Commonwealth of Northern Mariana Islands Critical Minerals: Biological Assessment and Essential Fish Habitat Assessment

Prepared for the National Marine Fisheries Service
in Accordance with Section 7(c) of the Endangered Species Act of 1973, and the Magnuson-Stevens Fishery Conservation and Management Act, as Amended

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BUREAU OF OCEAN ENERGY MANAGEMENT

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List of Abbreviations and Acronyms

ADCP	acoustic doppler current profiler
AGL	Above Ground Level
AIS	Automatic Identification System
ASV	autonomous surface vessel
AUV	autonomous underwater vehicle
BA	Biological Assessment
BIA	biologically important area
BMP	best management practice
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CCZ	Clarion-Clipperton Zone
CH	critical habitat
CNMI	Commonwealth of the North Mariana Islands
CNP	Central North Pacific
CPS	Coastal Pelagic Species
CRE	Coral Reef Ecosystem
CTD	conductivity, temperature, and depth
dB	decibel(s)
DP	dynamically positioned
DPS	Distinct Population Segment
DVM	diel vertical migration
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFHCA	Essential Fish Habitat Conservation Areas
EMF	electromagnetic field
ENP	Eastern North Pacific
ESA	Endangered Species Act
ESU	evolutionary significant units
FAD	Fish Aggregating Device
FEP	Fishery Ecosystem Plan
FFS	French Frigate Shoals
FMP	Fishery Management Plan
FR	Federal Register
ft	foot/feet
GPS	Global Positioning System
HAPC	Habitat Area of Particular Concern
HMS	Highly Migratory Species
HRG	high-resolution geophysical
IMO	International Maritime Organization
IPF	impact-producing factor

ISA	International Seabed Authority
km	kilometer(s)
kn	knot(s)
LBL	long baseline
m	meter(s)
MARPOL	International Convention for the Prevention of Pollution from Ships
MBARI	Monterey Bay Aquarium Research Institute
MBES	multibeam echosounder
MHI	Main Hawai'ian Islands
mi	mile(s)
MPA	marine protected areas
MTMNM	Mariana Trench Marine National Monument
nmi	nautical mile(s)
NLAA	not likely to be adversely affected
NMFS	National Marine Fisheries Service
NOAA	National Oceanic & Atmospheric Administration
NTL	Notice to Lessees
NWHI	Northwestern Hawai'ian Islands
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
ONMP	Operational National Mitigation Protocol
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCFG	Pacific Coast Feeding Group
PFMC	Pacific Fishery Management Council
PIRO	Pacific Islands Regional Office
PRIA	Pacific Remote Island Areas
PSO	protected species observer
ROV	remotely operated vehicle
SAS	Synthetic Aperture Sonar
SBP	sub-bottom profiler
UNCLOS	United Nations Convention on the Law of the Sea
USACE	United States Army Corps of Engineers
USBL	ultra-short baseline
U.S.C.	United States Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USV	uncrewed surface vessel
WBG	World Bank Group
WNP	Western North Pacific
WPRFMC	Western Pacific Regional Fishery Management Council

1 Background and Purpose

1.1 Background

The United States (U.S.) Department of the Interior's Bureau of Ocean Energy Management (BOEM) manages the development of U.S. Outer Continental Shelf (OCS) energy, mineral, and geological resources in an environmentally and economically responsible way. The OCS is the federally managed ocean area extending across the outer boundaries of U.S. controlled waters 3 to 200 nautical miles (nmi) from shore, with some exceptions.

BOEM initiated a Request for Information and Interest on November 12, 2025, with intent to potentially lease for seabed minerals within the OCS east of the Commonwealth of the Northern Mariana Islands (CNMI). Subsequently, the lease area was expanded to include an area west of CNMI. On March 18, 2026, BOEM's Acting Director signed the Area Identification (Area ID) Memorandum with two areas, one east and one west of the CNMI (**Appendix A**). The area east of the CNMI is 35,483,044 acres (143,595 km^2) or 6,502 whole or partial blocks and is 128 mi (206 km) from Saipan and 127 mi (205 km) from Guam at its closest point. The area west of the CNMI is 33,618,369 acres (136,049 km^2), or 6,248 whole or partial blocks, and is 57 mi (91 km) from Saipan and 46 mi (74 km) from Guam at its closest point. The southern boundary of the recommended area is north of the OCS Administrative Boundary between the CNMI and Guam on the OCS (**Figure 1**).

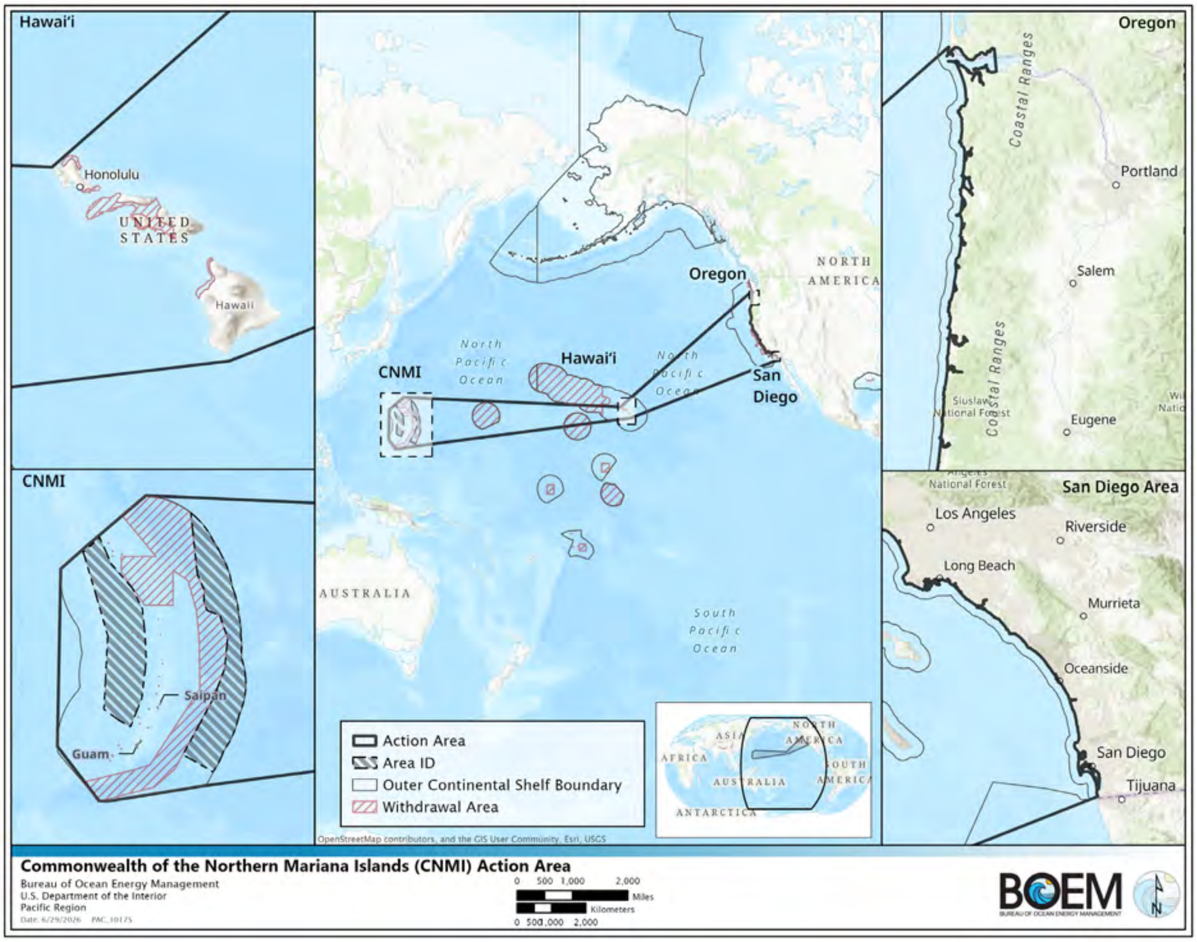

Figure 1. Map of the Proposed Action, which includes the CNMI OCS, Hawaiian waters, and the U.S. West Coast

1.2 Purpose of and Need for the Proposed Action

The purpose of this document is to evaluate the potential effects of the Proposed Action (issuing up to six leases for marine minerals in the CNMI OC) on species listed under the Endangered Species Act (ESA) and their designated critical habitat (CH), as well as on essential fish habitat (EFH). This document thus contains 1) a Biological Assessment (BA) for threatened and endangered marine mammals, sea turtles, fishes, and invertebrates and their designated CH likely to occur in the Action Area (**Figure 1**) and 2) an EFH assessment for this area.

This BA and EFH assessment are consistent with the revised *Guidance for Combining EFH Consultations with ESA Section 7 Consultations* (Guidance) within National Marine Fisheries Services (NMFS) Policy Directive 03-201-05.

Under section 7(c) of the ESA, as amended, federal agencies are required to ensure actions they authorize do not jeopardize the existence of any species listed under the ESA. NMFS Pacific Islands Regional Office (PIRO) in Honolulu, HI, provided technical input on the list of species considered.

The purpose of the Proposed Action is to issue up to six commercial leases to allow the collection of survey data on the CNMI OCS. Survey data, including sample collection, are needed to determine where economically viable marine mineral resources occur and better understand the deep-sea environment in which they occur. The issuance of a lease allows a lessee to conduct preliminary activities (e.g., high-resolution geophysical surveys, limited seabed and biological sampling, and oceanographic measurements). The issuance of these leases enables the collection of data to inform potential future delineation of areas, testing, biological assessments, and evaluation of viability for commercial mineral development. Critical minerals support key sectors such as consumer electronics, energy production, healthcare, transportation, and defense, and identifying potential resources through lease issuance informs future decisions about whether delineation, testing, or commercial development may be warranted.

The need for the Proposed Action is to help meet U.S. demand for critical minerals while reducing reliance on imports. In accordance with Outer Continental Shelf Lands Act (OCSLA) Section 11 (43 United States Code [U.S.C.] §1340), BOEM is authorized to permit geophysical and geological exploration for marine minerals intended for commercial use. Leasing could support national security and economic resilience while managing development of the OCS mineral resources in an environmentally responsible manner. Section 3 of OCSLA (43 U.S.C. §1332) describes the OCS as a vital national resource reserve to be developed expeditiously and orderly, while ensuring environmental protection. OCSLA Section 8 (43 U.S.C. §1337(k)) establishes a competitive leasing process for commercial mineral development. Many of the 60 critical minerals included in the U.S. Geological Survey's (USGS's) list (90 Federal Register [FR] 50494, issued November 7, 2025) occur on the OCS.

Commercial-scale seabed mining is a new industry with few countries testing seabed mining equipment or recovery within their waters. For the ratifiers of the United Nations Convention on the Law of the Sea (UNCLOS), the International Seabed Authority (ISA) governs the mining of mineral resources in the seabed and subsurface beyond the limits of national jurisdiction, totaling approximately 60% of the ocean floor.

A region of concentrated interest is the Clarion-Clipperton Zone (CCZ), a region south of Hawai'i and west of Mexico, between 115°–157°W and 7°–17°N, and spanning nearly 4.5 million km^2 at depths of 4,000–5,500 m. USGS scientists estimate that the polymetallic nodules in the CCZ contain more than two times the amount of nickel and manganese and more cobalt than that occurring in all economically feasible terrestrial deposits (International Seabed Authority 2025b). The National Oceanic and Atmospheric Administration (NOAA) is reviewing exploration license applications for the CCZ.

Equipment testing and baseline environmental research within these areas, and led by the ISA, gives exploration prospectors "preference and priority" when awarding seabed mining activities beyond national jurisdiction. Since the U.S. has not ratified UNCLOS, NOAA (under the Deep Seabed Hard Mineral Resources Act) regulates U.S. exploration and potential commercial recovery of critical minerals like manganese, cobalt, and nickel from the ocean floor beyond national jurisdiction, balancing resource access with environmental stewardship. This process is not connected with BOEM's regulations and authorities, but ISA examples and projects informed BOEM's approach and analysis throughout the OCS mineral leasing process.

In preparation for this BA and EFH, BOEM certifies that we used the best scientific and commercial data available.

1.3 Consultation History with NOAA's NMFS

This is the first time BOEM has consulted with NOAA's NMFS in accordance with section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.) on preliminary activities associated with the seabed mining in CNMI. BOEM requested technical assistance for this ESA/EFH consultation on June 16, 2026, providing the Proposed Action and list of ESA-listed species. BOEM received questions from NMFS regarding the Proposed Action later that same day, and BOEM provided NMFS with answers to those questions on June 18, 2026. BOEM plans to initiate consultation in early July of 2026.

BOEM also reached out to United States Army Corps of Engineers (USACE) on June 22, 2026, as a potential co-action agency since deploying buoys and moorings as part of the Proposed Action would require USACE permit. USACE responded on the same day expressing interest in being a co-action agency for this BA. BOEM shared the draft Proposed Action on June 23, 2026, and will also share the BA when complete.

2 Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind—authorized, funded, or carried out, in whole or in part—by federal agencies (see 50 CFR 402.02). This section describes the proposed federal action for which we are requesting ESA and EFH consultation. This section also discusses avoidance and BMPs used for protection of ESA-listed species and designated CH; details of the BMPs can be found in **Appendix B**.

2.1 Leasing for Commercial Mining and Authorization of Preliminary Activities

The Proposed Action is to issue up to six leases that authorize preliminary activities only; any future action would require submission of a plan and a separate BOEM environmental review. Up to three leases would be issued on the CNMI eastern area and up to three leases on the western area. A maximum of six leases is reasonable due to the need for sufficiently large lease areas to allow for mineral exploration and to consider the number of companies that responded with interest in the Request for Information and Interest comment period. Issuing up to six leases promotes competition, accounts for the unquantified commercial value, and provides opportunities for potential commercial activity.

Up to three leases would be issued in each of the eastern and western leasing areas, making each lease approximately 44,977 to 45,699km^2 in size (**Table 1**).

Table 1. Areas of individual leases

Survey Area	Eastern Area (km^2)	Western Area(km^2)
Total Area	137,007	134,930
Proposed Action – Three Leases	45,669 each	44,977 each

Leasing six areas, three in the eastern area and three in the western area, is to allow for more, smaller leases, which may increase competition and may reduce financial barriers to participating in the auction by lowering costs based on acreage, such as the bidding amount and rent. Smaller sized leases are more comparable in scale, but still larger in size compared to the size of subdivided exploration contract areas managed by the ISA. The ISA gives a total of 75,000 km^2 to each country; each portion is then divided into areas of approximately 15,000 km^2. For comparison, the NORID (Nauru Ocean Resources Inc.) exploration area in the CCZ is 25,000 km^2.

Each lease in the eastern area could be approximately 11.3 million acres (45,700 km^2). Each lease in the western area could be approximately 11.1 million acres (45,000 km^2). The ISA typically issues exploration leases areas of similar sizes, of approximately 18.1 million acres (75,000 km^2) for nodules and 2.5 million acres (10,000 km^2) for sulfides. Offering large lease areas also provides flexibility for exclusion areas that may be deemed necessary on an environmental or technical basis.

Issuing leases in the Proposed Area would authorize the lease holder to conduct only preliminary activities. Additional activities are not authorized and have separate environmental review processes. Geological, geophysical, and other surveys classified as preliminary may indicate the presence of mineral resources and, in the case of geological sampling, may involve collection of limited samples of the seabed. The regulatory classification of these activities as preliminary is determined in part by objective, but more by the scope and intensity of potential environmental effects of the activity. Preliminary activities are described in **Table 2**.

Table 2. Potential actions evaluated in this BA

Description from 30 CFR 582.21d	Activity	Lease in the Eastern Area	Lease in the Western Area
Bathymetric, Geophysical, Mapping, and Other Surveys	Use of survey vessels, autonomous underwater vehicles (AUVs), and remotely operated vehicles (ROVs)	Yes	Yes
Bathymetric, Geophysical, and Mapping Surveys	HRG surveys using sound sources that are documented as causing little to no impact to species, Tier 4 *de minimis* sound sources[1,2] High-resolution video or acoustic cameras	Yes	Yes
Other Surveys	Sampling seabed (sediments, minerals), water, and species from an ROV	Yes	Yes
Other Surveys	Anchors on the seafloor for moorings, buoys, and physical, chemical, or biological data collection	Yes	Yes, with prior visual clearance and controlled placement
Other Surveys	Scientific physical, chemical, and biological monitoring from a ship that does not contact the seafloor, including towed equipment,	Yes	Yes
Other Surveys	Scientific physical, chemical, and biological monitoring from a ship that does contact the seafloor and use of landers	Yes	Yes
Geotechnical Survey	Box core sampling, free-floating grab samples	Yes	No
Other Surveys	Expendable equipment, such as weights and underwater transponder positioning units	Yes	Yes, with prior visual clearance and controlled placement
Other Surveys	Irretrievable equipment meant for one-time use, such as expendable bathy thermographs	Yes	YesAUVs and other equipmen
Other Surveys	Focused biological surveys from the air, from the ship, or in water can utilize aerial digital imaging; visual observation; radar; thermal or acoustic monitoring	Yes	Yes

Note: [1]Sound sources are described in NMFS (2025a); [2]Center for Marine Acoustics (2023)

Preliminary activities are similar for both the eastern and western sides, except no box cores will be collected from the western area and more ROV sampling may take place in the west. The eastern and western sides of the CNMI differ due to the seafloor conditions associated with distinct types of the critical mineral deposits. In the eastern CNMI waters, mineral deposits are associated with abyssal, soft sediments and relatively flat bathymetry, which may allow for box coring without risk of notable impacts. In western CNMI waters, mineral deposits are generally associated with hard or consolidated sediments and/or hydrothermal systems that are not amenable to tools like box cores. More selective sampling from an ROV would be more feasible to minimize habitat disruption and collect the targeted information. Tools like rock drills and piston cores are not considered within the scope of preliminary activities.

2.2 Bathymetric, Geophysical, and Mapping Surveys

Bathymetric, geophysical, and mapping surveys are an important first step for planning subsequent activities. Bathymetric surveys measure depth and elevation of the seafloor, while geophysical surveys are focused on the composition of sediments on and below the seafloor. The scientific community, several U.S. agencies, and the ISA have standard methodologies for exploring and sampling the ocean seafloor; these methodologies have become less destructive as technology improved. For the leases in both the eastern and western areas, an initial HRG survey to map an area of interest would use a hull-mounted multibeam echosounder (MBES). An MBES is a category of HRG equipment that collects bathymetry and reflectivity at roughly 100-m resolution of the seafloor; subsequent finer resolution surveys then would be conducted within smaller areas.

HRG surveys utilize many types of equipment to map the seafloor or subsurface. Most HRG survey equipment generates sound, which is transmitted toward the seafloor, where it is reflected back and received by the AUV or vessel. Different equipment types generate sound with different frequencies and sound levels, which could cause harm to species if the sound emitted from the equipment is too powerful or overlaps with frequencies that species are sensitive to. The scientific and regulatory communities categorized the sound profiles of HRG equipment into categories or tiers of impact. BOEM uses the standardized tiering system based on Ruppel et al. (2022) Tier 4 of this categorization lists activities considered *de minimis*—defined as sources considered unlikely to result in the incidental take of protected species. Equipment types are described below in **Table 3.**

Table 3. HRG survey equipment considered during preliminary activities

Equipment Type	Data Collection and/or Seafloor Survey Types	Description of the Equipment
Bathymetry (depth) sounder; multibeam echosounder (MBES)	Shallow hazards, archaeological resources, and seafloor habitats	A depth sounder is a microprocessor-controlled, high-resolution, survey-grade system that measures precise water depths in both digital and graphic formats. The system records with a sweep appropriate to the range of water depths expected in the survey area. This EA assumes the use of multibeam bathymetry systems to characterize complex bathymetric. Units can be hull-mounted, mounted in an AUV or towed.
Side-scan Sonar	Shallow hazards, hard (rock) bottoms, and archaeological resources	Side-scan sonar evaluates surface sediments, seafloor morphology, and potential surface objects (MMS 2007). Systems typically consist of a top-side processor, tow cable, and towfish with transducers (or "pingers") that generate and record the returning sound traveling through the water column at a known speed. This BA assumes the use of a digital dual-frequency side-scan sonar system with 300–500 kHz frequency ranges or greater to record continuous planimetric images of the seafloor. Synthetic Aperture Sonar (SAS) may also be used, are similar to side-scan sonars, and operate in the 70–100kHz frequency ranges. Side-scan sonars and SAS can be mounted in an AUV or towed.

Equipment Type	Data Collection and/or Seafloor Survey Types	Description of the Equipment
Magnetometers; Gradiometer	Archaeological resources and shallow hazards	These types of equipment detect and aid in the identification of ferrous or other objects having a distinct magnetic signature. The gradiometer sensor is typically towed approximately 6 m above the seafloor. This methodology is not anticipated as it is not commonly used in depths greater than 500 m. Magnetometers can be installed inside AUVs and may be present during surveys. They are passive and make no noise.

Key: kHz = kilohertz

Several survey methods can be used to collect HRG data. Typically, these methods are based on the water depth of the survey area. However, restrictions on available equipment may affect which survey methods are chosen. Additional information about autonomous underwater surveys, shallow multi-instrument tow, deep-tow, and uncrewed surface vessel surveys is provided in Appendix A. The instruments listed below are generally considered *de minimis* according to the standardized tiering system (Ruppel et al. 2022):

- Fathometers for navigation
- Sub-bottom profilers that are hull-mounted, towed, and parametric sub-bottom profilers
- MBES systems (hull-mounted EM120–124 [EM120, EM122, EM 124]) 12kHz, EM 302–304 (30kHz)
- MBES systems (towed/AUV) EM 2040 (200–700 kHz)
- EK60 and EK80 split-beam echosounders
- Pingers (acoustic locators) for locating over the side wireline instrumentation in the water column
- Acoustic releases (brief duration pinging), e.g., for moorings and landers
- Ultra-short baseline (USBL) and long baseline (LBL) positioning equipment, e.g., for navigation of submersibles, ROVs
- Acoustic Doppler Current Profiling (ADCP) equipment
- Instrumentation on HOVs, AUVs, and ROVs
- Pressure-equipped inverted echo sounders and Pressure Monitoring Transducers
- Electromagnetic sources

Sub-bottom profilers are used to survey geological features, hazards, and archaeological resources present below the seafloor (in subsurface sediments). Sub-bottom profilers (also known as pingers) can penetrate sediment depth ranges of 3 m to greater than 100 m, depending on frequency and bottom composition. High-resolution compressed high-intensity radar pulse (CHIRP) system sub-bottom profilers generate a profile view under the seabed to develop a geologic cross-section of subsurface sediment conditions.

The HRG surveys associated with the Proposed Action are not going to use medium-penetration sub-bottom profiler systems, which are also known as boomers, sparkers, bubble pulsers, or impulse-type systems. Low-frequency sources, such as the Wolfspar listed in Ruppel et al. (2022), are also not evaluated here and will not be used.

2.3 Other Environmental Surveys

Part of preliminary activities are other surveys to characterize the seabed condition and surrounding environment. Geological, oceanographic, and biological surveys that collect seabed, physical, and species information are necessary for describing deep-sea, open-ocean environments. These data are commonly collected nationally and internationally in ways determined to not notably alter the environment or natural resources by domestic and international agencies.

As listed in **Table 2**, other surveys in eastern CNMI include sampling sediments and species by ROV, anchoring buoys and scientific equipment to the seafloor, deploying equipment (such as box core sampling) from a ship, and using landers. Some equipment can remain on the seafloor, such as weights and underwater transponder positioning (UTP) units. Focused biological surveys from the air, from the ship, or in water can utilize aerial digital imaging; visual observation; radar; and thermal or acoustic monitoring.

Other surveys in western CNMI are similar, except they do not include deploying equipment from a ship that contacts the seafloor due to more variable seafloor characteristics. In western CNMI waters, any preliminary activities that touch the seafloor require prior visual clearance and controlled placement to ensure that sampling methods are appropriate for the targeted habitat and do not inadvertently impact the seafloor.

2.3.1 Geological, Geotechnical, and Biological Sampling

The purpose of geological sampling during preliminary activities is multifold: to validate (ground truth) HRG surveys, conduct environmental characterization, better identify site-specific exploration targets, and collect information for developing a Delineation, Testing, and/or Mining Plan. Geological and geotechnical surveys include a variety of seabed sampling equipment that cause a range of impacts to the seafloor.

Within the scope of preliminary activities, ROVs provide the most precise method for data and sample collection. ROVs can collect grab and push core samples within centimeters and provide real-time visual control. Instruments that measure conductivity, temperature, and depth; USBL pingers; cameras; and other equipment can also be mounted on an ROV for additional environmental observations.

Box core and free-fall sampling are considered preliminary activities only on the eastern side of CNMI. A box core is lowered from a surface vessel to the seabed by winch and penetrates the seabed; when tension is applied, the box core jaws close, sealing the sample inside. Once on deck, various sub-sampling (e.g., grab or scoop) and tests can be performed. A free-fall grab is similar except that it is released unconnected to the vessel, descends to the seafloor, samples the seabed, releases ballast weights, and comes back to the surface via a float. A box core or free-fall grab retrieves a greater sample volume of sediment than an ROV, but preclearance is typically not possible. Sensors also can be mounted on a box core or free-fall sampler for additional environmental observations. Box core sampling also can provide information to characterize the biological environment, such as identifying species and contributing to genetic libraries. The intent would be to further scientific understanding, rather than for commercial purposes.

On the eastern side of CNMI, BOEM assumes up to three seafloor sampling efforts using box cores or free-fall grabs. The initial effort would include sampling and mapping at a coarse scale covering a larger area and then two subsequent sampling surveys would focus on increasingly smaller areas of interest. This assumed approach maximizes the number of surveys and samples; therefore, the document analyses the maximum anticipated environmental impact. The number of surveys and samples, and area are estimated from research-based activities, U.S. agency research, and 2023 ISA guidance with details available in **Appendix A**. The ISA's deep data website (International Seabed Authority 2025a) shows that sampling grids sometimes are not constant throughout a lease. However, the values in **Table 4** assume a consistent survey density and a greater-than-average number of samples for ISA exploration contracts. Under the Proposed Action, multiple sampling surveys would be completed on the eastern area, collecting approximately 2,550 samples (**Table 4**). Each sample could disturb an area of 0.5 to 1.5 m^2 of the seafloor. Together, multiple surveys could disturb 2,265 m^2 of the seafloor and represent less than 0.0000016% of the total lease in the eastern area (**Table 5**).

For the leases in the eastern area, BOEM expects four main surveys: one mapping HRG survey from a ship, and three subsequent surveys (increasingly fine scale) utilizing AUVs, box cores, and/or free-fall samplers. Several oceanography cruises also may be conducted. For the leases in the western area, BOEM expects three main types of surveys: mapping and chemical oceanography, AUV, and ROV. For mapping, HRG survey activities would be similar to those in the eastern area, with the addition of instruments that measure conductivity, temperature, and depth (CTDs) to detect active hydrothermal vents. Subsequently, a dense AUV survey would be used to identify inactive and extinct vents, either along exposed fault lines or off axis of the spreading center. After a deposit is found, an ROV would be deployed to collect additional information, including physical samples via push core and/or grab, for example. HRG, ROV, and AUV equipment are described in more detail below and in Appendix A.

Table 4. Estimated range of number of seabed box core and free-fall grab sample stations on the eastern side of CNMI

Survey	Total Number of Stations in Eastern Area
Coarse survey using free-fall grab (15-km grid)	567.9 (257.5 to 1,038.2)
Coarse survey using box core (50-km grid)	62.1 (32.1 to 116.2)
Lease area box core survey (10-km grid)	1,353.5 (419 to 3,237.2)
Area of interest box core survey (7-km grid)	565.9 (279.1 to 982.1)
Total	2,549.4 (987.7 to 5,373.7)

Note: Counts of samples or stations contacting the seafloor are mean values with a range in parenthesis of 5% to 95% the value. Totals are derived from running simulations, and not additive, from the four surveys and explained further in **Appendix A**.

Table 5. Estimated area of disturbance to the seafloor caused by box core and free-fall grab surveys on the eastern area

Survey	Total Disturbance in Eastern Area (m^2)
Coarse survey using free-fall grab (15-km grid)	283.9 (117.4 to 544.5)
Coarse survey using box core (50-km grid)	62.1 (28.4 to 121.3)
Lease area box core survey (10-km grid)	1,353 (390.2 to 3,305.7)
Area of interest box core survey (7-km grid)	565.9 (279.1 to 982.1)
Total	2,264.9 (815.1 to 4,953.6)

Note: Area of disturbance to the seafloor are 50% values with a range in parenthesis of 5% to 95% the value. Totals are derived from running simulations, and not additive, from the four surveys and explained further in **Appendix A**.

On the western area, BOEM assumes multiple seafloor sampling efforts by ROV. This assumed approach maximizes the number of sampling sites (i.e., potential deposits) and samples; therefore, the maximum anticipated environmental impact. The number of sites and samples are estimated from research-based activities, U.S. agency research, and 2023 ISA guidance, with details available in **Appendices A and E**. BOEM estimates there may be up to 241 deposits in the western area. One ROV survey per lease would be completed under the Proposed Action, collecting approximately 30 samples per deposit (**Table 6**). Together, these surveys could disturb 13,586 m^2 of the seafloor and represent approximately 0.000010% of the total western area (**Table 6**).

Table 6. Estimated range of number of seabed ROV samples and area of seafloor disturbance on the western side area

ROV Sampling Method	Number of Samples per Deposit	Total Disturbance in Western Area (m^2)
Push core	10 (5 to 15)	4,529.4 (13,89.1 to 11,135.5)
Grab	20 (10 to 30)	9,056.6 (2,771.8 to 22,129.1)
Total	30 (15 to 45)	13,586 (4,160.9 to 33,264.6)

All geotechnical sampling may require applications to be reviewed by USACE, potentially under the Nationwide Permit Activity 6.

2.3.2 Moorings and Equipment Placement

Ocean environmental characterization surveys utilize anchors, clump or ballast weights, and placement of scientific equipment on the seafloor. Weights and some equipment are considered expendable and left on the seafloor, while the connected equipment is released and retrieved. Sediment plumes are a known concern from commercial-scale mining, and a common way to understand ocean sedimentation and currents is to anchor sampling devices on or near the seafloor. AUVs may also require the use of multiple navigation devices positioned on the seafloor. During preliminary activities, a lessee would likely include placement of sampling devices and associated anchors to position those devices on the seafloor.

For leases in the western area, preliminary activities that contact the seafloor, such as placing anchors, require prior visual clearance and controlled placement of equipment. Sediments and substrates on the leases in the western area are expected to be more variable and contain hard-bottom or consolidated sediments, which may be sensitive to disturbance. Therefore, any equipment on the seafloor must be placed precisely where imagery, or other clearance methods, have confirmed that placement would have no notable adverse impact. Due to expansive soft sediments expected in the leases in the eastern area, the same procedures are recommended where feasible but not required.

Surface buoys are anchored at fixed locations for monitoring and evaluating water column and air conditions. In deeper waters, lessees are more likely to set moorings for collecting oceanographic data without a surface buoy (AMC Consultants Pty Ltd et al. 2021). However, BOEM estimates two large surface ocean buoys would be placed per lease; the Proposed Action could have a maximum of 12 buoys. Likely buoy types for deep water include discus-shaped, boat-shaped, and spar buoys; a large discus-shaped hull buoy has a circular hull of 10–12 m in diameter. Meteorological buoys are the most common type of larger ocean buoy deployed. Meteorological buoy anchors deployed create a buoy watch circle (i.e., excursion radius) of approximately 1,250 m and almost 3,000 m of line (Pacific Northwest National Laboratory 2019). Onboard power supply sources for buoys could include solar arrays, lithium or leadacid batteries, and diesel generators, which require an onboard fuel storage container with appropriate spill protection and environmentally sound methods for refueling activities. Buoys will be lit in accordance with the U.S. Coast Guard (USCG) private aid to navigation (PATON) requirement. Decommissioning to remove the approved equipment is essentially the reverse of the installation process. Installation and decommissioning of buoys are expected to be completed within one day per buoy, and decommissioning likely would be performed with the support of a vessel(s) equivalent in size and capability to that used for installation.

A buoy would be anchored to the seafloor at two or three locations by equipment made from materials such as solid cast iron, cement, or chain. The line connecting the buoy to the anchor consists of chain, jacketed wire, nylon rope, polypropylene rope, and subsurface floats, which keep the mooring line taut to semi-taut, reduce slack, and eliminate looping (National Data Buoy Center 2025). The chain at bottom of the mooring line could sweep and disturb the seafloor. A meteorological buoy anchor deployed a solid cast iron anchor weighing approximately 11,000 lbs and had a footprint of approximately 2.3 m^2 (Pacific Northwest National Laboratory 2019). Anchors range from 3,700–6,800 lbs, with similar types of mooring lines extending approximately 500 m below the surface to avoid interference with other marine activities (Sharma and Nath 2020; AMC Consultants Pty Ltd et al. 2021; China Minmetals Corporation 2024; National Data Buoy Center 2025). BOEM estimates that mooring installation could disturb approximately 28 m^2 of seafloor per mooring (**Appendix A**). After installation, the transport vessel likely would remain in the area for several hours while technicians configure systems.

The speed and direction of ocean currents would likely be assessed with ADCPs. An ADCP is a remote sensing technology that transmits sound waves at a constant frequency and measures their reflection as the waves ricochet off fine particles or zooplankton suspended in the water column. A typical ADCP has three to four acoustic transducers that emit and receive acoustical pulses from different directions, with frequencies ranging from 300–600 kHz and a sampling rate of every 1 to 60 minutes. ADCPs could be mounted independently on the seafloor, attached to a buoy, or have multiple instruments deployed as a subsea current mooring. A seafloor ADCP likely would be mounted in a tripod or a trawl resistant mount. One subsea current mooring might have 8–10 ADCPs vertically suspended from an anchor, combined with several floats made of syntactic foam. These moorings do not breach the surface. A typical ADCP is about 1–2 ft tall and 1–2 ft wide. Its mooring, base, or cage (surrounding frame) would be several feet wider. BOEM estimates that eight moorings per lease could be installed across all lease areas, with seafloor disturbance likely around 28 (12.6 to 78.5) m^2 per mooring.

Preliminary activities in eastern CNMI waters may include a seafloor lander. This stationary scientific monitoring device ‘lands’ on the seafloor and ranges in size. BOEM assumes approximately 22 landers could be deployed across the total area but not at the same time. Most landers would displace about 2 m^2 of seafloor, though the footprint of a newer device rated to ocean depths of 6,000 m is approximately 4 m^2 (Guo et al. 2023).

As a part of the Proposed Action, the BA also assumes AUV-based surveys would use multiple AUVs and require placement of UTP units on the seafloor. Each UTP could displace 1 m^2 of area, with up to 405 UTPs placed across the eastern area (**Table 7**) and 1,472 UTPs in the western area (**Table 8**). Leases in the eastern area would likely have one HRG AUV survey. Leases in the western area would likely have an additional denser AUV survey.

Environmental Surveys involve the deployment and decommissioning of buoys, which may require applications to be reviewed by the USACE, potentially under the Nationwide Permit Activity 5.

Table 7. Estimated area of disturbance to the seafloor caused by deploying equipment and moorings for data collections within leases in the eastern area

Survey	Disturbance per Lease Alternative A (m^2)	Total Disturbance for Eastern Lease Areas (m^2)
UTP deployment for AUV survey	134.9 (67.4 to 239.4)	404.7 (202.2 to 718.2)
Moorings for equipment	186.7 (95 to 303.8))	560 (285 to 911.3)
Landers	7.3 (5 to 9.6)	21.9 (15.1 to 28.8)
Total seafloor disturbance	328.9 (167.4 to 552.8)	986.6 (502.3 to 1,658.3)

Note: Any value that has a range is described as the mean value (5% to 95%). Totals are derived from running simulations, and not additive, from the three efforts and explained further in **Appendix A**.

Table 8. Estimated area of disturbance to the seafloor caused by deploying equipment and moorings and landers for data collections within leases in the western area

Survey	Disturbance per Lease Alternative A (m^2)	Total Disturbance for Western Lease Areas (m^2)
UTP deployment for AUV survey	498.8 (269.8 to 757.8)	1,471.6 (794.9 to 2,229.9)
Moorings for equipment	183 (93.1 to 297.8)	549 (279.4 to 893.3)
Landers	7.2 (4.9 to 9.4)	21.5 (14.8 to 28.2)
Total seafloor disturbance	689 (367.8 to 1,065)	2,041.5 (1,044.1 to 3,151.4)

Note: Any value that has a range is described as the mean value (5% to 95%) value. Totals are derived from running simulations, and not additive, from the three efforts and explained further in **Appendix A**.

2.4 Vessel Trip and Number of Days for Surveys

The survey duration in days and number of vessel trips anticipated for Proposed Action (Preliminary Activity) surveys and equipment deployments are estimated in **Tables 9 and 10**. The number of survey vessels at any one time is estimated to be two with a maximal statistical potential of five per lease (**Appendix A**). A vessel trip is a two-way voyage of a ship moving from a port or harbor to the survey area and then returning. BOEM assumes vessels will utilize the port at Saipan, but vessels could use ports from the CNMI region or the unincorporated U.S. territory of Guam. Transit to the CNMI would likely be from U.S. mainland ports but could be from other energy hubs in the Pacific Ocean (e.g., Malaysia, Australia). Available ships that can access deep waters and stay in the open ocean are limited in the global market. BOEM projected vessel trip information from the initial assessment of the CCZ's Nauru Ocean Resources property and from Tonga Offshore Mining Limited Clarion Clipperton Zone Project Exploration Area.

For leases in the eastern area, there is a range for the survey duration estimates listed (**Table 9**), which is due to varying densities reported from related assessments. Survey duration combined the following factors: (1) expected duration of the survey work using the calculated line miles and expected velocity, (2) number and duration of line turns, (3) expected daily time for deck work, such as AUV or device deployments, retrievals, or sampling operations, and (4) amount of time when no work is conducted because of either mechanical or weather delays. The sum of these factors approximates the survey duration. More explanations and assumptions are listed in **Appendix A**.

For the three potential leases in the western area, there is also a range of survey duration estimates (**Table 10**). These estimates are based on factors listed above, as well as assumptions about the expected magnitude and duration of AUV and ROV surveys, including amount of time to sample and move among deposit sites. More explanations and assumptions are listed in **Appendix A**.

Table 9. Estimated number of vessel trips for surveys and for equipment or mooring deployments on the leases in the eastern area

Survey	Duration of Survey in Days[1] and Number of Vessel Trips[2]
Mapping survey: initial or coarse survey with low or medium frequency (one survey)	56.9 (45.9 to 70.2) days across 5 trips (low frequency) 112.7 (91.7 to 137.8) days across 8 trips (medium frequency)
Geological, geotechnical, and biological sampling[3]: initial or coarse, lease area, and fine (total of three) surveys	946.5 (388.6 to 1,969.9) days across 55 trips
Oceanographic/biological surveys: include deployment and retrievals of equipment, water, chemical, avian, fishes, marine mammal, and sea turtle (total of four) surveys[4]	328.8 (279.3 to 382.6) days
Total estimated number of days at sea with vessel trips (Alternative A)	1,668 (1,174.5 to 2,504.7) days across 156.2 (117.1 to 220.6) trips

Notes:
1. Survey days and vessel trip numbers and ranges were calculated using methodology in **Appendix A**. Values are intended to be conservative estimates of survey requirements accounting for weather and maintenance.
2. A vessel trip is a two-way voyage of a ship moving from a port/harbor to the survey area and then returning.
3. Geotechnical and biological sampling assume 24-hour survey days.
4. Avian, fish, marine mammal, and sea turtle surveys are typically conducted during daylight hours (10 hours).
5. Surveys could occur simultaneously from the same vessel but not concurrently with HRG surveys.

Table 10. Estimated number of vessel trips for surveys and for equipment or mooring deployments on the leases in the western area

Survey	Duration of Survey in Days[1] and Number of Vessel Trips[2]
Mapping and chemical oceanography survey: MBES and CTD tow-yos	46.3 (38.2 to 56) days across 6 trips mapping with an EM122 109.8 (89.4 to 134.4) days across 10 trips mapping with an EM304 146.6 (89.6 to 230) days across 13 days to conduct CTDs
AUV survey with six AUVs: identify inactive and extinct vents along exposed faults or "off axis"	395 (298.1 to 502.7) days over 31 trips
ROV survey: targeted collection of water, sediment, rocks, and animals	1,381.3 (465.9 to 3,299.3.) days over 104 trips
Total estimated number of days at sea with vessel trips (Alternative A)	2,214.5 (1,226.7 to 4,201) days across 191 (116.2 to 340.1) trips

Notes:
1. Survey days and vessel trip numbers and ranges were calculated using methodology explained in **Appendix A**. Values are intended to be conservative estimates of survey requirements accounting for weather and maintenance, with actual numbers likely to be lower.
2. A vessel trip is a two-way voyage of a ship moving from a port/harbor to the survey area and then returning.

Vessels that install moorings and conduct surveys are typically 90 to 122 m in length (German Federal Institute for Geosciences and Natural Resources 2018; China Minmetals Corporation 2024). Crew boats used for buoy operations and maintenance are typically 16 to 17 m in length, with 100- to 400-hp engines and 1,800-gal fuel capacity. The remote location is a large cost for data collection. BOEM anticipates larger vessels would attempt to collect as much data as possible while on the water. While a cruise may have a particular category or priority, survey vessels could function as platforms for collecting HRG, geotechnical, biological, and oceanographic information. Vessels performing surveys or towing equipment are relatively slow moving at approximately 4–6 kn.

2.5 Non-Routine Events

Non-routine and low-probability events and hazards that could occur in all alternatives include the following: (1) allisions and collisions between vessels and other vessels or marine life; (2) spills from collisions or fuel spills resulting from generator refueling; and (3) recovery of lost survey equipment. Non-routine and low-probability events and hazards are incorporated by reference from the BOEM American Samoa 2026 Environmental Assessment Section 2.6 as the actions considered are similar for this analysis and the documentation is recent and reliable.

2.6 BMPs

If leases or grants are issued, BOEM will require the lessee to comply with BMPs through lease stipulations to minimize potential impacts to ESA-listed species These BMPs have been developed through years of conventional energy operations and consultations with the NMFS, including vessel strike avoidance BMPs, visual monitoring, and reporting. These BMPs, which minimize or eliminate potential effects from preliminary activities to ESA-listed species are described in **Appendix B**. Operators are expected to follow the measures when conducting actions on or near the Action Area. They are enforceable as conditions to lease sales, permits, and plan approvals.

3 Action Area

The “Action Area” means all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). The Action Area encompasses two areas, east and west of the CNMI where most of the Proposed Action will occur (**Figure 1 and Appendix A**). The two areas near CNMI include abyssal plains; abyssal hills; active, inactive, and extinct hydrothermal vents; seamounts; and guyots. The areas partially border the Mariana Trench Marine National Monument (MTMNM) (**Figure 1, Figure 2**). The size, depth range, and distance of each area are shown in **Table 11.**

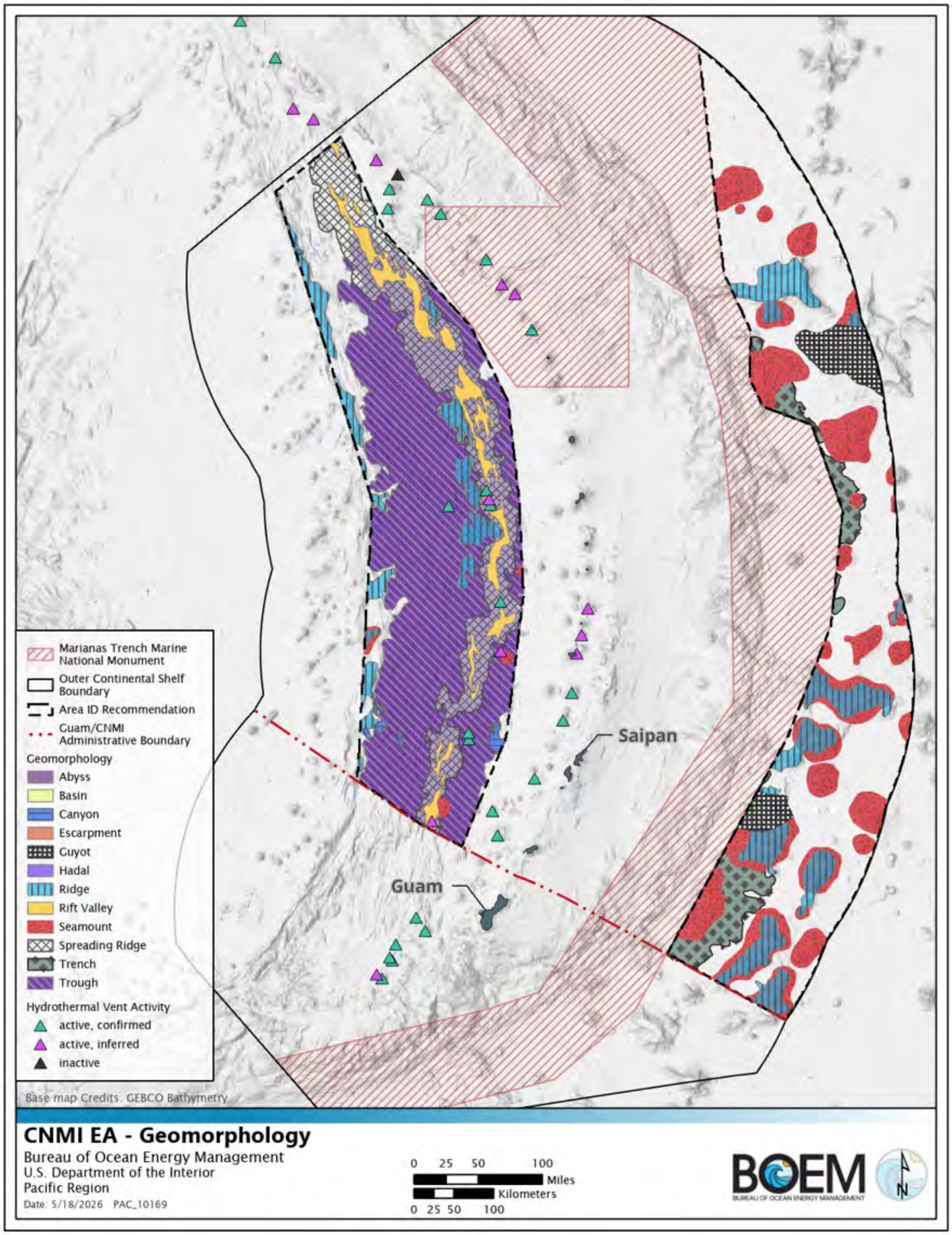

Figure 2. Map of geomorphology within the Proposed Action Area
Data from GRID Arendal.

Table 11. Area, depth range, and distance of the two potential lease areas

Area	Acres	Square Kilometers	Depth Range	Nearest Saipan Shore Distance	Nearest Guam Shore Distance
Eastern Area	35,483,044	143,595	3,700–25,100 ft (1,130–7,650 m)	128 mi (206 km)	127 mi (205 km)
Western Area	33,618,369	136,049	2,820–18,670 ft (860–5,690 m)	57 mi (91 km)	46 mi (74 km)

The CNMI has a population of approximately 47,329 according to the 2020 Census (U.S. Census Bureau 2021). The archipelago consists of 14 islands, including Saipan, Tinian, Guguan, and Rota, which serve as the primary population and economic centers. Saipan is the capital and main urban center with a size of 46.5 mi^2, supporting most of the CNMI's commercial activity, which is primarily tourism. Rota is the southernmost island of the CNMI, which is located north of Guam. The CNMI has Chamorro and Carolinian cultural heritage (Ballendorf 2026).

The MTMNM, designated in 2009 by presidential proclamation, encompasses the Trench Unit, Volcanic Unit (an arch of undersea mud volcanoes and thermal vents), and Islands Unit. These areas include some of the deepest oceanic environments on Earth and contain unique geological and biological features. The monument has no permanent human population and is cooperatively managed by the U.S. Fish and Wildlife Service (USFWS) and the NOAA (FWS 2026).

The Action Area includes two additional areas to account for possible vessels transiting from Hawai'i and the U.S. West Coast. For waters around Hawai'i, we made the boundary around O'ahu and excluded Kaua'i since vessels are not anticipated to come out of Kaua'i for activities associated with the Proposed Action. Lastly, the most eastern side of the Action Area is the U.S. West Coast. The northern side of the West Coast includes up to Astoria, Oregon, and the southern tip includes San Diego (**Figure 1**).

This rest of this sections below describe ongoing activities within the Action Area and stressors unassociated with the Proposed Action that may impact ESA-listed species and/or CH within the Action Area.

3.1 Fishing Industry

Both the CNMI and Guam are categorized as "fishing communities" by the Western Pacific Regional Fishery Management Council (WPRFMC). This designation is based on the portion of the population that is dependent upon fishing for subsistence; the economic importance of fishery resources to the islands; and the geographic, demographic, and cultural attributes of the communities (Western Pacific Regional Fishery Management Council 2009a; 2009c; 2024). Archaeological and historical records show a long tradition of pelagic and reef fishing, ranging from trolling mahimahi, marlins, and tunas to shore-based netting and reef gleaning, that persists today in modified forms (Amesbury 2013). Thus, fishing is deeply embedded in the social fabric and food systems of the Chamorro and other resident communities of the CNMI and Guam, where catch is frequently shared through customary exchange networks alongside cash sales, blurring boundaries between "commercial," "subsistence," and "recreational" activities (Hospital and Beavers 2012; 2014). Summaries and studies related to the complexity and richness of CNMI and Guam fisheries are incorporated here by reference: Hensley and Sherwood (1993); Allen and Bartram (2008); Western Pacific Regional Fishery Management Council (2009a; 2009c); Allen and Amesbury (2012);

Hospital and Beavers (2012); Kotowicz and Richmond (2013); Severance et al. (2013); Hospital and Beavers (2014); Ayers (2018); Kleiber et al. (2018); Chan (2024); Dombrow et al. (2025).

Pelagic fisheries in the Mariana Archipelago (Guam and CNMI) are dominated by small-vessel operations, typically using boats less than 25 ft in length, that target highly migratory species such as skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*), wahoo (*Acanthocybium solandri*), and mahimahi (*Coryphaena hippurus*) (Western Pacific Regional Fishery Management Council 2009a; 2009c). These fisheries primarily employ trolling gear and frequently operate around anchored fish aggregating devices (FADs), which enhance catch rates and reduce fuel costs (Bell et al. 2015). Fishing trips range from nearshore waters out to offshore banks and seamounts, with most vessels remaining within approximately 50 mi of shore.

Bottomfish Fisheries. Deep-slope bottomfish fisheries are an important component of local food systems and small-scale commerce. These hook-and-line fisheries target species such as *Etelis carbunculus*, *Etelis coruscans*, and *Pristipomoides filamentosus* snappers at depths of 50–400 m along slopes and offshore banks.

Reef Fisheries. Nearshore reef fisheries, largely non-commercial, supply protein for household consumption and cultural exchange. These fisheries employ hook-and-line, spears, nets, and gleaning to harvest surgeonfish, parrotfish, rabbitfish, goatfish, and groupers.

In CNMI and especially in Guam, there is a **recreational and for-hire** charter fleet, with small-boat, one- to two-day trips targeting pelagic and bottomfish species for purposes ranging from full-time commercial fishing to part-time recreational, cultural, and tourism-related activities (Chan 2024).

Crustacean fisheries are small-scale, nearshore, and primarily supply local consumption, with spiny and slipper lobsters as the main targets and little to no commercial export. Most harvesting occurs in shallow waters within 3 nmi using hand-picking or diving, and there are currently no active commercial fisheries for deepwater shrimp or Kona crab, while slipper lobster harvest is minor and subject to localized regulations. Currently, there is no precious coral fishery in the Mariana Archipelago.

Aquaculture is not a dominant activity in CNMI, but five small operations produce tilapia and shrimp for local consumption (Pacific Community 2026b). In Guam, tilapia ("cherry snapper") and marine prawns are the main products (Pacific Community 2026a). No aquaculture activities occur offshore.

3.2 Vessel Traffic

Commercial shipping and fishing vessels are the bulk of vessel traffic types in the CNMI. For compiling vessel traffic information within the Action Area, vessel data was downloaded from the NOAA (2024). The analysis used a summary of Automatic Identification Systems (AIS) vessel traffic positions between 2017 to 2023. Due to the remoteness of the area under analysis, AIS data may be incomplete.

The general interpretation of the data as shown in **Figure 3** below is that the brighter magenta colors indicate higher density, and, as the values decrease, they move closer to light blue. The NOAA data available from 2017 to 2023, as shown in **Figure 3**, provides an aggregate of AIS-broadcasted points of tanker vessel concentration south of the Port of Saipan and between the legs of the Area ID. Cargo vessels have aggregated points that mimic track lines from all directions. Fishing is limited within the Area ID, and the image does not differentiate between commercial, recreational, and for-hire fisheries or the activities the vessels are engaged in (actively fishing, transiting, etc.). However, there are three distinct routes in the southern portion of the Area ID, running north-northwest/south-southeast, and northeast to southwest. Towing vessel activity around the Area ID is sparse, with two distinct informal north-northeast to south-southwest routes running to/from the Port of Saipan and the Unincorporated U.S. Territory of Guam. Any leisure (passenger, pleasure, etc.) vessel activity in the area is estimated to be included with track lines within the 'Other' image, along with other vessel types such as ferries, tugs, etc. There is no differentiation among the varied vessels within this group, and it is unclear which tracks represent leisure vessel activity. In general, as shown in **Figure 3**, most of the AIS-broadcasted points for all vessel types are found to be in the southernmost region of the Area ID.

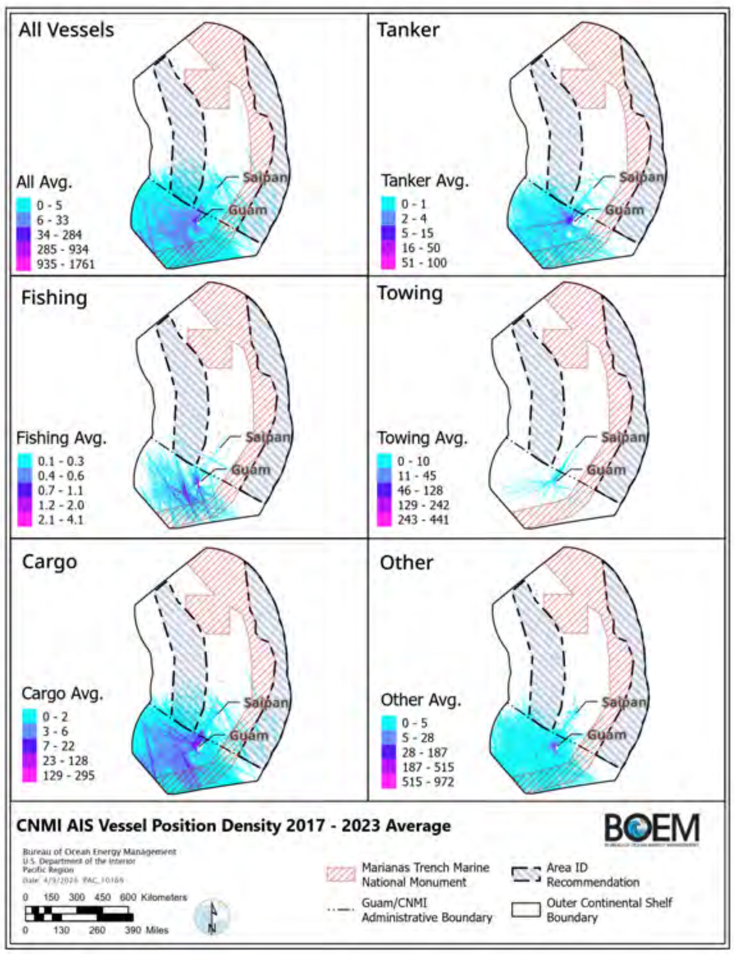

Figure 3. NOAA Office for Coastal Management data of AIS density, for all vessels, received between 2017 and 2023

The Port of Saipan is the port identified for possible use in the navigation and vessel traffic geographic analysis area. Port of Saipan has navigational aids and harbor buoys, but no formal routing measures (traffic separation schemes, precautionary areas, safety fairways, anchorage areas) exist in the area. The Proposed Action Area does not have seasonal management areas with federally established vessel speed regulations. There are seven Marine Protected Areas (MPAs) in the CNMI, as shown in **Figure 4**. They consist of 1) Managaha Marine Conservation Area; 2) Bird Island Sanctuary; 3) Forbidden Island Sanctuary; 4) Tinian Marine Reserve, Tinian; 5) Sasanhaya Bay Fish Reserve; 6) Laolao Bay Sea Cucumber Sanctuary; and 7) Lighthouse Reef Trochus Sanctuary. None currently have transit restrictions.

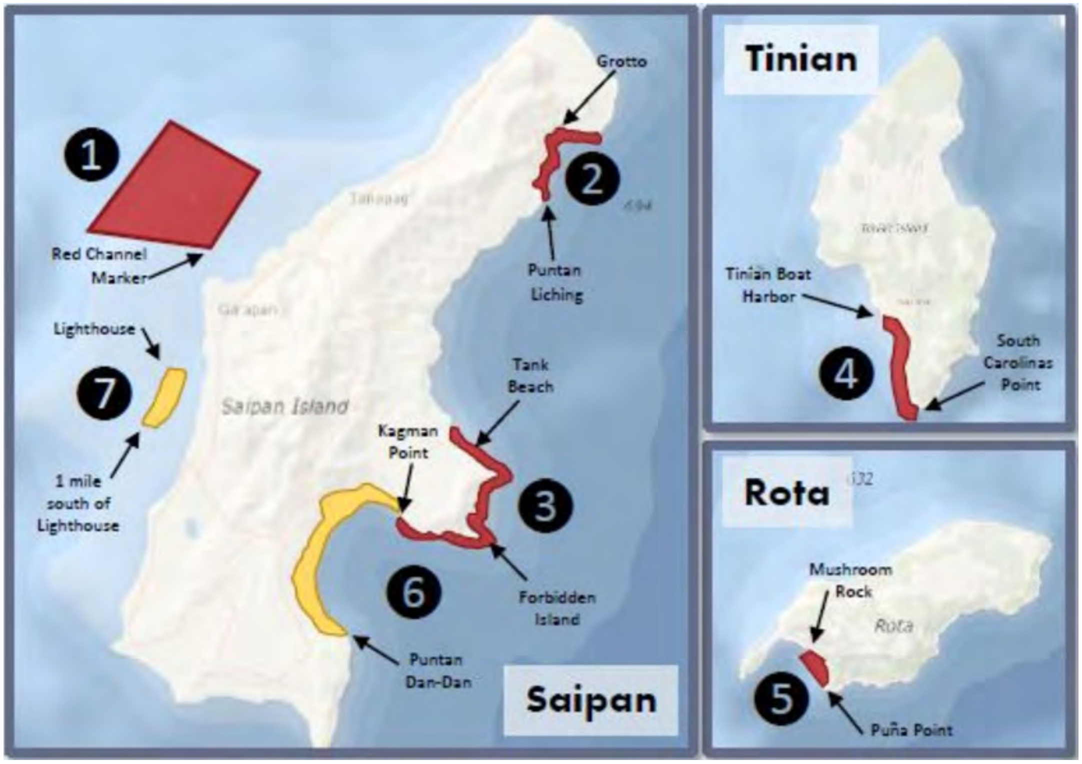

Figure 4. CNMI MPAs
Source: Division of Coastal Resources Management (2018)

For analysis of vessel traffic in and around the Hawai'ian waters, vessel data were downloaded from the World Bank Group (WBG) data catalog. The analysis used International Monetary Fund's analysis of hourly AIS positions received between January 2015 and February 2021 (**Figure 5**). The brighter red and yellow colors indicate higher position density of vessels, and, as the values decrease, they move closer to green. The WBG data available from January 2015 to February 2021 (**Figure 5**) provides an aggregate of AIS-broadcasted points of vessel activity concentration in the areas around Hawai'i. The image does not differentiate between commercial, recreational, and for-hire fisheries or the activities the vessels are engaged in (actively fishing, transiting, etc.).

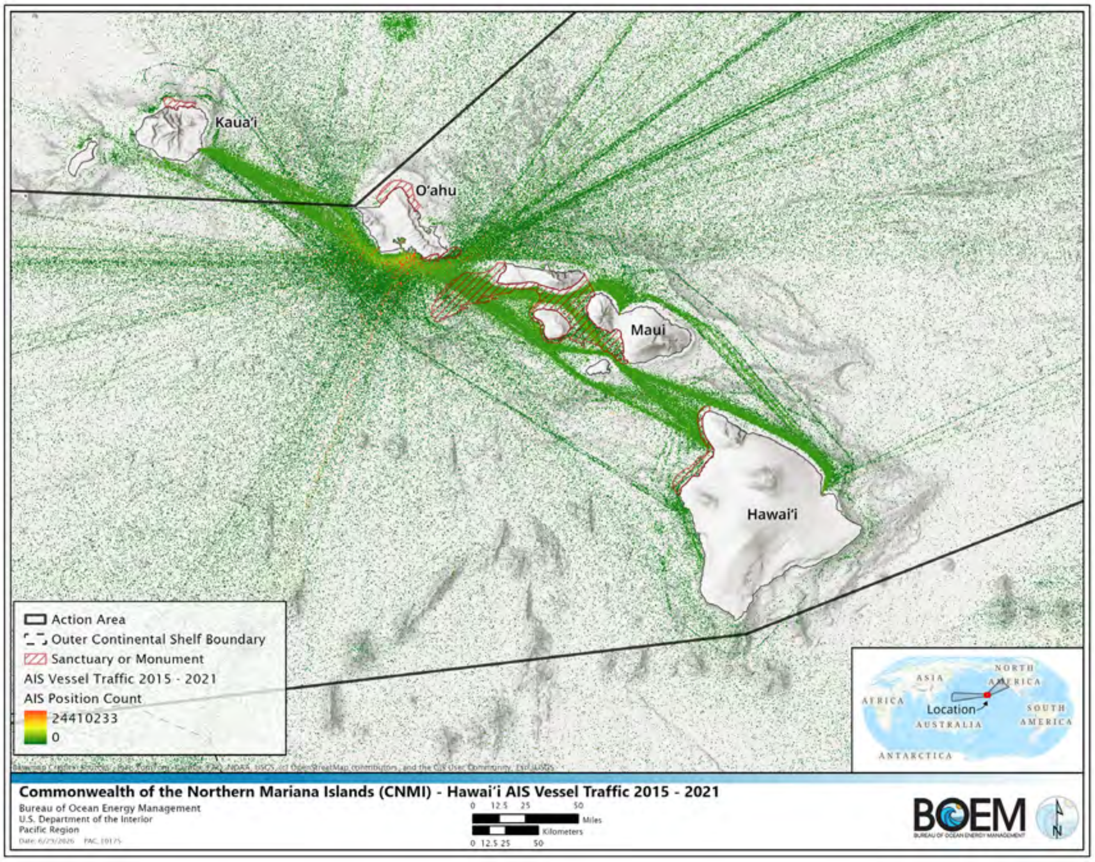

Figure 5. Vessel activities in and around Hawaiian waters

For analysis of vessel traffic in and around the U.S. West Coast waters, vessel data were downloaded from WBG data catalog. The analysis used International Monetary Fund's analysis of hourly AIS positions received between January 2015 and February 2021 (**Figure 6**). The brighter red color indicates higher position density of vessels, and, as the values decrease, they move closer to green. The WBG data available from January 2015 to February 2021 aggregate of AIS-broadcasted points of vessel activity concentration in the areas around the U.S. West Coast. The image does not differentiate between commercial, recreational, and for-hire fisheries or the activities the vessels are engaged in (actively fishing, transiting, etc.).

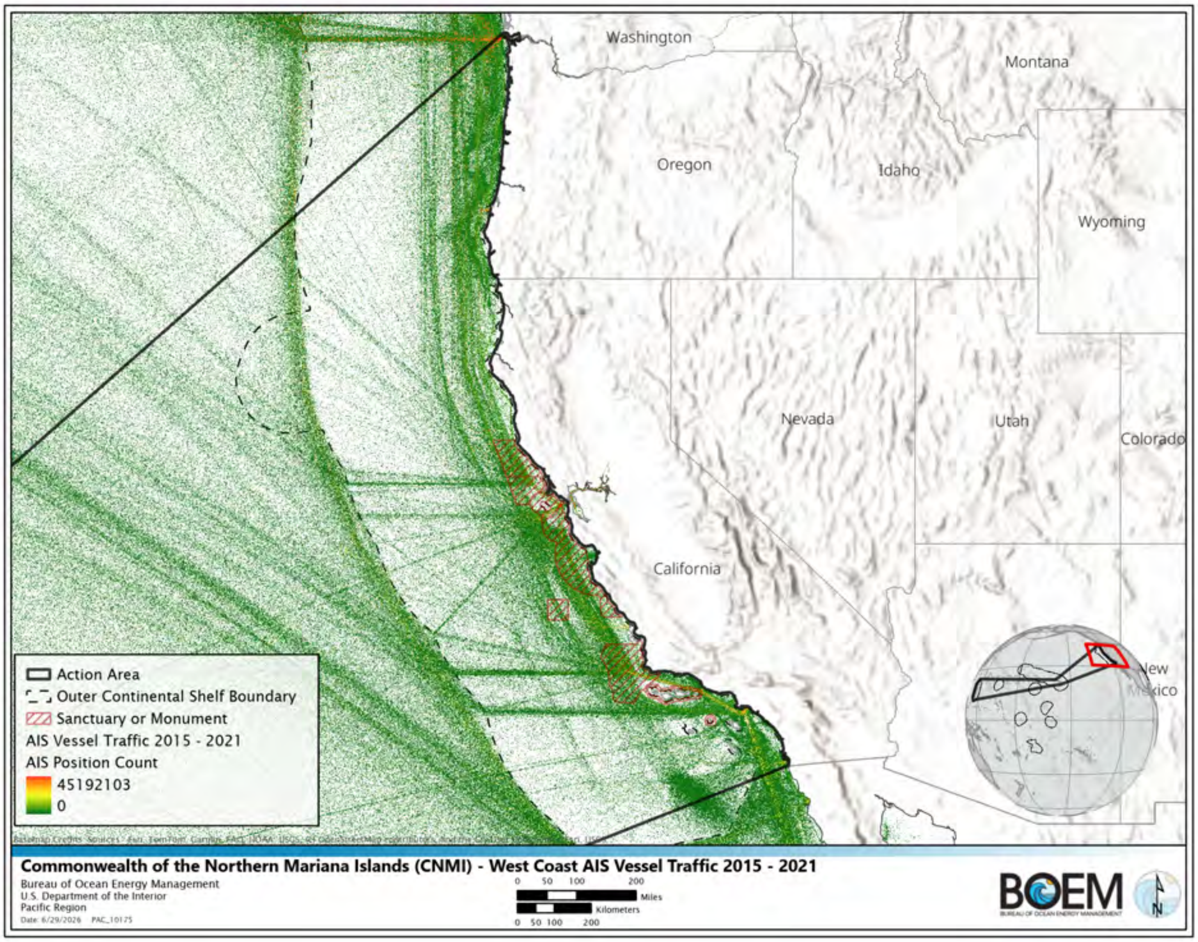

Figure 6. Vessel activities in and around the U.S. West Coast

3.3 Allisions and Collisions

An *allision* occurs when a moving object (i.e., a vessel) strikes a stationary or moored object (e.g., meteorological buoy); a *collision* occurs when two moving objects strike each other. A buoy in the area could pose a risk to vessel navigation. An allision between a ship and buoy could result in the damage or loss of the buoy and/or the vessel, as well as loss of life and spillage of petroleum products. Vessels associated activities could collide with other vessels, resulting in damage to the vessels, petroleum product spills, or capsizing.

Vessel strikes of marine mammals, sea turtles, and manta rays occur, but precise information on the rate at which collisions occur each year for which species is unknown. However, vessel collisions are identified as known or possible cause of death for several ESA-listed species. The potential for vessel collisions to injure listed species depends on vessel speed and the manner in which encounters occur. A marine mammal or sea turtle at the surface could be struck directly by a vessel, a surfacing animal could hit the bottom of a vessel, or an animal just below the surface could suffer injuries from a propeller. For large whales in particular, the severity of injuries typically depends on the size and speed of the vessel (Knowlton and Kraus 2001; Laist et al. 2001; Vanderlaan and Taggart 2007). Because some whale species can avoid slower-moving vessels, reducing vessel speed is a practical measure for reducing the risk of vessel strikes of large whales. For instance, Wiley et al. (2011) determined that a 10-kn speed restriction in North Atlantic right whale Seasonal Management Areas reduced the risk of collisions by nearly 60% from the status quo. Less research is available for vessel interactions with sea turtles, but there are some studies that document these incidents. Green turtles have been documented as being hit by boats in Guam (Seminoff et al. 2015). For example, in May 2012, one stranded green turtle with evidence of being hit by a vessel washed ashore east of Kil Wharf on Naval Base Guam. Another green turtle that stranded dead at Uniform Wharf at Naval Base Guam in September 2011 had a gash on the carapace suggesting a vessel strike (Seminoff et al. 2015). Additionally, Summers et al. (2018) documented stranding of sea turtles between 2005 through 2016 on Saipan and Tinian, CNMI; of the 89 strandings, two green turtles were documented to have boat strike injuries. These green sea turtle incidents may have occurred from high speed vessel traffic because they are known to flee less frequently and at shorter distances from vessels approaching at higher speeds than at lower speeds (Hazel et al. 2007).

3.4 Entrapment and Entanglement

There are reports of large whales (including humpback, right, and fin whales) interacting with anchor moorings of yachts and other vessels towing small yachts from their moorings, or becoming entangled in anchor chains, sometimes with lethal consequences (Blue Water Sailing 2012; Saez et al. 2020). A total of 511 whale entanglements, 429 confirmed, along the U.S. West Coast have been reported from 1982–2017. The annual average of total entanglement reports received by NMFS for the same period was 14, with an average of 12 confirmed entanglement reports per year (Saez et al. 2020). There are no recorded events in the literature of ESA-listed species becoming entangled in ROV cables. The following gear types have been identified in the entanglement of large whales off the U.S. West Coast between 1982 and 2017: netting, commercial and recreational fishing pots/traps, salmon troll line, steel cables, and one weather buoy (in 2014). Since 2000 (289 confirmed reports), pot/trap gear has become the most commonly identified gear type associated with entanglement reports (32%).

Sea turtles have been documented to be entangled in a large variety of man-made items (Duncan et al. 2017). Sea turtle entanglements are an underestimate as not all entanglements are reported. Between 2002 (when the Sea Turtle Disentanglement Network was formed) and 2014, there were 275 entanglements in vertical lines (NMFS 2015a). Turtles are usually entangled around the neck and/or front flippers. Leatherback sea turtles, most frequently sighted in central California, face significant threats from bycatch in fisheries (entanglement and/or hooking) (Benson et al. 2020). Of the 89 sea turtle stranding cases between 2005 through 2016 on Saipan and Tinian, CNMI, one hawksbill and one olive ridley turtle were entangled in marine debris (Summers et al. 2018).

It is possible that ESA-listed turtles may become entrapped in moon pools, a term used to describe an opening in vessel hulls used for deploying and retrieving AUVs and other equipment. Although not within the Action Area, four instances of sea turtle entrapment (two loggerhead and two leatherback turtles) in moon pools have been documented aboard vessels operating in the Gulf of America, with all animals released alive (NMFS 2020b). Moon pools have been used for decades off the West Coast, and there is no known record of entrapment of ESA-listed species in the moon pools in the Pacific. The Monterey Bay Aquarium Research Institute (MBARI) regularly uses moon pools in launching ROVs and other instruments as it is safer for their staff and equipment. MBARI researchers and monitors have never had an animal trapped in their moon pool (MBARI staff, pers. comm.).

3.5 Climate Change

One of the factors affecting ESA-listed species and the marine environment is climate change. Global warming (increase in average annual surface air temperature by 1.0 °C over the last 115 years between 1901 and 2016) is occurring, and the Earth's temperature is the warmest in the history of modern civilization. Strong evidence suggests human activities, particularly greenhouse emissions, as probable cause of this trend (U.S. Global Change Research Program 2017). There is broad consensus that the further and faster Earth warms, the greater the risk of potentially large and irreversible negative impacts to wildlife (U.S. Global Change Research Program 2017).

Greenhouse gas emissions and changes in air and sea surface temperatures can impact the marine environment (e.g., changes in ocean acidity, altered precipitation patterns, sea level rise, and changes in ocean currents). Global average sea levels are expected to rise by several inches in the next 15 years and 1–4 ft by 2100 (U.S. Global Change Research Program 2017).

Climate change can influence ocean circulation for major basin-wide currents including intensity and position of western boundary currents. Natural climatic oscillations (e.g., El Niño, La Niña) occur off the U.S. West Coast and are associated with anomalously warm water incursions. These oscillations can potentially impact the biological ecosystems with regards to nutrient availability and phytoplankton and zooplankton distribution (van Gennip et al. 2016). These impacts may also lead to changes to ecological functions, such as migration, feeding, and breeding locations of listed species. Changes to any of these factors may make the currently used habitat unsuitable and lead to decreased productively in different patterns of prey distribution and availability. These changes may affect individual animals dependent on those affected prey.

NMFS has conducted climate vulnerability assessments for many of its protected species (Lettrich et al. 2020). The potential impacts of climate and oceanographic change on whales and other marine mammals likely will affect habitat availability and food availability. Site selection for migration, feeding, and breeding may be influenced by factors such as ocean currents and water temperature. For example, there is some evidence from Pacific equatorial waters that sperm whale feeding success and, in turn, calf production rates, are negatively affected by increases in sea surface temperature (Smith and Whitehead 1993; Whitehead 1997). Any changes in these factors could render currently used habitat areas unsuitable. Changes to climate and oceanographic processes may also lead to decreased prey productivity and different patterns of prey distribution and availability. Different species of marine mammals likely will react to these changes differently. For example, range size, location, and whether or not specific range areas are used for different life-history activities (e.g., feeding, breeding) are likely to affect how each species responds to climate change (Learmonth et al. 2006).

Based upon available information, it is likely that sea turtles are being affected by climate change. Sea turtle species are likely to be affected by rising temperatures that may affect nesting success and skew sex ratios, as some rookeries are already showing a strong female bias as warmer temperatures in the nest chamber leads to more female hatchlings (Chan and Liew 1995; Kaska et al. 2006). Rising sea surface temperatures and sea levels may affect available nesting beach areas as well as ocean productivity. Based on climate change modeling efforts in the eastern tropical Pacific Ocean, for example, Saba et al. (2012) predicted that the Playa Grande (Costa Rica) leatherback nesting population would decline 7% per decade over the next 100 years. Changes in beach conditions are expected to be the primary driver of the decline, with hatchling success and emergence rates declining by 50–60% over the next 100 years in that area (Tomillo et al. 2012). Sea turtles are known to travel within specific isotherms, and these could be affected by climate change and cause changes in their bioenergetics, thermoregulation, prey availability, and foraging success during the oceanic phase of their migration (Robinson et al. 2009; Saba et al. 2012). While the understanding of how climate change may impact sea turtles is building, there is still uncertainty and limitations surrounding the ability to make precise predictions about or quantify the threat of future effects of climate change on sea turtle populations (Hawkes et al. 2009).

Environmental changes associated with climate change are occurring within the Action Area (e.g., increased sea level rise, altered precipitation patterns) and are expected to continue into the future.

3.6 Accidental Release of Pollutants and Marine Debris

Oil and other chemical spills are a specific type of ocean contamination that can have damaging effects on some marine mammal species directly through exposure to oil or chemicals and indirectly due to pollutants' impacts on prey and habitat quality (Matkin et al. 2008; Helm et al. 2014). In the five-year period from 2013–2017 along the Pacific Coast, there were 127 pinnipeds found stranded with a serious injury or mortality caused by oil or tar coating their body (Carretta et al. 2019a).

On a broader scale, ocean contamination resulting from chemical pollutants inadvertently introduced into the environment by industrial, urban, and agricultural use is also a concern for marine mammal conservation and has been the subject of numerous studies (Krahn et al. 2007; Fair et al. 2010; Moon et al. 2010; Desforges et al. 2016; Cossaboon et al. 2019). For example, the chemical components of pesticides used on land flow as runoff into the marine environment and can accumulate in the bodies of marine mammals and be transferred to their young through mother's milk (Fair et al. 2010). The presence of these chemicals in marine mammals has been assumed to put those animals at greater risk for adverse health effects, and potential impact on their reproductive success given toxicology studies and results from laboratory animals (Krahn et al. 2007; Fair et al. 2010; Godard-Codding et al. 2011; Peterson et al. 2014; Peterson et al. 2015). Desforges et al. (2016) have suggested that exposure to chemical pollutants may act in an additive or synergistic manner with other stressors, resulting in significant population-level consequences. Although the general trend has been a decrease in chemical pollutants in the environment following their regulation, chemical pollutants remain important given their potential to impact marine mammals (Law et al. 2014; Bonito et al. 2016; Jepson and Law 2016). Marine species, including seals, sea birds, sea turtles, whales, and dolphins can become entangled in debris, resulting in hindered movement, decreased feeding ability, injury, and death (NOAA Marine Debris Program 2014; Kühn et al. 2015). Fish, crustaceans, shellfish, and zooplankton ingest microplastics, and some of these organisms consume less food and have decreased energy for growth as a result (Boerger et al. 2010; Murray and Cowie 2011; Cole et al. 2013; Watts et al. 2015). Furthermore, microplastics adsorb organic contaminants and trace metals from their surrounding environments (Holmes et al. 2012; Rochman et al. 2013).

There is a clear increase in the number of species, particularly marine mammals, known to be affected, with 40% of the taxa known to ingest marine debris, mainly attributable to a review of the impacts of marine debris on cetaceans (Baulch and Perry 2014). The number of marine fish and seabirds affected by ingestion or entanglement has also risen. New records for plastic ingestion by fish have been reported in a range of habitats, including open ocean, deep water, and temperate pelagic and demersal (see Appendix 1a in Secretariat of the Convention on Biological Diversity 2016).

Within the Action Area near CNMI waters, where the majority of the Proposed Action will take place, a couple oil spill incidents have been documented. In 2019, *Grand Mariana* yacht grounded near Micro Beach in Saipan and was cited as a source of an oil spill following Typhoon Yutu, which made landfall in October of 2018 (Manabat 2021). On June 6, 2025, approximately 30 gallons of oil spill from freight vessel *Mariana* occurred in Tinian Harbor, CNMI (Gu 2025). The U.S. Coast Guard and local responders contained the spill using booms, and no significant impacts to wildlife or shoreline were reported.

4 Range-wide Status of Species and CH

In this section, BOEM considers the status of the NOAA ESA-listed species within the Action Area that may be affected but are not likely to be adversely affected (NLAA) by the Proposed Action. This section also examines the condition of the CH throughout the designated area and discusses the function of the physical or biological features that are essential for the conservation of the species.

4.1 Blue Whale *(Balaenoptera musculus)*

Blue whale populations were greatly reduced by commercial whaling in the early 1900s, and the species was federally listed as endangered in 1970 (35 FR 18319). Two blue whale stocks are recognized in the North Pacific Ocean: the Eastern North Pacific (ENP) stock and the Central North Pacific (CNP) stock (Carretta et al. 2024).

The seasonal migration of the ENP population has been confirmed by long-term acoustic monitoring (Burtenshaw et al. 2004) and by movements of photo-identified individuals between southern California and the Gulf of Alaska (Calambokidis 2009). Blue whales travel northward as summer progresses in response to northward progressing spring transition, and subsequent increases in primary productivity (Burtenshaw et al. 2004; Calambokidis 2009). Blue whale biologically important areas (BIAs) are described in Calambokidis et al. (2015) and updated in Calambokidis et al. (2024). Both the blue whale feeding core and parent BIAs overlap with the Action Area on the West Coast (**Figure 7**).

The most current information suggests that the ENP population may have recently recovered since commercial whaling ended in 1971, despite ship strikes, interactions with fishing gear, and increased levels of ambient sound in the Pacific Ocean (Barlow 1997; 2003; Calambokidis and Barlow 2013; Campbell et al. 2015; Monnahan et al. 2015; Širović et al. 2015b; Barlow 2016; International Whaling Commission 2016; Rockwood et al. 2017; Valdivia et al. 2019; Carretta et al. 2020). The population of ENP blue whales may be near carrying capacity, and the rate of change of the population size has declined (Monnahan et al. 2015; International Whaling Commission 2016; Carretta et al. 2020). Based on NMFS systematic ship surveys from 1991 to 2014, the abundance of blue whales in the area (the combined Oregon/Washington stratum and the Northern California stratum) is estimated at 1,496 whales (Barlow 2016). The annual entanglement rate of blue whales (observed) during 2013–2017 is the sum of observed annual entanglements (1.35/yr), plus species probability assignments from unidentified whales (0.09/yr), totaling 1.44 blue whales annually (Carretta et al. 2020). Most observed blue whale ship strikes have been in southern California or off San Francisco, CA, where the seasonal distribution of blue whales is in close proximity to shipping ports (Berman-Kowalewski et al. 2010). Using the moderate level of avoidance model from Rockwood et al. (2017), estimated ship strike deaths of blue whales are 18 annually. A comparison of average annual ship strikes observed over the period 2013–2017 (0.4/yr) versus estimated ship strikes (18/yr) indicates that the rate of detection for blue whale vessel strikes is approximately 2%. The observed and assigned annual incidental mortality and injury rate from ship strikes (0.4/yr) and commercial fisheries (≥ 1.44 /yr) totals 1.84 whales annually from 2013–2017. This exceeds the calculated potential biological removal of 1.23 for this stock of blue whales (Carretta et al. 2020).

Blue whales identified in the area off northern California are re-sighted most frequently off Point St. George (Calambokidis et al. 2004; Calambokidis 2007). They are most commonly sighted along the continental shelf break but also occur farther inshore, in transit or feeding on surface swarms of krill. Satellite-tagged blue whales provided information on "core areas of use," indicating a high area of overlap for individuals at the western part of the Channel Islands, near the Gulf of the Farallones, and at the northern part of Cape Mendocino (Irvine et al. 2014). Irvine et al. (2014) found that although the satellite tracks were widely distributed, these whales tended to occupy the area off northern California during the latter part of the feeding season in late October–November. Based on a series of aerial and summer/fall shipboard surveys off California, Oregon, and Washington from 1991–2018, sightings of blue whales in inshore and offshore waters off California decreased (Becker et al. 2020). Recently, blue whales were detected in Saipan and Tinian (Ollier et al. 2025).

The CNP stock are known to be found around the Hawaiian Islands during the winter. This stock appears to feed in summer southwest of Kamchatka, south of the Aleutians, and in the Gulf of Alaska; in winter, they migrate to lower latitudes in the western and central Pacific, including Hawai'i (NMFS 2018a). The status of this stock of blue whales in Hawai'i is unknown and is insufficient to evaluate trends in abundance.

No CH is designated for blue whales in the Pacific.

Threats

Blue whales experienced intensive whaling throughout the 20th century, and the threat of directed hunting remains. Other threats that may be affecting blue whales with at least a potential for population-level consequences or are significant enough to contribute to the species' extinction risk include ship strikes, entanglement in marine debris and fishing gear, anthropogenic noise, and loss of prey base due to climate and ecosystem change (NMFS 2020c). Recovery of the globally listed blue whale population is contingent upon all nine management units meeting the relevant criteria described in the blue whale recovery plan (NMFS 2020d).

It is difficult to estimate the numbers of blue whales possibly killed and injured by fishing gear, because large whales that become entangled in fishing gear may often die later and drift far enough to not strand on land after such incidents. Vessel strikes are also a threat to all large whales, including blue whales, although reported vessel strikes are considered a minimum accounting of the total. The threat to blue whales due to underwater noise, pollutants, marine debris, and habitat degradation are difficult to quantify. However, there is a growing concern that the increasing levels of anthropogenic noise in the ocean may be a habitat concern for whales, particularly for whales that use low-frequency sound to communicate, such as baleen whales.

The blue whale recovery plan (NMFS 2020d) describes recommended actions to determine the level of threat, fishery entanglements, vessel strikes, and other potential threats pose to the likelihood of survival and recovery of the species.

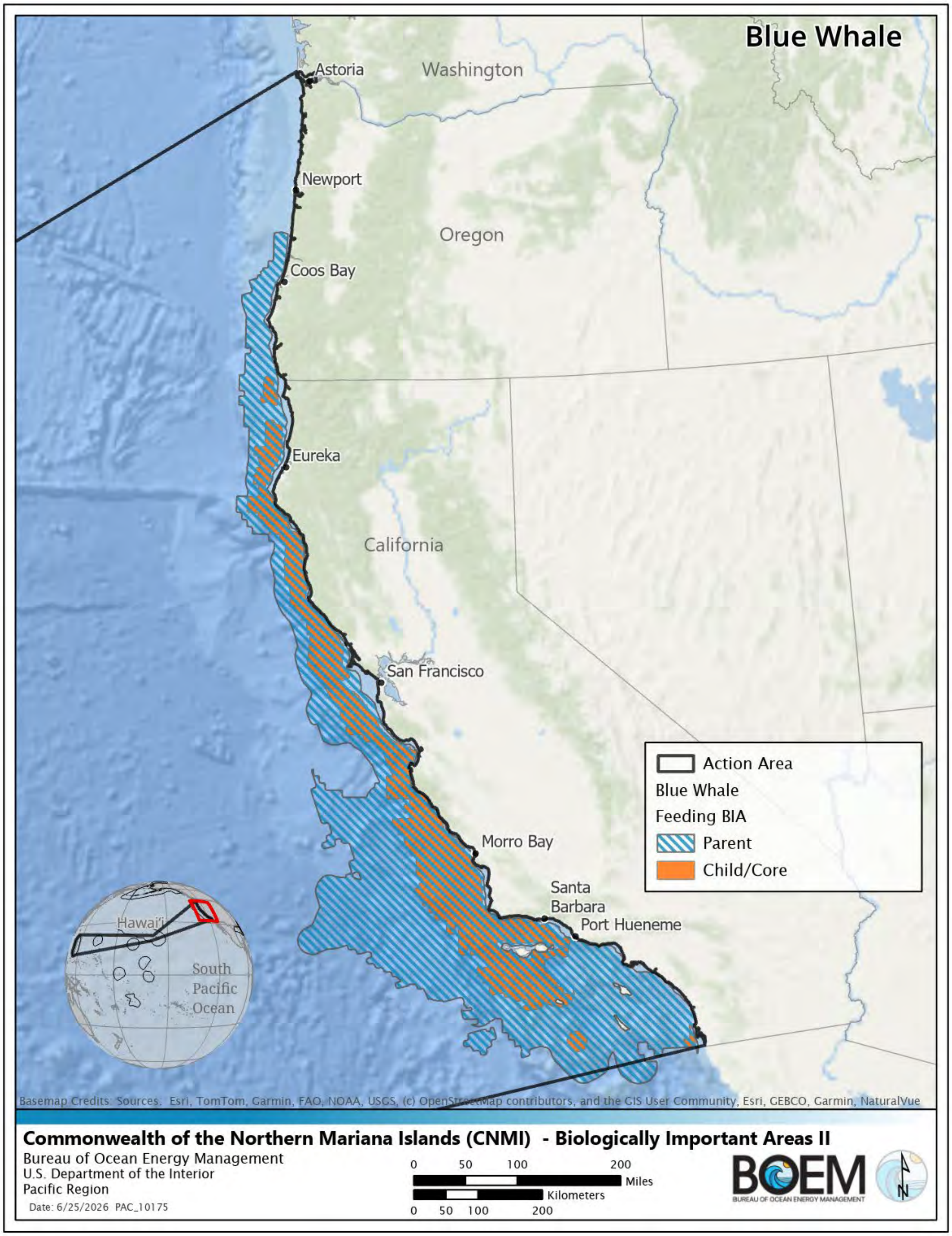

Figure 7. Feeding BIAs for blue whales relative to the Action Area

Data source: Calambokidis et al. (2024)

4.2 Fin Whale *(Balaenoptera physalus)*

Fin whales prefer temperate and polar waters (Reeves et al. 2002; Jefferson et al. 2015). This species has been documented from 60° N in Alaska waters to tropical waters off Hawai'i, in Canadian waters both offshore and inland including some fjords, and they have frequently been recorded in waters within the Southern California Bight (Campbell et al. 2015; Jefferson et al. 2015; Mate et al. 2016; Širović et al. 2016; Mate et al. 2018). As demonstrated by satellite tags and discovery tags, fin whales make long-range movements along the entire U.S. West Coast (Falcone et al. 2011). Locations of breeding and calving grounds are largely unknown. The species is highly adaptable, following prey, typically off the continental shelf (Azzellino et al. 2008; Panigada et al. 2008). Survey and acoustic data indicate that fin whale distributions shift both seasonally as well as annually (Douglas et al. 2014; Jefferson et al. 2014; Calambokidis et al. 2015; Burnham et al. 2019).

During aerial surveys conducted within the 2,000-m isobath off southern Washington, Oregon, and Northern California in the spring, summer, and fall of 2011 and 2012, there were six sightings of 13 fin whales during winter and summer 2012 only in offshore waters over the continental slope (Adams et al. 2014). For sightings from systematic ship surveys out to 300 nmi off the U.S. West Coast, satellite tag data and habitat-based density models built with these data indicate that fin whales are more likely to be present seaward of the continental shelf in the offshore portion of the Action Area in late June to early December (Becker et al. 2020). Because fin whale abundance appears lower in winter/spring in California (Dohl et al. 1983; Forney et al. 1995) and in Oregon (Green et al. 1992), it is likely that the distribution of this stock extends seasonally outside these coastal waters. Fin whales have also been recently detected in Saipan and Tinian, primarily in the winter and spring seasons (Ollier et al. 2025).

The fin whale is listed as endangered under the ESA, but there is no designated CH for this species. Fin whale population structure in the Pacific Ocean is not well known. During the 20th century, more fin whales were taken by industrialized whaling than any other species (Rocha Jr. et al. 2014). NMFS recognizes three fin whale stocks: (1) the Northeast Pacific stock (Alaska); (2) the California, Oregon, and Washington stock, and (3) the Hawai'i stock; all stocks are considered depleted under the Marine Mammal Protection Act and endangered under the ESA (Carretta et al. 2024). Analysis of genetic and acoustic data suggests that fin whales in the North Pacific interbreed and are a single population (Archer et al. 2019).

There has been a roughly five-fold abundance increase between 1991 and 2014. Since 2005, the abundance increase has been driven by increases off northern California, Oregon, and Washington, while numbers off central and southern California have been stable (Nadeem et al. 2016). The best estimate of fin whale abundance in California, Oregon, and Washington waters out to 300 nmi is 9,029 (CV = 0.12) whales, based on a trend analysis of 1991–2014 line-transect data (Nadeem et al. 2016).

Total mean annual fishery-related serious injury and mortality is 0.67 fin whales annually (2014–2018) (Carretta et al. 2020). The average observed annual mortality and serious injury due to ship strikes is 1.6 fin whales per year during 2014–2018. Documented ship strike deaths and serious injuries are derived from direct counts of whale carcasses and represent minimum impacts (Carretta et al. 2020). The most conservative estimate of ship strike deaths from Rockwood et al. (2017) is 43 whales annually. The ratio of documented ship strike deaths (1.8/yr) to estimated annual deaths (43) implies a carcass recovery/documentation rate of 4.1%. There is uncertainty regarding the estimated number of ship strike deaths; however, it is apparent that carcass recovery rates of fin whales are quite low.

Although no fin whale entanglements have been observed 1990–2016 (Carretta et al. 2018), some gillnet mortality may go unobserved because whales swim away with a portion of the net (Carretta et al. 2020).

The average observed annual mortality due to ship strikes is 1.6 fin whales per year for the period 2012–2016 (Carretta et al. 2020). Additional ship strike mortality probably goes unreported because the whales do not strand or, if they do, they may not have obvious signs of trauma.

BIAs for fin whales, including parent and core areas, were recently delineated due to the availability of additional data (see Calambokidis et al. 2024). Both the fin whale parent and core feeding BIAs overlap with the Action Area (**Figure 8**).

Threats

A comprehensive list of general threats to fin whales is detailed in the recovery plan (NMFS 2010) and updated in the most recent five-year status review (NMFS 2019b). Obvious threats to fin whales, besides vessel interactions and fishery entanglements, include reduced prey abundance due to overfishing or other factors (including climate change and competition with other baleen whales), habitat degradation, and disturbance from low-frequency noise, including ship traffic and airguns. Because little evidence of entanglement in fishing gear exists, and large whales such as the fin whale may often die later and drift far enough not to strand on land after such incidents, it is difficult to estimate the numbers of fin whales killed and injured by gear entanglements.

Documented ship strike deaths and serious injuries are derived from actual counts of fin whale carcasses and should be considered minimum values, although Rockwood et al. (2017) recently published efforts to generate plausible estimates of ship strike mortality for several whale species. Continued research around vessel traffic pattern inconsistencies may inform our understanding of the mitigation of vessel strike risks with Redfern et al. (2019), who suggested consideration of both the reduction of vessel speeds along with expanded areas of avoidance.

The threats to fin whales due to underwater noise, pollutants, marine debris, and habitat degradation are difficult to quantify, although recent studies are finding concerning levels of persistent organic pollutants (Pinzone et al. 2015) and microplastics, including plastic additives (Fossi et al. 2012), in the blubber of fin whales. There is a growing concern that the increasing levels of anthropogenic noise in the ocean may be a habitat concern for fin whales that use low-frequency sound to communicate.

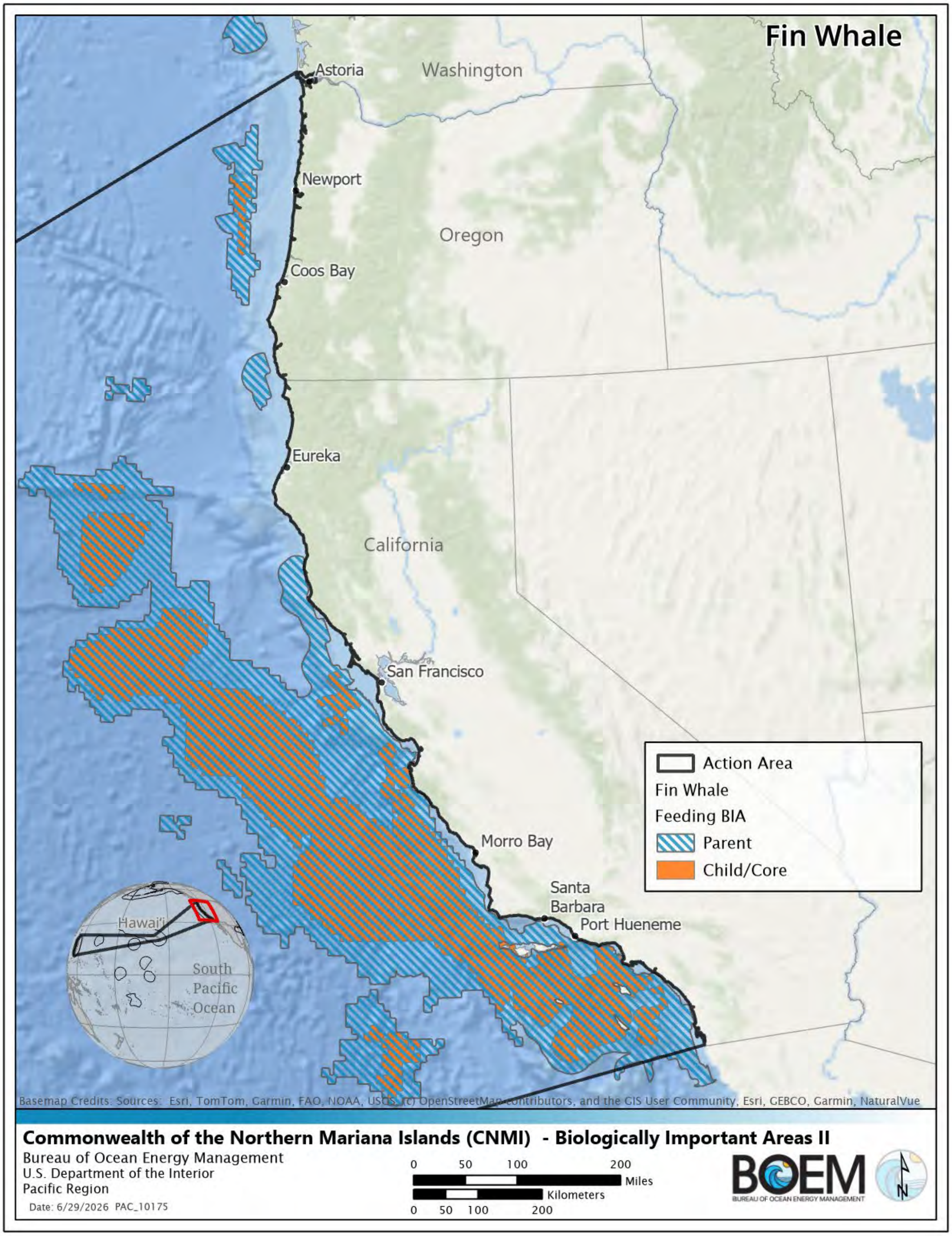

Figure 8. Feeding BIAs for fin whales relative to the Action Area

Data source: Calambokidis et al. (2024)

4.3 Sei Whale *(Balaenoptera borealis)*

Sei whales have a worldwide distribution and are found primarily in cold temperate to subpolar latitudes across the North Pacific where there is steep bathymetric relief, such as the continental shelf break, canyons, or basins between banks and ledges (Horwood 1987; Best and Lockyer 2002; Horwood 2009; Burnham et al. 2019). Sei whales are migratory, spending the summer months feeding in the subpolar higher latitudes and returning to the lower latitudes to calve in the winter (Fulling et al. 2011; Smultea and Jefferson 2014; Rone et al. 2017). In the winter in the Pacific, sei whales have been detected as far south as the Mariana Islands, Hawai'i, and southern California (Fulling et al. 2011; Smultea and Jefferson 2014). Analysis of sei whale genetic samples from around the Pacific suggests a single stock present in the Pacific (Baker et al. 2006; Huijser et al. 2018). For the marine mammal stock assessment reports, sei whales within the Pacific U.S. EEZ are divided into three discrete non-contiguous areas: (1) California, Oregon, and Washington waters, (2) waters around Hawai'i, and (3) Alaskan waters. The ENP stock includes animals found within the U.S. West Coast EEZ and in adjacent high seas waters, and the Hawaiian stock includes animals found both within the Hawaiian Islands EEZ and in adjacent high seas waters (NMFS 2023b).

The sei whale is listed as endangered under the ESA, but there is no designated CH for this species (Carretta et al. 2024). No data on trends in sei whale abundance exist for the eastern North Pacific. Although the population in the North Pacific is expected to have grown since being given protected status in 1976, the possible effects of continued unauthorized takes (Yablokov 1994), vessel strikes and gillnet mortality make this uncertain. Barlow (2016) noted that an increase in sei whale abundance observed in 2014 in the California Current is partly due to recovery of the population from commercial whaling but may also involve distributional shifts in the population. The best estimate of abundance for California, Oregon, and Washington waters is the unweighted geometric mean of the 2008 and 2014 estimates, or 519 (CV = 0.40) sei whales (Barlow 2016). For the Hawaiian stock, encounter data from a 2010 shipboard line-transect survey of the entire Hawaiian Islands EEZ was used to evaluate the current abundance estimate of 391 (CV=0.9) (Bradford et al. 2017).

Threats

Sei whales are rare in the California Current (Dohl et al. 1983; Green et al. 1992; Forney et al. 1995; Barlow 2016) but were the fourth most common whale taken by California coastal whalers in the 1950s–1960s (Rice 1974). Shipboard surveys off California, Oregon, and Washington from 1991–2014 sighted approximately 17 sei whales from 35° N to 45° N (Barlow 2016). The California swordfish drift gillnet fishery is the most likely U.S. fishery to interact with sei whales from this stock, but no entanglements have been observed from 8,845 monitored fishing sets from 1990–2016 (Carretta et al. 2018). The average observed annual mortality due to ship strikes is 0.2 sei whales per year for the period 2012–2016. The reported take of North Pacific sei whales by commercial whalers totaled 61,500 between 1947 and 1987 (C. Allison, IWC, pers. comm.). There has been an International Whaling Commission prohibition on taking sei whales since 1976, and commercial whaling in the U.S. has been prohibited since 1972. Increasing levels of anthropogenic sound in the world's oceans is a habitat concern for whales, particularly for baleen whales that may communicate using low-frequency sound (Croll et al. 2002). Other threats include prey base changes due to climate change and impacts from oil and gas exploration.

4.4 Humpback Whale *(Megaptera novaeangliae)*

Humpback whales occur throughout the North Pacific, with multiple populations recognized based on low-latitude winter breeding areas (Calambokidis et al. 2001; Calambokidis et al. 2008; Barlow et al. 2011).

Exchange of animals between breeding areas occurs rarely, based on photo-identification data of individual whales (Calambokidis et al. 2001; Calambokidis et al. 2008). Hill et al. (2020a) documented the Mariana Archipelago as a breeding area for humpback whales. Photo-identification evidence also suggests strong site fidelity to feeding areas, but animals from multiple feeding areas converge on common winter breeding areas (Calambokidis et al. 2008). The only ESA-listed humpback whale population present in the Marianas, including the CNMI OCS Action Area, is the Western North Pacific (WNP) Distinct Population Segment (DPS), which is listed as endangered under the ESA (NMFS 2022; Young et al. 2026). The Marianas/Ogasawara-North Pacific unit (also referred to as a Demographically Independent Population, or DIP, of the WNP stock) is specifically recognized as the relevant management unit for the Marianas region (Young et al. 2026). For the marine mammal stock assessment reports, the California/Oregon/Washington Stock is defined to include humpback whales that feed off the U.S. West Coast, including whales from the endangered Central American and threatened Mexican DPSs defined under the ESA (NMFS 2022). Three other stocks are recognized in the Pacific region stock assessment reports: (1) CNP Stock (with feeding areas from Southeast Alaska to the Alaska Peninsula), (2) WNP DPS listed as endangered under ESA, with summer feeding areas from the Aleutian Islands, the Bering Sea, and Russia and wintering in the Mariana Archipelago and Ogasawara (NMFS 2022; 2023c; Young et al. 2026), and (3) American Samoa Stock in the South Pacific (with largely undocumented feeding areas as far south as the Antarctic Peninsula) (Carretta et al. 2024). Nearly all Central American whales migrate to California and Oregon to feed, but the California/Oregon feeding area represents a mix of whales from Mexico and Central America (Wade 2021).

Both core and parent BIAs for humpback whale feeding areas were identified off the U.S. West Coast by Calambokidis et al. (2015) and updated by Calambokidis et al. (2024). Both the core and parent humpback whale feeding BIAs overlap with the Action Area on the West Coast (**Figure 9**). There are also reproductive BIAs in Hawai'i for humpback whales (**Figure 10**). Within the Marianas, the relevant ESA-listed population is the WNP DPS, specifically the Marianas/Ogasawara-North Pacific unit, which winters in the Mariana Archipelago (NMFS 2022; Young et al. 2026).

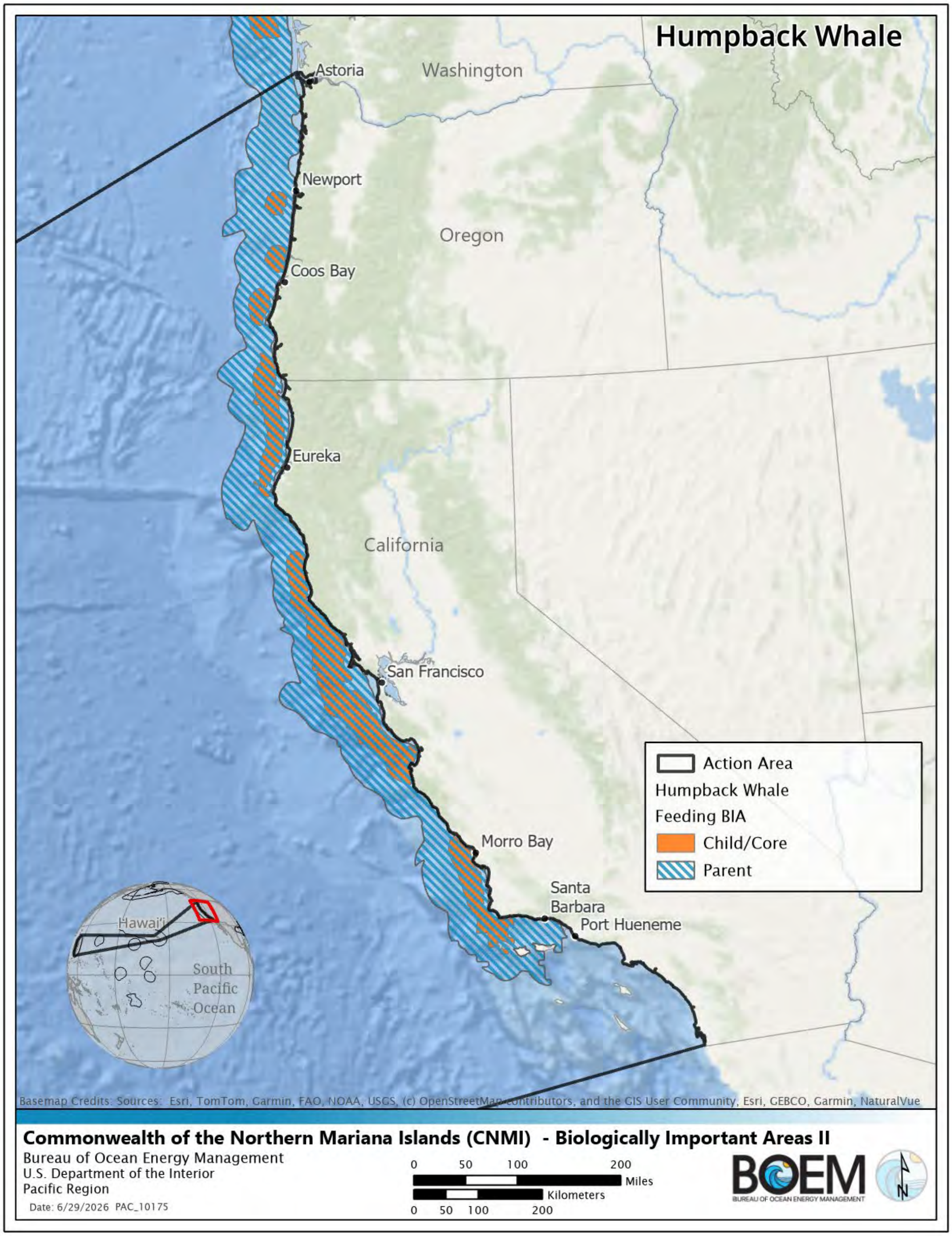

Figure 9. Feeding BIAs for humpback whales relative to the Action Area within the West Coast

Data source: Calambokidis et al. (2024)

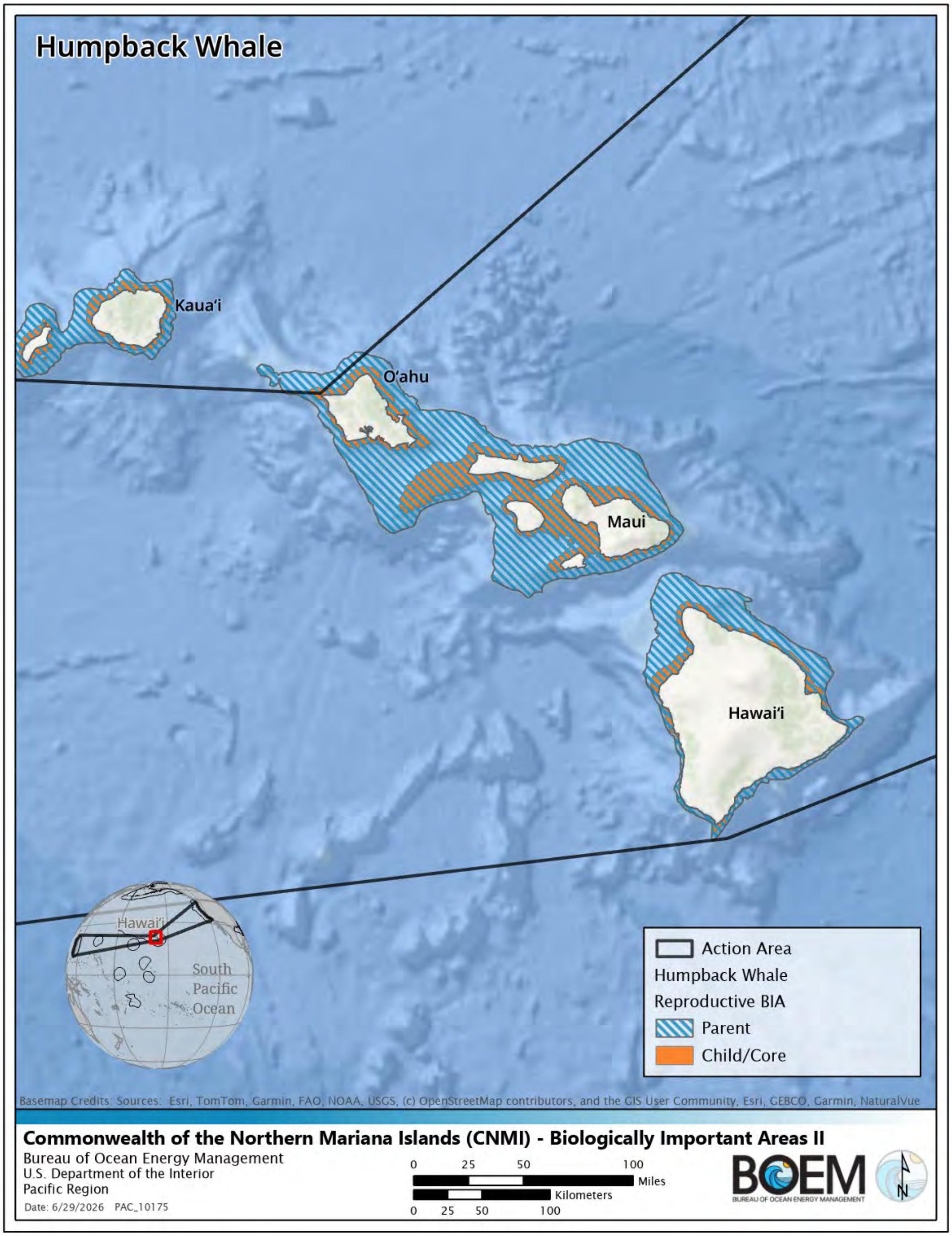

Figure 10. Reproductive BIAs for humpback whales relative to the Action Area in Hawaiian waters

Data source: Calambokidis et al. (2024)

CH for the WNP DPS of humpback whales is designated only in Alaskan waters and does not overlap with the Action Area, including the Marianas or Ogasawara. Therefore, there are no CH-related effects for the WNP DPS in this BA, but the WNP DPS, specifically the Marianas/Ogasawara-North Pacific unit, is the only ESA-listed humpback whale population present in the Marianas (NMFS 2022; Young et al. 2026). CH for the endangered Central America DPS and the threatened Mexico DPS of humpback whales within waters off the U.S. West Coast (**Figure 11**) was designated on April 21, 2021 (86 FR 21082), identifying prey as the single essential feature for both DPSs. CH for these DPSs serve as feeding habitat and contain the essential biological feature of humpback whale prey. CH for the Central America DPS of humpback whales contains approximately 48,521 nmi^2 of marine habitat in the North Pacific Ocean within the portions of the California Current Ecosystem off the coasts of Washington, Oregon, and California. Specific areas designated as CH for the Mexico DPS of humpback whales contain approximately 116,098 nmi^2 of marine habitat in the North Pacific Ocean, including areas within portions of the eastern Bering Sea, Gulf of Alaska, and California Current Ecosystem. For the Central America DPS, the prey essential feature is described as primarily euphausiids (*Thysanoessa, Euphausia, Nyctiphanes,* and *Nematoscelis*) and small pelagic schooling fishes, such as Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), and Pacific herring (*Clupea pallasii*), of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth. For the Mexico DPS, the prey feature is described as primarily euphausiids (*Thysanoessa, Euphausia, Nyctiphanes,* and *Nematoscelis*) and small pelagic schooling fishes, such as Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasii*), capelin (*Mallotus villosus*), juvenile walleye pollock (*Gadus chalcogrammus*), and Pacific sand lance (*Ammodytes personatus*) of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth.

Threats

Fishery interaction is one of the primary threats humpbacks face. From 2013–2017, mortality due to interactions with fisheries amounted to 17.3 whales per year (Carretta et al. 2020). Fourteen humpback whales (totaling 8 deaths, 2.8 serious injuries, and 2 non-serious injuries) were reported struck by vessels between 2013 and 2017 (Carretta et al. 2019a). An encounter theory model estimated the number of annual ship strike deaths to be 22 humpback whales, though this includes only the period July–November when whales are most likely to be present in the U.S. West Coast EEZ and the time of year that overlaps with cetacean-habitat models generated from line-transect surveys (Becker et al. 2016; Rockwood et al. 2017). A humpback whale was entangled in a research marine mooring buoy in 2014. The whale is estimated to have been entangled for 3 weeks and had substantial necrotic tissue around the caudal peduncle. Although the whale was fully disentangled, this animal was categorized as a serious injury because of the necrotic condition of the caudal peduncle and the possibility that the whale would lose its flukes due to the severity of the entanglement (Carretta et al. 2019a). Increasing levels of anthropogenic sound in the world's oceans (Andrew et al. 2002) has also been identified as a threat to humpback whales. Other threats include climate change and vessel-based harassment (e.g., whale-watching vessels, recreational boats and other boats causing stress and behavioral changes).

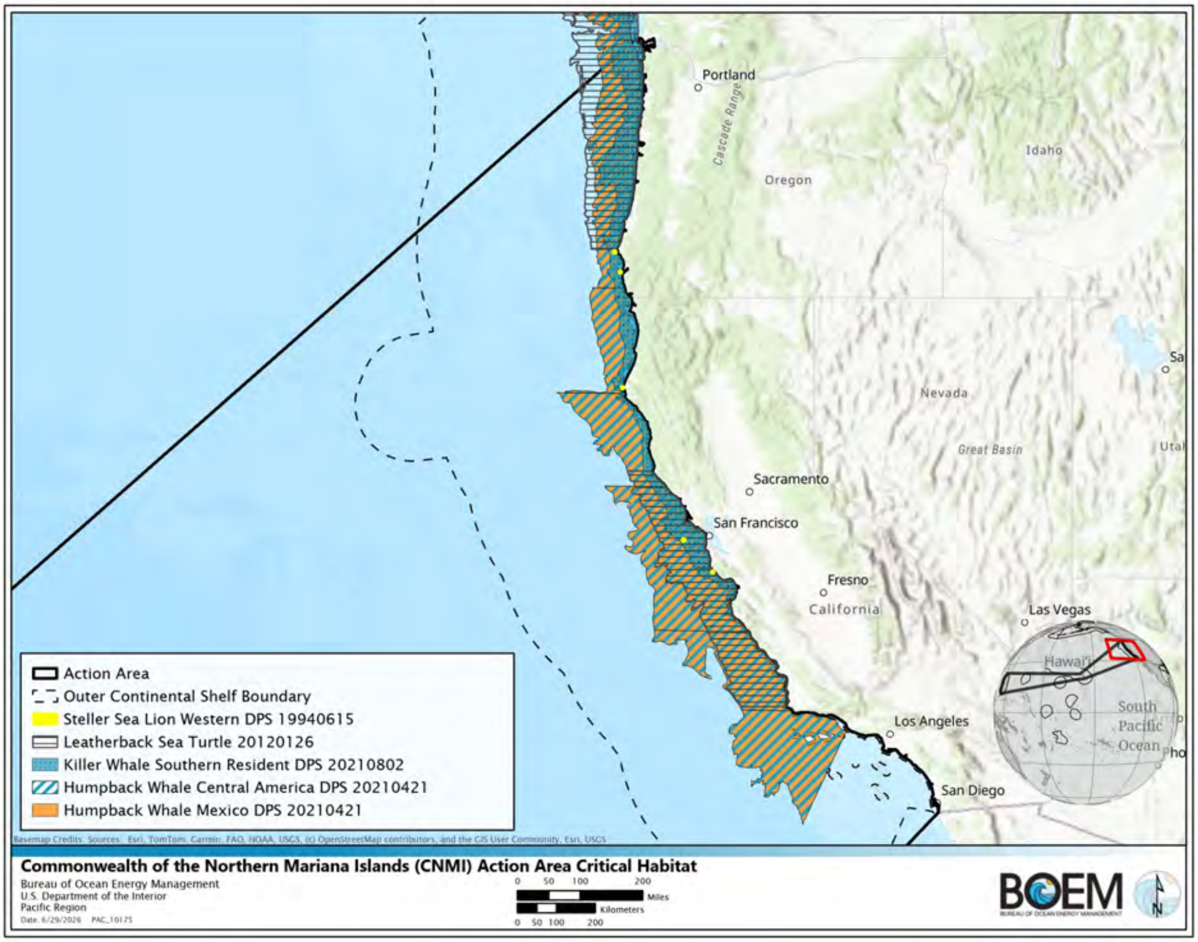

Figure 11. Action Area and CH of Steller sea lions, leatherback sea turtles, Southern Resident killer whales, and Central America and Mexico DPS of humpback whales

4.5 Gray Whale (*Eschrichtius robustus)*

There are two North Pacific stocks of gray whales: the WNP stock and the ENP included in the Pacific Stock Assessment Report (Carretta et al. 2024). Gray whales of the WNP stock primarily occur in shallow waters over the U.S. West Coast, Russian, and Asian continental shelves, while the ENP stock whales primarily occur in shallow waters over the continental shelf of the U.S. West Coast and Mexico. This species is considered to be one of the most coastal of the great whales (Jones and Swartz 2009; Jefferson et al. 2015; Carretta et al. 2024). The WNP stock primarily feed in the Okhotsk Sea off Sakhalin Island, Russia, and in the southeastern Kamchatka Peninsula in the southwestern Bering Sea in nearshore waters generally less than 225 ft deep (Jones and Swartz 2009; Weller and Brownell Jr. 2012). The breeding grounds consist of subtropical lagoons in Baja California, Mexico, and suspected wintering areas in southeast Asia (Urbán R. et al. 2003; Alter et al. 2009; Jones and Swartz 2009; Weller et al. 2013; Mate et al. 2015). The ENP stock also feeds in nearshore waters in the Chukchi Sea, Bering Sea, Gulf of Alaska, the Pacific Northwest, and Northern California (Mate et al. 2010; Mate et al. 2013; Weller et al. 2013; Calambokidis et al. 2017; Lagerquist et al. 2019). The main breeding grounds consist of subtropical lagoons in Baja California, Mexico (Urbán R. et al. 2003; Alter et al. 2009; Jones and Swartz 2009).

Some gray whales make the longest annual migration of any mammal (15,000–20,000 km roundtrip; Guazzo et al. 2019). Gray whales migrate along the Pacific Coast twice a year between October and July (Calambokidis et al. 2015). Although they generally remain mostly over the shelf during migration, some gray whales may be found in more offshore waters to the west of San Clemente Island and the Channel Islands (Mate and Urbán-Ramirez 2003; Smultea and Jefferson 2014; Calambokidis et al. 2015; Guazzo et al. 2019; Schorr et al. 2019). Recordings from a hydrophone array deployed offshore of central California (near Monterey) show that gray whales are acoustically active while migrating and that this acoustic behavior and their swimming behavior during migration changes on daily and seasonal time scales (Guazzo et al. 2017).

Information from tagging, photo-identification and genetic studies show that some whales identified in the western North Pacific off Russia have been observed in the eastern North Pacific, including coastal waters of Canada, the U.S. and Mexico (Weller and Brownell Jr. 2012; Mate et al. 2015; Urbán R. et al. 2019). The number of whales documented moving between the western and eastern North Pacific represents 14% of gray whales identified off Sakhalin Island and Kamchatka according to (Urbán R. et al. 2019). Some whales that feed off Sakhalin Island in summer migrate east across the Pacific to the West Coast of North America in winter, while others migrate south to waters off Japan and China (Weller et al. 2016). The current stock structure for gray whales in the Pacific has been in the process of being re-examined for a number of years and remains uncertain as of the most recent Pacific Stock Assessment Report (Carretta et al. 2020). Genetic data reveal mixed-stock aggregations of gray whales in the North Pacific Ocean and indicate that current population structure is not reflected by the current eastern and western stock or DPS designations based on geography (Brüniche-Olsen et al. 2018; Carretta et al. 2020).

The WNP is endangered, with an estimated population size from photo-ID data for Sakhalin and Kamchatka in 2016 of 290 whales (90% percentile intervals = 271–311) (Cooke et al. 2017; Cooke 2018). Their main wintering areas are in waters off Russia and Asia (Weller et al. 2012; Moore and Weller 2013; Weller et al. 2013; Mate et al. 2015). Recent analysis of the data available for 2005 through 2016 estimates the combined Sakhalin Island and Kamchatka populations are increasing (Cooke 2019). The ENP has recovered from whaling exploitation, is not considered depleted, and was delisted under the ESA in 1994 (Swartz et al. 2006; Carretta et al. 2020). The most recent estimate of abundance for the ENP population is from the 2015/2016 southbound survey and is 26,960 (CV = 0.05) whales (Durban et al. 2017).

A few hundred gray whales that feed along the Pacific Coast between southeastern Alaska and northern California throughout the summer and fall are known as the Pacific Coast Feeding Group (PCFG) (Mate et al. 2013; Weller et al. 2013; Calambokidis et al. 2017; Carretta et al. 2018). The group has been identified as far north as Kodiak Island, Alaska (Gosho et al. 2011) and has generated uncertainty regarding the stock structure of the ENP (Weller et al. 2012; Weller et al. 2013; Carretta et al. 2018). Photo-identification, telemetry, and genetic studies suggest that the PCFG is demographically distinct from the ENP (Mate et al. 2010; Frasier et al. 2011; Calambokidis et al. 2017; Lagerquist et al. 2019). In 2012–2013, the Navy funded a satellite tracking study of PCFG gray whales (Mate et al. 2013). Tags were attached to 11 gray whales near Crescent City, California in fall 2012. Good track histories were received from 9 of the 11 tags, which confirmed an exclusive nearshore (< 19 km) distribution and movement along the northern California, Oregon, and Washington coasts (Mate et al. 2013). Although the duration of the tags was limited, none of the PCFG whales moved south beyond northern California.

Both stocks could be present in the West Coast part of the Action Area during their northward and southward migration (Weller et al. 2012; Moore and Weller 2013; Weller et al. 2013; Calambokidis et al. 2015; Cooke et al. 2015). During whale surveys of the northern feeding grounds, the largest number of

WNP gray whales was observed in late August and early September (Meier et al. 2007), suggesting those few gray whales that may migrate down the U.S. West Coast will not be in California waters in general during those months.

Gray whale BIAs, including migratory, reproductive, and feeding BIAs were identified along the U.S. West Coast (Calambokidis et al. 2015; Calambokidis et al. 2024). The migration corridors used by the majority of gray whales are within 10 km of the U.S. West Coast (Calambokidis et al. 2015). However, some gray whales may take a migration path farther offshore, so an additional buffer extending 47 km from the coastline was added to the BIAs. The gray whale feeding (core and parent), migratory (core and parent), and reproductive (single) BIAs overlap with the Action Area (**Figures 12, 13, 14**).

There has been no CH designated for this species.

Threats

Threats for gray whales include entanglement in fishing gear, vessel strikes, disturbance from whale-watching activities, ocean noise, habitat degradation, and climate change.

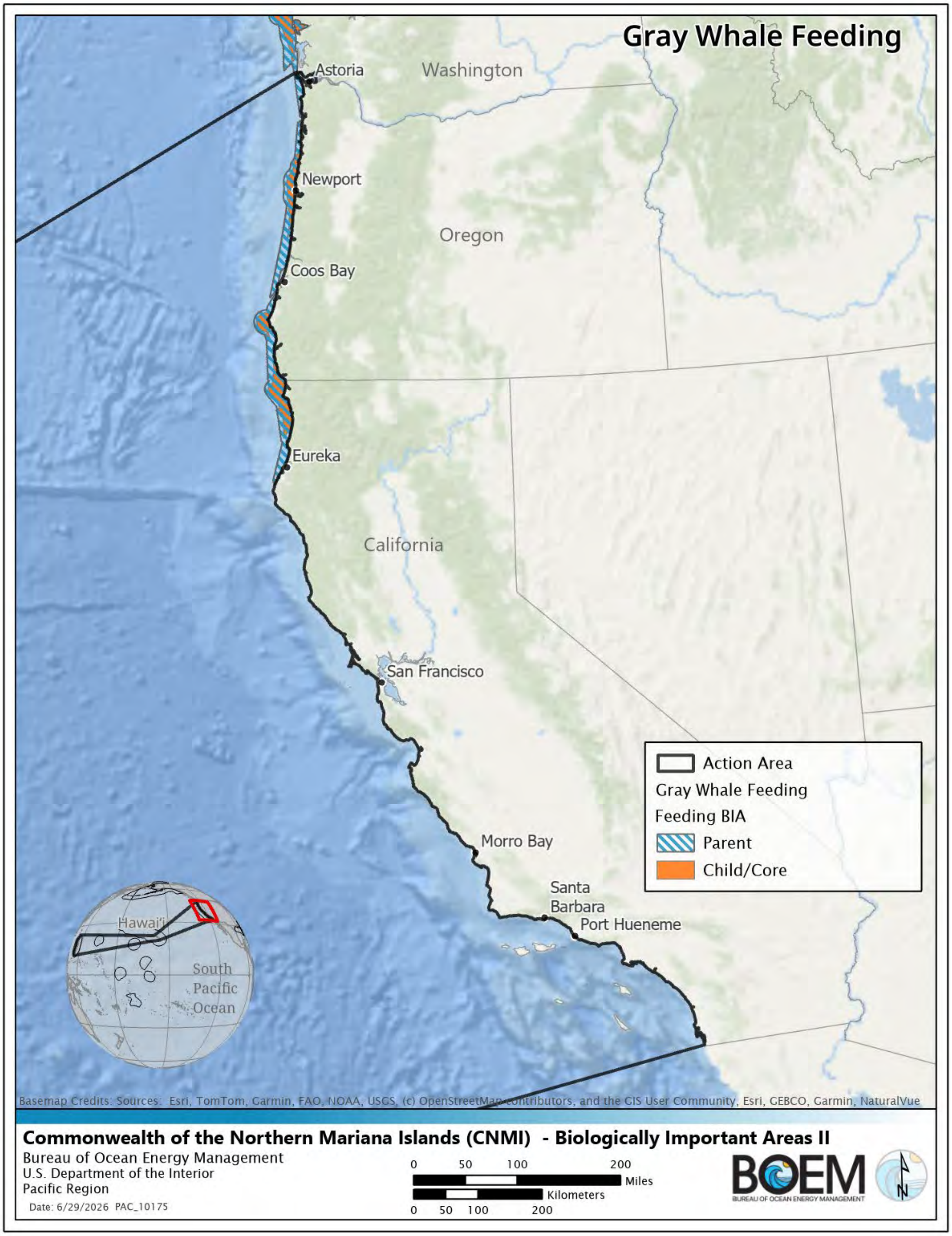

Figure 12. Feeding BIAs for gray whales relative to the Action Area

Data source: Calambokidis et al. (2024)

Figure 13. Migratory BIAs for gray whales relative to the Action Area

Data source: Calambokidis et al. (2024)

Figure 14. Reproductive BIA for gray whales relative to the Action Area

Data source: Calambokidis et al. (2024)

4.6 Sperm Whale (*Physeter macrocephalus)*

The sperm whale has been listed as endangered since 1970 under ESA (NMFS 2015b), but there is no designated CH for this species in the North Pacific. Sperm whales within the Pacific U.S. EEZ are divided into three discrete, non-contiguous areas: California, Oregon, and Washington waters, waters around Hawai'i, and Alaska waters (Carretta et al. 2024).

Sperm whales in the California Current have been identified as demographically independent from animals in Hawai'i and the Eastern Tropical Pacific (Mesnick et al. 2011). The best estimate of sperm whale abundance in the California Current is the trend-based estimate corresponding to the most recent 2014 survey, or 1,997 (CV = 0.57) whales (Moore and Barlow 2014).

Sperm whales of the Hawaiian stock have been sighted throughout the Hawaiian EEZ, including nearshore waters of the main and Northwestern Hawaiian Islands (NWHI) (NMFS 2021b). In addition, the sounds of sperm whales have been recorded throughout the year within the main and NWHI (Thompson and Friedl 1982; Merkens et al. 2019). Summer/fall shipboard surveys of waters within the U.S. EEZ of the Hawaiian Islands resulted in 43 sperm whale sightings in 2002, 46 in 2010, and 24 in 2017 throughout the study area (NMFS 2021b). A few sperm whales have been documented in the Marianas as part of the NOAA surveys conducted between 2010 to 2019 as well as in 2021 (Hill et al. 2020b; Yano et al. 2022).

Sperm whales consume a variety of squid and fish; females feed mostly on deep-living species of squid, whereas males often forage for bottom-dwelling fish (Whitehead 2003; Whitehead et al. 2008). Based on habitat models derived from line-transect survey data collected between 1991 and 2008 off the U.S. West Coast, sperm whales show an apparent preference for deep waters (Barlow et al. 2009; Becker et al. 2010; Becker et al. 2012; Forney et al. 2012). Sperm whales are distributed across the entire North Pacific and into the southern Bering Sea in summer, but the majority are thought to be south of 40°N in winter (Rice 1974; 1989; Miyashita et al. 1995). Sperm whales are found year-round in California waters (Dohl et al. 1983; Forney et al. 1995; Barlow 1997), but they reach peak abundance from April through mid-June and from the end of August through mid-November (Rice 1974). Sperm whales are seen off Washington and Oregon in every season except winter (Green et al. 1992). Of 176 sperm whales that were marked with discovery tags off southern California in winter between 1962 and 1970, only three were recovered by whalers: one off northern California in June, one off Washington in June, and one far off British Columbia in April (Rice 1974).

Since 1978, there have been accounts of at least three other stranded sperm whales, including two in 2008, recorded by the Humboldt State University Vertebrate Museum. No sperm whales were reported from 30 surveys conducted off Eureka in fall 1991–2007 (Calambokidis 2009). Only two sperm whales were observed in low-elevation aerial surveys, both at depths of 200–2,000 m (Adams et al. 2014); satellite tracking has indicated their migration occurs along the continental shelf break, and passive acoustic monitoring has detected them in the Eel River Canyon.

The fishery most likely to injure or kill sperm whales from this stock is the California thresher shark/swordfish drift gillnet fishery (Julian and Beeson 1998; Carretta et al. 2019a; Carretta et al. 2019b), although sablefish hook-and-line fishery, entanglements in unknown fisheries, ingestion of marine debris and vessel strikes are also threats to this species (Carretta et al. 2020). For the 1991–2014 study period, conclusions about whether the population has increased or decreased are uncertain (Moore and Barlow 2017).

Threats to sperm whales include commercial whaling industry, sperm whale depredation in sablefish longline fishery, sounds from anthropogenic sources (e.g., shipping, military exercises), changes in prey distribution and quality with climate change, entanglement in fishing gear, ship strikes due to increased vessel traffic and oil and gas activities

4.7 Southern Resident Killer Whale (*Orcinus orca*)

The ENP Southern Resident stock of killer whales is composed of three matrilineal pods named J, K, and L (Bigg et al. 1990) and occur in the inland waterways of Puget Sound, Strait of Juan de Fuca, and southern Georgia Strait in spring, summer, and fall. Little is known about their fall, winter, and spring movements, but they have been reported in coastal waters off Oregon and Washington, especially in the area between Grays Harbor and the Columbia River (Ford et al. 2000; Hanson et al. 2017), and travel as far south as central California and as far north as the Southeast Alaska. Although less is known about the whales' movements in outer coastal waters, satellite tagging, opportunistic sighting, and acoustic recording data suggest that Southern Residents spend nearly all of their time on the continental shelf, within 34 km of shore in water less than 200 m deep (Hanson et al. 2017). Details of their winter range from satellite tagging reveal whales use the entire Salish Sea (northern end of the Strait of Georgia and Puget Sound) in addition to coastal waters from the central west coast of Vancouver Island, British Columbia to Pt. Reyes in northern California (Carretta et al. 2020). Of the three pods comprising this stock, one (J) is commonly sighted in inshore waters in winter, while the other two (K and L) apparently spend more time offshore (Ford et al. 2000). Krahn et al. (2009) described sample pollutant ratios from K and L pod whales that were consistent with a hypothesis of time spent foraging in California waters, which is consistent with sightings of K and L pods as far south as Monterey Bay.

Following the peak census count of 99 animals in 1995, the population size has declined approximately 1% annually and currently stands at 73 animals as of the 2019 census (Ford et al. 2000; Center for Whale Research 2020).

The Southern Resident killer whales were federally listed as endangered in 2005 (70 FR 69903). CH for this DPS was designated in the summer core area in Haro Strait and waters around the San Juan Islands, Puget Sound (**Figure 15**), and the Strait of Juan de Fuca (79 FR 69054). In August 2021, additional CH was designated along the U.S. West Coast from the Canadian border to Point Sur, California, between depths of 6.1–200 m (86 FR 41668). Vessels transiting from the West Coast (e.g., Coos Bay, Crescent City, San Francisco Bay, etc.) may intersect CH en route to CNMI. Essential features for Southern Resident killer whales include (1) water quality to support growth and development; (2) prey species of sufficient quantity, quality and availability to support individual growth, reproduction, development, as well as overall population growth; and (3) passage conditions to allow for migration, resting, and foraging. In particular, Southern Resident killer whales show a strong preference for salmonids, particularly larger, older age class Chinook (79 FR 69054). Small and resident BIA parent and core areas were delineated for Southern Resident killer whales (Calambokidis et al. 2024), and the small and resident BIAs overlap with the Action Area (**Figure 15**).

Threats

A population viability analysis identified several risk factors to this population, including limitation of preferred Chinook salmon prey, entanglement in fishing gear, anthropogenic noise and disturbance resulting in decreased foraging efficiency, vessel strikes and high levels of contaminants, including polychlorinated biphenyls (PCBs) and DDT (Erbe 2002; Krahn et al. 2007; Clark et al. 2009; Krahn et al. 2009; Lacy et al. 2017; Carretta et al. 2020).

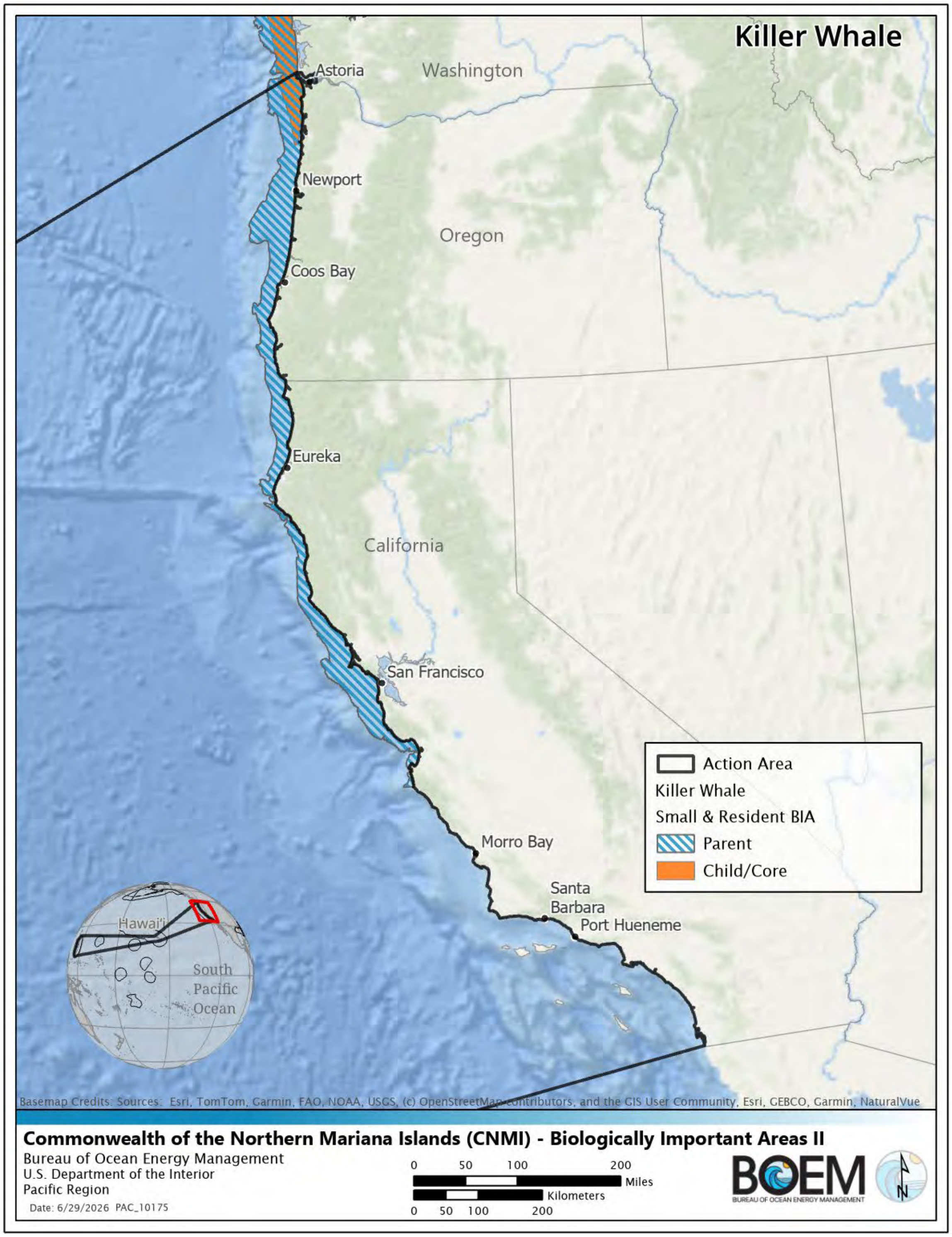

Figure 15. Small and resident BIAs of Southern Resident killer whales relative to the Action Area
Data source: Calambokidis et al. (2024)

4.8 False Killer Whale (*Pseudorca crassidens*)

Main Hawaiian Islands insular false killer whales were listed as “endangered” under the ESA (77 FR 70915, 28 November 2012) and they are found worldwide in tropical and warm temperate waters (Stacey et al. 1994). They have been encountered during periodic shipboard line-transect surveys of the U.S. EEZ around the Hawaiian Islands, and focused studies near the main and NWHI indicate that false killer whales occur in nearshore waters throughout the Hawaiian Archipelago (Baird et al. 2008; Baird et al. 2013). This species also occurs in the U.S. EEZ around Palmyra and Johnston Atolls and American Samoa (NMFS 2024d). The abundance estimate for 2015 was 167 (CV = 0.14). Annual estimates over the 16-year survey period ranged from 144 to 187 animals and are similar to multi-year aggregated estimates published previously (Oleson et al. 2010).

Reproductive BIAs for false killer whale are also found in Hawai’i within the Action Area (**Figure 16**).

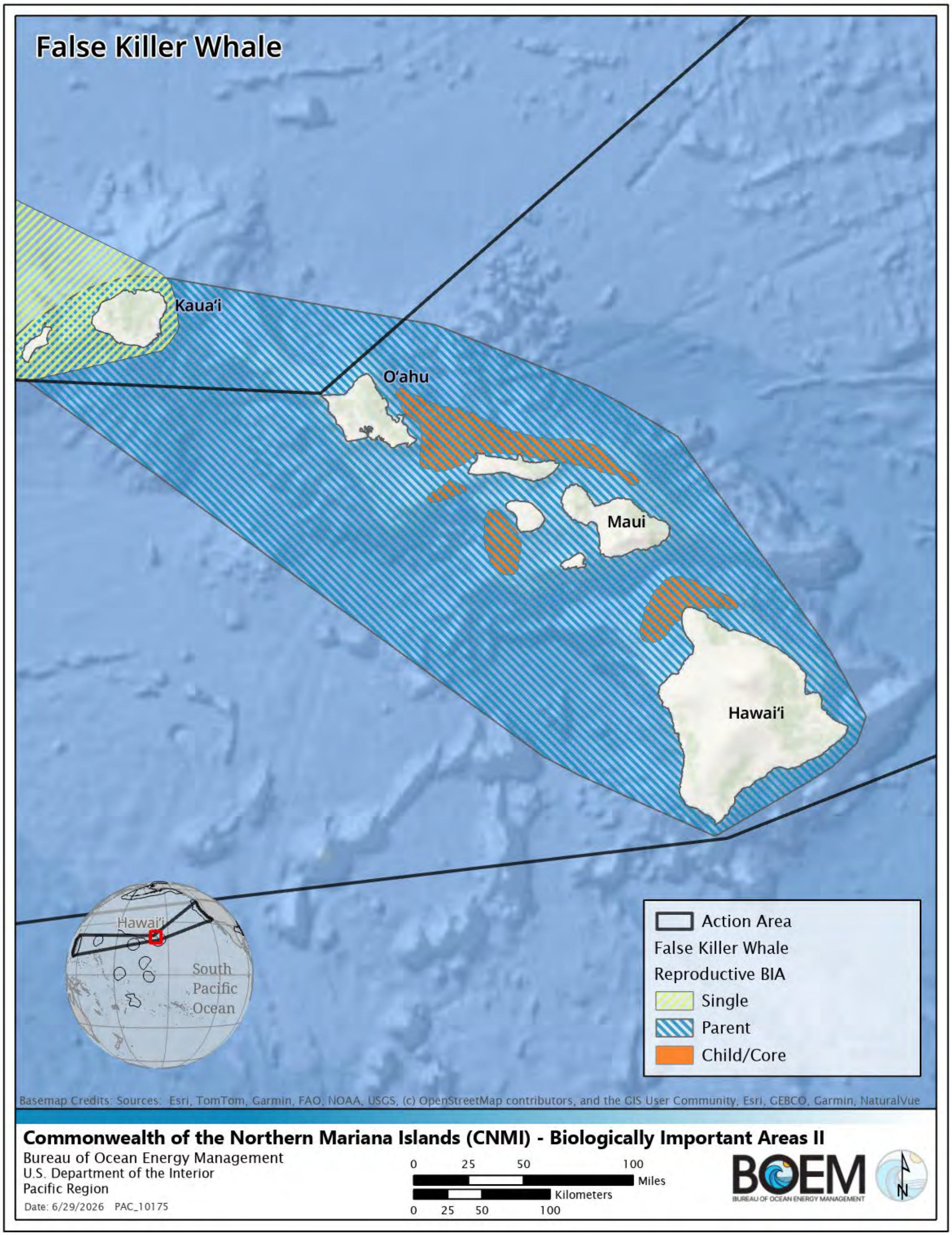

Figure 16. Reproductive BIAs of Southern Resident killer whales relative to the Action Area

Data source: Calambokidis et al. (2024)

CH of false killer whales was designated in the waters surrounding the main Hawaiian Islands from the 45-m depth contour out to the 3,200-m depth contour (**Figure 17**). MHI insular false killer whales are island-associated whales that rely entirely on the productive submerged habitat of the main Hawaiian Islands to support all their life-history stages. The following characteristics of this habitat support insular false killer whales' ability to travel, forage, communicate, and move freely around and among the waters surrounding the main Hawaiian Islands:

- Adequate space for movement and use within shelf and slope habitat
- Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth
- Waters free of pollutants of a type and amount harmful to MHI insular false killer whales
- Sound levels that would not significantly impair false killer whales' use or occupancy

Threats

The Status Review report produced by the Biological Review Team (Oleson et al. 2010; amended in Oleson et al. 2012) found of the 29 identified threats to the population, the effects of small population size, including inbreeding depression and Allee effects; exposure to environmental contaminants (Ylitalo et al. 2009); competition for food with commercial fisheries (NMFS 2024d); and hooking, entanglement, or intentional harm by fishermen to be the most substantial threats to the population. There is significant geographic overlap between various nearshore fisheries and evidence of interactions with hook-and-line gear (NMFS 2024d), such that these fisheries may pose a threat to the stock. Six main Hawaiian Islands (MHI) insular false killer whales stranded between 2010 and 2021, including four from cluster 3 (Baird et al. 2023), a high rate for a single social cluster. High concentrations of PCBs exceeding those proposed to cause adverse health effects (Kannan et al. 2000) were measured from 29 of 41 sampled individuals in the MHI insular stock (Kratofil et al. 2020). All PCB concentrations from four stranded individuals within this population revealed levels more than twice the highest suggested health threshold for PCBs, and this population had the highest levels of any sampled whales in the study. Differences in contaminant loads for various contaminant classes are also evident among social clusters, suggesting differences in exposure or consumption of contaminated prey based on preferred foraging regions (Kratofil et al. 2020).

In summary threats of the false killer whales include fishery interactions, competition of prey with fisheries, environmental contaminants, hunting, and small population size with reduced genetic diversity, making them very vulnerable to diseases or environmental changes.

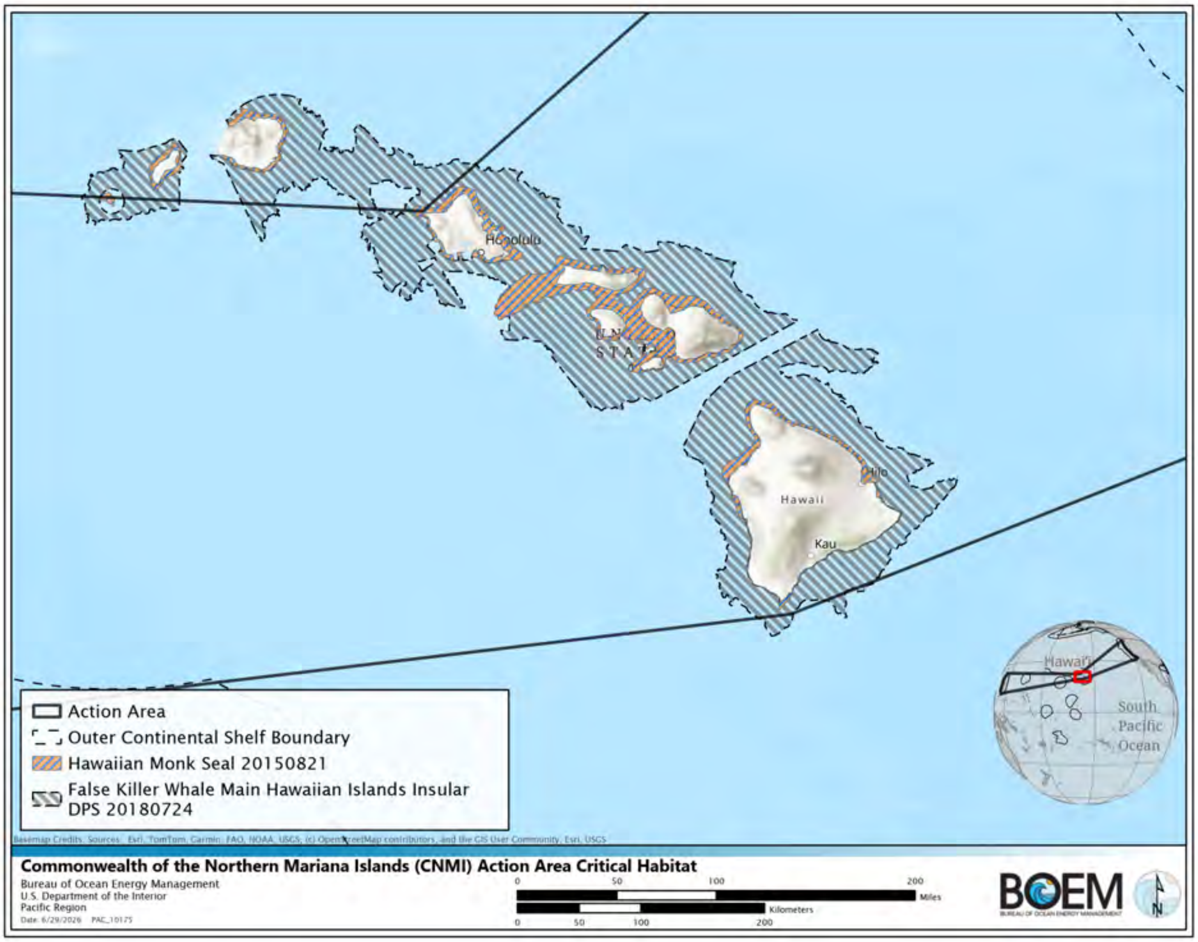

Figure 17. Action Area and location of the false killer whale and Hawaiian Monk seal CH

4.9 North Pacific Right Whale (*Eubalaena japonica*)

The likelihood of a North Pacific right whale being present in the Action Area is extremely low, as in recent years this species has only been routinely observed or acoustically detected in the Bering Sea (Brownell Jr. et al. 2001; Shelden et al. 2005; Zerbini et al. 2010; Wade et al. 2011a; Wade et al. 2011b; Zerbini et al. 2015; NMFS 2017; Wright et al. 2018; Filatova et al. 2019; Wright et al. 2019), with occasional sightings of individuals in the Gulf of Alaska (Wade et al. 2011a; Matsuoka et al. 2014; Širović et al. 2015a), waters off British Columbia and the border with Washington State (Širović et al. 2015b; U.S. Navy 2015; Ford et al. 2016), and Southern California (Muto et al. 2019). The most recent estimated population for the eastern North Pacific right whale is between 26 and 31 individuals (Muto et al. 2020). Although this estimate may be reflective of a Bering Sea subpopulation, the total eastern North Pacific population is unlikely to be much larger (Wade et al. 2011b). There have been only four sightings, each of a single right whale, in southern California waters over approximately the last 30 years (in 1988, 1990, 1992, and 2017) (Carretta et al. 1994; Brownell Jr. et al. 2001; NMFS 2017). Sightings off California are rare, and there is no evidence that the western coast of the United States was ever highly frequented by this species (Scammon 1874; Brownell Jr. et al. 2001; NMFS 2017). As for Hawaiian waters, only two whales have been documented. One right whale was sighted off Maui in April 1996 (Salden and Mickelsen 1999), was identified 119 days later and 4,111 km north in the Bering Sea (Kennedy et al. 2012). One other right whale was sighted twice in March and April in 1979 (Herman et al. 1980; Rowntree et al. 1980).

The North Pacific right whale was listed under ESA in 1970 and in 2008 (35 FR 8491; 73 FR 12024), and their CH was designated in 2008 (73 FR 19000). The CH is only located in Alaska (Bering Sea and Gulf of Alaska) and does not overlap with the Action Area. Thus, no further discussions are included in this BA.

Threats

Threats of the North Pacific right whale include vessel strikes, entanglement, ocean noise, biotoxins from harmful algal blooms, and climate change.

4.10 Guadalupe Fur Seal (*Arctocephalus townsendii*)

The Guadalupe fur seal is a pelagic species for most of the year, occurring in the subtropical waters of southern California and Mexico. Breeding occurs almost entirely on Isla de Guadalupe, Mexico, from May to July (California Resources Agency 2009; NMFS 2019c). In recent years, several Guadalupe fur seals have been consistently observed at San Miguel Island. In 1997, a pup was observed there but no other pups were observed until 2008. Breeding colonies may occur on San Miguel and San Nicolas Islands (Pacific Marine Mammal Center 2023). Guadalupe fur seals are solitary, non-social animals, but males may mate with up to 12 females during the breeding season (NMFS 2019c). They feed in deep waters on krill, squid, and small schooling fish (California Resources Agency 2009). Unusual mortality events, in the form of increased strandings of Guadalupe fur seals, have occurred along the entire coast of California, beginning in January 2015 at eight times higher than the historical average. Strandings have continued since 2015 at well above average rates in California. Additionally, Guadalupe fur seal strandings in Oregon and Washington became elevated in 2019. Along the U.S. West Coast, strandings occur almost annually in California waters and animals are increasingly observed in Oregon and Washington waters (Carretta et al. 2020). Most stranded animals were less than 2 years old, malnourished with secondary bacterial and parasitic infections (NMFS 2019a; Carretta et al. 2020). Guadalupe fur seals that stranded in central California and treated at rehabilitation centers were fitted with satellite tags and documented to travel as far north as Graham Island and Vancouver Island, British Columbia, Canada (Norris et al. 2015). Some satellite-tagged animals traveled far offshore outside the U.S. EEZ to areas 700 nmi west of the California-Oregon border. The population is considered to be a single stock because all are recent descendants from one breeding colony at Isla Guadalupe, Mexico (Carretta et al. 2020).

The Guadalupe fur seal was federally listed as endangered in 1967 and then re-listed as threatened in 1985 (50 FR 51252). The main reason for listing was a severe population decline due to hunting. No CH has been designated for the Guadalupe fur seal. Since their listing, Guadalupe fur seals have significantly increased in numbers with an estimated annual rate of increase of 5.9% (range 4.1–7.7%) (García-Aguilar et al. 2018). The minimum population size of 31,019 animals is taken as the lower bound of the estimate provided by García-Aguilar et al. (2018) in Muto et al. (2020).

Threats

Current threats include incidental mortality and serious injury in commercial and unidentified fisheries, entanglement in marine debris and shootings (Carretta et al. 2020).

4.11 Steller Sea Lion (*Eumetopias jubatus*)

The Steller sea lion was federally listed as threatened in 1990 (55 FR 49204). In 1997, the eastern DPS (i.e., east of 144° W longitude) was listed as threatened, and the western DPS (i.e., west of 144° W longitude) was listed as endangered (62 FR 24345). The eastern DPS has since recovered and was delisted in 2013 (78 FR 66139).

CH for Steller sea lions was designated in 1993 (58 FR 45269; **Figure 11**). Physical and biological features identified as essential for conservation of Steller sea lions include terrestrial, air, and aquatic habitats (as described at 50 CFR § 226.202) that support reproduction, foraging, rest, and refuge. CH includes an air zone that extends 3,000 ft above areas historically occupied by sea lions at each major rookery in California and Oregon, measured vertically from sea level. CH includes an aquatic zone that extends 3,000 ft seaward in state and federally managed waters from the baseline or basepoint of each major rookery in California and Oregon. CH for the Steller sea lion remained in effect for the endangered western DPS, as the designated CH remains to support the DPS' important biological functions (e.g., feeding and resting).

Although the Action Area includes areas that remain associated with designated CH, we do not expect that any individuals from the currently listed western DPS of Steller sea lions would occur within these areas. Based on genetic and tagging data, individuals of the listed western DPS of Steller sea lions are not known to visit the areas designated as CH in Oregon or California (Bickham et al. 1996; Raum-Suryan et al. 2006). Additionally, there is no evidence that would suggest that the western DPS would need to expand into these areas for recovery. Thus, no further effect analyses of Steller sea lion from the Proposed Action will be discussed in this BA.

4.12 Hawaiian Monk Seal (*Neomonachus schauinslandi*)

Hawaiian monk seals are endemic to the Hawaiian Archipelago and are distributed throughout the NWHI, with subpopulations at French Frigate Shoals (FFS), Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll, Kure Atoll, and Necker and Nihoa Islands. They also occur throughout the MHI. Population is about 1,600 and only about 400 in MHI (Carretta et al. 2025). The main terrestrial habitat requirements for the monk seals include haul-out areas for pupping, nursing, molting, and resting. These are primarily sandy beaches, but virtually all substrates are used at various islands. Monk seals also spend nearly two-thirds of their time in marine habitat. Monk seals are primarily benthic foragers (Goodman-Lowe 1998) and will search for food in a broad depth range up to 500 m and over different substrates (Parrish et al. 2000; Parrish et al. 2023). Hawaiian monk seals are "generalist" feeders. They eat a wide variety of foods depending on what is available. They eat many types of common fishes, squids, octopuses, eels, and crustaceans (crabs, shrimps, and lobsters). Diet studies indicate that they forage at or near the seafloor, and they prefer prey that hides in the sand or under rocks. Hawaiian monk seals can hold their breath for up to 20 minutes and dive more than 1,800 ft. However, they usually dive an average of 6 minutes to depths of less than 200 ft to forage at the seafloor.

In 1976, Hawaiian monk seals were listed as endangered under ESA (41 FR 51611; 1976) and the species is well below its sustainable population and has not recovered from past declines. Monk seal CH has been designated in 2015 (80 FR 50925) (**Figure 17**). There are two terrestrial and one marine essential feature of the Hawaiian monk seal CH described below.

1) *Terrestrial areas and adjacent shallow, sheltered aquatic areas with characteristics preferred by monk seals for pupping and nursing*. Preferred areas that serve an essential service or function for Hawaiian

monk seal conservation are defined as those areas where two or more females have given birth or where a single female chooses to return to the same site more than one year. Preferred pupping areas generally include sandy, protected beaches located adjacent to shallow sheltered aquatic areas, where the mother and pup may nurse, rest, swim, thermoregulate, and shelter from extreme weather. Additionally, this habitat area provides relatively protected space for the newly weaned pup to acclimate to life on its own. The newly weaned pup uses these areas for swimming, exploring, socializing, thermoregulatory cooling and the first attempts at foraging. Characteristics of terrestrial pupping habitat may include various substrates such as sand, shallow tide pools, coral rubble, or rocky substrates, as long as these substrates provide accessibility to seals for hauling out. Some preferred sites may also incorporate areas with low lying vegetation used by the pair for shade or cover, or relatively low levels of anthropogenic disturbance. Characteristics of the adjoined sheltered aquatic sites may include reefs, tide pools, gently sloping beaches, and shelves or coves that provide refuge from storm surges and predators.

(2) *Marine areas from 0 to 200 m in depth that support adequate prey quality and quantity for juvenile and adult monk seal foraging*. Inshore, benthic and offshore teleosts, cephalopods, and crustaceans are commonly described as monk seal prey items. Habitat types that are regularly used for foraging include the sand terraces, talus slopes, submerged reefs and banks, nearby seamounts, barrier reefs, and slopes of reefs and islands. Monk seals focus foraging in bottom habitats on bottom-associated prey species, with most foraging occurring in waters between 0 to 200 m in depth. Habitat conditions, such as water quality, substrate composition and available habitat, should support growth and recruitment of bottom-associated prey species to the extent that monk seal populations are able to successfully forage.

(3) *Significant areas used by monk seals for hauling out, resting or molting.* Significant haul-out areas are defined by the frequency with which local populations of seals use a stretch of coastline or particular beach. Significant haul-out areas are defined as natural coastlines that are accessible to Hawaiian monk seals and are frequented by Hawaiian monk seals at least 10% as often as the highest used haul-out site(s) on individual islands, or islets. Significant haul-out areas are essential to Hawaiian monk seal conservation because these areas provide space that supports natural behaviors important to health and development, such as resting, molting, and social interactions. Hawaiian monk seals use terrestrial habitat to haul out for resting, and molting. Certain areas of coastline are more often favored by Hawaiian monk seals for hauling out. These favored areas may be located near preferred foraging areas, allow for relatively undisturbed periods of rest, or allow small numbers of Hawaiian monk seals to socially interact as young seals and reproductive adults. These haul-out sites are generally characterized by sandy beaches, sand spits, or low shelving reef rocks accessible to seals.

Threats

Several threats exist for this population. Interactions in nearshore recreational and subsistence fisheries occur frequently with Hawaiian monk seals in the MHI. Between 1976 and 2024, NMFS documented 317 hookings, 13 net entanglements, and 14 mortalities associated with these fisheries (NOAA Fisheries 2026c). Intentional killing of seals is another threat to these species. Additionally, as of 2024, at least six seals died from apparent gunshots (including one pregnant female) and 12 from blunt force trauma. Other threats include limited prey, contaminants, habitat loss, and shark predation.

4.13 Leatherback Turtle (*Dermochelys coriacea)*

Leatherback sea turtles were listed in 1970 as endangered throughout their global range (35 FR 8491). The leatherback turtle has the most extensive global distribution of any reptile and is distributed throughout the oceans of the world from the equator to subpolar regions in both hemispheres.

Leatherback turtles spend the majority of their lives at sea, where they develop, forage, migrate, and mate, nesting on beaches on every continent except Europe and Antarctica, and several islands of the Caribbean and the Indo-Pacific (Eckert et al. 2012; NMFS and FWS 2020a). Seven populations are currently recognized: (1) Northwest Atlantic; (2) Southeast Atlantic; (3) Southwest Atlantic; (4) Northeast Indian; (5) Southwest Indian; (6) West Pacific; and (7) East Pacific Ocean populations (NMFS and FWS 2020a). While NMFS and FWS (2020a) have identified and defined the seven DPSs, the population has not been established and listed as DPSs under the ESA, which requires official rulemaking and publication in the Federal Register (16 U.S.C. 1533(a)(1)), and no effort to this extent is anticipated. Recent information on population structure (through genetic studies) and distribution (through telemetry, tagging, and genetic studies) have led to an increased understanding and refinement of the global population structure and supported the separation of the population into DPSs (NMFS and FWS 2020a). For this BA, we focus only on the West Pacific leatherback sea turtle population.

The marine distribution for Pacific leatherback sea turtles extends north into the Sea of Japan, northeast and east across the North Pacific to the West Coast of North America (predominantly off California), west to the South China Sea and Indonesian Seas, and south into the high latitude waters of the western South Pacific Ocean and Tasman Sea (Benson et al. 2011). About 150 to 170 leatherback sea turtles occur annually off the California coast between Point Conception and Point Arena during the summer and fall (June and stay until mid-October) whereafter they move to waters off Hawai'i. A total index of nesting female abundance of the West Pacific population was estimated to be 1,277 females. Leatherback turtles of the West Pacific DPS nest in tropical and subtropical latitudes primarily in Indonesia, Papua New Guinea, and Solomon Islands, and to a lesser extent in Vanuatu (NMFS and FWS 2020a). Oceanic currents help to structure the spatial and temporal distribution of juveniles which lead them to foraging and developmental habitats (e.g., the North Pacific Transition Zone); they undertake seasonal migrations seeking favorable oceanic habitats/temperatures and abundant foraging resources (Gaspar et al. 2012).

The West Pacific Ocean leatherback sea turtle was estimated to have declined by as much as 78.3% from 1984 to 2011 (Tapilatu et al. 2013). Causes for the decline in the Pacific include the intensive egg harvest at leatherback rookeries and high levels of mortality through the 1980s associated with bycatch in the gill net fisheries (NMFS and FWS 2020a). The trend in the foraging population off central California is similar to declines of about 6% annually in the nesting population on Indonesian beaches (Benson et al. 2020).

Migration and foraging strategies vary based on these life-history strategies, likely due to prevailing offshore currents and, for hatchlings, seasonal monsoon-related effects experienced as hatchlings (Benson et al. 2011; Gaspar et al. 2012). Summer nesting females forage in Northern Hemisphere foraging habitats in Asia and the North Pacific Ocean, while winter nesting females migrate to tropical waters of the Southern Hemisphere in the South Pacific Ocean (Benson et al. 2011; Harrison et al. 2018). The lack of crossover among seasonal nesting populations suggests that leatherback turtles develop fidelity for specific foraging regions likely based on juvenile dispersal patterns (Benson et al. 2011; Gaspar et al. 2012). Stable isotopes, linked to particular foraging regions, confirm nesting season fidelity to specific foraging regions (Seminoff et al. 2012).

Leatherback sea turtles feed from near the surface to depths exceeding 1,000 m, including nocturnal feeding on tunicate colonies within the deep scattering layer (Spotila 2004). Migrating leatherback sea turtles spend a majority of their time submerged and display a pattern of continual diving. They appear to spend almost the entire portion of each dive traveling to and from maximum depth, suggesting continual foraging along the entire depth profile (Eckert et al. 1989). Diet is primarily jellyfish, but they also consume other invertebrates, small fish, and plant material (NOAA Fisheries 2016; Nafis 2026).

CH for leatherback turtles designated in 2012 for waters off the U.S. West Coast (**Figure 11**) is defined at 50 CFR 226.207 (77 FR 4170). CH stretches along the California coast from Point Arena to Point Arguello east of the 3,000-m depth contour, and also includes around 25,000 mi^2 stretching from Cape Flattery, Washington to Cape Blanco, Oregon, east of the 2,000-m depth contour. In the final rule designating leatherback CH, NMFS identified one primary constituent element essential for the conservation of leatherbacks in marine waters off the U.S. West Coast: the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae (e.g., Chrysaora, Aurelia, Phacellophora and Cyanea), of sufficient condition, distribution, diversity, abundance, and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks.

Threats

The primary ongoing threats to leatherback sea turtles worldwide are fisheries bycatch, marine debris or other entanglement, and the legal and illegal directed harvest of nesting female turtles and their eggs (NMFS and FWS 2020a). Other threats to this species include changing environmental conditions due to climate change (e.g., sand temperatures that result in egg or hatchling mortality or changes in hatchling sex ratios, erosion of nesting beaches due to rising sea levels and increased storm frequency and magnitude), vessel strikes, pollution, and ingestion of marine debris (NMFS and FWS 2020a).

4.14 Pacific Loggerhead Turtle (*Caretta caretta*)

Loggerhead turtles were listed as threatened in 1978 (43 FR 32800). The North and South Pacific DPS's were listed as endangered in 2011 (76 FR 58868) with no designated CH.

Within the North Pacific, loggerhead nesting has been documented only in Japan, although low level nesting may occur outside of Japan in areas surrounding the South China Sea (Conant et al. 2009). In the South Pacific, nesting beaches are restricted to eastern Australia and New Caledonia and, to a much lesser extent, Vanuatu and Tokelau (Conant et al. 2009). There are no nesting records from Guam, CNMI, Palau, the Republic of the Marshall Islands, the Federated States of Micronesia, or American Samoa (NMFS and FWS 1998b).

With the exception of four records from Hawai'i (see Insular and Pelagic Range), U.S. Pacific sightings are confined to the west coast of the continent. The loggerheads are occasionally sited from the coasts of Washington and Oregon, but most records are of juveniles off the coast of California. Sightings in California tend to occur from July to September but can occur over most of the year during El Niño years when ocean temperatures rise. It is not known whether these individuals are resident or transient. No studies of distribution, abundance, or residency have been undertaken. Since there is no documented nesting anywhere in the U.S. Pacific, we can conclude that U.S. waters (principally those off California) are used as foraging grounds and as migratory corridors (NMFS and FWS 1998b). The loggerhead sea turtle is primarily pelagic, but occasionally enters coastal bays, lagoons, salt marshes, estuaries, creeks, and mouths of large rivers (NMFS and FWS 2020b). They consume whelks and conchs, but also sponges, crustaceans, jellyfish, worms, squid, barnacles, fish, and plants (NMFS and FWS 2020b).

For the North Pacific Ocean DPS, the greatest anthropogenic threats exist for the neritic juveniles and neritic adults, where the coastal fisheries in Baja California, Mexico, and Japan kill significant number of turtles (Conant et al. 2009). For the South Pacific Ocean DPS, the greatest threats come from bycatch in the oceanic environment for juveniles and adults (Conant et al. 2009). At nesting beaches, an average of 40 adult females are taken annually in aboriginal harvest (Conant et al. 2009). Threat levels for this DPS include anthropogenic and natural mortalities. Other threats for both the North and South Pacific DPS include loss and degradation of nesting habitat, vessel strikes, ocean pollution, and changing environmental conditions.

4.15 Green Turtle (*Chelonia mydas*)

The green turtles were listed as threatened in 1978 (43 FR 32800). They occur worldwide in surface water that remains above 22°C (Van Houtan et al. 2015) and nest in over 80 countries. We assess 6 DPS of green turtles: Central South Pacific, Central West Pacific, East Pacific, East Indian-West Pacific, and Southwest Pacific, (NMFS 2023a). The sixth DPS, Central North, will also be included in analysis because they are found in Hawai'i and the vessels may be transiting or coming through that location.

The Central South Pacific DPS of green turtles were classified as endangered in 2016 (81 FR 20057). They are distributed north from northern New Zealand to Fiji, Tuvalu, and Kiribati and east to include French Polynesia. The range of this DPS includes a longitudinal expanse of 7,500 km—from Easter Island, Chile in the east to Fiji in the west, and encompasses American Samoa, French Polynesia, Cook Islands, Fiji, Kiribati, Tokelau, Tonga, and Tuvalu. Central South Pacific green sea turtle nesting is geographically widespread at low levels. The most abundant nesting area is Scilly Atoll, French Polynesia, which in the early 1990s hosted 300–400 nesters annually (Balazs 1995). The current estimate is 1,050 breeding females (Seminoff et al. 2015). The most recent information is for American Samoa, with the majority of nesting at Rose Atoll and sporadic nesting on Tutuila (no recent reported nesting), Ofu and Swains Islands; subadult and adult turtles occur in low abundance in nearshore waters around Tutuila, Ofu, Olosega, Ta'u, and Swains islands (NMFS and FWS 1998a; Maison et al. 2010). Historically, 100–500 females nested annually at Canton Island, Kiribati (Balazs 1975). Although population trends are not known, NMFS' Status Review Team concluded that this DPS had a 62% probability of having a greater than 1% risk of extinction over the next 100 years (Seminoff et al. 2015). The Status Review Team estimated the Central South Pacific green sea turtle nester abundance as 2,677 females (Seminoff et al. 2015) based on known nesting. They indicate that the number is likely higher due to the level of unmonitored nesting, suggesting fewer than 3,600 total nesters. The Status Review Team concluded that chronic harvesting, the effect of coastal development, and the effect of phenomena related to climate change (e.g., sea level rise) would be expected to place this DPS of green turtle at a relatively high risk of extinction in the foreseeable future (Seminoff et al. 2015).

The East Pacific green sea turtle is listed as threatened in 2016 (81 FR 20057). The geographic range of this DPS extends from the California/Oregon border (USA; 42°N) southward along the Pacific Coast of the Americas to central Chile. These green sea turtles occur year-round off the southern California coast with highest concentrations occurring between July through September. The green sea turtle is usually seen in El Niño years when ocean temperatures are warmer than normal. Climate change and ocean warming trends may impact the habitat and range of this species over time (Fuentes et al. 2013). It inhabits shallow waters of lagoons, bays, estuaries, mangroves, eelgrass, and seaweed beds; it prefers areas with abundant vegetation in shallow, protected water. Green sea turtles are herbivorous, feeding primarily on algae and seagrasses (NMFS 2025b). Counts of adult females at nesting sites in Mexico, Costa Rica, and Ecuador used by the East Pacific DPS were used to estimate an abundance of over 20,000 nesters (Seminoff et al. 2015). Seminoff et al. (2015) ranked the DPS as having a low risk of extinction based on the abundance of nesting females.

The distribution of Southwest Pacific green sea turtles extends from the western boundary of Torres Strait (at 142°E longitude), southeast to the eastern tip of Papua New Guinea and out to the offshore coordinate of 13°S, 171°E; the eastern boundary runs from this point southeast to 40°S, 176°E; the southern boundary runs along 40°S from 142°E to 176°E; and the western boundary runs from 40°S, 142ºE north to Australian coast then follows the coast northward to Torres Strait. Southwest Pacific green sea turtles are listed as threatened in 2016 (81 FR 20057). The estimated abundance of nesting females in this population is high with 83,058 adult nesting females (Seminoff et al. 2015). The population dynamics of this DPS are similar to that of the other green turtles, but Southwest Pacific green sea turtles may produce higher proportions of females or females in this DPS may have survival rates that are disproportionately higher than their male counterparts. If this trend continues, it would have severe implications for the future of this DPS.

The Central West Pacific green sea turtle DPS has as their northern boundary 41°N latitude and is bounded by 41°N, 169°E in the northeast corner, going southeast to 9°N, 175°W, then southwest to 13°S, 171°E, west and slightly north to the eastern tip of Papua New Guinea, along the northern shore of the Island of New Guinea to West Papua in Indonesia, northwest to 4.5°N, 129°E then to West Papua in Indonesia, then north to 41°N, 146°E. Central West Pacific green sea turtles are listed as endangered in 2016 (81 FR 20057). The DPS exhibits low nesting abundance, with an estimated total nester abundance of 6,518 females at 51 documented nesting sites (Seminoff et al. 2015). Historical baseline nesting information in general is not widely available, but 22 and 57 nesting turtles of the Central West Pacific green turtle DPS, have been observed in Guam and CNMI, respectively. Aerial sea turtle surveys show that an in-water population exists around Guam (Seminoff et al. 2015). Although In-water information of this DPS is limited overall, in-water green turtle density in the Mariana Archipelago is known to be low and mostly restricted to juveniles (Seminoff et al. 2015). The population dynamics of this DPS are similar to that of the other green turtles; however, clutch sizes appear to be more variable: clutch sizes range from 59 to 139 eggs per nest (compared with 80 to 120 eggs per nest in the general pattern; Palacios 2012 as cited in Seminoff et al. 2015). Moreover, hatching success for areas where this information is available is more variable: from 44.1–73.8% (Suganuma 1985 as cited in Seminoff et al. 2015).

The western boundary for the East Indian-West Pacific green sea turtle DPS is 84°E longitude from 40°S to where it coincides with India near Odisha, northeast and into the West Pacific Ocean to include Taiwan extending east at 41°N to 146°E longitude, southwest to 4.5°N, 129°E, then south and east to West Papua in Indonesia (at 135°E) and the Torres Straits in Australia (at 142°E longitude). This DPS is also included because the genetic evidence demonstrates that this DPS may occur in CNMI waters. East Indian-West Pacific green sea turtles are listed as threatened in 2016 (81 FR 20057). The abundance of nesting females in this DPS is estimated at 77,009 females over 50 nesting sites (Seminoff et al. 2015).

CNP green turtle DPS, listed under ESA in 2016 (81 FR 20057) cover the Hawaiian Archipelago and Johnston Atoll. FFS, located in the NWHI, represents the prominent focal point of green turtle nesting and hatchling production in the Hawaiian Archipelago. Information from tagging at FFS, other areas in the NWHI, areas in the MHI and Johnston Atoll show that the vast majority of reproductive females and males periodically migrate to FFS for seasonal breeding from these distant locations. At the end of the season, they return to their respective foraging areas. While the nesting population trajectory is positive and encouraging, more than 96% of nesting occurs at one site in the NWHI and it is highly vulnerable to threats. Survival of this DPS is currently highly dependent on successful nesting at FFS (Niethammer et al., 1992 as cited in Seminoff et al. 2015).

Based on the behavior of post-hatchlings and juvenile green turtles raised in captivity, it is presumed that those in pelagic habitats live and feed at or near the ocean surface, and that their dives do not normally exceed several meters in depth (NMFS and FWS 1998a). The maximum recorded dive depth for an adult green turtle was 138 m (Hochscheid 2014), while subadults routinely dive 20 m for 9–23 minutes, with a maximum recorded dive of 66 minutes (Brill et al. 1995 cited in Lutcavage and Lutz 1997).

NMFS and the USFWS are proposing to designate CH for five DPS of green turtles including: Central South Pacific DPS (American Samoa area), East Pacific DPS (the West Coast area), Central Pacific DPS (Hawai'i area) for green turtles (88 FR 46572; 2023). Although these CHs have been proposed, it has not been finalized. Thus, no analysis will be conducted for this proposed CH.[1]

Threats

A thorough discussion of threats to green turtles worldwide can be found in the most recent status review (Seminoff et al. 2015). Major threats include coastal development and loss of nesting and foraging habitat; incidental capture by fisheries; and the harvest of eggs, subadults, and adults. Climate change is also emerging as a critical issue. Destruction, alteration, and/or degradation of nesting and nearshore foraging habitat is occurring throughout the range of green turtles. These problems are particularly acute in areas with substantial or growing coastal development, beach armoring, beachfront lighting, and recreational use of beaches. In addition to damage to the nesting beaches, pollution and effects on foraging habitat is a concern. Pollution runoff can degrade seagrass beds that are the primary forage of green turtles. The majority of green turtles in coastal areas spend their time at depths less than 5 m below the surface (Schofield et al. 2007; Hazel et al. 2009) and hence are vulnerable to being struck by vessels. Collisions with vessels are known to cause significant numbers of deaths every year (NMFS and FWS 2007; Seminoff et al. 2015). Marine debris is also a source of concern for green sea turtles especially given their presence in nearshore coastal and estuarine habitats.

The bycatch of green sea turtles, especially in coastal fisheries, is a serious problem because in the Pacific, many of the small-scale artisanal gillnet, setnet, and longline coastal fisheries are not well regulated. These are the fisheries that are active in areas with the highest densities of green turtles (NMFS and FWS 2007). The meat and eggs of green turtles have long been favored throughout much of the world that has interacted with this species. As late as the mid-1970s, upwards of 80,000 eggs were harvested every night during the nesting season in Michoacán (Clifton et al. 1981). In some parts of Mexico and the eastern Pacific, consumption of green sea turtles remains a part of the cultural fabric and tradition (NMFS and FWS 2007). Like other sea turtle species, increasing temperatures have the potential to skew sex ratios of hatchlings. Many rookeries are already showing a strong female bias as warmer temperatures in the nest chamber leads to more female hatchlings (Chan and Liew 1995; Kaska et al. 2006). Increased temperatures also lead to higher levels of embryonic mortality (Matsuzawa et al. 2002). An increase in typhoon frequency and severity, a predicted consequence of climate change (Webster et al. 2005), can cause erosion which leads to high nest failure (Van Houtan and Bass 2007). Climate change may also affect green sea turtle feeding. Seagrasses are a major food source for green sea turtles and may be affected by changing water temperature and salinity (Short and Neckles 1999; Duarte 2002).

[1] The reason for a proposal of designating green turtle CH in the Pacific are the following: 1) Reproductively active females nest in the following areas: Palmyra atoll (Strawn, Copper and Aviation) and Rose Atoll (Swains, Ofu, Olosega, Ta'u, Aunu'u, and Motu o Manu); 2) Migratory green turtles (East Pacific DPS) need 10 km offshore with unobstructed water that allow for unrestricted transit of reproductive individuals between benthic foraging/resting and reproductive areas.; and 3) From the mean high water line to 20-m depth, underwater refugia and food resources (i.e., seagrasses, macroalgae, and/or invertebrates) of sufficient condition, distribution, diversity, abundance, and density are necessary to support survival, development, growth, and/or reproduction of benthic foraging/resting of the following green turtles: East Pacific, Central North Pacific, Central South Pacific, and Central West Pacific DPSs.

4.16 Olive Ridley Turtle (*Lepidochelys olivacea*)

Olive ridley turtles were listed as threatened in 1978 (43 FR 32800) with no designated CH. They have a global tropical distribution, occurring in the Atlantic, Pacific, and Indian oceans (NMFS and FWS 2014). In the eastern Pacific, olive ridley typically occur in tropical and subtropical waters, as far south as Peru and as far north as California but occasionally have been documented as far north as Alaska. The number of olive ridley sea turtles occurring in U.S. territorial waters is believed to be small (NMFS and FWS 1998c; 2014).

Studies from different populations of olive ridley sea turtles show a strong preference for neritic waters (shallow, nearshore waters overlying the continental shelf) (Polovina et al. 2004; Plot et al. 2015; Rees et al. 2018). However, deepwater foraging has been documented in the North Pacific, where prey items are scattered and less predictable and migrate widely from nesting locations (Polovina et al. 2004). Comparing olive ridley habitat use in different regions, Plot et al. (2015) suggest that the differing migration patterns observed (i.e., oceanic migrations versus neritic movements) may be attributed to specific environmental conditions of the areas in close proximity to nesting sites. There are no known nesting sites within U.S. territory.

Overall, at least 1,000,000 nesting females occur in the threatened population in the East Pacific, and this is considered a minimum population estimate. In the western Pacific, information on the size of olive ridley nesting aggregations and their trends are limited (NMFS and FWS 2014).

Olive ridley sea turtles exhibit temperature-dependent sex determination, and warmer incubation temperatures produce more females (NMFS and FWS 2014). The middle third of the incubation period is when the developing embryo's sex determination is sensitive to temperatures (Merchant-Larios et al. 1997). The temperature at which a nest will produce 50% males/females was estimated to be 29.95°C for nesting populations in Mexico (Sandoval Espinoza 2011 as cited in Hernández-Echeagaray et al. 2012), approximately 30–31°C for nesting populations in Costa Rica, and less than 29°C in Gahirmatha, India (NMFS and FWS 2014). Pivotal temperatures likely vary within and among populations and generalizations should be applied with caution. Studies on sex ratios of olive ridley hatchlings are few and non-existent for juvenile and adults. (Hernández-Echeagaray et al. 2012) found a slight female-bias sex ratio (55%) for the 2010–2011 nesting season at La Escobilla, Mexico. Sex ratios may also change over the nesting season.

Although olive ridley turtles are probably surface feeders, they have been caught in trawls at depths of 80–110 m (NMFS and FWS 1998c), and a post-nesting female reportedly dove to a maximum depth of 290 m. The average dive length for an adult female and adult male is reported to be 54.3 and 28.5 minutes, respectively (Plotkin et al. 1993).

They face threats throughout each of their respective life cycles, including bycatch in fishing gear, harvesting of eggs, loss and degradation of nesting habitat, vessel strikes, ocean pollution, and changing environmental conditions.

4.17 Hawksbill Turtle (*Eretmochelys imbricata)*

Hawksbill turtles were listed as endangered in 1970 (35 FR 8491), and they inhabit the tropical and subtropical waters of all the world's major oceans. They nest at nine primary locations within Oceania (excluding Hawai'i) including: Australia's Great Barrier Reef World Heritage Area, Papua New Guinea, Solomon Islands, Vanuatu, Fiji, the Federated States of Micronesia, Republic of Palau, and the Samoan Islands (Independent Samoa and American Samoa) spanning the central Pacific population excluding

Hawai'i and the eastern portion of the West Pacific population. Hawksbill sea turtle nesting may occur elsewhere within this region, but any such nesting is thought to be in very low numbers. Thus, the total number of annual nesting females in Oceania is estimated based on information from the nine locations mentioned at 5,400–6,160 females annually, with an overall downward trend (NMFS and FWS 2013). Specifically in the Mariana Archipelago of Guam and the CNMI, only about 5 to 10 females nest annually (NMFS and FWS 2013). In 2009 and 2010, four and three hawksbill nests, respectively, were documented in Guam (NMFS and FWS 2013) which suggests a declining population.

Hawksbill diving behavior has been studied at several sites (NMFS and FWS 2013). Dive patterns are influenced by complex biological and environmental factors (Blumenthal et al. 2008; Gaos et al. 2012), thus factors such as benthic topography, oceanic characteristics, prey availability, diel period, and life stage would likely affect diving behavior. Unlike other marine turtles, hawksbills are not generally deep divers, which may be a reflection of the shallow depths of their primary food—sponges and macroalgae. Hawksbills actively forage during the day and tend to rest at night (NMFS and FWS 2013). However, (Gaos et al. 2012) documented foraging activity at night as well as during the day and thought it might be due to possible overlap of foraging and resting areas.

CH was designated in 1998 (63 FR 46693), but it is near Puerto Rico and does not overlap with the Action Area.

Their threats include bycatch in fishing gear, harvesting of eggs, loss and degradation of nesting and foraging habitat, predation of eggs and hatchings, vessel strikes, and ocean pollution. Boat strikes have been documented. In Australia, five stranded hawksbill sea turtles in 2011 were determined to have injuries from boat strikes (Meager and Limpus 2012). Increasing boat traffic may increase the likelihood of boat strikes (NMFS and FWS 2013).

4.18 Oceanic Whitetip Shark (*Carcharhinus longimanus*)

The oceanic whitetip shark (*Carcharhinus longimanus*) was listed as endangered under the ESA on January 30, 2018 (83 FR 4153). NMFS determined on March 5, 2020, that a designation of CH was not prudent at this time (85 FR 12898).

The oceanic whitetip shark is a highly mobile, large, open-ocean shark found in tropical and subtropical waters around the globe. It generally remains offshore in the open ocean, on the OCS, or around oceanic islands in water depths greater than 184 m and occurs from the surface to at least 152-m depth. This species has a strong preference for warm waters above 20°C and is therefore a surface-dwelling species (NMFS 2024c), and is known to occur in the Mariana Islands (Myers and Donaldson 2003). These sharks are apex predators in pelagic ecosystems and feed primarily on teleost fishes and cephalopods, although sometimes they may consume sea birds, marine mammals, other sharks and rays, mollusks, crustaceans, and garbage (NMFS 2024c). Bycatch and harvest for international trade threatens this species (NMFS 2024c).

4.19 Giant Manta Ray (*Mobula birostris*)

The giant manta ray (*Mobula birostris*) was listed as threatened throughout its range on January 22, 2018 (83 FR 2916; taxonomy revised on November 22, 2023, 88 FR 81351). NMFS determined on December 5, 2019, that a designation of CH was not prudent at this time (84 FR 66652).

The giant manta ray is a migratory species and seasonal visitor along productive coastlines with regular upwelling, in oceanic island groups, and near offshore pinnacles and seamounts (Miller and Klimovich 2017). The timing of these visits varies by region and seems to correspond with the movement of zooplankton, current circulation and tidal patterns, seasonal upwelling, seawater temperature, and possibly mating behavior. While seeking zooplankton, its primary food source (Miller and Klimovich 2017), this manta species demonstrates a great deal of plasticity in depth distribution, ranging from the surface to about 1,000 m (Weigmann 2016). Across its range the giant manta ray inhabits waters between 19–30°C (Miller and Klimovich 2017), although during deeper foraging ambits individuals will encounter water as cool as 12°C (Stewart et al. 2016). Giant manta rays have been reported off the coast of Guam and the CNMI, but they may have been confused with reef manta rays, *Mobula alfredi* (NMFS 2024b). High spatial covariance between *Sphyrna lewini* and *Manta birostris* has been noted (Western Pacific Regional Fishery Management Council 2025a).

Along the U.S. West Coast, the giant manta ray has not been formally recorded north of Santa Barbara, CA (Love et al. 2021). In the Morro Bay offshore renewable energy lease areas in 2024, shipborne marine mammal observers recorded one uncertain instance of one large and four small “manta rays” that were viewed using an infrared camera at the surface during nighttime (Marine Ventures International 2024). Until further documentation is secured, BOEM considers this observation unsubstantiated for the giant manta ray. These rays may be a closely related species, *Mobula mobular* (formerly *M. japonica*), which is very similar in appearance to the giant manta ray and which has a northern range limit that extends into central California and thus overlaps with the Morro Bay offshore renewable energy lease areas (Love et al. 2021).

Bycatch and overutilization from commercial fishing activities threatens this species (Miller and Klimovich 2017).

4.20 Eulachon (*Thaleichthys pacificus*)

The eulachon is a small, cold-water species of anadromous smelt, occupying the eastern Pacific Ocean in nearshore waters to depths of about 300 m from California to the Bering Sea. Eulachon will return to their natal river spawn. Juveniles disperse from freshwater to marine habitats on the continental shelf within the first year of their life, residing near the bottom at depths of 50–200 m. The Southern DPS was first listed as threatened by NMFS on March 18, 2010 (75 FR 13012). On October 20, 2011, NMFS designated CH for Southern DPS eulachon (76 FR 65324), with the designated areas being a combination of freshwater creeks and rivers and their associated estuaries which do not overlap with the Action Area. Southern DPS eulachon are those that spawn in rivers south of the Nass River in British Columbia to the Mad River in California (NMFS 2016). Eulachon eat krill, cumaceans, and copepods. Eulachon faces threats from climate change, dams and water diversions, bycatch, predation, and water quality (Gustafson et al. 2022).

4.21 Scalloped Hammerhead Shark (*Sphyrna lewini*)

The scalloped hammerhead shark, (*Sphyrna lewini),* Eastern Pacific DPS, was listed as endangered and the Indo-West Pacific DPS was listed as threatened under the ESA on July 3, 2014 (79 FR 38214). On November 17, 2015, NMFS found that there are no marine areas within the jurisdiction of the United States that meet the definition of CH for the Eastern Pacific DPS or the Indo-West Pacific DPS of scalloped hammerhead shark (80 FR 71774).

Sphyrna lewini is a semi-oceanic and cosmopolitan species globally distributed throughout tropical and warm temperate seas. The Indo-West Pacific DPS is distributed throughout the tropical and subtropical waters of the Indian Ocean and western Pacific, including offshore waters around Guam and the CNMI, as well as the U.S. Pacific Remote Island Areas and Hawai'i (Miller et al. 2014). The Eastern Pacific DPS occurs from southern California southward along the Pacific coasts of Mexico and Central and South America and includes offshore island habitats. The Eastern Pacific DPS is genetically isolated from the Indo-West Pacific DPS but it may also be present in the U.S. Pacific Remote Island Areas and Hawai'i, where the ranges of the Indo-West Pacific and Eastern Pacific DPSs may overlap Hawai'I (Miller et al. 2014). As either solitary individuals or in aggregations, it occurs over continental and insular shelves, as well as adjacent deep waters, but is seldom found in waters cooler than 22° C (Miller et al. 2014). It ranges from the intertidal and surface to depths of up to 450–512 m, with occasional dives to even deeper waters. It has also been documented entering enclosed bays and estuaries (Miller et al. 2014). Neonate and juvenile aggregations are more common in nearshore nursery habitats, such as Kāne'ohe Bay in Oahu, Hawai'i, and Guam's inner Apra Harbor (Miller et al. 2014). High spatial covariance with between *Sphyrna lewini* and *Manta birostris* has been noted (Western Pacific Regional Fishery Management Council 2025a).

The scalloped hammerhead shark is an apex predator and opportunistic feeder with a diet that includes a wide variety of teleost fishes, cephalopods, crustaceans, and rays (Miller et al. 2014). Adult hammerhead sharks are threatened by commercial fishing, mainly for the shark fin trade. Juveniles may be threatened by pollution and degradation of water quality (Miller et al. 2014).

4.22 Green Sturgeon (*Acipenser medirostris*)

The North American green sturgeon is an anadromous fish that occurs in the nearshore eastern Pacific Ocean from Alaska to Mexico (Huff et al. 2012). Green sturgeons are long-lived, late-maturing, iteroparous, anadromous species that spawn infrequently in natal streams, and spend substantial portions of their lives in marine waters. NMFS has identified two DPS of green sturgeon: northern and southern (Israel et al. 2009). In 2006, NMFS determined that the Southern DPS of green sturgeon warranted listing as a threatened species under the ESA (71 FR 17757). Green sturgeon have been observed in large concentrations in the summer and autumn within coastal bays and estuaries along the U.S. West Coast, including the Columbia River estuary, Willapa Bay, Grays Harbor, San Francisco Bay and Monterey Bay (Moser and Lindley 2007; Lindley et al. 2008; Lindley et al. 2011; Huff et al. 2012).

On October 9, 2009, NMFS designated CH for the Southern DPS of green sturgeon (74 FR 52300; **Figure 18**). CH is designated in coastal U.S. marine waters within 110 m (60 fathoms) depth from Monterey Bay, California (including Monterey Bay), north to Cape Flattery, Washington, including the Strait of Juan de Fuca, Washington, to its United States boundary; the Sacramento River, lower Feather River, and lower Yuba River in California; the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San Francisco bays in California; the lower Columbia River estuary; and certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor). The portion of the CH that lies within marine coastal zone overlaps with the Action Area on the West Coast.

Figure 18. Locations of black abalone and green sturgeon CH overlapping the Action Area.

4.23 Salmonid Fishes

Chinook Salmon (*Oncorhynchus tshawytscha*)

Chinook salmon are an anadromous fish species that are found along the Pacific Coast and inland from Ventura River in California to Point Hope, Alaska and in northeast Asia. On occasion, they have been found further south. Like other Pacific salmon species, they are semelparous and spawning occurs in freshwater from August through February. Chinook salmon can spend up to a year in freshwater before migrating downstream to the ocean. They spend 2 to 8 years in the ocean before migrating back to natal freshwater rivers and streams to spawn.

Given this widespread geographic distribution, Chinook salmon have developed diverse and complex life-history strategies. Chinook salmon can be categorized as either “stream-type” or “ocean-type” strategists. Stream-type Chinook salmon reside in freshwater for a year or more following emergence, whereas “ocean-type” Chinook salmon migrate to the ocean predominantly within their first year. In addition to differences in freshwater life histories, there appears to be differing ocean use patterns between these stream-type and ocean-type Chinook salmon. Stream-type populations appear to undertake extensive offshore ocean migrations while ocean-type Chinook salmon undertake distinct, coastally oriented, ocean migrations (Good et al. 2005).

Juvenile Chinook salmon exhibit a patchy distribution in U.S. West Coast waters; in pelagic trawl surveys conducted in summer and fall along Oregon and Washington, half of all juvenile salmonids were collected in about 5% of the surveys, and none were collected in about 40% of the surveys (Peterson et al. 2010). In general, salmonids are low in abundance in U.S. West Coast waters when compared to other fish, as evidenced by: (1) the low numbers of juvenile salmonids captured in directed pelagic surface/ subsurface research trawls relative to other nekton (Brodeur et al. 2004; Brodeur et al. 2005; Trudel et al. 2009; Peterson et al. 2010; Fisher et al. 2014), and (2) the low numbers of adult and subadult salmonids captured as bycatch in midwater trawls (e.g., commercial trawls for whiting, see Lomeli and Wakefield 2014).

Juvenile salmonids are pelagic and typically surface-oriented, most often found in the upper 20 m of the water column (Emmett et al. 2004; Beamish et al. 2005; Walker et al. 2007). Adult coho salmon tend to occur at shallower depths (< 40 m) than adult Chinook salmon (Walker et al. 2007). Juvenile Chinook salmon tend to occur closer inshore than other juvenile salmonid species, generally within the 100-m isobath (Brodeur et al. 2004; Peterson et al. 2010), and they occasionally have been found in the surf zone (Marin Jarrin et al. 2009). Once in the ocean, Chinook salmon feed upon small crustaceans, other invertebrates as juveniles, and larval and juvenile fish as adults (Love 1996).

Within the Action Area, nine evolutionary significant units (ESUs) may occur that are either threatened or endangered under the ESA.

Sacramento River Winter-run Chinook ESU (Endangered)

The listing status for this Chinook salmon ESU was determined to be endangered on January 4, 1994, (59 FR 440). CH was designated on June 16, 1993, (58 33212) and does not overlap with the Action Area. This ESU includes winter-run Chinook salmon spawning naturally in the Sacramento River and its tributaries, as well as winter-run Chinook salmon that are part of the conservation hatchery program at the Livingston Stone National Fish Hatchery.

Upper Columbia River Spring-run Chinook ESU (Endangered)

The listing status for this Chinook salmon ESU was determined to be endangered on March 24, 1999 (64 FR 14308) and June 28, 2005 (70 FR 37159); updated April 14, 2014 (79 FR 20802). CH was designated on September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This ESU includes naturally spawned spring-run Chinook salmon originating from Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam (excluding the Okanogan River subbasin). This ESU also includes Chinook salmon from several artificial propagation programs.

California Coastal Chinook ESU (Threatened)

The listing status for this Chinook salmon ESU was determined to be threatened on September 16, 1999 (64 FR 50394). CH was designated on September 2, 2005 (70 FR 52488) and does not overlap with the Action Area. On June 28, 2005, (70 FR 37159) NMFS confirmed the listing of California Coastal Chinook salmon as threatened under the ESA and also added seven artificially propagated populations from the following hatcheries or programs to the listing. This ESU includes all naturally spawned populations of Chinook salmon from rivers and streams south of the Klamath River (Humboldt County, CA) to the Russian River (Sonoma County, CA).

Central Valley Spring-run Chinook ESU (Threatened)

The listing status for this Chinook salmon ESU was determined to be endangered on September 16, 1999 (FR 64 50394). CH was designated on September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This ESU includes naturally spawned spring-run Chinook salmon originating from the Sacramento River and its tributaries, and also spring-run Chinook salmon from the Feather River Hatchery Spring-run Chinook Salmon Program.

Lower Columbia River Chinook ESU (Threatened)

The listing status for this Chinook salmon ESU was determined to be threatened on May 24, 1999 (64 FR 14308) and June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This ESU includes all includes naturally spawned Chinook salmon originating from the Columbia River and its tributaries downstream of a transitional point east of the Hood and White Salmon Rivers, and any such fish originating from the Willamette River and its tributaries below Willamette Falls. This ESU also includes Chinook salmon from several artificial propagation programs.

Puget Sound Chinook ESU (Threatened)

The listing status for this Chinook salmon ESU was determined to be threatened on March 24, 1999 (64 FR 14308) and June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This ESU includes naturally spawned Chinook salmon originating from rivers flowing into Puget Sound from the Elwha River (inclusive) eastward, including rivers in Hood Canal, South Sound, North Sound and the Strait of Georgia. This ESU also includes Chinook salmon from several artificial propagation programs.

Snake River Fall-run Chinook ESU (Threatened)

The listing status for this Chinook salmon ESU was determined to be threatened on April 22, 1992 (57 FR 14653) and June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on December 28, 1993 (58 FR 68543) and does not overlap with the Action Area. This ESU includes all naturally spawned fall-run Chinook salmon originating from the mainstem Snake River below Hells Canyon Dam and from the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and Clearwater River subbasins. This ESU also includes Chinook salmon from several artificial propagation programs.

Snake River Spring/Summer-run Chinook ESU (Threatened)

The listing status for this Chinook salmon ESU was determined to be threatened on April 22, 1992 (57 FR 14653) and June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on October 25, 1999 (64 FR 57399) and does not overlap with the Action Area. This ESU includes all naturally spawned spring/summer-run Chinook salmon originating from the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins. This ESU also includes Chinook salmon from several artificial propagation programs.

Upper Willamette River Chinook ESU (Threatened)

The listing status for this Chinook salmon ESU was determined to be threatened on March 24, 1999 (64 FR 14308) and June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on September 2, 2005 (70 FR 52629) and does not overlap with the Action Area. This ESU includes naturally spawned spring-run Chinook salmon originating from the Clackamas River and from the Willamette River and its tributaries above Willamette Falls. This DPS also includes Chinook salmon from several artificial propagation programs.

Chum Salmon (Oncorhynchus keta)

Chum salmon are found are found throughout the North Pacific Ocean and range from the Arctic coast of Canada and throughout the northern coastal regions of North America and Asia. In the United States, chum salmon are found throughout Alaska and as far south as Yaquina Bay, Oregon, on the West Coast.

They are anadromous—they hatch in freshwater streams and rivers then migrate out to the saltwater environment of the ocean to feed and grow. Chum salmon do not reside in fresh water for an extended period and young chum salmon (fry) typically migrate directly to estuarine and marine waters soon after they are born. As they grow larger, they migrate offshore across the North Pacific Ocean. As they approach sexual maturity, they migrate back into coastal waters and return to the freshwater area where they were born to spawn, typically spawn between the ages of 3 and 6 years. They spawn from late summer to March, with peak spawning concentrated in early winter when the river flows are high. They usually nest in areas in the lowermost reaches of rivers and streams, within 60 mi of the ocean. Young chum salmon feed on insects as they migrate downriver and on insects and marine invertebrates in estuaries and nearshore marine habitats. Adults eat copepods, fishes, mollusks, squid, and tunicates.

Within the Action Area, two ESUs may occur that are threatened under the ESA.

Columbia River Chum ESU (Threatened)

The listing status for this coho salmon ESU was determined to be threatened March 25, 1999 (64 FR 14508) and June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This ESU naturally spawned chum salmon originating from the Columbia River and its tributaries in Washington and Oregon. Coho salmon originating from three artificial propagation programs also are included. This ESU also includes fish from a number of artificial propagation programs.

Hood Canal Summer-run Chum ESU (Threatened)

The listing status for this coho salmon ESU was determined to be threatened on March 25, 1999 (64 FR 14508) and June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This ESU includes naturally spawned summer-run chum salmon originating from Hood Canal and its tributaries as well as from Olympic Peninsula rivers between Hood Canal and Dungeness Bay (inclusive). This ESU also includes fish from a number of artificial propagation programs.

Coho Salmon (*Oncorhynchus kisutch*)

Coho salmon are found in the North Pacific Ocean and inland from Monterey Bay, California to Point Hope, Alaska, and north Asia. They are semelparous and spawning takes place in freshwater from September through late January. Coho salmon typically exhibit a three-year life history, divided between 18 months in freshwater and 18 months in saltwater phases. In freshwater, coho salmon spawn and rear in small streams with stable gravels and complex habitat features, such as backwater pools, beaver dams, and side channels. Marine survival and growth of coho salmon are linked to food availability, environmental conditions, and stressors present in the nearshore environment. Juvenile coho salmon disperse from their natal streams to coastal waters; their ocean distribution changes with time, with juveniles typically moving northward or farther offshore (Brodeur et al. 2004). Ocean dispersal rates for yearling Columbia River coho salmon averaged between 3.2 and 6.6 km/d (Fisher et al. 2014). Juvenile salmonids are pelagic and typically surface-oriented, most often found in the upper 20 m of the water column (Emmett et al. 2004;

Beamish et al. 2005; Walker et al. 2007). Adult coho salmon tend to occur at shallower depths (< 40 m) than adult Chinook salmon (Walker et al. 2007).

In general, juvenile salmonids are low in abundance in U.S. West Coast waters when compared to other fish, as evidenced by the low numbers of juvenile salmonids captured in directed pelagic surface/subsurface research trawls relative to other nekton (Brodeur et al. 2004; Brodeur et al. 2005; Peterson et al. 2010; Fisher et al. 2014). Juvenile coho salmon exhibit a patchy distribution in U.S. West Coast waters; in pelagic trawl surveys conducted in summer and fall along Oregon and Washington, half of all juvenile salmonids were collected in about 5% of the surveys, and none were collected in about 40% of the surveys (Peterson et al. 2010). Juvenile coho salmon occur in coastal waters, usually further offshore than juvenile Chinook salmon (Brodeur et al. 2004; Peterson et al. 2010). While in the ocean, coho salmon primarily feed upon fish and planktonic invertebrates (Love 1996).

Within the Action Area four ESUs may occur that are either threatened or endangered under the ESA.

Central California Coast Coho ESU (Endangered)

The listing status for this coho salmon ESU was determined to be threatened under the ESA on October 31, 1996 (64 FR 56138); NMFS reclassified the ESU as endangered on June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on May 5, 1999 (64 FR 24049) and does not overlap with the Action Area. This ESU includes naturally spawned coho salmon originating from rivers south of Punta Gorda, California, up to and including Aptos Creek, as well as such coho salmon originating from tributaries to San Francisco Bay. Coho salmon from three artificial propagation programs are included in this ESU.

Lower Columbia River Coho ESU (Threatened)

The listing status for this coho salmon ESU was determined to be threatened under the ESA on June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on February 24, 2016 (81 FR 9251) and does not overlap with the Action Area. This ESU includes naturally spawned coho salmon originating from the Columbia River and its tributaries downstream from the Big White Salmon and Hood Rivers (inclusive) and any such fish originating from the Willamette River and its tributaries below Willamette Falls. Coho salmon that originate from a number of artificial propagation programs are also included.

Oregon Coast Coho ESU (Threatened)

The listing status for this coho salmon ESU was determined to be threatened on August 10, 1998 (63 FR 42587) and June 20, 2011 (76 FR 35755); updated April 14, 2014 (79 FR 20802). CH was designated on February 11, 2008 (73 FR 7815) and does not overlap with the Action Area. This ESU includes naturally spawned coho salmon originating from coastal rivers south of the Columbia River and north of Cape Blanco. This ESU also includes coho salmon from the Cow Creek Hatchery Program.

Southern Oregon and Northern California Coasts Coho ESU (Threatened)

The listing status for this coho salmon ESU was determined to be threatened under the ESA on May 6, 1997 (62 FR 24588). The listing was revisited and confirmed as threatened on June 28, 2005 (70 FR 37160); updated April 14, 2014 (79 FR 20802). CH was designated on May 5, 1999 (64 FR 24049) and does not overlap with the Action Area. This ESU includes naturally spawned coho salmon originating from coastal streams and rivers between Cape Blanco, Oregon, and Punta Gorda, California. Coho salmon originating from three artificial propagation programs also are included.

Steelhead (*Oncorhynchus mykiss*)

Steelhead originally ranged from northern Mexico to southeastern Alaska and inland. They are iteroparous and spawning takes place in the spring. Juveniles typically spend 2 years in freshwater before migrating downstream the ocean. While in the ocean, steelhead feed upon insects, mollusks, crustaceans, fish eggs, and other small fishes (Love 1996).

Steelhead are rainbow trout that exhibit an anadromous life-history pattern. By migrating to the ocean, steelhead grow to much larger sizes than their resident rainbow trout cohorts. Anadromous steelhead and resident rainbow trout can be considered to be from the same population, as anadromous parents can produce resident offspring and resident parents can produce anadromous offspring. This adaptive life history makes steelhead flexible to changing habitat conditions. Also, unlike other Pacific salmonids, they can spawn more than one time.

After emergence, young steelhead rear in freshwater streams for 1 to 4 years before migrating out to the ocean. After reaching the ocean in the spring, juvenile steelhead tend to move offshore quickly rather than use nearshore waters like other salmon. For example, Daly et al. (2014) captured tagged juvenile steelhead that migrated greater than 55 km offshore of the Columbia River within 3 days. While as sea, steelhead are found in pelagic waters of the Gulf of Alaska principally within 10 m from the surface, though they sometimes travel to greater depths (Light et al. 1989).

Within the Action Area, 11 DPSs may occur that are either threatened or endangered under the ESA.

Southern California Steelhead DPS (Endangered)

The listing status for this steelhead DPS was determined to be endangered on August 18, 1997 (62 FR 43937) and January 5, 2006 (71 FR 834); range extension on May 1, 2002 (67 FR 21586); updated April 14, 2014 (79 FR 20802). CH was designated on September 2, 2005 (70 FR 52536) and does not overlap with the Action Area. The Southern California Coast Steelhead DPS is comprised of a suite of anadromous steelhead populations that inhabit coastal stream networks from the Santa Maria River system south to the U.S. border with Mexico.

California Central Valley Steelhead DPS (Threatened)

The ESA listing status for this steelhead DPS was threatened on March 19, 1998 (62 FR 13347); reaffirmed January 5, 2006 (71 FR 834). CH was designated September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This DPS includes naturally spawned anadromous populations originating below natural and man-made impassable barriers from the Sacramento and San Joaquin Rivers and their tributaries; excludes such fish originating from San Francisco and San Pablo Bays and their tributaries. Steelhead from the following artificial propagation programs are also included within the DPS: Coleman National Fish Hatchery Program, Feather River Fish Hatchery Program, and Mokelumne River Hatchery Program.

Central California Coast Steelhead DPS (Threatened)

The ESA listing status for this steelhead DPS was threatened on August 18, 1997 (62 FR 43937) and January 5, 2006 (71 FR 834); updated April 14, 2014 (79 FR 20802). CH was designated September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This DPS includes naturally spawned anadromous populations originating below natural and man-made impassable barriers from the Russian River to and including Aptos Creek, and all drainages of San Francisco and San Pablo Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers. Steelhead from the following artificial propagation programs are also included within the DPS: Don Clausen Fish Hatchery Program and Kingfisher Flat Hatchery Program (Monterey Bay Salmon and Trout Project).

Lower Columbia River Steelhead DPS (Threatened)

The ESA listing status for this steelhead DPS was threatened on March 19, 1998 (63 FR 13347) and January 5, 2006 (71 FR 834); updated April 14, 2014 (79 FR 20802). CH was designated September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This DPS includes naturally spawned anadromous O. mykiss (steelhead) originating below natural and man-made impassable barriers from rivers between the Cowlitz and Wind Rivers (inclusive) and the Willamette and Hood Rivers (inclusive); excludes such fish originating from the upper Willamette River basin above Willamette Falls. This DPS also includes fish from a number of artificial propagation programs.

Middle Columbia River Steelhead DPS (Threatened)

The ESA listing status for this steelhead DPS was threatened on March 25, 1999 (64 FR 14517) and January 5, 2006 (71 FR 834); updated April 14, 2014 (79 FR 20802). CH was designated September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This DPS includes naturally spawned anadromous O. mykiss (steelhead) originating below natural and man-made impassable barriers from the Columbia River and its tributaries upstream of the Wind and Hood Rivers (exclusive) to and including the Yakima River; excludes such fish originating from the Snake River basin. This DPS also includes fish from a number of artificial propagation programs.

Northern California Steelhead DPS (Threatened)

The ESA listing status for this steelhead DPS was threatened on June 07, 2000 (65 FR 36074) and January 5, 2006 (71 FR 834); updated April 14, 2014 (79 FR 20802). CH was designated on September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This DPS includes naturally spawned anadromous steelhead originating below natural and man-made impassable barriers in California coastal river basins from Redwood Creek to and including the Gualala River.

Puget Sound Steelhead DPS (Threatened)

The ESA listing status for this steelhead DPS was threatened on May 11, 2007 (72 FR 26722); updated April 14, 2014 (79 FR 20802). CH was designated February 24, 2016 (81 FR 9252) and does not overlap withing the Action Area. This DPS includes naturally spawned anadromous O. mykiss (steelhead) originating below natural and man-made impassable barriers from rivers flowing into Puget Sound from the Elwha River (inclusive) eastward, including rivers in Hood Canal, South Sound, North Sound, and the Strait of Georgia. This DPS also includes fish from a number of artificial propagation programs.

Snake River Steelhead DPS (Threatened)

The ESA listing status for this steelhead DPS was threatened on August 18, 1997 (62 FR 43937) and January 5, 2006 (71 FR 834); updated April 14, 2014 (79 FR 20802). CH was designated September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This DPS includes all naturally spawned anadromous O. mykiss (steelhead) originating below natural and man-made impassable barriers from the Snake River basin. This DPS also includes fish from a number of artificial propagation programs.

South-Central California Coast DPS (Threatened)

The ESA listing status for this steelhead DPS was threatened on August 18, 1997 (62 FR 43937) and January 5, 2006 (71 FR 834); updated April 14, 2014 (79 FR 20802). CH was designated September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This DPS includes naturally spawned anadromous steelhead originating below natural and man-made impassable barriers from the Pajaro River to (but not including) the Santa Maria River.

Upper Columbia River Steelhead DPS (Endangered)

The ESA listing status for this steelhead DPS was endangered on August 18, 1997 (62 FR 43937); reclassified to threatened on January 5, 2006 (71 FR 834) and August 24, 2009 (74 FR 42605); updated April 14, 2014 (79 FR 20802). CH was designated September 2, 2005 (70 FR 52630) and does not overlap withing the Action Area. This DPS includes naturally spawned anadromous O. mykiss (steelhead) originating below natural and man-made impassable barriers from the Columbia River and its tributaries upstream of the Yakima River to the U.S.-Canada border. This DPS also includes fish from a number of artificial propagation programs.

Upper Willamette River Steelhead DPS (Threatened)

The ESA listing status for this steelhead DPS was threatened on March 25, 1999 (64 FR 14517) and January 5, 2006 (71 FR 834); updated April 14, 2014 (79 FR 20802). CH was designated September 2, 2005 (70 FR 52630) and does not overlap with the Action Area. This DPS includes naturally spawned anadromous winter-run steelhead originating below natural and man-made impassable barriers from the Willamette River and its tributaries upstream of Willamette Falls, to and including the Calapooia River.

4.24 Black Abalone (*Haliotis cracherodii*)

The black abalone (*Haliotis cracherodii*) was listed as endangered under the ESA on January 14, 2009 (74 FR 1937), and CH was designated by NMFS on November 28, 2011 (76 FR 66806; **Figure 18**).

Black abalone distribution ranges from approximately Point Arena, Mendocino County, California, south to Bahia Tortugas and Isla Guadalupe in Mexico (VanBlaricom et al. 2009). This species primarily feeds on algae, is long-lived (up to 30 years), and possesses a planktonic larval stage of 4–10 days before settling on benthic substrate (VanBlaricom et al. 2009). The majority of black abalone live on rocky substrates in the high to low intertidal zone, and it is rarely found deeper than 6 m of water (VanBlaricom et al. 2009). CH for black abalone consists of rocky intertidal zones and shallow subtidal areas (< 6m) along Coastal California where they find shelter and access to food (NMFS 2011). The spatial distribution of CH is discontinuous and includes the areas between Del Mar Landing Ecological Reserve and Natural Bridges State Beach; Pacific Grove and Cayucos; Montaña De Oro State Park and just south of Government Point; Palos Verdes/Torrance Border and Los Angeles Harbor; and Farallon, Año Nuevo, San Miguel, San Rosa, Santa Cruz, Anacapa, Santa Barbara, and Santa Catalina Islands (NMFS 2011). The largest threats to the black abalone include suboptimal water temperatures, low density, disease, and illegal take (Neuman et al. 2010).

4.25 White Abalone (*Haliotis sorenseni*)

The white abalone (*Haliotis sorenseni*) was listed as endangered under the ESA on May 29, 2001 (FR 66 FR 29046). NMFS determined that designation of CH for white abalone was not prudent, because a designation would not provide significant benefits that outweigh the increased risk of poaching that may result from identifying the species' CH (66 FR 29046; May 29, 2001). Distribution and life-history information are summarized by NMFS (2008; 2018b).

White abalone occur on the North American West Coast along offshore islands and banks (particularly Santa Catalina and San Clemente Islands) and along the mainland coast from Point Conception, California, south to Punta Abreojos, Baja California, Mexico. This species primarily feeds on algae, is long-lived (35–40 years), and possesses a planktonic larval stage that lasts for about 2 weeks before settling on benthic substrate. Adults occupy open, low relief rocky reefs or boulder habitat surrounded by sand. Because suitable habitat is patchy, the distribution of white abalone is also patchy. White abalone are the deepest living abalone species on the North American west coast, occupying depths from 5–60 m. Current remnant populations are most common between 30 and 60 m in depth, and surveys found the highest densities at depths of 40–50 m. Threats to the white abalone include overfishing, low reproduction rates, habitat destruction, and disease.

4.26 Sunflower Sea Star (*Pycnopodia helianthoides*)

The sunflower sea star (*Pycnopodia helianthoides*) was proposed for listing as threatened under the ESA in 2023 (88 FR_16212); a final rule has not been issued nor has CH been designated. The species is a large, fast moving, many-armed sea star, native to the eastern Pacific Ocean from Baja California, Mexico to the Aleutian Islands, Alaska. The species is most abundant in the waters off eastern Alaska and British Columbia. Between 2013 and 2017, sea star wasting syndrome killed an estimated 90% of the population (Lowry et al. 2022).

The sunflower sea star has no clear associations with specific habitat types or features and is considered a habitat generalist (Lowry et al. 2022). Sunflower sea stars occupy a wide range of benthic substrates including mud, sand, shell, gravel, and rocky bottoms while roaming in search of prey (Lowry et al. 2022). The diet of adult sunflower sea stars generally consists of benthic and mobile epibenthic invertebrates, including sea urchins, snails, crab, sea cucumbers, and other sea stars (Lowry et al. 2022), and appears to be driven largely by prey availability.

Lowry et al. (2022) reviewed 27 datasets on the distribution and abundance of sunflower sea stars and described the depth distribution as the low intertidal and subtidal zones to a depth of 435 m, but these sea stars are most common at depths less than 25 m and rare in waters deeper than 120 m. However, sunflower sea star has been observed at depths beyond 435 m offshore of Oregon and central California, with a gradual decline through ~600 m and sporadic occurrence to a maximum depth of 1,158 m (NMFS 2024f). Lowry et al. (2022) notes that, from all depths along the entire U.S. West Coast, *P. helianthoides* "density peaked in 2013, declined suddenly in 2014, and went to essentially zero in 2015 with no sign of recovery. The survey recorded 2,618 *P. helianthoides* from 2003–2014 but only seven individuals from 2015–2021." In summary, this abundance information suggests that, although there may be potential habitat in the Action Area, the probability of sunflower sea stars occurring there is extremely low. Furthermore, any individuals that could be found there would be exposed to mortality risk due to being trawled up by ongoing groundfish commercial fishers who operate off the U.S. West Coast (Wang et al. 2024).

Threats to the sunflower sea star were broadly grouped into the five ESA Section 4(a)(1) categories of: 1) present or threatened destruction, modification, or curtailment of habitat or range; 2) overutilization for commercial, recreational, scientific, or educational purposes; 3) competition, disease, or predation; 4) adequacy of existing regulatory mechanisms; and 5) other natural or man-made factors affecting continued existence (Lowry et al. 2022).

4.27 Coral Species

Acropora globiceps

A. globiceps was listed as threatened on September 10, 2014 (79 FR 53852). In 2025, NMFS designated CH for this species on Tutuila and its offshore banks, Ofu-Olosega, and Ta'u between 0–20-m depth; Rose, Palmyra, and Johnston Atolls, and Lalo (FFS) between 0–10-m depth; and Guam, Rota, Aguijan, Tinian, Saipan, Alamagan, Pagan, Asuncion, Maug Islands, and Uracas between 0–12-m depth (90 FR 31800, 90 FR 39339). Designated CH supports the reproduction, recruitment, growth, and maturation of *A. globiceps*, providing substrate for larval settlement and the water conditions that are suitable for survival.

Distribution and life-history information are summarized by (NMFS 2023d). *A. globiceps* has a relatively broad geographic distribution, occurring on Guam, CNMI, American Samoa, Pacific Remote Island Areas (PRIA), and the NWHI within U.S. waters. The species inhabits shallow forereefs, as well as backreef areas, pools, and lagoons with high wave energy. Its depth distribution ranges from 0–20 m, although it is typically found shallower than 8-m depth. Generally, *Acropora* species have rapid skeletal growth and low tolerance to stress. They are hermaphroditic broadcast spawners that can recruit quickly and compete for space but are susceptible to disturbance.

Threats to *A. globiceps* include ocean warming, ocean acidification, disease, fishing, land-based sources of pollution, and collection and trade, which are all projected to worsen in the foreseeable future.

4.28 Giant Clam Species

Horse's Hoof Clam (*Hippopus hippopus*)

The horse's hoof clam (*Hippopus hippopus*), also known as the bear paw or strawberry clam, was proposed for listing as threatened under the ESA in 2024 (89 FR 60498). Distribution and life-history information are summarized by (Rippe et al. 2024). The species is widely distributed throughout the Indo-Pacific, including the U.S. territories of American Samoa, Guam, and CNMI. Due to overexploitation, it was extirpated in CNMI and then reintroduced in the 1980s, although it is still very rare or absent in the area. It occurs frequently in Australia, Palau, and Vanuatu.

This species of giant clam inhabits shallow, nearshore reef patches, sandy areas, seagrass beds, and lagoonal reefs, but can be found as deep as 10 m. Giant clams are protandrous hermaphrodites, maturing first as males and then later developing ovaries to function as both; spawning season seems to vary with species and location. Although they may be capable of self-fertilization, they are broadcast spawners with high fecundity but high mortality and low natural recruitment. Like other giant clams, the horse's hoof clam is a suspension feeder with symbiotic dinoflagellates (or zooxanthellae) in its mantle, which provides a large proportion of its trophic requirements. However, this species derives less nutrition from its symbionts in comparison to other giant clams.

The main threat to the horse's hoof clam is historical and ongoing overexploitation that has led to low abundance and negative population trajectories, complicated by low natural productivity.

Smooth Giant Clam (*Tridacna derasa*)

The smooth giant clam (*Tridacna derasa*) was proposed for listing as endangered under the ESA in 2024 (89 FR 60498). Distribution and life-history information are summarized by Rippe et al. (2024). This species historically occurred and was reportedly extirpated in CNMI and Guam, but has been reintroduced in both locations, American Samoa, and other areas of the central and western Pacific Ocean as a local food source.

The smooth giant clam occurs in clear offshore waters away from large island masses and freshwater runoff. It is often found on or adjacent to coral reefs between 4–25-m depth. Like other giant clams, it is a protandrous hermaphrodite and broadcast spawner. In waters shallower than 20 m, the smooth giant clam can rely on its zooxanthellae for all its nutrition.

Threats to the smooth giant clam are historical and ongoing overexploitation leading to low abundance and negative population trajectory, and habitat alteration from ocean warming and ocean acidification impacts to corals.

True Giant Clam (*Tridacna gigas*)

The true giant clam (*Tridacna gigas*) was proposed for listing as endangered under the ESA in 2024 (89 FR 60498). Distribution and life-history information are summarized by (Rippe et al. 2024). It historically occurred and may be extirpated in CNMI and Guam; it has been reintroduced in both places, as well as American Samoa and Hawai'i for local harvest. This species has been reportedly observed near Johnston and Wake Atolls.

The true giant clam is found in tropical waters shallower than 20 m throughout the Indo-Pacific and Great Barrier Reef. It is typically associated with coral reefs and can be found in a variety of habitats, such as high- and low-islands, atoll lagoons, and fringing reefs. The true giant clam is long-lived (up to 63 years) with a relatively fast growth rate (8–12 cm per year). Like other giant clams, it is a protandrous hermaphrodite and broadcast spawner. Although the true giant clam can release hundreds of millions of eggs in a single spawning event, this species may have the lowest levels of recruit survival of all animals (less than 1%) and delayed sexual maturity. Compared to other giant clam species, the true giant clam exhibits high photosynthetic efficiency. As they grow larger, the relative contribution of heterotrophic nutrition decreases; large adults may be able to solely rely on their zooxanthellae.

Threats to the true giant clam are historical and ongoing overexploitation leading to low abundance and negative population trajectory, and habitat alteration from ocean warming and ocean acidification impacts to corals.

Other Giant Clams

In 2024, the small (*T. maxima*) and fluted (or scaly, *T. squamosa*) giant clams were proposed for listing as threatened under Section 4(e) of the ESA, which would only prohibit the import and export of derivative parts and products for which the species of origin cannot be visually determined, due to their similarity of appearance to other giant clam species (89 FR 60498).

5 BA: Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or CH that are caused by the Proposed Action, including the consequences of other activities that are caused by the Proposed Action (see 50 CFR 402.02). A consequence is caused by the Proposed Action if it would not occur but for the Proposed Action, and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). When evaluating whether the Proposed Action is likely to adversely affect listed species or CH, BOEM considers whether the effects are expected to be completely beneficial, insignificant, or discountable. *Completely beneficial* effects are contemporaneous positive effects without any adverse effects to the species or CH. *Insignificant effects* relate to the size of the impact and should never reach the scale where take occurs. Effects are considered *discountable* if they are extremely unlikely to occur.

The following **Sections 5.1 to 5.6** are effects of the action to marine mammals and sea turtles. **Section 5.7** focuses on effect of the action to fishes and invertebrates. **Section 5.8** covers impacts to CH.

5.1 Acoustic Sound Sources

Noise can impact animal hearing and/or behavioral disturbance, resulting in interruption or cessation of important behaviors such as migration, feeding, resting, communication, or breeding (Reese et al. 2023). The assessment of potential hearing effects to marine mammals, sea turtles and fish is based on NMFS' updated acoustic technical guidance (NMFS 2024a) and other acoustic information (NMFS 2025c; 2025d) and tools (NOAA Fisheries 2025; 2026a) for assessing the effects of anthropogenic sounds on marine mammals, sea turtles, and fishes (**Table 12**).

The methodology developed by the U.S. Navy is currently thought to be the best available approach to evaluate the effects of survey noise exposure to sea turtles (U.S. Navy Marine Mammal Program 2017; NMFS 2021a; Accomando et al. 2025). Sea turtle hearing capabilities and potential effects to sea turtles from sound sources are provided in **Table 13**.

For determining injury for protected fishes, NMFS' ESA acoustic threshold summary was used (NMFS 2025c). NMFS does not distinguish among fish taxa but rather divides impacts by fish mass (greater or less than 2 g; (**Table 14).** Onset of physical injury and potential behavioral disturbance for the two fish categories are also listed in **Table 14**. More detailed effect analyses to fish and invertebrates can be found in **Section 5.7.3.6**.

Table 12. Marine mammal functional hearing groups and acoustic thresholds identifying the onset of auditory injury for marine mammals from impulsive and non-impulsive sound sources

Hearing Group	Generalized Hearing Range	Onset of Auditory Injury from Impulsive Sound	Onset of Auditory Injury from Non-Impulsive Sound
Low frequency (e.g., baleen whales)	7 Hz to 36 kHz	222 dB Peak 183 dB cSEL	197 dB cSEL
High frequency (e.g., toothed whales)	150 Hz to 160 kHz	230 dB Peak 193 dB cSEL	201 dB cSEL
Very High frequency (e.g., porpoise)	200 Hz to 165 kHz	202 dB Peak 159 dB cSEL	181 dB cSEL
Phocid pinnipeds (true seals) (underwater)	40 Hz to 90 kHz	223 dB Peak 183 dB cSEL	195dB cSEL
Otariid pinnipeds (sea lions and fur seals) (underwater)	60 Hz to 68 kHz	230 dB Peak 185dB cSEL	199 dB cSEL

Notes: Created using NMFS (2025d)
cSEL = Cumulative sound exposure level (decibel referenced to 1 micropascal squared seconds [dB s]), Peak = Peak sound pressure level (decibel referenced to 1 micropascal [dB re 1 μPa]); dB = decibels; Hz = hertz; kHz = kilohertz

Table 13. Hearing capabilities and acoustic thresholds identifying the onset of auditory injury of sea turtles from impulsive and non-impulsive sound sources

Sea Turtle Species	Life Stage	Range of Audibility (Hz)	Range of Highest Sensitivity (Hz)	Onset of Auditory Injury from Impulsive Sound	Onset of Auditory Injury from Non-Impulsive Sound	Source
Green (*Chelonia mydas*)	Juvenile	50–1,600	200–400	230 dB Peak 184 dB cSEL	198 dB cSEL	Ridgway et al. (1969); Bartol and Ketten (2006); Piniak et al. (2012b); Piniak et al. (2016)
Hawksbill (*Eretmochelys imbricata*)	Hatchling	50–1,600	400	230 dB Peak 184 dB cSEL	198 dB cSEL	Piniak (2012)
Kemp's ridley (*Lepidochelys kempii*)	Juvenile	100–500b	100–500[a]	230 dB Peak 184 dB cSEL	198 dB cSEL	Bartol and Ketten (2006)
Leatherback (*Dermochelys coriacea*)	Hatchling	50–1,200	300	230 dB Peak 184 dB cSEL	198 dB cSEL	Piniak (2012); Piniak et al. (2012a)
Loggerhead (*Caretta caretta*)	Post-Hatchling[b]	50–1,100	200	230 dB Peak 184 dB cSEL	198 dB cSEL	Bartol et al. (1999); Lenhardt (2002); Martin et al. (2012); Lavender et al. (2014)

Sea Turtle Species	Life Stage	Range of Audibility (Hz)	Range of Highest Sensitivity (Hz)	Onset of Auditory Injury from Impulsive Sound	Onset of Auditory Injury from Non-Impulsive Sound	Source
Loggerhead	Juvenile	50–1,100	50–800	230 dB Peak 184 dB cSEL	198 dB cSEL	Bartol et al. (1999); Lenhardt (2002); Martin et al. (2012); Lavender et al. (2014)
Loggerhead	Adult	35–1,131	100–400	230 dB Peak 184 dB cSEL	198 dB cSEL	Bartol et al. (1999); Lenhardt (2002); Martin et al. (2012); Lavender et al. (2014)

Source: Bartol et al. (1999); Lavender et al. (2012); Martin et al. (2012); Lavender et al. (2014); Papale et al. (2020); Reese et al. (2023)
Data adapted from Papale et al. (2020) and Reese et al. (2023) based on highest and lowest frequency of underwater audibility that was reported for each species including both auditory evoked potential and behavioral studies.
[a] Only in-air measurements are available for Kemp's ridley sea turtles.
[b] Post-hatchling refers to the size classification given to hatchlings when they reach a straight maximum length of 5 cm.

Table 14. Acoustic thresholds identifying the onset of physical and behavioral injury for fish

Fish Size	Onset of Physical Injury for Impulsive Sources	Potential Onset of Behavioral Disturbance [1]
Fishes ≥ 2g	206 dB Peak 187 dB cSEL	150 dB
Fishes < 2g	206 dB Peak 183 dB cSEL	150 dB

Notes: dB =decibels (NMFS 2025c)
1 While this is not a "formal" threshold, it serves as a level where one can begin to look at potential behavioral responses

A peer-reviewed paper by Ruppel et al. (2022), "Categorizing Active Marine Acoustic Sources Based on Their Potential to Affect Marine Animals," uses physical criteria about various HRG sources, such as source level, transmission frequency, directionality, beamwidth, and pulse repetition rate to evaluate the potential impacts to protected species. Ruppel et al. (2022) divided marine acoustic sources into four tiers that could inform regulatory evaluation (**Table 15**). Tier 4 includes most high-resolution geophysical, oceanographic, and communication/tracking sources, which are considered unlikely to result in incidental take of marine mammals and are therefore termed *de minimis.* The Operational National Mitigation Protocol (ONMP) and its adoption within the 2025 Biological Opinion formalizes this tiered system for categorizing geophysical sound sources based on their relative potential to affect marine mammals (BOEM 2026). All the acoustic sources under this Proposed Action fall into this *de minimis* category. Use of these equipment types does not injure or disturb marine mammals, turtles, or fishes and mitigations are therefore not required. Some types of MBES systems and sub-bottom profiler systems can potentially cause acoustic injury and/or disturbance to marine mammals when operated at certain source levels, transmission frequencies, directionalities, beamwidths, tow depths, and pulse repetition rates. Therefore, the precise equipment types, equipment settings and uses for planned surveys will be submitted to BOEM 30 days or more prior to use for review to confirm that the sources comply with the *de minimis* criteria described in Ruppel et al. (2022) and the ONMP. If the proposed survey equipment is determined to present risk to disturb or harm ESA-listed species, BOEM will not approve the activity or use of equipment without initiating consultation with NMFS.

Table 15. Ranked classification of acoustic sources based on impacts to marine mammals

Category	Active Acoustic Sources: Short Descriptions	Example Sources
Tier 1	High-energy airgun surveys (includes GI guns)	Airguns: arrays larger than 12 airguns
Tier 2	Low / intermediate energy airgun surveys (includes GI guns)	Airguns
Tier 3	HRG seismic sources (most)	Some sparkers, bubble guns, some boomers
Tier 4	De minimis sources (not likely to result in incidental take)	MBES, SSS, hull-mounted sub-bottom profiler (SBP); towed SBP evaluated here; parametric SBP; SBES (EK60/80),ADCP, pingers (locators), acoustic releases, seafloor/water column navigational/tracking acoustics for ROVs, AUVs, etc.

Notes: This table was reproduced from Table 3 of Ruppel et al. (2022).

Whether deployed from vessel or AUVs, all the acoustic sources in the Proposed Action fall under the *de minimus* category as described by Ruppel et al. (2022) and in the ONMP and will not present any risk of injury or disturbance to ESA-listed species.

Vessel Noise

The sound generated from individual vessels can contribute to overall ambient noise levels in the marine environment on variable spatial scales. The survey vessels would contribute to the overall noise environment by transmitting noise through both air and water. Underwater noise produced by vessels is a combination of narrow-band (tonal) and broadband sound. Tones typically dominate up to about 50 Hz, whereas broadband sounds may extend to 100 kHz. According to Southall (2004) and Richardson et al. (1995), vessel noise typically falls within the range of 100–200 Hz. In the frequency range of 20–500 Hz, distant shipping is the primary source of ambient noise (DOSITS 2025). Spray and bubbles associated with breaking waves are the main contributions to ambient noise in the 500–100,000 Hz range. At frequencies greater than 100,000 Hz, "thermal noise" caused by the random motion of water molecules is the primary source. Ambient noise sources, especially noise from wave and tidal action, can cause coastal environments to have particularly high ambient noise levels.

The vessels used for the Proposed Action would produce low-frequency, broadband, underwater sound below 1 kHz (for larger vessels), and higher-frequency sound between 1 kHz to 50 kHz (for smaller vessels), although the exact level of sound produced varies by vessel type. The general frequency range for vessel noise (10 to 1000 Hz; Richardson et al. 1995) overlaps with the generalized hearing range for blue, fin, sei, humpback (7 Hz to 35 kHz) and sperm whales (150 Hz to 160 kHz) and therefore would be audible. Vessels without ducted propeller thrusters would produce levels of noise of 150 to 170 dB re 1 μPa-1 m at frequencies below 1,000 Hz, while the expected sound-source level for vessels with ducted propeller thrusters level is 177 dB (root mean square) at 1 m (BOEM 2015; Rudd et al. 2015). For ROVs, source levels may be as high as 160 dB (NMFS 2021a). Given that the noise associated with the operation of project vessels is below the thresholds that could result in injury, no injury is expected.

Vessel noise has the potential to disturb marine mammals and elicit an alerting, avoidance, or other behavioral reaction. These reactions are anticipated to be short term, likely lasting the amount of time the vessel and the whale are in close proximity (Watkins 1981; Richardson et al. 1995; Magalhães et al. 2002), and not consequential to the animals. Additionally, short-term masking could occur. Masking by passing ships or other sound sources transiting the Proposed Action Area would be short term and intermittent, and therefore unlikely to result in any substantial costs or consequences to individual animals or populations. Areas with increased levels of ambient noise from anthropogenic noise sources such as areas around busy shipping lanes and near harbors and ports may cause sustained levels of masking for marine mammals, which could reduce an animal's ability to find prey, find mates, socialize, avoid predators, or navigate (NMFS 2021a). Since protected species and vessels in these areas are continually moving, these masking effects are not likely to adversely affect ESA-listed species.

A comprehensive review of the literature on marine mammals and vessel noise (Richardson et al. 1995; Erbe et al. 2019) revealed that changes in behavior vary widely across species. Despite a number of demonstrable examples of short-term biological consequences in individuals (Holt et al. 2015), it is still very challenging to draw conclusions regarding potential long-term or population-level effects. Vessel noise associated with the Proposed Action may affect marine mammals, but the vessel noise is not expected to substantially add to the local noise in the operating area. The limited amount of project-related vessel traffic relative to the existing vessel traffic in the CNMI area as well as Hawai'i and the West Coast regions would contribute an insignificant amount to the overall noise levels in the area. Therefore, vessel noise could result, at most, in a localized minor and temporary impact. Any contribution is likely small in the overall environment of regional ambient sound levels. A vessel's transit past an individual animal will be brief and is not likely to impact any individual's ability to feed, reproduce, or avoid predators. Brief interruptions in sheltering or communication via masking are possible, but unlikely given the ability of marine mammals to move away from vessel disturbances and to quickly resume normal behaviors. Given the above justifications and the BMPs in place, vessel noise effects on marine mammals are not likely to adversely affect ESA-listed species.

Per NMFS (2021a) ESA-listed sea turtles could be exposed to a range of vessel noises within their hearing range. Their response from vessel noise exposure include avoidance, startle responses, altered submergence patterns, masking of biologically relevant sounds, and physiological stress (Samuel et al. 2005; National Science Foundation 2011). These responses may disrupt essential activities like feeding, migration and breeding behavior. However, these responses are only evident from vessels 10 m or closer, suggesting their detection of approaching vessels relies more on visual than on acoustic cues (Hazel et al. 2007). Similarly, Lester et al. (2013) showed that the diamondback terrapin did not alter its behavior in response to recorded boat noise. Díaz et al. (2024) found that traveling green sea turtles increased vigilance with increasing vessel noise. However, those resting on the seabed did not exhibit increased vigilance, suggesting that sea turtles may also respond differently when in different behavioral states.

Current evidence indicates that sea turtles respond to vessel noise at very close ranges, making population-level impacts unlikely. Therefore, the noise from vessels is not likely to affect sea turtles at further distances, and if a sea turtle hears a vessel nearby or sees it as it approaches, they would likely avoid it. If sea turtles were to have a response from the vessel noise exposure, the available literature on sea turtle response from vessel noise suggests their responses are limited to temporary non-injurious changes in behavior and only endured while the vessel transits through the area where the sea turtle encountered it. Therefore, impacts to sea turtles from vessel noise exposure are expected to be insignificant (i.e., minor and temporary effects that cannot be meaningfully evaluated).

Geotechnical Survey Noise

Geotechnical surveys (vibracores, piston cores, gravity cores) related to the Proposed Action are typically numerous, but very brief, sampling activities that introduce relatively low levels of sound into the environment. General vessel noise is produced from vessel engines and dynamic positioning to keep the vessel stationary while equipment is deployed, and sampling conducted. Dynamically positioned (DP) systems produce continuous noise, but unlike transiting vessels, this source is usually stationary. DP systems use propellers and thrusters for station-keeping (e.g., holding station over a specific seafloor location), docking, and other precise maneuvering during operations. DP uses input from gyrocompasses, motion sensors, Global Positioning System (GPS), active acoustic positioning systems, and wind sensors to determine relative movement and the environmental forces at work. Most of the noise generated by DP systems (low frequency and high amplitude) comes from the vessel thrusters. As with propulsion, source levels during the use of DP vary greatly based on size and type of vessel, type of thruster, and operational conditions including both weather and oceanographic conditions. DP systems typically do not have a high peak sound pressure and rapid rise time compared to impulsive sounds but can still produce significant acoustic energy, most of which is below 1,000 Hz, with tones related to engine and propeller size and type (National Institute for Occupational Safety and Health 1998; Acoustical Society of America 2008). The sound can also vary directionally, and this directionality is much more pronounced at higher frequencies. Because this is a dynamic operation, the sound levels produced will vary based on the specific operation, the exact system used (e.g., jet or propeller rotation, versus a rudder or steering mechanism), and factors such as the blade rate, blade pitch and cavitation, and material condition of the system.

Representative sound field measurements from the use of DP are difficult to obtain because the sound transmitted is often highly directional and context specific. The direction of sound propagation may change as different DP needs requiring different configurations are applied. Vessel noise can potentially mask vocalizations and other biologically important sounds (e.g., sounds of prey or predators) that marine mammals rely on. Potential masking can vary depending on the ambient noise level within the environment, the received level and frequency of the vessel noise, and the received level and frequency of the sound of biological interest. In the open ocean, ambient noise levels are between about 60 and 80 dB re 1 μPa in the band between 10 Hz and 10 kHz due to a combination of natural (e.g., wind) and anthropogenic sources (Urick 1983), while inshore noise levels, especially around busy ports, can exceed 120 dB re 1 μPa. When the noise level is above the sound of interest, and in a similar frequency band, masking could occur. This analysis assumes that any sound that is above ambient noise levels and within an animal's hearing range may potentially cause masking. However, the degree of masking increases with increasing noise levels; a noise that is just detectable over ambient levels is unlikely to cause any substantial masking.

Recent analyses of the potential impacts to protected species exposed to noise generated during geotechnical survey activities determined that effects to protected species from exposure to this noise source are extremely unlikely to occur (NMFS 2021a). Hence, we expect impacts associated with geotechnical survey noise as part of the Proposed Action to be discountable.

Aircraft Traffic Noise

Other than vessels, aircraft are an alternative means of crew transport, and aerial scientific surveys may be proposed by lessees. Aircraft noise has the potential to propagate underwater at levels that could be detected by marine mammals, sea turtles and fish. Air-to-water transmission depends on 1) the receiver depth, and 2) the altitude, aspect, and strength of the source (Richardson et al. 1995). The angle of incidence at the water surface, water depth, and bottom conditions also strongly influence the propagation and levels of underwater sound from passing aircraft; propagation is attenuated in shallow water, especially when the bottom is reflective (Richardson et al. 1995).

For this Proposed Action, aircraft operations, if any, are expected to occur at or above typical transit altitudes for crew transport, which are generally at or above 1,000 ft Above Ground Level (AGL), except during takeoff and landing. The use of helicopters is not anticipated, but if required, would be likely limited to similar or greater altitudes. Drones (unoccupied aerial systems) are not expected to be used, and if deployed, would be small, commercial-grade units with minimal noise output (Bevan et al. 2018).

The potential for adverse effects from aircraft noise is influenced by the type of aircraft, altitude, lateral distance from animals, environmental conditions, and behavioral state and species of the animal at the time of exposure (Patenaude et al. 2002; Smultea et al. 2008; Smith et al. 2016). The literature indicates that helicopters generally produce greater acoustic effects than fixed-wing aircraft, and that behavioral responses in cetaceans and pinnipeds are more likely at lower altitudes and closer lateral distances. For example, Patenaude et al. (2002) found that cetaceans exhibited behavioral responses to aircraft flying below approximately 1,640 ft AGL, with stronger responses at lower altitudes and closer lateral distances. Sperm whales have been observed to respond to a fixed-wing aircraft circling at altitudes of 804 to 1,099 ft by ceasing forward movement and moving closer together, interpreted as an agitation or defense reaction (Smultea et al. 2008). In the same study, about 14% of bowhead whales approached during aerial surveys exhibited short-term behavioral reactions (Patenaude et al. 2002).

For pinnipeds, Born et al. (1999) found that 6% of ringed seals showed escape behavior in response to low altitude (approximately 500 ft) fixed-wing aircraft overflights, with a maximum escape response of 1,970 ft. In contrast, 50% of seals showed escape behavior in response to helicopters flying at the same altitude, with a maximum escape distance of 4,760 ft. These findings indicate a heightened response to helicopters versus fixed-wing aircraft at similar altitudes. Recent consultations in the Alaska Region have documented that flights at 1,000 ft AGL can result in take, as defined by the ESA, for ringed and bearded seals (NMFS 2020a). NMFS (2020a) further identifies that, for pinnipeds observed on land during aerial surveys, take is defined as movements of twice the animal's body length or more, changes of direction greater than 90 degrees, or retreats (flushes) to the water. For this Proposed Action, it is extremely unlikely that pinnipeds will be exposed to aircraft noise given their distribution and the geographic concentration of project activities.

The effects of underwater transmission of airborne noise from helicopters or fixed-wing aircraft are minimal and unlikely to affect marine species. Petel et al. (2006) evaluated helicopter and fixed-wing aircraft noise levels to determine potential effects to Weddell seals (*Leptonychotes weddellii*). They determined that in-water transmission of sound was greatest when aircraft landings and takeoffs took place on surface ice. Underwater transmission was otherwise inaudible or barely audible. Above the water's surface, airborne sound was more substantial and could be heard from aircraft traveling at altitudes up to 914 m (3,000 ft). Marine mammals may also react to the visually observable presence of an aircraft; however, large whales spend the majority of their time foraging and traveling underwater and therefore should not be significantly affected by helicopter activity overhead. If they are disturbed, they are likely to dive but not in a way that would significantly affect their behavior.

Sea turtles may also respond to aircraft overflights. Based on sea turtle sensory biology (U.S. Navy Marine Mammal Program 2017; NMFS 2021a; Accomando et al. 2025), sound from low flying aircraft could be heard by sea turtles that are at or near the surface. Turtles might also detect low flying aircraft via visual cues such as the aircraft's shadow. Auditory response testing by Moein et al. (1993) showed sound-induced swimming and sound-induced head movements in most, but not all Atlantic Loggerhead test subjects. In a study of responses to unoccupied aerial systems (UASs or drones), Bevan et al. (2018) studied behaviors of three species of sea turtle, including green turtles, flatback turtles (*Natator depressus*), and hawksbill turtles (*Eretmochelys imbricata*), to a small commercially available (1.4 kg) multirotor drone. Juvenile green and hawksbill turtles foraging on shallow algae-covered reefs in nearshore waters off nesting beaches or in foraging habitats exhibited no evasive behaviors (e.g., rapid diving) in response to the drone at or above 20–30 m altitude, and at or above 10 m altitude, respectively. Thus, although some behavioral changes of turtles may occur from aircraft, we expect those changes to be minor and temporary (i.e., insignificant).

Sound produced from aircrafts may impact ESA-listed species. If there are any behavioral responses from individuals exposed to sound produced from aircraft, at most those would likely constitute a short-term disturbance, and individuals would be expected to resume their behaviors and activities. Moreover, due to the relatively low numbers of aerial surveys expected in addition to the temporary duration of the aerial survey activity, BOEM expects sound effects from aerial surveys, if any, would be minor and temporary, thus insignificant.

Conclusion on Effects from Sound Sources

Although there are several sound sources added to the Action Area as part of the Proposed Action (e.g., sounds from geotechnical surveys, vessel noise, etc.), as described above, these sources are all insignificant to ESA-listed species. Therefore, sound impacts from the Proposed Action **may affect but** are **not likely to adversely affect** (NLAA) ESA-listed species. As stated above, if lessees propose to use, equipment not described in the Proposed Action and/or exceeds impacts covered by this analysis, BOEM will not permit the activity or use of equipment, and consultation with NMFS would be reinitiated.

5.2 Allisions and Vessel Collisions

There is some risk of allisions with buoys for marine mammals and sea turtles. However, through U.S. Coast Guard (USCG) Private Aids to Navigation requirements and aerial surveys (if necessary) would not be conducted during periods of reduced visibility conditions, as flying at low elevations could pose a safety risk during storms, we anticipate that occurrence of allisions would be extremely unlikely. Thus, we anticipate effects of marine mammals and sea turtles from allision with buoys is discountable.

Vessel collisions represent a key hazard to marine mammals (Rockwood et al. 2017; Byrnes and Dunn 2020; Carretta et al. 2025). Marine mammals are more likely to be struck by a vessel that is large (i.e., 80 m [262.5 ft] 34 or longer) or traveling at high speed (Laist et al. 2001; Hazel et al. 2007; Vanderlaan and Taggart 2007; Conn and Silber 2013). Although collisions most frequently involve larger marine mammals, smaller species have also been reported (Van Waerebeek et al. 2007). However, these smaller species tend to be more agile swimmers and more capable of avoiding collisions with oncoming vessels. Rockwood et al. (2020) demonstrated that implementing speed reduction measures decreased the whale ship strike mortalities on the U.S. West Coast. Vessel strikes also pose a threat to the West Pacific population of leatherback sea turtles that are known to be around the Action Area. Of leatherback strandings documented in central California between 1981 and 2016, 11 were determined to be the result of vessel strikes (7.3% of total; NMFS and FWS 2020a). However, information on leatherback vessel strikes for other locations is not available (NMFS and FWS 2020a). Green turtles have been documented as being hit by boats in Guam (Seminoff et al. 2015). In May 2012, one stranded green turtle with evidence of being hit by a vessel washed ashore east of Kil Wharf on Naval Base Guam. Another green turtle that stranded dead at Uniform Wharf at Naval Base Guam in September 2011 had a gash on the carapace that may have been a vessel strike (Seminoff et al. 2015). Additionally, Summers et al. (2018) documented stranding of sea turtles between 2005 through 2016 on Saipan and Tinian, CNMI, and of the 89 strandings, two green turtles were documented to have boat strike injuries.

The number of vessel trips for surveys within the Proposed Action Area for both lease areas is a conservative estimate (**Tables 9 and 10**), meaning that BOEM estimated a higher number of trips than are likely to occur. As stated in **Appendix B**, vessel speeds must be reduced to 10 kn or less when mother-calf pairs, pods, or large assemblages (greater than three) of any marine mammal are observed near a vessel, whether in a lease area or traveling between a port to the lease area. Operators shall be particularly vigilant to watch for turtles at or near the surface in areas of known or suspected turtle activity, and if practicable, reduce vessel speed to 5 kn or less. These BMPs for Vessel Strike Avoidance and Injured/Dead Protected Species Reporting (**Appendix B**) will minimize the risk of vessel strikes to ESA-listed species. Additionally, wherever available, lessees will be required to ensure all vessel operators check for daily information regarding ESA-listed species sighting locations. These media could include, but are not limited to Channel 16 broadcasts, whalesafe.com, and the Whale/Ocean Alert App. BMPs align with recommended types of enhanced conservation measures to decrease ship strike mortality (Rockwood et al. 2017).

Although the project-related vessel traffic would increase the overall vessel traffic and risk of collision with ESA-listed species in the Action Area, BMPs and reporting requirements in place would minimize risks to ESA-listed species. Thus, BOEM anticipates that the effects to ESA-listed species from vessel collision would be discountable. Therefore, potential effects from allisions and with buoys and vessel collision from to the Proposed Action **may affect but are not likely to adversely affect** (NLAA) ESA-listed species.

5.3 Entanglement and Entrapment

Most entanglements are never observed, and confirmed entanglements underestimate the true number of entangled whales, as many entangled whales go undetected (e.g., not observed while entangled and die at sea; NMFS 2024e). However, there are reports of large whales (including humpback, right, and fin whales) interacting with commercial or recreational fishing gear (e.g., buoys with identifiable marks, traps, nets and monofilament line), anchor moorings of yachts and other vessels, towing small yachts from their moorings or becoming entangled in anchor chains, sometimes with lethal consequences (Blue Water Sailing 2012; Love 2013; Saez et al. 2020; NMFS 2024e).

Meteorological anchoring buoys will be used as part of the Proposed Action. A line connects the buoy to the anchor, which is comprised of materials including chain, jacketed wire, nylon rope, polypropylene rope, and subsurface floats (used to keep the mooring line taut to semi-taut, reduce slack, and eliminate looping). The Proposed Action also includes the use of HRG survey equipment, which includes lines that pose an entanglement risk, including deep tow lines (**Chapter 2**, **Tables 2 and 3**). BOEM will work with lessees and requires the use of the best available mooring systems, using the shortest practicable line lengths, anchors, chain, cable, or coated rope systems, to prevent and/or reduce potential entanglement of marine mammals and sea turtles. BOEM reviews each buoy design and methods for use of HRG survey equipment to ensure that reasonable low risk designs are used. Although there are potential impacts to marine mammal and sea turtle species from entanglement related to buoys and lines associated with meteorological anchoring and the HRG survey equipment, the use of these types of equipment is temporary and considering the use of BMPs, the effects, if any, would be temporary and minimal. Thus, the entanglement effects from using these types of equipment are expected to be insignificant.

Lost or derelict fishing gear could become entangled in the meteorological buoy lines and present an entanglement risk to ESA-listed species. From 1982 to 2017, direct entanglements in fishing gear were most attributed to unidentifiable gear, netting, and pot/traps (Saez et al. 2020). Changes in gillnet fishing regulations helped address the 1980s increase, which was primarily gray whales entangled with gillnets (Saez et al. 2020). Of the 89 sea turtle stranding cases documented between 2005 and 2016 in Saipan and Tinia, CNMI, one hawksbill and one olive ridley turtle were entangled in marine debris (Summers et al. 2018); however, due to the BMPs in place (**Appendix B**), likelihood of entanglement related to buoy deployment and operations is expected to be extremely unlikely and is therefore discountable.

Moon pool usage presents a potential for marine mammals and sea turtles to become entrapped. Moon pools may be used in the Action Area to deploy and/or retrieve equipment (e.g., ROVs, AUVs). Although four instances of sea turtle entrapment (two loggerhead and two leatherback turtles) in moon pools have been documented aboard vessels operating in the Gulf of America, with all animals released alive (NMFS 2020b), we anticipate that the risk of moon pool entrapment for the Proposed Action will be extremely low because the intensity of survey activity in the Gulf of America (NMFS 2020b; NMFS and FWS 2020b) where the entrapment occurred greatly exceed those of the Proposed Action. Moreover, there is no known record of entrapment of ESA-listed species in the moon pools in the Pacific. We also have BMPs in place that minimize risks including protocols for monitoring for the presence of ESA-listed species, limiting the amount of time that moon pool doors are left open when ESA-listed species may be present. Given the lower intensity of survey activity in the Action Area compared with the Gulf of America, no known cases of entrapment in the Pacific, and implementation of the BMPs, BOEM believes entrapment of ESA-listed species within moon pools is extremely unlikely to occur and is therefore discountable.

As discussed above, the low likelihood of entanglement/entrapment and having BMPs in place, we conclude the risk of ESA-listed species becoming entangled/entrapped is either insignificant or discountable. Thus, we anticipate that the Proposed Action **may affect but is not likely to adversely affect** (NLAA) ESA-listed species.

5.4 Disturbance to Feeding or Modified Prey Abundance

Ports in Hawai'i and the U.S. West Coast may be used by vessels transiting to CNMI, but this Proposed Action only adds a small amount of vessel activity to the existing vessel traffic in Hawai'i and the West Coast. Although feeding behavior or prey abundance may be impacted by the additional vessel traffic in Hawai'i and/or the West Coast, the effect would be insignificant relative to the existing levels of vessel activity in these locations.

Green and hawksbill turtles possibly feed in and around the CNMI waters within the Action Area where most of the Proposed Action of survey activities will occur (NMFS and FWS 2013; Becker et al. 2019; Murakawa et al. 2024). Leatherbacks, olive ridleys, and loggerheads may also feed in this area (Conant et al. 2009; NMFS and FWS 2014; 2020a). Marine mammal species may also use this area for feeding. Prey types vary by species, but they include jellyfish, crabs, mollusks, and fish for sea turtles and fish, invertebrates and plankton for marine mammals.

The vessel traffic associated with the Proposed Action may disrupt the feeding behavior of marine mammals and sea turtles. If the Proposed Action occurs while the sea turtles and marine mammals are feeding, they may avoid the area and miss an opportunity to consume their prey. Moreover, prey may be impacted by the Proposed Action. For instance, survey activities may push the prey to go elsewhere. If the prey of sea turtles and marine mammals were no longer available, marine mammals and sea turtles would also miss an opportunity to feed. Decreased amount of prey consumption in either scenario would lead to decreased calorie intake. If this persists, the marine mammals and sea turtles would experience decreased levels of adipose tissue. Two possible pathways can occur thereafter. First path is emaciation leading to decreased energy availability for breeding (i.e., decreased reproductive success) which then results in decreased population levels. The second pathway from emaciation leading to increased vulnerability to disease (i.e., decrease immune system) which could result in higher likelihood of animals resulting injury and/or mortality including stranding/mortality events.

Above scenarios may occur if the decreased prey quantity persists. However, the Proposed Action is temporary and changes in prey abundance/availability and prolonged disturbance to the feeding behavior are not expected (i.e., minor effects, if any). Although impacts from decreased prey availability and disturbance to feeding grounds may affect marine mammals and sea turtles, especially if the Proposed Action occurs in the marine mammal BIAs, the Proposed Action would be temporary and insignificant to marine mammals and sea turtles. Thus, BOEM believes that the Proposed Action **may affect but is not likely to adversely affect** (NLAA) feeding behavior and feeding availability for marine mammals and sea turtles.

5.5 Habitat Disturbance

Several sea turtles are known to be present in and around the Action Area where most of the surveys are expected to take place within the CNMI waters. For example, green turtles have been documented from aerial surveys demonstrating their in-water population around Guam and juvenile green turtles the Mariana Archipelago (Seminoff et al. 2015). Both green and hawkbill turtles are also known to be nesting in Guam and CNMI (NMFS and FWS 2013; Seminoff et al. 2015). Survey vessels are anticipated to transit from a shore base to offshore to conduct various Proposed Actions. The vessel routes used for the Proposed

Action are the same as the established vessels paths, and it is not anticipated that sea turtles would use those areas for nesting. In addition, noise generated from the survey vessels and equipment would typically dissipate prior to reaching the coastline and the nesting habitats of sea turtles. Although nesting and breeding behavior could be impacted from the Proposed Action, vessel paths would not be close to the nesting areas and breeding turtles would unlikely be disrupted by the vessels transiting in the already existing vessel paths. Thus, BOEM anticipates that the nesting and breeding effects, if any, would be minor and temporary and thus insignificant.

Habitat where sea turtles and marine mammals use for feeding and migration may be affected by the Proposed Action, especially in the CNMI water where most of the Proposed Action will be occurring. Breeding of humpback whales is known to occur (Hill et al. 2020a) and breeding of other marine mammals and sea turtles may also be occurring in the Action Area, particularly in areas where the survey activities will be taking place. However, BMPs are designed to reduce risks to marine mammals and sea turtles (**Appendix B**); thus, potential impacts to feeding, migrating, and breeding sea turtles/marine mammals, if any, are expected to be temporary and minimal, thus insignificant.

If equipment is lost, grapnel lines (e.g., hooks, trawls) may be used to retrieve them and bottom disturbance could result from dragging the line along the bottom until it hooks the lost equipment. In addition, after the line catches the lost equipment, components are dragged along the seafloor until recovery which may result in additional bottom disturbance. For example, a broken vibracore rod that cannot be retrieved needs to be cut and capped 1–2 m below the seafloor. However, if equipment is lost, BOEM would work with the lessee/operator to ensure the process minimizes the risk to ESA-listed species and CH. Thus, we anticipate that the habitat disturbance, if any, would be temporary and minor because BOEM would work with the lessees/operators to minimize risks to ESA-listed species that may result from bottom disturbance. Considering the low likelihood of losing gear and authority of BOEM to require removal if it occurred, any effects would be minor and temporary. Thus, we anticipate that effects to ESA-listed species from retrieving lost equipment would be insignificant.

Ports in Hawai'i and the West Coast may be used to transport the vessel to CNMI, but only the existing ports will be used. Although habitat disturbance may occur from vessel traffic, especially in the BIAs of marine mammals, vessel numbers included in the Proposed Action are minimal (two with a maximal statistical potential of five per lease) and effects from vessel traffic, if any, are expected to be minor and temporary. Thus, we expect insignificant impacts from vessel traffic to habitat of marine mammals and sea turtles in these two locations.

Thus, the Proposed Action is anticipated to have insignificant effects to marine mammals and sea turtles with regards to their migration/breeding/feeding behavior. Additionally, retrieving lost equipment may have insignificant effects to marine mammals/sea turtles. Therefore, BOEM believes that the Proposed Action **may affect but is not likely to adversely affect** (NLAA) habitat of feeding/migrating/breeding marine mammals and sea turtles.

5.6 Accidental Release of Pollutants and Marine Debris

The Proposed Action may generate trash comprised of paper, plastic, wood, glass, and metal. Records of interactions between anthropogenic marine debris and wildlife have been increasing rapidly in recent decades and are a cumulative source of impacts on ESA-listed species and other marine life. In the marine environment alone, the number of species reported to be affected by debris increased by more than 159% during 1995–2015 (Fossi et al. 2018). Sea turtles and marine mammals are reported to be ingesting large amounts of debris worldwide (Schuyler et al. 2013; Murphy et al. 2025). However, companies operating offshore have developed and implemented trash and debris reduction and improved handling practices to reduce the amount of offshore trash that could potentially be lost into the marine environment. In addition, all authorizations for shipboard surveys would include guidance for marine debris awareness. The guidance would be similar to the Bureau of Safety and Environmental Enforcement's (BSEE's) Notice to Lessees (NTL) No. 2015-G03 ("Marine Trash and Debris Awareness and Elimination") or any NTL that supersedes this NTL. Moreover, lessees are prohibited from deliberately discharging containers and other similar materials (i.e., trash and debris) into the marine environment (30 C.F.R. 250.300(a) and (b)(6)) and are required to make durable identification markings on equipment, tools, containers (especially drums), and other material (30 C.F.R. 250.300(c)). The intentional jettisoning of trash has been the subject of strict laws such as the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including USCG and the Environmental Protection Agency. BOEM also requires that operators ensure that all offshore employees and those contractors actively engaged in their offshore operations complete awareness training that includes viewing a training video or slide show (specific options are outlined in the NTL). Although the likelihood of producing debris from the Proposed Action would be extremely unlikely, if it occurred, the amount of trash and debris dumped offshore would be expected to be minimal and temporary. Although marine debris could pose a risk to marine mammals and sea turtles through entanglement and ingestion, due to the extremely unlikelihood of producing trash and debris, placement of BMP and BSEE's guidance (including continued training and awareness of marine debris and its impacts) as well as minimal and temporary effects if it were to occur, the overall effects to marine mammals and sea turtles from trash and debris are expected to be insignificant.

If equipment is lost, BOEM is required to work with the lessee/operator to ensure an effective retrieval process. Selection of a mitigation strategy would depend on the nature of the lost equipment, and further consultation with stakeholders could be necessary. Potential impacts associated with recovery of lost survey equipment could include vessel trips, noise and lighting, air emissions, and routine vessel discharges from a single vessel. However, we anticipate that these impacts, if any, would be temporary and minor because BOEM would work with the lessees/operators to ensure procedures will result in no or minimal risk to ESA-listed species. Considering the low likelihood of losing equipment and that any effects would be minor and temporary, we anticipate that effects to ESA-listed species from retrieving lost equipment would be insignificant.

An accidental incident could result in release of fuel or diesel by a survey vessel used as part of the Proposed Action. BOEM used NOAA's Automated Data Inquiry for Oil Spills to predict dissipation of a maximum spill of 2,500 barrels, a spill far greater than what is assumed as a non-routine event during the Proposed Action. Results of the modeling analysis showed that dissipation of spilled diesel fuel is rapid. The amount of time it took to reach diesel fuel concentrations of less than 0.05% varied between 0.5 and 2.5 days, depending on ambient wind direction and speed (Tetra Tech Inc. 2015), suggesting that 88 gallons would reach similar concentrations faster and limit the potential environmental impact. Modern meteorological buoys do not use petroleum, further reducing the possibility of a spill. Any vessels used to conduct survey activities would be required to comply with USCG spill prevention requirements and follow 33 CFR Parts 151, 154, and 155, which contain guidelines for spill response plans and shipboard oil pollution emergency plans. Further, a spill would be expected to dissipate rapidly and then evaporate and biodegrade within a day or two, limiting the potential impacts to a localized area for a short duration. Marine mammals and sea turtles are susceptible to oiling impacts because 1) they breathe at the surface of the water, and if oil is present, they can inhale oil and its vapors into their lungs; 2) they can also be exposed to oil and its components by ingesting oiled prey; 3) breeding can be disturbed if sea turtle nests or breeding ground(s) for marine mammals are oiled; and 4) sufficient exposure to oil can lead to mortality events (Frasier et al. 2020). However, modeling demonstrated that dissipation of spilled diesel fuel is rapid and would be a temporary event in a small area if it occurred, meteorological buoys not using petroleum limiting exposure, and compliance with USCG spill prevention would limit impacts from spill events. Due to the extremely unlikely occurrence of oil spill incidents, we expect that effects to marine mammals and sea turtles from an accidental fuel or diesel spill would be discountable.

In summary, Proposed Action could lead to an accidental fuel or diesel spill as well as produce marine debris (including lost equipment). However, effects from these incidents are either insignificant or discountable to marine mammals and sea turtles as discussed above. Therefore, BOEM believes that the Proposed Action associated with producing marine debris and accidental spills **may affect but is not likely to adversely affect** (NLAA) marine mammals and sea turtles.

5.7 Impacts to Fishes and Invertebrates

5.7.1 Introduction

This section evaluates the potential impacts of the Proposed Action, including all preliminary activities and associated vessel operations, on ESA-listed fish and invertebrate species and their habitats. The analysis is based on the best available scientific information, incorporates enforceable BMPs, and is structured to address each impact-producing factor (IPF) identified as relevant to listed fish species.

5.7.2 Regulatory and Biological Context

The Action Area encompasses deep oceanic habitats (1,400–6,000 m) offshore the CNMI, as well as vessel transit corridors through the U.S. West Coast and Hawaiian EEZs. Listed fish and invertebrate species potentially present include giant manta ray (*Mobula birostris*), Indo-West Pacific DPS and Eastern Pacific DPS of scalloped hammerhead shark (*Sphyrna lewini*), oceanic whitetip shark (*Carcharhinus longimanus*), green sturgeon (*Acipenser medirostris*), eulachon (*Thaleichthys pacificus*), multiple salmonid ESUs/DPSs, black and white abalone (*Haliotis spp*.), sunflower sea star (*Pycnopodia helianthoides*), one coral (*Acropora globiceps*), and several giant clam species (*Hippopus hippopus, Tridacna* spp.).

The Proposed Action is limited to preliminary activities (bathymetric, geophysical, and mapping surveys; seafloor sampling; mooring and lander deployment; vessel operations) and does not include commercial-scale mining. As in the above section regarding effects to marine mammals and sea turtles, if leases or grants are issued, BOEM will require the lessee to comply with BMPs through lease stipulations to minimize potential impacts to ESA-listed species These BMPs, which minimize or eliminate potential effects from preliminary activities to ESA-listed species are described in **Appendix B**.

5.7.3 IPFs and Analysis

5.7.3.1 Habitat Disturbance

Nature of Impact
Direct disturbance to benthic habitats will occur from the deployment of box cores, free-fall grabs, landers, moorings, and UTP units. For six leases, the aggregate seafloor disturbance is estimated at ~18,879 m², concentrated at depths of 1,400–6,000 m (**Tables 4 through 8**). This is a very small fraction of the total lease area and is well below the depth range of listed species.

Biological Consequences
Habitat disturbance may have indirect effects to listed species. Localized removal or compaction of

sediments and nodules may cause mortality of infauna and epifauna, including rare or slow-growing taxa (Simon-Lledó et al. 2019). Sessile megafauna and microbial assemblages may require decades to recover from disturbance (Vonnahme et al. 2020). However, the spatial scale of disturbance is orders of magnitude too small to generate population-level effects or compromise regional ecosystem integrity (i.e., insignificant effects). Sensitive habitats (e.g., deep-sea coral and sponge aggregations, seamounts) will be avoided through pre-survey planning and BMPs (**Appendix B).**

Conclusion
Habitat disturbance is considered insignificant for listed fish and invertebrate species given the limited spatial extent, avoidance of sensitive habitats, and enforceable BMPs.

5.7.3.2 Sediment Resuspension and Turbidity

Nature of Impact
Sediment resuspension will occur where box cores, free-fall grabs, landers, and moorings contact the seabed, temporarily increasing near-bottom turbidity. *In situ* studies show that most disturbed sediment remains within 2 m of the seabed and redeposits locally (Muñoz-Royo et al. 2022).

Biological Consequences
Elevated suspended sediment can affect filter feeders and visual predators, but the magnitude and duration of plumes from preliminary activities are insufficient to affect pelagic species occupying the upper water column (Wilber and Clarke 2001; van der Grient and Drazen 2022). Fine-particle deposition could impair filter feeders if work occurred directly atop sensitive coral or sponge communities, but survey design and BMPs require avoidance of such habitats (**Appendix B**).

Conclusion
Sediment resuspension and turbidity effects, if any, are minor and temporary and thus are insignificant to listed species.

5.7.3.3 FAD Effect

Nature of Impact
Surface buoys and moored structures may function as incidental FADs, temporarily aggregating pelagic fishes in the upper water column. Studies indicate that floating objects can alter fish movement and residency, but the effect is localized and short term, with residence times typically ranging from hours to days (Dempster and Taquet 2005; Robert et al. 2013).

Biological Consequences
The Proposed Action involves at most 12 surface buoys, with most moorings subsurface and less visible. No directed fishing is associated with these buoys, and the spatial and temporal footprint is minimal. While FADs can alter local predator-prey dynamics and increase vulnerability to fishing, the absence of associated fishing effort and the limited number of buoys make the effect insignificant (Morgan 2011).

Conclusion
The FAD effect is considered insignificant for listed species.

5.7.3.4 Entanglement

Nature of Impact
Lines, chains, and ancillary attachments used for moorings and equipment deployment pose a limited entanglement hazard to large fishes, such as mobulid rays and sharks. Documented cases of manta ray

entanglement in mooring lines highlight the risk (Hilbourne and Stevens 2023). For sharks, large-scale entanglement has been associated with net-based drifting FADs rather than taut mooring lines (Filmalter et al. 2013).

Biological Consequences
The Proposed Action differs from fisheries FAD deployments: moorings are few, deep, taut, and lack netting. BMPs require the shortest practicable line lengths, rigid sleeves or weak links, and real-time monitoring during deployment and retrieval (**Appendix B**). These measures align with international best practices and have been shown to reduce entanglement risk (Murua et al. 2016; Grande et al. 2025).

Conclusion
Incident of entanglement is extremely unlikely due to the BMPs in place; thus, effects from entanglement are discountable.

5.7.3.5 Marine Debris

Nature of Impact
Accidental loss of small components during deployment, operation, or retrieval of equipment could introduce marine debris, posing entanglement or ingestion risks to fishes and invertebrates (Cole et al. 2013; Kühn et al. 2015).

Biological Consequences
The Proposed Action incorporates stringent BMPs: annual training, gear labeling, immediate recovery efforts, and reporting requirements (**Appendix B**). The operational context (deep, remote waters, few moorings, and defined retrieval procedures) further limits debris inputs. Any effects, if any, would be rare, minimal, localized, and short-lived (i.e., insignificant).

Conclusion
Marine debris effects are insignificant for listed species.

5.7.3.6 Noise

Nature of Impact
Underwater sound from vessels, HRG systems, and AUV/ROV operations is limited to high-frequency, directional sources classified as *de minimis* (Ruppel et al. 2022). Fishes primarily detect particle motion, and most project equipment operates above the hearing range of many EFH species (Popper and Fay 2011; Popper et al. 2014). Noise associated with aircraft may also affect listed fish and invertebrates.

Biological Consequences
Vessel noise may cause stress or affect fish behavior by causing them to startle, swim away from an occupied area, change swimming direction and speed, or alter schooling behavior (Engås et al. 1995; Engås et al. 1998; Mitson and Knudsen 2003). Physiological responses have also been documented for fish exposed to increased boat noise. Nichols et al. (2015) demonstrated acute physiological stress effects from increased noise (playback of boat noise) on coastal giant kelpfish. Other studies have also shown exposure to continuous or chronic vessel noise may elicit stress responses indicated by increased cortisol levels (Scholik and Yan 2001; Wysocki et al. 2006). Because of the characteristics of vessel noise, sound produced from vessels is unlikely to result in direct injury, hearing impairment, or other trauma to ESA-listed fish. In the near field, fish are able to detect water motion as well as visually locate an oncoming vessel. In these cases, most fishes located in close proximity that detect the vessel either visually, via sound and motion in the water would be capable of avoiding the vessel or move away

from the area affected by vessel sound. Thus, fish are more likely to react to vessel noise at close range than to vessel noise emanating from a greater distance away. Auditory masking due to vessel noise can potentially mask biologically important sounds that fish may rely on. However, vessel noise is predominantly low frequency, and the incremental contribution from project vessels is small relative to existing traffic (McKenna et al. 2012b). BMPs require slow speeds, routing awareness, and monitoring, further reducing risk (**Appendix B**). Due to a small number of vessels resulting in minimal contribution of vessel noise from the Proposed Action, we expect that the impacts, if any, would be minor and temporary (i.e., insignificant), and that such responses would not be expected to compromise the general health or condition of individual fish.

Very little information is available about fish responses to aircraft. One study found substantial effects from a sonic boom above a fish hatchery (Gladwin et al. 1988), but routine overflights are highly unlikely to elicit a similar response. Fish are more likely to respond to an aerial predator with short-term evasive movements. For instance, in response to a passing helicopter shadow, fish may dive or change direction. This type of response is within the normal pattern of fish behavior and is unlikely to cause unusual or severe stress response (i.e., insignificant effects).

As described in Section 5.1, Ruppel et al. (2022) categorize marine acoustic sources into four tiers to support regulatory evaluation (**Table 15**). Tier 4 includes most high-resolution geophysical, oceanographic, and communication/tracking sources, which are considered de minimis because they are unlikely to result in incidental take of ESA-listed species. All acoustic sources proposed under this action fall within this de minimis category. These types of equipment are not expected to injure or disturb fish, and no mitigation measures are required.

Some MBES and sub-bottom profiler systems may cause acoustic injury and/or disturbance when operated at certain source levels, frequencies, directionalities, beamwidths, tow depths, or pulse repetition rates. Therefore, lessees must submit detailed information on the planned equipment types, settings, and survey methods to BOEM at least 30 days prior to use. BOEM will review this information to confirm that the proposed sources meet the de minimis criteria in Ruppel et al. (2022) and the ONMP.

If a lessee proposes equipment or technology not explicitly described in the Proposed Action, BOEM may approve its use without reinitiating consultation with NMFS provided that BOEM determines the potential effects do not exceed those analyzed in this BA. If the proposed equipment would exceed the impact levels assessed here, BOEM would initiate consultation with NMFS before approving its use.

Because invertebrate species lack gas-filled structures within their bodies, they are less sensitive to anthropogenic noise sources compared to fishes, although many taxa appear to have morphological structures (e.g., hair cells) that can be sensitive to particle motion (Popper and Hawkins 2018). A recent review indicates that some invertebrates change their behavior when exposed to chronic shipping noise (Murchy et al. 2019). Much more research needs to be done to determine if such behavior changes translate into population-level effects. The low levels of expected anthropogenic noise are not known to permanently alter characteristics of pelagic or benthic habitats. Due to the shallow distribution of listed invertebrate species, they will be minimally exposed to noise from HRG surveys, buoy installation and retrieval, and geological and/or biological collections, and thus will have no effect on listed species.

Conclusion

Overall, the level of disturbance from noise associated with vessels and aircrafts to fish is insignificant. Moreover, survey equipment used under the Proposed Action are all under Tier 4 (i.e., *de minimis* category); thus, impacts from use of survey equipment would be insignificant to ESA-listed fish. For invertebrates, we expect no effects from the Proposed Action due to their lower sensitivity to noise compared to fish.

5.7.3.7 Artificial Light

Nature of Impact
Artificial light from vessels, AUVs, ROVs and equipment may disrupt diel vertical migration of zooplankton and micronekton, potentially altering predator-prey dynamics (Berge et al. 2020; Marangoni et al. 2022). Many zooplankton and micronekton migrate nightly to feed in surface waters and return to depth during the day. Artificial light can suppress this behavior, altering predator-prey dynamics and carbon flux (Berge et al. 2020; Marangoni et al. 2022).

As depth increases, the role of vision transitions from dominant (epipelagic) to highly specialized (meso- and bathypelagic) to largely diminished (abyssal habitats) (Haddock and Choy 2024). In the mesopelagic zone, visual interactions are particularly important and have driven the evolution of sensitive eyes and bioluminescent signaling. In deeper zones, the scarcity of light leads to a shift toward other sensory modalities, although bioluminescence remains a key adaptation in many midwater species. Artificial light from AUVs or ROVs may disturb visually sensitive species such as gelatinous zooplankton and deep-sea fishes.

Biological Consequences
Lighting is limited in scope and duration. The small number of illuminated assets, brief use, and deep settings ensure that any light-induced changes to pelagic habitats are short-lived and spatially limited, with no measurable impact at the regional scale (i.e., insignificant).

Conclusion
Artificial light effects are insignificant for listed species.

5.7.3.8 Electromagnetic Field (EMF) Alteration

Nature of Impact
EMF sources are limited to low-power electronics and navigation transponders. Laboratory and field studies show that behavioral responses to EMF are species- and exposure-dependent, with greatest concern focused on high-capacity transmission cables, not low-power scientific devices (Gill et al. 2014; Hutchison et al. 2020).

Biological Consequences
The Proposed Action incorporates the use of only *de minimis* equipment and require survey plan review (**Appendix B**). Any EMF-related effects would be highly localized and minor (i.e., insignificant).

Conclusion
EMF-related effects are insignificant to listed species.

5.7.3.9 Vessel Strike

Nature of Impact
Vessel strikes can affect large fishes, including sharks and rays, but the risk is minimized by slow operational speeds, low vessel density, and remote, deepwater settings (Schoeman et al. 2020; Womersley et al. 2022).

Biological Consequences
BMPs require speed limits, continuous monitoring, and avoidance protocols (**Appendix B**). Any strike-related effects on pelagic species would be highly localized and effects, if any, are expected to be minor and temporary due to the low number of vessels included in the Proposed Action. Thus, effects from vessel strike to listed species would be insignificant.

Conclusion
Effects from vessel strike are insignificant for listed species.

5.7.3.10 Oil Spills

Nature of Impact
Accidental releases of petroleum products could affect pelagic or shallow-water species sensitive to polycyclic aromatic hydrocarbons (PAHs) (Incardona et al. 2014).

Biological Consequences
The plausible spill scenario is limited to small volumes of marine diesel, which disperses rapidly. BMPs require spill prevention and response planning (**Appendix B**). Any accidental release would be short-lived, spatially constrained, and unlikely to overlap with sensitive spawning events. Therefore, effects, if any, would be brief/temporary, localized, and minor (i.e., insignificant).

Conclusion
Effect from oil spill risk is anticipated to be insignificant for listed species.

5.7.3.11 Invasive Species

Nature of Impact
The Proposed Action is expected to generate survey vessel traffic in and out of the CNMI, as well as vessel transits from Hawai'i and the U.S. West Coast. Project vessels, biofouling, and equipment transfers could accidentally introduce non-native species. However, the project will implement a biofouling-management approach consistent with International Maritime Organization (IMO) guidelines, including antifouling systems, regular inspection, and cleaning of AUVs/ROVs (Davidson et al. 2016; International Maritime Organization 2023).

Biological Consequences
In the CNMI reef ecosystems, there are a few nuisance species, such as crown-of-thorn sea stars (*Acanthaster planci*), *Drupella* snails, and *Terpios* sponges. However, their spread is mainly attributed to environmental changes rather than accidental introduction (Perez et al. 2021). There are non-native species along the U.S. West Coast, but they are generally not invasive (Zabin et al. 2018). Given the deep, remote setting, limited surface infrastructure, and enforceable BMPs for hull/equipment biofouling and debris control, the probability of successful introduction and spread of non-indigenous species is low. Any effects on EFH or Habitat Areas of Particular Concern (HAPCs), if any, would be short term, minor and localized (i.e., insignificant).

Conclusion
Invasive species risk is insignificant for listed species.

5.7.3.12 Species-Specific Considerations

Scalloped Hammerhead Shark (*Sphyrna lewini*) and Oceanic Whitetip Shark (*Carcharhinus longimanus*)

Both species are highly mobile, pelagic predators that may transit the Action Area. The primary risks are from entanglement (in mooring lines), vessel strike, and FAD effects. However, due to the limited number of moorings, deepwater setting, and BMPs in place, incidents of entanglement and vessel strike are extremely unlikely to occur and thus discountable. Due to the absence of associated fishing effort and the small number of buoys, we anticipate no effects to the FAD.

Green Sturgeon (*Acipenser medirostris*), Eulachon (*Thaleichthys pacificus*), and Salmonids

These anadromous species are present primarily in the U.S. West Coast transit corridors. The main risks are from vessel noise, strike, and invasive species. Given the limited number of vessel trips, slow speeds, and BMPs, risks are insignificant. No activities occur in freshwater or estuarine CH.

Black and White Abalone (*Haliotis spp.*), Sunflower Sea Star (*Pycnopodia helianthoides*), Coral, and Giant Clams

These taxa are primarily associated with benthic habitats that do not overlap with the proposed lease areas. The limited and highly localized nature of seafloor disturbance, avoidance of sensitive habitats, and BMPs ensure that risks are insignificant. No commercial-scale mining is authorized.

5.7.4 Cumulative and Indirect Effects

Cumulative effects from other activities (e.g., commercial fishing, shipping, potential future mineral development) are expected to be minor and temporary (i.e., insignificant) relative to the Proposed Action. The incremental contribution of the Proposed Action to overall risk to listed species is insignificant, given the deep, remote setting, limited number of assets, and robust best management practices approach in place.

5.7.5 Conclusion

Based on a comprehensive review of the Proposed Action, the best available scientific information, and the implementation of enforceable BMPs, the Proposed Action is either discountable or insignificant and thus **may affect but is not likely to adversely affect** (NLAA) listed fish and invertebrate species or their designated EFH. All potential impacts are not anticipated to have population-level or long-term effects.

5.8 Impacts to CH

Steller Sea Lion CH

Steller sealion CH have been designated (50 FR 226.202, 50 FR 30715), and the Action Area overlaps with the Steller sea lion designated CH. Project vessels could expose the aquatic and terrestrial habitats associated with the designated CH to vessel noise if those vessels transit nearby heading into or out of port. While vessel noise could potentially impact resting, foraging, and refuge features on and surrounding the islands where CH is designated within the Action Area, no ESA-listed Steller sea lions are expected to occupy any of these sites. Nonetheless, we consider the potential impacts of vessel noise on Steller sea lion behavior based on the anticipated sound exposures and acoustic disturbance distances that could occur if ESA-listed Steller sea lions were present. As none of the West Coast areas containing CH are the subject of proposed survey activities, we anticipate that acoustic exposures would occur while vessels are in transit and would thus be brief and temporary. Considering the acoustic disturbance distances for otariids (**Table 12**), Steller sea lions are either not likely to respond to this limited exposure to vessel noise that is expected to be generated by the Proposed Action or are not likely to measurably respond to it in ways that would alter or disrupt normal behavior patterns such as resting or foraging. Given that we do not anticipate that the Proposed Action could lead to measurable or meaningful effects to the physical of biological features essential to the conservation of the currently listed Steller sea lion DPS, we conclude the potential effects to designated CH within the Action Area would be insignificant. Thus, the Proposed Action **may affect but is not likely to adversely affect** (NLAA) designated CH of Steller sea lions.

Southern Resident Killer Whale CH

CH of Southern Resident killer whales was designated (79 FR 69054) off the West Coast (**Figure 11**), and, similar the Steller sea lions, only vessel transit would be occurring in this area as part of the Proposed Action. Any displacement of prey species or individuals as a result of possible limited vessel transits to and from the West Coast, as well as limited and temporary introduction of debris and contaminants, conducted as part of the Proposed Action is anticipated to be short term and temporary, and, therefore, insignificant to designated CH for the Southern Resident killer whales. Thus, the Proposed Action **may affect but is not likely to adversely affect** (NLAA) designated CH of Southern Resident killer whales.

Humpback Whale CH

Both CHs of Central America DPS and Mexico DPS of humpback whales were listed on the West Coast (86 FR 21082), and these overlap with the Action Area (**Figure 11**). Any displacement of prey species or individuals as a result of possible limited vessel transits to and from the West Coast, as well as limited and temporary introduction of debris and contaminants, conducted as part of the Proposed Action is anticipated to be short term and temporary, and, therefore, insignificant to designated CH for ESA-listed humpback whales. Thus, the Proposed Action **may affect but is not likely to adversely affect** (NLAA) designated CH of humpback killer whales.

North Pacific Right Whale CH

CH of North Pacific right whale designated in 2008 (74 FR 190000) is located in the waters of Alaska, which does not overlap with the Action Area. Thus, no effects to the CH are expected.

False Killer Whale and Hawaiian Monk Seal CH

CH of false killer whale (83 FR 35062) and Hawaiian monk seals (50 CFR 226.201) have been designated in and around the Hawaiian waters, which overlap with the Action Area (**Figure 17**). Any displacement of prey species or individuals as a result of possible limited vessel transits to and from the Hawai'I, as well as limited and temporary introduction of debris and contaminants, conducted as part of the proposed action are anticipated to be short term and temporary, and, therefore, insignificant to designated CH for false killer whales and Hawaiian monk seals. Thus, BOEM believes that the Proposed Action **may affect but is not likely to adversely affect** (NLAA) designated CH of false killer whales and Hawaiian monk seals.

Pacific Leatherback CH

The Proposed Action Area overlaps with leatherback CH (77 FR 4169; **Figure 11**). CH extends to a water depth of 80 m from the ocean surface. However, none of the activities in the Proposed Action would adversely affect the adult prey (medusa) of Pacific leatherbacks. Any displacement of prey species or individuals as a result of vessel transits to and from the West Coast to their respective and/or alternative ports or to the survey areas in the CNMI are anticipated to be short term and temporary. Given the limited extent of displacement of prey/foraging that could occur, we conclude the potential effects will be insignificant to designated CH of leatherback sea turtles. Thus, he Proposed Action **may affect but is not likely to adversely affect** (NLAA) designated CH of leatherback sea turtles.

Salmonid CH

CH for all salmonids is focused on freshwater habitats (e.g., river and stream channels and reaches, floodplains) and occasionally estuaries and not in marine ports or offshore areas included in the Action Area. Therefore, the salmonid CHs do not overlap with the Proposed Action, and **no adverse effects** are expected to salmonid CH.

Black Abalone CH

Black abalone CH has been designated (76 FR 66806) and overlaps with the Action Area. No preliminary activities would occur in black abalone CH, so potential impacts would be associated only with vessels transiting from the U.S. West Coast. Any potential impacts to CH are further limited to the risk of accidental events (i.e., introduction of non-native species, release of pollutants and marine debris) and, therefore, discountable. Thus, the Proposed Action **may affect but is not likely to adversely affect** (NLAA) designated CH of black abalone.

Coral CH

CH for *A. globiceps* has been designated (90 FR 31800, 90 FR 39339) and overlaps with the Action Area. No preliminary activities would occur in the coral CH, so potential impacts would be associated only with vessel traffic in and out of the CNMI. Any potential impacts to CH are limited to the risk of accidental events (i.e., introduction of non-native species, release of pollutants and marine debris) and, therefore, discountable. Thus, the Proposed Action **may affect but is not likely to adversely affect** (NLAA) designated CH of *A. globiceps*.

6 BA: Cumulative Effects and Conclusions for ESA-Listed Species

6.1 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the Action Area of the federal action subject to consultation [50 CFR 402.02 and 402.17(a)]. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-federal activities are reasonably certain to contribute to the overall environmental health and habitat quality within the Action Area. However, it is challenging to distinguish between the Action Area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the Action Area are described earlier **Section 3.5** (Climate Change).

We did not identify additional state or private activities that are reasonably certain to occur within the Action Area, do not involve federal activities (including permitting), and could result in cumulative effects to ESA-listed species and designated CH within the Action Area. Activities that may occur in these areas will likely consist of actions related to ocean use policy and management of public resources, However, none of these potential state, local, or private actions can be anticipated with any reasonable certainty in the Action Area at this time, and most actions in marine waters would likely involve federal involvement (e.g., permitting) of some type.

6.2 Conclusion

Due to the nature of the Proposed Action, as well as the BMPs employed as part of the Proposed Action (**Appendix B**), BOEM has determined that the impacts to ESA-listed species and their designated CH from the Proposed Action will be insignificant or discountable. Therefore, the Proposed Action may affect but is **not likely to adversely affect** (NLAA) ESA-listed species and their designated CH. **Table 16** summarizes BOEM's determinations for each of the list of ESA-listed species and designated CH evaluated in this BA. Status of the ESA listing, species and CH citations, and whether CH overlap with the Action Area or not are also included.

Table 16. Summary of BOEM's determinations for NMFS ESA-listed species and CH as *no effect* or *may affect*, but *not likely to be adversely affected* (NLAA) by the Proposed Action

N/A indicates CH was not listed as of 2025. NA indicates Not Applicable. NLAA indicates Not Likely to Be Adversely Affected.

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	Determination of Species	CH Designation	CH Overlap	Determination of CH
Blue whale	ENP, CNP	Endangered	35 FR 18319 (1970)	NLAA	N/A	NA	NA
Fin whale	CA/OR/WA, Hawai'i, Northeast Pacific	Endangered	35 FR 8491 (1970)	NLAA	N/A	NA	NA
Sei whale	ENP, Hawai'i	Endangered	35 FR 12024 (1970)	NLAA	N/A	NA	NA
Sperm whale	CA/OR/WA, Hawai'i, North Pacific	Endangered	35 FR 18319 (1970)	NLAA	N/A	NA	NA
False killer whale	MHI Insular	Endangered	77 FR 70915 (2012)	NLAA	83 FR 35062 (2018)	Yes	NLAA
Southern Resident killer whale	CA/OR/WA	Endangered	70FR69903 (2005)	NLAA	71 FR 69054 (2006), 86 FR 41668 (2021)	Yes	NLAA
North Pacific right whale	Throughout range	Endangered	35 FR 8491 (1970), 73 FR 12024 (2008)	NLAA	73 FR 19000 (2008)	No	No effect
Hawaiian monk seal	Throughout range	Endangered	41 FR 51611 (1976)	NLAA	80 FR 50925 (2015)	Yes	NLAA
Humpback whale	Mexico	Threatened	81 FR 62260 (2016). 1991 Recovery Plan	NLAA	86 FR 21082 (2021)	Yes	NLAA
Humpback whale	Central America	Endangered	81 FR 62260 (2016). 1991 Recovery Plan	NLAA	86 FR 21082 (2021)	Yes	NLAA
Humpback whale	Western North Pacific	Endangered	81 FR 62260 (2016). 1991 Recovery Plan	NLAA	86 FR 21082 (2021)	No	No effect
Gray whale	Western North Pacific	Endangered	59 FR 31094 (1994)	NLAA	N/A	NA	NA
Guadalupe fur seal	Throughout range	Threatened	50 FR 51252 (1985)	NLAA	N/A	NA	NA
Steller sea lion	Eastern	Delisted but CH still in effect	55 FR 49204 (1990), 62 FR 24345 (1997), Delisted 78 FR 66139 (2013)	NA	58 FR 45269 (1997)	Yes	NLAA
Green turtle	Central North Pacific	Threatened	43 FR 32800 (1978), 81 FR 20057 (2016)	NLAA	Proposed 88 FR 46572 (2023)	NA (i.e., proposed)	NA

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	Determination of Species	CH Designation	CH Overlap	Determination of CH
Green turtle	Central South Pacific	Endangered	43 FR 32800 (1978), 81 FR 20057 (2016)	NLAA	Proposed 88 FR 46572, July 19 (2023)	NA (i.e., proposed)	NA
Green turtle	Central West Pacific	Endangered	43 FR 32800 (1978), 81 FR 20057 (2016)	NLAA	Proposed 88 FR 46572 (2023)	NA (i.e., proposed)	NA
Green turtle	East Pacific DPS	Threatened	43 FR 32800 (1978), 81 FR 20057 (2016)	NLAA	Proposed 88 FR 4657 (2023)	NA (i.e., proposed)	NA
Green turtle	East Indian-West Pacific	Threatened	43 FR 32800 (1978), 81 FR 20057 (2016)	NLAA	Proposed 88 FR 46572 (2023)	NA (i.e., proposed)	NA
Green turtle	Southwest Pacific	Threatened	43 FR 32800 (1978), 81 FR 20057 (2016)	NLAA	Proposed 88 FR 46572 (2023)	NA (i.e., proposed)	NA
Hawksbill turtle	Throughout range	Endangered	35 FR 8491 (1970)	NLAA	63 FR 46693 (1998)	No (Puerto Rico only)	No effect
Leatherback turtle	West Pacific	Endangered	35 FR 8491 (1970)	NLAA	77 FR 4170 (2012)	Yes	NLAA
Loggerhead turtle	North Pacific	Endangered	76 FR 58868 (2011)	NLAA	N/A	NA	NA
Loggerhead turtle	South Pacific	Endangered	43 FR 32800 (1978), 76 FR 58868 (2011)	NLAA	N/A	NA	NA
Olive ridley turtle	Population other than Mexico's Pacific Coast breeding population	Threatened	43 FR 32800 (1978)	NLAA	N/A	NA	NA
Oceanic whitetip shark	Throughout range	Endangered	83 FR 4153 (2018)	NLAA	Not prudent (85 FR 12898)	NA	NA
Giant manta ray	Throughout range	Threatened	83 FR 2916 (2018), 88 FR 81351 (2023)	NLAA	Not prudent (84 FR 66652)	NA	NA
Scalloped hammerhead shark	Indo-west Pacific	Endangered	79 FR 38213 (2014)	NLAA	Not prudent (80 FR 71774)	NA	NA
Coral *Acropora globiceps*	Throughout range	Threatened	79 FR 53852 (2014)	No effect	90 FR 31800; 90 FR 39339	Yes	NLAA
Fluted giant clam	-	Proposed threatened	Proposed (89 FR 60498)	N/A	N/A	NA	NA
Horse's hoof clam	-	Proposed threatened	Proposed (89 FR 60498)	N/A	N/A	NA	NA

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	Determination of Species	CH Designation	CH Overlap	Determination of CH
Small giant clam	-	Proposed threatened	Proposed (89 FR 60498)	N/A	N/A	NA	NA
Smooth giant clam	-	Proposed endangered	Proposed (89 FR 60498)	N/A	N/A	NA	NA
True giant clam	-	Proposed endangered	Proposed (89 FR 60498)	N/A	N/A	NA	NA
Chinook salmon	Sacramento River winter-run	Endangered	Threatened 54 FR 32085 (1989), 55 FR 46515 (1990); Endangered 59 FR 440 (1994)	NLAA	58 FR 33212 (1993)	NA	NA
Chinook salmon	Central Valley spring-run	Endangered	64 FR 50394 (1999)	NLAA	70 FR 52630 (2005)	NA	NA
Chinook salmon	California Coastal	Threatened	64 FR 50394 (1999); 70 FR 37159 (2005)	NLAA	70 FR 52488 (2005)	NA	NA
Chinook salmon	Lower Columbia River	Threatened	64 FR 14308 (1999), 70 FR 37160 (2005), 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA
Chinook salmon	Upper Columbia River Spring-run	Endangered	64 FR 14308 (1999), 70 FR 37159 (2005); 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA
Chinook salmon	Snake River Fall	Threatened	57 FR 14653 (1992), 70 FR 37160 (2005), 79 FR 20802, (2014)	NLAA	58 FR 68543 (1993)	NA	NA
Chinook salmon	Snake River Spring/Summer Run	Threatened	57 FR 14653 (1992), 70 FR 37160 (2005), 79 FR 20802, (2014)	NLAA	64 FR 57399 (1999)	NA	NA
Chinook salmon	Upper Willamette River	Threatened	64 FR 14308 (1999), 70 FR 37160 (2005), 79 FR 20802 (2014)	NLAA	70 FR 52629 (2005)	NA	NA
Chinook salmon	Puget Sound	Threatened	64 FR 14308 (1999), 70 FR 37160 (2005), 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	Determination of Species	CH Designation	CH Overlap	Determination of CH
Coho salmon	Central California Coast	Endangered	Threatened 61 FR 56138 (1996); endangered 70 FR 37160 (2005), 79 FR 20802 (2014)	NLAA	64 FR 24049 (1999)	NA	NA
Coho salmon	Southern Oregon/Norther n California Coast	Threatened	62 FR 24588 (1997), 70 FR 37160 (20050), 79 FR 20802 (2014)	NLAA	64 FR 24049 (1999)	NA	NA
Coho salmon	Lower Columbia River	Threatened	70 FR 37160 (2005), 79 FR 20802 (2014)	NLAA	81 FR 9251	NA	NA
Coho salmon	Oregon Coast	Threatened	63 FR 42587 (1998), 76 FR 35755 (2011), 79 FR 20802 (2014)	NLAA	73 FR 7815 (2008)	NA	NA
Steelhead trout	California Central Valley	Threatened	62 FR 13347 (1998); 71 FR 834 (2006)	NLAA	70 FR 52630 (2005)	NA	NA
Steelhead trout	Central California Coast	Threatened	62 FR 43937 (1997), 71 FR 834 (2006), 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA
Steelhead trout	Southern California	Endangered	62 FR 43937 (1997), 71 FR 834 (2006); range extension 67 FR 21586 (2002), 79 FR 20802 (2014)	NLAA	70 FR 52536 (2005)	NA	NA
Steelhead trout	South-Central California Coast	Threatened	62 FR 43937 (1997), 71 FR 834 (2006), 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA
Steelhead trout	Northern California	Threatened	65 FR 36074 (2000); 71 FR 834 (2006); 79 FR 20802 (20140	NLAA	70 FR 52630 (2005)	NA	NA
Steelhead trout	Lower Columbia River	Threatened	63 FR 13347 (19980), 71 FR 834 (20060, 79 FR 20802 (20140	NLAA	70 FR 52630 (2005)	NA	NA
Steelhead trout	Middle Columbia River	Threatened	64 FR 14517 (1999), 71 FR 834 (2006), 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	Determination of Species	CH Designation	CH Overlap	Determination of CH
Steelhead trout	Upper Columbia River	Endangered	Endangered 62 FR 43937 (19970); reclassified to Threatened 71 FR 834 (2006) and 74 FR 42605 (2009), 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA
Steelhead trout	Puget Sound	Threatened	72 FR 26722 (2007), 79 FR 20802 (2014)	NLAA	81 FR 9252 (2016)	NA	NA
Steelhead trout	Snake River	Threatened	62 FR 43937 (1997), 71 FR 834 (2006), 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA
Steelhead trout	Upper Willamette River	Threatened	64 FR 14517 (1999), 71 FR 834 (2006), 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA
Chum salmon	Columbia River	Threatened	64 FR 14508 (1999); 70 FR 37160 (2005); 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA
Chum salmon	Hood Canal summer-run	Threatened	64 FR 14508 (1999); 70 FR 37160 (2005); 79 FR 20802 (2014)	NLAA	70 FR 52630 (2005)	NA	NA
Green sturgeon	North American Southern	Threatened	71 FR 17757 (2006)	NLAA	74 FR 52300 (2009)	Yes	NLAA
Eulachon	Pacific Southern	Threatened	75 FR 13012 (2010)	NLAA	76 FR 65324 (2011)	No	No effect
Black abalone	Throughout range	Endangered	74 FR 1937 (2009)	NLAA	76 FR 66806 (2011)	Yes	NLAA
White abalone	Throughout range	Endangered	66 FR 29046 (2001)	NLAA	Not prudent (66 FR 29046)	NA	NA
Sunflower sea star	NA	Proposed threatened	88 FR 16212 (2024)	NLAA	N/A	NA	NA

7 EFH Assessment

Prepared by the BOEM for the NMFS in accordance with the Magnuson-Stevens Fishery Conservation and Management Act, as amended in 1996

7.1 Purpose

Under Section 305 (b) (2) of the Magnuson Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.) as amended by the Sustainable Fisheries Act on October 11, 1996, federal agencies are required to consult with the Secretary of Commerce on any actions that may adversely affect EFH. On December 19, 1997, the Department of Commerce published an interim final rule (50 CFR Part 600) in the Federal Register that detailed the procedures under which federal agencies would fulfill their consultation requirements. These regulations were updated in 2002 (67 FR 2376). As set forth in the regulations, EFH Assessments must include 1) a description of the action; 2) an analysis of the potential adverse effects, including cumulative effects, of the action on EFH and managed species; 3) the federal agency's conclusions regarding the effects of the action on EFH; and 4) proposed mitigation, if applicable.

7.2 Project Description

This EFH assessment covers lease issuance and preliminary activities for CNMI Critical Minerals. Details of the Proposed Action and maps of the Action Areas are provided in **Sections 2 and 3** of this document.

7.3 EFH

EFH is defined in the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1802(10)) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The implementing regulations (50 C.F.R. Part 600, Subpart J) require that Fishery Management Plans describe, identify, and map EFH (§ 600.815(a)(1)). HAPCs are discrete subsets of EFH that meet one or more of the following criteria: they are ecologically significant, sensitive to human-induced degradation, stressed by development, or rare. Their designation under § 600.815(a)(8) does not impose additional regulatory restrictions beyond those applicable to EFH but highlights priority areas for conservation and consultation.

EFH within the Action Area will experience different IPFs depending on whether they are located within potential lease areas or transit corridors. Two fisheries managed by the WPRFMC, the Fishery Ecosystem Plan (FEP) for the Mariana Archipelago and FEP for Pacific Pelagic Fisheries of the Western Pacific Region, overlap with the potential lease areas. An additional two fisheries managed by the WPRFMC overlap with the transit corridor and include the FEP for the Hawaiian Archipelago and FEP for the Pacific Remote Island Areas. Four fisheries managed by the Pacific Fishery Management Council (PFMC) overlap with the transit corridor and include the Coastal Pelagic Species (CPS) Fishery Management Plan (FMP), Highly Migratory Species FMP, Pacific Groundfish FMP, and Pacific Salmon FMP. EFH managed by these councils are summarized in **Tables 17 and 18**.

Table 17. Management unit species for EFH within the U.S. Pacific Islands

Management Unit Species	EFH for Eggs and Larvae	EFH for Juveniles and Adults
Bottomfish	Water column down to 400-m depth from shoreline out to the 200-mi U.S. EEZ boundary.	Water column and all bottom from shoreline down to 400-m depth.
Seamount Groundfish	Water column down to 200-m depth of all EEZ waters bounded by 29–35° N and 171° E to 179° W.	Water column down to 200-m depth of all EEZ waters bounded by 29–35° N and 171° E to 179° W.
Pelagics	Water column down to 200-m depth from shoreline out to EEZ boundary.	Water column down to 1,000-m depth from shoreline out to EEZ boundary.
Precious Corals	Known precious coral beds in the Hawai'ian Islands located at: Keāhole point, between Miloliʻi and South Point, the ʻAuʻau Channel, Makapuʻu, Kaʻena point, the southern border of Kauaʻi, Wespac bed, Brooks bank bed, and 180 Fathom Bank.	Known precious coral beds in the Hawai'ian Islands located at: Keāhole point, between Miloliʻi and South Point, the ʻAuʻau Channel, Makapuʻu, Kaʻena point, the southern border of Kauaʻi, Wespac bed, Brooks bank bed, and 180 Fathom Bank.
Coral Reef Ecosystems	Water column and all bottom down to 100-m depth from shoreline out to EEZ boundary.	Water column and all bottom down to 100-m depth from shoreline out to EEZ boundary.
Crustaceans	Lobsters/crab: water column down to 150-m depth from shoreline out to EEZ boundary. Deepwater shrimp: outer reef slopes between 300- to 700-m depth.	Lobsters/crab: bottom from shoreline down to 100-m depth Deepwater shrimp: outer reef slopes between 550- to 700-m depth.

Source: NOAA Fisheries (2026b)

Table 18. EFH within the U.S. West Coast EEZ

Fishery / Species	EFH for Eggs & Larvae	EFH for Juveniles & Adults	Footnotes
Pacific Coast Groundfish	All waters and substrate ≤3,500-m depth from mean higher high water line to upriver saltwater intrusion; includes seamounts >3,500 m	Same as eggs/larvae (all life stages)	50 CFR 660.75
Pacific Sardine, Northern Anchovy, Pacific Chub Mackerel, Jack Mackerel (CPS)	Marine/estuarine waters from shoreline to EEZ above thermocline, SST 10–26 °C	Same as eggs/larvae	PFMC Amendment 8
Market Squid (CPS)	Assemblage EFH as above; benthic spawning on sand/mud substrates <100-m depth	Pelagic waters within CPS EFH	PFMC EFH Review 2023
Krill (CPS)	Upper surface layer from nearshore to shelf-break isobaths	Same upper pelagic layer	PFMC Amendment 12
Highly Migratory Species (HMS)	Species-specific; most spawning and larval habitat outside EEZ	Pelagic waters seaward of ~12-m depth to EEZ	PFMC HMS EFH Appendix
Pacific Coast Salmon—Chinook & Coho	Freshwater EFH: all water bodies currently/historically occupied; estuarine EFH	Marine EFH: estuarine/nearshore to EEZ north of Point Conception	50 CFR 660.412
Puget Sound Pink Salmon	Freshwater EFH: Puget Sound, Strait of Juan de Fuca/Georgia	Marine EFH: Puget Sound and EEZ waters north of 48° N	50 CFR 660.412

Source: Pacific Fishery Management Council (2024a; 2024b; 2024c; 2026)

7.3.1 FEP for the Mariana Archipelago

The WPRFMC first designated EFH (and HAPC) for its fisheries via an omnibus amendment in the 1990s and carried these designations forward when it reorganized the species-based FMPs into place-based FEPs, including the Mariana Archipelago, which encompasses both Guam and the CNMI (Western Pacific Regional Fishery Management Council 2009c). EFH in the Mariana Archipelago spans a broad depth gradient and includes habitats essential for spawning, growth, and survival of managed species. HAPC designations focus on areas of high biodiversity, structural complexity, and ecological sensitivity, such as coral reef MPAs, Saipan Lagoon, Cocos Lagoon, and offshore banks. These habitats are integral to sustaining fishery resources and maintaining ecosystem resilience in the face of anthropogenic and climate-related pressures (Western Pacific Regional Fishery Management Council 2005b; 2009c; 2025c).

The Mariana Archipelago FEP encompasses two major fishery management units: Bottomfish and Precious Corals. Each fishery has distinct EFH and HAPC designations.

Bottomfish Management Unit Species. EFH for bottomfish species includes benthic and water column habitats from the shoreline to approximately 400-m depth. These habitats consist of hard-bottom areas, reef slopes, rocky outcrops, and seamount features that provide shelter and foraging grounds for juveniles and adults. Eggs and larvae occupy surface waters from the shoreline to the outer boundary of the EEZ down to 400 m, where oceanographic conditions facilitate dispersal and recruitment. HAPC for bottomfish includes all escarpments and slopes between 40 to 280 m, which are considered ecologically sensitive and functionally critical for sustaining bottomfish populations due to their structural complexity and rarity.

Precious Corals Management Unit Species. In the Marina Archipelago, little is known about the presence of precious corals, and the amount of habitat where precious corals can grow is limited because of the steep topography (Western Pacific Regional Fishery Management Council 2009c; 2025c). EFH for precious corals is defined as deep, hard-bottom areas typically found at depths of 350 to 1,500 m, where species such as pink coral (*Corallium secundum*), gold coral (*Gerardia* spp., *Narella* spp., *Calyptrophora* spp.), bamboo coral (*Lepidisis olapa, Acanella* spp.), and black coral (*Antipathes dichotoma, A. grandis, A. ulex)* occur. These habitats are characterized by strong bottom currents, low sedimentation, and solid substrates, and are generally rare and patchily distributed in the region (Western Pacific Regional Fishery Management Council 2005b). Since 2009, NMFS has not issued any federal permits for precious coral harvest in the Mariana Archipelago, and, to date, no specific HAPC has been designated.

7.3.2 FEP for Pacific Pelagic Fisheries of the Western Pacific Region

The WPRFMC first designated EFH and HAPC for its fisheries via an omnibus amendment in 1998–1999 and carried these designations forward when it reorganized the species-based FMPs into place-based FEPs, including the Pelagic FEP (Western Pacific Regional Fishery Management Council 2005a; 2009a; 2025a).

EFH within the Pelagic FEP covers all pelagic management unit species managed in the Pelagic FEP, including tunas, billfishes, wahoo, mahi-mahi (dolphinfish), oceanic sharks, moonfish, pomfrets, oilfish, and pelagic squids across the U.S. EEZ surrounding American Samoa, Hawaiʻi, Guam, CNMI, and the PRIA. EFH for Western Pacific Pelagic FEP species is defined as the upper ~200 m water column (eggs/larvae) and the surface to ~1,000 m water column (juveniles/adults), extending from the shoreline to the EEZ boundary. Within this EFH, HAPC are designated over seamounts and banks with summits shallower than ~2,000 m, recognizing their critical ecological functions for aggregation, feeding, and growth. The Pelagic FEP further recognizes the dynamic nature of EFH, emphasizing fronts, eddies, and current systems as essential habitat features (Western Pacific Regional Fishery Management Council 2005a; 2009a; 2025a).

7.3.3 FEP for the Hawai‘i Archipelago

The FEP for the Hawai‘i Archipelago consolidates EFH designations for these sectors: bottomfish and seamount groundfish, crustaceans, and precious corals within the U.S. EEZ around Hawai‘i. Pelagic species are managed separately under the Pelagic FEP and are not included here. EFH definitions and HAPC priorities were first set in the 2009 Hawai‘i Archipelago FEP and subsequently refined in 2016 for bottomfish and seamount groundfish by Amendment 4 to reflect improved life-history and habitat information (Western Pacific Regional Fishery Management Council 2005b; 2009b; 2025b).

Bottomfish Management Unit Species. EFH spans the water column and bottom habitats from the shoreline to ~400-m depth, with life-stage specificity: eggs/post-hatch pelagic use the surface to complex-specific depths out to the EEZ, while post-settlement and sub-adult/adult stages occupy benthic/benthopelagic zones within depth bands that reflect newly defined shallow (0–240 m), intermediate (40–320 m), and deep (80–400 m) assemblages. Species-level EFH descriptors (zone, depth, extent) are provided in Amendment 4 (e.g., *Etelis* spp., *Pristipomoides* spp., *Hyporthodus quernus*, *Aphareus rutilans*). HAPC for bottomfish were refined to seven priority areas where nursery or multi-species habitat functions, sensitivity, and/or rarity are documented: Ka‘ena Point, Kāne‘ohe, Makapu‘u, Penguin Bank, Pailolo Channel, North Kaho‘olawe, and Hilo (with site-specific boundaries and notes). These HAPC are intended to focus consultation and conservation on nursery flats, canyon/pinnacle complexes, drowned reef terraces, and coral/sponge beds important to bottomfish species.

Seamount Groundfish Management Unit Species (armorhead, alfonsin, raftfish). EFH encompasses the water column to ~600 m and, for settled/sub-adult/adult stages, 120–600 m, in waters west of 180° W and north of 28° N, aligning with the Hancock Seamounts Ecosystem Management Area (retaining a moratorium due to overfished status of armorhead). HAPC is designated around Hancock Seamount summits and slopes (rare, small, isolated habitat supporting the complex); Cross Seamount was considered but excluded from preferred HAPC due to broader species occurrence.

Crustaceans Management Unit Species (spiny/slipper lobsters, Kona crab, deepwater shrimp). EFH includes eggs/larvae in the water column to ~150 m and juveniles/adults on all bottom habitat to ~100 m. HAPC emphasizes Northwest Hawaiian Island banks with summits ≤ ~30 m, recognizing susceptibility of shallow banks and biogenic structures to anchors/gear.

Precious Coral Management Unit Species (pink/red, gold, bamboo, black corals). EFH is confined to specific beds and depth strata documented in the MHI and northwest Hawaiian Islands (e.g., Makapu‘u, Brooks Bank, 180-Fathom Bank; Au‘au Channel for black corals). These beds and associated slopes are designated HAPC due to ecological importance, sensitivity, and rarity of slow-growing deep corals.

7.3.4 Pacific Remote Islands Area (PRIA) FEP

The FEP for the PRIA reorganized demersal fisheries management around place-based ecosystem boundaries and consolidates the provisions formerly contained in the four sectors of Bottomfish and Seamount Groundfish, Crustaceans, Precious Corals, and Coral Reef Ecosystems (CRE) (Western Pacific Regional Fishery Management Council 2005b; 2009d; 2025b). The PRIA FEP identifies EFH and HAPC for the demersal fisheries under WPRFMC authority, and pelagic species are managed separately under the Pelagic FEP. The PRIA FEP applies across The U.S. EEZ (0–200 nm) surrounding each island/atoll and overlays National Wildlife Refuge boundaries. The spatial overlap of the PRIA FEP managed area with the Action Area includes only transit corridors within the EEZ surrounding Palmyra Atoll, Kingman Reef, and

Jarvis Island (**Figure 1**). EFH is described for the different fishery sectors below and summarized in **Table 17**.

Bottomfish Management Unit Species. EFH comprises hard-bottom slopes, pinnacles, promontories, and other high-relief features typically between ~73 and 265 m (~40 and 145 fathoms), where adult snappers, jacks, and groupers aggregate; distributions are patchy and closely tied to structural complexity and current flow, which enhance food availability. Juvenile snappers occupy relatively shallow, flat, soft-bottom habitats (often 40–80 m), distinct from adult grounds.

CRE Management Unit Species. EFH in PRIA encompasses reef and associated shallow habitats (generally ≤91 m or ≤50 fathoms) supporting high coral and fish diversity, apex predators, planktivores, and invertebrates. Because these ecosystems sit within minimally developed island settings, EFH quality is strongly shaped by regional oceanography (e.g., upwelling, equatorial currents) rather than land-based runoff.

Crustacean Management Unit Species. EFH includes rocky reef and high-energy reef-front habitats used by spiny lobsters and slipper lobsters for shelter and foraging. Spiny lobster larvae are pelagic for months and widely dispersed by currents, while settlement and subsequent growth occur in crevice-rich, nearshore reef zones used by adults. Thus, EFH forms a continuum from oceanic larval transport to reef-structured benthic nurseries. Kona crab EFH is associated with sandy bottoms from ~24–115 m for adults, with larvae pelagic in the water column.

Precious Coral Management Unit Species. EFH around Palmyra Atoll, Kingman Reef, and Jarvis Island has been poorly described. It is thought that two principal deep-water zones for EFH occur: approximately 350–475 m and 1,000–1,500 m, typically on solid substrates in areas swept by moderate to strong bottom currents that minimize sediment accumulation and facilitate feeding and larval settlement. It is likely that the standing crops, depth ranges, and growth rates illustrate the slow-growing, long-lived nature of these colonies and their sensitivity to sedimentation and substrate erosion.

HAPCs. The PRIA FEP identifies HAPCs for demersal management unit species where habitats meet criteria of ecological importance, sensitivity, exposure to development stress, or rarity. CRE HAPCs are recognized in PRIA, leveraging the overlay of National Wildlife Refuges and the Pacific Remote Islands Marine National Monument to restrict or prohibit fishing and other activities that could degrade EFH. These designations prioritize protection of reef habitats and associated biota where vulnerability and ecological value are highest.

Palmyra Atoll, Kingman Reef, and Jarvis Island. EFH and HAPC considerations are particularly notable around these sites. PRIA coral reef ecosystems are generally healthy and productive, with large apex predators common; the west sides of the equatorial islands (Jarvis, Baker, Howland) show high densities of small planktivorous fishes linked to upwelling from the Equatorial Undercurrent, highlighting pelagic-benthic coupling within EFH. Coral species diversity is substantially higher at Palmyra and Kingman, likely due to larval transport via the Equatorial Countercurrent, underscoring their role as biodiversity hubs warranting HAPC emphasis. At Kingman, crown-of-thorns starfish aggregations and a reported decline in large fish densities in 2004 signal sensitivities that strengthen the case for precautionary habitat protection; Palmyra exhibited crown-of-thorns aggregations earlier (2001–2002) that subsequently dissipated, illustrating dynamic pressure regimes inside EFH.

7.3.5 Coastal Pelagic Species (CPS) FMP

CPS species include Pacific sardine, Pacific/chub mackerel, northern anchovy, jack mackerel, market squid, and all euphausiid (krill) species occurring within the U.S. West Coast EEZ. CPS finfish and market squid are primarily pelagic, inhabiting the upper mixed layer of the ocean above the thermocline and generally occurring near the surface rather than in association with the seafloor. For EFH purposes, these species are treated as a complex because of their similar life histories and habitat requirements.

The EFH for CPS finfish is defined by a thermal range and geographic area that encompasses waters where these species occur at any life stage, where they have historically occurred under similar environmental conditions, or where conditions do not preclude colonization (Pacific Fishery Management Council 2024a). Because CPS distributions vary widely over time in response to ocean temperature, EFH boundaries are dynamic. The east–west extent of EFH for CPS finfish includes all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington offshore to the limits of the EEZ, above the thermocline, where sea surface temperatures range between 10°C and 26°C. The southern boundary is the U.S.–Mexico maritime border, while the northern boundary is defined by the position of the 10°C isotherm, which shifts seasonally and annually.

For krill species, EFH extends along the entire West Coast from the shoreline to the 1,000-fathom isobath and to a depth of approximately 400 m. This designation is based on the distribution of the two principal species, *Euphausia pacifica* and *Thysanoessa spinifera*, whose larvae tend to occur closer to shore over the continental shelf. These boundaries approximate areas of highest population concentrations and major upwelling zones that support consistently high phytoplankton productivity, although krill are not strictly associated with fixed bottom topography.

At present, no HAPCs have been incorporated into the CPS FMP.

7.3.6 FMP for the U.S. West Coast Fisheries for HMS

Within the U.S. West Coast EEZ, HMS EFH is primarily associated with pelagic and epipelagic waters rather than benthic habitats, reflecting the highly mobile and oceanic nature of these species (Pacific Fishery Management Council 2024b). These habitats occur in temperate waters of the PFMC region, generally beyond the 100-fathom isobath and extending offshore to the EEZ boundary. The distribution and abundance of HMS within these waters varies seasonally and interannually in response to oceanographic conditions such as sea surface temperature, current patterns, and prey availability. EFH for most life stages is linked to open-ocean features, including upwelling zones, thermal fronts, and convergence boundaries that concentrate prey and provide favorable conditions for growth and survival.

Species-specific EFH designations reflect these pelagic preferences. For example, albacore tuna occupy epipelagic waters beyond the 100-fathom contour from the U.S.–Mexico border north to Canada, typically associated with sea surface temperatures between 10°C and 20°C. Bigeye tuna and yellowfin tuna are concentrated in the Southern California Bight, primarily south of Point Conception, in waters beyond the 200-fathom isobath where temperatures range from 17°C to 22°C for bigeye and up to 31°C for yellowfin. Pacific bluefin tuna occur farther offshore beyond the 183-m contour, with juveniles feeding on northern anchovy and squid in waters between 14°C and 23°C. Swordfish and striped marlin utilize oceanic waters of the Southern California Bight, often above the thermocline and beyond the 200- to 400-fathom isobaths. Sharks such as common thresher and shortfin mako use epipelagic waters from nearshore to offshore, including the Southern California Bight, and likely depend on pupping areas within the southern portion of the EEZ. Blue sharks range widely in epipelagic waters from Mexico to Canada, primarily beyond the 183-m contour.

At present, no HAPCs have been designated for HMS. However, the FMP provides a framework for future identification of HAPCs based on ecological importance, rarity, and vulnerability. Potential HAPCs include shark pupping grounds, core nursery areas, key migratory corridors, and feeding aggregations, particularly for thresher and mako sharks. Research is needed to locate these areas, which may concentrate pups and pregnant females at certain times of the year, making them highly susceptible to habitat disturbances.

7.3.7 Pacific Coast Groundfish FMP

EFH for the Pacific Coast Groundfish FMP encompasses all waters and substrates from the shoreline (mean higher high water or upriver extent of saltwater intrusion) seaward to areas with depth $\leq$ 3,500 m within the U.S. West Coast EEZ (Pacific Fishery Management Council 2026). This EFH is implemented in regulation at 50 CFR § 660.75 and is protected through gear and area-based measures updated by Amendment 28 (84 CFR 63966). Amendment 28 and associated regulations include coastwide EFH restrictions seaward of the 1,280 m (700 fathom) contour for bottom trawl gear (50 CFR § 660.112(a)(5)(ii)), plus specific Essential Fish Habitat Conservation Areas (EFHCAs) where bottom-contact gear is prohibited (e.g., Davidson Seamount EFHCA) to protect deep-water habitats.

Pacific Groundfish HAPCs include hard substrate and habitat-forming invertebrates (corals, sponges), including those developing on methane-seep carbonates as these areas provide attachment, refuge, foraging, and spawning functions for multiple commercial groundfish (e.g., sablefish, thornyheads, Dover sole). Biogenic microhabitats at seeps (bacterial mats, tube-worm beds, carbonate boulders) that attract higher densities of WPRFMC-managed species relative to off-seep transects are also HAPC.

PFMC implements HAPC-like protections through EFHCA, which are discrete subsets of EFH designated in regulation that prioritize sensitive habitat types (hard substrate, canyons, seamounts, coral/sponge, methane seeps) for gear restrictions and area closures. These EFHCAs function as HAPCs because they meet Magnuson-Stevens Fishery Conservation and Management Act criteria (high ecological function, rarity, sensitivity, and threat exposure). Amendment 28 re-configured West Coast EFHCAs and other bottom-contact gear restrictions to minimize adverse effects of fishing on EFH. It includes large closures to bottom trawling (and, in specified sites, closures to all bottom-contact gears), while reopening some lower-sensitivity grounds. EFHCAs and coastwide restrictions are codified in 50 CFR §§ 660.76–660.79, 660.12, 660.112.

7.3.8 Pacific Coast Salmon FMP

The following EFH descriptions were developed by the PFMC for the three species of Pacific salmon managed under the Pacific Coast Salmon FMP: (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and Puget Sound pink salmon (*O. gorbuscha*) (Pacific Fishery Management Council 2024c). EFH spans freshwater, estuarine, and marine environments historically or currently occupied by these species. Key habitat features across species are those with good connectivity across habitat types, clean gravel, cool water, riparian cover, structural complexity from woody debris, floodplain complexity, unpolluted estuarine transition zones, and productive nearshore marine habitats.

Chinook Salmon. Freshwater EFH includes all currently or historically occupied habitats within Washington, Oregon, Idaho, and California, excluding areas upstream of designated impassable dams. Key features include clean gravel for spawning, cool, well-oxygenated water, and complex habitats such as floodplains, side channels, and off-channel ponds. Estuarine EFH includes ocean-type juveniles rear for weeks to months in tidal channels, marsh edges, and shallow nearshore habitats. Marine EFH includes nearshore and offshore waters from state territorial seas to the EEZ north of Point Conception. It also includes Alaska-designated EFH. Juveniles concentrate along the continental shelf and adults range widely across the North Pacific.

Coho Salmon. Freshwater EFH includes spawning in small streams with coarse gravel and moderate currents; juveniles rear for one year in low-gradient alluvial channels, pools with large woody debris, and off-channel habitats such as beaver ponds. Estuarine EFH includes intertidal and pelagic habitats with cover and prey availability where juveniles will reside for days to months. Marine EFH includes nearshore and offshore waters within the EEZ north of Point Conception; juveniles initially occupy coastal waters before migrating north.

Puget Sound Pink Salmon. Freshwater EFH includes spawning habitats that occur in riffles and pool-riffle transitions with clean gravel and moderate currents, typically within 50 km of tidewater. Estuarine EFH includes habitats where fry are found, but they generally migrate quickly through estuaries, although some briefly use shallow tidal channels. Marine EFH includes nearshore habitats in Puget Sound, Strait of Juan de Fuca, and Strait of Georgia. EFH extends to U.S. EEZ waters north of 48° N latitude and includes Alaska-designated EFH.

Habitat Areas of Particular Concern (HAPCs). For Pacific Coast Salmon HAPCs are those habitat subtypes highly sensitive to degradation. For Pacific salmon, the following HAPCs are designated:

- *Complex Channels and Floodplain Habitats.* Meandering, braided channels, side channels, sloughs, wetlands, and areas with abundant large woody debris that support spawning and juvenile rearing.
- *Thermal Refugia.* Cool-water habitats such as tributary junctions, groundwater seeps, and deep pools that provide refuge during periods of elevated temperature.
- *Spawning Habitat.* Clean gravel substrates with adequate intragravel flow and oxygenation, typically in low-gradient stream reaches.
- *Estuaries.* Semi-enclosed waters with tidal influence, providing critical rearing and transition zones for juveniles.
- *Marine and Estuarine Submerged Aquatic Vegetation.* Eelgrass and kelp beds that offer cover, migration corridors, and prey resources.

7.4 Potential IPFs

BOEM proposes to issue up to two leases for preliminary seabed mineral exploration activities in the proposed lese area. Preliminary activities include marine vessel traffic; HRG surveys; sediment sampling; buoy and mooring deployment, operation, and retrieval; AUV and ROV surveys; and other low-impact technologies. Although these activities would not result in commercial-scale disturbance, they may generate a suite of potential IPFs that may affect EFH, and include habitat disturbance, sediment resuspension and turbidity, FAD effect, entanglement, marine debris, vessel strike, noise, artificial light, EMF alteration, vessel strike, oil spills, and introduction of invasive species. Vessel transit corridors have fewer IPFs and include those associated with marine transportation activities, especially noise, vessel strike, introduction of invasive species, and oil spills.

A summary description of each impacting source, the potential effects on EFH, and proposed mitigation and BMPs is included in the following section.

7.5 Effects on EFH and Mitigations and BMPs

Habitat Disturbance. Seafloor contact from box cores, free-fall grabs, landers, moorings, and UTP units would create small, discrete footprints spread over very large areas. For six leases, the aggregate seafloor disturbance is estimated at ~18,879 m², concentrated at depths of 1,400 to 6,000 m (**Tables 4 through 8**), concentrated on abyssal plains between ~1,400- to 6,000-m depth. These depths lie below EFH for demersal WPRFMC fisheries (generally ≤400 m) and beyond pelagic EFH usage for juveniles/adults (surface to ~1,000 m), so direct EFH impacts are unlikely. Geotechnical surveys (box core sampling, free floating grab samples) will not be conducted in the Western Lease Area, and so habitat disturbance to vent habitat will be minimized. Transit corridors and any seamount flanks with EFH/HAPC sensitivity are addressed through avoidance and operational controls (**Appendix B**).

Local biological consequences at disturbance points include removal/compaction of sediments and any nodules present, causing mortality of infauna/epifauna and disruption of microbial assemblages. Evidence from long-term experiments indicates that sessile megafauna and suspension feeders can remain depressed decades after disturbance, and microbial functions may require > 50 years to recover (Simon-Lledó et al. 2019; Vonnahme et al. 2020). Abyssal nodules themselves accrete extremely slowly (mm–cm per million years), so any nodule removal represents habitat loss on human timescales (Hein et al. 2020). Moreover, many abyssal megafauna exhibit strong associations with hard substrata provided by nodules (Amon et al. 2016). Given the very small aggregate footprint of preliminary activities and their dispersion across vast lease blocks, the scale of disturbance is orders of magnitude below that required to cause population-level effects or to compromise EFH functions regionally. Implementation of BOEM's BMPs of Pre-survey planning, sensitive-habitat avoidance (including deep-sea corals/sponges and seamount features) further constrains interaction with EFH/HAPCs and focuses work away from mapped sensitive areas.

In conclusion, with the proposed spatially limited sampling and the BMP suite in place, habitat disturbance from preliminary activities would result in minimal adverse effects to EFH and, where present, HAPCs.

Sediment Resuspension and Turbidity. Sediment resuspension will occur where box cores, free-fall grabs, landers, and moorings contact the seabed, generating short-lived, near-bottom plumes confined to abyssal depths within the lease areas. In deep-sea settings, plume behavior is dominated by low-lying turbidity currents; in situ measurements show that only a small fraction of disturbed sediment rises ≥ 2 m above the bed for hours, with the majority remaining within 2 m and depositing locally, indicating limited vertical exposure to pelagic EFH occupied above ~200–1,000 m (Muñoz-Royo et al. 2022). Geotechnical surveys (box core sampling, free floating grab samples) will not be conducted in the Western Lease Area and so sediment resuspension/turbidity impacts within vent habitat will be minimized.

Potential biological consequences of elevated suspended sediment are well described from shallow-water studies. Responses scale with concentration and exposure duration, and include behavioral change, reduced feeding success in visual predators, and sublethal physiological stress (Newcombe and Jensen 1996; Wilber and Clarke 2001). Because the suspended sediment concentration in the deep sea is extremely low, small absolute increases can be proportionally meaningful (van der Grient and Drazen 2022). However, the Proposed Action's preliminary activities disturb orders-of-magnitude less sediment than collector-vehicle mining tests, and the resulting plumes are localized at the seabed, making interaction with EFH used by eggs/larvae in the upper water column and by pelagic species in the epipelagic zone unlikely.

Within EFH/HAPCs that include deep-sea coral-sponge communities on seamount features, fine-particle deposition could impair filter feeders if work occurred directly atop sensitive patches; the analysis controls this risk through survey design and stipulations to avoid sensitive habitats and minimize slack line and contact duration (**Appendix B**).

Given the abyssal location of disturbance, the short duration and limited vertical extent of plumes, and implementation of BOEM BMPs, sediment resuspension and turbidity from preliminary activities would result in minimal adverse effects to EFH and, where present, HAPCs.

FAD Effect. Surface buoys and moored structures associated with preliminary oceanographic surveys can function as incidental FADs, temporarily aggregating pelagic fishes in the epipelagic to upper mesopelagic, where EFH for tunas and other managed species occurs (eggs/larvae ~0–200 m; juveniles/adults to ~1,000 m). Studies show that floating objects alter tuna movement and residency, with individuals exhibiting short transits and multi-day associations and residence times at anchored or drifting FADs often range from hours to several days and can extend longer depending on array density and local conditions (Dempster and Taquet 2005; Robert et al. 2013; Baidai et al. 2020; Pérez et al. 2020).

For this Proposed Action, a maximum of 12 surface buoys would be deployed, and subsurface moorings, with taut configurations and limited slack, are expected to be more common in deep water, substantially reducing the visibility and aggregating potential compared to purpose-built FAD arrays. While localized increases in fish density around any surface buoy could briefly modify foraging or predator-prey interactions within Pelagic FEP EFH, the small number, short deployment durations, and lack of directed fishing effort at these buoys constrain the spatial and temporal footprint. Moreover, regional fishery bodies have discouraged fishing on data buoys, acknowledging their incidental FAD effect but managing access to minimize impacts (Morgan 2011).

Entanglement. Lines, chains, and ancillary attachments used to deploy buoys, moorings, landers, and UTP units could pose a limited entanglement hazard to large fishes in pelagic EFH, particularly mobulid rays and some sharks whose morphology or ram-ventilation behavior makes escape difficult once fouled. Documented cases of manta entanglement in mooring lines in the Maldives demonstrate how thin vertical lines can cause rapid mortality in obligate swimmers (Hilbourne and Stevens 2023), and sublethal injuries from fishing lines (which could be considered analogs to mooring lines) are among the most common anthropogenic wounds observed in manta populations (Strike et al. 2022). For sharks, large-scale entanglement has been associated with net-based drifting FADs rather than taut mooring lines. Silky shark mortality at FADs was a major concern a decade ago (Filmalter et al. 2013), but adoption of non-entangling designs has dramatically reduced ghost-fishing risk (Grande et al. 2025; International Seafood Sustainability Foundation 2025). Purse seine fisheries are not common within the proposed lease areas.

The Proposed Action differs materially from fisheries FAD deployments: moorings are deep, configured to remain taut with minimal slack; without netting in the basic design; and deployment/retrieval is controlled from vessels operating far offshore in abyssal waters. BMPs require the shortest practicable line lengths, rigid sleeves or weak links to prevent loops, slow and controlled lowering/raising, and real-time monitoring to halt operations if protected species are near the gear (**Appendix B**). These measures directly target the mechanisms implicated in manta/shark fouling and reflect current international best practice shown to lower entanglement risk at floating structures for all species (Murua et al. 2016; Pilling et al. 2017).

Consequences to EFH are therefore expected to be limited to rare, localized encounters with individual animals in the pelagic water column; no alteration of EFH structure or function is anticipated, and benthic HAPCs (e.g., seamount coral/sponge communities) are avoided by design and proposed lease stipulations.

Given the small number of moorings, deep deployments, and enforceable BMPs, the entanglement IPF would be temporary and unlikely to cause population-level effects. BOEM concludes the proposed activities would result in minimal adverse effects to EFH and, where present, HAPCs.

Marine Debris. Marine debris associated with preliminary activities could arise from the accidental loss of small components (e.g., lines, shackles, floats) during deployment, operation, or retrieval of buoys, moorings, landers, and UTP units. Lost items may pose entanglement risks to large pelagic fishes that use the epipelagic EFH, including mobulid rays and sharks; sublethal injuries and impaired feeding from line fouling are widely documented across taxa (Boerger et al. 2010; Cole et al. 2013; Rochman et al. 2013; Kühn et al. 2015; Watts et al. 2015). Although these studies primarily address coastal and surface-water debris, they highlight mechanisms, such as entanglement, ingestion, and contaminant transfer, that can occur wherever debris intersects EFH.

The Proposed Action incorporates multiple, enforceable BMPs that substantially limit debris generation and persistence. Marine Trash and Debris Prevention requires annual training, labeling of gear, immediate recovery efforts, monthly reporting, and 48-hour incident reports for potentially harmful losses, coupled with recovery plans and time-bound retrieval (**Appendix B**). Moreover, taut-line configurations, shortest practicable line lengths, rigid sleeves/weak links are mandated to prevent loops, controlled lowering/raising, and real-time observation during deployment/retrieval, reducing the primary pathways for entanglement and gear loss. These measures complement MARPOL Annex V and related prohibitions on persistent solid waste discharge.

Operational context also constrains risk. Work occurs in deep, remote waters with a small number of moored structures and defined retrieval procedures for any lost equipment ("Lost Survey Equipment"), limiting debris inputs and enabling targeted recovery. Sensitive HAPCs (e.g., shallow seamount coral/sponge assemblages) are avoided by siting and stipulation. Debris introduction into those habitats is therefore unlikely, and any incident would trigger notification, reporting, and corrective actions under **Appendix B** within the Protection of Biological Resources.

Considering the limited scale of activities, stringent training, labeling and recovery requirements, and engineering controls that minimize slack and snagging, potential debris-related effects are expected to be rare, localized, and short-lived. The Proposed Action would not measurably alter EFH function or HAPC condition. BOEM concludes that risk of introducing marine-debris associated with the Proposed Action will result in minimal adverse effects on EFH and, where present, HAPCs.

Noise. Underwater sound from survey vessels, HRG systems (e.g., multibeam echosounders, ADCPs, USBL), AUV/ROV operations, and routine vessel transits constitute a potential impacting factor for EFH across pelagic and demersal habitats. Fishes primarily detect particle motion, with pressure sensitivity enhanced in some taxa via swim-bladder and ear specializations. Relevant biological effects include masking, behavioral change, stress, temporary threshold shift, and, at very close ranges, injury (Popper and Fay 2011; Popper et al. 2014; Hawkins and Popper 2017; Popper and Hawkins 2019a). Because particle motion, not pressure, is the dominant cue for most fishes and is rarely measured, conservative assessment is warranted. For example, indirect inference from pressure is often invalid in shelf seas and shallow waters (Nedelec et al. 2016).

The Proposed Action limits acoustic sources to Tier-4 *de minimis* HRG systems and explicitly excludes boomers, sparkers, and other low-frequency impulse sources. BOEM's classification and equipment list indicate primarily high-frequency, directional tools whose attributes (frequency, beamwidth, duty cycle) reduce the likelihood of fish exposure above behavioral thresholds (Crocker et al. 2019; Ruppel et al. 2022). In deep pelagic EFH (Pelagic FEP) and over abyssal plains of the lease areas, these sources are expected to elicit, at most, short-lived, localized behavioral responses, and no population-level impacts are anticipated. Avoidance of HAPCs (e.g., seamount coral/sponge communities) further reduces risk. Sound exposure from the project's HRG use would be intermittent and brief, with BMP-required clearance/shutdown procedures for any non-*de minimis* configuration providing additional safeguards (**Appendix B**).

Marine vessel noise during transits is predominantly low-frequency cavitation noise (< 1 kHz), which can propagate widely and contribute to ambient conditions that mask biologically relevant cues (McKenna et al. 2012b; Erbe et al. 2019). Regional studies show shipping raises low-frequency levels by > 10–15 dB during high-traffic periods (McKenna et al. 2012a; ZoBell et al. 2024), but changes scale with ship counts as incremental noise from the limited number of project vessel trips is expected to be small relative to existing traffic in the vessel corridors (McKenna et al. 2012a; ZoBell et al. 2024). BMPs require slow speeds, routing awareness, and monitoring, which are measures that reduce source levels and audibility ranges (**Appendix B**).

For fishes, sensitivity is greatest at lower frequencies and near sources, and high-frequency MBES/sonars potentially used in the Proposed Action are generally above the hearing range of many EFH species, while directional beams and short pings limit exposure duration (Hastings and Popper 2005; Popper et al. 2014; Crocker et al. 2019). Where hearing-specialist clupeids or CPS species occur in West Coast EFH, the dominant risk is masking from continuous vessel noise rather than brief HRG signals. Minimizing speed and avoiding prolonged engine loads in sensitive areas mitigates this concern (McKenna et al. 2012a; Popper and Hawkins 2019b).

Acoustic-risk controls include (i) use of Tier-4 *de minimis* sources; (ii) submission of survey-equipment parameters for BOEM review; (iii) clearance/shutdown procedures where warranted; and (iv) speed management and observer protocols during transits. These measures align with best available science on fish bioacoustics and reduce the probability of adverse effects to EFH/HAPCs (Popper et al. 2014; Ruppel et al. 2022).

In conclusion, given the limited duration and number of acoustic activities, the exclusion of low-frequency impulse sources, implementation of BMPs, and the deep, remote setting of lease-area operations, noise-related effects are expected to be localized, short-term, and not measurably alter EFH function or HAPC condition in either the lease areas or transit corridors. The Proposed Action would result in minimal adverse effects to EFH and, where present, HAPCs.

Artificial Light. Artificial light associated with night operations on vessels, buoys, AUV/ROV platforms, and work decks can alter underwater lightscapes and disrupt diel vertical migration (DVM), a process that structures pelagic EFH by governing predator-prey encounters and carbon flux. Experimental work during polar night shows that standard ship working-lights change fish and zooplankton behavior down to at least 200 m and over areas > 0.125 km^2, indicating sensitivity of pelagic communities to point sources of illumination (Berge et al. 2020). Light-defined isolumes vertically organize zooplankton on diel to seasonal timescales and shifting light levels can compress or displace the migrating layer, with potential secondary effects for visually hunting fishes that occupy EFH in the upper 200–1,000 m (Hobbs et al. 2021).

Across marine ecosystems, artificial light at night is recognized to inhibit zooplankton DVM, alter predation rates, and change community interactions. These effects are most pronounced near light sources and depend on intensity, spectrum, and exposure duration (Davies et al. 2014; Marangoni et al. 2022). Pelagic fishes are highly responsive to light intensity, with activity and dispersion varying predictably across day–night transitions which suggests that artificial lighting can therefore modify local schooling, foraging, and energy budgets, but impacts diminish rapidly with distance and depth (Didrikas and Hansson 2009; Kaartvedt et al. 2019).

Within the Proposed Action, lighting is limited in scope and duration: work occurs in remote, deep waters; operations are intermittent; and HRG surveys rely primarily on acoustic sources rather than lighting. Survey planning, speed management, and avoidance of HAPCs on shallow banks or seamount flanks further reduce the likelihood that artificial light intersects sensitive coral/sponge assemblages designated as HAPCs.

Considering the small number of illuminated assets, the brief use, and deep settings, any light-induced changes to pelagic EFH (e.g., transient layer displacement, local behavior shifts) would be short-lived, spatially limited, and not measurable at EFH/HAPC scales in either lease areas or transit corridors. The Proposed Action is therefore expected to have minimal adverse effects on EFH and, where present, HAPCs.

EMF Alteration. EMFs introduced by marine activities can affect taxa (e.g., elasmobranchs, some teleosts, invertebrates) that use electro- or magneto-reception for orientation and foraging. Laboratory and field studies near energized subsea power cables show behavioral responses such as attraction or altered movement in skates and lobsters, though population-level impacts have not been demonstrated (Normandeau Associates Inc. et al. 2011; Hutchison et al. 2020). Evidence for benthic invertebrates indicates limited or no adverse effects under static magnetic exposures orders of magnitude higher than natural geomagnetic variation (Bochert and Zettler 2004). Reviews conclude that responses are species-, life stage-, and exposure-dependent, with greatest concern focused on high-capacity AC/DC transmission cables rather than low-power scientific devices (Gill et al. 2014; Albert et al. 2020; Naisbett-Jones and Lohmann 2022).

Under the Proposed Action, EMF sources are limited to vessel/ROV electronics, seafloor transponders used for navigation (USBL/LBL), ADCPs, and other low-energy equipment deployed intermittently and at depth; magnetometers, if present, are passive sensors. These emissions are highly localized compared to subsea power transmission, and operations avoid medium-penetration HRG sources and export-cable infrastructure. EFH most plausibly intersected includes pelagic EFH within the upper 1,000 m and deep benthic features that may qualify as HAPCs (e.g., coral/sponge communities on seamount flanks), but any EMF-related effects would be limited to short-duration and small spatial scales at device proximity, with no mechanism for broad habitat alteration.

BMPs in the lease stipulations further constrain risk by restricting work to low-energy, *de minimis* equipment, requiring survey plan review with equipment specifications, and avoiding sensitive benthic habitats during seafloor device placement. In combination with deep-water settings, sparse assets, and intermittent use, these measures ensure that potential EMF interactions with electro/magneto-sensitive species within EFH and any HAPCs encountered remain minimal. Based on the small number and low power of EMF-emitting devices, their limited deployment, and enforceable BMPs, the Proposed Action is expected to result in minimal (i.e., insignificant) effects to EFH and, where present, HAPCs.

Vessel Strike. Vessel strikes occur when boats collide with marine animals; although most literature emphasizes whales, collisions affect at least 75 species, including some large sharks and mobulid rays that spend prolonged periods near the surface for feeding or cleaning, increasing exposure to traffic (Schoeman et al. 2020). Propeller and blunt-force injuries to reef manta rays (*Mobula alfredi*) have been documented and can heal rapidly, which may mask strike prevalence in photo-ID datasets (McGregor et al. 2019). Regional analyses show anthropogenic injuries, including boat strikes, are concentrated at sites with heavier tourism and vessel activity; for *M. alfredi* in the Maldives, injury likelihood was higher at cleaning stations and populated atolls (Strike et al. 2022), and in French Polynesia the majority of sub-lethal injuries at inhabited islands were consistent with propeller strikes (Carpentier et al. 2019).

For large sharks, global tracking and AIS data indicate extensive overlap with large-vessel traffic (≈92% of horizontal space use), with modeled collision-risk hotspots in major shipping corridors where collisions are often undetected and can be lethal (Womersley et al. 2022). Collectively, these studies demonstrate that pelagic EFH in the upper water column, often used by manta rays and sharks for feeding, cleaning, and migration, can be affected by vessel strike, while deeper HAPCs (e.g., seamount flanks supporting coral/sponge communities) are not exposed.

Under the Proposed Action, survey vessels tow equipment slowly (≈4–6 kn) and operate in remote, deep OCS waters far from nearshore aggregation sites, with limited trips and intermittent presence. Risk is further reduced by enforceable BMPs: speed limits ≤10 kn when feasible and when mammals and turtles are spotted, continuous monitoring and strike-avoidance zones around whales and other protected species, and use of trained Protected Species Observers within the potential lease areas with authority to slow/stop operations (**Appendix B**). Lower speeds are consistently linked to lower lethality in vessel-animal interactions, especially for medium vessels typical of survey fleets (Garrison et al. 2025).

Considering slow operational speeds, low vessel density, remote deep-water settings, and application of BMPs to detect and avoid animals, any strike-related effects on pelagic EFH used by manta rays and sharks would be short term and highly localized. Effects on HAPCs, if present along transit routes, are unlikely. The Proposed Action is expected to result in minimal adverse effects to EFH (and HAPCs, if applicable).

Oil Spills. Accidental releases of petroleum products from survey vessels could affect EFH, particularly pelagic spawning habitats where fish eggs and larvae are highly sensitive to PAHs. Experimental exposures to crude oil from *Deepwater Horizon* caused dose-dependent cardiotoxicity and developmental defects in embryos of tunas and amberjack at environmentally realistic PAH concentrations, indicating elevated mortality risks for early life stages in surface waters used as EFH (Incardona et al. 2014). Field studies in oiled marshes likewise documented persistent sublethal physiological and reproductive impairment in resident fishes despite low hydrocarbon residues, underscoring that even weathered oil can produce biologically meaningful effects (Whitehead et al. 2011). Reef-associated corals are also vulnerable: laboratory tests show condensate and aromatic hydrocarbons can inhibit coral larval metamorphosis at concentrations measured after large spills, with ultraviolet light amplifying toxicity; fertilization and settlement of *Acropora* spp. are inhibited by dispersed oils at sub-mg L^{-1} levels, which could degrade coral-reef HAPCs if exposure coincides with spawning (Negri and Heyward 2000; Negri et al. 2016). Long-term ecosystem syntheses following major spills further demonstrate persistent, indirect and chronic effects that can delay recovery of coastal communities (Peterson et al. 2003).

For this Proposed Action, the plausible spill scenario is limited to small volumes of marine diesel or lubricants from a small number of slow-moving vessels conducting intermittent deep-water operations far offshore. Diesel weathers and disperses rapidly, and small spills at sea typically evaporate and dilute within days; acute toxicity arises mainly where entrainment exposes organisms directly, especially in surface layers. The action includes enforceable BMPs that minimize spill likelihood and consequence: a site-specific Spill Prevention and Response Plan, a Contingency Plan defining operational limits and response authority, and marine-debris/contamination controls (**Appendix B**). These measures require immediate reporting, containment, and recovery where feasible, with emphasis on preventing releases during fueling and deck operations and curtailing activities under adverse conditions.

Given the remote location, deep-water setting, low traffic, limited fuel inventories, and implementation of BMPs, any accidental release would be short-lived, spatially constrained, and unlikely to overlap temporally with sensitive spawning events or coral recruitment. Therefore, effects on pelagic EFH would be brief and localized, and exposure pathways to reef HAPCs along transit routes are improbable. The Proposed Action is expected to result in minimal adverse effects to EFH (and HAPCs, if present).

Invasive Species. The principal pathway of potential invasive species effects is translocation of non-indigenous organisms and pathogens via vessel biofouling (hulls, niche areas, moorings) and equipment moved between regions; ballast water is a secondary pathway (Ruiz et al. 2000; Molnar et al. 2008). Biofouling transfers diverse taxa and associated microbes across bioregions, and even limited project fleets can act as vectors if proactive management is absent (Davidson et al. 2016; Georgiades et al. 2021). Observation-class ROV/AUV systems can also carry fouling biota unless cleaned between sites (Thaler et al. 2015).

Within the Action Area, pelagic EFH (eggs/larvae in the upper water column; juveniles/adults to ~1,000 m) and coral-reef EFH/HAPCs near the CNMI could be affected if biofouling organisms detach and colonize suitable near-surface habitats; precious-coral HAPCs are sensitive to introductions that alter benthic community structure (see EFH descriptions). Risk is moderated by the deep-water location, small number of vessels, and remote operations far offshore.

The project will implement a biofouling-management approach consistent with the IMO 2023 Biofouling Guidelines (MEPC.378(80)), including voyage-planning to avoid high-risk stops, selection/maintenance of effective antifouling systems, regular inspection of hull/niche areas, and avoidance of uncontained in-water cleaning (Davidson et al. 2016; International Maritime Organization 2023). ROV/AUVs will be inspected and cleaned of all organic material prior to each deployment, with pre-/post-dive checks and decontamination when moving between sites (Thaler et al. 2015). Where cleaning is required, capture systems or shore-based facilities will be used to prevent release (Davidson et al. 2016; International Maritime Organization 2023). The BMPs also require marine-debris prevention, spill contingency, and protected-species observers, reducing risk of ancillary vectors (**Appendix B**).

Given the deep, remote setting, limited surface infrastructure, and enforceable BMPs for hull/equipment biofouling and debris control, the probability of successful introduction, establishment, and spread of non-indigenous species or pathogens is low. Any effects on pelagic EFH or coral-reef/precious-coral HAPCs would be short-term and localized. The Proposed Action is expected to result in minimal adverse effects to EFH (and HAPCs, if applicable).

7.6 Cumulative Analysis

This section describes the projects and activities considered in the cumulative analysis for the Proposed Action. Possible sources of cumulative impacts specific to managed species and EFH are those that degrade the environment via one or more of the IPFs discussed in previous sections.

BOEM considered activities that may spatially and temporally overlap with proposed activities and lease areas. They include seabed mineral development, commercial fishing, marine vessel traffic, nonpoint sources of ocean discharges. Dynamic oceanographic and meteorologic conditions are also considered. Potential cumulative impacts are discussed below.

Seabed Mineral Development. There are currently no existing leases or formal commercial operations in regions nearby the proposed lease areas. However, deep-sea minerals do exist there, and some countries have been conducting exploration activities in areas beyond national jurisdiction.

Commercial Fishing. Commercial fishing activity occurs throughout the western Pacific (Western Pacific Regional Fishery Management Council 2009a; 2009c). Commercial fishing is the most widespread human exploitative activity in the marine environment, generating significant impacts to habitats and populations (Jennings and Kaiser 1998). Proposed activities would only incrementally add to the impacts relative to fishing, and those impacts would be temporary.

Marine Vessel Traffic. Commercial shipping has seen rapid growth in recent years and is expected to increase (Kaplan and Solomon 2016). The Action Area has active maritime traffic corridors (**Figures 5 and 66**). Noise from this shipping traffic can vary considerably according to regulatory and economic events (McKenna et al. 2012a), but it is an ongoing activity that occurs throughout the year. The proposed activities are only expected to produce a temporary increase in anthropogenic sound in the Action Area.

Nonpoint Source Discharges. Turbidity can increase in marine environments from terrestrial runoff, especially during storm events. The nearest nonpoint sources of pollution along West Coast transit routes are rivers and creeks which empty into the ocean along the mainland coast. The proposed activities are only expected to produce a temporary and incrementally small increase in turbidity within the Action Area.

Dynamic Oceanographic and Meteorologic Conditions. Dynamic oceanographic and meteorologic conditions may have significant impacts to marine life stemming from large shifts in ocean temperature, circulation, stratification, nutrient input, oxygen content, and ocean acidification (Doney et al. 2012; Penn and Deutsch 2022). In the short term, the minimally adverse consequences from project activities shall incrementally and temporarily increase the negative pressures faced by marine life and habitats that are experiencing these dynamic conditions.

Cumulative Conclusion

The impacts from the IPFs associated with project activities would be temporary and incremental and will not generate population-level consequences to managed species. Only minor adverse effects to EFH are expected, and these will be reduced through implementation of BMPs.

7.7 EFH Conclusion

Based on a comprehensive review of the proposed preliminary activities for commercial mineral leasing offshore CNMI and a synthesis of the best available scientific information, BOEM concludes that the Proposed Action will result in minimal adverse effects to EFH and, where present, HAPCs.

The analysis demonstrates that the spatial and temporal footprint of all project activities, including seafloor sampling, mooring and lander deployment, vessel operations, and associated support actions, will be extremely limited relative to the large lease areas and the dynamic, deepwater environment in which they occur. Direct disturbance to benthic habitats is restricted to small, discrete patches on abyssal plains, well below the depth range of demersal EFH and outside the core usage zones for pelagic EFH. Geotechnical surveys (box core sampling, free floating grab samples) will not be conducted in the Western Lease Area, and so disturbance within vent habitat will be minimized. The areal extent of seafloor disturbance is orders of magnitude too small to generate population-level impacts or compromise EFH functions at the regional scale. Where seamount flanks or other features with EFH/HAPC designations may be present, avoidance measures and operational controls are in place to prevent significant interaction.

Potential indirect effects, such as sediment resuspension and turbidity, are predicted to be short-lived and highly localized, with negligible vertical transport into the water column zones where pelagic eggs, larvae, and juveniles reside. The best available evidence from deep-sea plume studies and shallow-water sediment impact research supports the conclusion that the magnitude and duration of any such effects are insufficient to cause measurable harm to EFH or HAPC resources.

Other potential impacting factors, including the FAD effect, entanglement, marine debris, noise, artificial light, EMF alteration, vessel strike, oil spills, and invasive species, have each been evaluated in detail. The analysis incorporates peer-reviewed literature on the ecological mechanisms and sensitivities relevant to each IPF, with special attention to vulnerable taxa such as manta rays, sharks, and coral communities. In every case, the combination of project design, operational protocols, and enforceable BMPs ensures that risks are minimized. These BMPs include, but are not limited to, pre-survey planning and habitat avoidance; use of non-entangling mooring designs; strict marine debris prevention and recovery protocols; vessel speed limits and protected species observer requirements; downward-directed and shielded lighting; EMF minimization through low-power, intermittent use of scientific equipment; spill prevention and response planning; and comprehensive biofouling management to prevent invasive species introductions.

The cumulative analysis further supports the conclusion that, even when considered in the context of other ongoing and reasonably foreseeable activities in the region (such as commercial fishing, shipping, and potential future mineral development), the incremental contribution of the Proposed Action to overall EFH risk is minor and temporary. The deep, remote setting, limited number of assets, and robust mitigation framework collectively ensure that the structure, function, and ecological integrity of EFH and HAPCs will be maintained.

In summary, BOEM determines that the Proposed Action, as described and conditioned by the full suite of BMPs, will have minimal adverse effects on EFH and HAPCs.

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Appendix A: Bureau of Ocean Energy Management Area Identification Memorandum and Survey Assumptions

Appendix A1

Area Identification Memorandum

United States Department of the Interior
BUREAU OF OCEAN ENERGY MANAGEMENT
Pacific OCS Region
760 Paseo Camarillo, Suite 102
Camarillo, CA 93010-6064

Memorandum

To: Acting Director

From: Douglas P. Boren
Regional Director, Pacific Regional Office

DOUGLAS BOREN Digitally signed by DOUGLAS BOREN Date: 2026.03.13 13:40:21 -07'00'

Subject: Area Identification Recommendation for the Commonwealth of Northern Mariana Islands Outer Continental Shelf (OCS) Mineral Leasing Process

Area Identification (Area ID) is a major step in the Bureau of Ocean Energy Management's (BOEM) Outer Continental Shelf (OCS) mineral leasing process to develop a recommendation for an area to be carried forward for further leasing consideration and environmental analysis offshore the Commonwealth of Northern Mariana Islands (CNMI). Pursuant to 30 CFR 581.14, after considering the available OCS mineral resources, environmental data, and information, and the comments received from interested parties, including through the Request for Information and Interest (RFI), BOEM recommends tracts to be considered for a proposed lease offering. The recommended tracts would be considered in the forthcoming environmental analysis conducted for the activities that would be permissible under the proposed lease offering.

This memorandum documents your Area ID decision in accordance with 30 CFR 581.14. As noted above, your decision identifies the tracts to be carried forward for further leasing consideration and environmental analysis. The Area ID decision is not a final decision to lease nor is it an irreversible or irretrievable commitment of resources. The Area ID decision to support a potential OCS mineral lease sale offshore the CNMI is documented by your signature and marking your choice on the last page of this memorandum. A copy of this memorandum and the associated attachment will be made available on BOEM's website for public viewing and downloading.

I. Background

The Trump Administration recognizes that an overreliance on foreign critical minerals and their derivative products could jeopardize U.S. defense capabilities, infrastructure development, and technological innovation. To support and facilitate domestic production of critical minerals, President Trump issued a series of Executive Orders which direct the Department of the Interior (DOI) bureaus to facilitate and expedite critical mineral permitting, leasing, and ultimately development of critical minerals on the OCS. In response, on November 12, 2025, BOEM issued an RFI for commercial leasing for OCS seabed critical minerals offshore the CNMI (90 Fed. Reg. 50-872). The RFI requested information and comments on, and indications of interest in, the leasing of OCS minerals in the RFI Area. The RFI Area is located to the east of the Mariana Trench National Marine Sanctuary and extends to the northern, southern, and eastern limits of the OCS offshore the CNMI. It comprises approximately 35.5 million acres (143,595 square kilometers [km^2]) with approximate water depths ranging from 3,700–25,100 feet (1,130–7,650 meters). BOEM considered available OCS mineral resources, environmental data, and information and interest received in response to the RFI when considering whether to proceed with additional steps leading to a potential OCS mineral lease sale offshore the CNMI.

II. Comments Received in Response to the RFI

In response to the RFI, BOEM received comments both opposing and supporting the proposed commercial lease sale in and around the RFI Area. Through January 12, 2026, BOEM received a total of 65,585 public comment submissions in response to the RFI (Docket BOEM-2025-0351). Of the total 65,585 public submissions, 1,672 have been identified as unique; 58,592 copies were associated with 29 form letter campaigns, petitions, and letters with multiple signatories; and 5,321 were considered duplicate or not germane. Pursuant to 30 CFR 581.14, BOEM considered these comments in developing an Area ID recommendation for a proposed lease sale for OCS minerals offshore the CNMI. **Attachment 1 provides an RFI comment summary**. Key highlights of the comments received are noted below:

- Governor of the Commonwealth of the Northern Mariana Islands David M. Apatang submitted a letter stating that he will neither fully support nor fully oppose advancing seabed mining activities based on information contained in the RFI. He requested that prior to any leasing decisions, the following be conducted: comprehensive scientific data and baseline environmental information, a full Environmental Impact Statement (EIS), clear economic benefit pathways, and meaningful government-to-government and community engagement.
- Governor of Guam Lourdes A. Leon Guerrero, Lieutenant Governor Josh Tenorio, and other top government leaders of Guam submitted several letters stating joint opposition to the proposed commercial leasing of OCS minerals offshore the CNMI. Top government leaders requested: a halt to the leasing process; inclusion of Guam in further discussion and decisions; initiation of a regional EIS; sufficient scientific research and analysis of the environmental, ecological, economic, and marine life impacts of seabed mining; and assurance that any future policy aligns with U.S. commitments to Indigenous rights and environmental protection.
- The Guam Legislature submitted Resolution No. 132-38 (COR) which reaffirms a moratorium on deep-sea mining and opposes BOEM's offshore mineral leasing proposal near the CNMI.
- Commenters cited the growing global consensus against deep-sea mining, noting that approximately 40 organizations in approximately 40 countries, over 65 major corporations, 37 financial institutions, and more than 940 marine scientists and experts have called for a moratorium.
- Commenters requested that the governments of the CNMI and Guam be transparently consulted and engaged in any leasing decisions in the RFI Area.
- Commenters expressed concern about irreversible damage to deep-sea ecosystems, and highlighted potential threats to marine food webs, endangered species, coral reefs, fisheries, noise pollution, light pollution, important national monuments such as

the Mariana Trench National Monument, and toxic releases associated with mining activities.

- Commenters emphasized the biodiversity and slow recovery of benthic communities, including rare and undiscovered species, particularly on seamounts and hydrothermal vents. They suggested mitigation measures such as plume elimination, selective harvesting, third-party monitoring, and spatial restrictions; they also urged BOEM to create avoidance zones and protective buffers (e.g., 5-mile “no-mining” areas) for sensitive and culturally significant sites.
- Commenters described sediment plumes that can potentially travel hundreds of miles or kilometers as detrimental to water quality by disturbing and redistributing sediment on the seafloor, smothering benthic communities, and discharging any unwanted mud, silt, and debris from the above-surface mining vessel.
- Commenters expressed concern about the potential for transboundary impacts from deep-sea mining activities, including spillover effects from oil spills, drilling discharge, and sediment plumes, as well as increased vessel traffic and geochemical and water temperature alteration across the CNMI and into neighboring islands.
- Commenters expressed concerns about impacts to commercial and subsistence fisheries, including threatening commercially important fish species and the $5.5 billion Pacific tuna industry.
- Commenters expressed concerns over the impact that deep-sea mining would have on tourism and recreation in the CNMI and Guam, including interfering with activities like whale watching, diving, fishing tours, and snorkeling.
- Commenters discussed the lack of comprehensive baseline data and ongoing environmental monitoring in the RFI Area, and emphasized the need to characterize habitats, document species interactions, and assess existing human impacts to prevent and mitigate deep-sea mining effects.
- Commenters urged respect for Indigenous rights and sovereignty in ocean resource decisions, citing cultural, spiritual, and ancestral ties to the Mariana Islands.
- Commenters stated that BOEM must fully consult with the Indigenous people of the CNMI, give weight to local concerns, hold public hearings, and provide education resources as part of any leasing process.
- Commenters expressed concern that mining would destroy underwater cultural heritage sites including shipwrecks, airplane wrecks, submerged landscapes, and archaeological materials that are largely unrecorded and irreplaceable.
- Commenters stated that leasing in the proposed area could mitigate national security risks, provide large quantities of critical minerals and revenue for the U.S. Treasury, and support ocean resource economy initiatives.
- Commenters expressed concerns that current proposals do not guarantee local job creation, investment in infrastructure, or meaningful benefit sharing frameworks with the CNMI or Guam.
- Commenters expressed support for BOEM advancing exploration and evaluation of potential commercial leasing, emphasizing the importance of the U.S. Exclusive Economic Zone (EEZ) and the need for federal oversight.
- A commenter stated that the RFI Area lies within a marine mineral prospective region for ferromanganese crust and nodules and is therefore suitable for OCS mineral

development, and also suggested fully excluding seafloor sulfide and cobalt-rich crust seabed mineral resources from consideration for future mining leases, describing the invasive effects this type of mining would have on the area.

- Commenters stated that BOEM should develop a clear leasing schedule to allow for the incorporation of ongoing data collection efforts.
- Commenters provided a variety of comments regarding rent and royalty rates, lease size, and lease contraction. Industry comments expressed support for BOEM's proposal not to charge rent during the first five years of leases; for BOEM to suspend rental payments during Plan reviews; and suggested that royalty rates should be based on revenues generated, no higher than 3 percent, and reduced to 1.5 percent for the first five years. Other commenters stated that BOEM should ensure royalty rates provide a fair return, reject low rates proposed by industry of 3 percent or lower, and that robust royalty and compensatory mitigation programs be put in place to offset impacts to ocean resources and the local economy.
- Commentors expressed support for large lease areas by suggesting a minimum lease area size of 25,000 km^2 and that the lease area sizes are consistent with the size of other International Seabed Authority (ISA) exploration contracts (75,000 km^2).
- A commenter said that a two-stage lease contraction schedule, with the first contraction reduced to no more than 25 percent of the original lease area and the second reduced to 5 to 10 percent of the original lease area, seems reasonable but that the contraction parameters should be clearly defined in advance.

III. Indications of Interest Received in Response to the RFI

BOEM received indications of interest from several companies in response to the RFI. Indications of interest identified areas of interest in the RFI Area and several included additional areas west of the CNMI, as shown in the Indications of Interest Heat Map (Figure 1).

Indications of interest and comments identified polymetallic nodules in the RFI Area to the east. In addition to interest in the RFI Area, there were multiple expressions of interest in polymetallic sulfides to the west of the CNMI. In both areas, the primary minerals for commercial development include potential commercially viable quantities of cobalt, nickel, copper, manganese, zinc, rare earth elements, along with other minerals that may prove economically viable to extract and process in the future.

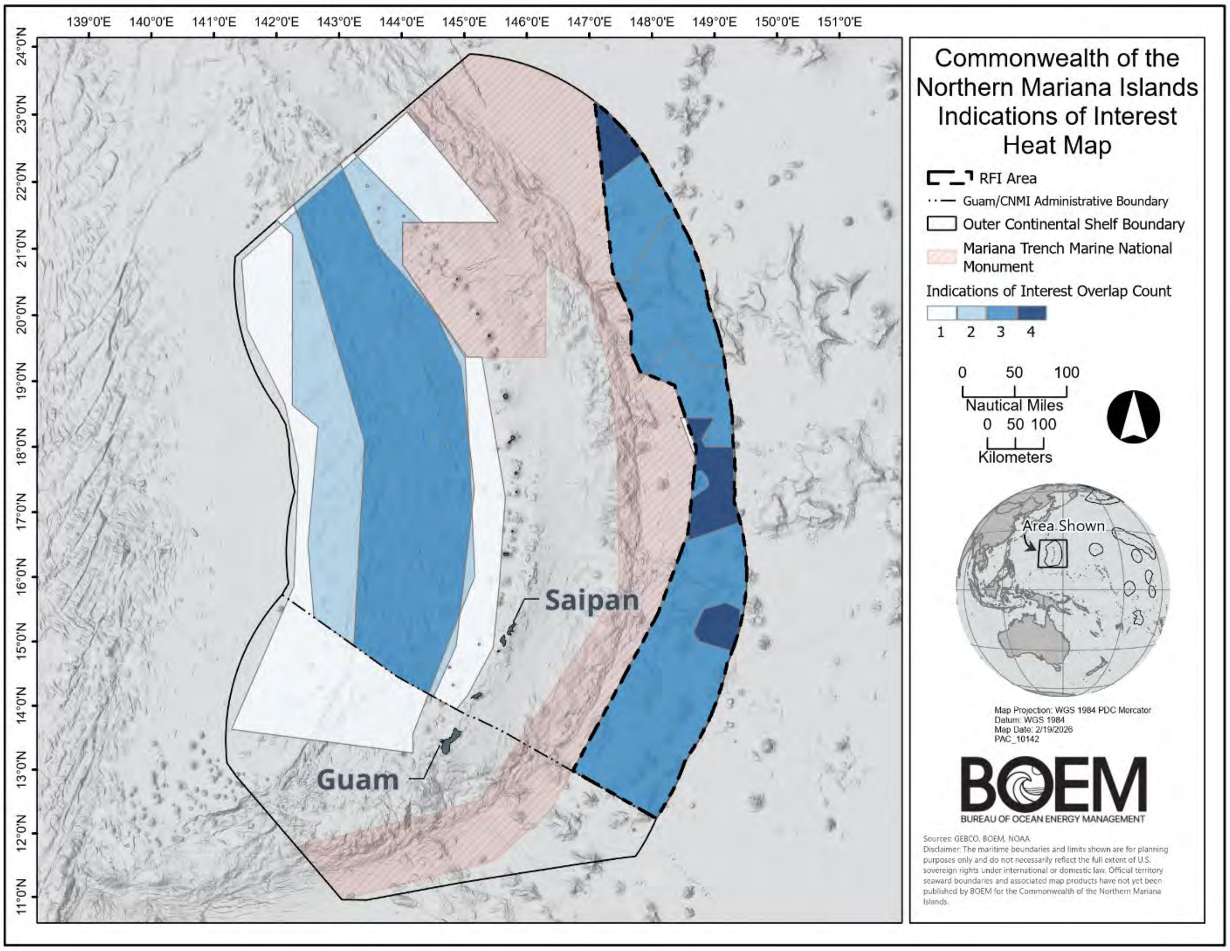

Figure 1: Indications of Interest Heat Map. The highest priority areas are shown as dark blue, lower priority areas shown in lighter shades of blue, and the lowest priority area shown in white.

IV. Recommendation

In formulating the Area ID recommendation, BOEM considered the available OCS mineral resource information, environmental data and information, comments received in response to the RFI, and indications of interest in OCS mineral leasing. The presence of any minable orebody is unknown, and additional prospecting is needed to discover and delineate OCS minerals, hence, the size of the tracts for potential leasing is relatively large. The recommended area includes two geographically distinct areas, one east and one west of the CNMI as shown in Figure 2. The area east of the CNMI is 35,483,044 acres (143,595 km^2) or 6,502 whole or partial blocks and is 128 mi (206 km) from Saipan and 127 mi (205 km) from Guam at its closest point. The area west of the CNMI is 33,618,369 acres (136,049 km^2), or 6,248 whole or partial blocks, and is 57 mi (91 km) from Saipan and 46 mi (74 km) from Guam at its closest point. The southern boundary of the recommended area is north of the OCS Administrative Boundary between the CNMI and Guam on the OCS.

The recommended area located east of the CNMI and the Mariana Trench National Marine Monument is consistent with indications of interest and prospective seabed mineral regions identified by the U.S. Geological Survey (USGS) in and around the RFI Area for ferromanganese crusts and polymetallic nodules, as shown in the CNMI Marine Minerals Prospective Regions Map (Figure 2), which is based on the USGS Global Marine Mineral Prospective Regions Viewer[1] and Global Marine Minerals Prospective Regions Map.[2]

The recommended area located west of the CNMI is consistent with indications of interest. However, published information on prospective areas for polymetallic sulfides is limited. The USGS Global Marine Mineral Prospective Regions Viewer[1] is presently limited to areas prospective for ferromanganese crusts and nodules. The viewer does not display the USGS outline of areas prospective for polymetallic sulfide deposits. Instead, the USGS regional outline of prospective areas for polymetallic sulfide deposits is depicted on a static map[2] and the rationale described in a separate USGS publication.[3] These USGS sources support the area being prospective for polymetallic sulfides because the geologic setting is a back-arc basin, which are known to be regions where hydrothermal vents form.[3] USGS states that under certain conditions hydrothermal vents can form polymetallic sulfide deposits.

Additionally, data contained in the InterRidge Vents Database,[4] which provides a comprehensive list of active submarine hydrothermal vent fields aggregated from USGS reports and other research efforts, lists multiple identified active vents in the recommended area to the west of the CNMI. The presence of these hydrothermal vents is the result of the circulation of hydrothermal fluids, which are a necessary component for the formation of polymetallic sulfide deposits. The presence of a hydrothermal vent does not directly correlate with the presence of a polymetallic sulfide deposit. When present, the majority of a deposit is buried beneath sediment, making detection difficult without physical sampling and application of geophysical exploration methods. To date, no field work within the area has been conducted expressly for the purpose of locating polymetallic sulfide deposits using physical sampling or geophysical exploration techniques. The presence of polymetallic sulfide deposits in the area is therefore inferred based on the geologic setting and presence of hydrothermal vents.

The RFI noted that BOEM, based on information received, would determine if any responses identify specific areas of interest in and around the RFI Area that could support commercial mineral development. With the inclusion of the additional western area that was included in several indications of interest, the recommended area is approximately twice the size of the RFI Area. Collectively, all areas with three or more indications of interest are fully contained within the acreage/blocks included in the Area ID recommendation.

The recommendation is for selected tracts east and west of the CNMI to be considered in the environmental analysis conducted for the proposed lease offering. BOEM will consider available

[1] USGS Global Resource Viewer. September 24, 2024. World Regions of Interest for Ferromanganese Minerals
[2] USGS Global Marine Mineral Prospective Regions Map. January 31, 2025. https://www.usgs.gov/media/images/global-marine-mineral-prospective-regions-map.
[3] USGS Fact Sheet 2025-3017: April 2025. fs20253017.pdf - U.S. Geological Survey Global Seabed Mineral Resources
[4] Beaulieu, SE; Szafrański, KM (2020): InterRidge Global Database of Active Submarine Hydrothermal Vent Fields

environmental information and comments received through the RFI that inform the environmental review of activities permissible under a lease which are preliminary activities[5] needed to prepare plans for comprehensive technical and environmental review by BOEM. The comments received in response to the RFI will also inform future project specific environmental analysis if leases are issued and plans are submitted by lessees for work under their lease.

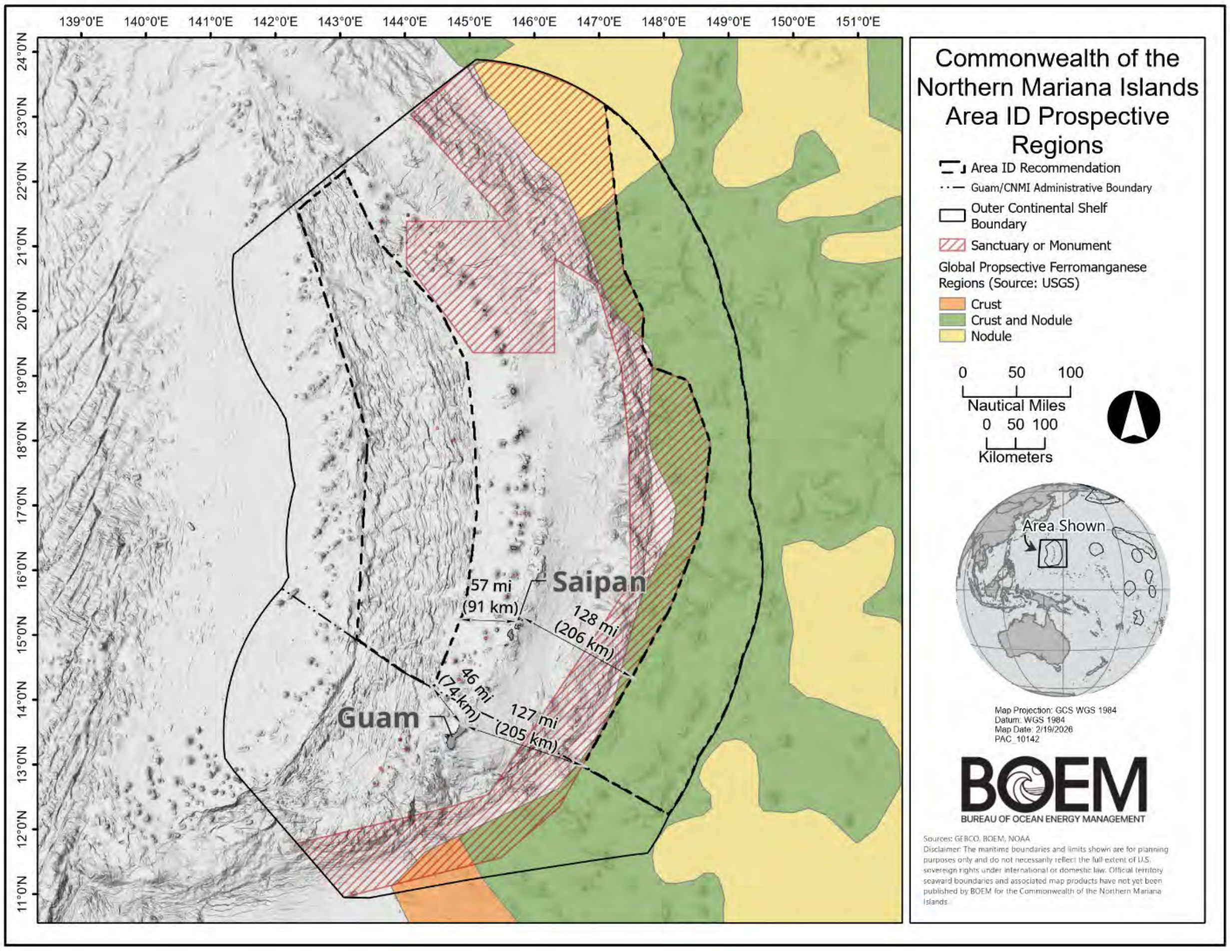

Figure 2: CNMI Marine Minerals Prospective Regions Map. Global prospective ferromanganese regions for crusts are shown in orange, and prospective ferromanganese regions for nodules are shown in yellow, based on the USGS Global Marine Mineral Prospective Regions Map[6]

We recommend that you consider for environmental analysis for potential leasing all available blocks within the CNMI RFI Area plus an additional area to the west of the CNMI, as shown in the CNMI Area ID Map (Figure 3). This Area ID recommendation

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[5] Preliminary activities are bathymetric, geological, geophysical, mapping, and other surveys necessary to develop a comprehensive Delineation, Testing, or Mining Plan. 30 CFR 582.21(d).

[6] USGS Coastal and Marine Hazards and Resources Program. Global Marine Mineral Prospective Regions Map. January 31, 2025. https://www.usgs.gov/media/images/global-marine-mineral-prospective-regions-map.

constitutes an area of approximately 12,750 whole or partial blocks covering approximately 69,101,413 acres. This Area ID recommendation does not commit DOI to future leasing or a specific number of blocks or acreage to be offered at the lease sale stage.

- This Area ID recommendation provides flexibility as BOEM completes the required consultations, environmental analyses, and development of reasonable alternatives pursuant to National Environmental Policy Act (NEPA) and other statutes.
- The environmental analysis, which will be completed before making any decisions to hold a lease sale, will inform potential exclusions and best management practices that can be applied to leases issued in a potential CNMI OCS mineral lease sale.

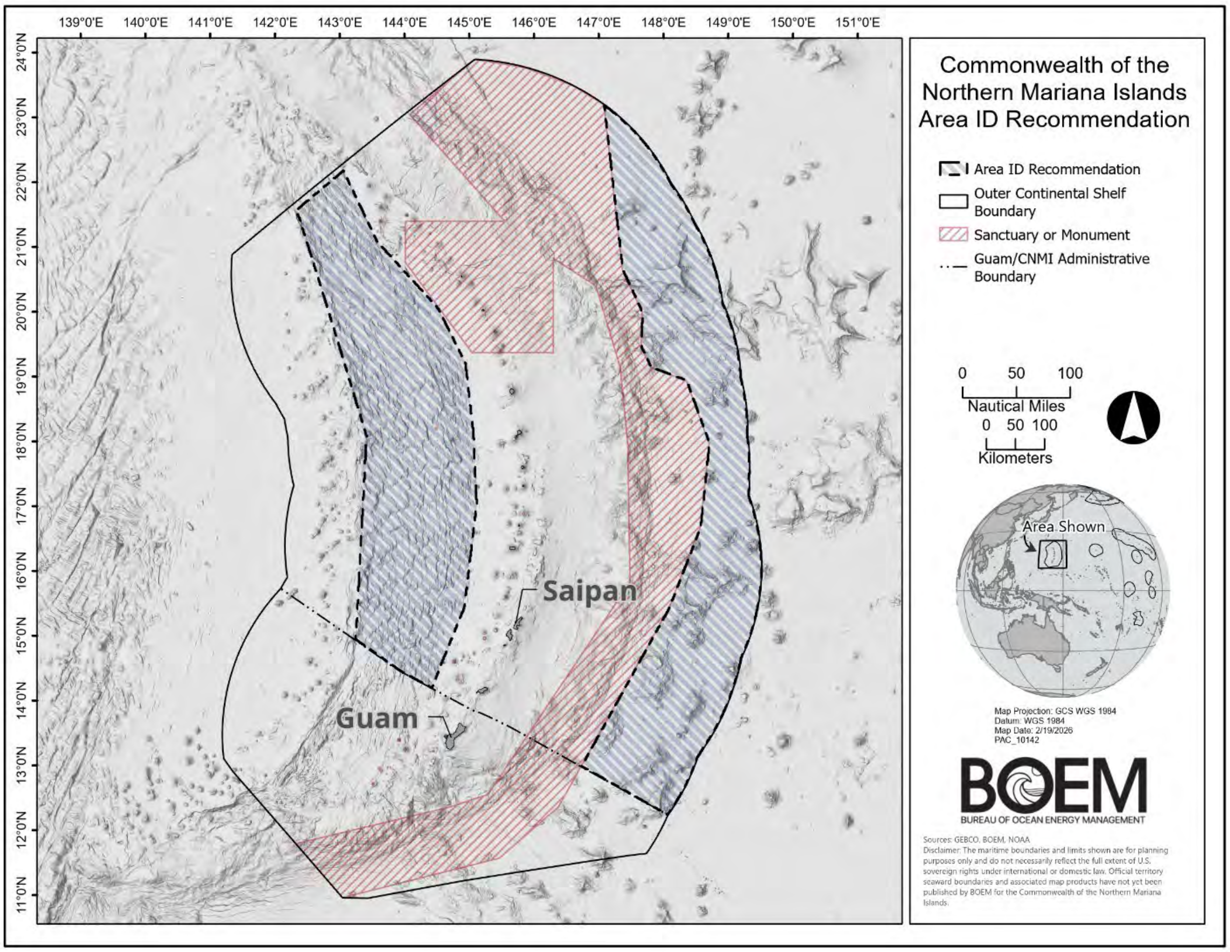

Figure 3: CNMI Area ID Recommendation Map.

V. Decision Options

Please indicate your decision by signing and dating this memorandum and marking appropriately below:

☑ I concur with the recommendation. Please continue with the Area ID announcement.

_______ I have made edits to modify the Area ID recommendation; please finalize and continue with the Area ID announcement.

_______ Please stop preparations for the Area ID announcement.

MATTHEW GIACONA Digitally signed by MATTHEW GIACONA Date: 2026.03.16 12:30:30 -04'00'

3-16-2026

Matthew N. Giacona
Acting Director
Bureau of Ocean Energy Management

Date

Attachment 1. BOEM CNMI RFI Public Comment Summary Report

Appendix A2

Survey Assumptions: Additional Survey Technical Specifications and Examples

Overview

This appendix summarizes technical information for some of the survey equipment expected to be used during preliminary activities. Examples of representative, available technology at the time of this writing are provided.

Autonomous Underwater Vehicles

Kongsberg's Hugin AUV was developed in the late 1990s to perform deepwater surveys where traditional methods were no longer feasible. The Hugin AUV has become the industry standard AUV used for hydrographic and geophysical surveys within the petroleum and renewable industries. The early systems used an aluminum hydrogen peroxide "fuel cell" battery and quickly changed to lithium-ion battery. Over the past few decades, advances in battery and sensor technology, together with improvements in computer hardware and software, have significantly enhanced AUV capabilities. These developments have increased survey endurance, enabling longer underwater missions, while also improving the resolution and georeferencing accuracy of the data collected. Other advances in technology allow AUVs to operate independently of direct support from a vessel and allow a single vessel to support multiple AUV systems simultaneously.

Table A2-1 describes representative payloads that an AUV can carry. **Table A2-2** shows the representative AUV payload, including navigation equipment.

Table A2-1. Representative AUV - Kongsberg Hugin 6000, summary of specifications

AUV	Characteristic
Physical Dimensions	19.7 ft (6 m) long, 2.5 ft (0.75 m) diameter
Weight	3,307 pounds (1,500 kilograms) (in air), neutrally buoyant (in water)
Endurance	60–80 hours Rechargeable Lithium-Ion Polymer Batteries
Speed range	2–6 knots (operational speed ~ 3.5 knots)
Depth rating	19,685 ft (6,000 m)

Table A2-2. Representative AUV payload including navigation equipment

AUV Payload / Equipment	Make / Model	Acoustic Information (if acoustic)	Intent / Coverage	Lateral Distance (m) to Level B Threshold[1]
MBES	Kongsberg EM2040	Frequency: 200–400 kHz Operational Power: 150W Source Level: 218 dB re 1 μPa Beam Width: 0.4° x 0.7° (400 kHz)[2]	Bathymetric mapping	N/A
Side-scan Sonar	Edgetech 2205	Frequency 230/410 kHz Operational Power: 200 W Source Level 226 dB re 1 μPa Beam Width: 0.2° x 0.2[2]	Target identification, seabed sediment delineation	N/A
Sub-bottom Profiler	Edgetech DW216	Frequency: 2–16 kHz Operational Power: 200 W Source Level: 176 to 180 dB	Seabed structure imaging	8.7
Magnetometer	Ocean Floor Geophysics, Inc. Self Compensating Magnetometer	See Note 3	Detect ferrous materials	N/A
Forward-looking Sonar	Imagenex 837A Delta T – 120°V x 10°H	Frequency: 260 kHz[2] Operational Power: 22 to 32 Volts DC at less than 5 W Source Level: See Note 4. Beam Width: 3°, 1.5°, 0.75°	Obstacle avoidance multibeam sonar	N/A
Conductivity, Temperature, and Density Profiler	SAIV AS CTD Profiler 208	See Note 3	Critical for MBES data quality and improves subsea positioning	N/A
Doppler Velocity Log	Nortek DVL	Frequency: 500 kHz[2] Operational Power: 4 W average Source Level: See Note 4. Beam Width: 4°	Bottom tracking, provides information on currents experienced by AUV for navigation.	N/A
Depth Sensor	Paroscientific Digiquartz D50	See Note 3	Provides accurate depth values for navigation	N/A
Digital Altimeter	Kongsberg Mesotech, Ltd.	Frequency: 200 kHz or 675 kHz[2] Operational Power: 22 to 28 Volts DC external power source Source Level: See Note 4. Beam Width: 2.7° (675 kHz), 10° (200 kHz)	Provides accurate altitudes above seabed to assist in maintaining required AUV flight altitude	N/A
Inertial Motion Unit	Honeywell HG9900	See Note 3	Provides motion information for navigation	N/A
AUV Novatel Global Navigation Satellite System	NovAtel	See Note 3	For surface navigation; state-of-the-art system with sub-meter accuracy, uncertainty conforming to IHO special order	N/A
HD Camera + Lights (Optional)	CathX Ocean M12 A1000 UHD stills camera	See Note 3	Stills camera: supplemental AUV system (not required for planned survey activities but could be used for data collection)	N/A

AUV Payload / Equipment	Make / Model	Acoustic Information (if acoustic)	Intent / Coverage	Lateral Distance (m) to Level B Threshold[1]
Turbidity, Fluorescence, Dissolved Oxygen	FLNU (RT)D	See Note 3	Water quality sensors: supplemental AUV system (not required for planned survey activities but could be used for data collection)	N/A
cNODE Ultra-Short Baseline (USBL) Beacon	Kongsberg TDR30V or TD40V USBL Transponder 206dB TX x 85dB Rx	Frequency: 21–31 kHz Operational Power: Battery-powered (charger is 110 or 120 W) Source level: 206 dB Beamwidth: 30° horizontal and vertical Ping Rate: between 1 and 10 seconds	Underwater positioning to communicate with the surface system deployed from the surface support vessel	45–48
cNODE Modem Explorer	Kongsberg Modem Explorer 34 with TDR40V Transponder	Frequency 21–31 kHz Operational Power: 100 W Beamwidth: +/- 20° Vertical Duty cycle: 50%	Acoustic modem between survey vessel and AUV; transmits vehicle health and decimated HRG data; receives navigation updates and survey commands	45–48
UTP Array on Seabed	Kongsberg cNODE Maxi	Further details in Table A2-3	Further details in Table A2-3	45–48
Survey Support Ship USBL System	Kongsberg HiPAP 502	Frequency: 21–31 kHz Operational Power: 15 W Source Level: See Note 4. Beam Width: Dynamically alters the beam using electronic beam control Ping Rate: 1–10 Hz[3, 4]	Mounted on the survey support vessel; provides accurate subsea positioning of cNODE UTP and cNODE USBL beacons, enabling accurate subsea navigation; USBL used to directly position the AUV during operations in the export cable siting corridors and could also assist in AUV positioning in the lease area	31.20

Key: AUV = autonomous underwater vehicle; dB = decibel; DC = direct current; kHz = kilohertz; MBES = multibeam echosounder; re 1 μPA = underwater sound pressure referenced as 1 micro-Pascal; USBL = ultra-short baseline; UTP = underwater transponder positioning; W = watts

Notes:

1. Level B harassment for nonmilitary readiness activities means any act of pursuit, torment, or annoyance with the potential to disturb a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, including, but not limited to, migration, breathing, nursing, feeding, or sheltering. Changes in behavior that disrupt biologically significant behaviors or activities for the affected animal are indicative of take by Level B harassment under the Marine Mammal Protection Act.
2. Operating frequencies are above all relevant marine mammal hearing thresholds and therefore are not possible sources of disturbance to marine mammals.
3. Proposed equipment is non-acoustic or otherwise not a possible source of disturbance to marine mammals.
4. Information not specified by the manufacturer.

Underwater Transponder Positioning (UTP)

Acoustic energy travels farther in water than other forms of energy, such as light. As a result of this characteristic, underwater sound has been used to support the positioning of vessels and systems under the water for decades in the form of ultra-short or long baseline positioning systems. The use of AUVs required improved accuracy. As such, researchers at Kongsberg Marine developed UTP to be used in tandem with the HUGIN AUV (Hegrenæs et al. 2009). Weighted transponders (with or without a flotation collar) are placed on the seafloor and transmit a location signal only when interrogated by the AUV. **Table A2-3** describes representative specifications and acoustic characteristics of typical UTPs.

Table A2-3. UTP support equipment details for AUV

UTP	Characteristic
Physical Dimensions	**Weighted Deployment** The UTP transponder will comprise a 132-pound (60-kilogram) steel clump weight, 16- to 33- ft (5- to 10-m) rope, and the UTP transponder. The UTP transponder will be in a flotation collar suspended 19 to 36 ft (5 to 11 m) above the seabed. The footprint of each UTP transponder weight is less than 15 ft^2 (1.4 m^2). The total area of seabed impacted is conservatively (highest reasonable case) estimated at 27 x 15 ft^2 (1.4 m^2) plus 13 x 21.5 ft^2 (2m^2), a total area of 684.5 ft^2 (64 m^2).
Acoustic Characteristics	Frequency: 21–31 kHz Operational Power: Battery-powered 10–14.4 volts DC Source level: 206 dB Beamwidth: 30° horizontal and vertical Ping rate: 1–10 Hz.

Geotechnical Sampling Equipment

Direct sampling of the seabed is important to determine the presence and makeup of seabed minerals. For polymetallic nodules, box cores and free floating grab samplers are used by industry to conduct geotechnical surveys. For sulfides, BOEM envisions that direct sampling by ROVs will be used. Box cores consist of a 0.5–1.0 m^2 box and a large swinging spade that sinks into the seabed; the top and bottom of the box core is sealed when lifted back to the surface. The box core is deployed via a ship and is connected to an oceanographic winch. Free floating grab samplers consist of weights and a float with a sample basket to take the sample. Free floating grab samplers are not connected to a vessel and operate mechanically. When the free floating grab sampler is deployed at the surface, it is negatively buoyant and sinks to the seabed. Once it contacts the seabed, the ballast is released, and the buoyant force of the float closes the sample basket and returns the grab sampler to the surface for retrieval.

Both systems can also employ use of cameras, CTDs, USBL beacons, dissolved oxygen sensors, and other equipment. Typically, box cores are tracked by USBL navigation to the seabed and can be positioned within several hundred meters of the intended target. Free floating grab samplers typically are not tracked by USBL. The vessel will deploy a free floating grab sampler and transit to the next deployment site. Several free floating grab samples can be deployed with the vessel returning later to retrieve the samplers at the surface.

ROVs would sample seafloor massive sulfides using their manipulator. Push cores, which are small tubes pushed into the seabed to retrieve a sample, could be used. In addition, small scoops have been used by manipulators, along with physically retrieving a sample with the manipulator’s claw from the seabed.

Surface Vessel Multibeam and Sub-bottom

Deep water bathymetry requires use of a “full ocean depth” multibeam. There are two in general use today. The Kongsberg EM12x and EM30x models of multibeam (the x is the version number, now at 4). These are a 12kHz (low frequency) multibeam and a 30kHz (medium frequency) multibeam, respectively. The EM124 multibeam is typically installed on large research vessels, while the EM304 is installed on smaller vessels. Both multibeams function similarly with an array of transmit transducers mounted parallel to the keel of the vessel, with an array of receive transducers perpendicular to the keel. This is called the Mills Cross configuration. Using this arrangement “beams” of bathymetric soundings can be measured in a fan shape perpendicular to the motion of travel of the vessel. Backscatter, which is the intensity of the return, and water column data, which is the reflectivity of the water column, are also typically recorded.

Kongsberg also manufactures the SB29, an add on for these multibeams, that is a separate transducer that allows for sub-bottom profiling. This transducer emits a sub-bottom sonar pulse that is detected by the multibeam’s receive transducers. If not so equipped, some research vessels have a separate deep water sub-bottom profiler that is a standalone unit.

The main functional difference between the two multibeam is the frequency and power of the transmitted sonar pulse. With the EM124, the lower frequency sonar, a swath width of 10km+ can be achieved in 5,000m+. With the medium frequency sonar, the EM304, the swath width is only about 3km. The medium frequency sonar will lead to more survey lines being needed to run to achieve the same result as the larger, low-frequency sonar.

Appendix B: BMPs for Protection of ESA-Listed Species

If leases or grants are issued, BOEM will require the lessee to comply with BMPs through lease stipulations to minimize potential impacts to ESA-listed species. BMPs described below have been developed through years of conventional energy operations and consultations with the NMFS, including vessel strike avoidance BMPs, visual monitoring, and reporting. These BMPs minimize or eliminate potential effects from preliminary activities to ESA-listed species. The Lessee, its operators, personnel, and contractors will be required to satisfy requirements related to ESA-listed species by complying with the BMPs outlined below, as appropriate.

Vessel Speed Requirements

Summary

Vessel speeds must be reduced to 10 knots or less when mother-calf pairs, pods, or large assemblages (greater than three) of any marine mammal are observed near a vessel, whether in a lease area or traveling between a port to the lease area. Operators shall be particularly vigilant to watch for turtles at or near the surface in areas of known or suspected turtle activity, and if practicable, reduce vessel speed to 5 knots or less.

Justification

Studies show that lower vessel speed is associated with lower risk for animal injury and mortality. Vessels traveling at lower speeds will have more time to notice and avoid ESA-listed species, reducing the risk of ship strikes. Even if observers are posted to watch for ESA-listed species, marine mammals and sea turtles spend the majority of their time underwater and may not be sighted as vessels approach. The lower vessel speed allows ESA-listed species more time to move out of the path of vessels and reduces the risk of injury and mortality if a vessel strikes an animal.

Vessel Strike Avoidance Zone

Summary

All vessels associated with lessee activity must have a Protected Species Observer (PSO) or trained observer monitoring the vessel strike avoidance zone for ESA-listed species at all times. If sperm whales are detected at or within 100 meters, any baleen whale is detected within 500 meters, or any other ESA-listed species is detected within 50 meters, including sea turtles, and large jellyfish aggregations, the vessel shall slow down, stop, or alter course, as appropriate and regardless of vessel size to avoid striking any ESA-listed species. The only exception is when the safety of the vessel or crew necessitates deviation from these requirements.

Justification

The vessel strike avoidance zone is recommended to reduce the risk of ship strikes by providing more time for vessel operators to adjust course or slow down to avoid marine mammals and sea turtles. Additionally, avoiding animals seen at the surface may also reduce risk of collision with other nearby animals underwater. These vessel strike avoidance zone distances mirror the nationwide policy recommended by BOEM’s Center for Marine Acoustics, which reflects prior NMFS consultations. The

500m vessel strike avoidance zone is a precautionary approach due to the uncertainty and data gaps surrounding ESA-listed species abundance and distribution in these areas.

Protocols

a. For all vessels associated with lessee activity and operating in the lease area (including while surveying and transiting), a PSO must monitor a Vessel Strike Avoidance Zone (100 m or greater for sperm whales; 500m or greater for all baleen whales; 50m or greater for any other ESA-listed species, including sea turtles) in all directions to ensure detection of that animal in time to take necessary measures to avoid striking the animal. If an animal is detected at or within the above vessel strike avoidance zones, the vessel shall slow down, stop, or alter course, as appropriate and regardless of vessel size to avoid striking any ESA-listed species.

b. For all vessels transiting to a lease area, a PSO or a trained vessel captain or trained crew member must watch for ESA-listed species and when detected at or within the vessel strike avoidance zones listed above, the vessel shall slow down, stop, or alter course, as appropriate and regardless of vessel size to avoid striking any ESA-listed species

c. All PSOs monitoring the strike avoidance zone must have completed an NMFS-approved commercial PSO training course. Documentation of the most recent training certificates of individual PSOs' successful completion of an NMFS-approved commercial PSO training course with an overall examination score of 90% or greater must be provided upon request. Instructions and application requirements to become an NMFS-approved PSO can be found at http://www.fisheries.noaa.gov/national/endangered-species-conservation/protected-speciesobservers

d. All observers (trained captain or crew) monitoring the strike avoidance zone must have completed an NMFS-approved training course for ESA-listed species observers.

    i. PSOs and trained vessel captain and crew observers must maintain a vigilant watch for all ESA-listed species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any ESA-listed species. The presence of a single individual at the surface may indicate the presence of submerged animals in the vicinity; therefore, precautionary measures should always be exercised.

e. Survey plans must include identification of vessel strike avoidance measures, including procedures for equipment shut down and retrieval, communication between PSOs/observers, equipment operators, and the captain, and other measures necessary to avoid vessel strike while maintaining vessel and crew safety. If any circumstances are anticipated that may preclude the implementation of this BMP, they must be clearly identified in the survey plan and alternative procedures outlined in the plan to ensure minimum distances are maintained and vessel strikes can be avoided. This includes the use of ancillary and autonomous surface vessel (ASV) or uncrewed surface vessels (USVs).

f. All vessel crew members must be briefed on the identification of ESA-listed species that may occur in the survey area and in regulations and best practices for avoiding vessel collisions. Reference materials must be available aboard all project vessels for identification of ESA-listed species. The expectation and process for reporting of ESA-listed species sighted during surveys must be clearly communicated and posted in highly visible locations aboard all project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process for crew members to do so.

g. The Vessel Strike Avoidance Zones are a minimum of 100 m or greater for sperm whales; 500m or greater for all baleen whales; and 50m or greater for any other ESA-listed species, including sea turtles and must be maintained around all surface vessels at all times.

h. If an ESA-listed species is identified within 500 m of the forward path of any vessel, the vessel operator must steer a course away from the animal at 10 kn or less until the minimum vessel strike avoidance zone separation distance has been established (as required above). Vessels may also shift to idle if feasible.

i. If an ESA-listed species is sighted within 200 m of the forward path of a vessel, the vessel operator must reduce speed and shift the engine to neutral. Engines must not be engaged until the animal has moved outside of the vessel's path and beyond the appropriate vessel strike avoidance zone. If stationary, the vessel must not engage engines until the animal has moved beyond the appropriate vessel strike avoidance zone.

j. When ESA-listed species are sighted while a vessel is underway, the vessel shall take action as necessary to avoid violating the relevant separation distance (e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area, reduce speed, and shift the engine to neutral). This does not apply to any vessel towing gear or any vessel that is navigationally constrained. These requirements do not apply in any case where compliance would create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply.

k. All observations by observers must be recorded per reporting requirements.

l. Vessels underway must not divert their course to approach any ESA-listed species.

m. Lessees are directed to NMFS' Marine Life Viewing Guidelines, which highlight the importance of these measures for avoiding impacts to mother/calf pairs.

n. Wherever available, lessees will ensure all vessel operators check for daily information regarding ESA-listed species sighting locations. These media may include, but are not limited to: Channel 16 broadcasts, whalesafe.com, and the Whale/Ocean Alert App.

Moon Pools

Summary

During all times of year when a vessel is equipped with a moon pool, there must be a hull door that can be kept closed as much as possible (to prevent species from entering) and monitored prior to and after closure.

Justification

Any vessel with a moon pool must keep the hull door closed as much as possible to avoid ESA-listed species being trapped within the moon pool.

Protocols

a. Closure of the hull door

   i. Should the moon pool have a hull door that can be closed, the operator(s) should keep the doors closed as much as reasonably practicable when no activity is occurring within the moon pool, unless the safety of crew or vessel require otherwise. This will prevent ESA-listed species from entering the confined area during periods of non-activity.

   ii. Should the moon pool have a hull door that can be closed, then, prior to and following closure, the moon pool must be monitored continuously by a dedicated crew observer with no other tasks to ensure that no individual ESA-listed species is present in the moon pool area. If visibility is not clear to the hull door from above (e.g., turbidity or low light), 30 minutes of monitoring is required prior to hull door closure.

   iii. If an ESA-listed species is observed in the moon pool prior to closure of the hull door, the hull door must not be closed, to the extent practicable. If the observed animal leaves the moon pool, the operator may commence closure. If the observed animal remains in the moon pool, contact NMFS prior to closure of the hull doors according to reporting requirements (see below under Protected Species within an Enclosed Moon Pool Reporting).

b. Movement of the vessel (no hull door) and equipment deployment/retrieval

   i. Prior to movement of the vessel and/or deployment/retrieval of equipment, the moon pool must be monitored continuously for a minimum of 30 minutes, by a dedicated crew observer with no other tasks, to ensure no individual ESA-listed species is present in the moon pool area.

   ii. If an ESA-listed species is observed in the moon pool prior to movement of the vessel, the vessel must not be moved and equipment must not be deployed or retrieved, except for human safety considerations. If the observed animal leaves the moon pool, the operator may commence activities. If the observed animal remains in the moon pool, contact BSEE prior to planned movement of the vessel according to reporting requirements (see Reporting Requirements under Protected Species within an Enclosed Moon Pool Reporting).

c. BOEM does not advocate the lowering of crew members into the moon pool to free ESA-listed species. NMFS should be contacted if ESA-listed species are encountered in the moon pool.

Equipment Deployment and Retrieval

Summary

Any mooring systems used during autonomous underwater vehicle and/or remotely operated vehicles (AUV/ROV) usage, buoy deployment, operations, equipment retrieval, and any survey activities should be configured to prevent any potential entanglement of ESA-listed species. PSOs should monitor for ESA-listed species in the area prior to and during deployment and retrieval of equipment, including AUVs and ROVs, buoys, and other equipment. Work should be stopped if ESA-listed species are observed to minimize entanglement risk. In the unlikely event that entanglement does occur, ensure proper reporting of entanglement events according to the measures specified below. BOEM must review survey equipment to be used by the Lessee on a case-by-case basis to determine which BMPs are required for that specific equipment use.

Justification

The equipment deployment and retrieval requirements are designed to minimize entanglement, injury and disturbance risk to ESA-listed species.

Protocols

a. Ensure that any buoys attached to the seafloor use the best available mooring systems. Buoys, lines (chains, cables, or coated rope systems), swivels, shackles, and anchor designs must prevent any potential entanglement of ESA-listed species while ensuring the safety and integrity of the structure or device. Avoid using floating lines at the surface.

b. All mooring lines and ancillary attachment lines must use one or more of the following measures to reduce entanglement risk: reduced number of lines as much as possible; shortest practicable line length; and rubber sleeves, weak links, chains, cables or similar equipment types that prevent lines from looping (i.e., reduce amount of slack in lines), wrapping, or entrapping ESA-listed species.

c. Any equipment must be attached by a line within a rubber sleeve for rigidity and recommend using sheaths, chains, acoustic releases and weak links if possible. The length of the line must be as short as necessary to meet its intended purpose.

d. During all buoy deployment and retrieval operations, buoys should be lowered and raised slowly to minimize risk to ESA-listed species and benthic habitat. Additionally, PSOs should monitor for ESA-listed species in the area prior to and during deployment and retrieval and work should be stopped if protected species are observed to minimize entanglement risk.

e. If a live or dead marine ESA-listed species becomes entangled, the Lessee must immediately contact the applicable NMFS stranding coordinator using the reporting contact details (see Reporting Requirements section) and provide any on-water assistance requested.

f. All buoys must be properly labeled with owner and contact information.

Protected Species Observers (PSOs)

Summary

A minimum of one qualified third-party PSO is located on each vessel to conduct observations while the vessel is in the lease area. The number of observers per vessel must be sufficient to ensure complete viewing coverage of the surrounding marine environment. The Lessee must ensure that observers have the safety and monitoring equipment adequate to conduct their activities (including night-vision equipment for nighttime survey operations). All PSOs must have completed an NMFS-approved commercial PSO training course to act as a PSO.

The Lessee must ensure that the observers have the authority to stop any activity that could result in harm to an ESA-listed species, except when the stopping of the activity would put the safety of the vessel or crew at risk. In the event that a marine mammal is struck by a vessel or survey equipment or becomes entangled in any cable or lines, the Lessee must ensure that the observer immediately notifies NMFS so that appropriate response measures can be implemented. Similarly, if the vessel or its crew causes any harassment or harm to a marine mammal occurs.

Justification

A PSO requirement reduces the risk of injury or death to ESA-listed species. PSOs are trained professionals, certified by NMFS with standardized training and qualifications, who are independent specialists whose sole responsibility is to provide continuous monitoring for protected species. A PSO will reduce the risk of a contact or collision incident by detecting and alerting for the presence of wildlife using methods that allow the vessel to have the time to avoid contact. A PSO also ensures compliance with related procedures of avoidance zones, clearance and shutdown zones, deck operations, and data collection.

The PSO NMFS certification ensures objective compliance that interactions with wildlife will be reported and that the required data reporting will include standardized data details. Due to the lack of data in marine mammal and sea turtle population densities and behaviors in the Action Area, data collection by PSOs inform ongoing and future project management in the Action Area.

Protocols

a. All PSOs must have completed an NMFS-approved commercial PSO training course to act as a PSO for preliminary activity surveys. Documentation of the most recent training certificates of individual PSOs' successful completion of an NMFS-approved commercial PSO training course with an overall examination score of 90% or greater must be provided upon request. Instructions and application requirements to become an NMFS-approved PSO can be found at http://www.fisheries.noaa.gov/national/endangered-species-conservation/protected-speciesobservers

b. PSOs deployed for preliminary survey activities must be employed by a third-party observer provider. While the vessel is underway, they must have no other tasks than to conduct observational effort, record data, and communicate with and instruct relevant vessel crew to the presence of ESA-listed species and associated requirements. PSOs on duty must be clearly listed on daily data logs for each shift.

c. A minimum of one PSO must be on duty observing for ESA-listed species at all times that noise-producing equipment of concern is operating, or the survey vessel is actively transiting in the lease areas during daylight hours (i.e., from 30 minutes prior to sunrise and through 30 minutes following sunset). One PSO must be on duty during nighttime operations, unless more are needed to adequately monitor the required nighttime vision equipment. A PSO schedule showing that the number of PSOs used is sufficient to effectively monitor the affected area for the project (e.g., surveys) and record the required data must be provided to BOEM. PSOs must not be on watch for more than 4 consecutive hours, with at least a 2-hour break after a 4-hour watch. PSOs must not be on active duty observing for more than 12 hours in any 24-hour period.

d. Visual monitoring must occur from the most appropriate vantage point on the associated operational platform that allows for 360-degree visual coverage around the vessel. When the viewing bandwidths of all the PSOs on watch are combined, there must be full 360-degree visual coverage around the vessel.

e. The most suitable and appropriate equipment must be available to each PSO to adequately observe the full extent of the clearance and shutdown zones during all vessel operations and to meet all reporting requirements. PSO equipment and protocols should include the following:

   i. Visual observations must be conducted using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.

   ii. Rangefinders (at least one per PSO, plus backups) or reticle binoculars (e.g., 7 x 50) of appropriate quality (at least one per PSO, plus backups) to estimate distances to ESA-listed species located in proximity to the vessel and Clearance and Shutdown Zone(s).

   iii. Digital full frame cameras with a telephoto lens that is at least 300 mm or equivalent. The camera or lens should also have an image stabilization system. The cameras should be used to record sightings and verify species identification whenever possible.

   iv. A laptop or tablet to collect and record data electronically.

   v. GPS if data collection/reporting software does not have built-in positioning functionality.

   vi. Any other tools deemed necessary to adequately perform PSO tasks.

   vii. PSO data must be collected in accordance with standard data reporting, software, tools, and electronic data submission standards approved by BOEM for the particular activity.

Protected Species Reporting

Summary

The Lessee must submit a final report summarizing the results of monitoring activities to BOEM and other appropriate agencies no more than 90 days following yearly upon completion of survey activities. Yearly completion dates must be defined in the associated survey plan. The report must, at a minimum, include: (a) an evaluation of the effectiveness of monitoring protocols and (b) reporting of: (i) marine mammal, sea turtle, and other wildlife sightings (species and numbers); (ii) any wildlife behavioral changes; and (iii) any interactions or conflict with marine wildlife, including reporting of any project delays or cessation of operations due to the presence in the project area of marine wildlife species subject to protection

Justification

To ensure compliance and evaluate effectiveness of best management practices and mitigation measures, regular reporting of survey activities and information on all ESA-listed species will be required as stated below in the Protocols.

Protocols

a. Data from all PSO and other observer (captain or vessel crew members) observations must be recorded based on standard PSO collection and reporting requirements. PSOs must use standardized electronic data forms to record data. The following information must be reported electronically in a format approved by BOEM:

   i. Visual Effort

      a. Vessel name;
      b. Dates of departures and returns to port with port name;
      c. Lease number;
      d. PSO/observer names and affiliations;
      e. PSO ID (if applicable);
      f. PSO/observer location on vessel;
      g. Height of observation deck above water surface (in meters);
      h. Visual monitoring equipment used;
      i. Dates and times (Greenwich Mean Time) of survey on/off effort and times corresponding with PSO on/off effort;
      j. Vessel location (latitude/longitude, decimal degrees) when survey effort begins and ends; vessel location at beginning and end of visual PSO duty shifts; recorded at 30 second intervals if obtainable from data collection software, otherwise at practical regular interval;
      k. Vessel heading and speed at beginning and end of visual PSO duty shifts and upon any change;
      l. Water depth (if obtainable from data collection software) (in meters);
      m. Environmental conditions while on visual survey (at beginning and end of PSO shift and whenever conditions change significantly), including wind speed and direction, Beaufort scale, Beaufort wind force, swell height (in meters), swell angle, precipitation, cloud cover, sun glare, and overall visibility to the horizon;
      n. Factors that may be contributing to impaired observations during each PSO shift change or as needed as environmental conditions change (e.g., vessel traffic, equipment malfunctions); and
      o. Survey activity information, such as type of survey equipment in operation, acoustic source power output while in operation, and any other notes of significance (i.e., preclearance survey, ramp up, shutdown, end of operations, etc.).

   ii. Visual Sighting (all Visual Effort fields plus the following)

      a. Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform);
      b. Vessel/survey activity at time of sighting;
      c. PSO/PSO ID/observer who sighted the animal;
      d. Time of sighting;
      e. Initial detection method;

f. Sightings cue;
g. Vessel location at time of sighting (decimal degrees);
h. Direction of vessel's travel (compass direction);
i. Direction of animal's travel relative to the vessel;
j. Identification of the animal (e.g., genus/species, lowest possible taxonomic level, or unidentified); also note the composition of the group if there is a mix of species;
k. Species reliability;
l. Radial distance;
m. Distance method;
n. Group size; estimated number of animals (high/low/best);
o. Estimated number of animals by cohort (adults, yearlings, juveniles, calves, group composition, etc.);
p. Description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics);
q. Detailed behavior observations (e.g., number of blows, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; note any observed changes in behavior);
r. Mitigation Action; Description of any actions implemented in response to the sighting (e.g., delays, shutdown, ramp up, speed or course alteration, etc.) and time and location of the action.
s. Behavioral observation to mitigation;
t. Equipment operating during sighting;
u. Source depth (in meters);
v. Source frequency;
w. Animal's closest point of approach and/or closest distance from the center point of the acoustic source;
x. Time entered shutdown zone;
y. Time exited shutdown zone;
z. Time in shutdown zone; and
aa. Photos/Video.

b. Final Report: The project proponent must submit a final monitoring report to BOEM within 90 days after completion of survey activities. The report must fully document the methods and monitoring protocols, summarize the survey activities and the data recorded during monitoring, estimate the number of ESA-listed species that may have been taken during survey activities, and describe, assess and compare the effectiveness of monitoring and mitigation measures. PSO/observer sightings, effort data and trackline data in Excel spreadsheet format must also be provided with the final monitoring report.

c. Vessel Strike: In the event of a vessel strike of an ESA-listed species by any survey vessel, the project proponent must immediately report the incident to BOEM (details to be provided) and

NMFS (details to be provided). Sea turtle and marine mammal strikes must be reported to the NOAA Marine Wildlife Hotline: (888) 256-9840. The report must include the following information:

i. Name, telephone, and email or the person providing the report;
ii. Vessel name;
iii. Lease Number;
iv. Time, date, and location (latitude/longitude) of the incident;
v. Species identification (if known) or description of the animal(s) involved;
vi. Vessel speed during and leading up to the incident;
vii. Vessel course/heading and what operations were being conducted (if applicable);
viii. Status of all sound sources in use;
ix. Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike;
x. Environmental conditions (wave height, wind speed, light, cloud cover, weather, water depth);
xi. Estimated size and length of animal that was struck;
xii. Description of the behavior of the species immediately preceding and following the strike;
xiii. If available, description of the presence and behavior of any other protected species immediately preceding the strike;
xiv. Disposition of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, last sighted direction of travel, status unknown, disappeared); and
xv. To the extent practicable, photographs or video footage of the animal(s).

d. Protected Species within an Enclosed Moon Pool—It is unlikely that an ESA-listed species would come in contact with a moon pool, but the following applies: If an ESA-listed species is observed within an enclosed moon pool and does not demonstrate any signs of distress or injury or an inability to leave the moon pool of its own volition, measures described in this section must be followed (only in cases where they do not jeopardize human safety). Although this particular situation may not require immediate assistance and reporting, an ESA-listed species could potentially become disoriented with their surroundings and may not be able to leave the enclosed moon pool of their own volition. Within 24 hours of any observation, and daily after that for as long as an individual ESA-listed species remains within a moon pool (i.e., in cases where ESA-listed species has entered a moon pool, but entrapment or injury has not been observed), reporting is required.

   i. For initial reporting associated with activities within the moon pool, the following information is required:

      a. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
      b. Species identification (if known) or description of the animal(s) involved;
      c. Condition of the animal(s) (including carcass condition if the animal is dead);
      d. Observed behaviors of the animal(s), if alive;
      e. If available, photographs or video footage of the animal(s); and

f. General circumstances under which the animal was discovered.

ii. After the initial report (see above), the following reporting measures must be followed, and information must be reported to BSEE (contact details to be provided) for operations requiring use of a moon pool to continue:

a. Describe the animal's status to include external body condition (e.g., note any injuries or noticeable features), behaviors (e.g., floating at surface, chasing fish, diving, lethargic, etc.), and movement (e.g., has the animal left the moon pool and returned on multiple occasions?);

b. Describe the animal's status to include external body condition (e.g., note any injuries or noticeable features), behaviors (e.g., floating at surface, chasing fish, diving, lethargic, etc.), and movement (e.g., has the animal left the moon pool and returned on multiple occasions?);

c. Describe the animal's status to include external body condition (e.g., note any injuries or noticeable features), behaviors (e.g., floating at surface, chasing fish, diving, lethargic, etc.), and movement (e.g., whether the animal left the moon pool and returned on multiple occasions);

d. Any additional photographs or video footage of the animal, if possible; and

e. Guidance received and followed from NMFS liaison or stranding hotline that was contacted for assistance.

e. Sightings of any injured or dead ESA-listed species must be immediately reported, regardless of whether the injury or death is related to survey operations, to BOEM (details to be provided), and the NOAA West Coast stranding hotline at 1-866-767-6114 and 562-506-4315. If the project proponent's activity is responsible for the injury or death, they must ensure that the vessel assist in any salvage effort as requested by NMFS. When reporting sightings of injured or dead ESA-listed species, the following information must be included:

a. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
b. Species identification (if known) or description of the animal(s) involved;
c. Condition of the animal(s) (including carcass condition if the animal is dead);
d. Observed behaviors of the animal(s), if alive;
e. If available, photographs or video footage of the animal(s); and
f. General circumstances under which the animal was discovered.

f. Reporting and Contact Information—Injurious Takes of Endangered and Threatened Species:

a. NOAA Marine Wildlife Hotline: (888) 256-9840
b. BOEM Office of Environment, Pacific Region Regional Supervisor

Remote Operated Vehicles (ROVs)/Autonomous Underwater Vehicle (AUV) Usage

Summary

All ROVs and AUVs must have a deployment plan.

Justification

All ROVs and AUVs must have a deployment plan to minimize risk of entanglement, strike, disturbance, injury or mortality to ESA-listed species.

Protocols

a. A submersible dive plan will be in place for each dive that details each mission, locations, and deployment/recovery times to minimize the potential for collision with the substrate or groundings.

b. All AUV deployment missions will have a deployment and retrieval plan to minimize lag time in water and ensure that the AUV is properly retrieved.

c. In order to minimize malfunction, prior to operations employing submersibles, a pre-deployment test of all operating systems should be run to ensure that equipment is operating correctly, there are no visually apparent physical defects, and conditions are conducive to operations.

d. In order to minimize the spread of invasive species, all ROVs/AUV's will be inspected and cleaned of any organic material including algae and other organisms prior to deployment.

e. Keep any ROV lines as taut as practicable and deployed only as long as needed to properly accomplish the required task.

f. Use any ROV/AUV cameras, if available and practicable, to ensure no presence of ESA-listed species in and around large debris pieces prior to lifting.

g. Acoustic Analyses must be completed prior to the operation(s) using the User Spreadsheet Tool when AUVs emit any type of sonar or acoustics that may be within the hearing range of ESA-listed species. Operations cannot commence until reviewed by NMFS staff through technical assistance with the NMFS Office of Protected Resources or BOEM's Center for Marine Acoustics.

Contamination of Marine Environment

To understand the type and amount of marine debris generated, and to minimize the risk of entanglement in and/or ingestion of marine debris by ESA-listed species, lessees must implement the following BMPs:

a. A contingency plan to control toxic materials is required.

b. Appropriate materials to contain and clean potential spills shall be stored at the work site and be readily available.

c. All project-related materials and equipment placed in the water shall be free of pollutants.

d. The project manager and heavy equipment operators shall perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected and shall not proceed until the leak is repaired and equipment cleaned.

e. Fueling of land-based vehicles and equipment shall take place at least 50 feet away from the water, preferably over an impervious surface. Fueling of vessels shall be done at approved fueling facilities.

f. Turbidity and siltation from project-related work shall be minimized and contained through the appropriate use of erosion control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions.

g. A plan shall be developed to prevent debris and other wastes from entering or remaining in the marine environment during the project.

Protection of Biological Resources

Lessee shall avoid unnecessary or substantial disturbance to sensitive seabed habitats and biodiversity hotspots, including but not limited to seamounts, hydrothermal vent fields, cold seeps, deep-sea coral and sponge aggregations, and areas of high megafaunal density and or productivity, except as otherwise authorized by BOEM. The Lessee shall identify sensitive marine environmental avoidance areas in survey plans. The Lessor may update or impose new timing or location restrictions based on new information and/ or survey findings to ensure consistency with Endangered Species Act, Marine Mammal Protection Act, and OCSLA authority to protect the marine environment from irreparable harm as per 30 CFR 582.20Sensitive seabed habitats and areas of high megafaunal density shall be defined in accordance with BOEM-approved ecological criteria and may be updated based on new information or site-specific surveys. In areas designated by BOEM as suitable for mineral extraction, disturbance to seabed substrates may be permitted, provided that such activities are conducted in a manner that minimizes adverse environmental impacts.

BOEM may, at its discretion, require Lessee to submit an Environmental Management and Monitoring Plan or equivalent documentation at any point prior to or during operations, based on the nature of the proposed activity, the sensitivity of the environment, or the results of environmental monitoring. Any such plan shall include appropriate mitigation measures, monitoring protocols, and adaptive management strategies as determined by BOEM, pursuant to its authority under 43 U.S.C. § 1334 and 30 CFR § 582.1(a).

If previously unidentified sensitive habitats or biological communities are discovered, Lessee must notify the BOEM Regional Director within 48 hours. BOEM may require the Lessee to modify or suspend operations, implement additional mitigation measures, or relocate activities, and may also require a buffer of up to 500 m around designated sensitive features unless otherwise justified by site-specific conditions

Fisheries and Wildlife Awareness Training

To reduce the potential conflicts with fishers and minimize adverse interactions with wildlife during lease activities, the Lessee must ensure that all personnel and contractors who will be present on vessels or platforms within the Lease Area complete a Fisheries and Wildlife Awareness Training prior to marine operations (e.g., transit, surveys, equipment deployments), consistent with vessel and worker safety. This training must address: (1) identification of common wildlife species; (2) best practices for avoiding vessel strikes and minimizing noise and light impacts; (3) protocols for reporting wildlife sightings and entanglements; and (4) cultural and economic importance of regional fisheries. Training must also include a briefing by the Lessee's environmental compliance officer or designated representative on the importance of minimizing conflicts with local fishers and adhering to all applicable environmental protection measures. The Lessee must ensure that a copy of the environmental lease stipulations and related ESA, EFH, and MMPA (if applicable) conditions of approvals are made available and reviewed with all appropriate personnel aboard every project-related vessel.

U.S. Department of the Interior (DOI)

DOI protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

Bureau of Ocean Energy Management (BOEM)

BOEM's mission is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.