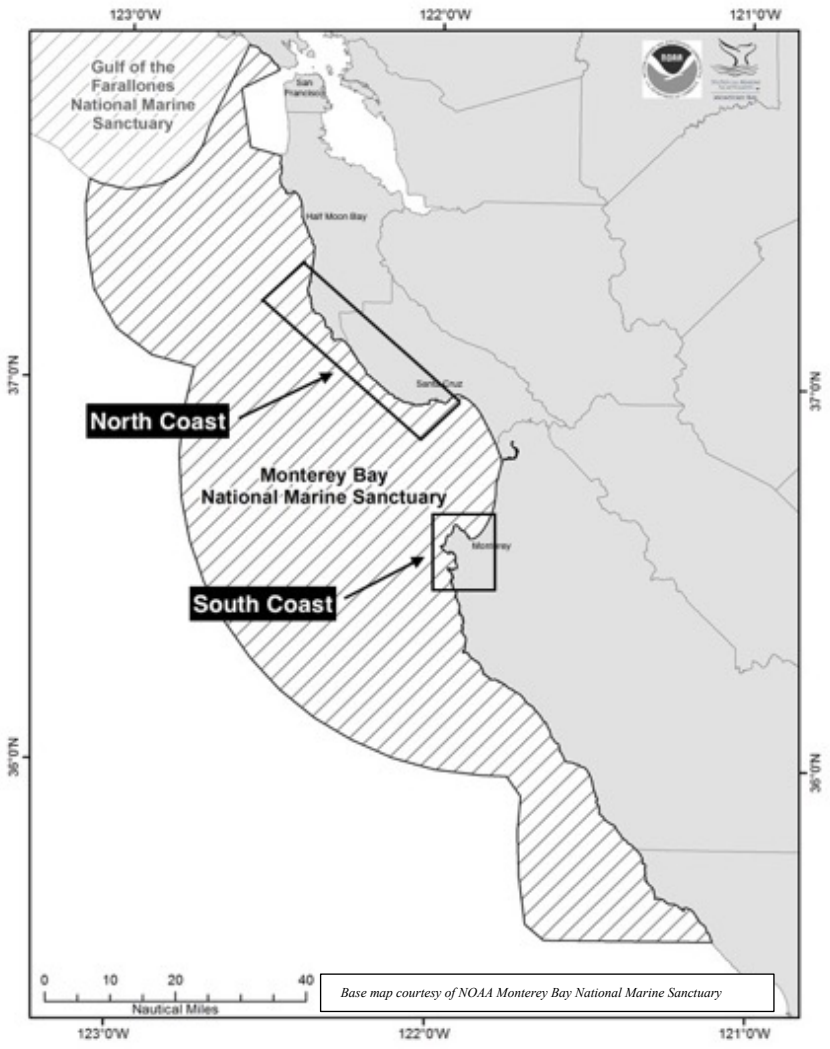


Figure 1. *Map showing Monterey Bay South Coast and North Coast Study Areas.*

The Monterey Bay South Coast study area (South Coast) is located along the northern portion of the Monterey County coast extending north from the south end of Point Lobos State Natural Reserve to the east side of the Coast Guard Pier in the City of Monterey and is broken into three monitoring sections: (1) Point Lobos (PL) (Point Lobos State Natural Reserve), (2) Pebble Beach (PB) (Stillwater Cove to Point Joe), and (3) Monterey Peninsula (MP) (Asilomar State Beach to Monterey). Both the Monterey Peninsula monitoring section and the Point Lobos monitoring section are completely covered, while the Pebble Beach monitoring section has a number of small breaks due to private property access restrictions.

The Monterey Bay North Coast study area (North Coast) extends north from the south end of Natural Bridges State Beach to the north end of Pescadero State Beach and consists of two monitoring sections: (1) northern Santa Cruz County coast (SC) and (2) southern San Mateo County coast (SM). It should be noted that each of the monitoring sections in the North Coast do not include the entire area of their respective section of coastline. The Santa Cruz monitoring section includes Natural Bridges State Beach and the University of California Santa Cruz's

Younger Lagoon Reserve, then a break until Wilder Ranch State Park's Wilder Beach to Three-Mile Beach, then a break until Shark Fin Cove to Davenport, and finally a break until Pelican Rock to Greyhound Rock. The San Mateo monitoring section includes only the area around Pigeon Point Light Station State Historic Park and the coastline of Pescadero State Beach, this does not include Año Nuevo State Park.

Black Oystercatcher Project

The California Central Coast Black Oystercatcher Project is part of the larger California coastwide project to assess the status of the Black Oystercatcher (*Haematopus bachmani*), a species of conservation concern, and hereafter occasionally referred to as BLOY, using the International Ornithologists' Union's common name abbreviation. The initial California coastwide project was managed by Audubon California partnering with local Audubon chapters, the California Coastal National Monument, California State Parks, and several other local coastal organizations. The local project focuses on the Monterey Bay region from the northern portion of the Monterey County coast to the southern portion of the San Mateo County coast.

The California coastwide Black Oystercatcher monitoring project (BLOY Project) began in 2011 with four basic objectives: (1) Identify distribution and abundance (number of BLOY along the California Coast); (2) Determine reproductive success (number of fledglings from breeding pairs); (3) Assess the habitat and threats to the habitat (reasons for nesting failure); and (4) Develop conservation measures (protective measures and outreach actions) to assist with the long-term success of the species.

The field effort of the BLOY Project was initiated in 2011 with a targeted survey measuring distribution and abundance using a standardized protocol developed specifically for detecting Black Oystercatchers during the early breeding season, when pair fidelity to breeding territories is highest and movement is lowest. Approximately 18% of the rocky habitat of the California' coast was covered during the first and third weeks of June (Weinstein et al. 2014).

The initial 10-year (2012-2021) reproduction monitoring portion of the project began in five California coastal regions - San Luis Obispo, Monterey Bay, San Francisco Bay, Sonoma Coast, and Mendocino Coast. The data from the initial 10-year BLOY reproduction monitoring, as well as the 2022 reproduction monitoring along the California coast, were combined and analyzed with the Oregon BLOY reproduction monitoring data and the resulting report was published in *Marine Ornithology* (Weinstein et al. 2024). See *Publication of 2012-2022 California & Oregon BLOY Monitoring Data Analysis* section below (pages 21-23) for a summary as it pertains to the local BLOY Project.

For the 10 years of the initial monitoring in the Monterey Bay region, the results of each breeding season are in reports for each year (Roberson 2012, Ceja et al. 2013, Ceja & Hanks 2014, Ceja & Hanks 2015, Ceja & Hanks 2016, Ceja & Hanks 2017, Ceja & Hanks 2018, Parkin et al. 2019, Parkin et al. 2020 & Parkin et al. 2021). In 2022, the second California coastwide 10-year BLOY monitoring initiative began, but this time the five regional efforts are coordinated by local entities. The Monterey region is under Monterey Audubon Society in collaboration with the California Coastal National Monument, Pacific Grove Museum of Natural History, and Point

Lobos Docents. The results of the 2022 and 2023 breeding seasons are also in individual reports (Parkin et al. 2022 & Parkin et al. 2023). All 12 of the individual monitoring season reports are available on the Monterey Audubon Society website at: https://www.montereyaudubon.org/bloy.

METHODS

The monitoring methodology used is based on the Black Oystercatcher standardized protocols for monitoring population size and reproductive success developed by the US Geological Survey (Elliott-Smith & Haig 2011), with slight modifications adapted by Audubon California. The primary monitoring is conducted during the breeding season from mid-April through the end of September.

The field work is conducted by a staff consisting of a Regional Coordinator, a Project Biologist, and an Assistant Biologist and it is currently operated as a community science venture using more than 50 volunteer monitors.

For 2024, with key funding from an anonymous donor and a few donations from various individuals, the California Central Coast Black Oystercatcher Project was able to continue the funding of two part-time biologists– the Project Biologist and the Assistant Project Biologist. The Project Biologist covered all the North Coast Black Oystercatcher territories once a week and all of the South Coast Black Oystercatcher territories once a month, while the Assistant Project Biologist covered all of the South Coast Black Oystercatcher territories once a week. Collectively, this provided a consistent monitoring base for each of the 81 Black Oystercatcher territories throughout the Monterey Bay region (See Appendix 1 for Google Earth maps of BLOY territories within each monitoring section).

Black Oystercatcher territory size was determined based on observations made of the individual Black Oystercatcher pair's foraging distance, encounters with neighboring pairs, and distance covered during territorial chases of interloping Black Oystercatchers (aka "floaters'), as well as areas traveled with young to forage post fledging. Google Earth Pro was used to obtain GPS coordinates, map nest locations, and delineate territory size.

Data collected from observations were entered into Google Sheets set up by each known territory to record the date, time of observation, nest stage, number of adults, adult behavior, number of eggs, stage of eggs, number of chicks, stage of chicks, disturbances, and quality of survey. A note section at the end allows for any other information observed (i.e., tide, weather, where the pair was observed in the territory, & other interesting observations).

Black Oystercatcher pairs were classified by stage (i.e., nest building, incubating, young, empty, or unknown). Pairs with an unknown status were counted as not having nested. A territory classified as "abandoned" is a territory that was once occupied by a Black Oystercatcher territorial pair, but regular monitoring has indicated that the territory is no longer occupied by a territorial pair. Lastly, a "neutral zone" is an area without a territorial Black Oystercatcher pair, but does consist of unattached Black Oystercatchers, including sub-adults, single adults, and newly paired Black Oystercatchers without established territories.

Observations were made using binoculars and spotting scopes from land at each Black Oystercatcher territory for a minimum of 30 to 60 minutes at least once a week during the initial portion of the breeding season. At nesting sites with incubation, the minimal observation time may be reduced to about 10 to 20 minutes, while for those nesting sites with chicks, the observations may need to be increased to 60 minutes or more while chicks were present or if other Black Oystercatcher activity warranted much longer observations. In some cases, volunteer monitors with assigned territories made observations almost daily, but at a minimum once a week. Nesting sites with known hatching dates, chicks, or near areas with high human disturbance were monitored more frequently than the minimum in order to document nesting success, predation, human interaction, and inform people about wildlife disturbance and Black Oystercatchers. In the North Coast, part of the Wilder Ranch State Park portion in the Santa Cruz monitoring section includes approximately 6.5 kilometer (4 miles) of a coastline trail with only one main access point. This required the use of a bicycle to efficiently monitor 10 territorial pairs within a reasonable amount of time.

NUMBER OF MONITORS, MONITORING HOURS & OBSERVATIONS

For the 2024 breeding season, the California Central Coast Black Oystercatcher Project used a total of 51 community science monitors, along with a small BLOY Project staff consisting of the Regional Coordinator, the Project Biologist, and the Assistant Project Biologist, creating a cadre of 54 monitors. A large majority of the community science monitors were distributed throughout the South Coast with 46 monitors -- 27 in the Monterey Peninsula monitoring section, 11 in the Pebble Beach monitoring section, and eight for the Point Lobos monitoring section. For the North Coast, there were five community science monitors for the southern portion of the Santa Cruz monitoring section. The Project Biologist and the Regional Coordinator monitored all territories in both the North Coast and South Coast study areas, while the Assistant Project Biologist monitored the South Coast study area. The project staff were the sole monitors for all 13 territories in the San Mateo monitoring section, as well as eight of the territories in the Santa Cruz monitoring section (SC10, SC11, SC12, SC13, SC14, SC15, SC16 & SC19). In the Monterey Bay South Coast study area, the project staff alone covered three territories in the Monterey Peninsula monitoring section (MP8, MP15 & MP17), one territory in the Pebble Beach monitoring section (PB15), and seven territories in the Point Lobos monitoring section (PL3, PL4, PL10, PL11, PL12, PL13 & PL15). In all, the project staff were the sole monitors of 32 of the 81 territories (40%) monitored.

The number of monitors, monitoring hours, and observations were determined based on data entries on the Google Sheets set-up for each of the five monitoring sections monitored (MP, PB, PL, SC & SM). The number of monitoring hours and the number of observations between 20 April and 30 September were calculated for each individual monitor. For example, a single Google Sheets entry with two monitors listed for 30 minutes of monitoring was counted as two individual observations with 30 minutes of observation for each monitor (two observations for a total of one hour).

For the 81 Black Oystercatcher territories monitored in the Monterey Bay region in 2024, there were a total of 1,972 hours of monitoring from 3,458 observations – 1,244 hours from 2,390 observations in the South Coast and 728 hours from 1,068 observations in the North Coast (Table 1). Throughout the Monterey Bay Region, the community science volunteers conducted

840 monitoring hours from 1,521 observations or 43% of all monitoring hours and observations. Together, the individual monitoring hours and observations for the Regional Coordinator, Project Biologist, and the Assistant Project Biologist totaled 1,132 hours and 1,937 observations or 57% of all monitoring hours and observations conducted during the 2024 breeding season.

Table 1. *2024 Black Oystercatcher Monitoring Hours & Observation Numbers - Monterey Bay Region*

Study Areas & Monitoring Sections	# of Monitoring Hours	# of Observations
Monterey Bay South Coast		
Monterey Peninsula (MP)	607	1,090
Pebble Beach (PB)	409	855
Point Lobos (PL)	228	445
Sub-Totals	**1,244**	**2,390**
Monterey Bay North Coast		
Santa Cruz County (SC)	445	782
San Mateo County (SM)	283	286
Sub-Totals	**728**	**1,068**
Grand Totals	**1,972**	**3,458**

RESULTS

Territorial Distribution

Monterey Bay South Coast

The South Coast study area had a total of 40 territorial pairs – 14 along the Monterey Peninsula (Appendix 1, Image 1), 13 along Pebble Beach (Appendix 1, Image 2), and 13 at Point Lobos (Appendix 1, Image 3). Of the 40 territorial pairs, there were a total of 20 nesting pairs and 20 pairs with an unknown status during the breeding season. In the Monterey Peninsula section, four territories (MP3, MP8, MP15 & MP17) are still considered abandoned. Since the 2019 breeding season, two territories in Pebble Beach (PB5 & PB13) have been identified as abandoned and one territory (PB9) has remained as a neutral zone. Along the Point Lobos (PL) monitoring section, three territories are still considered abandoned territories (PL9, PL11 & PL12). The Point Lobos section had a new territorial pair (PL16) that nested in the PL8 territory on Escobar Rocks. This pair hatched at least one chick which was lost soon after hatching. As of the end of the breeding season, this pair was still seen on Escobar Rocks interacting with the PL8 pair over territorial boundaries.

Monterey Bay North Coast

The North Coast study area had a total of 28 territorial pairs – 17 along the Santa Cruz monitoring section (Appendix 1, Images 4, 5 & 6) and 11 along the San Mateo monitoring section (Appendix 1, Images 7, 8 & 9). Of the 28 territorial pairs, there were a total of 22 nesting pairs and seven pairs with an unknown status. In the Santa Cruz (SC) monitoring section, two territories are still classified as abandoned (SC11 & SC19). In the San Mateo (SM) monitoring section one pair (SM12) and their two nearly fledged chicks were not seen after mid-July and were classified as unknown at that point. Two territories are classified as abandoned (SM11) and (SM13).

Timing of Breeding

In 2024, the Monterey Bay region had a total of 52 nesting attempts, including renesting attempts (replacement clutches). Of these, most nests were observed within one to seven days of initiation. Some nests were back calculated from the hatching date or first sighting of chick(s) or fledgling(s) date to determine the approximate nest initiation dates and were included in the nesting attempts.

In the Monterey Bay region, nesting started in early May (Figure 2) with the greatest number of clutches (17) laid between May 1 and May 15. The earliest nesting attempts, during the first week of May, were observed in the Santa Cruz County monitoring section (SC1 & SC5). A total of 17 nesting attempts, four in the South Coast and 13 in the North Coast, were initiated in early May. There were 15 nesting attempts observed from May 16 to May 31, 10 in the South Coast and five in the North Coast including one replacement clutch (SC10.2). In early to mid-June there were six nesting attempts, with one in the South Coast and five in the North Coast including one replacement clutch (SC5.2). A total of 11 nesting attempts occurred in mid to late June with eight nesting attempts in the South Coast including three replacement clutches (MP1.2, MP2.2 & MP6.2) and three nesting attempts in the North Coast including two replacement clutches (SC1.2 & SC17.2). The latest nesting attempts occurred in early to mid-July with three replacement clutches, one in the South Coast (MP13.2) and two in the North Coast (SC4.2 & SC6.2). There were no third nesting attempts this year.

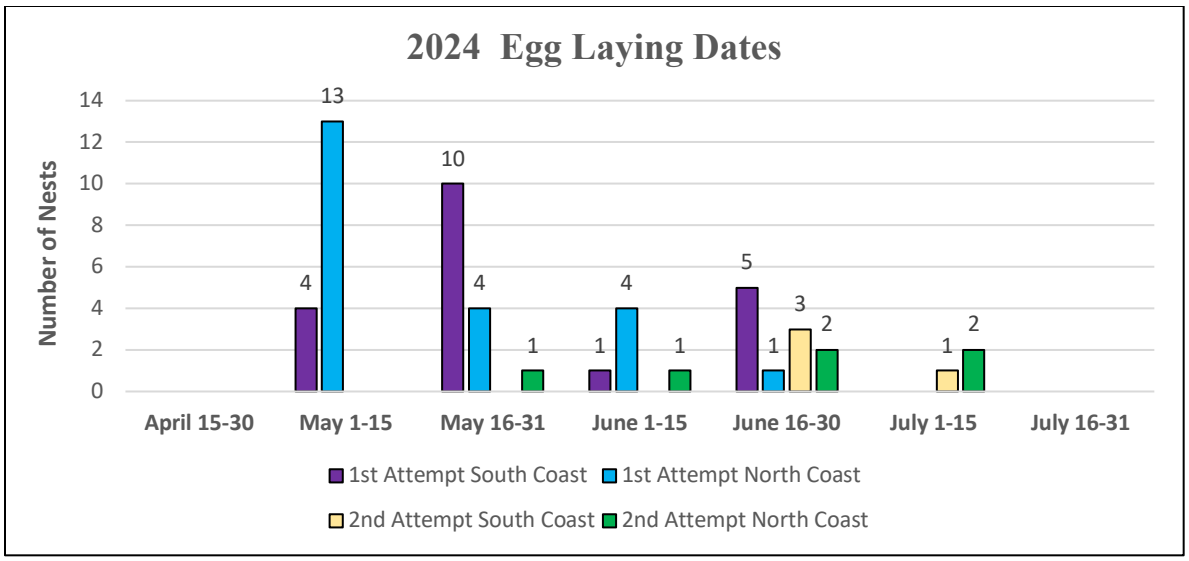


Figure 2. *2024 Monterey Bay region Black Oystercatcher egg laying dates.*

Reproductive Success

2024 Breeding Season

Due to the diverse coastal topography throughout the Monterey Bay region, exact clutch size for all nesting attempts was not attainable. A number of nesting sites could only be successfully viewed with spotting scopes from distant observation points onshore. Many nesting attempts, therefore, had an estimated clutch size of two eggs, an average number within the Monterey Bay

region, when confirmation was not possible. Most chicks were recorded at hatching and were observed throughout the course of the summer.

During the 2024 breeding season, a total of 68 territorial pairs were identified with 42 pairs (62%) observed nesting. These 42 breeding pairs produced a minimum of 115 eggs. A total of 29 breeding pairs produced young resulting in 62% nesting success (# of clutches that produced young / # of clutches) with a survival to fledging (# of chicks fledged / # of chicks) of 34%. A total of 19 chicks fledged in the Monterey Bay region with a reproductive success per pair (# of fledglings / # of breeding pairs) of 0.45 or 45% (Table 2).

Table 2. *2024 Black Oystercatcher Reproductive Success – Monterey Bay Region*

Study Areas	# of Breeding Pairs	# of Eggs	# of Chicks	# of Fledglings	# of Nest Attempts	Nesting Success (%)	Hatching Success (%)	Per Pair	Per Nest	Survival to Fledging (%)
Monterey Peninsula (MP)	9	29	10	2	13	38.5	34.5	0.22	0.15	20.0
Pebble Beach (PB)	5	11	5	1	5	40.0	45.5	0.20	0.20	20.0
Point Lobos (PL)	6	12	3	1	6	33.3	25.0	0.17	0.17	33.3
Monterey Bay South Coast	**20**	**52**	**18**	**4**	**24**	**37.5**	**34.6**	**0.20**	**0.17**	**22.2**
Santa Cruz County (SC)	11	40	21	5	17	70.6	52.5	0.46	0.29	23.8
San Mateo County (SM)	11	23	17	10	11	100.0	73.9	0.91	0.91	58.8
Monterey Bay North Coast	**22**	**63**	**38**	**15**	**28**	**82.1**	**60.3**	**0.68**	**0.54**	**39.5**
Monterey Bay South + North Coast	**42**	**115**	**56**	**19**	**52**	**61.5**	**48.7**	**0.45**	**0.37**	**33.9**

In the South Coast study area, there were a total of 20 nesting pairs and four renesting attempts for a total of 24 nesting attempts. A minimum of 52 eggs were produced which resulted in 38% nesting success (# of clutches that produced young / # of clutches) (Table 2). The total number of hatched chicks recorded was 18 with 22% surviving to fledging (# of chicks fledged / # of chicks). The total number of fledglings in the South Coast study area was four from four pairs, bringing the reproductive success to 0.20 per pair in 2024 (# of fledglings / # of breeding pairs). In the Monterey Peninsula monitoring section, two pairs (MP7 & MP13) successfully fledged one chick each. In the Pebble Beach monitoring section, one pair fledged one chick (PB11) and in the Point Lobos monitoring section, one pair successfully fledged one chick (PL8).

In the North Coast monitoring section, there were a total of 22 nesting pairs and six renesting attempts for a total of 28 nesting attempts. A minimum of 63 eggs were produced that resulted in 82% nesting success (Table 2). The total number of hatched chicks recorded was 38 with 40% surviving to fledging. The North Coast study area had a total of 15 fledglings from 11 pairs and a reproductive success of 0.68 per pair. In the Santa Cruz monitoring section, five chicks successfully fledged, three pairs (SC3, SC7 & SC12) successfully fledged one chick each and one pair (SC18) produced two fledglings. In the San Mateo monitoring section, seven pairs successfully fledged a total of 10 chicks. Four pairs (SM2, SM5, SM8 & SM10) produced one fledgling each and three pairs (SM4, SM6 & SM7) successfully fledged two chicks each. One pair, the SM12 pair on the southeast side of Pigeon Point (and right below the lighthouse), had

two chicks near fledging when the entire family disappeared in mid-July. It is unclear if the restoration activity on the lighthouse and surrounding buildings impacted this pair and their chicks, possibly causing their abandonment of the territory. As of the end of the breeding season, there were no sightings of the SM12 pair; therefore, the success of their two chicks is marked as unknown. Tables 3 through 7 in Appendices 2 through 6 show detailed 2024 productivity results for each territory within each monitoring section.

Comparison of 2016 – 2024 Reproductive Success

The Monterey Bay South Coast and North Coast study areas have had a comparable number of breeding pairs and nesting attempts throughout the past nine years of this study (Table 8). However, many of those years have shown a significant difference in reproductive success per pair (# of fledglings / # of breeding pairs). The South Coast study area has consistently shown a much lower reproductive success per pair with a mean of 0.26 (SD=0.18, n=9) for the last nine years. The North Coast study area has generally done much better with a mean of 0.63 (SD=0.20, n=9) per pair. The reproductive success of the entire Monterey Bay region (South and North Coast study areas combined) with a mean of 0.42 (SD=0.12, n=9) has ranged from a low of 0.19 per pair in 2021 to a high of 0.62 per pair in 2023. This fluctuation indicates that even though the North Coast study area has generally had better reproductive success per pair, this study area has also suffered from years with low reproductive success (2020, 2021 & 2022) which impacts the entire Monterey Bay region.

Table 8. *Black Oystercatcher Reproductive Success Per Pair for 2016 through 2024 - Monterey Bay Region*

Site	2016	2017	2018	2019	2020	2021	2022	2023	2024
Monterey Bay South Coast	0.14	0.21	0.31	0.24	0.36	0.04	0.33	0.50	0.20
Monterey Bay North Coast	0.82	0.84	0.74	0.71	0.27	0.46	0.43	0.73	0.68
Monterey Bay South Coast + North Coast	**0.40**	**0.46**	**0.50**	**0.48**	**0.32**	**0.19**	**0.38**	**0.62**	**0.45**

Ref.: Ceja & Hanks 2016, 2017 & 2018; Parkin et al. 2019, 2020, 2021, 2022, 2023 & 2024

The National Audubon literature review of BLOY reproductive success (mostly in Alaska & British Columbia), as well as the reproductive success of other shorebirds, resulted in the development of an initial population model suggesting that a pair productivity rate of ~0.65 or greater is likely a good sign for a healthy local population, while pair productivity estimates below 0.35 are likely a sign of caution for a population at risk (Meehan et al. 2018). In addition, an average productivity rate of ~0.50 is necessary to maintain a stable population (Weinstein et al. 2024).

Applying this model to the Monterey Bay North Coast and South Coast study area data, the Monterey Bay region population would be considered a population to watch because the overall reproductive success has not been above 0.65 per pair for a healthy population and has only once (2023) been above 0.50 per pair for a stable population (Table 8). In fact, there are several years (2016, 2020, 2021 & 2022) where the population was near or below the at-risk stage of <0.35 per pair.

The North Coast study area has had a reproductive success per pair at or above the 0.65 mark for six out of the nine years (2016-2024) of this study. However, the South Coast study area has hovered closer to or below the 0.35 mark eight of the nine years over the same time period. Overall, there has been a downward trend in reproductive success for the entire Monterey Bay region with the exception of a "spike" year (2023) when both study areas had improved reproductive success (Figure 3). The spike occurred when the South Coast study area increased to the highest reproductive success level seen throughout this study (0.50 per pair) and the North Coast study area increased to a reproductive success level not seen since 2019 (0.73 per pair). However, in 2024 the South Coast study area significantly decreased (0.20 per pair), causing the overall reproductive success to yet again decrease to well below the healthy population level.

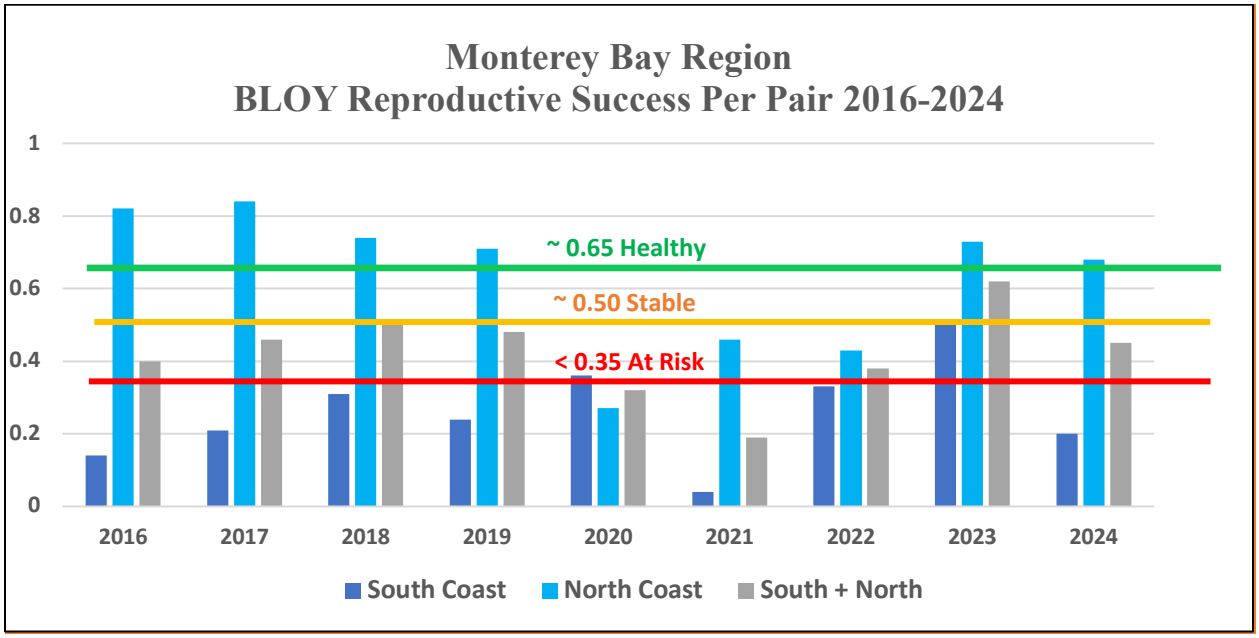


Figure 3. *Monterey Bay region Black Oystercatcher Reproductive Success per pair 2016 – 2024*

It should be noted that population stability is often quite variable due to many different circumstances including environmental and human influences. The uptick in the 2023 data could be due to more plentiful food sources, increased protections from roping and signs (creating less disturbance to breeding pairs), lower predation rates, or more experienced adults breeding. This variability in population stability is consistent with the findings of the recent analysis of the California and Oregon BLOY monitoring data that among other things, identified a lack of any temporal trend in productivity (Weinstein et al. 2024).

Assessing the comparison of the 2016-2024 Monterey Bay region's BLOY reproductive success indicates the need to continue the monitoring of the region's BLOY population and encourage further analysis of the various factors that may be influencing the health of the population in order to determine what variables need to be addressed to help with perpetuating the species.

Nest Location and Sea Level Rise

In 2024, a total of 52 nesting attempts (including renesting) occurred in the entire Monterey Bay region. Of those, 37% (n=19) nested on offshore rocks (rocks separated from coastal access

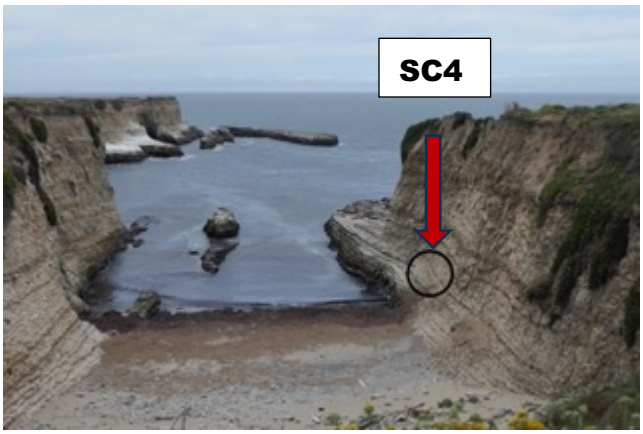
during higher tides), 51% (n=26) nested on rocky shores (bluffs, onshore rock outcroppings, cliffs & ledges), and 12% (n=6) nested on sand/gravel beaches. Of the 52 total nesting attempts, the South Coast study area had 22% (n=11) nesting on offshore rocks, 18% (n=9) nesting on rocky shores, and 8% (n=4) nesting on sand/gravel beaches. In the North Coast study area 15% (n=8) nested on offshore rocks, 33% (n=17) nested on rocky shores, and 4% (n=2) nested on sand/gravel beaches. Because these two study areas have diverse and different coastal topographies, there is a distinct difference in the number of nest locations predominantly used. In the South Coast study area, there are more nests occurring on offshore rocks and in the North Coast study area, there are more nests occurring on ledges below bluffs along the rocky shore.

In total, there were 32 nesting attempts that produced young, of those, 31% (n=10) nested on offshore rocks, 53% (n=17) nested on rocky shores, and 16% (n=5) nested on sand/gravel beaches. There were 15 nesting pairs that fledged at least one chick with 33% (n=5) nesting on offshore rocks, 53% (n=8) nesting on rocky shores, and 13% (n=2) nesting on sand/gravel beaches. Only one renesting attempt resulted in fledged young (MP13.2) and it was located on a sand/gravel beach.

The 2024 Black Oystercatcher territories and nest locations for the three monitoring sections of the Monterey Bay South Coast study area – Monterey Peninsula, Pebble Beach, and Point Lobos are shown on Images 1, 2, and 3 in Appendix 1. The entire stretch of the Santa Cruz monitoring section with the Black Oystercatcher territories and nest locations are shown on Image 4 in Appendix 1, while Images 5 and 6 in Appendix 1 show these territories and nest locations in more detail. The entire stretch of the San Mateo monitoring section with the Black Oystercatcher territories and nest locations are shown on Image 7 in Appendix 1, while Images 8 and 9 in Appendix 1 show these territories and nest locations in more detail.

Vulnerability to Sea Level Rise and Climate Change

During the 2024 breeding season several BLOY pairs lost nests due to unusually high tides coupled with a high swell, generally not seen during the late spring and summer months. Each year more nests are observed to be affected by sea level rise and associated issues. Pairs impacted by these high tide levels were SC1 (6.0') on June 5, SC1.2 (6.1') on July 21, SC4 (5.8') on June 22, SC17.2 (5.7') on July 18, and MP1 (6.4') on June 5. The SC1 pair lost their first nest of three chicks to these tides on June 5 with a high tide of (6.0') coupled with a west swell of (8.5') Also, this pair lost two small chicks from their second nesting attempt on July 21 from a second high tide and high swell combination. The SC4 pair lost their first nesting attempt from a high tide that carried in a "wall" of red algae that covered the nest site (Images 10 & 11). For their first nesting attempt, the SC4 pair moved to this lower, more exposed ledge due to large numbers of Brown Pelicans (BRPE) and Brandt's Cormorants (BRAC) roosting near the pair's traditional nesting site (which is on a ledge well above the high tide line). The SC17 pair lost two newly hatched chicks to the high tide on July 18. The MP1 pair lost their clutch of 2-3 eggs on June 5, the same high tide and swell combination that washed out the SC1 pair. Lastly, the MP10 pair narrowly avoided nest destruction during these high tides in early June (see Image 26 in *BLOYs & Drone Monitoring section*).



C. Burgess


J. L. Parkin

Images 10 & 11. *The SC4 nest (circled) before the "wall of algae" washed in (left) and after the "wall of algae" covered that nest (right).*

The impact of sea level rise and climate change can result in egg and chick losses, and a decrease in reproductive success for Black Oystercatchers. Nest losses may occur in the early breeding season due to erosion, increased precipitation, increased wave action, and higher tides. These factors, as well as sea surface temperature changes, can also influence BLOY food sources. All of these factors can have a detrimental effect on the health and availability of mussel beds that are the primary food source for BLOY in this region.

Nesting location is an important factor in determining how this species will react to the changing climate and sea level rise. The Monterey Bay region includes many different types of BLOY nesting habitat. Many of the BLOY pairs in this study, nest well above high tide on offshore rocks or mainland rocks. There are, however, a number of pairs that do not have territories that include rocks with suitable nesting habitat above mean high tide or, those areas are used by other avian species including BRPE, BRAC, Western Gull (WEGU), or Heermann's Gull (HEEG). As sea levels continue to rise there will be less available space for quality nesting and roosting.

Disturbance

Black Oystercatchers nesting in all five sections of the Monterey Bay region experienced varying degrees of natural and human caused disturbances. A disturbance was recorded when a pair or one individual of a pair were seen chasing or flying away, making alert, alarm, or territorial calls toward a threat (including other BLOY in the area). Disturbances are recorded as part of the regular monitoring of each BLOY territory.

In 2024, the most frequently observed natural disturbance for the entire Monterey Bay region was from Black Oystercatcher interlopers (177 observations). BLOY are very territorial, especially during the breeding season, and will readily chase away other BLOY entering their territory, even leaving eggs or chicks alone. This behavior can have a huge impact on the survival of eggs and young due to increased vulnerability to predation and less provisioning to young.

Various avian species caused the second most frequently observed natural disturbance with a total of 91 observations. This includes 35 observations of disturbance from gull species, six

from raptor species, eight from corvid species, and 42 from "other" avian species, predominantly BRPE, BRAC, and Pelagic Cormorant (PECO). Many of these species use the same ledges, bluffs, offshore rocks, and areas above high tide to roost. This can disturb resting BLOY and prevents BLOY from accessing prime nesting spots. Also, many of these avian species are a predation threat to BLOY eggs and chicks. Trampling of eggs and predation of chicks have been observed over the course of this study. It should be noted that many WEGU pairs are observed nesting near BLOY pairs without any incidents and many of these pairs have been observed to collaboratively defend their nests and their young from potential predators and even other gulls.

Human disturbance contributed a total of 55 observations of disturbance, 36 of which were by non-research related incidents. These were all incidents of people walking out on coastal rocks and causing disturbance to BLOY. Even Point Lobos State Natural Reserve had several incidents of people climbing on rocks disturbing BLOY, including an incident where BLOY were nesting (See further description in the Protective Measures section). The research related incidents included project staff roping off rocks at the beginning and end of the breeding season, repairing broken ropes during the breeding season, specific nest checks on some nests, academic research from various institutions, and drone research flights.

Disturbance due to unauthorized drone activity was observed a total of seven times with five observations in the Monterey Peninsula monitoring section, one observation in the Santa Cruz monitoring section, and one observation in the San Mateo monitoring section.

In 2024, a total of 19 observations were recorded from disturbances caused by waves (n=7), boats (n=2), pets (n=5), and native land mammals (n=5). Observations for these categories, as well as the drone category, are only made while someone is monitoring an area; therefore, these disturbances may occur more often than is represented here. Also, predation on eggs and chicks from native land animals may occur more frequently at night than during the day.

There were 12 observations of disturbance with an unknown cause. Generally, this category has ranged from 10-24 observations during each year of this study. The unknown category is used when a monitor observes a BLOY reaction such as alert or alarm calls and cannot find the source of the disturbance.

PROTECTIVE MEASURES

Vulnerability to Human Disturbance

The five monitoring sections of the Monterey Bay region differ greatly in topography, accessibility, land use, and regulations, making each area distinctively different in its vulnerability. The three monitoring sections of the South Coast study area, having a lot of human access points, are among the most vulnerable sections in the entire Monterey Bay region. Along their coastline are recreational trails, substantial coastline development, special events along the rocky bluffs (especially at Pebble Beach), street parking, parking pullouts, as well as numerous rocky outcroppings that are very accessible, especially at low tide. To prevent human related access, it is extremely important to use protective measures at select Monterey Peninsula, Pebble Beach, and Point Lobos monitoring section nesting spots.

The North Coast monitoring section has a mixture of State Parks, rugged topography, and accessible coastline. There are many bluff-top trails along the coast with varying levels of accessibility. Some of the more vulnerable areas in the Santa Cruz monitoring section include Natural Bridges State Beach, where people can access the rocky shoreline at lower tides and Greyhound Rock where there is access to this large mudstone rock at low tide. The San Mateo monitoring section is another highly vulnerable area especially at Pescadero State Beach due to parking above the beach and easy access to the rocky shore and offshore rocks during low tide. It is important to use protective measures in this area to decrease the disturbances to foraging and nesting BLOY.

Physical Protection Measures

In a continuing attempt to minimize human disturbance to nesting pairs, protective measures using a variety of signing techniques were put in place at nesting locations known to have high human activity. The extent of protective measures used depended on what was feasible for the particular nesting area and in what jurisdiction they were located. In 2024, the seasonal protective measures were implemented from April through October.

Physical protective measures were used for 20 territories with 24 nesting attempts in all five of the Monterey Bay region's monitoring sections (Table 9, Appendix 7). These seasonal measures provided protection for a total of 17 nesting pairs, 12 of which fall within the jurisdiction of the California Coastal National Monument, with four nesting pairs in the Monterey Peninsula monitoring section (MP1, MP2, MP5 & MP16) and eight in the San Mateo monitoring section (SM3, SM4, SM5, SM6, SM7, SM8, SM9 & SM10). The other five nesting pairs fall under the jurisdiction of the City of Pacific Grove (MP6), Pebble Beach Company (PB8 & PB11), California State Parks (PL14), and University of California Santa Cruz (SC1).

On the Monterey Peninsula, ropes and signs were placed around the entire area of High Rock and Pyramid Rock on the Point Pinos Islet, protecting the MP16 nesting site on the islet's western end, and entirely around Sentinel Rock protecting the MP5 nesting site on the northern side of the middle of the islet. Ropes with signs were also placed around Gull Rock East and extended on the eastern side of the rocks to protect the MP2 nesting attempts. Image 12 is the standard sign used on California Coastal National Monument rocks.

H.E. Hanks

H.E. Hanks


H.E. Hanks

Images 12, 13 & 14. *Standard sign used with ropes on California Coastal National Monument rocks & islets (left); "Help Save Our Coastal Birds" sign used on City of Pacific Grove properties (middle); and golf course style stakes with cord & signs in front & above MP6 nesting site (right).*

In addition, the City of Pacific Grove, as part of the implementation of the Memorandum of Understanding signed this year between the City of Pacific Grove and the Monterey Audubon Society, placed a 15 meter (50') line of golf course style cord strung through green wooden stakes coupled with two signs on low wooden stakes in front, to keep people from standing on the cliff edge above the MP6 nesting site (Images 13 & 14).

Once again, State Parks placed a temporary closure on MP1 at Gazebo Rock off the shoreline at the northern end of Asilomar State Beach. Instead of physically roping and signing the nesting location on the rock, State Parks used a "virtual roping" technique. A notice, that included an aerial view of the coastline surrounding Gazebo Rock with an outline of the closure area (Image 15), was posted on traffic A-frames that were placed on at least two of the stairway access points with a cable to cut off access to the shoreline at these locations. A similar approach was also used at Point Lobos State Natural Reserve on "Engagement Rock" near the Piney Woods coastal parking area and at Whalers Cove. Closure notices outlining the closed areas were placed on wooden posts and portable signposts at access points and key spots along the trails (Image 16), including at the diver entrance ramp at Whalers Cove (Image 17).

H.E. Hanks


H.E. Hanks

H.E. Hanks

Images 15, 16 & 17. *State Parks posted closure notices on traffic A-frames at Gazebo Rock (left); on portable posts at Engagement Rock (center); and on diver entrance ramp at Whalers Cove (right).*

In addition, at the coastal trail entrance north from the Piney Woods parking area, State Parks had extended the rods and cables along both sides of the two railroad tie stairs and left a short gap for shoreline access but closed it off with a yellow plastic chain with a closure notice attached to it (Images 18 & 19). Unfortunately, there was a period when the plastic chain broke and people climbed on the top of Engagement Rock (Image 20).


H.E. Hanks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H.E. Hanks

Images 18, 19 & 20. S*tate Parks added rods & cables at access to shoreline at Engagement Rock with yellow plastic chain at entrance gap (left) with closure notice attached to the chain (middle); People climbing on Engagement Rock when the yellow plastic chain was broken (right).*

At Pebble Beach's Bird Rock pullout along 17-Mile Drive, the Pebble Beach Company kept up and extended their cables with metal eye-rods and signs attached, signs that they developed to provide protection to the "Sensitive Nesting Habitat for Black Oystercatchers" (Image 21). In addition, the Pebble Beach Company added more than 150 meters (490') of permanent redwood, two-strand fence to provide unbroken fencing and cable coverage along the entire parking area and trail at the south end of the Bird Rock pullout. Additional signs and cable were placed at Point Joe, protecting the PB11 nesting attempt, and at the Fanshell Beach pullout to help protect the unmonitored Fanshell Beach BLOY pair and other BLOYs foraging in the area.

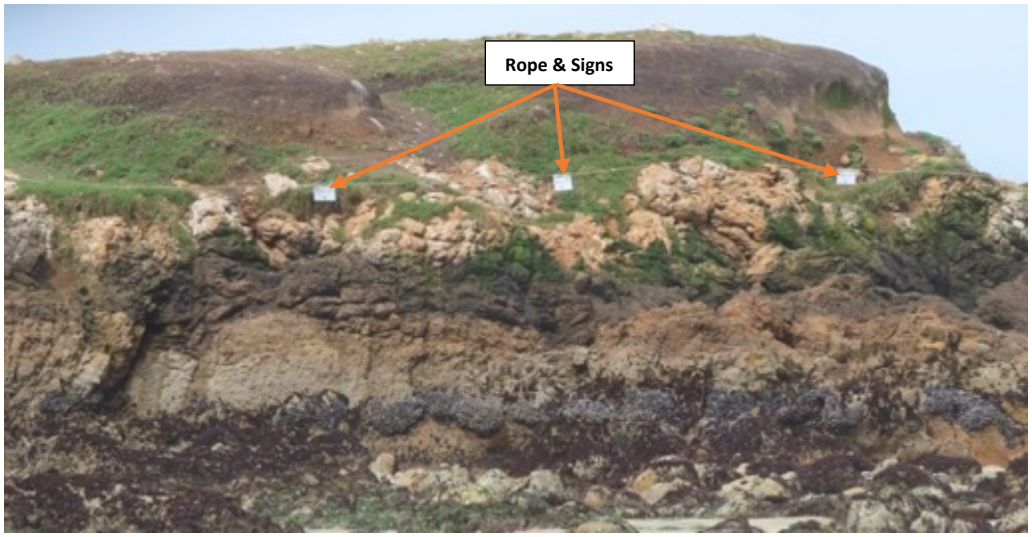
H.E. Hanks

J.L. Parkin

J.L. Parkin

Images 21, 22 & 23. *New version of Pebble Beach Company signs (left); Sign made by Younger Lagoon Reserve and placed on the bluff above the SC1 nesting site (middle); and signs posted at Natural Bridges State Park parking overlook near park entrance (right).*

In the Santa Cruz monitoring section, University of California Santa Cruz personnel posted a sign on the bluff above the SC1 nesting site area at the Younger Lagoon Reserve, part of the University of California Natural Research Reserve System (Image 22). The sign was placed at the access point to a popular spot for surfers to rappel down the bluff. The SC1 pair nested directly below this access. There are no other preventions on the beach and wrack area due to excessive tidal action. In addition, Natural Bridges State Park posted signs in the parking area that faces the beach near the rocky outcroppings that this pair has occasionally used for nesting (Image 23).



H.E. Hanks

Image 24. *Ropes & signs were placed above the high tide line on the eastern & northern sides of Pescadero Rock, a California Coastal National Monument islet off Pescadero State Beach.*

In the San Mateo monitoring section, ropes with signs were strung around the entire eastern side and across most of the northern portion of Pescadero Rock off Pescadero State Beach (Image 24). This provided protection for the SM3, SM5, SM7, SM9, and SM10 territorial pairs. In addition, ropes with signs were placed at the climbing locations on the rocks of the SM4, SM6, and SM8 nesting sites along Pescadero State Beach.

In total, the physical protection measures that protected the 20 territorial pairs, produced seven of the region's 19 fledglings or (37%) of the region's 2024 fledgling production.

Outreach

Some outreach continued in the form of contacts between monitors and curious locals and coastal visitors from around the state and around the country, as well as a wide variety of international tourists. When appropriate, the wildlife disturbance brochure and the card with the City of Pacific Grove's ordinances related to drone operation and wildlife disturbance were handed out.

This was the first year of implementing the Memorandum of Understanding (MOU) between the City of Pacific Grove and the Monterey Audubon Society regarding a protection protocol for BLOY nesting along the City's coastline. This partnership initiative is intended to provide an orderly approach to the installation and removal of physical protective measures and/or implementation of other measures, including but not limited to docent activities and public education, associated with BLOY nesting sites on the City of Pacific Grove jurisdiction. Similar arrangements are already in existence with the California Coastal National Monument, California State Parks Monterey District, Pebble Beach Company, and University of California Santa Cruz Younger Lagoon Reserve. In 2024, the City of Pacific Grove placed a couple signs and a golf course style stake and cord line to serve as a visible barrier to help prevent people from getting too close to the MP6 pair's nesting site.

On August 31, 2024, the BLOY Project participated in a local outreach event at the Pacific Grove Museum of Natural History called "Science Saturday: Backyard Birds." The event included a bird scavenger hunt, special Black Oystercatcher stickers, and bird-related activities and games. Six BLOY Project volunteers helped at the event, including overseeing a BLOY Project table next to a Snowy Plover Guardian Project table and a table for the Monterey Audubon Society. The two shorebird tables used the "Share the Shore" setup developed last year by the Monterey Audubon Society to engage with the public on weekends throughout the year at busy beach trail heads or parking areas. Each table also had outreach materials developed over the years between the two shorebird programs. Other community partners for the day included California Killer Whale Project, Bird School Project, and, of course, the Pacific Grove Museum of Natural History.

RELATED MONITORING ITEMS

BLOY California Coastwide "Index Survey" & Monterey Bay Region

Beginning in 2022, the California Coastwide BLOY Project initiated a 10-year "Index Survey" of the BLOY breeding pairs in the five BLOY monitoring regions – Mendocino Coast, Sonoma

Coast, San Francisco Bay, Monterey Bay, and San Luis Obispo Coast. The 10-year Index Survey (or "Index Monitoring") initiative is needed to ensure the continual monitoring and assessment of the reproductive success of the BLOY population in the event the regions cannot continue to monitor the full amount of breeding pairs as covered during the 2012-2021 10-year monitoring initiative. The 2022-2031 10-year "Index Survey" is intended to be the consistent monitoring of a selected sample of the BLOY breeding pairs monitored during the five-year period of 2017-2021. A 25% non-randomly selected sample was applied using a stratified unaligned probability sampling strategy with the monitoring sections serving as the sampling strata and breeding pairs as the sampling units. For the Monterey Bay region, this involved the selection of 12 breeding pairs with two in the Point Lobos monitoring section (PL1 & PL6); two in the Pebble Beach monitoring section (PB1 & PB3); three in the Monterey Peninsula monitoring section (MP1, MP6 & MP9); three in the Santa Cruz monitoring section (SC3, SC4 & SC18); and two in the San Mateo monitoring section (SM2 & SM9). The 2024 third year results are shown in Table 10 in Appendix 8.

In 2024, four fledglings were produced by the 12 Index Survey breeding pairs, that represents a reproductive success of 0.33. With a reproductive success of 0.45 for all of the monitored BLOY pairs in the Monterey Bay region in 2024, that is a decrease of 0.12 per pair. It should, however, be noted that the Index Survey data for the Monterey Bay region is for use with the Index Survey data from the other four BLOY monitoring regions in order to obtain a projected reproductive success rate for the entire California coastwide effort.

BLOYs & Drone Monitoring

In 2024, the BLOY Project was involved in the BLOY and wildlife monitoring of 32 drone (UAS or unmanned aerial system) flights that were part of 17 events associated with two drone projects. A "drone flight" is a launching and landing of the drone regardless of the time in flight. A "drone event" is a group of drone flights by a specific entity or organization on a specific day at a specific site or location. The local BLOY Project was involved with these drone flights in order to: (1) record BLOY reactions to a variety of drones, drone flight patterns, and drone operations; (2) document BLOY reactions to the drones during both the breeding season and the non-breeding season; and (3) reduce or prevent disturbance by the various drone flights to BLOYs and other wildlife, especially other avian species. Below is a brief discussion of the two drone projects. Table 11 in Appendix 9 provides a listing of the 2024 monitored drone events.

Hewatt-Sagarin Transect Study

The Hewatt-Sagarin Transect Study is a long-term collaboration that began in 1931 when Stanford University graduate student Willis Hewatt began studying the intertidal zone at Stanford's Hopkins Marine Station in Pacific Grove. Hewatt focused on the invertebrates living in a one-yard by 108-yard transect that runs from the shore outward. From 1991 until 1993, Stanford students Rafe Sagarin and Sarah Gilmore, working under the tutelage of Chuck Baxter, professor emeritus at Stanford, followed Hewatt's careful documentation and repeated the study step by step. Their findings were made famous in the early 2000s with a paper in *Science* about climate change. Researchers at Hopkin Marine Station have continued the Hewatt-Sagarin Transect Study. This year, Heidi Hirsh, a Stanford University PhD alumnus and currently an

Assistant NOAA Research Scientist in Miami, was asked to fly the Hewatt-Sagarin Transect with her new DJI Mini 4 Pro drone. The DJI Mini 4 Pro drone is small and quiet, as well as equipped with a high-resolution still photo and video camera (Image 25).

H.E. Hanks

H. Hirsh

Images 25 & 26. *DJI Mini 4 Pro drone flown over the Hewatt-Sagarin Transect (left); Photo of drone image over MP10 nesting site with BLOY on nest as shown by red arrow (right).*

From 6 June through 12 June, the BLOY Project had the opportunity to monitor drone flights associated with the Hewatt-Sagarin Transect Study and observe two BLOY territorial pairs, MP7 and MP10, during the BLOY breeding season. The MP10 pair was incubating a nest with three eggs less than 20 meters from the shoreline staging area and Hewatt-Sagarin Transect Study location (Image 26). The MP7 pair was incubating a nest with two eggs with a nesting site about 120 meters south of the transect starting point. Between the fourth and fifth days (6/9 & 6/10), the MP7 pair hatched a single chick (2nd egg was addled). Working with a cooperative drone operator, this provided a unique opportunity to observe two nesting BLOY pairs over a six-day period with the same drone flying in the same area. Although both pairs reacted negatively during most of the flights, immediate adjustments could be made and disturbances minimized.

Although various observations of specific reactions from BLOY were recorded and are still being analyzed, the flights help to verify the following:

(1) Flying drones during the middle of BLOY incubating and chick hatching is not recommended (Unfortunately the June dates of the Hewatt-Sagarin Transect are the dates for the study since it was established in 1931).

(2) Incubating BLOY and BLOY with chicks react more negatively to drones than non-nesting BLOY.

(3) When a drone is a perceived threat, both incubating BLOY and BLOY with chicks do alarm calling, some with extensive alarm calling, but BLOY with chicks have a much more aggressive reaction to drones than incubating BLOY, including flying to and even attacking the drone.

(4) Trained and experienced BLOY monitors are needed in key locations to recognize the extent and degree of BLOY reaction to the drone flight, as well as specific adjustments needed to the drone operation (e.g., moving launch/landing site, adjusting drone flight pattern, or bringing in the drone when harm to the BLOY or drone are possible).

(5) Working closely and collaboratively with the drone operator and communicating before, during, after each flight is important and key to ensure the safety of the BLOYs and the success of the drone flights.

MBARI Over Ocean Drone Fights

For the second year in a row, the BLOY Project monitored several Monterey Bay Aquarium Research Institute (MBARI) aerial drone events associated with their continuing project to make biological photographic surveys of the ocean surface with a drone launching from Terrace Point, outside the Seymour Marine Discovery Center in Santa Cruz, and two events in Davenport Landing. The MBARI drone is a fixed-wing Trinity F90+ drone with a 2.39-meter (7.85') wingspan and includes a Sony RX1-R2 camera with a maximum flight time of 90-minutes. The Trinity F90+ is capable of vertical takeoff and landing (VTOL type drone) (Images 27 & 28). Once the drone is airborne and up to elevation, usually about 18.3 meters (60'), it transitions to level flight and is extremely quiet.

J.L. Parkin

J.L. Parkin

Images 27 & 28. *MBARI flew a fixed-wing Trinity F90+drone with attached Sony RX1-R2 camera (left). MBARI drone launching at Terrace Point, Santa Cruz, CA (right).*

The BLOY Project monitored five drone flights during the non-breeding season. Three events launched at Terrace Point, within the SC1 (Natural Bridges) monitored territory. The two Davenport Landing events were monitored because at least one BLOY pair has been observed in the area but is not included in the BLOY Project surveys. There were no observed BLOY reactions to the drone during any of the five flight events.

During the breeding season five drone events were monitored at Terrace Point once a month from April through August. The drone events occurred pre-breeding season, during incubation, and post nesting attempt losses. The SC1 pair had two nest attempts during this time, both producing and eventually losing chicks due to high tides. There were no drone events while

chicks were present. The SC1 pair did not exhibit any disturbance from the VTOL drone during any flight events. The MBARI drone operators continue to work closely with BLOY Project monitors to avoid any wildlife disturbance.

Observations of Large Groups of BLOY

It is common for Black Oystercatchers to gather in groups during the winter months along the California coast. Since 2020, the BLOY Project staff and volunteers have observed some large gatherings of BLOY during the latter months of the breeding season. These gatherings have primarily been in Pebble Beach (PB7 territory) and in Point Lobos (mainly the PL3/PL4 and PL14 territories). Groups of BLOY resting and foraging together have been observed as early as July, with increased numbers in August and peak numbers in September. This year there were observations of 33 BLOY resting together at the PB7 territory on September 11 and 49 BLOY gathered at Weston Cove (PL3/PL4 territories) in Point Lobos State Natural Reserve on September 28, an unusually high number of gathered BLOY for the Monterey Bay region, especially this early at the end of the breeding season. Even the observation of 38 BLOY flocked together on the shoreline rocks in the Ocean Road Neutral Zone (PB9) in Pebble Beach as recently as November 15 is very early in the non-breeding season (Image 29). These are unusually high numbers of BLOY flocking together in the Monterey Bay region where previously numbers as large as 20 BLOY flocked together were considered high (e.g., on Pyramid Rock between Middle Rocks and Bird Island at Point Lobos State Natural Reserve in December 2019). These groups have been a mixture of adult and subadult BLOY. It is also worth noting the occasional aggressive behavior of the territorial pairs within these groups toward the interloping foraging and resting BLOY.

D. Bossart

Image 29. *Group of 38 BLOY with WEGU & Black Turnstones observed at the Ocean Road Neutral Zone (PB9) in Pebble Beach, 11/15/2024.*

Publication of 2012-2022 California & Oregon BLOY Monitoring Data Analysis

The California BLOY monitoring data for 2012 through 2022 was analyzed with the Oregon BLOY monitoring data for the same years and the results were a recently published paper, authored by Anna Weinstein, Joseph Liebezeit, Daniel Orr, Ryan Carle, and Timothy Meehan, and entitled “Black Oystercatcher *Haematopus bachmani* productivity in California and Oregon

and the effects of nest site and environmental covariates" in *Marine Ornithology,* 2024, Volume 52, pages 253-260. The authors began by stating that, "concern for BLOY and the lack of demographic information for southern populations motivated a public/private community science project to monitor BLOY productivity, nest-site characteristics, and nest disturbance in Oregon and California." They added that the project involved over 150 trained volunteers and professional biologists monitoring BLOY in three study regions. When the Oregon data were added as part of the analysis, the authors changed the five California regions to subregions and created three California-Oregon study regions – Southern (with San Luis Obispo, Monterey, and San Francisco subregions), Central (with Sonoma, Mendocino, and Southern Oregon subregions), and Northern (with Northern Oregon subregion) (Figure 4).

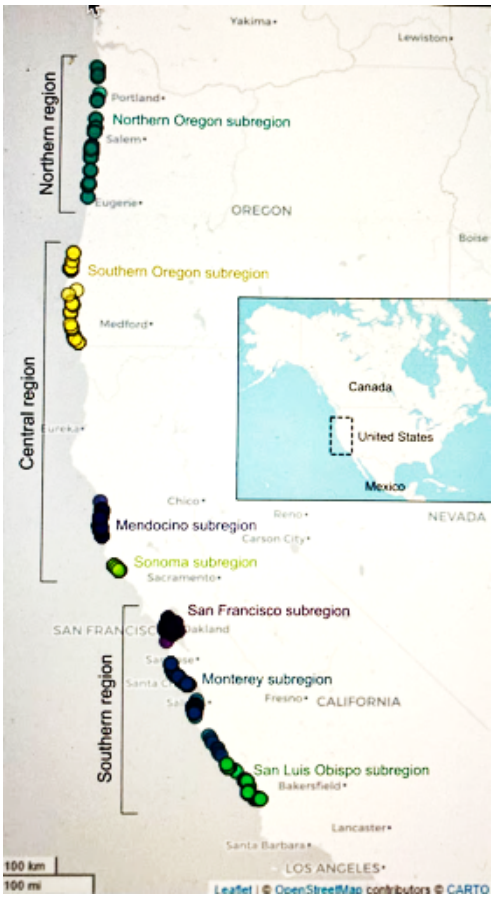


Figure 4. *From Weinstein et al. 2024, figure of the biogeographically defined regions and administrative subregions used in the study of breeding Black Oystercatchers, 2012 through 2022, in California and Oregon. Subregions were selected for ease of project management and coordination of observers.*

The stated analysis objectives were to (1) explore spatial and temporal variation in BLOY productivity among the three regions, and (2) evaluate the influence of potential covariates of productivity, including nest location, nest disturbance, and food availability. The analysis used the BLOY productivity data from each of the three regions, plus co-variate data collected by the observers including disturbances, predators, nest heights and locations. Nearly 2000 individual measurements, defined as fledged chicks per pair per year, went into the analysis. The analysis

also looked to the relationship of six co-variates, including a food availability/marine climate co-variate, with productivity.

There were two key findings. First, overall productivity increased from south to north among the three study regions. The analysis found a clear spatial gradient existed in productivity, with relatively low values in the Southern region (0.37 fledged young per pair per year) compared to the Central (0.46 per pair) and Northern (0.60 per pair) regions. Second, there is a lack of any temporal trend in productivity in any region or subregion. While productivity varied systematically across space, there was, however, no general trend over time.

The authors suggested the Black Oystercatcher be added as a metric within multivariate ongoing assessments of community-level change in the intertidal zone. They also recommended the continuation of stewardship and educational activities, as well as prioritization of the protection of suitable BLOY nesting habitat on islands (rocks and islets) and in areas with potential for higher-elevation nest sites near mussel beds.

In their acknowledgements, the authors deeply thank the individuals who made this project possible over such a large geography. They recognized the important contribution of more than 160 dedicated volunteer observers made over many years. The observers collected more than 1700 measurements of pair productivity, as well as almost 400 additional measurements for complementary data on six covariates, along the California and Oregon coasts from 2012 through 2022. Without the commitment of the community science observers, this analysis would not have been possible. It should be noted, with more than 65 volunteer observers for the Monterey Bay region over the 11 years of the study period, that is at least 40% of the California and Oregon BLOY observers.

ACKNOWLEDGEMENTS

A very special thank you to all of the volunteers from the Bureau of Land Management's California Coastal National Monument, Pacific Grove Museum of Natural History, and Point Lobos State Natural Reserve. Your continued monitoring work, dedicated effort, and passion for the protection of the Black Oystercatcher is the core value of this project.

We are particularly appreciative for the funding the California Central Coast Black Oystercatcher Project received in 2024. It covered a contract with the Project Biologist and the Assistant Project Biologist. This funding would not have been possible without an extremely generous $15,000 annual grant from an anonymous donor to which we are tremendously grateful. Once again, we are forever grateful for our anonymous donator who saved our monitoring effort and ensured the successful completion of our 13th year of the BLOY monitoring project in the Monterey Bay region.

We are also appreciative for a variety of small donations from a number of individual donors. We thank you all!

A special thank you to Monterey Audubon Society for taking the BLOY Project under its wing and for managing the project's funding account.

A thanks to the Pacific Grove Museum of Natural History for hosting the California Central Coast Black Oystercatcher Project as one of the museum's community science programs.

Thanks to the BLM's California Coastal National Monument for overseeing the California Central Coast Black Oystercatcher Project and providing technical guidance as needed.

And thanks to the Monterey District of California State Parks for permitting access to continue monitoring at Point Lobos State Natural Reserve and Asilomar State Beach. And a special thank you to the Monterey District's Resources staff for continuing the closures and signing around Gazebo Rock to protect the nesting MP1 nesting site at Asilomar State Beach and Engagement Rock to protect the PL14 nesting site, as well as extending the rods and cables, and adding a closure with signing to protect the PL7 nesting site at Point Lobos State Natural Reserve.

A thank you to Younger Lagoon Reserve for placing their protection signage on the bluff near Seymour Marine Discovery Center to prevent people from rappelling down the bluff to the beach area where the SC1 pair nested.

And a grateful thanks to the Pebble Beach Company for the extension of the two-strand redwood fencing to provide unbroken fencing and cable coverage along the entire parking area and trail at the south end of the Bird Rock pullout.

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MONTEREY BAY REGION
BLACK OYSTERCATCHER TERRITORIES & NESTING SITES
2024

Image 1. *2024 Black Oystercatcher territories and nest locations for the Monterey Peninsula (MP) monitoring section.*

APPENDIX 1-1

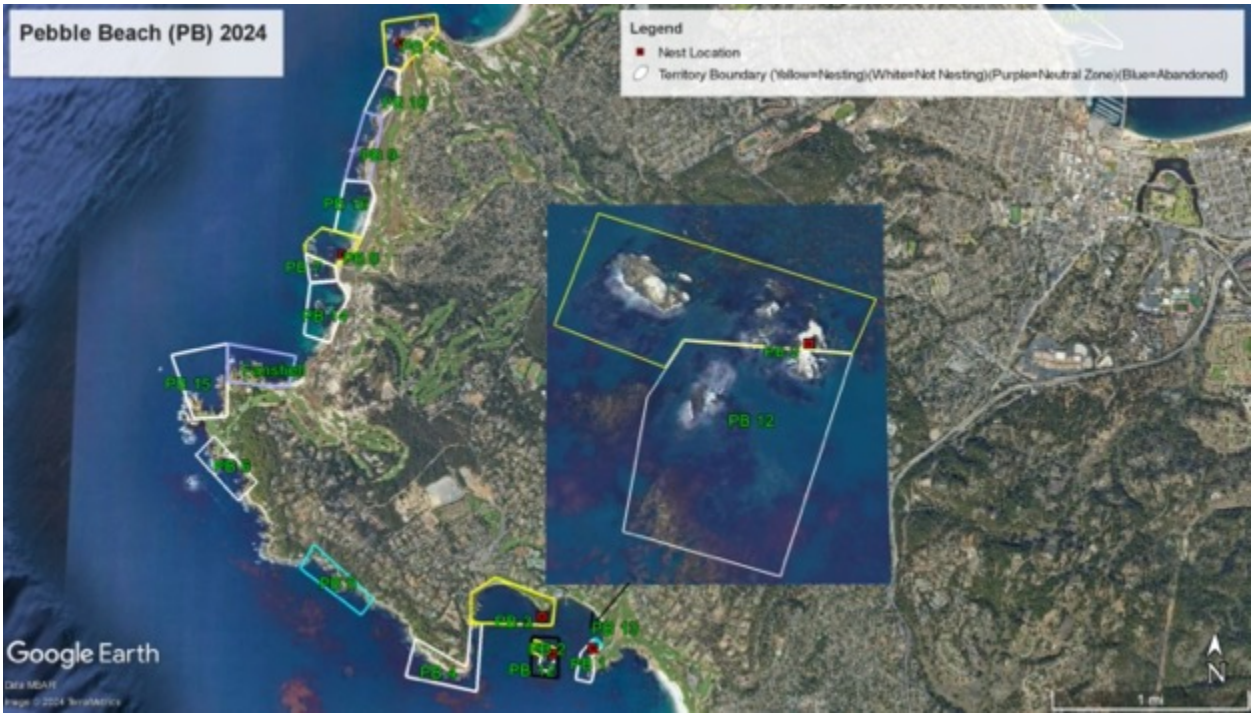

Image 2. *2024 Black Oystercatcher territories and nest locations for the Pebble Beach (PB) monitoring section.*

Image 3. *2024 Black Oystercatcher territories and nest locations for the Point Lobos (PL) monitoring section (Point Lobos State Natural Reserve).*

APPENDIX 1-2

Image 4. *2024 Black Oystercatcher territories and nest locations for the Santa Cruz County (SC) monitoring section.*

Image 5. *2024 Black Oystercatcher territories and nest locations for the Santa Cruz County (SC) monitoring section's southern portion (Natural Bridges State Beach to 3-Mile Beach, Wilder Ranch State Park).*

APPENDIX 1-3

Image 6. *2024 Black Oystercatcher territories and nest locations for the Santa Cruz County (SC) monitoring section's northern portion (Shark Fin Cove to Greyhound Rock).*

Image 7. *2024 Black Oystercatcher territories and nest locations for the San Mateo County monitoring section (SM).*

APPENDIX 1-4

Image 8. *2024 Black Oystercatcher territories and nest locations for the San Mateo County (SM) monitoring section's southern portion (Prisoner Rock and Pigeon Point).*

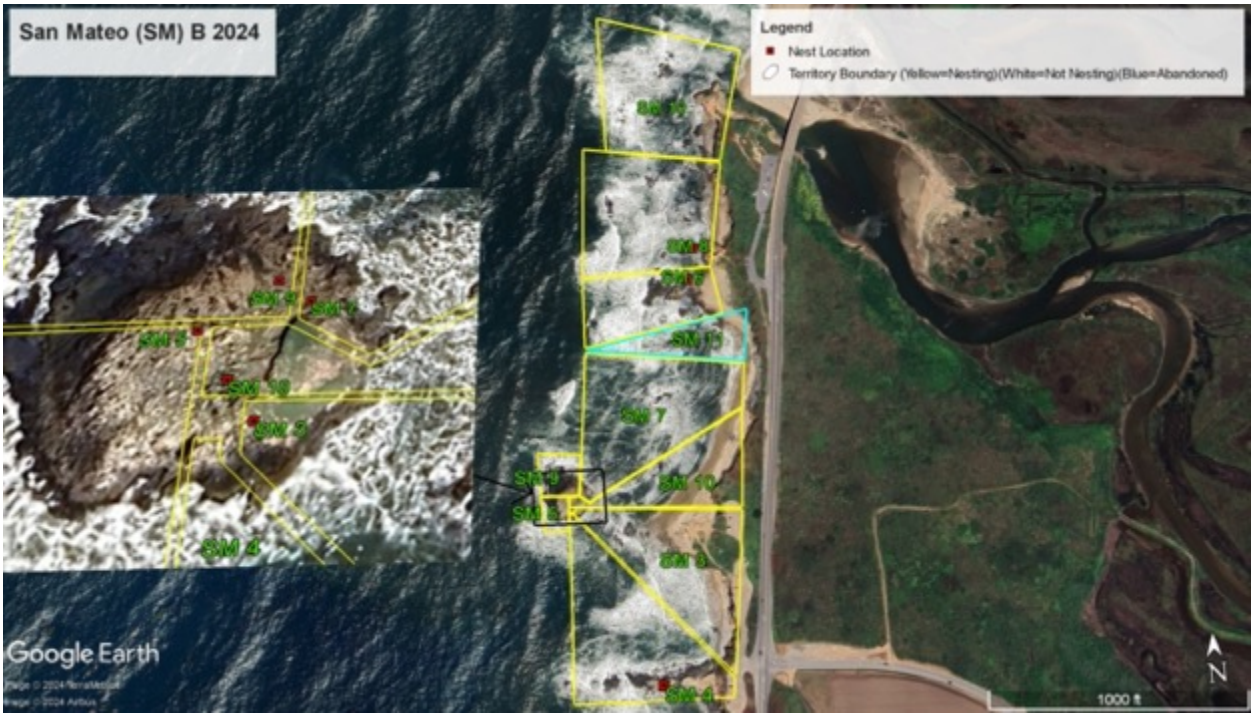

Image 9. *2024 Black Oystercatcher territories and nest locations for the San Mateo County (SM) monitoring section's northern portion off the shoreline of Pescadero State Beach.*

APPENDIX 1-5

MONTEREY BAY REGION
BLACK OYSTERCATCHER REPRODUCTIVE PRODUCTIVITY
2024

Table 3. *Monterey Bay South Coast Productivity – **Monterey Peninsula** (MP) Monitoring Section*

Nest #	Name	# of Eggs	# of Chicks	# of Fledglings
MP1	Gazebo	2*	0	0
MP1.2	Gazebo	2*	2	0
MP2	Gull Rock West	2*	0	0
MP2.2	Gull Rock West	2*	0	0
MP3	Barnacle Rock	ABANDONED	0	0
MP4	Point Pinos West	0	0	0
MP5	Point Pinos East	2	0	0
MP6	13th Street	2*	0	0
MP6.2	13th Street	3	1	0
MP7	Hopkins West	2*	2	1
MP8	Hopkins East	ABANDONED	0	0
MP9	Lover Point West (Oak Rock)	0	0	0
MP10	Hopkins North	3	0	0
MP11	Asilomar	0	0	0
MP12	Crespi Cove	1	0	0
MP13	Coast Guard Pier (El Torito)	3	3	0
MP13.2	Coast Guard Pier (El Torito)	2*	2	1
MP14	3rd Street	0	0	0
MP15	John Denver Rock East	ABANDONED	0	0
MP16	Point Pinos (Pyramid-Prom Rocks)	3	0	0
MP17	Perkins Park	ABANDONED	0	0
MP18	Charthouse	0	0	0
Total:		**29***	**10**	**2**

**Unknown clutch size; at least two eggs were believed to be present.*

APPENDIX 2

MONTEREY BAY REGION BLACK OYSTERCATCHER
REPRODUCTIVE PRODUCTIVITY – 2024 (Cont'd)

Table 4. *Monterey Bay South Coast Productivity – **Pebble Beach** (PB) Monitoring Section*

Nest #	Name	# of Eggs	# of Chicks	# of Fledglings
PB1	Stillwater Cove East	2*	0	0
PB2	Stillwater Cove South	2*	0	0
PB3	Stillwater Cove North	3	3	0
PB4	Ghost Tree (Stillwater Point)	0	0	0
PB5	Lone Cypress	**ABANDONED**	0	0
PB6	Cypress Point Lookout	0	0	0
PB7	Bird Rock South	0	0	0
PB8	Bird Rock North	2*	0	0
PB9	Ocean Road Neutral Zone (ORNZ)	0	0	0
PB10	China Rock South	0	0	0
PB11	Point Joe	2*	2	1
PB12	Stillwater Cove Pescadero Rock	0	0	0
PB13	Stillwater Cove Northeast [Abandoned]	**ABANDONED**	0	0
PB14	Bird Rock West	0	0	0
PB15	Cypress Point North	0	0	0
PB16	Bird Rock East	0	0	0
Total:		**11***	**5**	**1**

**Unknown clutch size; at least two eggs were believed to be present.*

APPENDIX 3

MONTEREY BAY REGION BLACK OYSTERCATCHER
REPRODUCTIVE PRODUCTIVITY – 2024 (Cont'd)

Table 5. *Monterey Bay South Coast Productivity – **Point Lobos** (PL) Monitoring Section*

Nest #	Name	# of Eggs	# of Chicks	# of Fledglings
PL1	Bird Island SE	2*	0	0
PL2	Bird Island NE	0	0	0
PL3	China Cove (Weston South)	0	0	0
PL4	Sand Hill Cove (Weston South)	0	0	0
PL5	Sea Lion Cove	0	0	0
PL6	Headland Cove South	2*	0	0
PL7	Whalers Cove	2*	0	0
PL8	Moss Cove	2*	2	1
PL9	Middle Rock North	**ABANDONED**	0	0
PL10	Cypress Cove	0	0	0
PL11	Headland Cove North [Abandoned]	**ABANDONED**	0	0
PL12	Bird Island Rocks	**ABANDONED**	0	0
PL13	Guillemot Rock	0	0	0
PL14	Engagement Rock	2*	0	0
PL15	Sand Hill Cove	0	0	0
PL16	Moss Cove/Escobar Rocks	2*	1*	0
Total:		**12***	**3***	**1**

**Unknown clutch size; at least two eggs were believed to be present.*

APPENDIX 4

MONTEREY BAY REGION BLACK OYSTERCATCHER
REPRODUCTIVE PRODUCTIVITY – 2024 (Cont'd)

Table 6. *Monterey Bay North Coast Productivity – **Santa Cruz** (SC) Monitoring Section*

Nest #	Name	# of Eggs	# of Chicks	# of Fledglings
SC1	Natural Bridges	3	3	0
SC1.2	Natural Bridges	3	2	0
SC2	Wilder Beach	0	0	0
SC3	Fern Grotto Beach South	2*	2*	1
SC4	Fern Grotto Beach North	2*	0	0
SC4.2	Fern Grotto Beach North	2*	2	0
SC5	Sand Plant Beach North	3	0	0
SC5.2	Sand Plant Beach North	3	2	0
SC6	Sand Plant Beach South	2*	1	0
SC6.2	Sand Plant Beach South	3	1	0
SC7	Strawberry Beach North	2*	1*	1
SC8	3 Mile Beach South	0	0	0
SC9	3 Mile Beach North	0	0	0
SC10	Shark's Tooth Rock	2	0	0
SC10.2	Shark's Tooth Rock	2*	1*	0
SC11	Shark's Tooth Cove South	ABANDONED	0	0
SC12	Davenport South	2*	2*	1
SC13	Davenport North	0	0	0
SC14	Pelican Rock	0	0	0
SC15	Greyhound Rock	2*	0	0
SC16	Davenport Bluff Middle	0	0	0
SC17	Ohlone Bluff	2*	0	0
SC17.2	Ohlone Bluff	3	2	0
SC18	Strawberry Beach West	2*	2	2
SC19	Greyhound Rock North	ABANDONED	0	0
Total:		**40***	**21***	**5**

**Unknown clutch size; at least two eggs were believed to be present.*

APPENDIX 5

MONTEREY BAY REGION BLACK OYSTERCATCHER
REPRODUCTIVE PRODUCTIVITY – 2024 (Cont'd)

Table 7. *Monterey Bay North Coast Productivity – **San Mateo** (SM) Monitoring Section*

Nest #	Name	# of Eggs	# of Chicks	# of Fledglings
SM1	Prisoner Rock	2*	1	0
SM2	Pigeon Point	2*	1	1
SM3	Pescadero 1	2*	1*	0
SM4	Pescadero 2	2*	2*	2
SM5	Pescadero 3	2*	2*	1*
SM6	Pescadero 4	3	2	2
SM7	Pescadero 5	2*	2*	2
SM8	Pescadero 6	2*	1	1
SM9	Pescadero 7	2*	1*	0
SM10	Pescadero 8	2*	2	1
SM11	Pescadero 9	**ABANDONED**	0	0
SM12	Pigeon Point South	2*	2*	0
SM13	Pescadero 10	**ABANDONED**	0	0
Total:		**23***	**17***	**10***

**Unknown clutch size; at least two eggs were believed to be present.*

APPENDIX 6

MONTEREY BAY REGION
BLACK OYSTERCATCHER PHYSICAL PROTECTION MEASURES
FOR POTENTIAL & ACTUAL NESTING SITES
2024

Table 9. *Monterey Bay Region BLOY Physical Protection Measures*

Region & Section	Nest #	Nest Location	Protection Method	# of Eggs	# of Chicks	# of Fledglings
Monterey Bay South Coast						
Monterey Peninsula	MP1	Gazebo Rock	Posted Closure	2*	0	0
	MP1.2	Gazebo Rock	Posted Closure	2*	2	0
	MP2	Gull Rock East	Ropes & Signs	2*	0	0
	MP2.2	Gull Rock East	Ropes & Signs	2*	0	0
	MP4	Point Pinos West	Ropes & Signs	0	0	0
	MP5	Point Pinos East	Ropes & Signs	2	0	0
	MP6	13th Street	Stakes, Cord & Signs	2*	0	0
	MP6.2	13th Street	Stakes, Cord & Signs	3	1	0
	MP16	Point Pinos Middle	Ropes & Signs	3	0	0
Pebble Beach	PB7	Bird Rock South	Cable & Signs	0	0	0
	PB8	Bird Rock North	Cable & Signs	2*	0	0
	PB11	Point Joe	Cable & Signs	2*	2	1
Point Lobos	PL7	Whaler's Cove	Posts & Signs	2*	0	0
	PL14	Engagement Rock	Posts & Signs	2*	0	0
Monterey Bay North Coast						
Santa Cruz	SC1	Natural Bridges	Signs	3	3	0
	SC1.2	Natural Bridges	Signs	3	2	0
San Mateo	SM3	Pescadero Rock 1	Ropes & Signs	2*	1*	0
	SM4	Pescadero Rock 2	Ropes & Signs	2*	2*	2
	SM5	Pescadero Rock 3	Ropes & Signs	2*	2*	0
	SM6	Pescadero Rock 4	Ropes & Signs	3	2	2
	SM7	Pescadero Rock 5	Ropes & Signs	2*	2*	0
	SM8	Pescadero Rock 6	Rope & Sign	2*	1	1
	SM9	Pescadero Rock 7	Rope & Sign	2*	1*	0
	SM10	Pescadero Rock 8	Ropes & Signs	2*	2	1
			TOTAL:	**49***	**23***	**7**

**Estimated number of eggs*

APPENDIX 7

MONTEREY BAY REGION
BLACK OYSTERCATCHER "INDEX SURVEY"
BREEDING PAIR STATUS
2024

Table 10. *Monterey Bay Region BLOY "Index Survey"*

Monitoring Sections	Breeding Pairs	Status	Eggs	Chicks	Fledglings	Notes
Point Lobos	PL1 Bird Island South	Failed	2*	0	0	No chicks
	PL6 Headland Cove	Failed	2*	0	0	No chicks
Pebble Beach	PB1 Stillwater East	Failed	2*	0	0	No chicks
	PB3 Stillwater North	Failed	3	3	0	3 chicks lost – 2 Small downy & 1 medium
Monterey Peninsula	MP1 Gazebo Rock	Failed	2*	0	0	No chicks
	MP1.2 Gazebo Rock	Failed	2*	2	0	2 chicks lost – Small downy
	MP6 13th Street	Failed	2*	0	0	No chicks
	MP6.2 13th Street	Failed	3	1	0	1 chick lost – Small downy
	MP9 Oak Rock	N/A	0	0	0	No nesting
Santa Cruz	SC3 Fern Grotto South	Fledged	2*	2	1	1 chick lost – medium **1 fledgling**
	SC4 Fern Grotto North	Failed	2*	0	0	No chicks
	SC4.2 Fern Grotto North	Failed	2*	2	0	2 chicks lost -- small
	SC18 Strawberry North	Fledged	2*	2	2	**2 fledglings**
San Mateo	SM2 Pigeon Point	Fledged	2*	1	1	**1 fledgling**
	SM9 Pescadero 7	Failed	2*	1*	0	1 chick lost – medium
Totals			**30**	**14**	**4**	

APPENDIX 8

MONTEREY BAY REGION
BLACK OYSTERCATCHER PROJECT DRONE (UAS) MONITORING EVENTS
2024

Table 11. *Monterey Bay Region Drone (UAS) Monitoring*

Date	Project & Entity	Location	# of Flights	BLOY Territory
19 January 2024	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	3	SC1
29 January 2024	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	1	SC1
29 January 2024	Ocean Surface Survey MBARI	Davenport Landing Davenport	1	Unmonitored
4 March 2024	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	2	SC1
4 March 2024	Ocean Surface Survey MBARI	Davenport Landing Davenport	1	Unmonitored
2 April 2024	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	1	SC1
15 May 2024	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	1	SC1
6 June 2024	Hewatt-Sagarin Transect Study Stanford University	Hopkins Marine Station Pacific Grove	1	MP7 & MP10
7 June 2024	Hewatt-Sagarin Transect Study Stanford University	Hopkins Marine Station Pacific Grove	2	MP7 & MP10
8 June 2024	Hewatt-Sagarin Transect Study Stanford University	Hopkins Marine Station Pacific Grove	3	MP7 & MP10
9 June 2024	Hewatt-Sagarin Transect Study Stanford University	Hopkins Marine Station Pacific Grove	3	MP7 & MP10
10 June 2024	Hewatt-Sagarin Transect Study Stanford University	Hopkins Marine Station Pacific Grove	2	MP7 & MP10
11 June 2024	Hewatt-Sagarin Transect Study Stanford University	Hopkins Marine Station Pacific Grove	4	MP7 & MP10
12 June 2024	Hewatt-Sagarin Transect Study Stanford University	Hopkins Marine Station Pacific Grove	4	MP7 & MP10
21 June 2024	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	1	SC1
03 July 2024	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	1	SC1
20 August 2024	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	1	SC1
TOTAL:	**17 Events**		**32 Flights**	

APPENDIX 9