

Summary of 2011-2016 Monitoring Efforts for the Point Sur to Point Mugu Chapter of the Seabird Protection Network



Report to the Torch/Platform Irene Oil Spill Trustee Council and U.S.
Bureau of Land Management, California National Monument

May 31, 2017

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Acknowledgements

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Cover photo: *Brandt's cormorants on nests at Point Arguello, Vandenberg Air Force Base*

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EXECUTIVE SUMMARY

The Point Sur to Point Mugu chapter of the Seabird Protection Network was established in 2011 in order to reduce human-caused disturbance to seabird colonies in southern and central California. The first six years (2011-2016) focused efforts on six sites between Piedras Blancas and Point Conception in central California. The six sites were selected from ten original sites that were monitored during the baseline years (2011-2012) before an outreach program was fully established. Four sites (Estero Bluffs State Park, Montaña de Oro State Park, North Shell Beach, and South Shell Beach) were selected due to high disturbance rates recorded during baseline years. The remaining two sites (North and South Vandenberg Air Force Base) are closed to the public and were chosen as controls to help assess the effectiveness of outreach efforts. Our monitoring efforts focused on seven species identified in a 2011 assessment of the study area: Brandt's Cormorant, Pelagic Cormorant, Double-crested Cormorant, Pigeon Guillemot, Western Gull, Black Oystercatcher, and California Brown Pelican. This report summarizes the monitoring efforts during the first six years after chapter establishment and assesses the effectiveness of outreach efforts during that same period.

Key findings:

- 1) Population trends were stable for all species but Black Oystercatcher which showed a steady decline throughout the six-year period.
- 2) Disturbance rates were highest at the two Shell Beach sites with a high diversity of user groups causing disturbances. In fact, disturbance rates were the second highest of all sites that we have monitored throughout California (Figure 1). The majority of disturbances at Shell Beach were caused by water-based sources including kayakers and a small tour boat.
- 3) Targeted outreach efforts were successful at reducing disturbances caused by the single tour boat, but long-term efforts will be needed to change the behaviors broader user groups like kayakers and hikers.

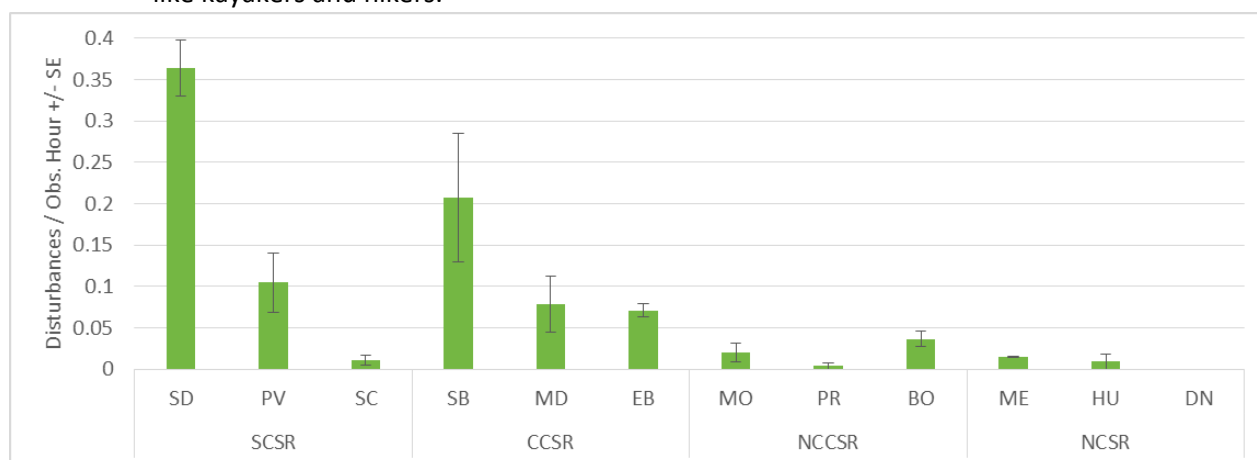


Figure 1. Mean +/- SE number of disturbances per hour of observation recorded during the baseline periods for each of the Marine Life Protection Act Initiative study regions (from Robinette et al. 2017). SCSR = South Coast Study Region, CCSR = Central Coast Study Region, NCCSR = North Central Coast Study Region, NCSR = North Coast Study Region, SD = San Diego, PV = Palos Verdes Peninsula, SC = Santa Cruz Island, SB = Shell Beach, MD = Montaña de Oro, eb = Estero Bluffs, MO = Montara, PR = Point Reyes, BO = Bodega Head, ME = Mendocino County, HU = Humboldt County, and DN = Del Norte County.

BACKGROUND

The Seabird Protection Network (SPN) was created by the Gulf of the Farallones National Marine Sanctuary to decrease disturbance at seabird breeding and roosting sites through education/outreach and the enforcement of existing regulations concerning seabird colonies. The SPN is expanding throughout coastal California using a chapter approach, with each chapter responsible for promoting seabird conservation within a defined stretch of coastline. The Point Sur to Point Mugu (PSPM) chapter was established in 2011 and promotes seabird conservation with three working groups: law enforcement, outreach, and monitoring. To date, the PSPM has promoted conservation primarily through monitoring and outreach. Point Blue Conservation Science (Point Blue) leads seabird monitoring and provides results directly to the outreach group. California State Parks leads the outreach group and uses the monitoring information to develop outreach materials and identify ocean user groups to target. The law enforcement group is led by the Bureau of Land Management (BLM) and has focused mainly on making direct contact with individuals or companies (e.g., boat tour companies) that have been observed disturbing seabirds on multiple occasions. Here, we summarize the first six years of seabird monitoring (2011 – 2016) with an emphasis on assessing the effectiveness of outreach activities.

Our first step in developing the monitoring program was to produce a biological assessment (Robinette and Acosta 2011). The assessment summarized the most up-to-date data available on seabird breeding population sizes and identified important roosting sites throughout the PSPM. The report also identified data gaps that needed to be addressed. Based on the findings of the assessment, we developed a monitoring plan (Robinette 2011) to guide the first six years of PSPM monitoring. The assessment recommended using a before-after-impact-control (BACI) monitoring design to assess and guide outreach efforts within the PSPM. The assessment also recommended focusing on a sub-section of the PSPM when developing the outreach and monitoring programs. We decided to focus on the area between Piedras Blancas and Point Conception (Figure 2) as this area contained an existing long-term seabird monitoring program at Vandenberg Air Force Base (Vandenberg) and several easily accessible areas with coastal habitat and seabird communities similar to Vandenberg.

The outreach program was developed during the first two years after the PSMP chapter was established (2011-2012) and was fully functioning for the latter three years (2013-2015). We therefore assigned 2011-2012 to be the 'before' or baseline period and 2013-2015 to be the 'after' period in our BACI design. We selected eight sites to serve as 'impact' sites (sites where outreach efforts could potentially reduce disturbance rates) and two sites at Vandenberg to serve as controls. Point Blue has been monitoring seabirds at Vandenberg since 1999 and has documented little to no disturbance at these sites. After the baseline years, we identified four sites that needed outreach focus (Estero Bluffs, Montaña de Oro, North Shell Beach, and South Shell Beach) based on the disturbance rates that we recorded. We therefore focused our monitoring efforts on these sites for 2013-2015 as well as continuing to monitor the Vandenberg control sites. Additionally, we established a partnership with the Morro Coast Audubon Society in 2013 and started a citizen science program. The citizen science group took over monitoring at Estero Bluffs and Montaña de Oro beginning in 2013 and at the two Shell Beach sites beginning in 2015. The two Vandenberg control sites continued to be monitored by trained biologists.

At each site, we monitored breeding population size, reproductive success, roost utilization, and rates of human-caused disturbance for the seven focal species identified in the initial PSPM assessment report

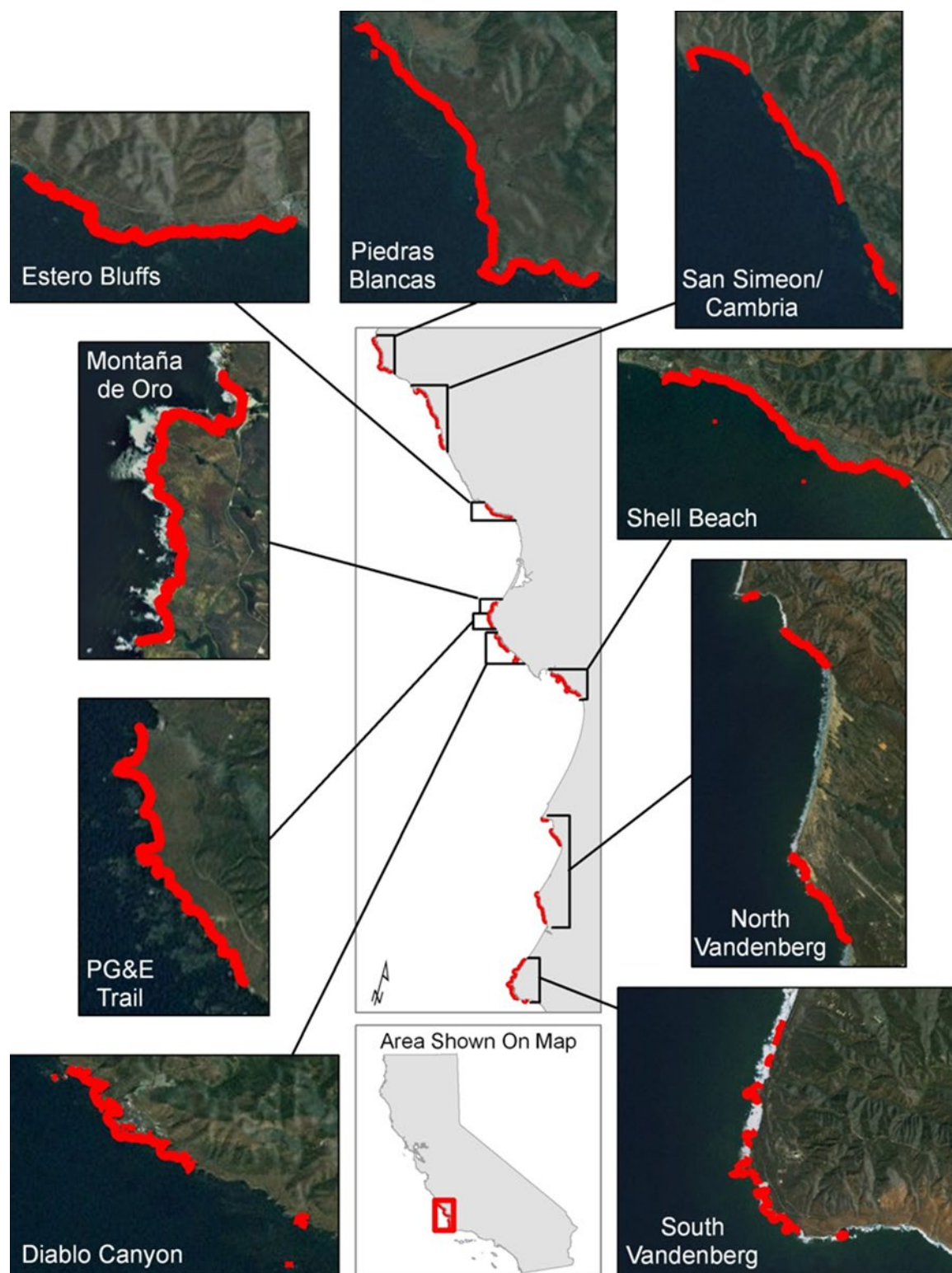


Figure 2. Map of the 2011-2015 focal area for the Point Sur to Point Mugu chapter of the Seabird Protection Network.

(Robinette and Acosta 2011): Brandt's Cormorants, Double-crested Cormorants, Pelagic Cormorants, Pigeon Guillemots, Western Gulls, Black Oystercatchers, and Brown Pelicans. Brown Pelicans do not breed within the study area but rely on coastal habitats for roosting after they disperse from breeding sites. Full methods for each survey type can be found within the three monitoring reports produced by this project (Robinette et al. 2012, 2013, 2015). The citizen science group recorded data for estimating breeding population size, roost utilization, and rates of human-caused disturbance following the same protocols used by trained biologists. Here, we 1) summarize baseline breeding population size and patterns of human-caused disturbance observed at each of the initial ten study sites during 2011-2012, 2) describe regional population trends using the six focal sites monitored for all six years (2011-2016) and 3) present the results of our BACI analysis assessing the effectiveness of outreach efforts using the six focal sites.

BASELINE RESULTS

Our results from 2011-2012 showed that each of the ten study sites were somewhat unique in their importance to our focal seabird species and the levels of human-caused disturbance they received. Mean population sizes over the baseline period are shown for each species in Table 1. While some sites did not host large breeding populations of focal species, they were often important roosting sites (e.g., Estero Bluffs). Below, we outline the importance of each site to the PSPM baseline study area.

Piedras Blancas has a large population of Brandt's Cormorants based on the aerial surveys conducted by Capitolo et al. (2012). A comparison of our ground surveys to the aerial surveys showed that the ground surveys underestimated the Brandt's Cormorant population (Robinette et al. 2012). This site has moderate breeding populations for Black Oystercatchers and Western Gulls, and a small population of Pigeon Guillemots. The area provides roosting habitat for all focal species. Much of the site is closed to the public except for guided tours given by BLM. Tour participants are instructed to stay on trails that keep them a good distance from the coastline. This site therefore receives very low disturbance rates. The few disturbances we documented were primarily caused by humans on foot. Because human-caused disturbance did not appear to be an issue at this site, we did not recommend focusing outreach efforts here and did not continue to monitor it beyond the baseline years.

San Simeon/Cambria has one of only two breeding colonies of Double-crested Cormorants within our baseline study area (excluding the Morro Bay area which was not covered by our monitoring efforts). There are also small breeding populations of Pigeon Guillemots, Black Oystercatchers and Western Gulls. The area provides roosting habitat for all focal species. There were low disturbance rates in this area that were caused by humans on foot and kayakers. Because human-caused disturbance did not appear to be an issue at this site, we did not recommend focusing outreach efforts here and did not continue to monitor it beyond the baseline years.

Estero Bluffs is a State Park that has small breeding populations of Black Oystercatchers and Western Gulls. However, this area is an important roosting area for cormorants and pelicans

Table 1. Mean \pm SE breeding population sizes calculated over the baseline period (2011-2012) for each of the six breeding focal species. For each species, the percent of the area-wide population found at a given study site is given in parentheses. *Population size for Brandt's Cormorant was likely underestimated by our ground-based surveys at Piedras Blancas.

Study Site	Double-crested Cormorant	Brandt's Cormorant	Pelagic Cormorant	Pigeon Guillemot	Western Gull	Black Oystercatcher
Piedras Blancas	0 \pm 0 (0%)	137 \pm 19* (4.4%)	0 \pm 0 (0%)	14 \pm 0 (0.6%)	57 \pm 7 (11.0%)	4 \pm 2 (6.3%)
San Simeon /Cambria	70 \pm 14 (36.3%)	0 \pm 0 (0%)	0 \pm 0 (0%)	25 \pm 1 (1.2%)	19 \pm 5 (3.7%)	0 \pm 0 (0%)
Estero Bluffs	0 \pm 0 (0%)	0 \pm 0 (0%)	0 \pm 0 (0%)	0 \pm 0 (0%)	1 \pm 1 (0.2%)	6 \pm 2 (9.5%)
Montaña de Oro	0 \pm 0 (0%)	0 \pm 0 (0%)	7 \pm 1 (1.4%)	224 \pm 15 (10.3%)	16 \pm 2 (3.1%)	8 \pm 2 (12.7%)
PG&E Trail	0 \pm 0 (0%)	809 \pm 277 (26.2%)	95 \pm 7 (18.8%)	207 \pm 4 (9.5%)	126 \pm 22 (24.3%)	8 \pm 4 (12.7%)
Diablo Canyon	0 \pm 0 (0%)	1,506 \pm 428 (48.7%)	61 \pm 21 (12.1%)	58 \pm 9 (2.7%)	78 \pm 32 (15.0%)	11 \pm 1 (17.5%)
North Shell Beach	123 \pm 33 (63.7%)	131 \pm 17 (4.2%)	84 \pm 26 (16.6%)	75 \pm 3 (3.5%)	17 \pm 1 (3.3%)	3 \pm 1 (4.8%)
South Shell Beach	0 \pm 0 (0%)	131 \pm 63 (4.2%)	105 \pm 25 (20.8%)	194 \pm 28 (8.9%)	116 \pm 28 (22.4%)	4 \pm 0 (6.3%)
North Vandenberg	0 \pm 0 (0%)	0 \pm 0 (0%)	10 \pm 0 (2.0%)	150 \pm 43 (6.9%)	10 \pm 4 (1.9%)	4 \pm 2 (6.3%)
South Vandenberg	0 \pm 0 (0%)	79 \pm 7 (12.3%)	144 \pm 10 (28.5%)	1,223 \pm 218 (56.4%)	80 \pm 12 (15.3%)	15 \pm 1 (23.8%)

and we suspect it is also an important foraging area for multiple seabird species. The area provides roosting habitat for all focal species. The disturbance rates were relatively high and caused by humans on foot and kayakers. Outreach efforts were focused at this site and the site was monitored for the entire six years.

Montaña de Oro is a State Park that has large breeding populations of Pigeon Guillemots and Black Oystercatchers and small breeding populations of Pelagic Cormorants and Western Gulls. The area provides roosting habitat for all focal species. Disturbance rates were moderate to high and primarily caused by humans on foot. Outreach efforts were focused at this site and the site was monitored for the entire six years.

PG&E Trail has large breeding populations of all focal species but Double-crested Cormorants. This is one of two areas that had a breeding population of Brandt's Cormorants that was >1,000 individuals. The area provides roosting habitat for all focal species and is important to roosting Brandt's Cormorants, Pelagic Cormorants, and Western Gulls. This site is only open to the public during specific hours on specific days. PG&E provides staff that meet guests at the

trail head and explain rules about staying on the trail. The trail is a safe distance from the coastline and the staff monitor the trail throughout the day to make sure guests are following the rules. Thus, despite a high level of human activity on the coastal trail, disturbance rates are low are very low. In fact, there were no disturbances recorded in 2012. Because human-caused disturbance did not appear to be an issue at this site, we did not recommend focusing outreach efforts here and did not continue to monitor it beyond the baseline years.

Diablo Canyon has large breeding populations of Brandt's Cormorants, Black Oystercatchers, and Western Gulls and moderate populations of Pelagic Cormorants and Pigeon guillemots. This was the only area that had a breeding population of Brandt's Cormorants that was >1,500 individuals based on ground surveys. The area provides roosting habitat to all focal species and is important to roosting Brandt's Cormorants, Pelagic Cormorants, Western Gulls, and Brown Pelicans. The site is closed to the public disturbance rates were low and primarily due to boats conducting research adjacent to the PG&E power plant. Because human-caused disturbance did not appear to be an issue at this site, we did not recommend focusing outreach efforts here and did not continue to monitor it beyond the baseline years.

North Shell Beach has large populations of Pelagic Cormorants, Pigeon Guillemots, and Western Gulls. There are also moderate populations of Black Oystercatchers and Brandt's Cormorants. The site has one of only two Double-crested Cormorant breeding colonies within the baseline study area. This site is also an important roosting site for all focal species. Disturbance rates are high and mostly from humans on foot, but also from kayaks and a small tour boat that would get close to the bluffs. The tour boat operator was contacted by the outreach group and disturbance rates decreased in subsequent years. This site was monitored for the entire six years, but was not included in the citizen science protocol for Shell Beach and will not continue to be monitored.

South Shell Beach has the largest human population of our ten study sites, with two small cities (Pismo Beach and Shell Beach) established directly along the bluffs. There is a high diversity of coastal and ocean users in this area as evident by the high diversity of potential disturbance sources identified. Like North Shell Beach, there are large populations of Pelagic Cormorants, Pigeon Guillemots, and Western Gulls as well as moderate populations of Black Oystercatchers and Brandt's Cormorants. The area is important to all focal species for roosting and had the largest number of roosting Brown Pelicans of all the sites. There were high disturbance rates for all seabird species with a high diversity of sources from land, air, and water. Outreach efforts were focused at this site and the site was monitored for the entire six years.

North Vandenberg AFB has moderate breeding populations of Pigeon Guillemots and Black Oystercatchers and small breeding populations of Pelagic Cormorants and Western Gulls. The area provides roosting habitat for all focal species and is important to roosting cormorants and Brown Pelicans. Though there is some coastal access and recreational activities for military personnel and their families, there were no disturbances recorded at North Vandenberg in 2011 and two (one helicopter and one human on foot) recorded in 2012. This site will therefore continue to be monitored as a control site.

South Vandenberg AFB has large breeding populations of Pelagic Cormorants, Pigeon Guillemots, and Black Oystercatchers and moderate populations of Brandt's Cormorants and Western Gulls. The area provides roosting habitat for all focal species and is important for roosting cormorants and Brown Pelicans. There was only one disturbance (a motorized vehicle) recorded at South Vandenberg in 2011 and three (one airplane, one human on foot, and one shoreline fisher) in 2012. Overall, there is very little human activity at South Vandenberg and military personnel are discouraged from entering coastal areas aside from the Boathouse recreational area. This site will therefore continue to be monitored as a control site.

BREEDING POPULATION TRENDS (2011-2016)

Figure 3 shows the population trends over the six-year study period data combined from the six focal sites. All focal species but Black Oystercatchers showed no significant trend over the six-year period. The Black Oystercatcher population decreased steadily over the six-year period. Brandt's and Pelagic Cormorants appear to be declining with the smallest population numbers recorded in 2015 and 2016. Western Gulls and Pigeon Guillemots showed stable populations throughout the study period. All species but Black Oystercatchers showed brief population increases in the middle of the time series. Brandt's Cormorants, Pelagic Cormorants, and Western Gulls all showed a brief increase in 2013, with the increase lasting two years for Brandt's Cormorants. Pigeon Guillemots showed a brief increase in 2012. Short-term increases and decreases in seabird breeding populations are likely due to annual variability in oceanographic conditions that influence prey availability (Ainley et al. 1995). Seabirds are long-lived species and individuals may opt to not breed in a given year when prey are not locally abundant (Clapp et al. 1982). Thus, it is important to develop long time series data to realistically estimate population trends for seabird species. The decreasing trend we observed in the oystercatcher population may be due to poor reproductive success in recent years. Results from our 18-year time series at Vandenberg show that fledging rates have been consistently below the 18-year average since 2007 (Robinette and Howar 2017).

EFFECTIVENESS OF OUTREACH EFFORTS

We used our BACI study design to evaluate the effectiveness of outreach efforts at the four outreach sites (Estero Bluffs, Montaña de Oro, North Shell Beach, and South Shell Beach), comparing outreach sites to the two Vandenberg control sites before and after the outreach program was in full effect. Our analysis focused on the three most visible nesters/roosters that were present at all sites (Brandt's Cormorants, Pelagic Cormorants, and Western Gulls) as these species provide good indices for estimating disturbance rates. We used our BACI design to look for changes in 1) ground-based disturbance rates, 2) water-based disturbance rates, 3) breeding population size, and 4) roost utilization.

We found no differences in ground-based disturbance rates among sites or before and after full outreach initiation (Figure 4). Similarly, we found no differences in mean disturbance rates before and after the full outreach initiation. However, there was a marginal difference in water-based disturbance rates among sites ($p = 0.059$) and a marginal interaction between the site and before/after effects ($p =$

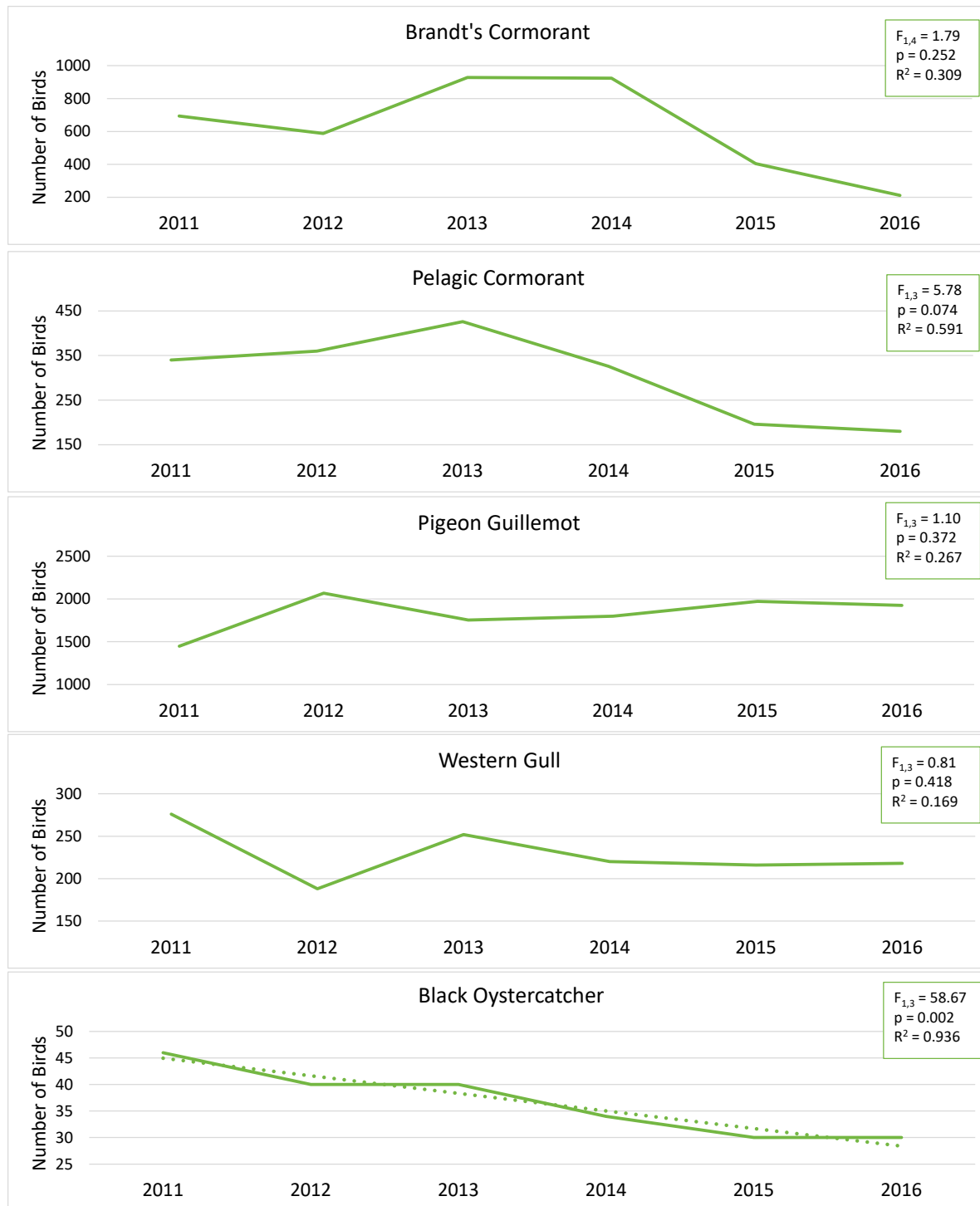


Figure 3. Annual breeding population sizes from 2011-2016 for the five focal species that breed throughout the Point Sur to Point Mugu study area. Population sizes are the sum across the six study sites monitored during all six years: Estero Bluffs, Montaña de Oro, North Shell Beach, South Shell Beach, North Vandenberg, and South Vandenberg. Results of regression analyses are shown in the upper right corner of each graph. Dashed line for Black Oystercatcher shows significant trend.

Disturbance Rates

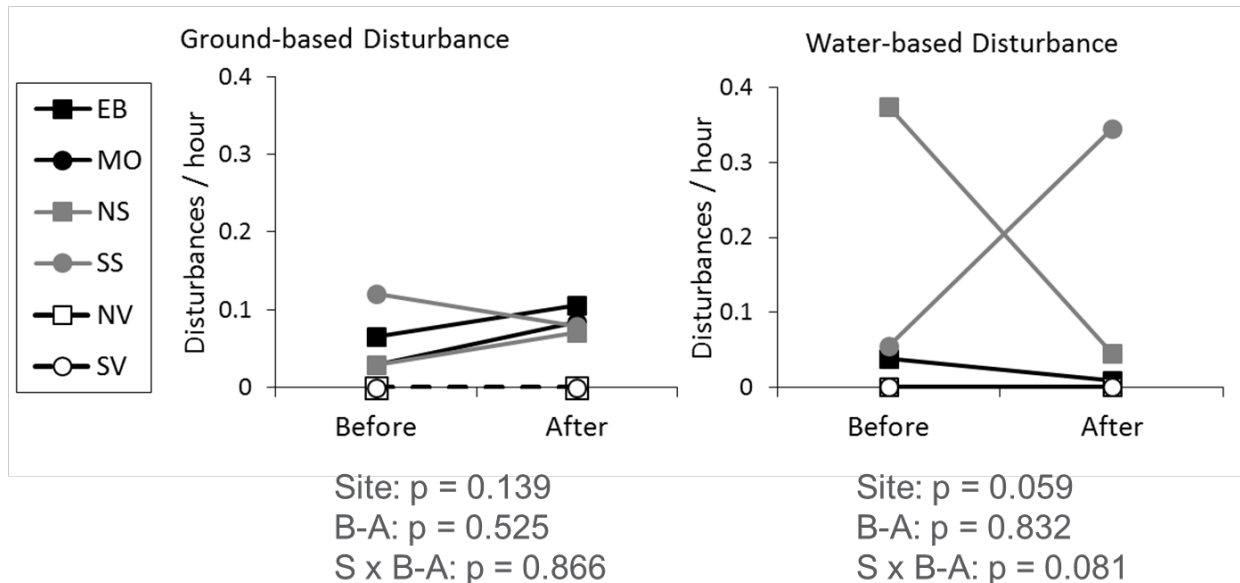


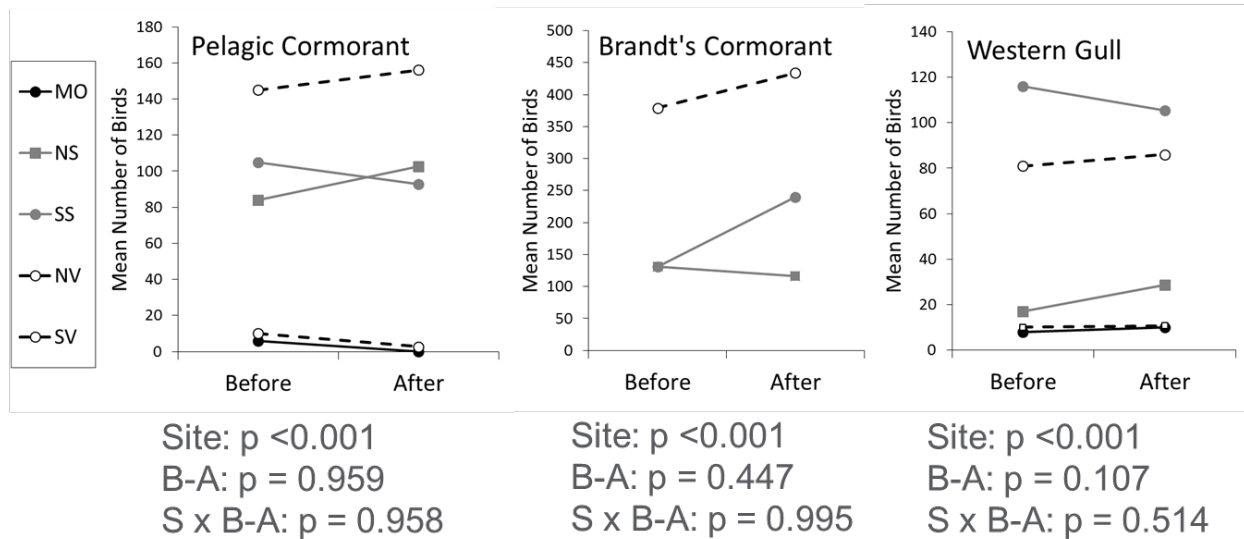
Figure 4. Results of Analysis of Variance comparing mean disturbance rates among sites (site) and before and after full outreach initiation (B-A) as well as interaction between the two effects (S x B-A). Analyses were performed separately for ground-based and water-based disturbances. EB = Estero Bluffs, MO = Montaña de Oro, NS = North Shell Beach, SS = South Shell Beach, NV = North Vandenberg, and SV = South Vandenberg.

0.081). Overall, there were more water-based disturbances at the two Shell Beach sites compared to other sites, but the before/after pattern was different for the two sites. Disturbance rates at North Shell Beach were higher before full outreach initiation while those for South Shell Beach were higher after full outreach initiation. We identified a single tour boat operator that was causing the majority of the water-based disturbances at North Shell Beach during the baseline years. The outreach working group contacted the boat operator directly and explained the impacts their operation was having. We feel that this contact was affective as the tour boat did not make close approaches to rocks and bluffs in subsequent years. At South Shell Beach, we feel that warmer weather conditions during the 2013-2015 period resulted in more people using this area for recreation which in turn created more opportunities for interaction with seabirds.

There were among site differences in both breeding population sizes and roost utilization, but no differences before and after full outreach initiation (Figure 5). Breeding population size was for Brandt's and Pelagic Cormorants was highest at South Vandenberg, while that for Western Gulls was highest at South Shell Beach. Roost utilization for all three species was highest at South Shell Beach where disturbance rates were high during the 2012-2015 period. The impacts of outreach on breeding population size and roost utilization will likely take more time to manifest. As mentioned above, much of the short term changes in breeding population size and roost utilization will be driven by oceanographic variability. As outreach techniques improve and the message permeates through the community, we

will likely see continued decreases in disturbance rates. This in turn can lead to increase reproductive performance and increases in population size over the long term.

Breeding Population



Roost Utilization

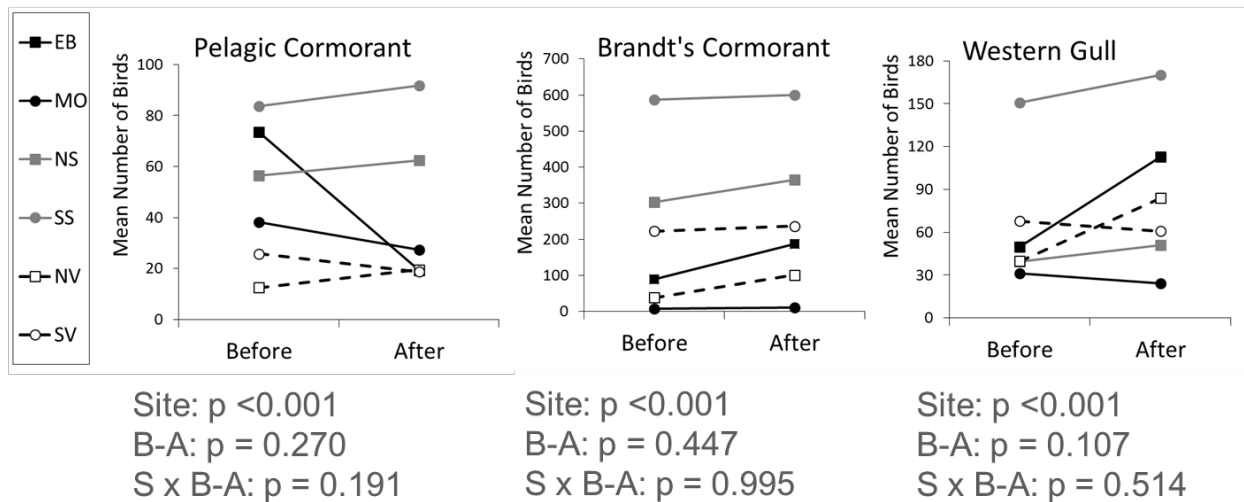


Figure 5. Results of Analysis of Variance comparing mean disturbance rates among sites (site) and before and after full outreach initiation (B-A) as well as interaction between the two effects (S x B-A). Analyses were performed separately for Pelagic Cormorant, Brandt's Cormorant, and Western Gull. EB = Estero Bluffs, MO = Montaña de Oro, NS = North Shell Beach, SS = South Shell Beach, NV = North Vandenberg, and SV = South Vandenberg.

FUTURE OPPORTUNITIES

The PSPM chapter was successful in developing monitoring and outreach programs and with its intent to have information from the monitoring program guide the implementation of the outreach program. Using the monitoring information, the outreach program was able to target specific user groups. This targeted outreach was successful in reducing disturbance rates in the short-term (specifically at North Shell Beach), but will be difficult to maintain over the long-term. Outreach to broader coastal user groups will be important to continue reducing the threat of disturbance over the long-term. The PSPM outreach group has developed multiple strategies to target broader groups. These strategies will take longer than our initial six-year period to prove successful and assess their success will require long-term monitoring data. We therefore recommend the following actions to sustain the success of the PSPM chapter over the long-term.

- 1) Continue to partner with Morro Coast Audubon to maintain citizen science monitoring at Montaña de Oro, Estero Bluffs, and South Shell Beach. The continued success of the outreach program will require an adaptive approach which, in turn, will require updated information on sources of disturbance in these areas.
- 2) Continue to monitor the Vandenberg sites for use as controls. As disturbance rates decrease in response to outreach efforts, we expect to positive impacts to breeding success, breeding population size, and roost utilization. However, all three metrics are strongly influenced by oceanographic variability. Having data from the Vandenberg control sites will help separate the impacts of oceanographic variability from the impacts of decreased disturbance rates when assessing the effectiveness of outreach efforts.
- 3) Work with other SPN chapters to develop an online data portal for data entry and analysis. The Gulf of the Farallones National Marine Sanctuary has a signed letter of intent (LOI) with the Bureau of Land Management, U.S. Fish and Wildlife Service, National Parks Service, Farallones Marine Sanctuary Association, and Point Blue Conservation Science to expand the SPN throughout coastal California. Part of this expansion involves developing an online data portal that will help standardize monitoring approaches and allow for data to be compared among chapters. This capability would strengthen the ability to assess outreach efforts across chapters and allow chapters to learn from each other's successes and shortcomings.

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