



U.S. Navy
**MARINE SPECIES
MONITORING
PROGRAM**

2023
ANNUAL REPORT
Pacific

Multi-range-complex marine species monitoring report for:

- *Hawaii Southern California Training and Testing (HSTT)*
- *Mariana Islands Training and Testing (MITT)*
- *Northwest Training and Testing (NWTT)*
- *Gulf of Alaska Training (GOA)*

June 2024



Multi-range-complex marine species monitoring report for Hawaii Southern California Training and Testing (HSTT), Mariana Islands Training and Testing (MITT), Northwest Training and Testing (NWTT), and Gulf of Alaska Training (GOA).

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Cover Photograph Credit:

A Chinook salmon (*Oncorhynchus tshawytscha*) tagged and released with a pop-up satellite archival tag near Chignik Bay, Alaska, photographed by Michael Courtney under the University of Alaska Fairbanks Institutional Animal Care and Use Committee assurance 495247 and State of Alaska Aquatic Resource Permits CF-20-039, CF-21-027, CF-21-085, and CF-22-034.

Short-finned pilot whales (*Globicephala macrorhynchus*) photographed by Robin W. Baird/Cascadia Research Collective on 17 April 2022 under NMFS Permit #20605 to Robin Baird.



Executive Summary

The United States (U.S.) Navy conducts training and testing activities in the Pacific region. These activities are described in the Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) for each area: the Hawaii-Southern California Training and Testing (HSTT) area (Department of the Navy [DoN] 2018a), the Mariana Islands Training and Testing (MITT) area (DoN 2020a), the Northwest Training and Testing (NWTT) area (DoN 2020b), and the Gulf of Alaska Training (GOA) area (DoN 2022a). The U.S. Navy training and testing ranges covered by these EISs/OEISs include the Hawaii Range Complex (HRC) and Southern California Range Complex (SOCAL), which are part of the HSTT Study Area; the Mariana Islands Range Complex (MIRC), which is part of the MITT Study Area; the Northwest Training Range Complex (NWTRC), the Keyport Range Complex, and the Southeast Alaska Acoustic Measurement Facility (SEAFAC) which are part of the NWTT Study Area.

To authorize these actions, the National Marine Fisheries Service (NMFS) issued Final Rules and Letters of Authorization (LOA) under the Marine Mammal Protection Act (MMPA) to the Commander, U.S. Pacific Fleet, and the Commander, Naval Sea Systems Command, and Biological Opinions under the Endangered Species Act (ESA) for each training and testing area.

This monitoring report was prepared in accordance with the annual monitoring reporting requirements for the 2023 calendar year (CY), and presents results and progress made during the period of 1 January 2023 to 31 December 2023. This is the Navy's 15th annual monitoring report since the program began in 2009. The marine species monitoring (MSM) described was conducted in accordance with objectives listed on the U.S. Navy's MSM Program website:

<http://www.navyminespeciesmonitoring.us/regions/pacific/current-projects/>.

In this report, monitoring goals for the HSTT, MITT, NWTT, and GOA study areas are framed in terms of progress made on question-based scientific objectives and programmatic Intermediate Scientific Objectives (as discussed in **Section 1**). The following list provides brief summaries of key results during 2023, with additional details in **Section 2**. **Section 3** lists the 2024 Monitoring Goals.

Highlights of scientific progress over the course of this reporting period include the following:

- Several projects in the HSTT and NWTT Study Area resulted in peer-reviewed publications or presentations in 2023, including: Cuvier's Beaked Whale (BW) and Fin Whale Population Dynamics and Impact Assessment at Southern California Anti-Submarine Warfare Range (SOAR); Marine Mammal Monitoring on Pacific Missile Range Facility (PMRF); Odontocete Studies on Pacific Missile Range Facility (PMRF), and Telemetry and Genetic Identity of Chinook Salmon in Alaska (see **Appendix A**).
- With regard to the conceptual framework categories, several projects in CY 2023 demonstrated progress beyond the category for *occurrence* and estimated the *exposure* of animals to mid-frequency active sonar (MFAS) and explosives, assessed animals' *responses* to underwater noise generated by U.S. Navy training and testing activities, and continued to



make strides toward assessing any population *consequences* resulting from these activities by investigating population trends.

U.S. Navy range-specific progress highlights include the following:

MITT

- A 10-year study of sea turtles in the Marianas was completed, providing information about the population structure, habitat use, and dive behavior of green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles in the waters of Guam, Saipan, and Tinian. This data was used by NMFS in support of proposing critical habitat for green sea turtles in the region.
- An examination of BW strandings from 1884–2023 determined Cuvier’s BWs (*Ziphius cavirostris*) were the most commonly stranded species throughout the Pacific Islands and discussed challenges.
- Drifting Acoustic Spar Buoy Recorders (DASBRs) deployed during the 2021 Mariana Archipelago Cetacean Surveys (MACS) were used to derive the first acoustic density and abundance estimates for Cuvier’s BW and Blainville’s BW (*Mesoplodon densirostris*) for the Marianas region. Results have been included in density estimates used in acoustic effects modeling for the next iteration of MITT compliance documents.
- Conducted Passive acoustic monitoring (PAM) off the island of Guam with the goal of detecting, classifying, locating, and deriving abundance and densities of BW species where the array is deployed; preliminary results showed Cuvier’s BWs were most commonly detected and occurred almost exclusively at night, while sonar events were detected less frequently and during the day.

HSTT HRC

- Acoustic data collection and analysis continued at PMRF; data were used to examine the abundance of baleen, beaked, sperm (*Physeter macrocephalus*), and killer (*Orcinus orca*) whales on the range, examine Bryde’s whale (*Balaenoptera edeni*) movement behavior, and observe sounds suspected to be associated with fish chorusing and the Deep Scattering Layer.
- The Marine Mammal Monitoring on U.S. Navy Ranges program continued to add to their acoustic trend analysis for abundance of Blainville’s and Cuvier’s BWs on PMRF, adding re-processing of collected data to account for equipment failure. Results from 2023 generally followed previously reported trends.
- Ten satellite tags were deployed on four odontocete species: short-finned pilot whale (*Globicephala macrorhynchus*), melon-headed whale (*Peponocephala electra*), pantropical spotted dolphin (*Stenella attenuata*), and bottlenose dolphin (*Tursiops truncatus*), and data will be analyzed for potential exposure and behavioral responses to sonar. Additionally, one biopsy sample was collected from a pantropical spotted dolphin.



- Data from four Blainville's BWs and 21 delphinid satellite tags were analyzed for exposure and response to U.S. Navy training activity at PMRF. Differences in dive behavior were noted between Submarine Command Course (SCC) phases for some individuals, however there were no consistent changes in behavior either within or across species.
- The University of Hawaii (UH) Health and Stranding Lab continued to conduct comprehensive stranding response, necropsy, and cause of death investigations, covering 15 stranding events that occurred in CY 2023 in the Pacific Islands Region. Detailed analysis of marine debris ingestion, as well as an investigation of causes of death in strandings in the Pacific Islands region between 2006 and 2022 was also conducted.
- A UH project to advance tagging capabilities in Hawaii progressed, with a workshop on tag data processing planned for spring 2024.

HSTT SOCAL

- Data recorded by High-frequency Acoustic Recording Packages (HARPs) deployed at four sites within the Southern California Bight between May 2022 and July 2023 were analyzed to characterize the seasonal occurrence and relative abundance of BWs. Cuvier's BWs were regularly detected at all sites and times of day but were detected most frequently at Site E from December through June. MFAS and explosions were also detected.
- As part of an ongoing study of the distribution and demographics of BWs and fin whales (*Balaenoptera physalus*) within SOCAL, 24 days of small vessel surveys were conducted in SOAR, resulting in 18 sightings of Cuvier's BWs, with 52 individuals identified and including two mother-calf pairs. This continues to provide information on population demographics of Cuvier's BWs in the area. In addition, six satellite tags were deployed on Cuvier's BWs and three on fin whales.
- Efforts continued to attempt to identify the species of BW that produces the BW43 pulse, but only two BWs were sighted: a Baird's BW (*Berardius bairdii*) and a possible Cuvier's BW.

NWTT

- The migration route and timing of Chinook salmon (*Oncorhynchus tshawytscha*) along the coast of Washington State were studied by tagging 298 maturing adult salmon across five locations throughout the GOA. Thus far, 61 of the acoustically tagged salmon have been detected along the Canadian and Washington Coasts, providing novel evidence that fish tagged in Alaska transit through the NWTT.
- Of 101 tagged Chinook salmon primarily from the Snake River spring/summer Evolutionarily Significant Units (ESUs), 56 individuals were detected primarily south of the Washington State coast between the Columbia River and Long Beach, Washington. Passive acoustic monitoring was conducted at the same time as the tags and is currently being analyzed to examine killer whale presence and co-occurrence with the tagged salmon.



- Visual surveys were conducted in Behm Canal and Southern Clarence Strait, Alaska, with a total of 75 sightings of eight species. Porpoises were sighted most frequently. Sonobuoys were also deployed, with only killer whales detected.
- In order to characterize the distribution of two distinct populations of green sturgeon (*Acipenser medirostris*) in and near the NWTT, 174 sturgeon were acoustically tagged between 2020 and 2023 and acoustically tracked moving along the Washington and Oregon coast, though some individuals were detected off the coast of British Columbia. Genetic analysis indicated that 71% of individuals belonged to the Northern Distinct Population Segment (DPS) and 29% belonged to the Southern (ESA-listed) DPS.

GOA

- Pop-up Satellite Archival Tags (PSATs) were deployed on 183 Chinook salmon within the GOA to characterize their horizontal and vertical distribution, habitat use, natural mortality of tagged individuals, and occupancy in the GOA. Movement models suggest the majority of tagged fish remained over the continental shelf in relatively close proximity to their tagging locations. Tissue samples analyzed for genetic analysis suggested that tagged Chinook salmon were from populations originating from Southeast Alaska, British Columbia, Washington, and Oregon.
- Three PAM moorings were deployed in the western GOA in fall 2023, and recovery is planned for September 2024. Data collected from these will allow investigation into the seasonal occurrence of several species, including North Pacific right whales (*Eubalaena japonica*), killer whales, and BWs.



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Appendices

Appendix A. 2023 Publications and Presentations from Navy-Funded Monitoring



List of 2023 Technical Reports Supporting This Annual Report

- DENSITY AND ABUNDANCE OF CUVIER'S AND BLAINVILLE'S BEAKED WHALES IN THE MARIANA ARCHIPELAGO ESTIMATED USING DRIFTING ACOUSTIC RECORDERS [BADGER ET AL. 2023]
- SMALL-BOAT SURVEYS AND SATELLITE TAGGING OF ODONTOCETES ON THE PACIFIC MISSILE RANGE FACILITY, KAUA'I, IN AUGUST 2023 [BAIRD ET AL. 2023]
- ASSESSING CETACEAN OCCURRENCE IN THE WESTERN GULF OF ALASKA USING PASSIVE ACOUSTICS [BERCHOK ET AL. 2024]
- STATUS REPORT FOR THE ACOUSTIC AND VISUAL SURVEY FOR CETACEANS IN BEHM CANAL AND SOUTHERN CLARENCE STRAIT, ALASKA [CRANCE ET AL. 2024]
- MARINE MAMMAL MONITORING ON NAVY RANGES (M3R) FOR BEAKED WHALES ON THE SOUTHERN CALIFORNIA ANTI-SUBMARINE WARFARE RANGE (SOAR) AND THE PACIFIC MISSILE RANGE FACILITY (PMRF), 2023 [DOLAN ET AL. 2024]
- 2013-2023 FINAL REPORT: SEA TURTLE SURVEYS AND TRACKING IN THE MARIANA ISLANDS TRAINING AND TESTING (MITT) STUDY AREA [GAOS ET AL. 2024]
- ASSESSING EXPOSURE AND RESPONSES OF SATELLITE-TAGGED BLAINVILLE'S BEAKED WHALES ON THE PACIFIC MISSILE RANGE FACILITY, HAWAII [HENDERSON ET AL. 2024A]
- RECEIVED LEVEL ESTIMATION, BEHAVIORAL RESPONSE, AND DIEL BEHAVIOR ANALYSES FOR DELPHINIDS TAGGED AT THE PACIFIC MISSILE RANGE FACILITY IN 2021-2022 [HENDERSON ET AL. 2024B]
- SUMMARY REPORT ON THE 2023 COLLABORATIVE BEAKED WHALE CRUISE OFF BAJA CALIFORNIA, MEXICO [HENDERSON ET AL. 2023]
- TAGGING GREEN STURGEON WITH ACOUSTIC TRANSMITTERS FOR EVALUATION OF HABITAT USE ALONG THE WASHINGTON COAST [HEIRONIMUS ET AL. 2023]
- PHASE II – CHINOOK OCCURRENCE AND STOCK ORIGIN ALONG COASTAL WA RELATIVE TO SRKW (UPDATE REPORT) [HUFF ET AL. 2024]
- PASSIVE ACOUSTIC MONITORING IN THE MARIANA ISLANDS: PRELIMINARY REPORT [KLINCK ET AL. 2023]
- FY23 ANNUAL REPORT ON PACIFIC MISSILE RANGE FACILITY MARINE MAMMAL MONITORING [MARTIN ET AL. 2024]
- PASSIVE ACOUSTIC MONITORING FOR MARINE MAMMALS IN THE SOCAL RANGE COMPLEX MAY 2022-JULY 2023 AND MARINE MAMMAL PRESENCE FROM CALCOFI VISUAL SURVEYS 2022-2023 [POSDALJIAN ET AL. 2024]
- CUVIER'S BEAKED WHALE AND FIN WHALE SURVEYS AT THE SOUTHERN CALIFORNIA OFFSHORE ANTI-SUBMARINE WARFARE RANGE (SOAR) [SCHORR ET AL. 2024]
- TELEMETRY AND GENETIC IDENTITY OF CHINOOK SALMON IN ALASKA: FINAL REPORT [SEITZ AND COURTNEY 2024]



MIGRATION ROUTE AND TIMING THROUGH THE NWTT OF CHINOOK SALMON
ACOUSTICALLY TAGGED IN THE GULF OF ALASKA [SMITH AND HUFF 2024]

COMPREHENSIVE STRANDING INVESTIGATIONS FOR HIGH PRIORITY CETACEAN SPECIES
[WEST ET AL. 2024A]

CAUSES OF MORTALITY AND PATHOLOGIC FINDINGS IN PACIFIC ISLAND CETACEANS: A
REVIEW OF STRANDINGS FROM 2006-2022 [WEST ET AL. 2024B]

AN EXAMINATION OF BEAKED WHALE STRANDING EVENTS IN THE PACIFIC ISLANDS
(1884–2023) [WEST ET AL. 2024C]

DISEASES OF STRANDED PACIFIC ISLAND MARINE MAMMALS [WEST ET AL. 2024D]



Acronyms and Abbreviations

BO	Biological Opinion	HSTT	Hawaii-Southern California Training and Testing	NWTRC	Northwest Training Range Complex
BW	beaked whale				
CalCOFI	California Cooperative Oceanic Fisheries Investigations	Hz	Hertz	NWTT	Northwest Training and Testing
		ICMP	Integrated Comprehensive Monitoring Program	OEIS	Overseas Environmental Impact Statement
CFC	Conceptual Framework Category	ISO	Intermediate Scientific Objective(s)	ONR	Office of Naval Research
CRC	Cascadia Research Collective	kHz	kilohertz	PacMAPPS	Pacific Marine Assessment Program for Protected Species
CY	calendar year	km	kilometer(s)		
DASBR	Drifting Acoustic Spar Buoy Recorder	km ²	square kilometer(s)		
		LOA	Letters of Authorization	PAM	passive acoustic monitoring
dB re 1μPa	decibel(s) referenced to 1 microPascal	m	meter(s)		
		M3R	Marine Mammal Monitoring on U.S. Navy Ranges	PCoD	Population Consequences of Disturbance
DEMVAL	Demonstration-Validation	MACS	Mariana Archipelago Cetacean Survey	Photo-ID	photo-identification
DoN	Department of the Navy			PMRF	Pacific Missile Range Facility
DPS	Distinct Population Segment	MarEcoTel	Marine Ecology and Telemetry Research	PSAT	Pop-up Satellite Archival Tag
EIS	Environmental Impact Statement	MFAS	mid-frequency active sonar	s	second(s)
ESA	Endangered Species Act	MIRC	Mariana Islands Range Complex	SCC	Submarine Command Course
ESU	Evolutionarily Significant Units	MITT	Mariana Islands Training and Testing	SOAR	Southern California Offshore Anti-Submarine Warfare Range
FM	frequency-modulated	MMPA	Marine Mammal Protection Act	SOCAL	Southern California Range Complex
GOA	Gulf of Alaska Training	MSM	marine species monitoring	SRKW	Southern Resident Killer Whale
GPS	Global Positioning System	nm	nautical mile(s)	TMAA	Temporary Maritime Activities Area
GVP	group vocal period	NMFS	National Marine Fisheries Service	UH	University of Hawaii
HARP	High-frequency Acoustic Recording Package	NIWC	Naval Information Warfare Center	U.S.	United States
hr	hour(s)	NUWC	Naval Undersea Warfare Center		
HRC	Hawaii Range Complex				
HCTT	Hawaii-California Training and Testing				



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1 Introduction

The United States (U.S.) Navy conducts training and testing activities in the Pacific region. These activities are described in the Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) for each area: the Hawaii-Southern California Training and Testing (HSTT) area (Department of the Navy [DoN] 2018a), the Mariana Islands Training and Testing (MITT) area (DoN 2020a), the Northwest Training and Testing (NWTT) area (DoN 2020b), and the Gulf of Alaska Training (GOA) area (DoN 2022a).

The U.S. Navy training and testing ranges covered by these EISs/OEISs include the Hawaii Range Complex (HRC) and Southern California Range Complex (SOCAL), which are part of the HSTT area; the Mariana Islands Range Complex (MIRC), which is part of the MITT area; the Northwest Training Range Complex (NWTRC), the Keyport Range Complex, and the Southeast Alaska Acoustic Measurement Facility (SEAFAC) which are part of the NWTT area.

To authorize these actions, the National Marine Fisheries Service (NMFS), under the Marine Mammal Protection Act (MMPA), issued (1) Final Rules for HSTT (NMFS 2018a, 2020j, 2022a), MITT (NMFS 2020g), NWTT (NMFS 2020d), and GOA (NMFS 2017b, 2023a); (2) Letters of Authorization (LOA) under the MMPA to Commander, U.S. Pacific Fleet and Commander, Naval Sea Systems Command for HSTT (NMFS 2018c, 2018d, 2020h, 2020i), MITT (NMFS 2020f), NWTT (NMFS 2020b, 2020c), and GOA (NMFS 2017a, 2023b); (3) and Biological Opinions (BOs) under the Endangered Species Act (ESA) for HSTT (NMFS 2018b), MITT (NMFS 2020e), NWTT (NMFS 2020a), and the GOA (NMFS 2017c, 2022b).

The regulations issued with the Final Rules for HSTT, MITT, NWTT, and GOA require the U.S. Navy to submit an annual monitoring report, as specified at 50 Code of Federal Regulations § 218.75(d) (HSTT), § 218.95(d) (MITT), § 218.145(d) (NWTT), and § 218.155(f) (GOA). Monitoring results from all Pacific U.S. Navy areas, (i.e., HRC, SOCAL, MIRC, NWTRC, and GOA), are treated in this report in an integrated fashion to allow comparison across ranges and a cumulative view of progress made on monitoring goals across ranges. This report is the ninth such “Multi-Range”-Complex Annual Monitoring Report (see DoN 2016, 2017, 2018b, 2019, 2020c, 2021, 2022b, 2023). Results from this report are intended to iteratively inform future cycles of the Integrated Comprehensive Monitoring Program (ICMP), Adaptive Management Review, and Strategic Planning Processes as well as provide a comprehensive view of marine species monitoring (MSM) within the Pacific Ocean during the 2023 reporting period. Additional information about the Integrated Comprehensive Monitoring Program and Strategic Planning Process is available on the U.S. Navy’s MSM Program website at:

<https://www.navymarinespeciesmonitoring.us/reading-room/program-workshop/>

Prior-year reports and associated publications are available on the U.S. Navy’s MSM Program website at:

<https://www.navymarinespeciesmonitoring.us/reporting/pacific/>



This monitoring report was prepared in accordance with the annual monitoring reporting requirements, and presents results and progress made during the period from 1 January 2023 to 31 December 2023, with some variation in the reporting period of individual technical reports.

MSM was conducted in accordance with project objectives listed on the U.S. Navy's MSM Program website at:

<http://www.navymarinespeciesmonitoring.us/regions/pacific/current-projects/>

Section 2 of this report summarizes monitoring results reported in 2023. Detailed technical reports for the individual MSM projects are provided as supporting documents to this report (Badger et al. 2023; Baird et al. 2023; Berchok et al. 2024; Crance et al. 2024; Dolan et al. 2024; Gaos et al. 2024; Henderson et al. 2023, 2024a, 2024b; Heironimus et al. 2023; Huff et al. 2024; Klinck et al. 2023; Martin et al. 2024; Posdaljian et al. 2024; Schorr et al. 2024; Seitz and Courtney 2024; Smith and Huff 2024; and West et al. 2024a, 2024b, 2024c, 2024d).

Section 3 of this report summarizes monitoring projects for the next year of 2024.

Appendix A provides a list of 2023 publications and conference presentations from U.S. Navy-funded monitoring by author's last name.



2 Marine Species Monitoring in the Pacific Ocean – 2023 Goals and Implementation

The U.S. Navy training and testing ranges within the Pacific Ocean are located within the HSTT Study Area, MITT Study Area, NWTT Study Area, and GOA Training Area. The study areas vary in terms of monitoring goals implemented for protected marine species, including marine mammals, sea turtles, and ESA-listed fishes, in support of each study area’s MMPA and ESA requirements (NMFS 2017a, 2017b, 2017c, 2018a, 2018b, 2018c, 2018d, 2020a, 2020b, 2020c, 2020d, 2020e, 2020f, 2020g, 2020h, 2020i, 2020j, 2022a, 2022b).

Figure 1 provides an overview of all MSM projects and goals across all the Pacific training and testing areas. **Figure 1** shows the distribution of monitoring questions and study objectives with respect to monitoring projects and Conceptual Framework Categories (CFC) (i.e., *occurrence*, *exposure*, *response*, and *consequences*) (DoN 2010), as well as illustrates which Intermediate Scientific Objectives (ISOs) are addressed by each monitoring project.

Current monitoring goals are framed in terms of progress made on scientific monitoring questions and are shown paired with accomplishments in **Table 1**. Project accomplishments are shown for the current year (2023). Readers may refer to previous Annual Monitoring Reports (DoN 2016, 2017, 2018b, 2019, 2020c, 2021, 2022b, 2023) for project accomplishments from previous years.



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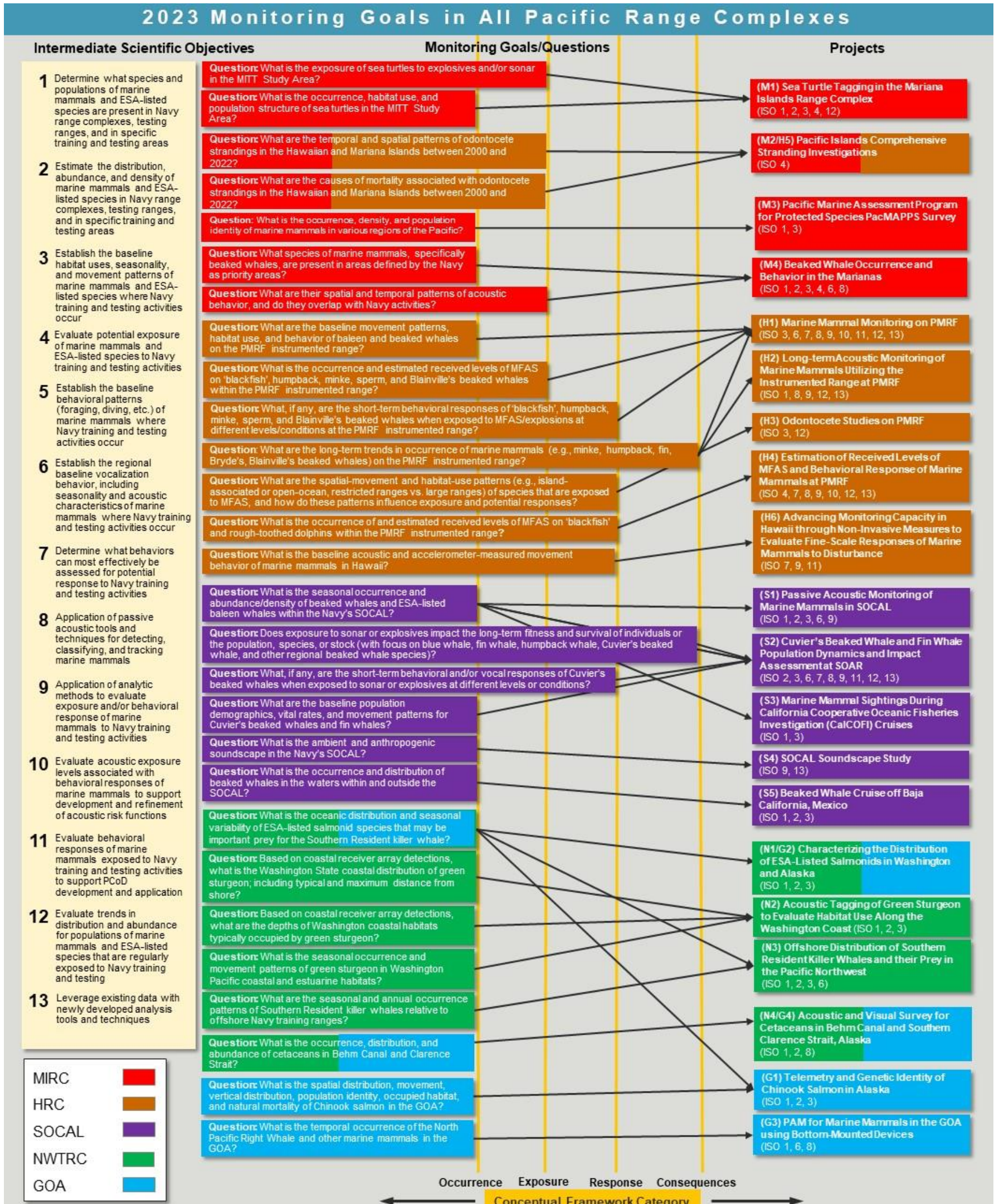


Figure 1. 2023 Monitoring goals in all Pacific range complexes by project. Range color under Projects indicates fieldwork location and under Monitoring Goals/Questions indicates where the questions are being addressed.



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Table 1. Monitoring goals and accomplishments for U.S. Navy study areas/ranges in 2023.

Project Title (Technical Report for 2023)	Conceptual Framework Category	Monitoring Questions	Accomplishments ^a
MITT			
[M1] Sea Turtle Tagging in the Mariana Islands Range Complex (Gaos et al. 2024)	Occurrence, Exposure	<ul style="list-style-type: none"> What is the occurrence, habitat use, and population structure of sea turtles in the MITT Study Area? What is the exposure of sea turtles to explosives and/or sonar in the MITT Study Area? 	In 2023: <ul style="list-style-type: none"> Final technical report completed (Gaos et al. 2024). Surveys around Guam, Saipan, and Tinian resulted in a total of 517 turtles encountered. Out of these, 111 were captured and outfitted with satellite tags. Green turtles were observed in greater numbers compared to hawksbills by a ratio of approximately 10:1. Overwhelming majority (97.5%) of captures were juveniles or sub-adults. Overall (95% volume contour) and core (50% volume contour) home ranges were calculated and compared by species, size, and island. No significant difference was found. The average overall home range for green turtles was 9.88 km² (SD = 20.8 km²) and core home range was 1.13 km² (SD = 1.84 km²). The average overall home range for hawksbill turtles was 7.96 km² (SD = 5.85 km²) and core home range was 0.95 km² (SD = 0.72 km²). Vast majority of turtles (92.8%) showed high foraging site fidelity and limited movements. Only 8 out of 107 tagged turtles whose tags transmitted data moved out of the home range and traveled between distinct areas on the same island, moved from one island to another, or departed the Mariana Islands. Both green and hawksbill turtles spent the majority of their time at depths of 25 m or less. Despite this similarity, overall, hawksbill turtles spent more time in deeper waters than green turtles, as well as having longer dive durations.
[M2/H5] Pacific Islands Comprehensive Stranding Investigations (West et al. 2024a, 2024b, 2024c, 2024d) This project is also a component of HRC [H5].	Exposure	<ul style="list-style-type: none"> What are the temporal and spatial patterns of odontocete strandings in the Hawaiian and Mariana Islands between 2006 and 2022? What are the causes of mortality associated with odontocete strandings in the Hawaiian and Mariana Islands between 2006 and 2022? 	In 2023: <ul style="list-style-type: none"> Reported on the stranding response, necropsy, and cause of death investigations, highlighting a few cases out of the 15 stranding events that occurred during the 2023 CY, including a sperm whale that died of marine debris ingestion, the first case of fatally disseminated toxoplasmosis in a bottlenose dolphin, and a fatal lungworm diagnosis in a spinner dolphin calf (West et al. 2024a). A comprehensive analysis of causes of death based on an examination of 250 stranding investigations of 20 cetacean species in the Pacific Islands region between 2006 and 2022 resulted in a morphological diagnosis or multiple diagnoses associated with death in 125 cases (50%). Natural disease was observed in 60% of stranded animals and (anthropogenic) trauma was observed in 28% of strandings. A peer-reviewed publication is expected in late 2024 (West et al. 2024b). Determined that Cuvier's BWs were the most commonly stranded out of five species across the Pacific Islands from 1884–2023, followed by Blainville's BWs. A peer-reviewed publication is expected in late 2024 (West et al. 2024c). Better understanding of BW circovirus has developed from improved testing techniques and increased testing of archived samples, with identification of four additional cetacean host species for the first time (West et al. 2024d).
[M3] Pacific Marine Assessment Program for Protected Species (PacMAPPS) Survey (Badger et al. 2024)	Occurrence	<ul style="list-style-type: none"> What is the occurrence, density, and population identity of marine mammals in various regions of the Pacific? 	In 2023: <ul style="list-style-type: none"> First density estimates of Cuvier's and Blainville's BWs in the Marianas were calculated using recent developments in the statistical treatment of acoustic data collected on drifting recorders in 2021, with several assumptions. BWs had a higher estimated density and abundance in the northern strata compared to the southern strata. The study area was divided into northern and southern strata demarcated at 15.5°N based on previous observations. Blainville's BWs had a higher estimated abundance (15,667) than Cuvier's (6,001). Cuvier's BWs were estimated at a density of 8.72 individuals per 1000 km² in the Northern strata and 4.78 individuals per 1000 km² in the Southern strata. Blainville's BWs were estimated at a density of 28.5 individuals per 1000 km² in the Northern strata and 4.15 individuals per 1000 km² in the Southern strata.



Project Title (Technical Report for 2023)	Conceptual Framework Category	Monitoring Questions	Accomplishments ^a
MITT (continued)			
<p>[M4] Beaked Whale Occurrence and Behavior in the Marianas</p> <p>(Klinck et al. 2023)</p>	<p>Occurrence, Exposure</p>	<ul style="list-style-type: none"> What species of marine mammals, specifically beaked whales, are present in areas defined by the Navy as priority areas? What are their spatial and temporal patterns of acoustic behavior and do they overlap with Navy activities? 	<p>In 2023:</p> <ul style="list-style-type: none"> Three species of BWs (Cuvier's, Blainville's, and "BWC") and one unidentified BW signal were detected on the six Rockhopper passive acoustic recording units off the west coast of Guam. A total of 145 BW encounters were detected, with Cuvier's BWs comprising 133 encounters, which occurred almost exclusively at night. Density estimation for Cuvier's BWs near the array is ongoing. MFAS was detected 18 times, primarily during the day. No BW detections occurred in close temporal proximity to the MFAS detections.
HRC			
<p>[H1] Marine Mammal Monitoring on PMRF</p> <p>(Martin et al. 2024)</p>	<p>Occurrence, Exposure, Response, Consequences</p>	<ul style="list-style-type: none"> What is the occurrence and estimated received levels of MFAS on 'blackfish', humpback, minke, sperm, and Blainville's beaked whales within the PMRF instrumented range? What, if any, are the short-term behavioral responses of 'blackfish,' humpback, minke, sperm, and Blainville's beaked whales when exposed to MFAS/explosions at different levels/conditions at PMRF instrumented range? What are the baseline movement patterns, habitat use, and behavior of baleen and beaked whales on the PMRF instrumented range? What are the long-term trends in occurrence of marine mammals (e.g., minke, humpback, fin, Bryde's, Blainville's) on the PMRF instrumented range? 	<p>In 2023:</p> <ul style="list-style-type: none"> Collected and analyzed 6,150 hr of new acoustic data from August 2022 to August 2023. Bryde's whale tracks from 2011–2022 showed they were more likely to travel in a faster and more directional state during the daytime than at night and between May and August when compared to other times of year. Abundance of Group Vocal Periods (GVPs) was highest for Blainville's BWs at 4.2 GVPs/hour in June 2023, with much lower GVPs for Cuvier's BWC, and Longman's BWs. Nine tracked whales were exposed to MFAS during the February 2023 SCC and median received sound level by source estimated by propagation modeling. GVPs of Blainville's Cuvier's and BWC BWs changed during the different phases of the February and August 2023 SCCs. Sounds suspected to be associated with fish coursing and the Deep Scattering Layer were observed occurring daily over 12 days of data in January 2017. Six publications were produced: Fleishman et al., Ecological inferences about marine mammals from passive acoustic data; Helble, et al., Minke whales change their swimming behavior with respect to their calling behavior, nearby conspecifics, and the environment in the central North Pacific; Henderson, Beaked whale behavioral responses to Navy mid-frequency active sonar; Kratofil, et al., Biologically Important Areas II for cetaceans within US and adjacent waters–Hawai'i Region; Manzano-Roth et al., Dive characteristics of Cross Seamount beaked whales from long-term passive acoustic monitoring at the Pacific Missile Range Facility, Kaua'i; McCullough et al., Geographic distribution of the Cross Seamount beaked whale based on acoustic detections.
<p>[H2/S2] Long-term Acoustic Monitoring of Marine Mammals Utilizing the Instrumented Range at PMRF and SOAR</p> <p>(Dolan et al. 2024)</p> <p>This is a joint project with [H3] "Odontocete Studies on PMRF" and [S2] "Cuvier's Beaked Whale and Fin Whale Dynamics and Impact Assessment at SOAR."</p>	<p>Consequences</p>	<ul style="list-style-type: none"> What are the long-term trends in occurrence of marine mammals (e.g., minke, humpback, fin, Bryde's, Blainville's and Cuvier's beaked whales) on the PMRF instrumented range? 	<p>In 2023:</p> <ul style="list-style-type: none"> Conducted five field surveys at SOAR (November 2022 and February, May, July, and October 2023) in collaboration with MarEcoTel (see Project [S2]), logged 555 acoustic detections, and directed MarEcoTel to animals of interest for 87 of the detections leading to 38 visual verifications. Conducted one field test at PMRF (in August 2023) with CRC (see Project [H4]), logged 99 acoustic detections, and directed CRC to 19 of the detections leading to 8 visual verifications. Cuvier's BWs exhibited a seasonal pattern on the SOAR range, with the numbers of GVPs detected and abundance higher from December through May with a maximum mean monthly abundance of 67.5 animals/hour in January. The maximum calculated abundance occurred in January 2023 at 110.3 animals/hour. Data collection problems were discovered, resulting in re-processing of data to account for different spatial occurrences at PMRF. Seasonal distribution of Blainville's BWs at PMRF peaked from March through July, with a maximum mean hourly abundance of 30.71 in January 2023. Seasonal distribution of Cuvier's BWs at PMRF peaked in February through July and declined in September/October.



Project Title (Technical Report for 2023)	Conceptual Framework Category	Monitoring Questions	Accomplishments ^a
HRC (continued)			
<p>[H3] Odontocete Studies on PMRF</p> <p>(Baird et al. 2023)</p> <p>Tag telemetry data collected was also used in Project [H4]. This project is conducted in conjunction with Project [H2].</p>	<p>Occurrence, Exposure, Response</p>	<ul style="list-style-type: none"> What are the spatial-movement and habitat-use patterns (e.g., island-associated or open-ocean, restricted ranges vs. large ranges) of species that are exposed to MFAS, and how do these patterns influence exposure and potential responses? 	<p>In 2023:</p> <ul style="list-style-type: none"> Had 30 encounters with six species of cetaceans, with the most unusual being four groups of pantropical spotted dolphins. Deployed a total of 10 satellite tags on four different species. All individuals remained on or in close proximity to PMRF for the majority of their tag deployments. Received location and high-resolution time series and/or dive behavior data from all 10 tags. Published a manuscript in <i>Endangered Species Research</i>, “Identifying social clusters of endangered main Hawaiian Islands false killer whales” (Mahaffy et al. 2023); Published a manuscript in <i>Marine Mammal Science</i>, “Sexually dimorphic characteristics of short-finned pilot whales, false killer whales, pygmy killer whales, and melon-headed whales assessed using fin and body morphometrics from photographs taken at sea” (Yahn et al. 2023).
<p>[H4] Estimation of Received Levels of MFAS and Behavioral Response of Marine Mammals at PMRF</p> <p>(Henderson et al. 2024a, 2024b)</p> <p>Data used in this project were collected from projects [H3] and [H1].</p>	<p>Exposure, Response</p>	<ul style="list-style-type: none"> What is the occurrence of and estimated received levels of MFAS on ‘blackfish’ and rough-toothed dolphins within the PMRF instrumented range? 	<p>In 2023:</p> <ul style="list-style-type: none"> Data from four Blainville’s BWs tagged in 2017, 2021, and 2022 were analyzed for exposure and response to Navy training activity at PMRF (Henderson et al. 2024a). One whale left the area immediately, but the tag data still provided useful baseline information. The remaining whales’ data demonstrated that while there may have been some changes to dive behavior and horizontal movement in response to MFAS, they did not display a strong avoidance response and remained in the area west of the range (Henderson et al. 2024a). Satellite-tagging efforts from August 2021 and 2022 resulted in 21 delphinids tagged, with 16 remaining in the area or with direct paths between their location and sources of MFAS. Maximum median received sound pressure levels ranged from 72.6 to 147.7 dB re 1 µPa, with a maximum estimated RL of 156.2 dB re 1 µPa (Henderson et al. 2024b). Differences in dive behavior were noted between SCC phases for some individuals; however, there were no consistent changes in behavior either within or across species (Henderson et al. 2024b).
<p>[H5/M2] Pacific Islands Comprehensive Stranding Investigations</p> <p>(West et al. 2024a, 2024b, 2024c, 2024d)</p> <p>This project is also a component of MIRC Project [M2].</p>			
<p>[H6] Advancing Monitoring Capacity in Hawaii through Non-Invasive Measures to Evaluate Fine-Scale Responses of Marine Mammals to Disturbance</p>	<p>Response</p>	<ul style="list-style-type: none"> What is the baseline acoustic and accelerometer-measured movement behavior of marine mammals in Hawaii? 	<p>In 2023:</p> <ul style="list-style-type: none"> Field work occurring in early 2024. Report expected summer 2024. Workshop on tag data processing developed and planned for spring 2024.
SOCAL			
<p>[S1] Passive Acoustic Monitoring of Marine Mammals in SOCAL</p> <p>(Posdaljian et al. 2024)</p> <p>Additional results reported in Project [S4].</p>	<p>Occurrence</p>	<ul style="list-style-type: none"> What is the seasonal occurrence and abundance/density of beaked whales and ESA-listed baleen whales within the Navy’s SOCAL? 	<p>In 2023:</p> <ul style="list-style-type: none"> Analyzed acoustic data recorded by HARPs deployed at four sites (Sites E, SN, H, N) from May 2022 to July 2023. Detected individual BW echolocation clicks, as well as MFAS and explosions (see Project [S4]). Cuvier’s BW FM pulses were regularly detected at all sites and all times of day but were detected in much higher numbers at site E with the highest detections from December 2022 to June 2023.



Project Title (Technical Report for 2023)	Conceptual Framework Category	Monitoring Questions	Accomplishments ^a
SOCAL (continued)			
<p>[S2/H2] Cuvier's Beaked Whale and Fin Whale Population Dynamics and Impact Assessment at the SOAR</p> <p>Schorr et al. 2024; Dolan et al. 2024)</p> <p>This is a joint project with Project [H2] "Long-term Passive Acoustic Monitoring of Marine Mammals at PMRF and SOAR".</p>	Occurrence, Exposure, Response, Consequences	<ul style="list-style-type: none"> What are the baseline population demographics, vital rates, and movement patterns for Cuvier's beaked whales and fin whales? What, if any, are the short-term behavioral and/or vocal responses of Cuvier's beaked whales when exposed to sonar or explosives at different levels or conditions? What is the seasonal occurrence and abundance/density of beaked whales and ESA-listed baleen whales within the Navy's SOCAL? Does exposure to sonar or explosives impact the long-term fitness and survival of individuals or the population, species, or stock (with focus fin whale, Cuvier's beaked whale, and other regional beaked whale species)? 	<p>In 2023:</p> <ul style="list-style-type: none"> Conducted 24 days of survey effort between 7 January 2023 and 8 October 2023. There were 203 sightings of cetaceans, including 18 sightings totaling 41 Cuvier's BWs and 37 sightings totaling 59 fin whales (Schorr et al. 2023). Identified 52 unique Cuvier's BWs, 15 (29%) of which had been sighted in a previous year. Two mother-calf pairs were identified, one new to the study, the other had been seen four times prior to 2023 including as a sub adult in 2010. Deployed six satellite tags on Cuvier's BWs, and three on fin whales. Processed 436 new fin whale identifications, bringing that dataset to 3,620 sightings of 1,377 unique individuals. See [H2] for additional results from Dolan et al. (2024).
<p>[S3] Marine Mammal Sightings During CalCOFI Cruises</p> <p>(Posdaljian et al. 2024)</p> <p>[This project was formerly titled "Beaked Whale Occurrence in SOCAL using Towed Array" in 2018 and "Marine Mammal Sightings during CalCOFI Cruises" from 2004–2017].</p>	Occurrence	<ul style="list-style-type: none"> What is the seasonal occurrence and abundance/density of marine mammals and ESA-listed baleen whales within the Navy's SOCAL? 	<p>In 2023:</p> <ul style="list-style-type: none"> Continued seasonal cruises with four surveys from fall 2022 to summer 2023. A total of 352 sightings were made of 12 cetacean species. Fin and humpback whales were the most frequently sighted mysticetes and short-beaked and long-beaked common dolphins were the most frequently encountered odontocetes. Spatial and temporal patterns were observed in all species following previously described patterns. Cumulative data from 20-years of CalCOFI surveys has allowed unique winter spatial habitat models to be developed for two species in the Hawaii-California Training and Testing (HCTT) Area for Phase IV (short-beaked common dolphin and fin whale).
<p>[S4] SOCAL Soundscape Study</p> <p>(Posdaljian et al. 2024)</p> <p>Additional results reported in Project [S1].</p>	Occurrence	<ul style="list-style-type: none"> What is the ambient and anthropogenic soundscape in the Navy's SOCAL? 	<p>In 2023:</p> <ul style="list-style-type: none"> MFAS was detected at all sites with the highest number of detections occurring during October 2022. Site N had the most MFAS packet detections and highest cumulative sound exposure levels. Explosions were detected at all sites, with the highest number at site H. A peak in number of explosions occurred in July at sites H and N, with a second peak in October through December only at site H. At all sites, temporal and spectral parameters suggest association with fishing, specifically with the use of seal bombs. Determined that the underwater ambient soundscape was highest for frequencies greater than 200 Hz at site SN, likely due to the site's exposure to the entire North Pacific. Peaks in sound levels below 100 Hz at all sites were related to the seasonally increased presence of blue and fin whales.
<p>[S5] Beaked Whale Cruise off Baja California, Mexico</p> <p>(Henderson et al. 2023)</p>	Occurrence	<ul style="list-style-type: none"> What is the occurrence and distribution of beaked whales in the waters within and outside the SOCAL? 	<p>In 2023:</p> <ul style="list-style-type: none"> Conducted a multi-week expedition in 2023, but weather conditions limited the search area. Two BWs were sighted, one of possible Cuvier's BW and one of Baird's BW. Eight other cetacean species were sighted, including one group of killer whales which was unusual for the area. Both BW species were also detected acoustically, though none in conjunction with a visual sighting, in addition to one detection of BW43 pulses.

NWTT



Project Title (Technical Report for 2023)	Conceptual Framework Category	Monitoring Questions	Accomplishments ^a
<p>[N1/G2] Characterizing the Distribution of ESA-Listed Salmonids in Washington</p> <p>(Smith and Huff 2024)</p> <p>This project is also linked to projects [G1], [G2], and [N3].</p>	Occurrence	<ul style="list-style-type: none"> What is the oceanic distribution and seasonal variability of ESA-listed salmonid species that may be important prey for the Southern Resident killer whale? 	<p>In 2023:</p> <ul style="list-style-type: none"> From 2020 to 2022, 298 maturing adult Chinook salmon were acoustically tagged across five locations in the Gulf of Alaska. Thus far, 61 tagged salmon have been detected, from 18 to 804 days after tagging in waters of the Pacific Northwest between March and October. Fish from the Upper Willamette River ESU and Oregon Coast ESU were detected on receivers within NWTT between June and October. The 298 tagged Chinook salmon included ten different genetic stocks that were from Southeast Alaska, British Columbia, Washington, or Oregon. This included two ESA Threatened ESUs, Lower Columbia River and Upper Willamette River, and one ESU, the Oregon Coast, which is a candidate for ESA listing.
NWTT (continued)			
<p>[N2] Acoustic Tagging of Green Sturgeon to Evaluate Habitat Use Along the Washington Coast</p> <p>(Heironimus et al. 2023)</p>	Occurrence	<ul style="list-style-type: none"> Based on coastal receiver array detections, what is the Washington State coastal distribution of green sturgeon; including typical and maximum distance from shore? Based on coastal receiver array detections, what are the depths of Washington coastal habitats typically occupied by green sturgeon? What is the seasonal occurrence and movement patterns of green sturgeon in Washington Pacific coastal and estuarine habitats? 	<p>In 2023:</p> <ul style="list-style-type: none"> Project final report reported on cumulative data from 312 green sturgeon captured in 2020, 2021, and 2023, of which 174 were implanted with VEMCO 69 kHz acoustic transmitters. Of the genetically sampled fish, 71% were from the northern DPS and 29% were from the southern DPS. Fin clips collected in 2023 had not been analyzed as of the report. Acoustic data indicated that some green sturgeon were detected on the offshore acoustic receiver array year-round, with peak detections occurring around May. The majority of individual fish were detected on the offshore acoustic receiver array moving back and forth between the Columbia River estuary, Willapa Bay, and Grays Harbor, though some individuals displayed long migrations up the coast and were detected off the coast of British Columbia.
<p>[N3] Distribution of Southern Resident Killer Whales and their Prey in the Pacific Northwest</p> <p>(Huff et al. 2024)</p> <p>This project is linked to projects [N1], [G2], and [G1].</p> <p>[SRKW focus 2014–2018; 2018–2022 focus on killer whale prey (ESA-listed salmonids)].</p>	Occurrence	<ul style="list-style-type: none"> What are the seasonal and annual occurrence patterns of Southern Resident killer whales relative to offshore Navy training ranges? What is the oceanic distribution and seasonal variability of ESA-listed salmonid species that may be important prey for the Southern Resident killer whale? 	<p>In 2023:</p> <ul style="list-style-type: none"> Tagged 101 Chinook salmon north of the Columbia River near the Washington Coast. These were primarily smolts from the Snake River spring/summer Chinook ESU. Of the 101 tagged salmon, 56 individual were detected 640 times in May and June, primarily between 11:00 am and 6:00 pm with reduced activity at night. Data collection is ongoing. The highest spatial activity was located south of the Washington state coast, between the mouth of the Columbia River and receivers located at Long Beach, Washington. Acoustic recordings deployed at the same time as the tags are currently being analyzed to examine killer whale presence and co-occurrence with the tagged salmon.
<p>[N4] Acoustic and Visual Survey for Cetaceans in Behm Canal and Southern Clarence Strait, Alaska</p> <p>(Crance et al. 2024)</p>	Occurrence	<ul style="list-style-type: none"> What is the occurrence, distribution, and abundance of cetaceans in Behm Canal and Clarence Strait? 	<p>In 2023:</p> <ul style="list-style-type: none"> Visual survey was conducted over 320 nm with a total of 75 sightings of eight species documented. The most frequently sighted species were Dall's porpoise and sea otters. Eighteen sonobuoys were deployed, of which 15 successfully transmitted. Surprisingly, the only species detected were killer whales (aligned with visual sightings) on four buoys. However, porpoise vocalizations are too high in frequency to be detected by sonobuoys. Planned survey for fall 2024.

GOA



Project Title (Technical Report for 2023)	Conceptual Framework Category	Monitoring Questions	Accomplishments ^a
<p>[G1] Telemetry and Genetic Identity of Chinook Salmon in Alaska</p> <p>(Seitz and Courtney 2024)</p> <p>This project is linked to projects [N1] and [N3].</p>	Occurrence	<ul style="list-style-type: none"> What is the spatial distribution, movement, vertical distribution, population identity, occupied habitat, and natural mortality of Chinook salmon in the GOA? 	<p>In 2023:</p> <ul style="list-style-type: none"> Collectively analyzed data from pop-up satellite archival tags attached to Chinook salmon in Alaska from 2013 to 2022. Of the 183 PSATs deployed, 170 tags provided more than 7,500 days of data. Movement models suggested that the majority of tagged fish remained over the continental shelf within relatively close proximity (<500 km) to their tagging location but ranged from the central Bering Sea to the coasts of Washington and Oregon. Chinook salmon occupied depths ranging from 0 to 538 m and experienced a thermal environment ranging from 1.8 to 10.0°C. Twenty-two tagged salmon were inferred to have occupied the TMAA and spent the majority of their time (52.6%) in waters over the continental shelf, and less time over the continental slope (23.9%) and basin (23.5%). The tags provided evidence of mortality of fish caused by endothermic fish (n=34), ectothermic fish (n=9), marine mammals (n=8), and unknown (n=22) causes. Genetic analyses suggested that all tagged Chinook salmon were from populations originating in southern Southeast Alaska, British Columbia, Washington, and Oregon.
GOA (continued)			
<p>[G2/N1] Characterizing the Distribution of ESA-Listed Salmonids in Washington</p> <p>(Smith and Huff 2024)</p> <p>This project is also linked to projects [G1] and [N3].</p>			<p style="text-align: center;"><i>See Project N1 (above, in NWTT)</i></p>
<p>[G3] PAM for Marine Mammals in the GOA using Bottom-Mounted Devices</p> <p>(Berchok et al. 2024)</p>	Occurrence	<ul style="list-style-type: none"> What is the temporal occurrence of the North Pacific Right Whale and other marine mammals in the GOA? 	<p>In 2023:</p> <ul style="list-style-type: none"> Three passive acoustic moorings were deployed in the western GOA in fall 2023. Recovery is planned for September 2024. Processing of existing passive acoustic recordings from three moorings in western GOA began, with one site's high-frequency band detecting killer whale vocalizations on 214 of the 258 days of recordings. However, porpoises and BWs could not be detected on the previous recordings.

^a As per the regulations implementing monitoring reporting requirements (described in **Section 1**, Introduction), accomplishments from monitoring are reported in a cumulative fashion.

^b Primary Research & Development and Demonstration-Validation (DEMVAL) investments for tools and techniques were supported by the Office of Naval Research Marine Mammal and Biology and the Living Marine Resource programs.

Key: °C = degrees Celsius; BW = beaked whale; BWC = beaked whale cross-seamount; CalCOFI = California Cooperative Oceanic Fisheries Investigations; CRC = Cascadia Research Collective; CY = calendar year; DASBR = Drifting Acoustic Spar Buoy Recorders; dB re 1 μPa = decibels referenced to 1 microPascal; DPS = Distinct Population Segment; ESA = Endangered Species Act; ESU = Evolutionarily Significant Units; FM = frequency-modulated; GOA = Gulf of Alaska Training; GVP = group vocal periods; HARP = High-frequency Acoustic Recording Package; hr = hour(s); HRC = Hawaii Range Complex; HSTT = Hawaii Southern California Training and Testing; Hz = Hertz; kHz = kilohertz; km = kilometer; km² = square kilometer(s); m = meter; MarEcoTel = Marine Ecology and Telemetry Research; MFAS = mid-frequency active sonar; MIRC = Mariana Islands Range Complex; MITT = Mariana Islands Training and Testing; nm = nautical miles; NWTT = Northwest Training and Testing; PAM = passive acoustic monitoring; PMRF = Pacific Missile Range Facility; PSAT = pop-up satellite archival tag; SCC = Submarine Command Course; SD = Standard Deviation; SOAR = Southern California Offshore Anti-Submarine Warfare Range; SOCAL = Southern California Range Complex; SRKW = Southern Resident Killer Whale TMAA = Temporary Maritime Activities Area.



3 2024 Monitoring Goals

The Strategic Planning Process is used to set ISOs, identify potential species of interest at a regional scale, and evaluate and select specific monitoring projects to fund or continue supporting for a given fiscal year (FY).

A quick summary of continuing monitoring projects for CY 2024 are listed in **Table 2** and on the U.S. Navy’s MSM Program website:

<http://www.navymarinespeciesmonitoring.us/regions/pacific/current-projects/>

Table 2. 2024 Monitoring projects for U.S. Navy Pacific ranges/study areas.

Range/Study Area	Project Title	Continuing or Proposed New Start
HRC, SOCAL	Long-term Passive Acoustic Monitoring of Cetaceans at PMRF and SOAR ^a	Continuing from 2006
HRC	Estimation of Received Levels of MFAS and Behavioral Response of Marine Mammals at PMRF	Continuing from 2011
HRC	Advancing Monitoring Capacity in Hawaii Through Non-invasive Triaxial Accelerometry Tags to Evaluate Fine-scale Responses of Marine Mammals to Disturbance	Continuing from 2022
SOCAL	Cuvier’s Beaked Whale and Fin Whale Population Dynamics and Impact Assessment at SOAR ^a	Continuing from 2016
SOCAL	Southern California Beaked Whale Occurrence [formerly Passive Acoustic Monitoring of Marine Mammals in SOCAL] ^b	Continuing from 1999
SOCAL	Marine Mammal Sightings During CalCOFI Cruises	Continuing from 2004
MITT	Beaked Whale Occurrence and Behavior in the Marianas	Continuing from 2022
MITT	Marianas Beaked Whale Expert Panel	Continuing from 2023
MITT, HRC	Pacific Islands Comprehensive Stranding Investigations	Continuing from 2017 ^c
NWTT	Pacific Northwest Distribution of Southern Resident Killer Whales and Prey	Continuing from 2014 ^d
NWTT	Visual and Acoustic Survey for Cetaceans in Behm Canal and Southern Clarence Strait, Alaska	Continuing from 2022
NWTT, GOA	Characterizing the Distribution of ESA-listed Salmonids in Washington and Alaska	Continuing from 2018
GOA	Telemetry and Genetic Identity of Chinook Salmon in Alaska	Continuing from 2020

Notes:

^a Focus shift for two SOCAL programs to concentrate on opportunistic exposure response and in particular Continuous Active Sonar response.

^b Funding permitting, new PAM deployments off Central California are planned in support of Phase IV monitoring; a shift is planned for SOCAL monitoring to change focus from annual observations to specific scientific publications.

^c Added emphasis and funding focused on these investigations starting in FY20.

^d SRKW focus 2014–2018; 2018–2022 focus on killer whale prey (ESA-listed salmonids).

Key: CalCOFI = California Cooperative Oceanic Fisheries Investigations; ESA = Endangered Species Act; GOA = Gulf of Alaska Training; HRC = Hawaii Range Complex; MFAS = mid-frequency active sonar; MITT = Mariana Islands Training and Testing; NWTT = Northwest Training and Testing; PMRF= Pacific Missile Range Facility; SOAR = Southern California Offshore Anti-Submarine Warfare Range; SOCAL = Southern California Range Complex.



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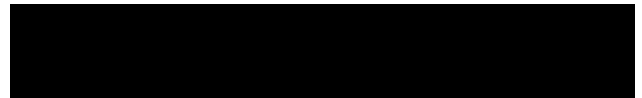
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2023 Publications and Conference Presentations from U.S. Navy-funded Monitoring





2023 Publications from U.S. Navy-funded Monitoring

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