

Marine Bird Abundance in the Cherry Point and Fidalgo Bay Aquatic Reserves

2013-2018 Monitoring Report for the National Estuaries Program



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Copies of this monitoring report will be available in the following locations:

- the Washington State Department of Natural Resources at: <https://www.dnr.wa.gov/managed-lands/aquatic-reserves>; and
- on the Aquatic Reserves website <http://www.aquaticreserves.org/resources/>

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Marine Bird Abundance in the Cherry Point and Fidalgo Bay Aquatic Reserves

2013-2018 Monitoring Report

Contents

Acknowledgments	2
Abstract	4
Introduction	4
Study Area Characteristics	6
Existing Bird Monitoring Data	6
Study Design	7
Field procedures	8
Results	9
Discussion	9
References	11

Abstract

This study used shore-based marine bird point counts to determine current abundance and evaluate long-term changes in abundance of several marine bird species within the Washington Department of Natural Resources' Cherry Point Aquatic Reserve (CPAR) and Fidalgo Bay Aquatic Reserve (FBAR). This project originated at the CPAR in 2013 and began as a pilot project using the same protocols at Fidalgo Bay in 2017. The study was conducted between April 2013 and May 2018 for Cherry Point and September 2017 through May 2018 for Fidalgo Bay. Point counts were conducted monthly from three sites at Cherry Point and four at Fidalgo Bay, with census locations and methodologies modeled after earlier census work conducted as part of the Marine Ecosystem Analysis (MESA) study (1978-1979) and the WWU Marine Bird Census (2003-2005). The three most abundant species counted at Cherry Point between 2016 and 2018 were surf scoter, brant, and bufflehead while green-winged teal, northern pintail, and bufflehead were the most abundant at Fidalgo Bay. Continued monitoring over the coming years will allow statistical tests for better determining the abundance trends of marine birds in the CPAR and FBAR.

Introduction

This study includes two of the eight Washington Aquatic Reserves (Figure 1). The Cherry Point Aquatic Reserve (Figure 2) was established by the Washington Department of Natural Resources to preserve, restore, and enhance this state-owned aquatic land (WA DNR 2010). Located in the Salish Sea, bounded by Birch Bay State Park in the north, and the Lummi Indian Reservation in the south, CPAR was chosen for reserve status based on its biological and cultural importance. The reserve is noted for its cobble beaches, aquatic vegetation, and a diverse community of fish, birds, and other animals. Culturally, the reserve is an important part of the treaty protected accustomed grounds and stations of local Native American tribes, including Lummi Nation. The shores of the reserve also host three major industrial sites, two oil refineries and an aluminum smelter, and the nearshore waters are regularly visited by ocean going ships. The reserve is also visited by many recreational users, including beachcombers, kayakers, sport fishers, and small boat operators.

The Fidalgo Bay Aquatic Reserve (Figure 3) is also designated by the WA DNR as an Environmental Reserve. One of the primary reasons for establishing a reserve in Fidalgo Bay is the preservation of critical habitat for forage fish spawning. A broader purpose is to conserve and enhance native habitats and associated plant and wildlife species, with a special emphasis on forage fish, salmonids, and migratory birds (WA DNR, 2008). Historically, Fidalgo Bay was home to both the Samish Indian Nation and the Swinomish Tribe, who have both fished for salmon and harvested shellfish in this bay for centuries. The shores of the reserve include parcels owned and managed by both tribes, two refineries, the City of Anacortes, and small landowners. A trestle crosses the bay, which now serves as the Tommy Thompson trail where visitors bike, run, walk, and bird watch along the trail daily. The bay almost fully empties on the inside of the trestle and is mainly characterized as mudflat habitat.

The CPAR Citizen Stewardship Committee (CPAR CSC) and FBAR Citizen Stewardship Committee (FBAR CSC) formed to increase public participation in the Aquatic Reserve process and assist DNR's Aquatic Reserve Program to successfully implement the Reserves' management plans. The committees oversee scientific monitoring projects, create and manage education and outreach activities, and keep a watchful eye for activities that may impact the ecology of the reserve. The committees conceived of and helped plan and execute the marine bird abundance studies reported here.

The CPAR marine bird abundance survey begun in 2013 to meet several important goals. The primary scientific goals of the survey were to assess changes in marine bird abundance at the CPAR since the late 1970's and to provide baseline data on marine bird abundance to enable assessment of the effects of environmental changes in the CPAR area on future marine bird abundance. Educational goals included using public outreach based on this citizen science effort to educate the public about marine environmental issues, marine bird identification and ecology, and how science is employed to assess the impacts of environmental changes on marine birds. In addition, the survey was designed to give individuals interested in participating in the study an opportunity to learn first-hand how a scientific field study is planned, conducted, and analyzed. These secondary goals involved the use of citizen science to provide scientific and ecological literacy to public.

To accomplish the two primary scientific goals the CPAR marine bird study was designed to follow the matched protocols of two previous studies, the Marine Ecosystem Analysis Puget Sound Project (MESA; 1978-79; EPA 1981) and the Western Washington University marine bird abundance study (WWU; 2003-2005; Bower 2009). Approximately monthly (September-May) shore-based point counts were conducted at three sites (Sandy Point, Neptune Beach, Gulf Rd. terminus) adjacent to the aquatic reserve over a period of five years (2013-14, 2014-15, 2015-16, 2016-17, and 2017-18). In the first two years of the study (2013-2015) census data was taken for seven marine bird species for which the waters around CPAR are important breeding, migratory and/or overwintering habitats. In the third year (2015-16) the number of species was increased to 15 in accordance with the increased skills and knowledge of the citizen researchers. In 2016, the number of species was then increased to 29 species as the counters felt like this was very reasonable and would provide more valuable data. Point count methods mimicked those employed in the two earlier studies, and involved a team of researchers including two experts in marine bird identification, spotters, and data recorders who count and identify all visible birds during a point count period (Steffensen and Joyce 2013). All contributors to the CPAR portion of the study were trained by Dr. John Bower, an ornithologist with expertise in marine bird population ecology, and other bird identification experts, during a multi-week series of training events, culminating with training in the field.

The FBAR CSC similarly began marine bird monitoring in September of 2017 with the help from the Skagit Audubon Society and those involved with the Cherry Point surveys. The FBAR study uses the same methods and rationale for surveying as CPAR. As FBAR provides different bird habitat, the list of species slightly differs. Thirty-two species were counted for FBAR, from four sites aiming to be consistent with two previous studies, the Marine Ecosystem Analysis Puget Sound Project (MESA; 1978-79; EPA 1981) and the Western Washington University marine bird abundance study (WWU; 2003-2005; Bower 2009). Some species counted were modified from the CPAR surveys to better reflect species observed at FBAR. Caanan Cowles, current Wildlife Biologist at Washington Department of Fish and Wildlife and participant of the 2003-2005 WWU studies with over 15 years of experience in bird and mammal studies, assisted with the start of this pilot study with oversight assistance from Dr. John Bower. A training was provided by Caanan Cowles, as well as guidance on site designations and proper protocol procedures. Volunteers from FBAR CSC, the Skagit Audubon, and members of the community all assisted in the pilot monitoring at FBAR on a monthly basis from September 2017 through May 2018. The pilot results are included in this report from FBAR with the intent to inform future monitoring efforts and are not intended to draw any conclusion as no counters for these surveys were officially qualified during the pilot year, and therefore we had no quality assurance or control checks to ensure that the bird species were correctly identified and counted for the FBAR surveys.

Study Area Characteristics

Cherry Point:

The Cherry Point Aquatic Reserve is located in the eastern Strait of Georgia in the Salish Sea. Its northern boundary is Birch Bay State Park and its southern boundary is the Lummi Indian Nation Reservation. The majority of the area in and near the reserve consists of a combination of WA DNR owned aquatic lands, Birch Bay State Park, private lands, and tribal lands. Figure 1 shows the location of the reserve in Puget Sound. Figure 2 shows the reserve and some of the surrounding characteristics along with the location of the survey sites.

The greater Cherry Point area falls under the following description by WA DNR: “Geomorphic characteristics of the Whatcom County shoreline include glacial sediments, limited sea level rise, moderate tidal range, considerable wave exposure, rock strewn cobble beaches with moderate to high backshore bluffs. Because of its combination of exposure, fetch, and glacial makeup, Cherry Point has a unique beach type of large cobble/boulders with lower areas of mixed sand and pebble infill. Cobble intertidal areas, submerged aquatic vegetation and a steep gradient into deep water support a high diversity of... marine and shore birds and migratory waterfowl.” (WA DNR 2010)

Recreational uses include bird watching, walking the select public tidelands of Cherry Point, and nearshore recreational boating, including kayaking.

Fidalgo Bay:

The FBAR (Figure 1, Figure 3) is located in Skagit County nearby the City of Anacortes and two refineries at March Point. Historically, Fidalgo Bay was home to both the Samish Indian Nation and the Swinomish Tribe, who have both fished for salmon and harvested shellfish in this bay for centuries. The Swinomish Tribal Community is located southeast of FBAR with some land holdings on the east side of the bay. Samish Tribe properties are located on the western shore of FBAR. Andeavor (formerly Tesoro and soon to be Marathon Petroleum Corp. in 2019) and Shell refineries own properties on March Point, on the eastern shore of the Reserve. Other property owners adjacent to the reserve include the City of Anacortes as well as smaller landholders. The area of the reserve south of the trestle was transferred from the Skagit Land Trust to WA DNR, with the condition that it is a conservation easement. The easement requires that the area be used for fish and wildlife enhancement while limiting human activities.

Recreational uses at FBAR include bird watching, walking, running, biking, and nearshore recreational boating.

Existing Bird Monitoring Data

Several major bird censuses have been conducted in and near the CPAR and/or FBAR. These include:

The **MESA Puget Sound Project** was a comprehensive environmental study of the area and included a rigorous marine-bird census component. The study surveyed marine birds in 13 regions over a two-year period, 1978-79. This baseline study included more than 7,000 counts, including abundance counts from over 100 shore-based sites, transect counts from ferries and small boats, breeding island counts, and aerial surveys (EPA 1981).

The **WWU Marine Bird Study** replicated the MESA bird census in 2003-2005 based on shoreline and ferry counts (the bulk of the original MESA data sets). Results indicated a 28.9% decline in the total number of birds observed at 62 study locations. Fourteen of the 37 most common overwintering Salish Sea species showed statistically significant declines,

Cherry Point and Fidalgo Bay Aquatic Reserves Marine Bird Monitoring 2018 Report

including decreases of over 50% for ten species. Significant increases were reported for six of the 37 species in the comparison (Bower 2009).

WDFW/ Puget Sound Ambient Monitoring Programming (PSAMP) relies on aerial surveys conducted since 1992 (Evenson et al. 2010; Nysewander et al. 2005) throughout the American side of the southern Strait of Georgia, its associated waters, and the Strait of Juan de Fuca. The study repeated 54 aerial transect surveys conducted during the MESA study, enabling analysis of changes in long-term abundance. Results from 1992-1999 showed significant declines in 13 of 20 species/groups of species studied, including declines as high as 95% in the case of the Western Grebe. While this study has been important in assessing long-term abundance trends in inland Washington waters, the surveys only occur once in the winter, and are comparable to the airplane transects of the MESA study, a relatively minor part of that study.

Other relevant studies include the following:

Christmas Bird Counts in this area of Salish Sea began in 1957. In a recent analysis of Salish Sea Christmas Bird Counts significant declines were reported for seven species and significant increases were reported for three of the 37 species in the comparison (Bower 2009).

The Lummi Intertidal Baseline Inventory (LIBI) was conducted to document the existing diversity, abundance, distribution, and habitats of biological resources that are found on the Lummi Reservation tidelands, just south of the Cherry Point Aquatic Reserve. The LIBI integrates the results from six field surveys that were conducted in 2008 and 2009 with compatible pre-existing information. One of these monitoring programs was the Shorebird and Marine Mammal Survey. This study documented the diversity and monthly abundance of birds and marine mammals. During the 11-month survey a total of 52 different bird species and two marine mammal species were identified. Generally, the diversity of birds present across the Reservation tidelands was lowest in the summer months and highest during the fall and winter months. Likewise, the total abundance of birds was lowest during the summer and highest during the fall and winter (LNR 2010).

The Puget Sound Seabird Survey (PSSS), lead by the Seattle Audubon Society, has similar protocols to those used in these studies. These surveys also rely on citizen science volunteers to gather data throughout Puget Sound the first Saturday of the month from October through April to capture live bird density on wintering seabird populations.

Study Design

The protocol for this study was based on the studies done in the area previously as described by Bower (2009). The protocol consisted of four or more individuals moving from one site to the next, doing a full and complete bird count at each site. There were two experts using spotting scopes to see distant birds, one birder using binoculars to see closer birds, and one person charged with recording data. Counts included all the birds of the species included in the study at the time observed in the area. Care was taken to not repeat birds in the count with the help of the spotters. Experts at bird identification and counting birds were qualified after completing in-class and field-testing, and after spending at least one full year practicing the protocol with previously qualified experts. Experts were designated by Dr. John Bower based on their experience in other marine bird censuses and known bird identification skills. As FBAR has just begun and the 2017-2018 survey season was a pilot, no counters were qualified yet, though many were considered competent counters. So, while this data is presented in this report, it should be considered with some caution.

Field procedures

Surveys were conducted monthly from September through May during a tide greater than or equal to +6 at FBAR as the bay nearly fully empties at low tide and can impact bird counts. Tides were taken into account when scheduling surveys during the monitoring season at FBAR. Cherry Point sites are not dependent on tides so this was not a factor in scheduling. In most cases, a poll was sent to volunteers with potential dates and times for surveying. Most surveys occurred around the middle of each month. This also created a similar amount of time between monthly surveys, aiming to have at least two weeks between each consecutive survey. Weather conditions varied between months, however in a rare case, the February 2018 survey at FBAR was cancelled due to inclement weather. If the weather is such that results may be inaccurate due to visual impairments such as extreme rain, wind, wave height, or fog, a survey would be canceled. Rolling or high wave action for example would compromise the ability to accurately identify and count birds. This shore-based point-count protocol was developed to be compatible with the 1978/79 MESA Program protocols (EPA 1981) as closely as possible. Shore-based point counts were conducted using binoculars and spotting scopes approximately equal in quality to Eagle Optics Ranger 10×40 binoculars and 20-40× scopes (Eagle possible Optics, Middleton, WV, USA), with no time or distance limits; counts continued until all birds in the area were counted. Birds were identified to species whenever possible, and identified as closely as possible to species when species identification was not possible (e.g. scoter spp. or duck spp.). Site distance was limited by scope power consistent with what was used in the MESA studies. The elevation of sites was comparable and would not be expected to contribute to any differences in counts between sites.

Each survey was conducted with the following methods. On arrival at the site, basic weather data such as cloud cover, wind, and Beaufort scale were recorded. Two experienced counters selected a central point in the distance as a reference point. Scanning outward, away from the central point, the two counters identified and counted all birds in the field of view. Counters were careful to communicate with each other about birds that moved between the two areas being counted. While only one scan was made across the horizon, occasionally scanning back was required to accurately identify and thoroughly count all birds within the viewing range. Counters ensured that no birds were counted twice but all were accounted for. This required acute attention to detail and strong communication between counters and spotters throughout the survey. Birds on the backshore are not counted but birds along the water's edge or flying over the point count were counted. A trained scribe recorded the numbers called out by observers, repeating the numbers verbally to ensure accuracy of transcription. One or two assistant observers used binoculars to scan the water spotting birds or groups of birds that were either closer to shore or missed by the counters using scopes. Assistant observers were individuals from the training program who had not yet passed the requirements to become a survey counter. All birds counted in the census were counted by two expert counters.

Field sheets were delivered to RE Sources where staff and volunteers would enter the data and quality control check the data entered. RE Sources maintains data spreadsheets for both CPAR and FBAR and shares data periodically with partners.

Results

Public Participation in This Citizen Science Effort:

Cherry Point and Fidalgo Bay Aquatic Reserves Marine Bird Monitoring 2018 Report

CPAR CSC hosted three evening classes, each 3 hours long, during February of 2017. Nearly 30 volunteers attended these classes and several attended the field training that followed in March 2017. FBAR CSC hosted several planning meetings and gathered enough interested participants to test out the field methods starting in September 2017. FBAR CSC then hosted a class and field training in February 2018 with also nearly 30 volunteers attending. Both classes were lead by expert Caanan Cowles on both bird identification and protocol procedures.

Monthly Abundance of Target Species:

The CPAR survey results are shown in Table 1 (2013-2016) and Table 2 (2017-2018). FBAR survey results are found in Table 3. Species specific graphs for the 3 most commonly counted species at each reserve are found in Figure 4 for CPAR and Figure 5 for FBAR during 2016-2018 to coincide with the grant. Comparisons to historical data for CPAR can be found in the 2013-2016 report (Bower 2016).

CPAR: Surf scoter were counted in the highest abundance at Cherry Point. Brandt and bufflehead were also found in higher abundance than the other species counted for the 2016-2017 and 2017-2018 surveys.

FBAR: Bufflehead were counted at all sites, most commonly at the Fidalgo Bay Sign and Trestle South sites. Green-winged teal had the highest count at the most southern survey site, March Point Road. Green-winged teal often were found in mixed rafts with northern pintail at the March Point site, where the habitat is shallow and muddy compared to the other three sites that have deeper water habitats.

Discussion

The CPAR marine bird survey has successfully met its scientific goals in providing high quality marine bird abundance data for the CPAR area while FBAR has successfully completed a pilot year of surveys to provide a good basis for moving forward. Marine bird abundance data gathered over these studies has given a snapshot of current marine bird abundance that can be used to evaluate long-term trends in marine bird abundance as well as providing a baseline for understanding future changes in marine bird abundance in the CPAR and FBAR area due to environment changes from a variety of factors such as changes in industrialization of the adjacent shoreline, climate change, recreational changes along on the shoreline and nearshore waters, and the effects of environmental protection efforts in the region. In addition, the educational outreach arm of the survey has met the project's educational goals, providing knowledge about marine bird population ecology and marine environmental issues to hundreds of Western Washington residents, as well as providing more in depth training in marine bird identification and field biology protocol to dozens of citizen scientists.

The expansion to more species at CPAR since 2016 has proven to be a good addition. This increase in species has not put an extra burden on citizen science volunteers while collecting additional valuable data. Additionally, a solid group of volunteers has allowed these studies to continue. The group still recruits new participants and hosts educational events to engage the public, which prove valuable to maintain interest. This data could also be used in the 2020 CPAR Management Plan and/or the Shoreline Master Program updates to inform any management strategies regarding marine birds.

The pilot year of marine bird surveys proved a success at FBAR in that every survey had at least six or more participants with two highly knowledgeable counters. Participants have become familiar with the sites and the protocol so that the

studies can continue. The next steps are to continue with trainings and to get at least four or more committed volunteers qualified to be counters to assure that data collected is accurate.

Some additional thoughts for FBAR, after only one season of data collection, include consideration of additional or alternative sites in consideration of what parts of the bay are being missed and what opportunities the data could be used for in the future. The bottom southwest corner of the bay currently is not captured in these surveys due to perceived lack of accessibility; however large numbers of birds are typically observed in this shallow muddy habitat while driving to the FBAR Sign site along highway 20. A site included in the WWU 2003-2005 studies was able to capture this site, but was considered not accessible due to changes in foliage and shoreline. Either another access point could be looked into, or FBAR CSC can actively watch for opportunities that might make another site available to this survey.

Another perceived use of the FBAR data is in pre and post assessment of the Tommy Thompson Trail trestle removal, if the project moves forward. If the trestle were to be removed, habitat could significantly change over time, along with it, bird abundance and use. Some consideration should be taken as to if there are alternative sites that might better additionally capture birds in areas not currently captured that would most likely be impacted by the trestle removal. The other end of the trestle from where currently surveyed, facing outside the bay near the Fidalgo Bay Resort is one area of interest to potentially add for such interest, though there may be others.

In the fall of 2018, the PSSS expanded significantly, included sites nearby or overlapping with both CPAR and FBAR. Both CSCs are considering the possibility of adopting a protocol that incorporates the current protocol used in this study alongside the PSSS protocol so that future data could be easily compared to the data already collected at these sites along with being included in the Puget Sound-wide data set to better understand what areas marine birds are using when throughout the region. Both data sets are important for different reasons, but there is reason to believe we could do both simultaneously. One factor that appears to be an obstacle for both CPAR and FBAR is that PSSS requires the survey to be conducted the first Saturday of the month during the survey season. Many of our expert counters have expressed concern as this timing conflicts with other obligations. Both groups will look more into the feasibility of the PSSS protocols during the current survey season to make a decision for the 2019-2020 surveys.

While regular reports such as this provide value, another future recommendation is to provide reports that are more accessible to the public that are shorter in length, utilize infographics, and highlight the important data through the use of storytelling. This can provide an important educational aspect for the communities around the reserves and help validate citizen science volunteer efforts. Also, previous reports included comparisons to historical data (Bower 2016). While this report did not include these comparisons, this could help to illustrate how marine bird abundance has been changing over time.

The CPAR marine bird survey has already begun the sixth year of surveys, gathering marine bird abundance data for 29 important species. The FBAR marine bird surveys have just begun the second year, gathering marine bird abundance data for 32 important species, and have learned a lot from the first year as well as established a good idea of what the main bird species are that use the bay. The survey stands as an excellent model for the benefits of citizen science and educational outreach in the environmental sciences.

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