



U.S. NAVY

MARINE SPECIES MONITORING IN THE PACIFIC NORTHWEST

Protecting the Seas through Science



MARINE SPECIES MONITORING PROGRAM

MARINE MAMMAL MONITORING, SURVEYS, AND TAGGING

MARINE SPECIES MONITORING – NORTHWEST TIMELINE

SOUTHERN RESIDENT KILLER WHALES

FISH AND SEABIRD MONITORING / NEARSHORE HABITAT MANAGEMENT

MARINE SPECIES MONITORING PROGRAM

Navy Marine Species Research and Monitoring Efforts

The Navy continues to be a world leader in marine species research and monitoring, having funded marine research programs, surveys, and data collection efforts since 1992 (since 2004 in the Pacific Northwest). The Navy partners with state and federal agencies, universities, research institutions, federal laboratories, and private researchers around the world to better understand marine species occurrence and behavior. This scientific research helps environmental regulators, scientists, and the Navy to:

- ▶ Better understand the abundance, distribution, foraging, reproduction, physiology, hearing and sound production, behavior, and ecology of marine species, which are needed to assess the effects on species from naval activities.
- ▶ Develop and improve models to better predict potential effects of underwater sound and explosives on marine species.
- ▶ Develop effective protective measures.

Integrated Comprehensive Monitoring Program

As part of its Integrated Comprehensive Monitoring Program, the Navy works closely with National Marine Fisheries Service (NMFS) to coordinate monitoring efforts across all ocean regions where the Navy trains and conducts tests. The Navy provides annual reports of training and testing activities and monitoring studies to NMFS. These reports are also available to the public.

The Monitoring Program Coordinates with Other Navy Research Programs

The monitoring program works closely with the Navy's research and development programs. The Office of Naval Research Marine Mammals and Biology program conducts basic research, and the Living Marine Resources program conducts applied research. Technology and knowledge developed by these research programs are transitioned for environmental compliance and use by the monitoring program, and has included satellite tags, acoustic monitoring buoys, and measurements of killer whale hearing.

The Navy is dedicated to protecting the marine and coastal environments of the Pacific Northwest.



Photo courtesy of Steve Scott

Visit www.navy.marinespeciesmonitoring.us for more information on the Navy's Marine Species Monitoring Program.

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MARINE MAMMAL MONITORING, SURVEYS, AND TAGGING

- ▶ Distribution, Abundance, Seasonality, and Density:
 - Determining densities for marine mammals in inland Puget Sound waters through multi-season aerial surveys. *Partner: Smultea Sciences*
 - Documenting seasonal variation in seal and sea lion haulout use throughout inland Puget Sound waters through multi-season, regional aerial haulout surveys. *Partner: Washington Department of Fish & Wildlife (WDFW)*
 - Developing the first density estimates for harbor seals in inland Puget Sound waters during a Navy and NMFS workshop of scientists, including WDFW.
 - Determining seal and sea lion haulout abundance, seasonal trends, and densities at Navy installations. *Partners: WDFW, NMFS*
- ▶ Satellite Tag Tracking:
 - Studying California sea lion habitat use, foraging, dive behavior, and movements between inland waters of the Salish Sea and along outer coast from Washington to California. *Partner: NMFS*
 - Studying habitat use, dive behaviors, and overlap with and movement between Navy training areas of blue whales, fin whales, and gray whales. *Partner: Oregon State University*
 - Studying mix of distinct population segments of humpback whales through satellite tagging off the coasts of Washington, Oregon, California, and Hawaii. *Partner: Oregon State University*
 - Studying distribution of ESA-listed Guadalupe fur seals through satellite tagging. *Partner: The Marine Mammal Center*



Image provided by Oregon State University Marine Mammal Institute taken under NMFS permit no. 14856 issued to Dr. Bruce Mate.



- Studying movement patterns of fin, humpback, gray, and killer whales (offshore ecotype) through satellite tagging off the Washington coast. *Partner: Cascadia Research Collective*

MARINE MAMMAL MONITORING, SURVEYS, AND TAGGING

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MARINE SPECIES MONITORING — NORTHWEST TIMELINE * OFFSHORE * INLAND



2004 – PRESENT*

Acoustic soundscape studies for seasonality of marine mammals, including Southern Resident killer whales (SRKW)

2005 – PRESENT*

Endangered Species Act (ESA)-listed fish surveys

2008 – PRESENT*

Marine mammal (pinniped) surveys at Naval Base Kitsap (Bangor, Bremerton, and Manchester), and Naval Station Everett piers

2011–2012*

Marbled murrelet science panel coordinated with U.S. Fish & Wildlife Service (USFWS)

2011 – PRESENT*

Blue whale, fin whale, gray whale, humpback whale, and killer whale (SRKW and offshore ecotype) satellite tagging and tracking studies

2012 – PRESENT*

- Marbled murrelet and seabird density surveys
- Forage fish spawning surveys

2015–2017*

First harbor seal density estimates developed in partnership with NMFS and WDFW

2015–2018*

SRKW feeding study to collect, analyze, and identify specific salmon populations to support recovery efforts and development of the SRKW Priority Chinook Stocks Report

2016 – PRESENT*

Marbled murrelet and marine species pelagic (spring and winter) surveys in Washington offshore

2017–2018*

ESA-listed Chinook salmon (fall-run) modeling to estimate distribution, survivorship, & abundance

2017 – PRESENT*

Humpback whale genetic analyses to determine distinct population segment (DPS)

2014–2016**

California sea lion satellite tagging and tracking study

2019*

Analysis of long-term marbled murrelet data set (2001–2019) to determine seasonal trends, abundance, and distribution

2013–2014*

Seal and sea lion haulout usage in Puget Sound via aerial surveys

2013–2017*

Marine mammal aerial surveys to determine densities

2018 – PRESENT*

- ESA-listed Guadalupe fur seal satellite tagging and tracking study for species distribution
- ESA-listed Chinook salmon, coho salmon, steelhead, and bull trout tagging and tracking study



Photo courtesy of Roger Tabor, USFWS



The Navy is dedicated to protecting the marine and coastal environments in the Pacific Northwest. Since 2004, the Navy has conducted monitoring and surveys to better understand marine species with which we share the ocean environment.

An overview of Navy-funded efforts in support of our Marine Species Monitoring Program in the Pacific Northwest is provided in this timeline.



MARINE SPECIES MONITORING — NW TIMELINE

SOUTHERN RESIDENT KILLER WHALES

FISH AND SEABIRD MONITORING / NEARSHORE HABITAT MANAGEMENT

SOUTHERN RESIDENT KILLER WHALES

Navy Participation in the Washington Southern Resident Killer Whale Task Force

- ▶ On March 14, 2018, Governor Jay Inslee signed Executive Order 18-02 designating state agencies to take several immediate actions to benefit southern residents, and establishing the Southern Resident Killer Whale Task Force to develop a longer-term action recommendations for orca recovery and future sustainability.
- ▶ In November 2018, the Southern Resident Killer Whale Task Force issued a final report and recommendations. One of the recommendations called for Navy involvement as the Southern Resident Killer Whale Task Force moved into a second year. As a result, the Navy is providing technical and scientific support to the Prey and Vessel Working Groups.



Southern Resident Killer Whale Monitoring, Surveys, and Tagging

- ▶ Passive Acoustic Monitoring Offshore (\$4.5 million, with \$2.5 million over the last five years, in addition to \$1.2 million for SRKW Chinook salmon prey study):
 - Determining seasonal movements of ESA-listed Southern Resident killer whales through passive acoustic and visual monitoring. *Partner: NMFS*
 - Studying the occurrence and seasonality of Southern Resident killer whales and the acoustic soundscape through acoustic recording devices. *Partner: Scripps Institution of Oceanography, NMFS*
- ▶ Satellite Tag Tracking
 - Studying movement patterns of Southern Resident killer whales through satellite tagging off the Washington coast. *Partner: NMFS*
- ▶ Southern Resident Killer Whale Feeding Study
 - Navy funding to collect and analyze Southern Resident killer whale feces to identify specific salmon prey populations to support recovery efforts and development of the Southern Resident killer whale Priority Chinook Stocks Report.



SOUTHERN RESIDENT KILLER WHALES

FISH AND SEABIRD MONITORING / NEARSHORE HABITAT MANAGEMENT

FISH STUDIES AND SURVEYS

- ▶ Surveying ESA-listed fish. *Partners: USFWS, WDFW, fisheries conservation organizations*
- ▶ Long term, ongoing surveys for spawning forage fish in cooperation with WDFW.
- ▶ Estimating seasonal variation in ocean distribution, survivorship, and abundance of fall-run ESA-listed Chinook salmon. *Partner: NMFS*
- ▶ Documenting oceanic distribution of Chinook salmon, coho salmon, steelhead, and bull trout. *Partner: NMFS*
- ▶ Hood Canal summer-run chum nearshore habitat use and DNA study. *Partner: Wild Fish Conservancy*
- ▶ Fish passage barrier surveys and culvert improvements/maintenance on Navy Bases as funding allows. *Partners: USFWS, WDFW*
- ▶ Estuary restorations at Naval Base Kitsap Bangor's Cattail Marsh (project mitigation) and Naval Air Station Whidbey Island's Crescent Harbor Marsh to enhance salmon spawning and juvenile rearing habitat. *Partners: Skagit River System Cooperative (lead), Phillip Williams and Associates, Salmon Recovery Funding Board, and the University of Washington Wetland Ecosystem Team*
- ▶ Navy mitigation funding to support: Fish hatchery improvements (in Hood Canal vicinity); and the Oak Bay - Kilisut Harbor Reconnection project.
- ▶ Salmon and bull trout fish tagging study initiated in 2018. As of May 2019, tagged 87 fish in 2019 (68 Chinook, two coho, and 17 bull trout). *Partners: NMFS, NW Fisheries Science Center*

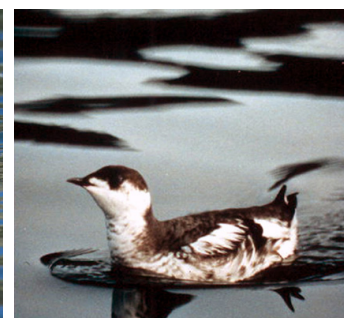
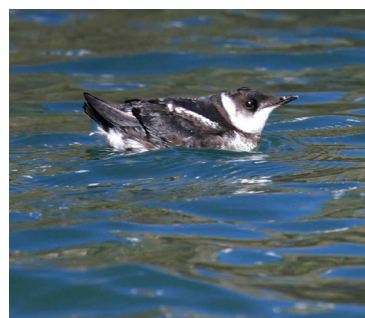


SEABIRD MONITORING AND SURVEYS

- ▶ Determining presence, distribution, and abundance of the ESA-listed marbled murrelet and short-tailed albatross in offshore waters. *Partner: WDFW*
- ▶ Estimating marbled murrelet densities within inland Puget Sound waters. *Partner: WDFW*
- ▶ Determining marbled murrelet seasonal trends, abundance, and distribution within inland Puget Sound waters. *Partners: USFWS, WDFW*

The following seabird reports and surveys are under development or underway:

- ▶ Pelagic winter survey report for 2017, 2018, and 2019.
- ▶ Trend analysis and draft manuscript are being developed; objective is to provide analysis of surveys conducted by WDFW since 2012.
- ▶ Currently conducting pelagic winter and spring surveys.



Nearshore habitat information on back cover.



NEARSHORE HABITAT MANAGEMENT IN NAVY REGION NORTHWEST

Integrated Natural Resource Management Plans (INRMPs)

- ▶ In accordance with the Sikes Act, Navy Region Northwest implements 12 INRMPs to manage natural resources. Land management/shore/nearshore activities that support marine mammals and endangered marine species include:
 - Marine mammal (pinniped) surveys at Naval Base Kitsap (Bangor, Bremerton, and Manchester), and Naval Station Everett piers since 2008.
 - Upland marbled murrelet nesting habitat and nearshore surveys for presence, distribution, and abundance.
 - Nearshore surveys of submerged aquatic vegetation, including eelgrass, which provide foraging, refuge, and suitable migration habitat for forage fish and juvenile ESA-listed fish.

Naval Air Station Whidbey Island Habitat Restoration: Crescent Harbor Marsh and Maylor Beach Restoration Projects

- ▶ The Air Station occupies several ecologically unique areas that have provided the Navy opportunities to restore and conserve unique habitats important to local salmon, surf smelt, and sand lance populations.

Partnering to Mitigate Ocean Acidification in Hood Canal

- ▶ In collaboration with the Puget Sound Restoration Fund and University of Washington Applied Physics Lab, the Navy provided funds to support an ocean acidification study to determine if kelp cultivation would sufficiently mitigate effects of ocean acidification on pteropods (free-swimming pelagic sea snails) in Hood Canal and the Washington coast.

FOR MORE INFORMATION:

- ▶ U.S. Navy Marine Species Monitoring Program navymarinespeciesmonitoring.us
- ▶ U.S. Navy Marine Mammals and Biology Program www.onr.navy.mil/Science-Technology/Departments/Code-32/All-Programs/Atmosphere-Research-322/Marine-Mammals-Biology
- ▶ U.S. Navy Living Marine Resources Program navysustainability.dodlive.mil/LMR
- ▶ Commander, U.S. Pacific Fleet www.cpf.navy.mil
- ▶ U.S. Navy Stewards of the Sea www.public.navy.mil/usff/environmental
- ▶ U.S. Navy Stewards of the Sea Facebook Page www.facebook.com/USNavyStewardsoftheSea



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