

**Black Oystercatcher (*Haematopus bachmani*)  
Reproductive Success  
California Central Coast, Monterey Bay Region  
2023**

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)



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Cover Photo (by J.L. Parkin): SM8 (Pescadero) adult with 4 months-old fledgling.

# **Black Oystercatcher (*Haematopus bachmani*) Reproductive Success California Central Coast, Monterey Bay Region 2023**

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## **SUMMARY OF 2023 BREEDING SUCCESS**

During the 2023 breeding season in the **Monterey Bay region**, a total of 68 Black Oystercatcher territorial pairs were identified, but only 50 pairs (73%) were observed nesting for a total of 65 nesting attempts (50 breeding pairs + 15 re-nesting attempts, also referred to as “replacement clutches”). From the observed breeding pairs (also referred to as “nesting pairs”), there were at least 144 eggs laid, 73 chicks hatched, and 31 chicks fledged, for an **overall breeding success rate of 0.62 per pair**, with 21 of the 50 breeding pairs (42%) producing fledglings. The 31 fledglings were the most fledglings produced in a single breeding season during the 12 years of monitoring. Also, the 0.62 breeding success per pair is the closest the overall Monterey Bay region breeding success has come to the modeled healthy population level of greater than 0.65 rate (Meehan et al. 2018).

In the Monterey Bay **South Coast** study area, a total of 24 breeding pairs and eight re-nesting attempts were recorded, for a total of 32 nesting attempts. A minimum of 70 eggs and 28 chicks were produced, with a total of 12 fledglings from eight breeding pairs, resulting in a reproductive success of 0.50 per pair. The Monterey Bay South Coast had more fledglings in 2023 than it had in any previously monitored breeding season.

In the Monterey Bay **North Coast** study area, a total of 26 breeding pairs and seven re-nesting attempts were recorded, for a total of 33 nesting attempts. A minimum of 74 eggs and 45 chicks were produced, with a total of 19 fledglings from 14 breeding pairs, resulting in a reproductive success of 0.73 per pair. Both the Santa Cruz monitoring section and the San Mateo monitoring section had similar numbers of fledglings – nine for Santa Cruz and 10 for San Mateo. The 19 fledglings were the most produced in the North Coast study area since monitoring began in the North Coast in 2014.

## **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.

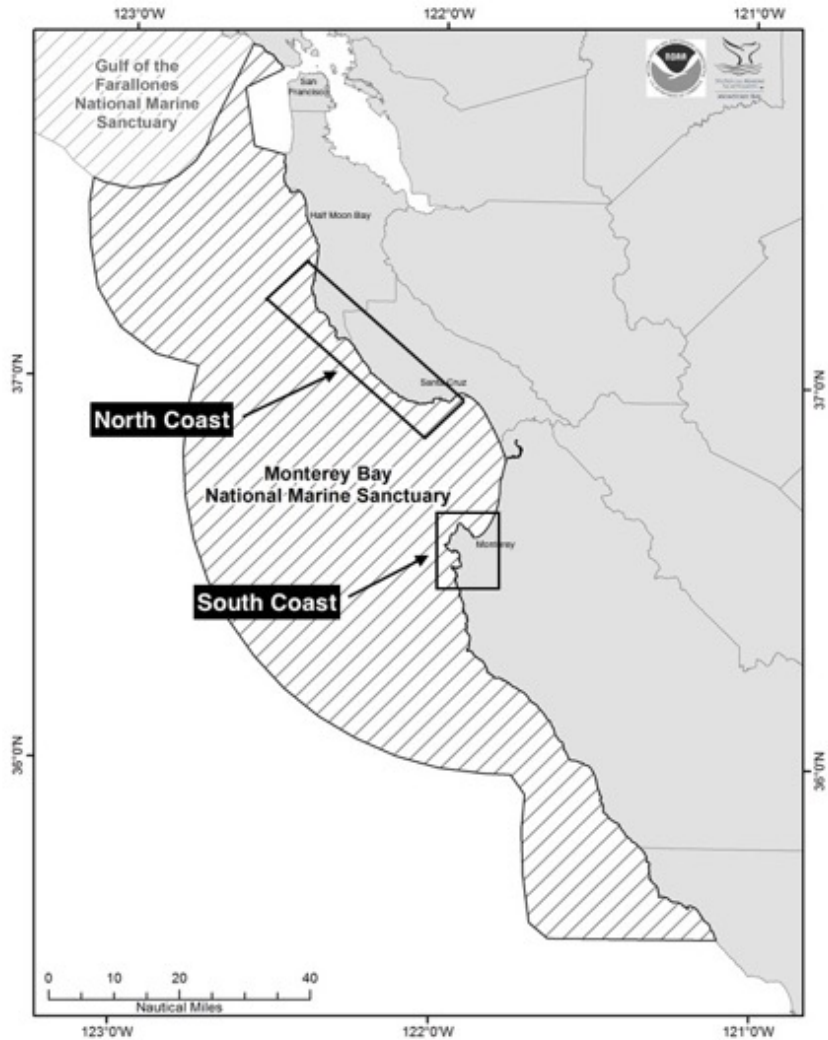


Figure 1. Map showing Monterey Bay South Coast and North Coast Study Areas.

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 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 BLOYs along the California Coast); (2) Determine reproductive success (number of fledglings from territorial/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).

In 2012, the reproduction monitoring portion of the project began in California five coastal regions - San Luis Obispo, Monterey Bay, San Francisco Bay, Sonoma Coast, and Mendocino Coast. For the Monterey Bay region, the Monterey Audubon Society and California Audubon formed a partnership to conduct the first monitoring project in Monterey County, covering a dozen BLOY territories (MP1, MP4, MP5, MP6, MP7, PB1, PB7, PB8, PB10, PL1, PL7 & PL8) in what is now the Monterey Bay South Coast study area (Roberson 2012). The following year, the California Coastal National Monument took the project lead for the Monterey Bay region, but covered only five BLOY territories (MP1, MP2, MP3, MP4 & MP5) in the Point Pinos portion of the Monterey Peninsula (Ceja et al. 2013). In 2014, a community science effort was initiated under the auspices of Audubon California and the California Coastal National Monument and its local partners – Pacific Grove Museum of Natural History and California State Parks Monterey District. Monitoring was conducted in the Monterey Peninsula monitoring section (11 territorial pairs) and Point Lobos monitoring section (11 territorial pairs), as well as five territorial pairs on Pescadero Rock in the San Mateo monitoring section (Ceja & Hanks 2014). In 2015, the Pebble Beach monitoring section, with 12 territorial pairs, was added to the

South Coast study area along with 12 territories on the Monterey Peninsula monitoring section and 11 territories in the Point Lobos monitoring section, but no monitoring was conducted in the North Coast (Ceja & Hanks 2015). The 2016 breeding season was the first time in the Monterey Bay region that BLOY monitoring was conducted in all five monitoring sections – three in the South Coast (Monterey Peninsula with 14 territories, Pebble Beach with 14 territories and Point Lobos with 13 territories) and two in the North Coast (Santa Cruz with 13 territories and San Mateo with 8 territories) (Ceja & Hanks 2016). Therefore, beginning with the 2016 breeding season, the Monterey Bay region BLOY monitoring effort had a fully robust and comparable monitoring sample with all five monitoring sections (Ceja & Hanks 2016, Ceja & Hanks 2017, Ceja & Hanks 2018, Parkin et al. 2019, Parkin et al. 2020, Parkin et al. 2021 & Parkin et al. 2022). In 2023, the local BLOY Project completed its 12<sup>th</sup> year in monitoring Black Oystercatcher breeding success (but its 8<sup>th</sup> year with comparable data from all five monitoring sections) in the Monterey Bay region-- 81 territories with 68 territorial pairs were monitored.

## **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 professional staff biologist and an assistant biologist and it is currently operated as a community science effort using 40 volunteer monitors (See *Number of Monitors, Monitoring Hours & Observations*).

For 2023, 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 hiring of the staff biologist and the assistant biologist. The staff biologist covered all of the North Coast Black Oystercatcher territories once a week and all of the South Coast Black Oystercatcher territories once a month, while the assistant 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, 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.

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 2023 breeding season, the California Central Coast Black Oystercatcher Project used a total of 40 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 43 monitors. A large majority of the community science monitors were distributed throughout the South Coast with 37 monitors, -- 20 in the Monterey Peninsula monitoring section, eight for the Point Lobos monitoring section, and nine in the Pebble Beach monitoring section. For the North Coast, there were three 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 covered monitoring for the entire San Mateo monitoring section, and entirely covered 14 of the 19 territories in the Santa Cruz monitoring section. In the Monterey Bay South Coast study area, the project staff alone covered two territories (MP3 & MP8) in the Monterey Peninsula monitoring section and four territories (PL8, PL10, PL11 & PL15) in the Point Lobos monitoring section.

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 15 April and 10 October 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 2023, there were a total of 2,206 hours of monitoring from 4,036 observations – 1,398 hours from 2,448 observations in the South Coast and 808 hours from 1,588 observations in the North Coast (Table 1). Together, the individual monitoring hours and observations for the Regional Coordinator, Project Biologist and the Assistant Project Biologist totaled 1,341 hours and 2,478 observations or more than 61% of all monitoring hours and observations conducted during the 2023 breeding season.



Table 1. 2023 Black Oystercatcher Monitoring Hours & Observation Numbers - Monterey Bay Region

Study Areas & Monitoring Sections	# of Monitoring Hours	# of Observations
<b>Monterey Bay South Coast</b>		
Monterey Peninsula (MP)	662	1,104
Pebble Beach (PB)	457	842
Point Lobos (PL)	279	502
<b>Sub-Totals</b>	<b>1,398</b>	<b>2,448</b>
<b>Monterey Bay North Coast</b>		
Santa Cruz County (SC)	423	1,139
San Mateo County (SM)	385	449
<b>Sub-Totals</b>	<b>808</b>	<b>1,588</b>
<b>Grand Totals</b>	<b>2,206</b>	<b>4,036</b>

## RESULTS

### Territorial Distribution

#### Monterey Bay South Coast

The South Coast study area had a total of 39 territorial pairs – 14 along the Monterey Peninsula (Appendix 1, Image 1), 13 along Pebble Beach (Appendix 1, Image 2), and 12 at Point Lobos (Appendix 1, Image 3). Of the 39 territorial pairs, there were a total of 24 nesting pairs and 15 pairs with an unknown status during the breeding season. Pairs with an unknown status were counted as not having nested.

In the Monterey Peninsula section, four territories (MP3, MP8, MP15 & MP17) are still considered abandoned. A territory classified as “abandoned” is a territory that was once occupied by a Black Oystercatcher territorial pair, but monitoring indicated that the territory is no longer occupied by a territorial pair. Since the 2019 breeding season, two territories in Pebble Beach (PB5 & PB13) have been identified as abandoned and one territory (PB9) remained as a neutral zone. 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. Along the Point Lobos (PL) monitoring section, three territories are now considered abandoned territories (PL9, PL11 & PL12). The Point Lobos section had a new territorial pair (PL15) defending an area along Sand Hill Cove that was between the PL5 and PL14 territories. This pair did not nest and defended this area during the breeding season.

#### Monterey Bay North Coast

The North Coast study area had a total of 29 territorial pairs – 17 along the Santa Cruz monitoring section (Appendix 1, Images 4, 5 & 6) and 12 along the San Mateo monitoring section (Appendix 1, Images 7, 8 & 9). Of the 29 territorial pairs, there were a total of 26 nesting pairs and three pairs with an unknown status.

In the Santa Cruz (SC) monitoring section, two territories are classified as abandoned (SC11 & SC19). In the San Mateo (SM) monitoring section, one territory was abandoned (SM11) and

reclaimed by the pair (SM6) that previously defended it. One new territory (SM13) was used on Pescadero Rock for nesting only, this pair hatched two chicks that were lost a few days later and the pair was not seen again.

**Timing of Breeding**

In 2023, the Monterey Bay region had a total of 65 nesting attempts, including reneating attempts (replacement clutches). Of these, 53 nests were observed within one to seven days of initiation. Some nests were back calculated from the hatching date or first sighting of 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 late April and early May (Figure 2) with the greatest number of clutches (28) laid between May 16 and May 31. The earliest nesting attempt, in late April, was observed on the Monterey Peninsula (MP13). A total of 12 nesting attempts, four in the South Coast and eight in the North Coast, were initiated in early May. During the peak egg laying period of May 16 to May 31, 28 nest attempts were observed, 13 attempts in the South Coast and 15 in the North Coast including three replacement clutches (SC1.2, SC5.2 & SC10.2). In early to mid-June there were 10 nest attempts, with five in the South Coast including two replacement clutches (MP10.2 & PL14.2) and five in the North Coast. A total of 10 nest attempts also occurred in mid to late June with six in the South Coast, including two replacement clutches (MP2.2 & PL1.2) and four in the North Coast, including three replacement clutches (SC3.2, SC6.2 & SC12.2). In early July, there were three nest attempts in the South Coast, and all were replacement clutches (MP6.2, MP13.2 & MP16.2). The latest nesting attempt was a third try attempt in the North Coast during mid-July by SC1.3. This pair (SC1) was the only pair to have three nest attempts.

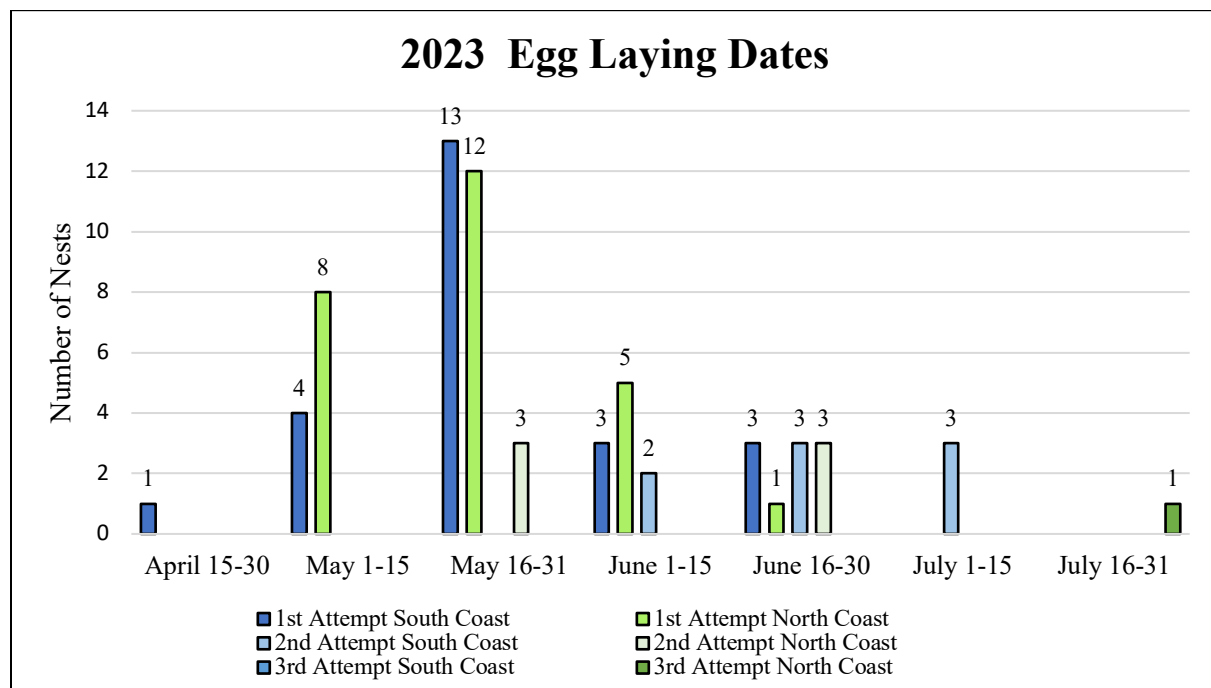


Figure 2. 2023 Monterey Bay region Black Oystercatcher egg laying dates.

## **Nest Location**

In 2023, a total of 65 nesting attempts occurred in the entire Monterey Bay region. Of those, 42% (n=27) nested on offshore rocks (rocks separated from coastal access during higher tides), 46% (n=30) nested on rocky shores (bluffs, onshore rocks, ledges, and outcroppings), and 12% (n=8) nested on sand/gravel beaches. Of the 65 total nesting attempts, the South Coast study area had 25% (n=16) nesting on offshore rocks, 17% (n=11) nesting on rocky shores, and 8% (n=5) nesting on beaches. In the North Coast study area 17% (n=11) nested on offshore rocks, 29% (n=19) nested on rocky shores, and 4% (n=3) nested on 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.

A total of 40 breeding pairs produced young with 40% (n=16) nesting on offshore rocks, 50% (n=20) nesting on rocky shores, and 10% (n=4) nesting on beaches. A little more than half (n=22) of those breeding pairs producing young, fledged at least one chick with 41% (n=16) nesting on offshore rocks, 55% (n=12) nesting on rocky shores, and 4% (n=1) nesting on beaches.

Images 1, 2, and 3 in Appendix 1 show the 2023 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. Image 4 in Appendix 1 shows the entire stretch of the Santa Cruz monitoring section with the Black Oystercatcher territories and nest locations, while Images 5 and 6 in Appendix 1 show in more detail the 2023 territories and nest locations for the Santa Cruz monitoring section. Image 7 in Appendix 1 shows the entire stretch of the San Mateo monitoring section with the Black Oystercatcher territories and nest locations, while Images 8 and 9 in Appendix 1 show in more detail the 2023 territories and nest locations for the San Mateo monitoring section.

## **Reproductive Success**

### **2023 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. Therefore, many nesting attempts 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. However, two pairs successfully raised and fledged young without notice until they were close to or fully fledged (PB6 & SC14).

During the 2023 breeding season, a total of 68 territorial pairs were identified with 50 pairs (73%) observed nesting. These 50 breeding pairs produced a minimum of 144 eggs resulting in 62% nesting success (# of clutches that produced young / # of clutches) with a survival to fledging (# of chicks fledged / # of chicks) of 43%. A total of 31 chicks fledged in the Monterey

Bay region with a reproductive success per pair (# of fledglings / # of breeding pairs) of 0.62 or 62% (Table 2).

In the South Coast study area, there were a total of 24 nesting pairs and eight renesting attempts for a total of 32 nesting attempts. A minimum of 70 eggs were produced which resulted in 50% nesting success (# of clutches that produced young / # of clutches) (Table 2). The total number of hatched chicks recorded was 28 with 43% surviving to fledging (# of chicks fledged / # of chicks). The South Coast study area had an increase in the number of fledglings from previous years, with a total of 12 fledglings from eight pairs bringing the reproductive success to 0.50 per pair in 2023 (# of fledglings / # of breeding pairs). In the Monterey Peninsula monitoring section, two pairs (MP5 & MP7) successfully fledged one chick each. In the Pebble Beach monitoring section, one pair fledged two chicks (PB3) and two pairs fledged one chick each (PB6 & PB8). The Point Lobos monitoring section had three pairs successfully fledged young. One pair (PL1.2) fledged one chick, one pair (PL7) fledged two chicks, and one pair (PL8) fledged-three chicks.

In the North Coast monitoring section, there were a total of 26 nesting pairs and seven renesting attempts for a total of 33 nesting attempts. A minimum of 74 eggs were produced that resulted in 73% nesting success (Table 2). A total of 45 hatched chicks was recorded, with 42% surviving to fledging. The North Coast study area had a total of 19 fledglings from 14 pairs and a reproductive success of 0.73 per pair. In the Santa Cruz monitoring section, nine chicks successfully fledged, five pairs (SC1.3, SC7, SC8, SC15 & SC18) all had one fledgling each and two pairs (SC6 & SC14) produced two fledglings each. In the San Mateo monitoring section, seven pairs successfully fledged a total of 10 chicks. Five pairs (SM1, SM2, SM7, SM10 & SM12) produced one fledgling each, one pair (SM8) fledged two chicks, and one pair (SM6) successfully fledged all three of their young. Tables 3 through 7 in Appendices 2 through 6 show detailed 2023 productivity results for each territory within each monitoring section.

Table 2. 2023 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)	8	29	12	2	13	61.5	41.4	0.25	0.15	16.7
Pebble Beach (PB)	9	21	7	4	10	40.0	33.3	0.44	0.40	57.1
Point Lobos (PL)	7	20	9	6	9	44.4	45.0	0.86	0.67	66.7
<b>Monterey Bay South Coast</b>	<b>24</b>	<b>70</b>	<b>28</b>	<b>12</b>	<b>32</b>	<b>50.0</b>	<b>40.0</b>	<b>0.50</b>	<b>0.38</b>	<b>42.9</b>
Santa Cruz County (SC)	15	50	28	9	22	63.6	56.0	0.60	0.40	32.1
San Mateo County (SM)	11	24	17	10	11	90.9	70.8	0.91	0.91	58.8
<b>Monterey Bay North Coast</b>	<b>26</b>	<b>74</b>	<b>45</b>	<b>19</b>	<b>33</b>	<b>72.7</b>	<b>60.8</b>	<b>0.73</b>	<b>0.58</b>	<b>42.2</b>
<b>Monterey Bay South + North Coast</b>	<b>50</b>	<b>144</b>	<b>73</b>	<b>31</b>	<b>65</b>	<b>61.5</b>	<b>50.7</b>	<b>0.62</b>	<b>0.48</b>	<b>42.5</b>

Comparison of 2016 – 2023 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 eight years of this study (See *BLOY Project* section above). 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 shown a much lower reproductive success per pair with a mean of 0.27 (SD = 0.14, n = 8) for the last eight years (Table 8). The North Coast study area has generally done much better with a mean of 0.63 (SD = 0.21, n = 8) per pair. The reproductive success of the entire Monterey Bay region has ranged from a low of 0.19 per pair in 2021 to a high of 0.62 per pair in 2023. **This year has proven to be the most reproductively successful year since this study began in 2012.**

Table 8. *Black Oystercatcher Reproductive Success Per Pair for 2016 through 2023 - Monterey Bay Region*

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

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

There has been a downward trend over the last several years, especially in the North Coast study area (Figure 3). With the addition of the 2023 data, the reproductive success increased to levels not seen since 2019 in the North Coast study area, while the South Coast study area increased to its highest level, well above any of the previous years.

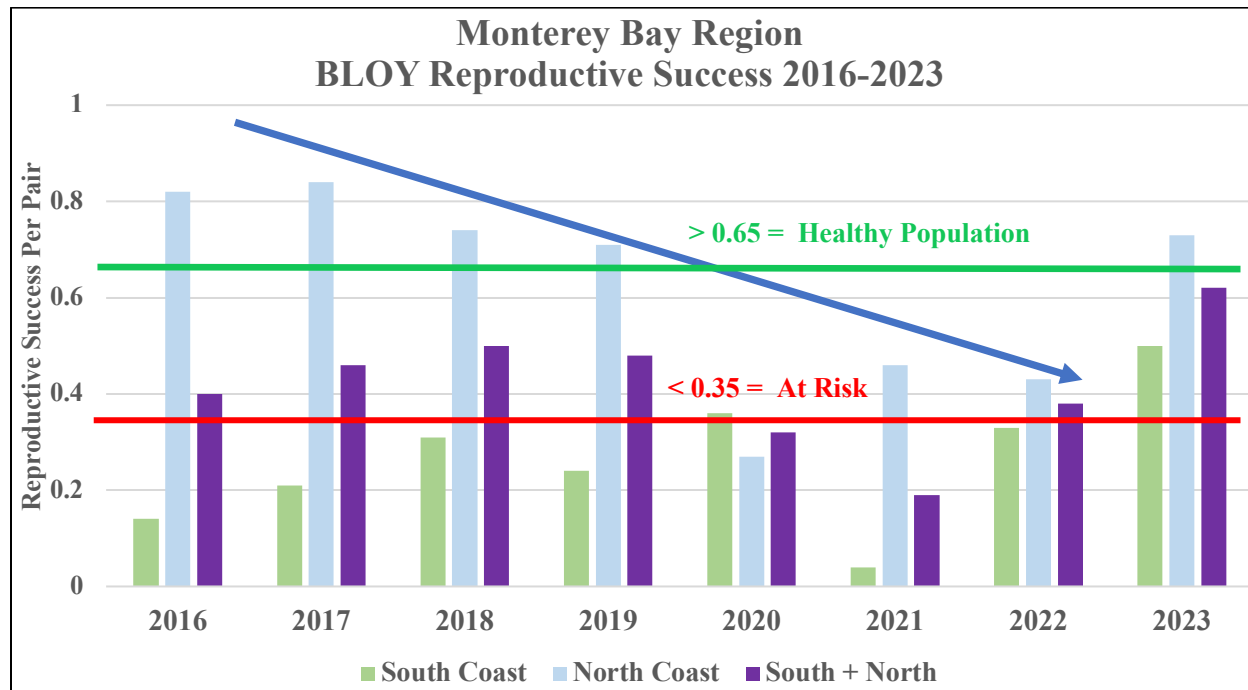


Figure 3. *Monterey Bay region Black Oystercatcher Reproductive Success 2016 - 2023*

The National Audubon literature review of BLOY (mostly in Alaska & British Columbia) and other shorebird breeding success resulted in the development of an initial population model suggesting that “pair productivity observations greater than about 0.65 are likely a good sign for a local population”, while a “pair productivity estimates below 0.35 are likely a sign of caution” for a population at risk (Meehan et al. 2018). 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 gone above 0.65 per pair. 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. This year, with a reproductive success rate of 0.62, is the closest the Monterey Bay region has come to having a BLOY population near the model’s healthy level of about 0.65.

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. Assessing the comparison of the 2016-2023 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.

## **Disturbance and Sea Level Rise**

### **Vulnerability to 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 (and 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 many of the Monterey Peninsula, Pebble Beach, and Point Lobos State Natural Reserve 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 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 easy access to this large mudstone rock at low tide.

The San Mateo monitoring section is another highly vulnerable area due to parking and easy access to the rocky shore and offshore rocks during low tide. Pescadero State Beach is a popular area for both BLOY and humans. There are at least eight pairs that use Pescadero Rock and nearby rocks along the beach to nest and forage. It is important to use protective measures in this area to decrease the disturbances to foraging and nesting BLOY.

## Types of 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 BLOYs in the area.

The most frequently observed natural disturbance for the entire Monterey Bay region was from Black Oystercatcher interlopers (327 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 can have a huge impact on the survival of young due to less provisioning and increased vulnerability to predation.

Various avian species caused the second most frequently observed natural disturbances with a total of 122 observations. This includes 38 observations of disturbance from gull species, 4 from raptors, 27 from corvid species, and 53 from “other” avian species, predominantly Brown Pelicans (BRPE), Brandt’s Cormorant (BRAC) and Pelagic Cormorant (PECO). A few examples of avian disturbance include juvenile Brown Pelicans (BRPE) roosting on, at, or near BLOY nests, large flocks of Heermann’s Gulls (HEEG), and flocks of roosting Cormorant species nearby. Other avian species not only disturb nesting BLOY, but also are a predation threat. Brown Pelicans were documented attempting to eat a week-old chick at PL1.2. The adult BLOY attacked the BRPE, while the chick was in its beak, causing the chick to be thrown into the air, fall into the ocean, and drown. Predation of this kind may occur more than we are aware of because observers are not present at all times.

Human disturbance contributed a total of 60 observations, 36 of which were by non-research related incidences. These were all incidences of people walking out on to coastal rocks and causing disturbance to BLOYs. Point Lobos State Natural Reserve even suffers from people climbing on rocks where BLOY are nesting (See further description in the Protective Measures segment). The research related incidences were a combination of project staff roping off rocks at the beginning and end of the breeding season and specific nest checks on some nests (mainly at the Point Pinos Islet), academic research from various institutions, and drone research flights.

Disturbance due to unauthorized drone activity was observed a total of 14 times with five observations in the Monterey Peninsula monitoring section, five observations in the Santa Cruz monitoring section, and four observations in the San Mateo monitoring section. An unusual observation was documented at Pescadero Rock with a recreational drone flight. Several resident BLOY pairs were chasing several interlopers, a total of 14 BLOY, and suddenly the entire group turned around with alarm calls and landed as a flock on Pescadero Rock, discontinuing any interloper reactions.

In 2023, a total of 14 observations were recorded from disturbances caused by waves (n=3), fishing (n=3), pets (n=1), and native land mammals (n=7). These disturbances decreased from the number observed in 2022 whereby waves, fishing, and boating accounted for 20 disturbance observations and pets and native land animals accounted for 17 observations. The best explanation for this difference is that observations are only made while someone is monitoring

an area; therefore, there are many hours when these disturbances can happen when no monitors are present.

There were 21 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.

### Vulnerability to Sea Level Rise and Climate Change

The impact of sea level rise and climate change can result in nest loss 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, sea surface temperature changes, and higher tides. These factors can also have an effect on 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.

Nest 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. However, there are a number of pairs that do not have territories that include rocks with appropriate nesting habitat above mean high tide or, those areas are used by nesting or roosting Western Gull (WEGU), BRAC, or BRPE. As sea level rise increases there will be less available space for quality nesting and roosting. This has already been observed with the SC1 pair in the North coast study area. For years, this pair nested on the high rocks of what used to be Natural Bridges. These rocks have eroded over the years and other avian species (mainly BRAC) have overrun the remaining rocky areas and have excluded the BLOY from nesting there. This pair has consistently nested on the beach or on the wrack area since 2021 and has had several nest losses due to the height and location of the nesting spot. In 2023, the SC1 pair lost two nests, one in mid- May with a three-egg clutch and one in early July with a brood of three chicks (about a week old) due to extremely high tides coupled with a very high swell. This was not the only pair that lost a clutch in the mid-May event, the SC5 pair, at Wilder State Park, also lost their three-egg clutch due to this event. There was also concern for the MP10 pair that often nests on the rocky beach at Hopkins Marine Laboratory. The MP10 pair nested on higher ground this year and eluded the high tides.

## **PROTECTIVE MEASURES**

### **Ropes, Signs, Cables & Cones**

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 2023, the seasonal protective measures were implemented from April through October.



Physical protective measures were used for 19 territories with 21 nesting attempts in all seven of the Monterey Bay region’s monitoring sections (Appendix 7, Table 9). These seasonal measures provided protection for a total of 16 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 (SM4, SM5, SM6, SM7, SM8, SM9, SM10 & SM13). The other four nesting pairs fall under the jurisdiction of California State Parks (PL14 & SC1) or under the Pebble Beach Company (PB8 & PB11).

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 10 is the standard sign used on California Coastal National Monument rocks.



Images 10, 11 & 12. *Standard sign used with ropes on CCNM rocks (left); State Parks area closure notice on traffic A-frame for a “virtual closure” at Gazebo Rock off the northern end of Asilomar State Beach (center); and Pebble Beach Company’s sign put up to add protection to Black Oystercatcher nesting at the Seal Rock pullout, Point Joe trail, and Fan Shell Beach pullout along 17-Mile Drive (right).*

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 11), was posted on traffic A-frames that were placed on at least two of the stairway access points and a cable cut off access to the shoreline at this location. A similar approach was used at Point Lobos State Natural Reserve on “Engagement Rock” after BLOY Project staff witnessed a family of six climbing to the top of the rock where the nesting PL14 pair was attempting to nest (Image 13). Closure notices outlining the closed area were placed on wooden stakes and portable signposts at access points and a couple key spots along the trail (Images 14 & 15).

At Pebble Beach’s Bird Rock pullout along 17-Mile Drive, the Pebble Beach Company kept up their cables with metal eye-bars and signs attached, signs that they developed to provide protection to the “Sensitive Nesting Habitat for Black Oystercatchers” (Images 12). Additional signs and cable were placed at Point Joe, protecting the PB11 nesting attempt, and at the Fan Shell Beach pullout, due to occasional sightings of BLOY.



H.E. Hanks



H.E. Hanks

Images 13 & 14. A family of six climbed onto Engagement Rock at Point Lobos State Natural Reserve & disturbed the PL14 nesting pair that flew with alarm calls around the oblivious family. After the disturbance, an area closure was put in place and signs (right photo) were positioned at access locations.



H.E. Hanks

Images 15. State Parks personnel attached signs on portable posts & stakes closing access to Engagement Rock at Point Lobos State Natural Reserve.

In the Santa Cruz monitoring section, a sign supplied by the Younger Lagoon Reserve, was placed on the bluff above the beach where the SC1 pair nests (Images 16 & 17). This is a popular spot for surfers to access the ocean and there is no place to put signage near the nest site due to high tide and high wave action.



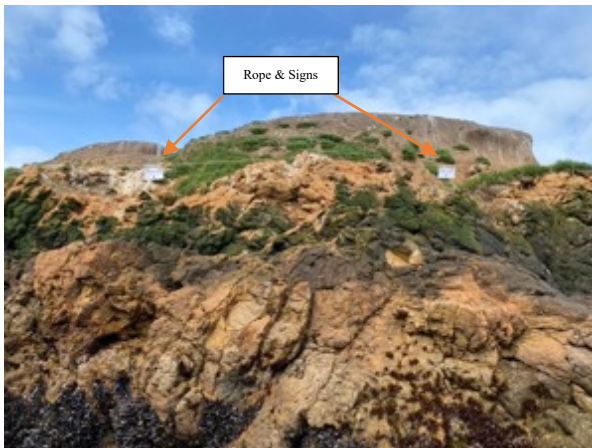
K. Workman, UCSC



J.L. Parkin

Images 16 & 17. Sign made by Younger Lagoon Reserve and placed on the bluff above the SC1 nesting site.

For 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 18). This provided protection for the SM3, SM4, SM5, SM7, SM9, SM10, and SM13 territorial pairs. In addition, ropes with signs were placed at the climbing locations on the rocks of the SM6 (Image 19) and SM8 nesting sites.



J.L. Parkin



H.E. Hanks

Images 18 & 19. Ropes & signs were placed above the high tideline on California Coastal National Monument rocks off Pescadero State Beach -- on the eastern & northern sides of Pescadero Rock (left) & across access points on the nesting rocks of the SM6 (right) & SM8 breeding pairs.

In total, the physical protection measures that protected the 19 territorial pairs and 21 nesting attempts in the Monterey Bay region produced ten of the region's 31 fledglings or (32%) of the region's 2023 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 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.

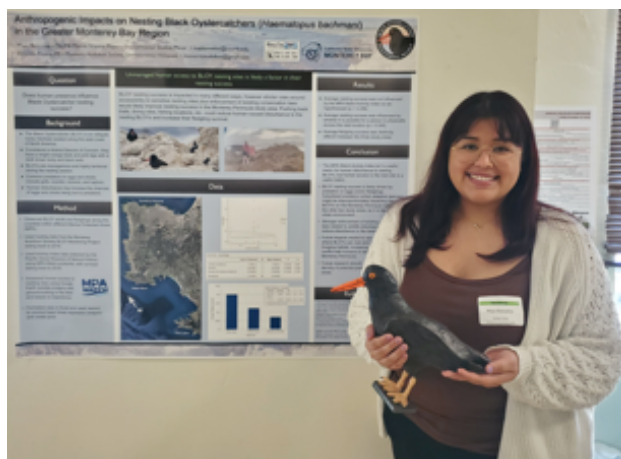
After several years of working with the City of Pacific Grove and the continual attention and perseverance of a handful of BLOY Project community science monitors, who are Pacific Grove residents, the Pacific Grove City Council approved, and the Mayor signed, a Memorandum of Understanding (MOU) with the Monterey Audubon Society regarding a protection protocol for BLOY nesting along the City of Pacific Grove's coastline. This partnership initiative will provide an orderly approach to 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 (A working relationship regarding BLOY nesting site protection already existed with the California Coastal National Monument, California State Parks Monterey District, Pebble Beach Company and University of California Santa Cruz Younger Lagoon Reserve).

BLOY Project helped staff a Monterey Audubon Society table at the California Marine Protected Areas (MPA) 10<sup>th</sup> Anniversary celebration and assessment meeting at the Monterey County Fairgrounds in Monterey on March 15, 2023 (Image 20). This provided the opportunity to do outreach and exposure for the BLOY monitoring effort associated with more than a half dozen MPA around the Monterey Bay.

With grant funding, Monterey Audubon Society was able to take on a BLOY Intern, Maya Bañuelos, a California State University Monterey Bay (CSUMB) environmental studies student, who conducted outreach starting in August and continuing throughout the fall CSUMB semester. She conducted public outreach along the Monterey Peninsula, mostly on the weekends, when there was a higher number of coastal visitors. She also created a research poster summarizing the BLOY Project and looking at the influence of human presence on BLOY nesting success based on the MPA Watch citizen science project that the Pacific Grove Museum of Natural History conducted. Although the MPA Watch data did not correlate with the BLOY nesting success data, it did find that the accessibility of a BLOY nest site did make the nests less likely to be successful. Maya presented the poster at the Central Coast Chapter of the Wildlife Society Symposium in San Luis Obispo on October 27, 2023 (Image 21).



A. Preece



A. Preece

Images 20 & 21. Monterey Audubon Society & BLOY Project outreach table at 10<sup>th</sup> Anniversary session in March in Monterey; Rick Hanks, CA Central Coast BLOY Project Regional Coordinator, with BLOY monitor Paul Fleischman holding BLOY model (left); Maya Bañuelos, Monterey Audubon Society BLOY intern, with her BLOY project poster presented at the Central Coast Chapter of the Wildlife Society Symposium in San Luis Obispo in October.

Monterey Audubon Society is also working on developing a "Share the Shore" outreach setup and table display for use by CSUMB students and the Snowy Plover Guardian Program volunteers to engage with the public on weekends throughout the year at busy beach trail heads or parking areas. Monterey Audubon Society also purchased a small folding table and created a tablecloth to go with the outreach material that has been developed over the years between the two shorebird programs -- the BLOY Project and the Snowy Plover Guardian Program.

## **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 2023 second year results are shown in Table 10 in Appendix 8.

In 2023, five fledglings were produced by the 12 Index Survey breeding pairs, that represents a breeding success of 0.42. With a breeding success of 0.62 for all of the monitored BLOY pairs in the Monterey Bay region in 2023, that is a 0.20 difference. 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 breeding success rate for the entire California coastwide effort.

### **BLOYS & Drone Monitoring**

In 2023, the BLOY Project was involved in the BLOY and wildlife monitoring of 30 drone (UAS or unmanned aerial system) flights that were part of 11 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 reaction to a variety of drones, drone flight patterns, and drone operations; (2) document BLOY reactions to the drones during both breeding season and 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 2023 monitored drone events.

### **ROXSI Project**

The ROXSI (ROcky shores eXperiments and SIMulations) is a multi-university/organization project funded by the Office of Naval Research and dealing with studying wave and current dynamics in a rocky coast environment. This was the second year that the drone portion of the

project was in the Monterey Bay area. This year, two universities flew drones -- College of Earth, Ocean & Atmospheric Sciences at Oregon State University (OSU) in Corvallis, Oregon, and Scripps Institution of Oceanography at the University of California San Diego (SIO) in La Jolla, California. Each used large custom designed research drones outfitted with different monitoring sensor payloads (e.g., LiDAR & ultrasonic). The OSU crew flew a medium-size four-prop battery powered drone (Image 22), while the SIO crew flew a larger medium-size eight-prop gas-powered drone (Image 23). The OSU drone flew off the northwestern portion of Hopkins Marine Station (HMS) in Pacific Grove, while the SIO drone flew off the south side of China Rock in the northern coastal area of Pebble Beach.



H.E. Hanks



H.E. Hanks

Images 22 & 23. As part of the 2023 ROXSI Project, Oregon State flew a 7' (2.1m) diameter four-prop battery powered Freestyle Alta X UAS with a Red Kamado video camera, yellow-scan LiDAR & ultrasound (left), while Scripps flew a 6.5' (2 m) diameter 8 prop hybrid gasline-electric propulsion Skyfront Perimeter 8 UAS with infrared camera module lens & LiDAR (right).

Between the two drones, 25 flights during seven events were monitored – 20 OSU drone flights during five events at HMS and five SIO drone flights during two events at China Rock. The drone flights at HMS involved the MP7, MP10, and MP14 territorial pairs and a single interloping subadult. The drone flights at China Rock involved a cluster of nine BLOYS that included three fledglings and a subadult. Although the China Rock flights were in the PB10 and PB11 BLOY territories, it could not be determined if any territorial pairs were included in the cluster of nine BLOYS.

At both drone launch locations, the BLOY reactions to the drone operations were in most cases minor. Given these flights occurred early in the non-breeding season, most of the BLOY reactions to the drone flights were limited to simply looking when the drones launched and landed. Even Western Gull reactions were very mild in comparison to reactions to drones during the breeding season. The BLOY reactions to the drone flights were limited to a few flushes, a few occurrences of standing alert, and occasional looking and head tilting. During 1<sup>st</sup> Flight launches in the first three HMS events, BLOY pairs flushed. A fourth flush occurred during the 3<sup>rd</sup> Flight of the 4<sup>th</sup> Event when the drone looped back over the MP7 pair in a route the drone operator should not have taken. At China Rock, the cluster of nine BLOYS, more than 200 meters (656') away from the SIO launch site, reacted to the drone only during the two launchings and landings of the first event. As was the case during both China Rock events, the BLOY

reactions were limited to looking in the direction of the drone. These minimal disturbances indicate that while the BLOYs were resting, they heard the drone over noisy wave action.

### MBARI Over Ocean Drone Flights

The Monterey Bay Aquarium Research Institute (MBARI) has initiated a project to make biological photographic surveys of the ocean surface with aerial drones launching from Terrace Point outside the Seymour Marine Discovery Center in Santa Cruz and Davenport Landing on the north coast of Santa Cruz County. 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. The Trinity F90+ is capable of vertical takeoff and landing (VTOL type drone) (Images 24 & 25). The drone can fly more than 90-minutes. Once the drone is airborne and up to elevation, it transitions to level flight and is extremely quiet. Four events (three with one flight and one with two flights) were monitored at Terrace Point. Terrace Point is within the SC1 (Natural Bridges) BLOY territory where the BLOY pair had a chick that fledged. This BLOY pair and the fledgling did not exhibit any disturbance from the VTOL drone during any of the flights either during or after the breeding season. This was due primarily to the fact that the MBARI drone operators did everything needed to avoid wildlife disturbance.



J.L. Parkin



J.L. Parkin

Images 24 & 25. MBARI flew a fixed-wing Trinity F90+ drone with attached Sony RX1-R2 camera (left). MBARI drone operator showing the Trinity F0+ drone to the public at Terrace Point, Santa Cruz, CA (right).

## 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 2023. 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 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 12<sup>th</sup> 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.

A thanks to Audubon California for providing data compilation through EYeS (End of Year System) for the entire California BLOY monitoring program.

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 placing ropes and signs along the trail near Engagement Rock at Point Lobos State Natural Reserve where the PL14 pair was attempting to nest. And thanks to the Asilomar State Beach staff for closing off a section at Gazebo Rock to protect the nesting MP1 BLOY pair.

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 last, but not least, a very grateful thanks to the Pacific Grove City Council for adopting a protocol, via a memorandum of understanding (MOU), to help protect nesting BLOYs along the city's coastline, and a big thanks to the city staff, Monterey Audubon folks, and BLOY monitors that kept the MOU moving through the system.



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**MONTEREY BAY REGION  
BLACK OYSTERCATCHER TERRITORIES & NESTING SITES  
2023**



Image 1. 2023 Black Oystercatcher territories and nest locations for the Monterey Peninsula (MP) monitoring section.

**MONTEREY BAY REGION - BLOY TERRITORIES & NESTING SITES 2023 (Cont'd.)**



Image 2. 2023 Black Oystercatcher territories and nest locations for the Pebble Beach (PB) monitoring section.



Image 3. 2023 Black Oystercatcher territories and nest locations for the Point Lobos (PL) monitoring section (Point Lobos State Natural Reserve).

**APPENDIX 1-2**

**MONTEREY BAY REGION - BLOY TERRITORIES & NESTING SITES 2023 (Cont'd.)**



Image 4. 2023 Black Oystercatcher territories and nest locations for the Santa Cruz County (SC) monitoring section.



Image 5. 2023 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**

**MONTEREY BAY REGION - BLOY TERRITORIES & NESTING SITES 2023 (Cont'd.)**



Image 6. 2023 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. 2023 Black Oystercatcher territories and nest locations for the San Mateo County monitoring section (SM).

**APPENDIX 1-4**

**MONTEREY BAY REGION - BLOY TERRITORIES & NESTING SITES 2023 (Cont'd.)**



Image 8. 2023 Black Oystercatcher territories and nest locations for the San Mateo County (SM) monitoring section's southern portion (Prisoner Rock and Pigeon Point).



Image 9. 2023 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  
2023**

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

<b>Nest #</b>	<b>Name</b>	<b># of Eggs</b>	<b># of Chicks</b>	<b># of Fledglings</b>
MP1	Gazebo	2*	1	0
MP2	Gull Rock West	3	0	0
MP2.2	Gull Rock West	2	0	0
MP3	Barnacle Rock	<b>ABANDONED</b>		
MP4	Point Pinos West	0	0	0
MP5	Point Pinos East	2	2	1
MP6	13 <sup>th</sup> Street	2*	2	0
MP6.2	13 <sup>th</sup> Street	2*	1	0
MP7	Hopkins West	2*	1	1
MP8	Hopkins East	<b>ABANDONED</b>		
MP9	Lover Point West (Oak Rock)	0	0	0
MP10	Hopkins North	2	0	0
MP10.2	Hopkins North	2*	1	0
MP11	Asilomar	0	0	0
MP12	Crespi Cove	0	0	0
MP13	Coast Guard Pier (El Torito)	2*	2	0
MP13.2	Coast Guard Pier (El Torito)	2*	0	0
MP14	3 <sup>rd</sup> Street	0	0	0
MP15	John Denver Rock East	<b>ABANDONED</b>		
MP16	Point Pinos (Pyramid-Prom Rocks)	3	0	0
MP16.2	Point Pinos (Pyramid-Prom Rocks)	3	2	0
MP17	Perkins Park	<b>ABANDONED</b>		
MP18	Charthouse	0	0	0
<b>Total:</b>		<b>29*</b>	<b>12</b>	<b>2</b>

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



**MONTEREY BAY REGION BLACK OYSTERCATCHER  
REPRODUCTIVE PRODUCTIVITY – 2023 (Cont'd.)**

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

<b>Nest #</b>	<b>Name</b>	<b># of Eggs</b>	<b># of Chicks</b>	<b># of Fledglings</b>
PB1	Stillwater Cove East	0	0	0
PB2	Stillwater Cove South	2*	1	0
PB3	Stillwater Cove North	2*	2	2
PB4	Ghost Tree (Stillwater Point)	2	0	0
PB5	Lone Cypress	<b>ABANDONED</b>		
PB6	Cypress Point Lookout	2*	1*	1
PB7	Bird Rock South	0	0	0
PB8	Bird Rock North	3	3	1
PB9	Ocean Road Neutral Zone (ORNZ)	0	0	0
PB10	China Rock South	2*	0	0
PB11	Point Joe	2*	0	0
PB12	Stillwater Cove Pescadero Rock	2*	0	0
PB12.2	Stillwater Cove Pescadero Rock	2*	0	0
PB13	Stillwater Cove Northeast	<b>ABANDONED</b>		
PB14	Bird Rock West	2*	0	0
PB15	Cypress Point North	0	0	0
PB16	Bird Rock East	0	0	0
<b>Total:</b>		<b>21*</b>	<b>7*</b>	<b>4</b>

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

**MONTEREY BAY REGION BLACK OYSTERCATCHER  
REPRODUCTIVE PRODUCTIVITY – 2023 (Cont'd.)**

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

<b>Nest #</b>	<b>Name</b>	<b># of Eggs</b>	<b># of Chicks</b>	<b># of Fledglings</b>
PL1	Bird Island SE	2*	1	0
PL1.2	Bird Island SE	3	3	1
PL2	Bird Island NE	2*	0	0
PL3	China Cove (Weston South)	0	0	0
PL4	Sand Hill Cove (Weston South)	0	0	0
PL5	Sea Lion Cove	2*	0	0
PL6	Headland Cove South	2*	0	0
PL7	Whalers Cove	2*	2	2
PL8	Moss Cove	3	3	3
PL9	Middle Rock North	<b>ABANDONED</b>		
PL10	Cypress Cove	0	0	0
PL11	Headland Cove North	<b>ABANDONED</b>		
PL12	Bird Island Rocks	<b>ABANDONED</b>		
PL13	Guillemot Rock	0	0	0
PL14	Engagement Rock	2*	0	0
PL14.2	Engagement Rock	2*	0	0
PL15	Sand Hill Cove	0	0	0
<b>Total:</b>		<b>20*</b>	<b>9</b>	<b>6</b>

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

**MONTEREY BAY REGION BLACK OYSTERCATCHER  
REPRODUCTIVE PRODUCTIVITY – 2023 (Cont'd.)**

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

<b>Nest #</b>	<b>Name</b>	<b># of Eggs</b>	<b># of Chicks</b>	<b># of Fledglings</b>
SC1	Natural Bridges	3	0	0
SC1.2	Natural Bridges	3	3	0
SC1.3	Natural Bridges	2	1	1
SC2	Wilder Beach	0	0	0
SC3	Fern Grotto Beach South	2*	0	0
SC3.2	Fern Grotto Beach South	2*	0	0
SC4	Fern Grotto Beach North	2*	1	0
SC5	Sand Plant Beach North	2*	0	0
SC5.2	Sand Plant Beach North	3	3	0
SC6	Sand Plant Beach South	2*	0	0
SC6.2	Sand Plant Beach South	3	3	2
SC7	Strawberry Beach North	2*	2	1
SC8	3 Mile Beach South	2*	1	1
SC9	3 Mile Beach North	2*	0	0
SC10	Shark Fin Rock	2*	0	0
SC10.2	Shark Fin Rock	2*	2	0
SC11	Shark Fin Cove South	<b>ABANDONED</b>		
SC12	Davenport South	2*	2	0
SC13	Davenport North	2*	0	0
SC14	Pelican Rock	2*	2*	2
SC15	Greyhound Rock	3	3	1
SC16	Davenport Bluff Middle	2	1	0
SC17	Ohlone Bluff	2*	2	0
SC18	Strawberry Beach West	3	2	1
SC19	Greyhound Rock North	<b>ABANDONED</b>		
<b>Total:</b>		<b>50*</b>	<b>28*</b>	<b>9</b>

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

**MONTEREY BAY REGION BLACK OYSTERCATCHER  
REPRODUCTIVE PRODUCTIVITY – 2023 (Cont'd.)**

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

<b>Nest #</b>	<b>Name</b>	<b># of Eggs</b>	<b># of Chicks</b>	<b># of Fledglings</b>
SM1	Prisoner Rock	2*	1	1
SM2	Pigeon Point	3	1	1
SM3	Pescadero 1	0	0	0
SM4	Pescadero 2	2*	0	0
SM5	Pescadero 3	2*	1*	0
SM6	Pescadero 4	3	3	3
SM7	Pescadero 5	2*	2*	1
SM8	Pescadero 6	2*	2	2
SM9	Pescadero 7	2*	1*	0
SM10	Pescadero 8	2*	2	1
SM11	Pescadero 9	<b>ABANDONED</b>		
SM12	Pigeon Point South	2*	2*	1
SM13	Pescadero 10	2*	2	0
<b>Total:</b>		<b>24*</b>	<b>17*</b>	<b>10</b>

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

**MONTEREY BAY REGION  
BLACK OYSTERCATCHER PHYSICAL PROTECTION MEASURES  
FOR POTENTIAL & ACTUAL NESTING SITES  
2023**

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

Region & Section	Nest #	Nest Location	Protection Method	# of Eggs	# of Chicks	# of Fledglings
<b>Monterey Bay South Coast</b>						
Monterey Peninsula	MP1	Gazebo Rock	Posted Closure	2*	1	0
	MP2	Gull Rock East	Ropes & Signs	3	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	2	1
	MP16	Point Pinos Middle	Ropes & Signs	3	0	0
	MP16.2	Point Pinos Middle	Ropes & Signs	3	2	0
Pebble Beach	PB7	Bird Rock South	Cable & Signs	0	0	0
	PB8	Bird Rock North	Cable & Signs	3	3	1
	PB11	Point Joe	Cable & Signs	2*	0	0
Point Lobos	PL14	Engagement Rock	Posts & Signs	2*	0	0
	PL14.2	Engagement Rock	Posts & Signs	2*	0	0
<b>Monterey Bay North Coast</b>						
Santa Cruz	SC1	Natural Bridges	Sign	3	0	0
	SC1.2	Natural Bridges	Sign	3	3	0
	SC1.3	Natural Bridges	Sign	2	1	1
San Mateo	SM3	Pescadero Rock 1	Ropes & Signs	0	0	0
	SM4	Pescadero Rock 2	Ropes & Signs	2*	0	0
	SM5	Pescadero Rock 3	Ropes & Signs	2*	1*	0
	SM6	Pescadero Rock 4	Ropes & Signs	3	3	3
	SM7	Pescadero Rock 5	Ropes & Signs	2*	2	1
	SM8	Pescadero Rock 6	Rope & Sign	2*	2	2
	SM9	Pescadero Rock 7	Rope & Sign	2*	1*	0
	SM10	Pescadero Rock 8	Ropes & Signs	2*	2	1
	SM13	Pescadero Rock 9	Ropes & Signs	2*	2	0
			<b>TOTAL:</b>	<b>47*</b>	<b>25*</b>	<b>10</b>

\*Estimated number of eggs

**MONTEREY BAY REGION  
BLACK OYSTERCATCHER “INDEX SURVEY”  
BREEDING PAIR STATUS  
2023**

Table 10. *Monterey Bay Region BLOY “Index Survey”*

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

**MONTEREY BAY REGION  
BLACK OYSTERCATCHER PROJECT DRONE (UAS) MONITORING EVENTS  
2023**

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

<b>Date</b>	<b>Project &amp; Entity</b>	<b>Location</b>	<b># of Flights</b>	<b>BLOY Territory</b>
5 October 2023	ROXSI Project Oregon State University	Hopkins Marine Station Pacific Grove	4	MP7, MP10 & MP14
6 October 2023	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	1	SC1
11 October 2023	ROXSI Project Oregon State University	Hopkins Marine Station Pacific Grove	4	MP7, MP10 & MP14
13 October 2023	ROXSI Project Oregon State University	Hopkins Marine Station Pacific Grove	4	MP7, MP10 & MP14
18 October 2023	ROXSI Project Oregon State University	Hopkins Marine Station Pacific Grove	4	MP7, MP10 & MP14
18 October 2023	ROXSI Project Scripps Institute, UCSD	China Rock South Pebble Beach	2	PB10 & MP11
19 October 2023	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	1	SC1
20 October 2023	ROXSI Project Oregon State University	Hopkins Marine Station Pacific Grove	4	MP7, MP10 & MP14
20 October 2023	ROXSI Project Scripps Institute, UCSD	China Rock South Pebble Beach	3	PB10 & MP11
21 November 2023	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	2	SC1
8 December 2023	Ocean Surface Survey MBARI	Terrace Point Santa Cruz	1	SC1
<b>TOTAL:</b>	<b>11 Events</b>		<b>30 Flights</b>	