Navy Conventional Prompt Strike Weapon System Flight Tests

Environmental Assessment/ Overseas Environmental Assessment

Draft
Volume 1: Chapters 1-7

Department of the Navy

May
2024

Cover images: Illeginni Islet, Kristin Miller; Bigeyes in Kwajalein Lagoon, Kristin Miller; Hawksbill turtle in Kwajalein Lagoon, Kristin Miller; Steephead parrotfish in Kwajalein Lagoon, Kristin Miller.

Navy Conventional Prompt Strike Weapon System Flight Tests
Draft Environmental Assessment/
Overseas Environmental Assessment

Lead Agency:	Department of the Navy
Action Proponent:	Strategic Systems Programs
Title of Proposed Action:	Navy Conventional Prompt Strike Weapon System Flight Tests
Project Location:	Atlantic and Pacific Ocean regions
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Document Date:	May 2024

Abstract

The Department of the Navy has prepared this Environmental Assessment (EA) / Overseas Environmental Assessment (OEA) to evaluate the potential environmental impacts of the Proposed Action to meet requirements of the U.S. National Environmental Policy Act (NEPA). The Proposed Action consists of conducting Navy Conventional Prompt Strike (CPS) weapon system (missile) flight tests in both Atlantic and Pacific Ocean regions. Testing would involve up to eight flight test launches per year from various sea-based launch locations conducted over a 10-year period. All flight tests would be at-sea missile tests launched from existing naval vessels operating in Pacific and Atlantic broad ocean areas. After launch, flight test activities would include vehicle flight over the Pacific and/or Atlantic Oceans and would involve splashdown of spent boosters and fairings in Pacific and Atlantic broad ocean areas. Navy CPS flight test payloads would impact at target sites in the broad ocean area and at U.S. Army test sites at Kwajalein Atoll within the Republic of the Marshall Islands.

The Draft EA/OEA evaluates the potential impacts to the human and natural environment from implementing the proposed CPS weapon system flight tests program. The No Action Alternative is also evaluated as a requirement of NEPA to serve as a baseline from which to analyze the effects of not implementing the test program. Supported by the information and environmental analysis presented in this document, the Navy will decide whether to conduct up to eight CPS flight tests annually over a 10-year period or to select the No Action Alternative. The Draft EA/OEA evaluates several environmental/resource categories within the affected environment that potentially could be impacted to provide Navy decision makers with sufficient information to plan and make informed decisions on the proposed CPS flight test program. Under the No Action Alternative, proposed CPS flight tests and associated activities would not occur. Other Department of Defense training and testing actions in both the Pacific and Atlantic study areas would continue to occur and baseline environmental conditions would not change under the No Action Alternative. Implementation of the Proposed Action would not significantly impact the quality of the human and natural environment and would not significantly harm the environment of the global commons (high seas).

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Executive Summary

ES.1 Introduction

The Department of the Navy (DON or Navy) has prepared this Environmental Assessment (EA) / Overseas Environmental Assessment (OEA) to analyze potential environmental impacts from conducting proposed Conventional Prompt Strike (CPS) weapon system (missile) flight tests in both Atlantic and Pacific Ocean regions. Supported by the U.S. Army Space and Missile Defense Command (USASMDC), the Navy prepared this EA/OEA in accordance with the National Environmental Policy Act (NEPA), Navy and Department of Defense policies and regulations for implementing NEPA, Executive Order 12114 (Environmental Effects Abroad of Major Federal Actions), and the Environmental Standards and Procedures for U.S. Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands, 16th Edition (USASMDC 2021) or UES.

ES.2 Purpose and Need

The purpose of the Proposed Action is to perform tests in a sea-based environment to prove the Navy CPS weapon system meets all key performance requirements for operational use. Testing the CPS weapon system at sea is needed to establish and verify CPS capabilities required to enhance U.S. options to respond to time-sensitive threats, thereby maintaining technical superiority against adversaries. The proposed series of CPS at-sea missile flight tests will allow the Navy to collect data needed to further demonstrate that weapon system development efforts have been successful, enabling its operational deployment for use in sea-based environments.

ES.3 Description of the Proposed Action and Alternatives

The Proposed Action is to perform Navy CPS weapon system flight tests in a sea-based environment. The Proposed Action would consist of up to eight flight test launches at up to eight different sea-based launch locations per year, conducted over a 10-year period beginning in fiscal year 2025. The CPS all-up-round missile is composed of a two-stage vehicle missile body and a Common Hypersonic Glide Body payload. Each flight test would involve pre-test preparations and operations, at-sea vehicle launch, vehicle flight over a broad ocean area (BOA), booster splashdown in the BOA, payload impact at either an ocean or land target site, and post-test operations.

Several alternatives were considered for implementation of the Proposed Action; however, the Navy has identified only one alternative (the Preferred Alternative) that meets the purpose, need, and program objectives. Under the Preferred Alternative, proposed flight tests would be conducted within broad Atlantic and Pacific Ocean areas. The Preferred Alternative would integrate a series of existing ranges, operational areas (OPAREAs), and BOAs to test the effectiveness of the CPS weapon system. All CPS vehicle launches would occur at sea from existing naval vessels while using ocean-based or land-based locations for targets. Under the Preferred Alternative, locations for CPS payload target sites would include ocean-based sites in Atlantic and Pacific BOAs and at the Kwajalein Missile Impact Scoring System in Kwajalein Atoll

in the Republic of the Marshall Islands (RMI), and one land-based target site at Illeginni Islet in the RMI. Floating target rafts would be utilized for a subset of flight test events involving payload impact in the Pacific and Atlantic BOAs. The flight tests would be supported by several existing U.S. military installations, ranges, and range complexes located in the Atlantic and Pacific Ocean regions.

This EA/OEA also evaluates the environmental consequences of the No Action Alternative. Under the No Action Alternative, the Navy would not conduct sea-based CPS weapon system flight testing. While CPS weapon system testing would not occur, Department of Defense (DoD) testing and training activities within existing naval OPAREAs, sea ranges, range complexes, and other DoD training and testing areas in the CPS study area would continue. By not implementing the Proposed Action, the Navy would not be able to achieve the goal of proving that the new hypersonic weapon system meets all key performance requirements for deployment to sea-based platforms or operational use in a sea-based environment.

ES.4 Summary of Environmental Consequences

This EA/OEA evaluates the potential impacts to the human and natural environment from implementing the CPS weapon system flight tests program under the Preferred Alternative. The No Action Alternative was also evaluated as a requirement of NEPA to serve as a baseline from which to analyze the effects of not implementing the test program.

Under the No Action Alternative, proposed CPS flight tests and associated activities would not occur. Other DoD training and testing actions in both the Pacific and Atlantic study areas would continue to occur. DoD training and testing has been occurring for decades in the BOAs and at Kwajalein Atoll and would continue. As a result, baseline environmental conditions for all resource topics are not expected to change under the No Action Alternative.

Table ES-1 provides a tabular summary of the potential impacts to environmental resource topics associated with the Proposed Action under the Preferred Alternative as well as cumulative impacts in combination with other past, present, and reasonably foreseeable future actions. Overall, implementation of the Proposed Action would not significantly impact the quality of the human and natural environment and would not significantly harm the environment of the global commons (high seas).

Table ES-1. Summary of Environmental Consequence and Cumulative Effects under the Preferred Alternative

Resource Topic	Preferred Alternative	Cumulative Effects
Air Quality (including Greenhouse Gases and Climate Change)	• No significant impacts to air quality would occur in the Atlantic and Pacific BOAs, KMISS, and Illeginni Islet with implementation of the Proposed Action. • Terminal payload impact at Illeginni Islet would result in fugitive dust and may volatize minor quantities of some contaminants already present; however, any emissions associated with impact would be within the UES air quality standards. • CPS flight tests would incrementally contribute to global emissions of greenhouse gases and are anticipated to have a minor impact. It is anticipated that the potential greenhouse gas emissions from CPS flight tests would not result in noticeable effects to climate change – less than a 0.0001% change from the Proposed Action.	• The Proposed Action annual greenhouse gas emissions would have a minor incremental additive contribution to cumulative greenhouse gases and climate change when combined with other flight test programs and actions. • It is possible that cumulative effects related to climate change would affect the potential environmental consequences of the Proposed Action on environmental resource topics considered. The exact potential impacts from the emissions from the Proposed Action along with other present and future foreseeable future actions are unquantifiable at this time. • No cumulative effects of greenhouse gases or climate change have been identified which would affect the implementation of the Proposed Action over the 10-year period of testing.
Cultural Resources	• There are no identified cultural resources with the potential to be affected along the possible flight paths over the ocean or in the Atlantic and Pacific BOAs. Therefore, there would be no adverse effects to cultural resources within the Atlantic and Pacific BOAs from the CPS flight tests. • No significant impacts are anticipated to occur to archaeological or historic resources at Illeginni Islet. The existing range target site on the west end of Illeginni Islet would be used as a target site for CPS flight tests. Previous archaeological investigations of Illeginni Islet have not found indigenous cultural or World War II materials. Cold War era buildings, eligible for listing in the Republic of the Marshall Islands National Register of Historic Places, on the opposite end of the islet would not be impacted by proposed activities.	• No interactive or additive effects have been identified which would contribute to cumulative effects on cultural resources. Therefore, the Proposed Action in conjunction with other actions would not result in cumulative effects on cultural resources.
Biological Resources	• The Proposed Action has the potential to impact biological resources through exposure to elevated sound levels, direct contact from test components, exposure to hazardous materials, and increased human activity and equipment operation. Overall, there would be no significant impacts to biological resources, including special status resources, with implementation of the Proposed Action. • Available data indicate that all potential impacts on biological resources in the BOAs and at Kwajalein Atoll would be negligible to moderate. • Activities within the BOAs may affect but are not likely to adversely affect species or habitats protected under the Endangered Species Act, as all potential effects would be discountable or insignificant.	• Cumulative effects on biological resources in the BOAs and at Kwajalein Atoll have likely occurred due to past military actions, commercial and subsistence fisheries, and the impacts of climate change. Current available data do not allow for quantitative characterization of cumulative effects, especially on nearshore and terrestrial biological resources at Illeginni Islet; therefore, cumulative effects were primarily evaluated using a qualitative approach.

Resource Topic	Preferred Alternative	Cumulative Effects
Biological Resources (continued)	• At Illeginni Islet, terminal payload impact has the potential to affect species and habitats protected under the UES; therefore, the Navy plans to coordinate and consult with UES Appropriate Agencies under requirements of the UES. • The Proposed Action would not result in any take, including level B harassment, of any marine mammal species, nor would it result in any incidental take of migratory birds that might result in a significant adverse effect on the sustainability of a population. There would be no adverse effects on essential fish habitat, national marine sanctuaries, or marine national monuments.	• No effects of the Proposed Action have been identified that would have interactive or meaningful additive effects on cumulative effects on biological resources. Based on the relatively small scale of proposed activities and on available data regarding the state of cumulative effects on biological resources, the Proposed Action would have negligible to minor contributions to cumulative effects on biological resources.
Geology and Soils	• There would be no adverse effects from the Proposed Action to geological and soil resources in the Atlantic or Pacific BOAs. • Payload impact at Illeginni Islet would result in formation of a crater. Based on the composition of the structure of the CPS flight body, the expected concentration of toxic heavy metals would be minimal at the impact location. Historical post-test soil sampling results for Illeginni Islet indicate beryllium, tungsten, and uranium at the target site have been below the UES compliance requirements. Minor, short-term adverse impacts would be expected as a result of payload impact at Illeginni Islet.	• Continued military testing at the land impact site on Illeginni Islet has the potential to result in cumulative effects on soils on the islet and in adjacent marine sediments through accumulations of heavy metals and other materials in the soil there. Post-test and/or periodic soil sampling for uranium, beryllium, and tungsten would be conducted at Illeginni Islet to ensure soils do not exceed UES compliance standards. Negligible cumulative effects on geology and soils are expected.
Water Resources	• Groundwater or surface water resources within the BOAs or KMISS would not be significantly impacted by the proposed flight tests. Disturbance to ocean waters would be limited to the individual test components and payloads sinking thousands of feet to the ocean floor. Some payload debris, including heavy metals and other materials, may be released into the ocean area. However, adverse water quality impacts are expected to be negligible in the BOAs and KMISS. • Illeginni Islet has no surface water; groundwater is very limited in quantity and is brackish and non-potable. Previous pre-and post-flight test groundwater sampling at Illeginni Islet has shown little variation in the concentrations of heavy metals with beryllium remaining undetected, tungsten exceeding residential tap water screening levels, and uranium well below the U.S. Environmental Protection Agency maximum contaminant level for drinking water. With the reasonably foreseeable land use at Illeginni Islet remaining as an active range and with the groundwater being not potable, the impacts on water resources from the Proposed Action would reasonably be expected to be adverse short-term minor impacts.	• Continued monitoring of groundwater tungsten levels at Illeginni Islet after flight tests involving land impacts at Illeginni Islet will likely be required as part of consultation requirements with UES Appropriate Agencies. No interactive effects with those of past, present, or future actions have been identified and the proposed up to one land impact per year would be expected to have negligible to minor additive contributions to cumulative effects on water resources at Illeginni Islet.

Resource Topic	Preferred Alternative	Cumulative Effects
Hazardous Materials and Waste Management	• Within the Atlantic and Pacific BOAs, implementation of the Proposed Action would result in introduction of potentially hazardous materials and waste as spent boosters and payloads enter the ocean. Hazardous materials are not expected to be found in concentrations high enough to adversely affect human environmental quality or habitat quality for marine life in the BOAs. Hazardous materials and wastes are expected to have negligible to minor impacts on environmental quality in the Atlantic and Pacific BOAs. • At USAKA, no significant impacts on hazardous materials and waste management are expected at either KMISS or Illeginni Islet. At KMISS, CPS payload materials are expected to sink to the ocean floor with little potential for impact on marine life. At Illeginni Islet, approximately one CPS payload impact per year may occur throughout the CPS flight test program's 10-year period. The CPS payload impact would be expected to form a crater and ejected material and payload debris could be scattered around the point of impact. Any visible test debris found would be collected as much as practicable, including hazardous materials.	• After decades of DoD testing at Illeginni Islet, no significant accumulation of hazardous materials has been detected. Continued soil and groundwater testing at Illeginni Islet and established response procedures for exceedance of levels specified in the UES substantially reduce the risk of cumulative hazardous materials effects. Given the protective measures in place to prevent cumulative effects for hazardous materials and wastes at Kwajalein Atoll, no cumulative effects are anticipated.
Environmental Justice	• Under the Proposed Action, no significant impacts on environmental justice are expected in the BOAs or at Kwajalein Atoll. The Navy has identified no human health, environmental, or other effects of the Proposed Action that would result in disproportionately high or adverse effects on minority or low income-populations. Proposed activities would have negligible impacts on the environmental justice concern of subsistence fishing or related human health.	• The potential exists for negligible additive contributions to cumulative effects on subsistence fisheries, the Proposed Action would have negligible impacts (i.e., undetectable levels of effect) on cumulative effects to topics of environmental justice concern.
Human Health and Safety	• The Proposed Action in both the Atlantic and Pacific BOAs would be conducted using existing naval vessels and would operate in accordance with established Navy safety procedures to protect personnel and the public. All BOA target sites would be located outside of exclusive economic zones in international waters. Proposed activities would not have significant impacts to health and safety. • All DoD testing activities at KMISS and Illeginni Islet take place within an active U.S. Army testing range and are therefore conducted in accordance with applicable U.S. Army and other federal and state safety standards and requirements. CPS flight tests at USAKA would not introduce new types of activities or increase levels of risk to personnel or the public. The Proposed Action would not result in significant impacts to health and safety.	• No substantial additive or interactive cumulative effects on health and safety have been identified.

Acronyms and Abbreviations: BOA = Broad Ocean Area, CPS = Conventional Prompt Strike, DoD = Department of Defense, KMISS = Kwajalein Missile Impact Scoring System, U.S. = United States, UES = Environmental Standards and Procedures for U.S. Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands

ES.5 Mitigation Measures

The Navy would implement mitigation measures and standard operating procedures as specified in **Appendix C** of the EA/OEA in order to avoid or reduce potential impacts on the identified environmental resources areas.

ES.6 Other Considerations

In accordance with 40 Code of Federal Regulations § 1502.16(c), analysis of environmental consequences shall include discussion of possible conflicts between the Proposed Action and the objectives of federal, regional, state, and local land use plans, policies, and controls. The principal federal and state laws and regulations that are applicable to the Proposed Action as well as the Navy's compliance for the Proposed Action are detailed in **Table 5.1-1** of the EA/EOA.

The Navy notified, coordinated, and consulted with relevant agencies on the Proposed Action to identify and resolve potential environmental issues and regulatory requirements associated with implementation of the Proposed Action. The Navy plans to conduct coordination and consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) under requirements of Section 7 of the Endangered Species Act, and with UES Appropriate Agencies (i.e., RMI Environmental Protection Authority, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, NMFS, and USFWS) under requirements of the UES.

ES.7 Public Involvement

As part of the NEPA process the Navy made the Draft EA/OEA for the CPS Weapon System Flight Tests available for a 30-day public comment period via the Internet at https://www.nepa.navy.mil/CPSSea-Based. Additionally, the Notice of Availability for the EA/OEA was published in newspapers in the United States and the RMI. Comments on the Draft EA/OEA, and responses to those comments, will be provided in **Appendix A** of the Final EA/OEA. The Navy will prepare the Final EA/OEA with consideration of comments received during public review of the Draft EA/OEA.

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Acronyms and Abbreviations

Acronym / Abbreviation	Definition
AUR	All-Up-Round
BOA	Broad Ocean Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
C-HGB	Common Hypersonic Glide Body
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CPS	Conventional Prompt Strike
dB	Decibel(s)
DoD	Department of Defense
DPS	Distinct Population Segment
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	Foot/Feet
GBSD	Ground Based Strategic Deterrent (now Sentinel)
GHG	Greenhouse Gas
KMISS	Kwajalein Missile Impact Scoring System
mg/kg	Milligrams per Kilogram
MSA	Magnuson-Stevens Fishery Conservation and Management Reauthorization Act
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act

Acronym / Abbreviation	Definition
nm	Nautical Mile
NMFS	National Marine Fisheries Service
NOTAM	Notice to Air Mission
NRHP	National Register of Historic Places
NTM	Notice to Mariners
OEA	Overseas Environmental Assessment
OEIS	Overseas Environmental Impact Statement
OPAREA	Operating Area
OPNAV	Chief of Naval Operations
OPNAVINST	Chief of Naval Operations Instruction
PCB	Polychlorinated Biphenyl
pH	Potential of Hydrogen
$PM_{2.5}$	Particulate Matter Less Than or Equal to 2.5 Microns in Diameter
PM_{10}	Particulate Matter Less Than or Equal to 10 Microns in Diameter
re	Referenced to
RMI	Republic of the Marshall Islands
ROI	Region of Influence
RTS	Ronald Reagan Ballistic Missile Defense Test Site
SINKEX	Sinking Exercise
UES	USAKA Environmental Standards
U.S.	United States
USAG-KA	United States Army Garrison – Kwajalein Atoll
USAKA	United States Army Kwajalein Atoll
USASMDC	United States Army Space and Missile Defense Command
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
µPa	Micropascal

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1.0 Purpose of and Need for the Proposed Action

1.1 Introduction

The Department of the Navy (DON or Navy) has prepared this Environmental Assessment (EA) / Overseas Environmental Assessment (OEA) to analyze potential environmental impacts from conducting proposed Conventional Prompt Strike (CPS) weapon system (missile) flight tests in both Atlantic and Pacific Ocean regions. Testing would consist of up to eight flight test launches per year at various sea-based launch locations conducted over a 10-year period. All flight tests would be at-sea missile tests launched from existing naval vessels using ocean-based or land-based locations for targets. There are several existing United States (U.S.) military ranges and broad ocean areas (BOAs) in the western Atlantic Ocean, and in the eastern, central, and western Pacific Ocean, being considered for the tests.

Following review of the proposed CPS weapon system flight tests program, the Navy determined that an EA/OEA is required to assess the potential environmental effects from these types of weapon system tests. Supported by the U.S. Army Space and Missile Defense Command (USASMDC), the Navy prepared this EA/OEA in accordance with the following regulations, statutes, standards, policies, and procedures:

- National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] § 4321 et seq.)
- Executive Order (EO) 12114 (Environmental Effects Abroad of Major Federal Actions)
- President's Council on Environmental Quality regulations for implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508)
- Department of Defense (DoD) regulations for implementing EO 12114 (32 CFR § 187, *Environmental Effects Abroad of Major Department of Defense Actions*)
- Navy environmental policy (Chief of Naval Operations [OPNAV] Instruction [OPNAVINST] 5090.1E [*Environmental Readiness Program*] and the accompanying OPNAV Manual 5090.1 [OPNAV M-5090.1])
- Navy policies for implementing NEPA (32 CFR § 775 et seq.)
- *Environmental Standards and Procedures for U.S. Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands*, 16th Edition (USASMDC 2021); hereafter referred to as the USAKA Environmental Standards or UES

1.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to perform tests in a sea-based environment to prove the Navy CPS weapon system meets all key performance requirements for operational use. Testing the CPS weapon system at sea is needed to establish and verify CPS capabilities required to

enhance U.S. options to respond to time-sensitive threats, thereby maintaining technical superiority against adversaries. The successful development and eventual fielding of the CPS weapon system has been identified as a national security priority by the DoD with the full support of the President's Administration and the U.S. Congress (White 2023, National Science and Technology Council 2022).

The proposed series of CPS at-sea missile flight tests will allow the Navy to collect data needed to further demonstrate that weapon system development efforts have been successful. This includes the safe, timely, and effective integration of the weapon system into surface ship and submarine based platforms, enabling its operational deployment for use in sea-based environments. To meet the CPS program objectives, test events must satisfy certain critical objectives, to include demonstrating weapon system effects on targets, and demonstrating applicable design features and operating procedures to ensure the safety of the warfighter and the public.

1.3 Scope of the Environmental Analysis

This EA/OEA evaluates the potential impacts to the human and natural environment from implementing the proposed CPS weapon system flight tests program. The No Action Alternative is also evaluated as a requirement of NEPA to serve as a baseline from which to analyze the effects of not implementing the test program. Supported by the information and environmental analysis presented in this document, the Navy will decide whether to conduct up to eight CPS flight tests annually over a 10-year period or to select the No Action Alternative. If the Navy decides to conduct the CPS flight tests, it will also decide on which of the U.S. military ranges and BOAs to use for individual tests. Expectations are that multiple sea-based training and testing ranges in both the Atlantic and Pacific Ocean regions would be used in support of the flight tests. The proposed ocean study areas for conducting the CPS flight tests are shown in **Figures 1.3-1** and **1.3-2**. The location of each individual test or test campaign would be determined based on the test objectives, and the availability and technical suitability of range areas and assets. Further descriptions of the Navy's Proposed Action and ocean study areas are provided in **Chapter 2.0**.

The anticipated CPS activities that are described and analyzed in this EA/OEA include pre-flight test preparations (e.g., use of an array of missile tracking sensors and telemetry systems); naval vessel operations and missile launches at sea; spent booster stages and missile payload impacts within the BOA[1]; use of floating targets in the BOA; limited missile payload impacts on land at a predetermined island target site; and post-flight test recovery and clean-up activities in the BOA and on land.

[1] For purposes of this EA/OEA, BOA is defined as any ocean area along the missile's flight path that is outside of territorial seas. Under maritime law, territorial seas generally extend seaward up to 12 nautical miles (nm) from a nation's official baseline (NOAA 2023a).

Figure 1.3-1. CPS Flight Test Study Area in the Atlantic Ocean Region

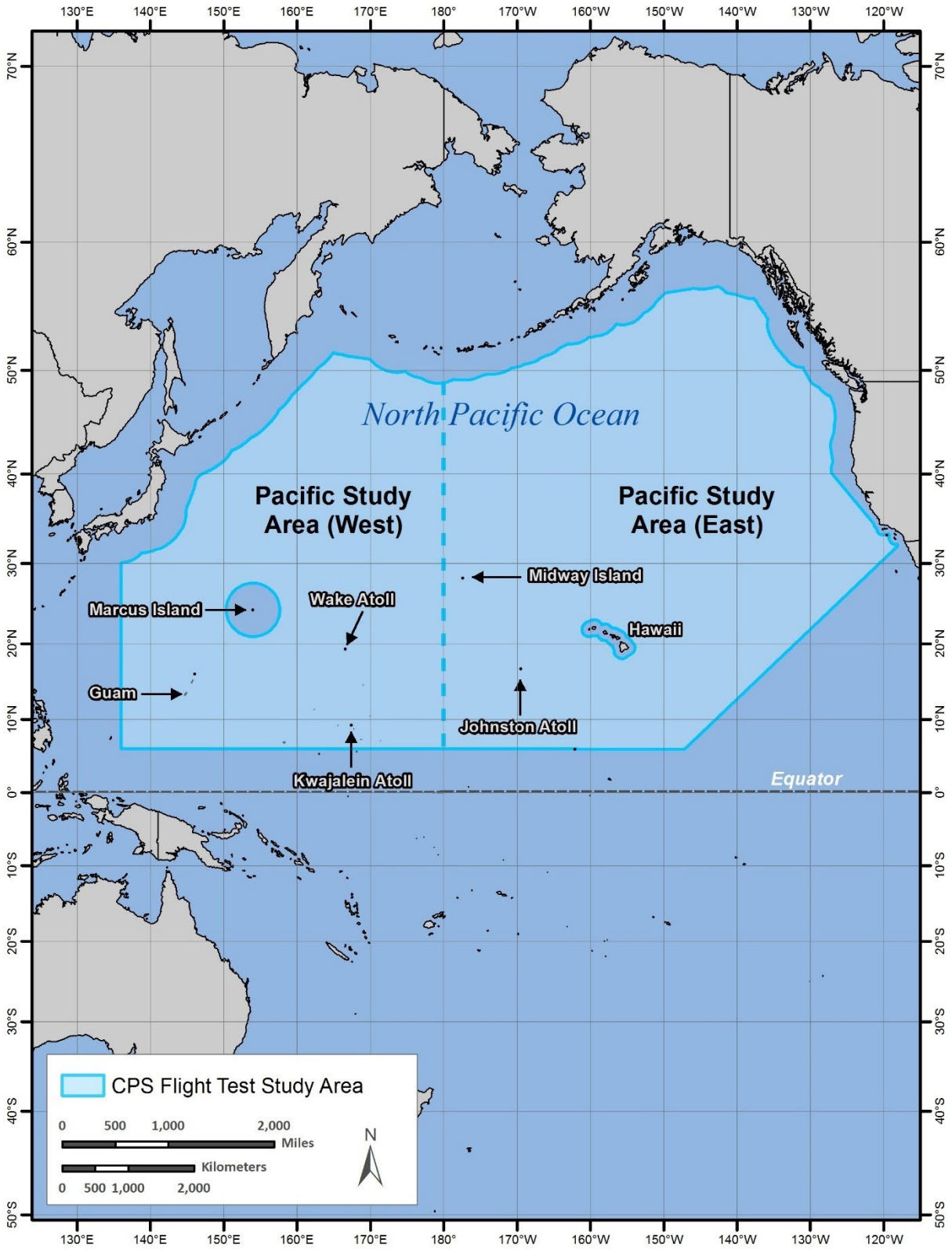

Figure 1.3-2. CPS Flight Test Study Area in the Pacific Ocean Region

In preparation for the proposed flight tests, several U.S. military installations and shipyards in both the Atlantic and Pacific Ocean regions would be used in providing various forms of logistical and operational support (e.g., fueling, supply, and maintenance of vessels; ordnance storage and handling; range asset management and operations). These types of activities conducted at existing naval installations within and outside of the continental United States are not analyzed in this EA/OEA, as these activities represent ongoing types of operations that are not dependent on CPS flight tests and therefore are considered to be outside the scope of this EA/OEA analysis. These installations and shipyards (**Table 1.3-1**) are required to maintain their own NEPA documentation and regulatory permitting for ongoing and future activities.

Table 1.3-1. Logistical and Operational Support Locations Not Analyzed in this EA/OEA

Atlantic Ocean Region Installations	Pacific Ocean Region Installations
Naval Facility Port Canaveral, Florida	Joint Base Pearl Harbor-Hickam, Hawaii
Naval Station Norfolk, Virginia	Naval Base Guam (Joint Region Marianas)
Naval Submarine Base Kings Bay, Georgia	Naval Base Kitsap, Bangor, Washington
Naval Submarine Base New London, Groton, Connecticut	Naval Base San Diego, California
Naval Weapons Station Yorktown, Virginia	Naval Base Ventura County, Point Mugu, California

To provide Navy decision makers with sufficient information to plan and make informed decisions on the proposed CPS flight test program, this EA/OEA evaluates several environmental/resource categories within the affected environment that potentially could be impacted. For this assessment, the following eight environmental/resource categories were considered in detail: air quality, cultural resources, biological resources, geology and soils, water resources, hazardous materials and waste management, environmental justice, and health and safety. Because the environmental issues associated with the proposed CPS flight test program may vary at each affected location, the environmental/resource categories analyzed at each location also varied. Refer to **Section 1.6** for identification of resource categories not included in this assessment and those described and analyzed by location.

1.4 Relevant Laws and Regulations

As part of the preparation of this EA/OEA, the Navy conducted analyses, agency coordination and consultations, and public outreach based on laws, statutes, regulations, policies, and standards that are pertinent to implementation of the Proposed Action. Further discussion on key regulatory requirements and compliance is provided in **Chapter 5.0**.

1.5 Public and Agency Participation and Intergovernmental Coordination

Council on Environmental Quality regulations (40 CFR § 1506.6) direct proponents and lead agencies responsible for preparation of NEPA documents to involve the public and other agencies who may be interested or affected by the proposed actions. The following sections

briefly describe agency and public involvement with the analysis and preparation of this EA/OEA. Detailed information about agency and public involvement can be found in **Appendix A***, Public and Agency Involvement and Distribution* and **Appendix E**, *Agency Correspondence*.

Interagency and intergovernmental coordination is an integral part of EA/OEA preparation. As part of early coordination and consultations, the Navy notified and consulted with relevant agencies on the Proposed Action to identify potential environmental issues and regulatory requirements associated with project implementation. A list of agencies contacted during development of the EA/OEA is included in **Appendix A**.

In accordance with Council on Environmental Quality and Navy policy for implementing NEPA, the Navy is soliciting comments on this Draft EA/OEA from interested and affected parties. A Notice of Availability for this Draft EA/OEA, and the Draft Finding of No Significant Impact (FONSI), was published in local and regional newspapers for locations associated with the Proposed Action (see **Table A.2.1-1** in **Appendix A**). Copies of the Draft EA/OEA and Draft FONSI were placed in local repositories (see **Table A.2.1-3** in **Appendix A**). for public access and also made available over the Internet at https://www.nepa.navy.mil/CPSSea-Based.

Comments on the Draft EA/OEA and Draft FONSI will be accepted over the 30-day public review period starting on or about June 3, 2024, as specified in the Notice of Availability. Written comments can be submitted using either of these two ways: (1) via the Internet at https://www.nepa.navy.mil/CPSSea-Based or (2) mailed to the following address:

Environmental Program Manager/SP2521
Strategic Systems Programs
1250 10th Street SE, Bldg. 200, Suite 3600
Washington Navy Yard, DC 20374-5127

Following the 30-day public review period, the Navy will decide whether to finalize the EA/OEA and sign the FONSI, which would allow the proposed CPS flight tests to proceed, or to prepare an Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). If the Navy decides to finalize the document, it will take into consideration those public and agency comments received as part of developing the Final EA/OEA and FONSI. The Final EA/OEA would include copies of substantive comments received (i.e., letters and electronic messages) and their resolution. Once completed, the Final EA/OEA and FONSI would be accessible via the internet at https://www.nepa.navy.mil/CPSSea-Based.

1.6 Environmental Resource Topics Included for Analysis

Impact analyses presented in this EA/OEA focus on issues or topics of importance or concern. Sixteen resource areas, or topics, were identified for consideration when evaluating the potential environmental consequences of the Proposed Action. Resource topics were retained for detailed analyses in this EA/OEA if (1) the environmental impacts associated with the topic were of critical importance, (2) a detailed analysis was necessary to make an informed selection

among alternatives, (3) the environmental impacts associated with the topic are of particular interest or concern to the public or regulators, or (4) there were potentially significant impacts to the resource. Based on preliminary analyses, it was concluded that several resource topics would have negligible, insignificant impacts and did not meet the importance or interest criteria (**Table 1.6-1**). Depending on the location of proposed activities, up to eight resource topics were carried forward for detailed analyses in this EA/OEA (**Table 1.6-1**).

For resource topics not carried forward for detailed analyses, **Table 1.6-2** provides a brief resource description and the reason(s) it was not carried forward for detailed analysis of environmental impacts in this EA/OEA.

Table 1.6-1. Resource Topics Considered for Detailed Analysis

Resource Topic	Location within Study Area	
	Broad Ocean Areas Atlantic and Pacific	Kwajalein Atoll
Airspace Management	No	No
Air Quality (including Greenhouse Gases and Climate Change)	Yes	Yes
Noise	No	No
Cultural Resources	No	Yes
Biological Resources	Yes	Yes
Geology and Soils	No	Yes
Water Resources	No	Yes
Hazardous Materials and Waste Management	Yes	Yes
Land Use	No	No
Infrastructure and Utilities	No	No
Socioeconomics	No	No
Transportation	No	No
Environmental Justice	No	Yes
Visual Resources	No	No
Human Health and Safety	Yes	Yes
Coastal Zone Management	No	No

Note: Where resource topics have “No” listed for a portion of the study area, the resource topic was not carried forward for detailed analysis of environmental impacts in this EA/OEA for that location. Where “Yes” is listed, resource topics were carried forward for detailed analysis for that location in this EA/OEA.

Table 1.6-2. Justification for Resource Topics Not Carried Forward for Detailed Analysis

Resource Topic	Location within Study Area	
	Broad Ocean Areas Atlantic and Pacific	**Kwajalein Atoll**
Airspace Management	The Proposed Action would use airspace that is currently available for existing naval operations that occur in the Atlantic and Pacific study areas. Implementation of the Proposed Action would not require the establishment of new special use airspace routes, would not include proposed airspace modifications, and would not change the relationship of existing special use airspace with federal airways, uncharted visual flight routes, and airport-related air traffic operations. Proposed activities would be conducted following all relevant Federal Aviation Administration regulations/requirements for flight testing. A NOTAM would be published 15 days prior to activities conducted in the offshore airspace of the Sea Range. In addition, all project activities would be postponed until airspace within the project area was clear of non-participating aircraft. Therefore, any impacts on airspace management in the Atlantic and Pacific study areas would be negligible and insignificant.	
Noise	In the Atlantic and Pacific BOAs, intermittent aircraft and vessel noise as would be associated with the Proposed Action is a routine occurrence. Flight test personnel on vessels would follow current noise protection standard operating procedures (i.e., use of ear plugs, personal protective equipment, and safety distances) for flight tests. There would be no human noise receptors located at the Atlantic or Pacific BOA target sites or on floating targets. Therefore, any impacts from noise in the Atlantic and Pacific BOAs would be negligible and insignificant on non-wildlife receptors.	At Kwajalein Atoll, intermittent noise associated with a land-based payload impacts is a routine occurrence. No human receptors would be located on Illeginni Islet or in the KMISS range during payload impacts. Therefore, any impacts from noise on Illeginni Islet and in the KMISS range would be negligible and insignificant on non-wildlife receptors.
Cultural Resources	There are no identified cultural resources with the potential to be affected along the possible flight paths over the ocean or in the Atlantic and Pacific BOAs. Therefore, there would be no adverse effects to cultural resources within the Atlantic and Pacific BOAs from the CPS flight tests.	Carried Forward
Geology and Soils	In the Atlantic and Pacific BOAs, CPS flight test activities would not require ground disturbing activities. CPS AUR vehicle components would fall to the ocean floor and become embedded in the seafloor. The deposition of flight test materials would occur offshore in deep ocean waters. Vehicle materials buried beneath sediments may remain intact for decades where geochemical conditions would inhibit corrosion of the metal casing. Studies conducted at several Navy ranges where impact testing has occurred and at underwater munitions disposal sites in Hawai`i have shown that military expended materials have not resulted in water or sediment toxicity (Briggs et al. 2016, DON 2018a, DON 2022a). Therefore, there would be no expected adverse effects from the Proposed Action to geological and soil resources in the Atlantic or Pacific BOAs.	Carried Forward

Resource Topic	Location within Study Area	
	Broad Ocean Areas Atlantic and Pacific	**Kwajalein Atoll**
Water Resources	There are no groundwater or surface water resources in the Atlantic or Pacific BOAs that would be affected by the CPS flight tests. There would be no disturbance to ocean waters beyond the settling of the individual booster stages hundreds of miles apart as they come to rest on the seafloor after splashing into the ocean along the flight path and sinking thousands of feet. No impacts would occur to water resources within the Atlantic or Pacific BOAs from the CPS flight test.	Carried Forward
Land Use	In the Pacific and Atlantic BOAs, the CPS flight path would avoid populated land masses. There would be no changes or impacts from CPS flight tests to land use along the flight paths over or within the Atlantic and Pacific BOAs.	No changes to land use would occur from the CPS flight tests. Illeginni Islet and KMISS have served as the terminal impact site for numerous flight test programs and the CPS flight test activities are consistent with the current capabilities and land use at Kwajalein Atoll.
Infrastructure and Utilities	If CPS flight test activities restrict access, short-term negligible restrictions would occur to infrastructure in the Atlantic or Pacific study areas (e.g., maritime transportation, national security, energy and mineral extraction, fisheries and aquaculture, tourism, and recreation) from the Proposed Action.	At Kwajalein Atoll, the Proposed Action represents activities that are consistent with the missions there and well within the limits of current operations of RTS and USAG KA. There would be no impacts to infrastructure or utilities.
Socioeconomics	In the BOAs, mineral extraction sites may be impacted when and if CPS flight test activities restrict access to these sites; any changes in accessibility to those sites would be short-term (typically 1.5 to 4 hours per location). Commercial and recreational fishing may be affected when and if CPS flight test activities restrict access to fishing areas or if the CPS flight tests cause fish to abandon a popular fishing site. Aquaculture and tourism may also be affected. Because of these potential impacts, the Navy notifies the public about restricted areas and closures. Impacts on socioeconomics in the BOAs would be negligible and insignificant.	At Kwajalein Atoll, personnel conducting the CPS flight tests would reside only temporarily at USAG-KA, and the CPS flight tests would not employ any Marshallese citizens or contribute to the local Marshallese economy. There are no permanent residents at Illeginni Islet. Therefore, there would be no impacts to socioeconomics from the Proposed Action.

Resource Topic	Location within Study Area	
	Broad Ocean Areas Atlantic and Pacific	**Kwajalein Atoll**
Transportation	In the BOAs, the Proposed Action would use airspace that is currently available for existing naval operations that occur in the Atlantic and Pacific study areas (i.e., U.S. Military installations, ranges, and range complexes). Vessel traffic and flight paths would be unaffected by the Proposed Action. CPS AUR flight would occur at high altitudes where it would be generally undetected by vessels or aircraft. Public NOTAMs and NTMs would be issued along the flight path to ensure the safety of both aircraft and vessels. Therefore, no impacts from the Proposed Action are expected to transportation services along the flight path in the Atlantic and Pacific study areas.	Vessel traffic and flight paths would be unaffected by the CPS flight tests at Kwajalein Atoll. Public NOTAMs and NTMs would be issued along the flight path to protect the safety of aircraft and vessels. The payload impact sites at Kwajalein Atoll do not have a resident population. Transport of CPS flight test materials, equipment, and personnel would occur using existing transportation methods. Proposed flight test activities are consistent with the mission and well within the limits of current operations of RTS and USAG-KA. There would be no impacts from the Proposed Action to transportation at Kwajalein Atoll.
Environmental Justice	Proposed activities in the BOAs would take place over and within the open ocean at least 50 nm from inhabited land areas. Since there are no human residents within the BOAs, there would be no disproportionate impacts to minority populations or low-income populations from CPS flight tests. Similarly, there would be no environmental health risks or safety risks for children in the BOAs because proposed activities would take place in the open ocean where no children are present.	Carried Forward
Visual Resources	Proposed activities would not involve any construction, demolition, or any land use changes. All activities, including vessel operations and flight testing, are consistent with activities that have occurred in the Atlantic and Pacific study areas for decades and will continue to occur into the foreseeable future. There would be no impacts to visual resources.	
Coastal Zone Management	The Atlantic BOA, Pacific BOA, and Kwajalein Atoll do not contain any coastal zone resources as defined under the Coastal Zone Management Act of 1972 and proposed activities in those areas would have no impacts on coastal zone management.	

Acronyms and Abbreviations: AUR = All-Up-Round, BOA = Broad Ocean Area, CPS = Conventional Prompt Strike, KMISS = Kwajalein Missile Impact Scoring System, nm = nautical miles, NOTAM = Notice to Air Mission, NTM = Notices to Mariners, RTS = Ronald Reagan Ballistic Missile Defense Test Site, USAG-KA = United States Army Garrison – Kwajalein Atoll.

2.0 Description of the Proposed Action and Alternatives

This EA/OEA provides an assessment of the Proposed Action and the No Action Alternative. Within this chapter for the Proposed Action, **Section 2.1** gives a detailed description of the CPS weapon system flight tests program, including information on the flight test vehicle, sea-based launch platforms, test areas, target sites, and flight test scenarios. **Section 2.2** provides a description of the No Action Alternative and other alternatives eliminated from further consideration. Lastly, identification of the Preferred Alternative is presented in **Section 2.3**.

2.1 Proposed Action

The proposed CPS weapon system flight tests would consist of up to eight flight test launches at up to eight different sea-based launch locations per year, conducted over a 10-year period beginning in fiscal year 2025. All flight tests would be at-sea missile tests launched from existing naval vessels while using ocean-based or land-based locations for targets. As mentioned in **Section 1.3**, the proposed flight tests would be conducted within broad Atlantic and Pacific study areas, which are delineated in **Figures 1.3-1** and **1.3-2**.

The flight tests would be supported by several existing U.S. military installations, ranges, and range complexes located in the Atlantic and Pacific Ocean regions. For the EA/OEA analysis, the designated study areas include the at-sea components of the ranges and range complexes. Apart from some island target locations, the land-based components and operations associated with these ranges are not included as part of the Proposed Action. Such land-based operations are part of ongoing logistical support and military readiness activities, including training, and Research, Development, Test, and Evaluation activities, which have been previously analyzed within various Navy Fleet and range complex EIS/OEISs listed in **Chapter 6.0**.

The detailed aspects of conducting the CPS flight tests are described in the following subsections.

2.1.1 CPS Flight Test Vehicle

The proposed CPS flight test vehicle design and operation is expected to be very similar to the test vehicles previously analyzed for the Joint Flight Campaign, which is a joint action between the Navy Strategic Systems Programs and the U.S. Army Rapid Capabilities and Critical Technologies Office (DON and U.S. Army 2022). Joint Flight Campaign flight tests 1 through 5 will be land-based launches only to help support development of the Navy's CPS flight test vehicle, the Army's Long Range Hypersonic Weapon, and the associated sea-based and land-based missile launch systems. Like the Joint Flight Campaign flight test vehicles currently undergoing testing, the CPS flight test vehicle missile body consists of a two-stage booster system and payload adapter. When combined with the payload, the vehicle is referred to as an

all-up-round (AUR) missile. The AUR missile body is approximately 30 feet (ft) in length and 3 ft in diameter (**Figure 2.1.1-1**).

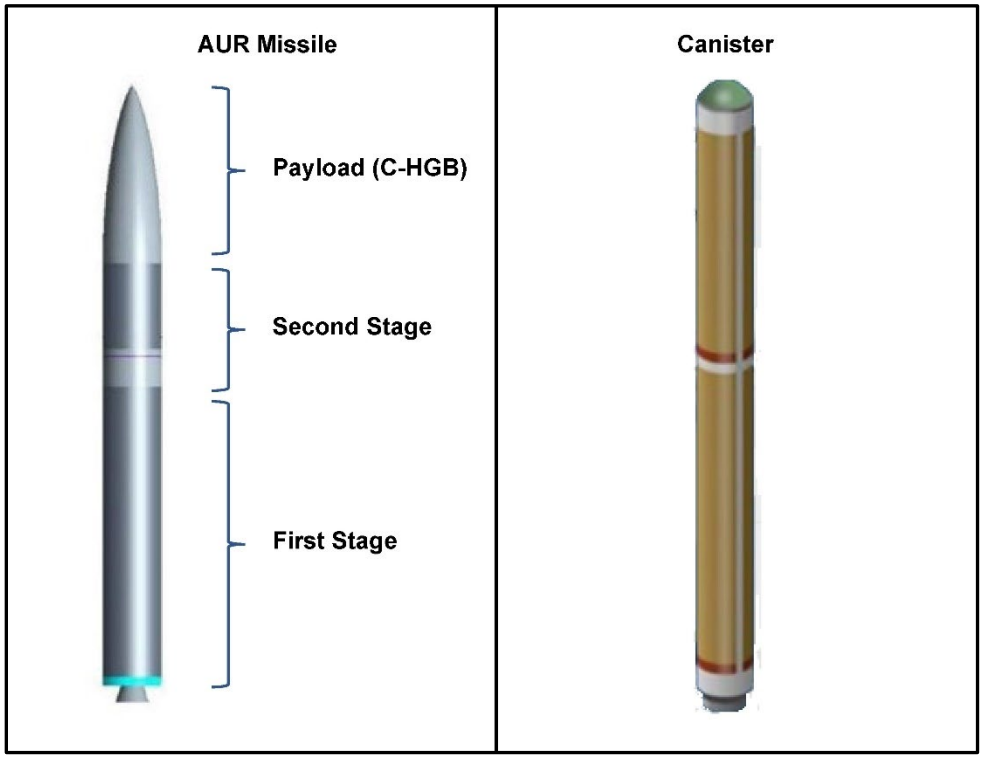

Figure 2.1.1-1. CPS Flight Test Vehicle and Canister

The AUR first and second stage rocket motors would contain a total of up to 20,000 pounds of rocket propellant. Other ordnance carried on the test vehicle is a Flight Termination System used only if the vehicle were to deviate from its course or should other problems occur during flight. The Flight Termination System serves as a destruct package that would stop forward thrust when activated, causing the vehicle to terminate flight and fall into the ocean. A list of characteristics for the missile body portion of the AUR is presented in **Table 2.1.1-1**.

Table 2.1.1-1. CPS Missile Body Characteristics

Major Components	Rocket motors, magnesium thorium, nitrogen gas, halon, asbestos
Communications	Various 5- to 20-watt radio frequency transmitters; one maximum 400-watt radio frequency pulse
Power	Up to 9 lithium-ion polymer and silver zinc batteries, each weighing between 3 and 40 pounds
Propulsion/Propellant	Rocket propellant and approximately 3 pounds of pressurized nitrogen gas
Other	Small electro-explosive devices for the Flight Termination System

A Common Hypersonic Glide Body (C-HGB) would be used as the missile payload (**Figure 2.1.1-1**), similar to that being tested on the Joint Flight Campaign flight tests. The C-HGB is a hypersonic glider designed to deliver a conventional payload. Once launched and released from the booster system in the upper atmosphere, the C-HGB would glide to a predetermined target location without any propulsion. The C-HGB would not contain any propellants or radioactive

materials. Flight test payloads may be conventional or may be inert and incorporate a mass simulator. A list of characteristics for the C-HGB is presented in **Table 2.1.1-2**.

Table 2.1.1-2. C-HGB Characteristics

Structure	Aluminum, steel, titanium, magnesium and other alloys, copper, fiberglass, chromate coated hardware, tungsten, plastic, Teflon, quartz, silicone
Communications	Two up-to 20-watt radio frequency transmitters
Power	Up to 3 lithium-ion polymer batteries and 1 thermal battery, each weighing between 3 and 50 pounds
Propulsion/Propellant	None
Other	Small electro-explosive devices for safety and subsystems operations

For safe handling and rapid fielding, the AUR would be encased in a launch canister (**Figure 2.1.1-1**). The function of the canister would be to protect the missile from damage during storage, transport, and loading onto naval vessels; and to help facilitate missile launch.

2.1.2 Sea-Based Launch Platforms and Support Ships

All proposed CPS flight tests would involve AUR launches conducted at sea from several existing naval surface ships and submarines that have been modernized to accommodate the new missile systems and launch canisters. All launches are expected to be conducted from surface and sub-surface firing platforms that are under the control of the Naval Sea Systems Command. Naval Sea Systems Command is responsible for developing, acquiring, delivering, and maintaining surface ships, submarines, unmanned vehicles, and other weapon system platforms; and oversees vessel operations.[2]

In addition to the sea-based launch platforms, other smaller ships and watercraft would be used in support of the CPS flight tests downrange. These support vessels would host various sensor systems, including telemetry and radar, and support target placement and recovery operations at designated target sites. Refer to **Section 2.1.4** for information on vessel operations downrange.

2.1.3 Launch Preparations and Operations

The proposed CPS flight tests would occur within the ocean study areas shown in **Figure 2.1.3-1** for the Atlantic region, and in **Figures 2.1.3-2** and **2.1.3-3** for the Pacific region. As was mentioned in **Section 1.3**, logistical and operational support for the launch vessels would be provided at various naval installations that are listed in **Table 1.3-1**. The locations of these installations are shown in **Figures 2.1.3-1** through **2.1.3-3**. With the exception of U.S. Naval Base Ventura County, Point Mugu in California, the launch vessels would be readied for testing at any of these locations prior to departure to a predetermined launch point in the BOA.

[2] For the purposes of this EA/OEA, the term “vessel” is inclusive of surface ships and submarines.

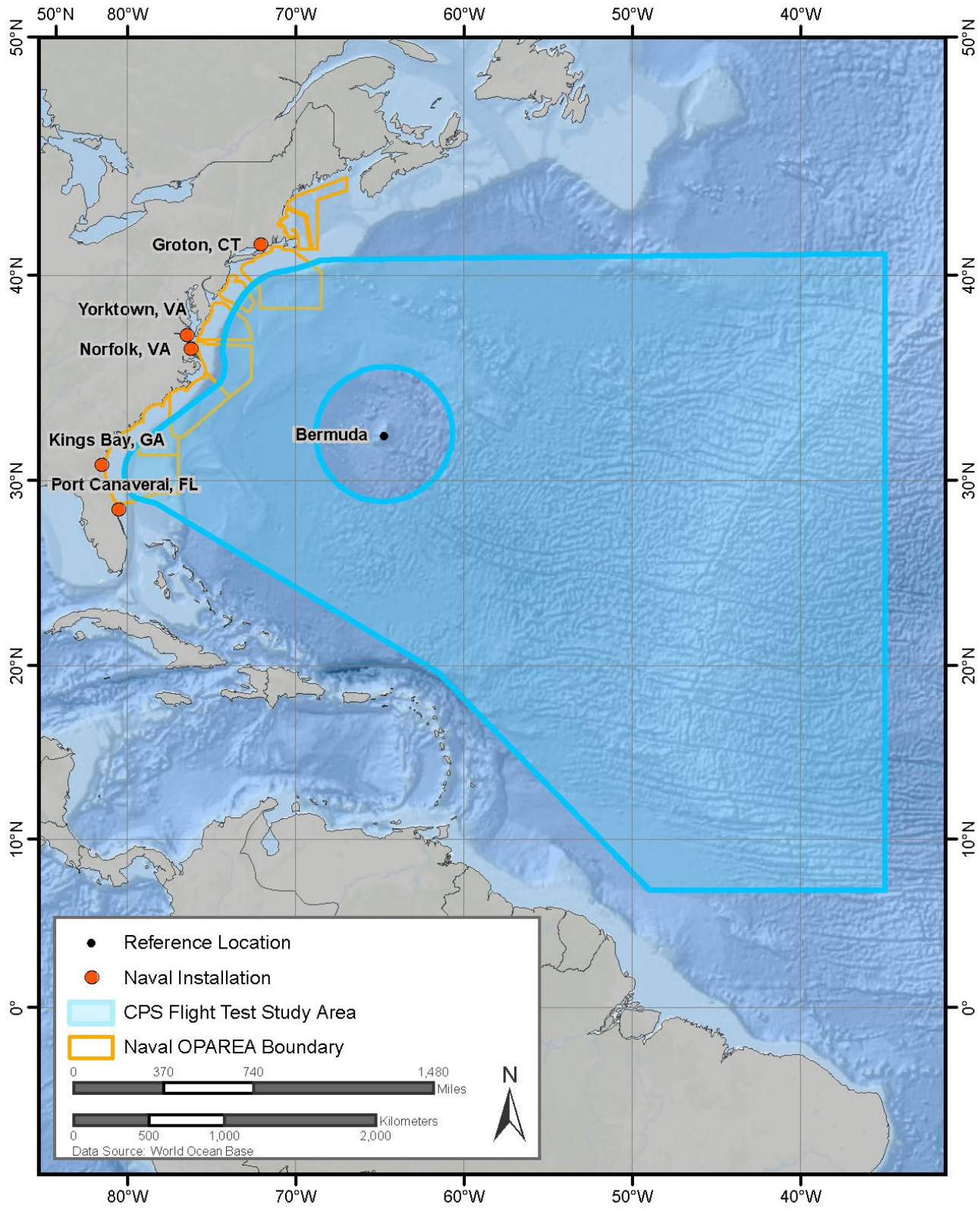

Figure 2.1.3-1. Atlantic Study Area for Flight Tests

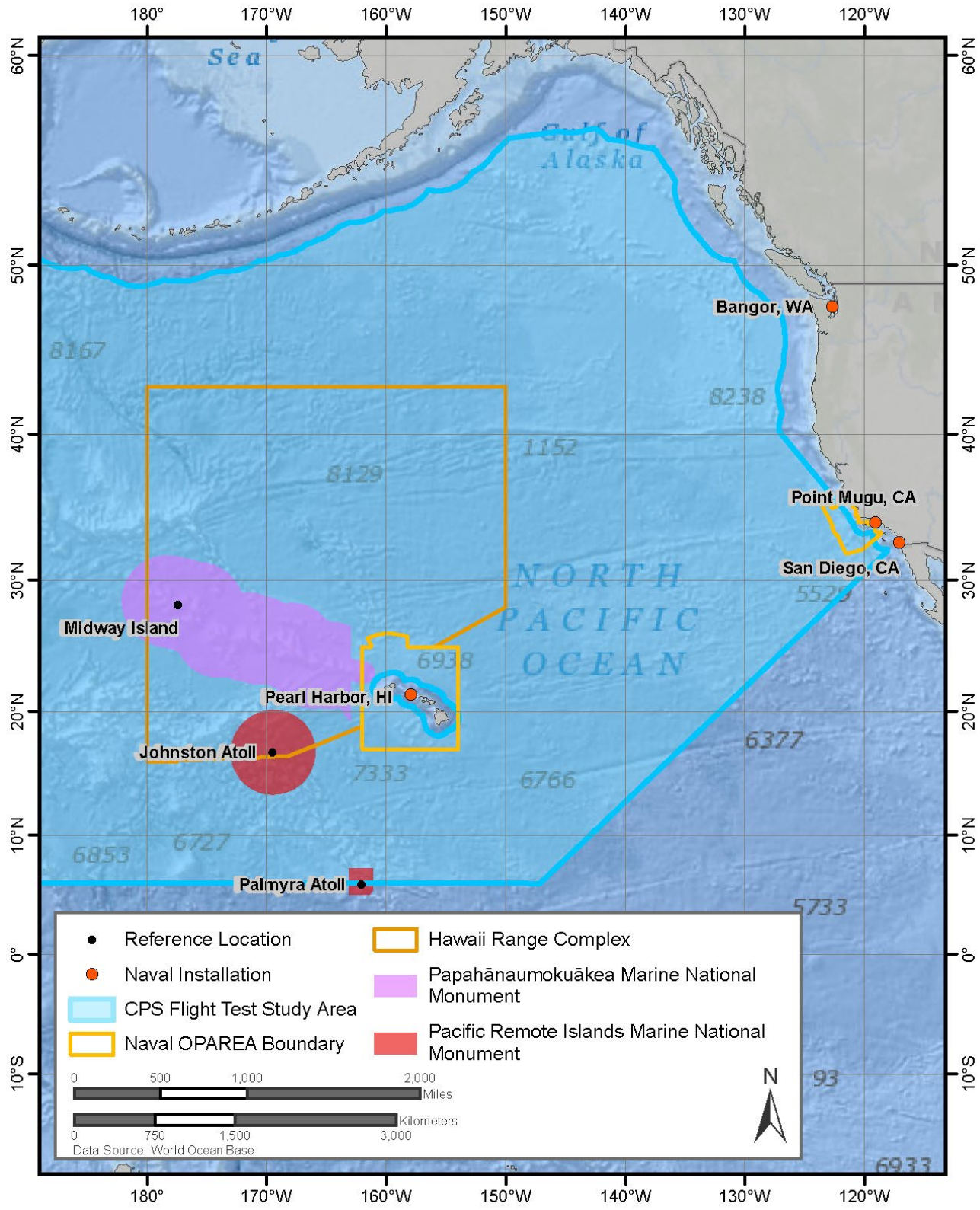

Figure 2.1.3-2. Pacific Study Area (East) for Flight Tests

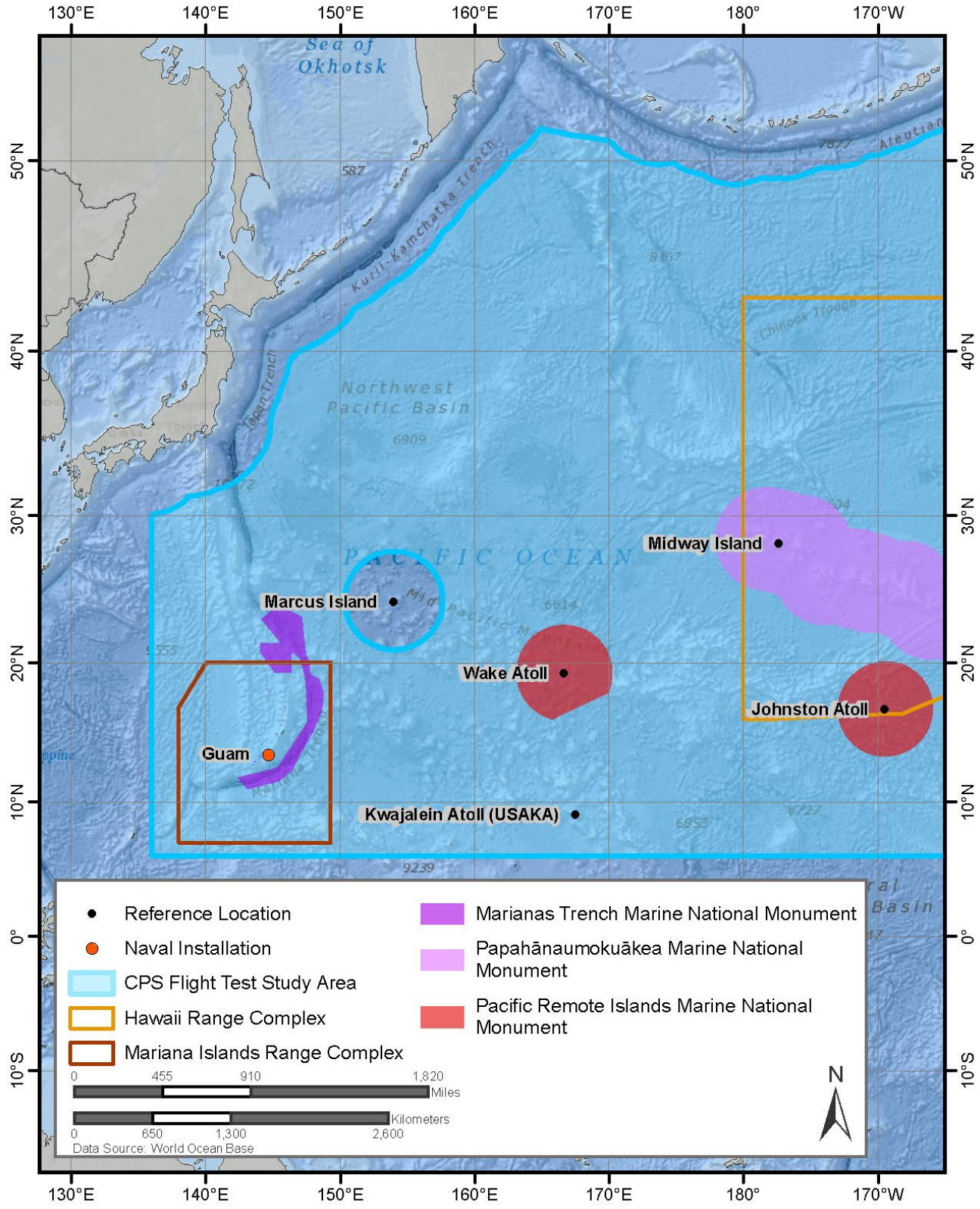

Figure 2.1.3-3. Pacific Study Area (West) for Flight Tests

The AUR canisters would be transported from the integration facility to the naval installation via truck or military aircraft in DoD and U.S. Department of Transportation approved shipping containers. To safeguard the AUR canisters from fire or other mishap, all transportation, handling, and storage of the components would be accomplished in accordance with applicable DoD, Navy, U.S. Air Force, and U.S. Department of Transportation policies and regulations. Each naval installation that would receive the AUR canisters has existing ordnance handling and storage facilities and standard operating procedures to ensure personnel and public safety. As previously mentioned, these types of logistical support and military readiness activities have been previously analyzed within the various Navy Fleet and range complex EIS/OEISs. As such, these land-based actions are not analyzed as part of the Proposed Action in this EA/OEA.

After a launch vessel departs and is in transit to the launch point in the BOA, CPS flight test activities would involve onboard pre-flight checks in preparation for launch. In addition to CPS flight test activities, crew members may conduct basic and routine unit-level activities such as surveillance and sonar training, and vessel maintenance. In some instances, the launch vessels may participate in fleet training exercises. Such routine activities and fleet exercises have also been previously analyzed within previous Navy EIS/OEISs. In all instances, vessels would be operated in accordance with applicable navigation rules, including international laws and regulations. Navy ships transit at speeds that are optimal for fuel conservation to maintain ship schedules and to meet mission requirements. Personnel are assigned to stand watch at all times, day and night, when vessels are moving through the water (underway) for safety of navigation, collision avoidance, range clearance, and man-overboard precautions. Environmental mitigation measures and standard operating procedures used by the Navy (see **Appendix C** for a list of measures relevant to the Proposed Action) benefit public health and safety, marine animals, and seafloor resources by identifying potential hazards and reducing the potential for vessel strikes.

The ocean study areas (**Figures 2.1.3-1** through **2.1.3-3**) for conducting the CPS flight tests include the airspace, ocean surface space, and undersea space. In all instances, test launches would be conducted at least 50 nautical miles (nm) offshore, usually within the existing naval operating areas (OPAREAs), sea ranges, and range complexes to maximize use of fleet assets. For some tests, however, launches could occur from more distant locations within the ocean study areas extending to 200 nm offshore. No launches are planned to occur within the marine national monuments or national marine sanctuaries located in the ocean study areas.

2.1.4 Downrange Preparations and Operations

For each flight test, there would be two to three additional support ships downrange from the launch point serving as host platforms for various sensors including telemetry and radar. A support ship and smaller watercraft would be used in the terminal area to support pre-flight test target placement/set-up, and post-flight test recovery and clean-up activities. Just as for the launch vessels described in **Section 2.1.3**, support ships and watercraft used downrange would operate in accordance with applicable navigation rules, including international laws and regulations, and monitor for marine mammals and sea turtles to avoid potential vessel strikes. Prior to downrange support ship and watercraft operations, Navy personnel would use the

Navy's Protective Measures Assessment Protocol to identify applicable environmental mitigation requirements which minimize potential impacts to protected marine species (see **Appendix C** for a list of measures relevant to the Proposed Action).

Depending on the particular trajectory for each flight test, existing fixed or mobile telemetry and radar sensors on land areas within view of the missile trajectory may be used. For mobile systems, there are no plans for the clearing of vegetation or ground disturbance. Such assets most likely would be operated within military installations.

A target site for the C-HGB would be at the terminal end of the CPS flight test. Target sites primarily would be located in the BOA in deep waters. In addition to BOA target sites, one island location in an established range operational area would serve as an occasional land-based target site. Most sea-based target sites would be within existing DoD sea-based ranges and range complexes located away from populated areas. All BOA target sites would be outside of exclusive economic zones (EEZs) in international waters. These sea-based and land-based target sites are further described in the following sections.

2.1.4.1 Broad Ocean Area Target Sites

In preparation for using target sites in the Atlantic and Pacific BOAs, the Navy may place self-stationing instrumented rafts around the targeted site for purposes of measuring and recording the C-HGB ocean impact. Equipped with radar, telemetry, and acoustic and optical sensors, the rafts would use battery powered trolling motors to maintain position; no anchoring systems would be used. Up to 12 sensor rafts would be deployed from a support ship prior to each flight test, which would then depart to a safe zone.

2.1.4.2 Floating Targets

For some target sites in the BOA, a floating target raft may be used. Floating target rafts would be pontoon rafts approximately 11 ft wide by 13 ft long (**Figure 2.1.4-1**). For flight tests involving a floating target raft, the raft would be deployed from a support ship prior to the flight test and would remain on-station for several hours using small electric motors. Target rafts would include several sensor types and scoring devices. A list of characteristics for the target raft is presented in **Table 2.1.4-1**.

Table 2.1.4-1. Target Raft Characteristics

Structural Components	Raft pontoons: high density polyethylene shell and urethane foam filler Raft frame: aluminum
Electronic Components	Sensors: hydrophones, pressure probes, camera system Electric motors Other electrical components: circuit boards, global positioning system, antennas, computer equipment, and copper electrical wiring
Power	Lithium-ion phosphate batteries
Other	Aluminum and steel plates

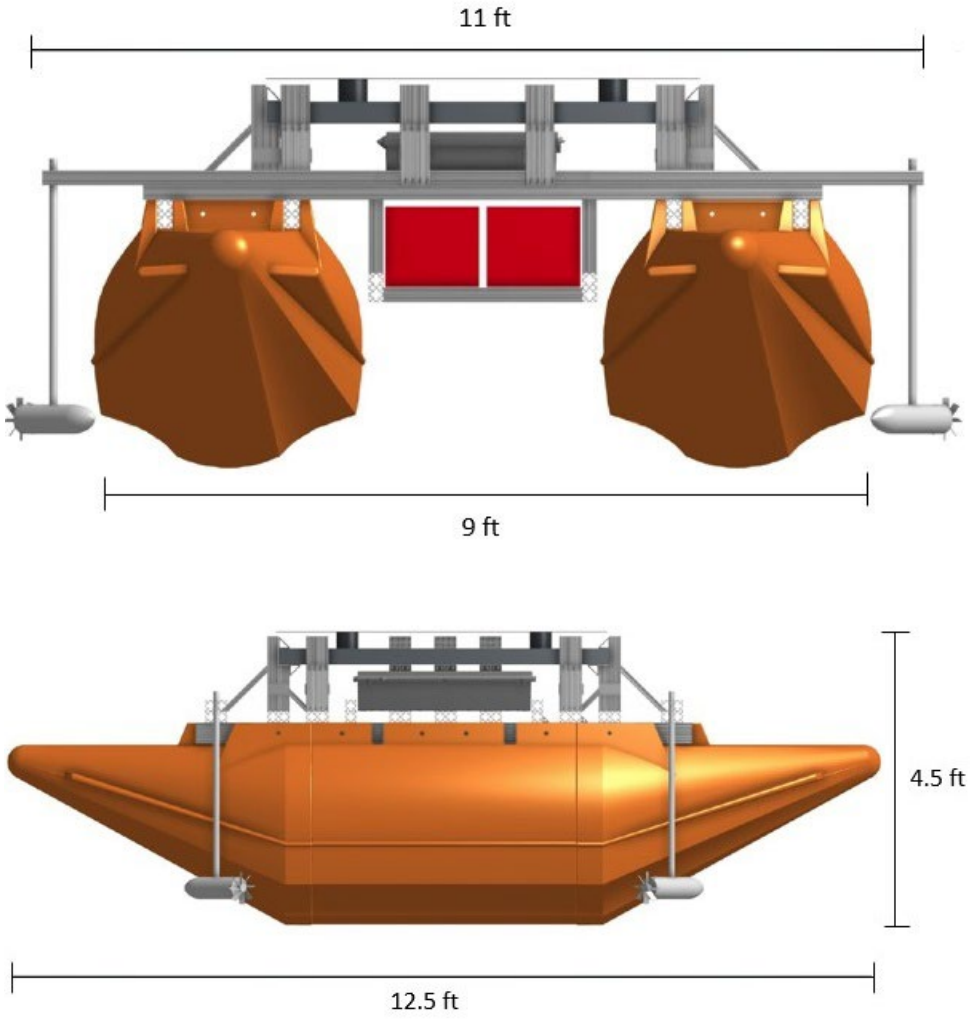

Figure 2.1.4-1. Notional Target Raft

2.1.4.3 Kwajalein Missile Impact Scoring System

Another deep-ocean target site being considered is the Kwajalein Missile Impact Scoring System (KMISS) located east of Kwajalein Atoll in the Republic of the Marshall Islands (RMI; **Figure 2.1.3-3**). KMISS, which is part of the Ronald Reagan Ballistic Missile Defense Test Site (RTS), is a deep-ocean range offshore Gagan Islet (**Figure 2.1.4-2**) with depths ranging from 7,000 to 12,000 ft. KMISS uses fixed underwater hydrophones to detect and locate surface impacts of missiles in all weather conditions (USASMDC 2014a). Use of KMISS for missile impact scoring has been previously analyzed by the U.S. Air Force for the Minuteman III and other missile programs (U.S. Air Force 2020a, U.S. Air Force 2021).

2.1.4.4 Land-Based Target Site

For C-HGB land-based impacts, one target site is proposed at a Pacific region island located at RTS (i.e., Illeginni Islet) in the RMI (**Figure 2.1.4-2**). The land impact site is included as part of the proposed CPS flight tests so as to collect real-time performance data and critically important post-mission information. The Navy anticipates approximately one land impact per year would occur at Illeginni Islet throughout the flight test program's 10-year period.

Illeginni Islet, Kwajalein Atoll in the RMI

Within Kwajalein Atoll, Illeginni Islet is one of 11 islets leased to the United States for U.S. Army Garrison–Kwajalein Atoll (USAG-KA) and RTS operations (**Figure 2.1.4-2**). Located on the west-central side of the atoll, Illeginni Islet is 31 uninhabited acres of land area with several buildings (some abandoned), towers, roadways, a helipad, and a dredged harbor area. The small islet has been used as a target site by the U.S. military for various hypersonic missile programs since the early 1990s. Such testing at the islet has been previously analyzed in several environmental documents (U.S. Air Force 2004, U.S. Air Force 2010, U.S. Air Force 2021, USASMDC 2011, DON 2019).

The CPS flight test target site at Illeginni Islet is an approximate 7.6-acre area on the west end of the islet that includes the helipad (**Figure 2.1.4-3**). The target site is non-forested and a C-HGB impact within the islet's forested area or in the adjacent reef and shallow waters would be unintentional and unlikely to occur.

To ensure the safe conduct of the flight tests for personnel at RTS, a Mid-Atoll Corridor impact area has been established across the atoll (**Figure 2.1.4-2**). When a point of impact is to occur in this area, a number of strict precautions are taken to protect personnel. Such precautions may consist of evacuating nonessential personnel and sheltering all other personnel remaining within the Mid-Atoll Corridor.

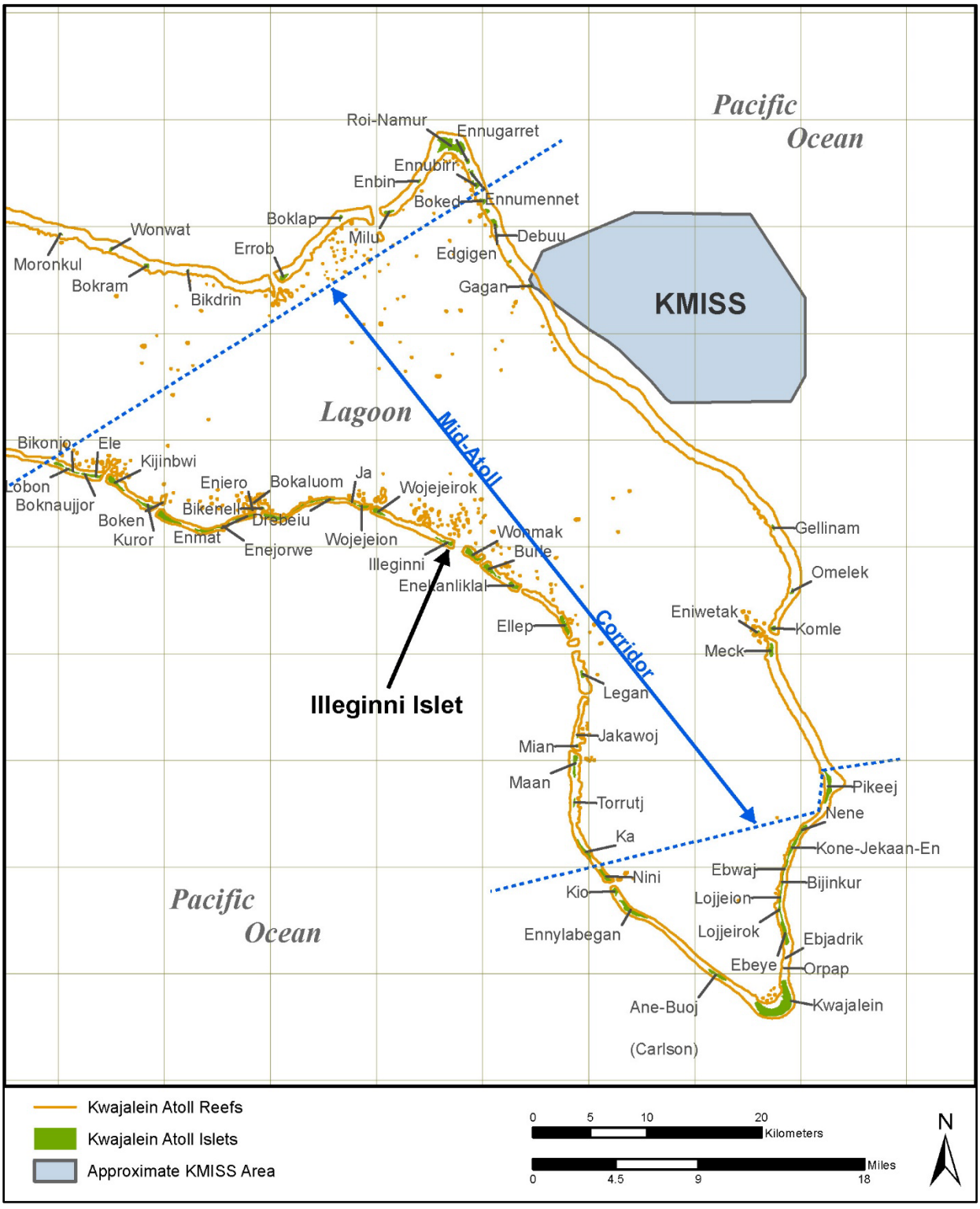

Figure 2.1.4-2. Kwajalein Atoll in the RMI

Figure 2.1.4-3. Illeginni Islet at Kwajalein Atoll in the RMI

2.1.5 Flight Test Scenario

As part of planning for each CPS flight test, range personnel would conduct a comprehensive safety analysis to determine specific launch and flight hazards associated with the test. Within days of each flight test, the Federal Aviation Administration (FAA) would issue Notices to Air Mission (NOTAMs) alerting the public to stay clear of the airspace hazard zones in the launch area and along the missile flight path. Additionally, the U.S. Coast Guard or Navy would issue Notices to Mariners (NTMs) alerting the public to stay clear of the ocean hazard zones. Within a day prior to launch, radar and other remote sensors would be used to verify that the hazard zones are clear of non-mission-essential aircraft, vessels, and personnel.

Once the launch vessel has reached the designated launch point in the BOA and is cleared by range safety to commence testing, the AUR would be launched. During the boost phase following launch of the AUR, the first-stage motor would burn out downrange and separate from the second stage. Farther into flight, the second stage would burn out and separate, then the payload adapter would be jettisoned from the C-HGB. Jettison of the second-stage booster and payload adaptor would occur outside the atmosphere. The spent booster stages and payload adapter would splash down in the BOA at different points downrange. All booster and payload adapter splashdown locations would be within the ocean study areas. First-stage boosters would splash down downrange of launch and as far as 330 nm offshore. Second-stage boosters and payload adapters would splash down outside of EEZs in international waters. The C-HGB would continue flying towards the predesignated sea-based or land-based target site before impact at the target sites.

The CPS missile flight paths would be designed to avoid Bermuda in the Atlantic, Marcus Island in the Pacific, and any other populated islands. Aside from the target sites at Kwajalein Atoll, no missile components are expected to splash down or impact within territorial seas or non-U.S. EEZs. Additionally, the Navy would plan all missile component splashdowns and payload impacts to avoid marine national monuments and national marine sanctuaries.

Based on data from other weapon system flight testing and on CPS weapon system design, the reliability rate of this developmental system is expected to be 80% during flight testing. Flight test failures would be expected no more than 20% of the time and would fall into four scenario categories presented in **Table 2.1.5-1**. If flight data were to indicate insufficient energy for the C-HGB to reach the target site, the vehicle could be directed to descend in a controlled termination into the BOA. All flight paths would be designed to ensure that, in the event of a failure, no CPS weapon system components or debris would descend into populated areas or marine protected areas.

2.1.6 Post-Flight Test Activities

Following completion of each CPS flight test, the launch vessel would depart from the launch point and continue normal operations before returning to port. Downrange, sensor support ships would also return to port. Post-flight test activities for each target site are described in the following sections.

Table 2.1.5-1. Flight Test Failure Scenarios

Scenario Number	Flight Test Failure Description	Results of Flight Test Failure	Post-Flight Test Response Actions
1	Flight test vehicle does not launch.	None. CPS AUR remains onboard the launch vessel.	None
2	Vehicle launches but there is no motor ignition. No auto destruct or command destruct is activated.	CPS AUR falls intact into the BOA, likely near the launch point. AUR would sink to the ocean floor.	Post-flight test clean-up and recovery. Recovery operations would be conducted to retrieve the payload or critical technologies if significant portions remain intact and if in waters less than 15,000 feet deep. Any visible debris found floating would be recovered, as much as practicable.
3	Vehicle launches but there is no motor ignition. Auto destruct or command destruct is activated using the Flight Termination System.	Intact CPS components or debris fall into the BOA, likely near the launch point. Debris would be large and small pieces. Most debris would sink to the ocean floor. It is unlikely that any pieces would float.	
4	Vehicle launches and motors ignite but the missile cannot reach the target site. Flight is terminated using command destruct.	Intact CPS components or debris fall into the BOA downrange. Debris would be large and small pieces. Most debris would sink to the ocean floor. It is unlikely that any pieces would float.	

Acronyms and Abbreviations: AUR = All Up Round, BOA = Broad Ocean Area, CPS = Conventional Prompt Strike

2.1.6.1 Broad Ocean Area Target Sites

For the sea-based target sites in the BOA, support ships would retrieve instrumented rafts and search for any floating debris before returning to port. All or most of the missile components would be expected to sink to the ocean bottom, including the spent booster stages. Any visible C-HGB or other missile debris found floating would be recovered, as much as practicable. During post-flight BOA searches after flight tests of similar systems, only the payload nose fairing segments (panels covering the payload) have been found floating and have been recovered; all other components sank to the ocean bottom.

In the event of a flight test failure, post-flight test clean-up and recovery operations would be conducted to retrieve portions of the payload or critical technologies that remain intact as described for the flight test failure scenarios in **Table 2.1.5-1**.

2.1.6.2 Floating Targets

For those flight tests involving a floating target raft, a support vessel would return to the BOA target site to retrieve the target. It is not planned or expected that target rafts would be sunk during flight test activities. Safety and other test support personnel would: (1) inspect the target raft for any hazards; (2) conduct an impact assessment of the raft and the test support equipment on the raft; and (3) recover any visible C-HGB or other test debris to the extent practicable. The raft would then be loaded onto a support ship for transport back to the appropriate port to remove the equipment, further evaluate damage to the raft, and determine whether the raft can be reused as a target.

The test would not involve any intentional sinking or abandonment of the target raft or test components on the target raft (e.g., sensors and motors). It is possible that material on the target raft might be inadvertently dislodged from the raft during a flight test. If materials were dislodged from the target raft, it is expected that most materials would sink (e.g., metal components) or be cleaned up during post-test operations if found floating (e.g., pontoon foam filler material). All lithium-ion batteries used on the target raft for sensor operation would be recovered unless they were inadvertently damaged beyond the point of safe retrieval/recovery. While there is some potential for the target raft to be sunk or for test materials on the raft to be dislodged or unrecoverable, it is considered unlikely that this would occur.

2.1.6.3 Kwajalein Missile Impact Scoring System

Following completion of a flight test at KMISS, a vessel or aircraft from USAG-KA would inspect the ocean impact site for any floating debris. Any visible C-HGB debris found floating would be recovered, as much as practicable. No debris would be retrieved from the ocean bottom.

2.1.6.4 Land-Based Target Site

For C-HGB impacts at the Illeginni Islet target site, Navy personnel would arrive via aircraft or surface vessel to first secure the area. Range safety personnel would then inspect the impact site for any hazards (e.g., residual unexploded ordnance from prior activities). Because the vehicle impact is expected to form a crater up to several feet in diameter, and eject soil over a wide area, personnel would be required to wear appropriate personal protective equipment. At Illeginni Islet, soil containing residual concentrations of beryllium, depleted uranium, and tungsten from prior intercontinental ballistic missiles and other flight tests could be scattered over the area (U.S. Air Force 2004, U.S. Air Force 2021, DON 2019). If necessary for personnel safety, the impact site would be wetted with water to stabilize the disturbed soil. Once the site is cleared for safe entry, other test support personnel would conduct an impact assessment of the site, and initiate cleanup and recovery operations. Any visible C-HGB debris would be recovered, as much as practicable. As part of recovery operations, loose soil material may need to be screened to retrieve vehicle debris. Any equipment brought on island during pre-flight test preparations would also be removed.

At Illeginni Islet, the crater may need to be backfilled and appropriate repairs made to any island structures. In addition, soil and groundwater samples would be taken at Illeginni Islet for testing, as needed, to ensure that concentrations of heavy metals, such as beryllium, uranium (as a surrogate for depleted uranium), and tungsten, do not exceed established UES standards (USASMDC 2021).

If a C-HGB were to inadvertently impact outside the island target site in adjacent shallow waters, divers in scuba gear would attempt to recover the debris manually. For an inadvertent impact off Illeginni Islet on the coral reef, reef flat, or in shallow waters less than 10 ft deep, an inspection by project personnel would occur within 24 hours. Representatives from the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) would also be invited to inspect the site as soon as practical after the test. The inspectors would assess

any damage to coral and other natural and biological resources and, in coordination with Navy and USAG-KA representatives, decide on any response measures that may be required (DON 2019).

2.2 Alternative Actions Including the No Action Alternative

By integrating a series of existing ranges, OPAREAs, and BOAs as identified for the proposed CPS flight test study areas in both the Atlantic and Pacific Ocean regions, the Navy is provided the flexibility to meet diverse testing requirements and the distances needed to fully demonstrate the CPS weapon system performance before it can be certified for fleet use. To meet CPS program objectives for the Proposed Action, alternatives must satisfy the following criteria:

- Support sea-based launch areas and missile flight corridors which allow flight testing over the entire performance envelope required to fully demonstrate CPS weapon system performance.
- Support flight testing in both the Atlantic and Pacific regions to meet requirements for system certification for fleet use in both regions.
- Include viable sea-based payload target sites or architecture that meets CPS performance and safety requirements.
- Include viable land-based payload target site(s) that meet CPS program performance and safety requirements.
- Include target sites, land- or sea-based, with existing sensors capable of collecting the data required to demonstrate CPS payload system performance or sites suitable for deployment of required sensors.
- Locations which support initial CPS weapon system flight testing by fourth quarter of fiscal year 2025.

Only one alternative has been identified that meets the Navy screening criteria for the Proposed Action: the Preferred Alternative, or Proposed Action, as described in **Section 2.1**. The No Action Alternative, as described in this section, was also carried forward for analysis in this EA/OEA. Alternatives that were considered but not carried forward for analysis are discussed in this section.

2.2.1 Alternatives Considered but Not Carried Forward

2.2.1.1 Simulation and Laboratory Testing

Although computer simulations, modeling, and other laboratory tests are being applied to the design and early evaluation of the CPS weapon system, such methods cannot provide all of the information needed to satisfy mission requirements (e.g., verify system operation and performance). Alternatives that relied solely on such methods would not satisfy the purpose and need of the Proposed Action, and thus were eliminated from further consideration. The Navy

requires access to realistic environments to fully test the operational aspects and effectiveness of a new weapon system.

2.2.1.2 Land-Based Target Sites

To meet the CPS program objectives, test events must satisfy certain critical objectives, to include demonstrating weapon system effects on targets and demonstrating applicable design features and operating procedures. To accomplish these objectives and meet the purpose and need of the Proposed Action, land-based target sites are required for a subset of Navy CPS flight tests. As part of the alternative selection process for the Proposed Action, the Navy assessed available DoD land-based ranges in the Pacific and Atlantic study areas. The Navy did not identify any suitable land-based target sites in the Atlantic study area. The Navy identified two potential land-based target sites in the Pacific study area which were evaluated as potential alternatives for Navy CPS flight testing but not carried forward for analysis in this EA/OEA. The first was the island of Farallon de Medinilla, a part of the Navy's Mariana Islands Range Complex, and the second was San Nicolas Island, a part of the Navy's Point Mugu Sea Range.

2.2.1.2.1 Farallon de Medinilla

Farallon de Medinilla is an island in the Commonwealth of the Northern Mariana Islands. The DoD leases Farallon de Medinilla from the Commonwealth of the Northern Mariana Islands to conduct U.S. military training and testing activities. Farallon de Medinilla has been used as a live and inert gunnery, missile, and bombing range since 1971. The island has three target sites for military training and testing. For the Mariana Islands Range Complex, the Navy has a checklist of six criteria that training and testing programs must meet in order to utilize Farallon de Medinilla (COMNAVMARIANASINST 3500.4E). After conducting an evaluation of the suitability of Farallon de Medinilla as a land-based payload target site based on the criteria, the Navy determined that the Farallon de Medinilla range cannot support the specific requirements of CPS payload impact during the required flight testing timeframe. Furthermore, inclusion of Farallon de Medinilla as a land-based alternative target site in this EA/OEA would require additional permits, authorizations, and consultations that would not allow the Navy to meet the required need date for initiation of CPS flight testing. This alternative was not carried forward for analysis.

2.2.1.2.2 San Nicolas Island

A land target site at San Nicolas Island was also considered as an alternative land-based target site for CPS flight testing. San Nicolas Island is one of the Channel Islands off the coast of Southern California. The island is owned by the Navy and is part of the Naval Air Station Point Mugu Sea Range. The island serves as a training and testing location for the U.S. military and has extensive tracking and communications instrumentation in place to support testing (DON 2022a). San Nicolas Island has a single land impact site which has been used for DoD training and testing for decades (DON 2022a). After conducting an evaluation of the suitability of the San Nicolas Island land impact site for CPS flight testing, the Navy has determined that the

range at San Nicolas Island does not have sufficient size to support the requirements for CPS payload testing. Furthermore, San Nicolas Island was removed from consideration as an alternative land-impact site based on specific range safety criteria which would not meet CPS flight test land-based target site requirements.

2.2.1.3 Ocean-Based Floating Targets

To adequately demonstrate CPS payload system performance, a floating target or platform would be required for a subset of tests with BOA payload impacts. In addition to floating target rafts, the Navy considered a range of floating targets or platforms for use in CPS testing including existing surface ships that have been decommissioned by the Navy, and welded steel, oceangoing deck barges. Use of these target platforms would require that the ship or barge have various sensors installed on it and that it be towed into position at an ocean-based target site. Post-flight test, an oceangoing tug or other vessel would retrieve the decommissioned vessel or barge. If damage to the target ship or barge was too extensive, such that towing it to port would present a hazard to navigational safety for the tug or other vessels, then the damaged vessel may have been sunk in place. This sinking would have occurred in a manner similar to the Navy's Sinking Exercise program, also known as SINKEX (OPNAV M-5090.1).

2.2.1.3.1 Ships and Barges as Floating Targets

After conducting an evaluation of the suitability of using decommissioned Navy ships or deck barges for CPS payload targets, the Navy has determined that inclusion of decommissioned Navy ships and barges as target platforms as alternatives was not required to prove CPS weapon system performance and would not support initial CPS weapon system flight testing by fourth quarter of fiscal year 2025. Inclusion of decommissioned vessels and barges as floating targets in this EA/OEA would require additional marine species density modeling, permits, authorizations, and consultations that would not allow the Navy to meet the required need date for initiation of CPS flight testing. Therefore, decommissioned Navy ships and oceangoing deck barges were removed from consideration as alternatives in this EA/OEA. If the Navy decides to pursue the use of decommissioned vessels and barges as floating targets for future CPS flight testing, additional regulatory compliance would be conducted to include, at a minimum, additional NEPA analyses, permitting, and consultation with federal regulatory agencies.

2.2.1.3.2 Navy Sinking Exercise Program

After conducting an evaluation of the suitability of potential sinking of decommissioned Navy ships or deck barges for CPS payload targets, the Navy determined that sinking would need to be conducted under a SINKEX program and that sinking of target platforms was not required to prove CPS weapon system performance. The current Navy SINKEX program, per regulations under the general permit (40 CFR § 229.2) must be conducted a certain distance from land and in waters no less than a certain depth. This current SINKEX program would not support flight test requirements over the entire CPS flight testing performance envelope due to current operational range limitations. While the general permit issued per the Ocean Dumping Act would not constrain this action, conducting this action in the BOA would require consideration of

high seas not previously covered by a Navy Marine Mammal Protection Act authorization. To accomplish Marine Mammal Protection Act authorization for CPS flight testing involving sinking of a target Navy decommissioned vessel, additional marine species density modeling, permitting, authorizations, and consultations would be required. Completing these requirements would not allow the Navy to meet the required need date for initiation of CPS flight testing by fourth quarter of fiscal year 2025. Therefore, sinking of vessels under the SINKEX program was removed from consideration as alternatives in this EA/OEA. If the Navy decides to pursue incorporation of the SINKEX program into future CPS flight testing, additional regulatory compliance would be conducted to include, at a minimum, additional NEPA analyses, permitting, and consultation with federal regulatory agencies.

2.2.2 No Action Alternative

Under the No Action Alternative, the Navy's CPS sea-based flight test program as described in **Section 2.1** would not occur. However, ongoing Navy training and testing activities within existing naval OPAREAs, sea ranges, range complexes, and other areas, as described and analyzed in previous environmental documents, would continue. By not implementing the Proposed Action, the Navy would not be able to achieve the goal of proving that the new hypersonic weapon system meets all key performance requirements for deployment to sea-based platforms or operational use in a sea-based environment.

2.3 Identification of the Preferred Alternative

The Navy's Preferred Alternative is to implement the Proposed Action in both the Atlantic and Pacific Ocean regions as described in **Section 2.1** of this EA/OEA.

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3.0 Affected Environment

This chapter describes the environmental conditions in the Atlantic and Pacific study areas that could be affected by the Proposed Action and No Action Alternatives. In compliance with NEPA, Council on Environmental Quality, and 32 CFR § 775 guidelines, the information and data presented are commensurate with the importance of the potential impacts to provide the proper context for evaluating such impacts. Sources of data used and cited in the preparation of this chapter include past EAs and EISs, environmental resource documents and other related environmental studies, installation and facility documents and data, and information from regulatory agencies.

Sixteen resources areas or topics were considered for analysis as detailed in **Section 1.6**. Only the resource areas with potential substantial impacts or that meet the importance or interest criteria detailed in **Section 1.6** are described in this section and analyzed in detail in **Chapter 4.0**. See **Section 1.6** for a discussion of resource topics that were not included for detailed analysis in this EA/OEA.

3.1 Broad Ocean Area

Proposed CPS flight tests may occur within the Atlantic and Pacific study areas, which include the airspace, ocean surface, and undersea space in the area delimited in **Figures 2.1.3-1** through **2.1.3-3**. Locations for logistical and operational support for the launch platform vessels include several U.S. Naval installations as listed in **Table 1.3-1** and shown in **Figures 2.1.3-1** through **2.1.3-3**. Proposed flight test support activities may occur within existing U.S. Naval OPAREAs. These include the Narragansett Bay OPAREA, the Atlantic City OPAREA, the Virginia Capes OPAREA, the Navy Cherry Point OPAREA, the Charleston OPAREA, and the Jacksonville OPAREA (DON 2018a) in the Atlantic study area and the Point Mugu Sea Range, the Hawai`i Range Complex, and the Mariana Islands Range Complex in the Pacific study area.

The BOAs within the Atlantic and Pacific study areas are areas at least 50 nm from the territorial sea baseline where proposed activities may occur. This section includes detailed descriptions of air quality, biological resources, hazardous materials and waste management, and health and safety within the Atlantic and Pacific BOA affected environments for CPS flight tests. These resource areas were carried forward for additional analysis of environmental consequences in **Chapter 4.0**.

3.1.1 Air Quality –BOA

3.1.1.1 Region of Influence

The Region of Influence (ROI) for the BOA consists of much of the North Atlantic Ocean (**Figure 2.1.3-1**) and the North Pacific Ocean (**Figures 2.1.3-2** and **2.1.3-3**) where proposed activities would take place. With the exception of Kwajalein Atoll (see **Section 3.2.1**), no proposed activities would occur on or over land or over nearshore waters.

3.1.1.2 Affected Environment

Air quality in the BOAs is considered good due to the following: (1) dominant and strong winds; (2) no stationary air pollution sources; (3) ocean cargo and military vessels are dispersed over a very large area; (4) lack of topographic features to inhibit dispersion; and (5) aircraft are typically above the mixing height altitude. These features effectively widely disperse air emissions across the entire over-ocean missile testing area.

Ongoing change in either the mean state of the climate or in its variability in northern hemisphere lands and oceans has contributed to rising sea levels and retreating shores, increased storm intensity, increased precipitation, disruption of natural ecosystems, and human health effects. Changes in sea level have occurred throughout history, with the primary influences being global temperatures; Arctic, Antarctic, and glacial ice mass changes; and changes in the shape of the oceanic basins and land/sea distribution. Generally, with rising global temperatures, less ice is created or maintained throughout the Earth and sea levels rise. Currently, the islands of Bermuda, which are adjacent to but not within the ROI, are being affected to some extent by rising sea levels from global climate change. The islands and nations within the Pacific study area, including the Hawaiian Islands, Commonwealth of the Northern Mariana Islands, RMI, and Federated States of Micronesia, are being affected to some extent by rising sea levels from global climate change (DON and U.S. Army 2022).

Global aviation activities that occur throughout the various levels of the atmosphere contribute to climate change via the emission of greenhouse gases (GHG; of key importance, carbon dioxide [CO_2]) and ozone depleting substances (Lee et al. 2021). Over the last few decades, anthropogenic gases released into the atmosphere have decreased ozone concentrations in the stratosphere which filter harmful ultraviolet sunlight (NOAA 2024). A 2022 NOAA study suggested that a significant increase in spaceflight activity (including rocket launches) may damage the protective ozone layer. According to NOAA research, a 10-fold increase in hydrocarbon fueled launches, which is plausible within the next two decades based on recent trends in space traffic growth, would damage the ozone layer and change atmospheric circulation patterns (NOAA 2022e). A CPS flight test vehicle has the potential to travel through the troposphere, stratosphere, and the mesosphere zones depending on the trajectory selected.

3.1.2 Biological Resources – BOA

3.1.2.1 Region of Influence

The ROI for biological resources in the BOAs includes the areas subject to the effects of the Proposed Action. The ROI would be within the study areas as defined in **Section 2.1** and shown in **Figures 2.1.3-1** through **2.1.3-3**. Based on the scope of activities and the stressors associated with these activities, the ROI for biological resources is divided into two main areas:

- Ocean waters within the study areas and between 50 and 200 nm from land (within the U.S. EEZ) where vessel operations, vehicle launch, and stage 1 booster splashdown may occur; and

- Ocean waters within the study areas outside of EEZs in international waters where vessel operations, vehicle launch, vehicle overflight, component splashdown, and payload impact may occur.

3.1.2.2 Affected Environment

The biological resources affected environment in the Atlantic and Pacific BOAs have been described in detail in several recent NEPA compliance documents for DoD training and testing activities. Biological resources in the Atlantic BOA ROI are described in detail in the Atlantic Fleet Training and Testing EIS/OEIS (DON 2018a) and in the Joint Flight Campaign EA/OEA (DON and U.S. Army 2022). Biological resources in the Pacific BOA ROI are described in detail in the Hawaii-Southern California Training and Testing EIS/OEIS (DON 2018b), the Mariana Islands Training and Testing Supplemental EIS/OEIS (DON 2020a), and in the Joint Flight Campaign EA/OEA (DON and U.S. Army 2022). While the study areas for these documents do not overlap with the proposed BOAs completely, the affected environment described in these documents still represents the best available information for biological resources in the majority of the ROI, and the relevant sections of these documents are incorporated here by reference. This section provides a brief overview of biological resources in the ROI with a focus on special-status species and any differences in biological resources from those described in the aforementioned documents.

Marine Vegetation

Marine vegetation in the ROI includes diverse communities of thousands of species of primary producers (DON 2018a, DON 2018b). These primary producers reside in either open ocean or coastal water ecosystems and can live in either benthic or water column habitats within these ecosystems (DON 2018b). These primary producers include species of diatoms, dinoflagellates, coccolithophores, green algae, brown algae, red algae, blue-green algae, and vascular plants (DON 2018a, DON 2018b). In coastal waters where water depths are shallow enough (less than 660 ft) to allow sunlight to reach the bottom, some benthic (bottom) vegetation may occur; however, these habitats are limited in the ROI (DON 2018a). Most of the ROI is open ocean or continental shelf waters where water depths are greater than 660 ft and where marine vegetation lives only within the water column. Marine vegetation in the water column occurs within the photic zone (the sunlit portions) near the ocean surface (DON 2018a). The basic groups of producers which would occur in the water column of the ROI include microalgae (e.g., phytoplankton) and macroalgae (e.g., seaweed).

No Endangered Species Act (ESA) listed marine vegetation occurs within the ROI. However, marine vegetation is vital to the marine ecosystems in the ROI. These primary producers are the base of the marine food web, providing food, oxygen, and habitat for marine wildlife (DON 2015a). Highly productive areas are generally those with high diversity and abundance of marine vegetation which supports a diversity and abundance of marine wildlife. In the ROI, coastal waters have higher productivity than waters of the open ocean (DON 2018b).

One ecologically important group, *Sargassum*, occurs in the Atlantic BOA ROI and is managed under the Fishery Management Plan for Pelagic *Sargassum* Habitat (South Atlantic Fishery

Management Council 2002) due to its importance as Essential Fish Habitat (EFH) for several species (DON 2018a). *Sargassum* species float freely on the ocean surface and form clumps or large mats which are vital habitat for a number of marine species (DON 2018a). One species that depends on *Sargassum* habitat is the ESA-listed loggerhead sea turtle (*Caretta caretta*). Areas of *Sargassum* habitat have been designated as critical developmental and foraging habitat for young loggerheads and occur within the ROI (see the Environmentally Sensitive Habitats subsection).

Marine Wildlife

Wildlife habitat in the ROI includes a wide range of pelagic (water column) and benthic habitats. The diversity and abundance of marine wildlife vary greatly across the ROI depending on factors such as distance from land, water depth, substrate type, ocean currents, temperature, salinity, nutrient content, and primary productivity (DON 2018a, DON 2018b). In general, species richness and abundance are greater in coastal waters compared to the open ocean (DON 2018a, DON 2018b). However, productivity and species richness and abundance can also be relatively high near underwater features such as hydrothermal vents and seamounts (DON 2018b). The basic groups of marine wildlife in the ROI include invertebrates, fish, reptiles, birds, and marine mammals. Extensive descriptions of the threats to these groups of marine wildlife, as well as descriptions of their hearing and vocalization can be found in the documents described above (DON 2018a, DON 2018b) and are incorporated here by reference.

Invertebrates. Invertebrate communities in the ROI consist of thousands of species in both pelagic and benthic assemblages including some groups important to commercial and recreational fishing (DON 2018b). Diversity and abundance of both pelagic and benthic invertebrates are greater in continental shelf waters than in the open ocean due to higher productivity and availability of complex habitats (DON 2018b).

The ROI consists primarily of deep open ocean waters, many of which are beyond the continental shelves and are predominantly in very deep waters (0.6 to 3.7 miles deep; UNEP 2006). In these deep waters, the greatest diversity of invertebrates occurs in the epipelagic zone where available sunlight enables primary production by phytoplankton and algae (DARPA 2020, DON 2018b). Pelagic invertebrates in the ROI include protozoans, copepods, jellyfish, squid, and larvae of benthic invertebrates (DON 2018b). The abundance and distribution of zooplankton is seasonal and depends on temperature, salinity, nutrient availability, oxygen concentration, and food availability (DON 2009b). As a result, zooplankton is seasonally and spatially variable in the ROI with concentrations in areas of high primary productivity, including areas of upwelling (DON 2009b).

In the ROI, benthic invertebrate diversity and abundance are highest over the continental shelf (DON 2018a). Diversity and abundance of benthic invertebrates in the open ocean are low except for at some hydrothermal vents and cold seeps (DON 2018b). Other hotspots for diversity tend to occur near underwater features such as seamounts, submarine canyons, and shelf breaks where upwelling occurs (UNEP 2006). A high diversity of arthropod (e.g., crabs and lobsters), mollusk (e.g., snails, clams, and cephalopods), echinoderm (e.g., starfish and sea

urchins), cnidarian (e.g., coral and sea anemones), segmented worm, flatworm, roundworm, and sponge species are found in benthic habitats of the ROI (DON 2009b, DON 2018a). Fewer invertebrates occur in deep-water benthic habitats, but deep-water corals occur at depths between 160 and 9,840 ft on plateaus, edges of the continental shelf, bases of slopes, canyons, and seamounts (DON 2009b, DON 2018a, DON 2018b).

Fishes. Due to the large size of the ROI, there is a diversity of oceanic habitats for fish from epipelagic to deep benthic and seamount habitats, and therefore a wide diversity of fish species. These fish are vital components of the marine ecosystem and have substantial ecological and economic importance. In general, coastal areas where the habitat has structural complexity (i.e., reef systems, continental slopes, and deep canyons) and high productivity (areas of nutrient upwelling) support a greater diversity of fish species than open ocean areas (DON 2018a, DON 2018b).

Fish assemblages in the ROI are vital components of the marine ecosystem and have great ecological and economic importance. Major fisheries in the North Atlantic include several snapper-grouper species, mackerel, cobia, sharks, dolphinfish, and wahoo (South Atlantic Fishery Management Council 2020). Key U.S. commercial and recreational fisheries of the Pacific Ocean include dolphinfish, Pacific halibut, rockfishes and scorpionfishes, marlin, snappers, swordfish, wahoo, and tunas (NOAA 2022b). Fisheries within the U.S. EEZ are managed by NMFS and regional fisheries management councils.

Several ESA-listed fish species have the potential to occur in the ROI (**Table 3.1.2-1**). Most of these species occur only in coastal habitats. Several ESA-listed Distinct Population Segments (DPSs) or Evolutionarily Significant Units of sturgeon (*Acipenser oxyrinchus oxyrinchus*), salmon (*Oncorhynchus* spp.), and steelhead (*Oncorhynchus mykiss*) have the potential to occur in coastal waters (**Table 3.1.2-1**) during the marine phase of their life cycle. Fish from these ESA-listed populations are either unlikely to occur in the ROI or would occur there in very low densities seasonally. Of ESA-listed fish species with the potential to occur in the ROI, only the oceanic whitetip shark (*Carcharhinus longimanus*), oceanic giant manta ray (*Mobula birostris*), and scalloped hammerhead shark (*Sphyrna lewini*) are likely to occur in the open ocean portion of the ROI.

Marine Reptiles. Several sea turtle species have the potential to occur in the ROI. Populations of each of these species in the ROI are listed as threatened or endangered under the ESA (**Table 3.1.2-1**). Sea turtles are highly migratory, and each sea turtle species has unique life history characteristics which result in different patterns of distribution and abundance (see DON and USASMDC 2024).

Yellow-bellied sea snakes (*Pelamis platura*) also occur in the ROI where they are primarily found in pelagic habitats where they can be found in large groups associated with marine debris (DON 2018b).

Table 3.1.2-1. ESA-Listed Species with the Potential to Occur in the Atlantic and Pacific BOA ROI

Common Name	Scientific Name	ESA Listing Status	Occurrence in the Study Area			
			Atlantic Coastal Waters / Large Marine Ecosystem	Atlantic Open Ocean	Pacific Coastal Waters / Large Marine Ecosystem	Pacific Open Ocean
Fishes						
Atlantic sturgeon[1]	*Acipenser oxyrinchus oxyrinchus*	E, T[1]	NE U.S. and SE U.S.			
Oceanic whitetip shark	*Carcharhinus longimanus*	T	NE U.S., SE U.S., and Caribbean Sea	N Atlantic and Atlantic Subarctic	California Current and Insular Pacific	NC, E Tropical and Equatorial Pacific
Oceanic giant manta ray	*Mobula birostris*	T	NE U.S., SE U.S., and Caribbean Sea	N Atlantic and Atlantic Subarctic	California Current and Insular Pacific	NC, E Tropical and Equatorial Pacific
Chum salmon – Hood Canal Summer run ESU	*Oncorhynchus keta*	T			GOA and California Current	
Coho salmon[1]	*Oncorhynchus kisutch*	E, T			GOA and California Current	
Steelhead trout[1]	*Oncorhynchus mykiss*	E, T[1]			GOA and California Current	
Sockeye salmon – Snake River ESU	*Oncorhynchus nerka*	E			GOA and California Current	
Chinook salmon[1]	*Oncorhynchus tshawytscha*	E, T[1]			GOA and California Current	
Smalltooth sawfish	*Pristis pectinate*	E	NE U.S. and SE U.S.			
Atlantic salmon - Gulf of Maine DPS	*Salmo salar*	E	NE U.S.			
Scalloped hammerhead shark[1]	*Sphyrna lewini*	E, T[1]	Caribbean Sea	CN Atlantic	California Current, Western Insular Pacific	NC and E Tropical Pacific
Sea Turtles						
Loggerhead turtle[2]	*Caretta caretta*	E, T[2]	NE U.S., SE U.S., and Caribbean Sea	N Atlantic and Atlantic Subarctic	GOA, California Current, and Insular Pacific	NC, E Tropical, Equatorial, and Subarctic Pacific
Green turtle[2]	*Chelonia mydas*	E, T[2]	NE U.S., SE U.S., and Caribbean Sea	N Atlantic	California Current, Insular Pacific	NC, E Tropical, and Equatorial Pacific
Leatherback turtle	*Dermochelys coriacea*	E	NE U.S., SE U.S., and Caribbean Sea	N Atlantic and Atlantic Subarctic	GOA, California Current, and Insular Pacific	NC, E Tropical, Equatorial, and Subarctic Pacific
Hawksbill turtle	*Eretmochelys imbricata*	E	NE U.S., SE U.S., and Caribbean Sea	CN Atlantic	California Current and Insular Pacific	NC, E Tropical and Equatorial Pacific

Common Name	Scientific Name	ESA Listing Status	Occurrence in the Study Area			
			Atlantic Coastal Waters / Large Marine Ecosystem	Atlantic Open Ocean	Pacific Coastal Waters / Large Marine Ecosystem	Pacific Open Ocean
Sea Turtles (continued)						
Kemp's ridley turtle	*Lepidochelys kempii*	E	NE U.S., SE U.S., and Caribbean Sea			
Olive ridley turtle[2]	*Lepidochelys olivacea*	E, T[2]			California Current and Insular Pacific	NC, E Tropical and Equatorial Pacific
Birds						
Band-rumped storm-petrel – Hawaii DPS	*Oceanodroma castro*	E			Insular Pacific	NC, E Tropical, and Equatorial Pacific
Short-tailed albatross	*Phoebastria albatrus*	E			GOA, California Current, Insular Pacific	NC and Subarctic Pacific
Bermuda petrel	*Pterodroma cahow*	E	NE U.S. and SE U.S.	N. Atlantic		
Hawaiian petrel	*Pterodroma sandwichensis*	E			Insular Pacific	NC, Equatorial, and Subarctic Pacific
Newell's shearwater	*Puffinus auricularis newelli*	T			Insular Pacific	NC and Equatorial Pacific
Roseate tern[3]	*Sterna dougallii*	E, T[3]	NE U.S., SE U.S., and Caribbean Sea	N. Atlantic		
Marine Mammals						
Guadalupe fur seal	*Arctocephalus townsendi*	T			California Current	NC and E Tropical Pacific
Sei whale	*Balaenoptera borealis*	E	NE U.S., SE U.S., and Caribbean Sea	N Atlantic and Atlantic Subarctic	GOA, California Current, and Insular Pacific	NC, E Tropical, Equatorial, and Subarctic Pacific
Blue whale	*Balaenoptera musculus*	E	NE U.S., SE U.S., and Caribbean Sea	N Atlantic and Atlantic Subarctic	GOA, California Current, and Insular Pacific	NC, E Tropical, Equatorial, and Subarctic Pacific
Fin whale	*Balaenoptera physalus*	E	NE U.S., SE U.S., and Caribbean Sea	N Atlantic and Atlantic Subarctic	GOA, California Current, and Insular Pacific	NC, E Tropical, Equatorial, and Subarctic Pacific
Gray whale –Western North Pacific DPS	*Eschrichtius robustus*	E			GOA and California Current	Pacific Subarctic
North Atlantic right whale	*Eubalaena glacialis*	E	NE U.S. and SE U.S.	Atlantic Subarctic		
North Pacific right whale	*Eubalaena japonica*	E			GOA and California Current	NC, E. Tropical, and Subarctic Pacific
Steller sea lion – Western DPS	*Eumetopias jubatus*	E			GOA	Pacific Subarctic

Common Name	Scientific Name	ESA Listing Status	Occurrence in the Study Area			
			Atlantic Coastal Waters / Large Marine Ecosystem	Atlantic Open Ocean	Pacific Coastal Waters / Large Marine Ecosystem	Pacific Open Ocean
Marine Mammals (continued)						
Humpback whale[4]	*Megaptera novaeangliae*	E, T[4]			GOA, California Current, and Insular Pacific	NC, E. Tropical, and Subarctic Pacific
Hawaiian monk seal	*Neomonachus schauinslandi*	E			Insular Pacific-Hawaii	
Sperm whale	*Physeter macrocephalus*	E	NE U.S., SE U.S., and Caribbean Sea	N Atlantic and Atlantic Subarctic	GOA, California Current, and Insular Pacific	NC and Subarctic Pacific
False killer whale – Main Hawaiian Islands Insular DPS	*Pseudorca crassidens*	E			Insular Pacific-Hawaii	

Acronyms and Abbreviations: C = Central, DPS = Distinct Population Segment, E (in ESA listing status) = ESA endangered, E (in occurrence) = East/Eastern, ESA = Endangered Species Act, ESU = Evolutionarily Significant Unit, GOA = Gulf of Alaska, N = North/Northern, S = South T = ESA threatened.

Note: Gray shaded cells indicate species or listed population does not occur in the portion of the ROI. Occurrence information primarily from DON 2018a, DON 2018b, DON 2020a, U.S. Army 2021, DON and U.S. Army 2022, and NOAA 2023b.

[1] Five ESA-listed DPSs of Atlantic sturgeon, four ESA-listed ESUs of coho salmon, eleven ESA-listed DPSs of steelhead trout, nine ESA-listed ESUs of chinook salmon, and four ESA-listed DPSs of scalloped hammerhead shark may occur in the ROI (see DON and USASMDC 2024 for details).

[2] Three ESA-listed DPSs of loggerhead turtle, six ESA-listed DPSs of green turtle, and two ESA-listed populations of olive ridley turtle may occur in the ROI (see DON and USASMDC 2024 for details).

[3] Two ESA-listed populations of Roseate tern may occur in the Atlantic BOA ROI; the endangered U.S. Atlantic Coast south to North Carolina and the threatened Western Hemisphere and adjacent oceans populations.

[4] Three ESA-listed DPSs of humpback whales may occur in the Pacific BOA ROI (see DON and USASMDC 2024 for details).

Birds. No terrestrial habitats occur within the ROI; therefore, birds in the study area are those that primarily forage in the open ocean: seabirds. Seabirds in the ROI include dozens of species, including species of ducks, loons, grebes, albatross, fulmars, petrels, shearwaters, storm-petrels, boobies, gannets, frigatebirds, tropicbirds, skua, and jaegers (DON 2018a, DON 2018b). Approximately 160 species of pelagic seabirds are found in the North Pacific Ocean alone (Drew et al. 2022). The feeding habits of these seabirds vary depending on species characteristics such as bill shape, wing shape, body mass, and preferred prey (DON 2018a). Some species forage on the ocean surface while others dive for prey. The ESA-listed Newell's shearwater *(Puffinus auricularis newelli)* is known to dive to depths of at least 100 ft to feed (DON 2018b). These seabirds spend the majority of their time at sea but nest in terrestrial coastal habitats or on oceanic islands. Species diversity and bird abundance are generally higher in coastal habitats than in the open ocean; however, some seabirds occur almost exclusively in the open ocean except when breeding. In the Atlantic ROI, species diversity is higher in the southern portion of the ROI, but seabird abundance can be higher in the northern portion due to the high productivity of northern waters (DON 2018a).

In addition to seabirds, millions of migratory birds from hundreds of species likely migrate through the Pacific and Atlantic study areas seasonally (DON 2018a, DON 2018b). Almost all seabirds and migratory birds in the ROI are protected under the Migratory Bird Treaty Act and many are USFWS birds of conservation concern (USFWS 2021a, DON 2018a, DON 2018b).

ESA-listed bird species occurring in the ROI (**Table 3.1.2-1**) are all seabird species that spend the majority of their time in the open ocean. These species may occur closer to land during the breeding season when they forage in waters closer to their nesting sites.

Marine Mammals. At least 40 marine mammal species are known to occur in the ROI, all protected under provisions of the Marine Mammal Protection Act. The most recent population information for the U.S. EEZ stocks of these marine mammals can be found in the NMFS Marine Mammal Stock Assessments (NMFS 2024). Detailed distribution and density information for these species can also be found in the Navy's Marine Species Density Databases for the Atlantic Fleet Training and Testing (Roberts et al. 2023, DON 2017c), Hawaii-Southern California Training and Testing (DON 2024, DON 2017b), and the Mariana Islands Training and Testing (DON 2018c) study areas. Species diversity and density are higher in shelf waters of the ROI and a number of biologically important areas for cetaceans occur in continental shelf waters (Harrison et al. 2023, Ferguson et al. 2015). As with other marine wildlife, marine mammal density and distribution shift seasonally. Most baleen whales are highly migratory, tracking the distribution of high-density prey items, while other cetaceans have primarily resident populations with relatively small seasonal shifts in density (DON 2018a). Pinnipeds primarily occur in coastal and continental shelf waters, but some migrate through the open ocean (DON 2018a, DON 2018b). Northern fur seals (*Callorhinus ursinus*) and northern elephant seals (*Mirounga angustirostris*) are both species that forage in deeper waters and are more likely to occur in the open ocean portions of the ROI (U.S. Army 2021).

Several ESA-listed cetacean and pinniped species have the potential to occur in the ROI (**Table 3.1.2-1**). Hawaiian monk seals (*Neomonachus schauinslandi*) and the false killer whale (*Pseudorca crassidens*) Main Hawaiian Islands Insular DPS would occur only in EEZ waters around the Hawaiian Islands. Several other species (i.e., Guadalupe fur seal, gray whale, North Pacific right whale, and humpback whale) are found primarily within EEZ waters but may migrate through or forage seasonally within the open ocean.

Environmentally Sensitive Habitats

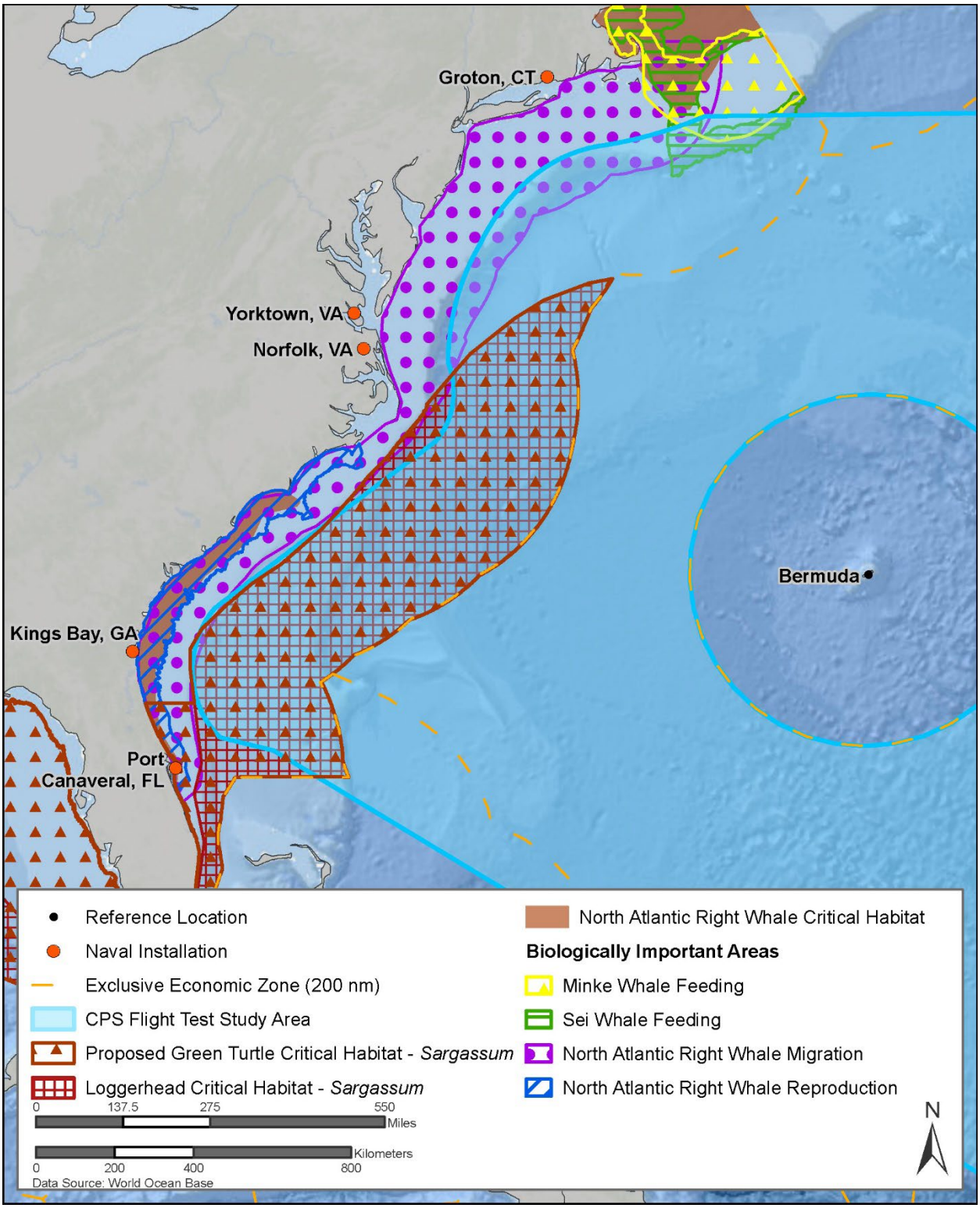
Critical Habitat. Habitat designated as critical habitat under the ESA only occurs within U.S. EEZs. One designated critical habitat area and one proposed critical habitat area, both *Sargassum* habitat for sea turtle species, occur in the Atlantic BOA ROI (**Figure 3.1.2-1**). In the Pacific study area, designated critical habitat for leatherback sea turtles (*Dermochelys coriacea*) as well as for the Central America DPS and Mexico DPS of humpback whales (*Megaptera novaeangliae*) occurs in coastal waters offshore of California (**Figure 3.1.2-2**); however, the Navy has excluded these critical habitat areas from proposed launch and component splashdown areas.

Designated and proposed critical habitats are described in detail in the Navy CPS Marine Biological Evaluation (DON and USASMDC 2024).

Biologically Important Areas. Biologically important areas are areas considered important to a species for all or part of the year. These areas are generally based on compilation of the best available information from scientific literature, unpublished species accounts, and expert knowledge to identify areas shoreward of the U.S. EEZs that are important reproductive, feeding, or migratory areas for species or groups (Ferguson et al. 2015, Harrison et al. 2023).

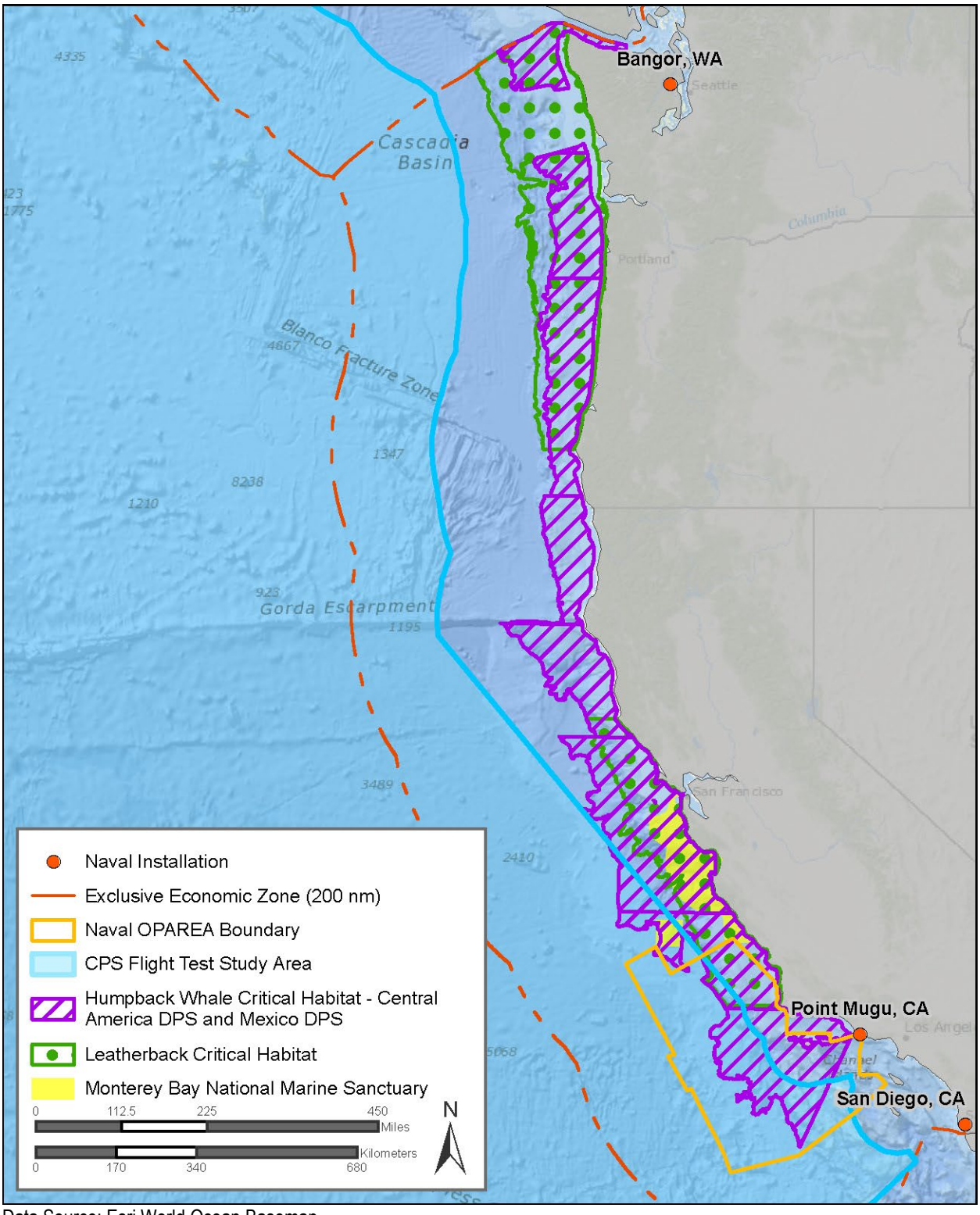
Biologically important areas for sei whale (*Balaenoptera borealis*) and minke whale (*Balaenoptera acutorostrata*) feeding and for North Atlantic right whale (*Eubalaena glacialis*) migration occur in the CPS Atlantic study area (**Figure 3.1.2-1**; Ferguson et al. 2015) but have been excluded from proposed launch and component splashdown areas. Biologically important areas for gray whale (*Eschrichtius robustus*) migration and humpback whale feeding occur within the Pacific study area in coastal waters near Point Mugu.

The deepwater canyons of the ROI support a diversity of hard and soft deep-sea corals (Packer et al. 2007) and include canyons in the Frank R. Lautenberg Deep Sea Coral Protection Area and the Georges Bank Coral Closure Area (**Figure 3.1.2-3**). Within these protected areas, commercial fishermen are prohibited from using most types of bottom-tending fishing gear such as trawls, dredges, bottom longlines, and traps to protect the slow-growing corals (50 CFR § 648.372; 86 Federal Register [FR] 33553 [June 25, 2021]). The submarine canyons are highly productive areas that not only provide habitat for deep-sea corals but provide feeding grounds for pelagic species, including dolphins, whales, and turtles; highly migratory fish, such as sharks, billfish, and tuna; and seabirds (DON and U.S. Army 2022).



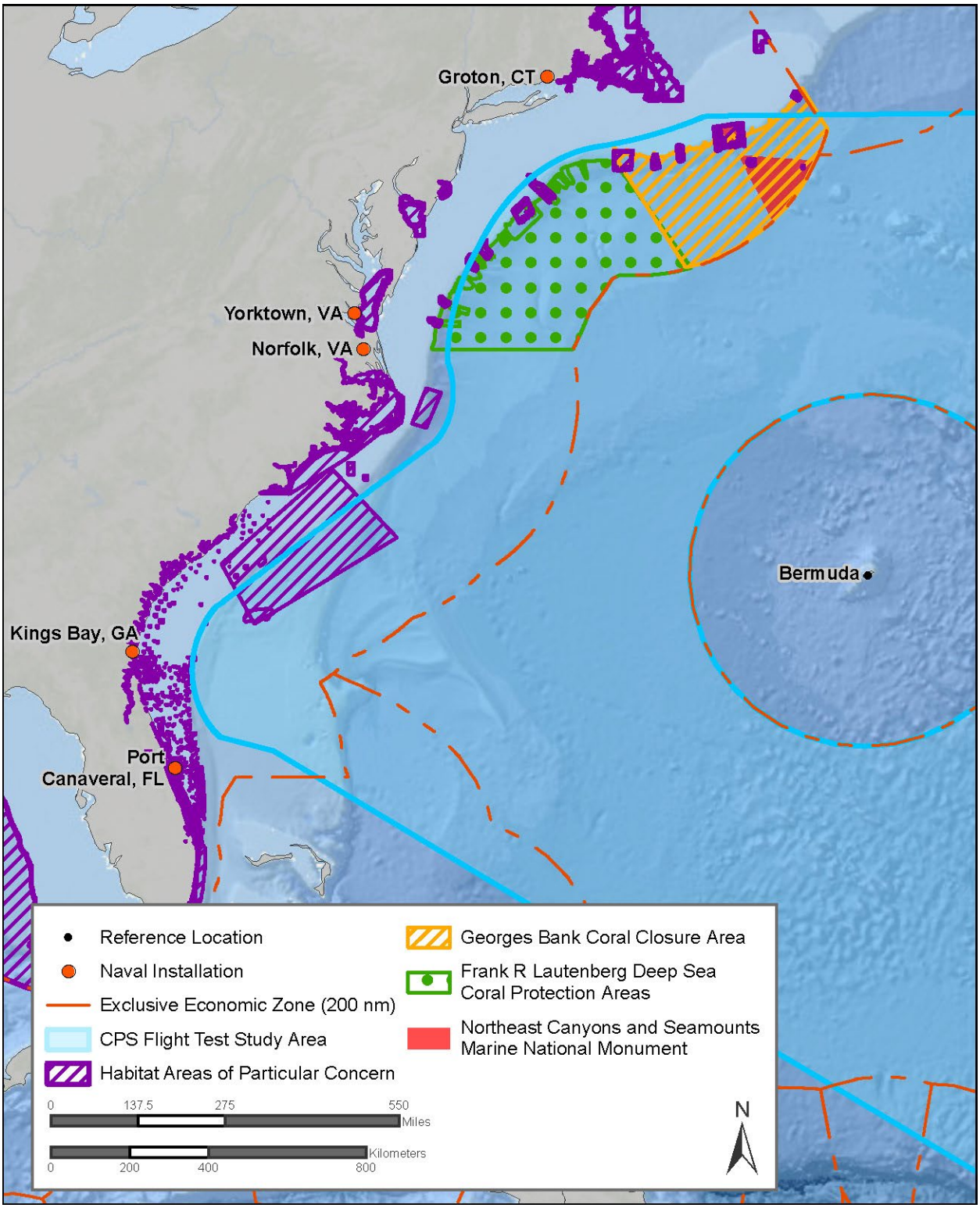
Data Source: Esri World Ocean Basemap

Figure 3.1.2-1. Designated Critical Habitat and Biologically Important Areas in the Atlantic BOA ROI



Data Source: Esri World Ocean Basemap

Figure 3.1.2-2. Designated Critical Habitat and Marine Protected Areas in the Eastern Pacific BOA ROI



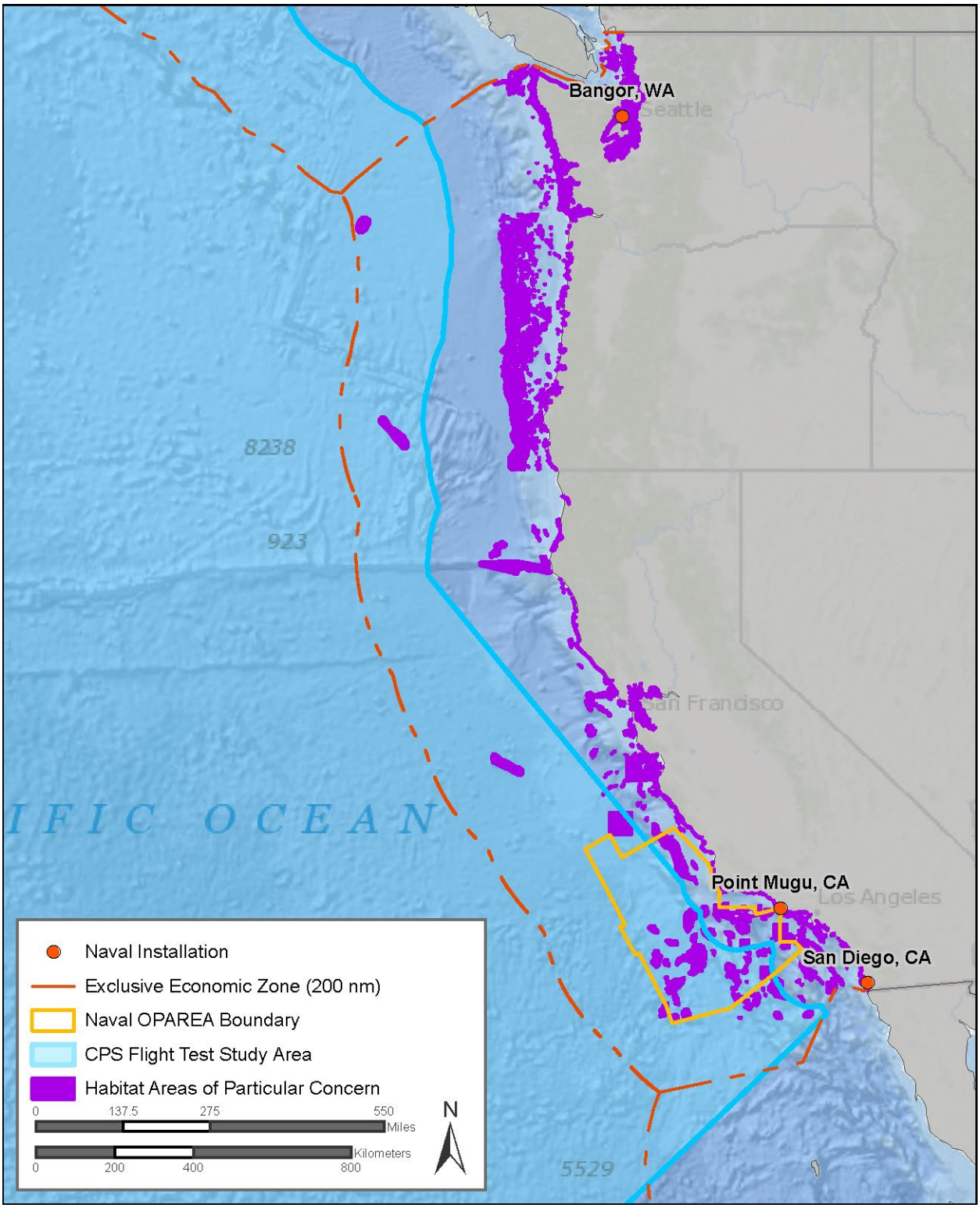
Data Source: Esri World Ocean Basemap

Figure 3.1.2-3. Habitat Areas of Particular Concern and other Marine Protected Areas in the Atlantic BOA ROI

Seamounts. Seamounts are located throughout the North and Central Pacific within the study area. Seamounts are underwater bathymetric features which create biological hotspots by altering the flow of water above them which creates upwelling of cold, nutrient-rich waters and by providing sessile fauna with hard substrates for attachment (Morgan et al. 2015, Nishizawa et al. 2015). Studies of the Emperor Seamount chain, which spans from the Aleutian Trench to the Northwestern Hawaiian Islands, indicate that seamounts in the North Pacific Ocean are ecologically and commercially important areas (Morgan et al. 2015, Nishizawa et al. 2015, Miyamoto and Kiyota 2017, McClain et al. 2010). Seamounts in the North Pacific Ocean support commercial fisheries that target bottomfish such as North Pacific armorhead *(Pseudopentaceros wheeleri)* and splendid alfonsino (*Beryx splendens*; Miyamoto and Kiyota 2017). The productive waters associated with these seamounts also help support populations of seabirds like the Laysan albatross (*Phoebastria immutabilis*) and black-footed albatross (*Phoebastria nigripes*), which tend to forage and aggregate around seamounts due to higher prey density (Nishizawa et al. 2015). Several seamounts in the ROI are managed and have special protections under the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act as Habitat Areas of Particular Concern (see the Essential Fish Habitat subsection).

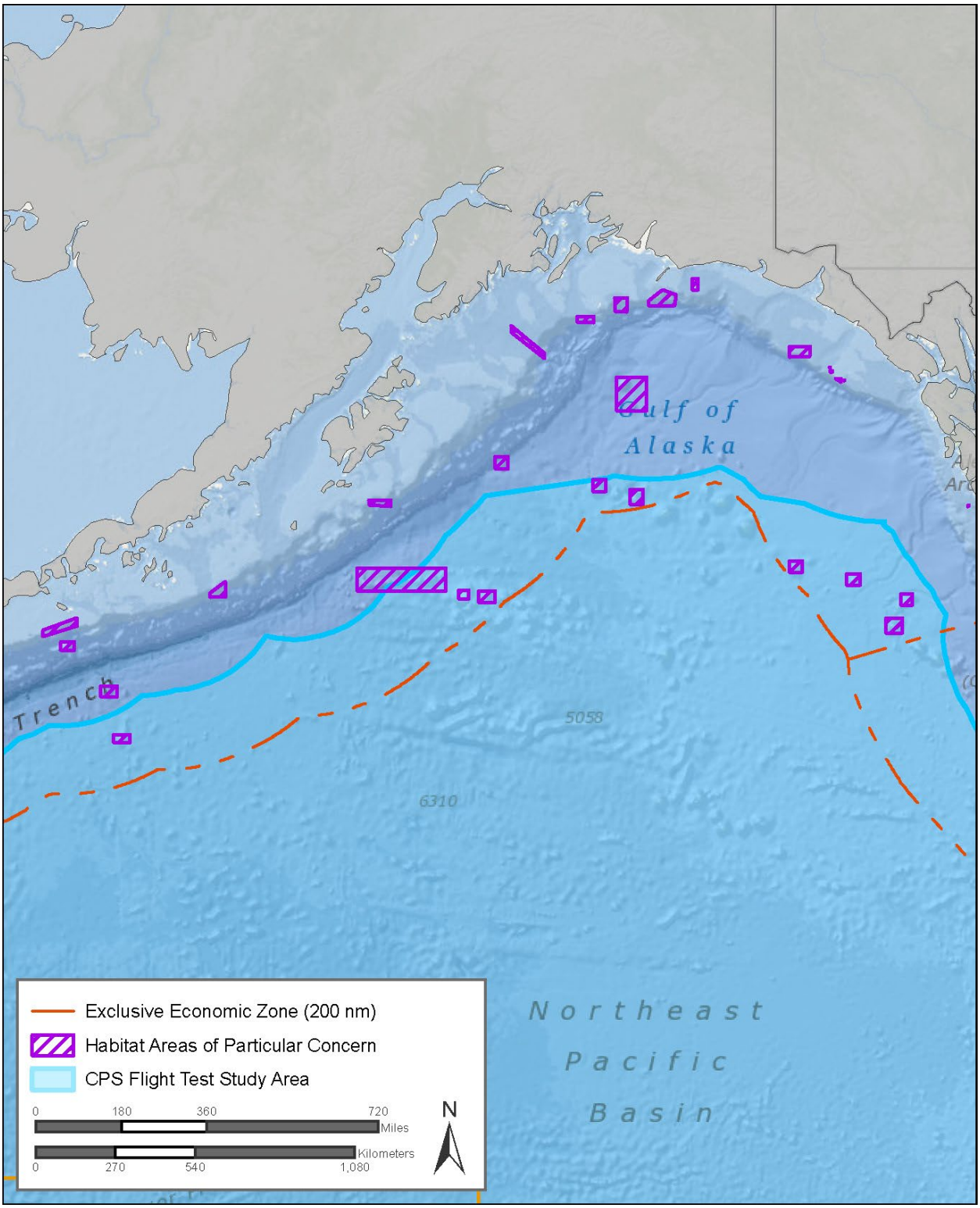
Essential Fish Habitat. EFH has been designated within the U.S. EEZ offshore of the entire U.S. Coast. These offshore areas provide important habitat for numerous fish and invertebrate species and are ecologically and economically important. The number of fish species and life stages with designated EFH in this area is quite extensive and is detailed in several DoD training and testing documents (DON and U.S. Army 2022, DON 2009b, DON 2018a, DON 2018b, DON 2020a, U.S. Army 2021). Given the limited potential for the Proposed Action to affect EFH, EFH in the ROI is only briefly summarized in this section.

In general, fisheries management councils designate EFH for marine species for separate life stages: eggs, larvae, juveniles, adults, and spawning adults. In addition to fish, macroalgae such as *Sargassum* and invertebrates such as octopus, squid, crabs, lobsters, scallops, and precious corals also have designated EFH (U.S. Regional Fishery Management Councils 2023). The EFH in the ROI includes benthic habitats (e.g., rocks, gravel, cobbles, sand, etc.), structure habitat (e.g., artificial reefs, shipwrecks, natural sponge and coral habitats), *Sargassum* habitat (pelagic mats of *Sargassum* spp.), Gulf Stream habitat, and water column habitat (DON 2009b). Several species with designated EFH also have designated Habitat Areas of Particular Concern within the ROI (**Figures 3.1.2-3** through **3.1.2-5**). Habitat Areas of Particular Concern are areas within EFH that are of particular ecological importance to the long-term sustainability of managed species, are of a rare type, or are especially susceptible to degradation or development. Designated Habitat Areas of Particular Concern in the Atlantic BOA ROI include coral reef and hard bottom, snapper-grouper, dolphin-wahoo, juvenile cod, canyon, and seamount habitat areas, all designated within the U.S. EEZ. Designated Habitat Areas of Particular Concern in the Pacific BOA ROI include several seamounts, rocky reefs, and Cherry Bank habitats of the U.S. West Coast (**Figure 3.1.2-4**) and seamount habitat protection areas in the EEZ offshore of Alaska (**Figure 3.1.2-5**).



Data Source: Esri World Ocean Basemap

Figure 3.1.2-4. Habitat Areas of Particular Concern along the U.S. West Coast



Data Source: Esri World Ocean Basemap

Figure 3.1.2-5. Habitat Areas of Particular Concern in the Pacific Ocean ROI near Alaska

Marine National Monuments and Sanctuaries. Several marine national monuments and national marine sanctuaries occur within the BOA ROI. All marine national monuments and national marine sanctuaries are designated within the U.S. EEZ.

In the Atlantic, the Northeast Canyons and Seamounts Marine National Monument (**Figure 3.1.2-3**) consists of approximately 4,913 square miles and includes three canyons and four seamounts and is home to at least 54 species of deep-sea corals (NOAA 2022a). The canyons and seamounts in the Monument cause areas of upwelling which lift nutrients which fuel growth of phytoplankton and zooplankton to make this a highly productive area (NOAA 2022a). The entire monument is protected with prohibitions on activities such as oil, gas and mineral exploration and development; removing, injuring, or damaging monument resources; placing or abandoning structures or material on the submerged lands; and most commercial fishing (NOAA 2022a).

Marine national monuments in the Pacific study area include Papahānaumokuākea around the Hawaiian Islands, Remote Pacific Islands around seven Pacific islands and atolls (**Figure 2.1.3-2**), and Mariana Trench in the Northern Mariana Islands (**Figure 2.1.3-3**). These large conservation areas are hotspots of species diversity and abundance in the Pacific (NOAA 2021). Several nationally and internationally endangered, threatened, and depleted species thrive at these monuments, including giant clams, pearl oysters, coconut crabs, fishes, reef sharks, sea turtles, and marine mammals (NOAA 2021). The monuments also provide important migratory shorebird and seabird habitat. Kingman Reef and Palmyra Atoll support higher levels of coral diversity (180–190 species) than any other reef, island, or atoll in the central Pacific (NOAA 2021).

The Monterey Bay National Marine Sanctuary occurs off the coast of California (**Figure 3.1.2-2**). The Sanctuary contains a diversity of habitats from kelp forests to underwater canyons which support a variety of marine life including 36 marine mammal species, more than 180 seabird and shorebird species, and at least 525 fish species (NOAA 2022c). Prohibited activities in the Sanctuary include exploring for, developing, or producing oil, gas, or minerals; drilling, dredging, or altering submerged lands; placing or abandoning structures; deserting vessels, disturbing, destroying, or taking sanctuary resources; and discharging harmful materials (NOAA 2022c).

The National Oceanic and Atmospheric Administration is in the process of designating a new national marine sanctuary in the ROI in and around Hudson Canyon in the Atlantic Ocean (NOAA 2023d, 87 FR 34853 [June 8, 2022]). Hudson Canyon is the largest submarine canyon along the U.S. Atlantic coast and reaches depths of 2.5 miles (NOAA 2023d). This canyon is a hotspot for biological diversity due to the diverse physical structure and areas of nutrient upwelling (NOAA 2023d). Hudson Canyon has been nominated as a national marine sanctuary to support conservation, research and management of marine wildlife, habitats, and maritime cultural resources (NOAA 2023d).

The National Oceanic and Atmospheric Administration has also begun the process for designating a Chumash Heritage National Marine Sanctuary in the Pacific Ocean off the California coast (NOAA 2023f). The proposed sanctuary would likely stretch along 134 miles of

coastline and encompass 5,617 square miles including areas historically important to the Chumash tribes and natural resources important to their heritage (NOAA 2023f). This area is rich in biodiversity and supports important habitats such as kelp forests, rocky reefs, and seamounts, banks, and canyons which are home to deep-sea corals and sponges (NOAA 2023f). A preferred alternative for the boundaries of the proposed sanctuary has not been selected but the sanctuary would likely overlap a very small portion of the Pacific BOA within the U.S. EEZ.

3.1.3 Hazardous Materials and Waste Management – BOA

3.1.3.1 Region of Influence

The ROI for hazardous material and wastes in the BOAs includes the areas within the Atlantic and Pacific study areas (**Figures 2.1.3-1** through **2.1.3-3**) where Proposed Action hazardous materials and wastes would be generated, utilized, released, deposited, or transported. Based on the scope of proposed activities and potential location of hazardous materials and wastes, the ROI for hazardous materials and wastes includes two main areas:

- Ocean waters within the study areas and between 50 and 200 nm from land (within the EEZ) where vessel operations, vehicle launch, and stage 1 booster splashdown may occur; and
- Ocean waters within the study areas which are outside of EEZs in international waters where vessel operations, vehicle launch, component splashdown, and payload impact may occur.

As discussed in **Section 2.1.3**, all land-based launch preparations and operations including transportation, storage, and handling of hazardous materials and wastes to or at naval installations for loading onto launch platform vessels as well as routine vessel operations as part of military readiness activities have been previously analyzed within the various Navy Fleet and range complex EIS/OEISs listed in **Chapter 6.0**. As such, these land-based actions and vessel activity locations are not included here as part of the ROI.

3.1.3.2 Affected Environment

The affected environment for hazardous materials and wastes in the BOA ROI includes the broad open ocean and seafloor. Generally, the affected environment would be within deep ocean waters. While the variety of underwater topographic features within the Atlantic and Pacific BOAs, including seamounts and the deepest underwater canyons on earth, and the size of the BOA does not allow for detailed specifications of ocean depth and conditions in the ROI, several generalizations about the hazardous materials and waste affected environment can be made. In general, waters in the BOA ROI would be quite deep. The average depth of the Atlantic Ocean is 11,962 ft with a maximum depth of 27,493 ft (Britannica 2023) and the Pacific Ocean is the largest and deepest ocean basin on Earth, with an average depth of 13,000 ft (NOAA 2023e).

Substances and materials introduced into the ROI may be transported and influenced by ocean currents, salinity, temperature, pH ocean floor substrate, biological processes and ocean stratification and mixing (DON 2018a). Ocean currents, tides, and storms in the ROI mix and redistribute seawater and consequently redistribute and dilute substances that are dissolved and suspended in ocean waters (DON 2018a). Temperature and pH can influence the solubility of trace metals in seawater and the concentration of metals varies with the type of metal and the position in the water column (DON 2018a). Water and sediment characteristics and quality within much of the Atlantic BOA ROI are described in detail in the Atlantic Fleet Training and Testing EIS/OEIS (DON 2018a). Water and sediment characteristics and quality within much of the Pacific BOA ROI are described in detail in the Hawaii-Southern California Training and Testing EIS/OEIS (DON 2018b) and the Mariana Islands Training and Testing Supplemental EIS/OEIS (DON 2020a). While the study areas for these EISs do not overlap with the proposed Atlantic and Pacific BOAs completely, the affected environment described in these documents still represents the best available information for the affected environment, and the relevant sections of these documents are incorporated here by reference.

Pollution and marine debris are growing concerns for environmental quality in the world's oceans (Landrigan et al. 2020, NOAA 2023c). Common ocean pollutants include toxic compounds such as metals, pesticides, and other organic chemicals; excess nutrients from fertilizers and sewage; detergents; oil; plastics; and other solids. Pollutants enter oceans from non-point sources (i.e., storm water runoff from watersheds), point sources (i.e., wastewater treatment plant discharges), other land-based sources (i.e., windblown debris), spills, dumping, vessels, and atmospheric deposition.

One of the main global ocean pollution concerns, including the waters of the BOA ROI, is marine debris. Marine debris includes any persistent solid material that is intentionally or unintentionally disposed of or abandoned into the marine environment (NOAA 2023c). Common types of marine debris include various forms of plastic and abandoned fishing gear, as well as clothing, metal, glass, and abandoned and derelict vessels (NOAA 2023c). Marine debris degrades environmental quality for humans and marine life (Landrigan et al. 2020, NOAA 2023c). Marine debris is an increasing problem with an estimated 23 million metric tons of plastic waste entering aquatic ecosystems in 2016 (NOAA 2023c). Debris that sinks to the seafloor is a concern for ingestion and entanglement by marine life and may contribute to marine habitat degradation, contributing to deep water habitat damage (NOAA 2023c). Plastic marine debris is a major concern because it degrades slowly and many plastics float, allowing the debris to be transported by currents throughout the oceans. Ocean currents create gyres within the world's oceans which act to accumulate floating plastic marine debris, often called garbage patches (NOAA 2023c).

3.1.4 Health and Safety – BOA

3.1.4.1 Region of Influence

The ROI for health and safety includes the sea space and airspace in the Atlantic and Pacific study areas. The Atlantic study area covers an extensive, continuous swath of open water in the

North Atlantic Ocean, except for a large exclusion area surrounding the island of Bermuda (**Figure 2.1.3-1**), that is open to military, commercial, and recreational users. Health and safety in the Atlantic BOA ROI are described in detail in the Atlantic Fleet Training and Testing EIS/OEIS (DON 2018a). While the Atlantic Fleet Training and Testing study area does not completely overlap with the proposed Atlantic BOA, the affected environment described in this document still represents the best available information for human health and safety in the majority of the ROI. The Pacific study area covers the majority of the North Pacific Ocean between North America and Asia. Exceptions within the study area, shown on **Figures 2.1.3-2** and **2.1.3-3**, are areas around Marcus Island and the Hawaiian Islands. Although not shown on the figures, other populated islands within the study area boundary—including those in the Commonwealth of the Northern Mariana Islands, RMI, and Federated States of Micronesia—also are not considered part of the Pacific study area ROI, as there would be no Proposed Action-related health and safety risks placed on them or within any nation's territorial seas outside of USAKA (see **Section 3.2.8**). At-risk public includes those commercial and recreational users transecting the open ocean and airspace in the BOA study area. At-risk personnel include those on naval vessels that launch and track the missile tests, and that provide target support downrange.

3.1.4.2 Affected Environment

The Navy's Fleet Area Control and Surveillance Facilities provide support and training resources for DoD, Department of Homeland Security, and foreign military units by coordinating, scheduling, and monitoring activities in the U.S. Fleet OPAREAs and special use airspace. In naval ranges within the BOA (**Figures 2.1.3-1** through **2.1.3-3)**, Range Control has published safety procedures for activities conducted both nearshore and offshore. Although operations in special use airspace are scheduled through the Navy Fleet and Area Control and Surveillance Facilities, Range Control coordinates the real-time control of operations in coordination with the FAA and other military users and communicates with the operations conductors and all participants entering and leaving the range areas. Current Navy practices employ the use of sensors and other devices (e.g., radar and electro-optical systems) to ensure public health and safety while conducting training and testing activities (DON 2018a).

The priority when planning and conducting missile tests is safety, both for military personnel and for the public. Military, commercial, and recreational activities take place simultaneously in the study area and have coexisted safely for decades because established rules and practices lead to safe use of the waterway and airspace. Standard operating procedures pertaining to health and safety are followed during any naval operation, regardless of whether it occurs in territorial or international waters.

Through the Naval Safety Command, the Navy promotes a proactive and comprehensive safety program designed to reduce to the greatest extent possible any potential adverse impacts on public health and safety from training and testing activities. The Navy schedules training and testing activities to minimize conflicts with the use of sea space and airspace within ranges and throughout the study area to ensure the safety of Navy personnel, the public, commercial aircraft, commercial and recreational vessels, and military assets. The Navy deconflicts its own

use of sea space and airspace to allow for the necessary separation of multiple Navy units to prevent interference with equipment sensors and avoid interaction with established commercial air traffic routes and commercial shipping lanes. These standard operating procedures benefit public health and safety (including persons participating in activities that have socioeconomic value, such as recreational or commercial fishing) through a reduction in the potential for interactions with training and testing activities.

Sea Space

While most of the Atlantic and Pacific study areas are accessible for recreational activities, the majority of recreational activities occur closer to the eastern and western coast of North America and most commercial activities occur along established routes. The intensity of use generally declines with increasing distance from the shoreline, although specific resources in the BOA may result in a concentration of use (e.g., sea mounts are preferred fishing locations). Some activities are prohibited or restricted within the naval OPAREAs closer to the shore and other designated danger zones or restricted areas. In accordance with 33 CFR § 165 (Regulated Navigation Areas and Limited Access Areas), these restrictions can be permanent or temporary. Nautical charts issued by the National Oceanic and Atmospheric Administration include these federally designated zones and areas. Operators of recreational and commercial vessels have a duty to abide by maritime regulations administered by the U.S. Coast Guard, which oversees maritime activities within U.S. (territorial) waters. The International Maritime Organization provides guidance for maritime activities in international waters.

Navy sea and air operations regularly occur in the Atlantic and Pacific BOA. Personnel on naval vessels abide by the rules and guidance provided in OPNAVINST 5100.19F, in addition to the general DoD and Navy Safety Program guidance and Occupational Safety and Health Administration regulations and training requirements. The Navy alerts the U.S. Coast Guard to any operations that would require closure or restriction of sea space to inform the public through NTMs. NTMs provide information about durations and locations of closures because of activities that are potentially hazardous to surface vessels. Broadcast notices on maritime frequency radio, weekly publications by the appropriate U.S. Coast Guard Navigation Center, and global positioning system navigation charts disseminate these navigational warnings.

Airspace

Navy operations occurring in airspace are planned and implemented according to OPNAVINST 3770.2L, Department of the Navy Airspace Procedures and Planning and subject to FAA regulations and guidance. Airspace operations in international airspace beyond FAA control are guided by the framework presented by the International Civil Aviation Organization’s Global Aviation Safety Plan. Aside from the OPAREAs, which include restricted airspace, Military Operations Areas, and Warning Areas, airspace in the Atlantic study area is accessible to military, commercial, and recreational activities along designated flight routes. Some areas, like waterways, are temporarily off-limits to civilian and commercial use. The Navy implements advance NOTAMs through the FAA prior to conducting any tests that might be hazardous to non-participants. NOTAMs alert aircraft pilots of any hazards en route to or at a specific location, such as upcoming or ongoing military exercises with airspace restrictions. Civilian

aircraft are responsible for being aware of restricted airspace and any NOTAMs that are in effect. Pilots have a duty to abide by aviation rules as administered by the FAA.

3.2 Kwajalein Atoll, RMI

The Kwajalein Atoll portion of the study area includes KMISS, Illeginni Islet, and other locations within Kwajalein Atoll where proposed activities would take place. Both KMISS and Illeginni Islet are part of RTS and USAKA. KMISS is a deep-ocean range located just east of Gagan Islet with water depths ranging from approximately 7,000 to 12,000 ft. The KMISS range is routinely used for missile impact scoring as part of DoD test programs (e.g., U.S. Air Force 2020a, U.S. Air Force 2021, U.S. Army 2021, and DON 2019). Illeginni Islet is a small (31 acre) islet on the western side of Kwajalein Atoll. An approximate 7.6-acre area on the western end of the islet is routinely used for DoD testing as a land impact site.

This EA/OEA focuses on those environmental resources considered potentially subject to impacts from the Proposed Action. This section includes detailed descriptions of air quality, cultural resources, biological resources, geology and soils, water resources, hazardous materials and waste management, environmental justice, and health and safety at Kwajalein Atoll. These resource areas were carried forward for additional analysis of environmental consequences in **Chapter 4.0**.

3.2.1 Air Quality – Kwajalein Atoll

3.2.1.1 Region of Influence

The ROI includes all of Kwajalein Atoll and within 5 miles of the atoll land boundaries.

3.2.1.2 Affected Environment

Air quality at USAKA, including KMISS (southeast of Gagan Islet) and Illeginni Islet, is considered good overall due to the following: (1) dominant northeasterly trade winds for most of the year; (2) limited stationary air pollution sources for the entire atoll, mostly from U.S. Army operations on Kwajalein Island; (3) ocean cargo and military vessels and aircraft being dispersed over a very large area; (4) lack of topographic features to inhibit dispersion; and (5) aircraft operation typically above the mixing height. These features effectively widely disperse air emissions across the entire region.

The primary activities at USAKA contributing to air pollution are combustion sources that produce carbon monoxide, nitrous oxide, particulate matter and sulfur dioxide, and hydrocarbon emissions (USASMDC 2021). Most of these sources are located on Kwajalein Island and are regulated under the current version Air Emissions from Major, Synthetic Minor, and Industrial Boiler Stationary Sources Document of Environmental Protection 2019 (USAKA 2019). **Table 3.2.1-1** summarizes the most recent regulated air emissions for Illeginni and Gagan Islets based on the USAKA Air Emissions Inventory Report for 2000 (USAKA 2002).

Table 3.2.1-1. Summary of Regulated Air Emissions for Illeginni and Gagan Islets

Island	Regulated Air Emissions (tons per year)					
	PM_{10}	SO_2	CO	NO_2	VOC	Total HAPs
Illeginni Islet	0.54	0.51	1.66	7.72	0.62	0.01
Gagan Islet	0.98	0.92	3.01	13.96	1.11	0.01

Source: USAKA 2002

Acronyms and Abbreviations: CO = carbon monoxide, HAPs = Hazardous Air Pollutants, NO_2 = nitrogen dioxide, PM_{10} = particulate matter less than or equal to 10 microns in diameter, SO_2 = sulfur dioxide, VOC = volatile organic compound

Consideration of Climate Change Impacts

Climate refers to average weather conditions within a certain range of variability. According to the Intergovernmental Panel on Climate Change primary concerns for small islands in the region are observed warming, increase in ocean acidification, continuing sea level rise associated with higher emissions, rise in storm surges and waves, shoreline retreat, and more intense tropical cyclones (IPCC 2021). The major climate-related natural hazards impacting the RMI are sea level rise, droughts, and typhoons (World Bank Group 2021).

Trends in the RMI are consistent with global patterns of warming and sea level rise. At Kwajalein, maximum temperatures increased at a rate of 0.36 degrees Fahrenheit per decade between 1960 and 2011 (PCCSP 2011) and mean air temperatures have increased 2 to 4 degrees Fahrenheit in the RMI since the 1950s (The Nature Conservancy n.d.). Ongoing global climate variability has contributed to rising sea levels and retreating shores, increased storm intensity, increased precipitation, disruption of natural ecosystems, and human health effects. Currently, USAKA and other islands and atolls in the RMI are being affected by rising sea levels from global climate change. Sea levels are expected to rise at least 0.2 inches per year with global mean sea level rise estimated in the range of 1.4 to 2.4 ft by 2100 (World Bank Group 2021). Sea level in the RMI rose approximately 0.3 inches per year between 1993 and 2011 (PCCSP 2011) with tide gauge data indicating a rise of approximately 5 to 6 inches between 1968 and 2015. For the Pacific Island region, an average sea level rise of between 9.8 and 22 inches is predicted by the middle of this century along the coastlines of Pacific Island countries, which would be devastating for islands that sit at or just above sea level (National Science Foundation 2022). Another consequence of increasing global CO_2 levels that has the potential to impact the environment at Kwajalein Atoll is ocean acidification. Ocean acidification has been slowly increasing in Marshall Islands' waters since the 18th century (PCCSP 2011). Ocean acidification and ocean temperatures are expected to continue to rise in the next several decades (Australian Bureau of Meteorology 2014).

3.2.2 Cultural Resources – Kwajalein Atoll

3.2.2.1 Region of Influence

The CPS flight test target site at Illeginni Islet is an approximate 7.6-acre area on the west end of the islet that includes the helipad. The ROI for Illeginni Islet at USAKA includes the proposed

impact site and adjacent areas on the west half of the island. Due to the development on the rest of the island, temporary siting of equipment and visits to establish equipment during testing do not have the potential to affect cultural resources and are excluded from the ROI and area of potential effects.

3.2.2.2 Affected Environment

KMISS is a deep-water range with no known cultural resources.

Illeginni Islet was developed in the 1970s and includes a helipad, roads, harbor, and facilities with moderate vegetative cover that represents regrowth since the 1970s development period (DON 2019). The site has been used for weapons testing since the 1990s. An archaeological survey and subsurface testing in 1994 identified charcoal associated with a midden along the lagoon shoreline that is most likely a modern intrusion and not recommended eligible for listing in the RMI National Register of Historic Places (NRHP). Archaeological surveys conducted in 1998 did not identify any archaeological sites on Illeginni Islet. Accordingly, no indigenous cultural materials or evidence of buried archaeological deposits has been found on Illeginni Islet.

A 1996 survey of Cold War-era properties at USAKA was followed by a 2012 Cold War Historic Context Study. Several buildings and structures at USAKA are eligible for listing in the RMI NRHP for associations with Cold War Missile Defense historic themes. Seven buildings on Illeginni Islet are potentially eligible for RMI NRHP listing for associations with Cold War Missile Defense historic themes. Three of those are considered to be significant. All are located on the central and eastern portions of the island and are no longer used and abandoned in place (DON 2019).

3.2.3 Biological Resources – Kwajalein Atoll

3.2.3.1 Region of Influence

The ROI for biological resources at USAKA includes the areas subject to effects of the Proposed Action including:

- The proposed deep ocean water impact site at KMISS (**Figure 2.1.4-2**);
- The proposed payload impact site on Illeginni Islet (**Figure 2.1.4-3, Figure 3.2.3-1**);
- Test support facilities and vessel operation locations at USAKA to be used for the Proposed Action; and
- Terrestrial and marine areas in the vicinity of these sites that may be subject to effects of the Proposed Action including elevated noise levels.

Biological resources in both the deep offshore waters and the Illeginni Islet portions of the ROI are substantially the same as those described in the Ground Based Strategic Deterrent (GBSD) EA/OEA (U.S. Air Force 2021). The status of biological resources in the ROI as described in the GBSD EA/OEA (U.S. Air Force 2021) remains the best available information for the ROI

affected environment and is incorporated here by reference. The following sections provide a brief summary of biological resources in the ROI, focusing on important habitats and special status species, including species considered coordination or consultation species under the UES. Detailed species descriptions and occurrence information can be found in the GBSD EA/OEA (U.S. Air Force 2021), Flight Test-3 EA/OEA (U.S. Army 2021), and in the Navy CPS Biological Assessment for Activities at Kwajalein Atoll (DON and USASMDC 2023) and are incorporated by reference.

3.2.3.2 Affected Environment Deep Offshore Waters

The waters of the ROI in the KMISS area are deep-water areas with a wide variety of pelagic and benthic habitats that support a diversity of marine life. Many special status marine species have the potential to occur in the ROI, including cetacean, sea turtle, and fish species protected under the UES (**Table 3.2.3-1**; USASMDC 2021, U.S. Army 2021). Distribution and abundance data in RMI waters are largely lacking for these species. Some species are migratory species which are present in RMI waters seasonally and some others are observed only rarely in the RMI.

Marine Wildlife

Invertebrates. Habitats in deep offshore areas of the ROI may support a variety of pelagic and deep-water benthic invertebrates. Little information is known about species assemblages in the deep offshore waters of Kwajalein Atoll; however, deep water benthic communities have been documented around other islands in the central Pacific including the Hawaiian Archipelago, Wake Island, and Johnston Atoll (Parrish and Baco 2007, Kelley et al. 2017, Kelley et al. 2018). A diversity of corals, sponges, and other invertebrates have been found in habitats at depths of 3,300 – 8,200 ft near these islands (U.S. Air Force 2021, Kelley et al. 2017, Parrish and Baco 2007, Kelley et al. 2018). The presence and potential composition of deep-water benthic communities in the ROI are unknown; however, if coral species occurred in the deep-water impact site within RMI waters, those species would likely be UES coordination species (listed in Appendix 3-4C of USASMDC 2021).

Gametes and larvae of many special status nearshore, reef-associated invertebrate species also have the potential to occur in the ROI seasonally during and within weeks after spawning (U.S. Air Force 2021). Many nearshore, reef-associated special status coral, mollusk, and fish species are likely to occur near Gagan Islet and throughout Kwajalein Atoll (U.S. Air Force 2021). Any eggs, larvae, or juveniles of these special status species that do occur in deep waters are likely to occur at very low densities and with patchy distributions (U.S. Air Force 2021). The Proposed Action would have minimal to no effects on gametes or larvae of special status species and they are not discussed further in this EA/OEA.

Table 3.2.3-1. UES Consultation (red) and Coordination Fishes, Sea Turtles, and Marine Mammals with the Potential to Occur in the Kwajalein Atoll ROI near Illeginni Islet and in Deeper Offshore Waters

Common Name	Scientific Name	UES Listing Status[1]	Likelihood of Occurrence	
			Nearshore Waters	Deeper Offshore Waters
Fishes				
Bigeye thresher shark	*Alopias superciliosus*	§ 3-4.5.1(a)	-	Potential
Bumphead parrotfish	*Bolbometopon muricatum*	§ 3-4.5.1(a)	Potential	-
Oceanic whitetip shark	*Carcharhinus longimanus*	T	-	Potential
Humphead wrasse	*Cheilinus undulatus*	§ 3-4.5.1(a)	Likely	-
Shortfin mako shark	*Isurus oxyrinchus*	§ 3-4.5.1(a)	-	Potential
Reef manta ray	*Mobula (Manta) alfredi*	§ 3-4.5.1(a)	Likely	Potential
Oceanic giant manta ray	*Mobula (Manta) birostris*	T	-	Likely
Giant coral trout	*Plectropomus laevis*	§ 3-4.6.1(a)	Likely	-
Scalloped hammerhead shark	*Sphyrna lewini*	T	-	Potential
Pacific bluefin tuna	*Thunnus orientalis*	§ 3-4.5.1(a)	-	Potential
Sea Turtles				
Loggerhead turtle	*Caretta caretta*	E, Statute 3	-	Potential
Green turtle	*Chelonia mydas*	T, Statute 3	Likely	Likely
Leatherback turtle	*Dermochelys coriacea*	E, Statute 1	-	Potential
Hawksbill turtle	*Enetmochelys imbricata*	E, Statutes 1 and 3	Potential	Likely
Olive ridley turtle	*Lepidochelys olivacea*	T, Statute 3	-	Potential
Marine Mammals				
Minke whale[2]	*Balaenoptera acutorostrata*	MMPA[2]	-	Likely
Sei whale[2]	*Balaenoptera borealis*	E[2], MMPA	-	Potential
Blue whale	*Balaenoptera musculus*	E, MMPA, Statute 1	-	Likely
Fin whale	*Balaenoptera physalus*	E, MMPA	-	Likely
Short-beaked common dolphin	*Delphinus delphis*	MMPA, Statute 2	-	Likely
Pygmy killer whale	*Feresa attenuata*	MMPA	-	Potential
Short-finned pilot whale	*Globicephala macrorhynchus*	MMPA	-	Likely
Risso's dolphin	*Grampus griseus*	MMPA	-	Potential
Pygmy sperm whale	*Kogia breviceps*	MMPA	-	Potential
Humpback whale	*Megaptera novaeangliae*	E[3], MMPA	-	Likely
Blainville's beaked whale	*Mesoplodon densirostris*	MMPA	-	Potential
Killer whale	*Orcinus orca*	MMPA	-	Likely
Melon-headed whale	*Peponocephala electra*	MMPA	-	Likely
Sperm whale	*Physeter macrocephalus*	E, MMPA, Statute 1	-	Likely
False killer whale	*Pseudorca crassidens*	MMPA	-	Potential

Common Name	Scientific Name	UES Listing Status[1]	Likelihood of Occurrence	
			Nearshore Waters	Deeper Offshore Waters
Marine Mammals (Continued)				
Pantropical spotted dolphin	*Stenella attenuata*	MMPA, Statute 2	-	Likely
Striped dolphin	*Stenella coeruleoalba*	MMPA, Statute 2	-	Likely
Spinner dolphin	*Stenella longirostris*	MMPA, Statute 2	-	Likely
Bottlenose dolphin	*Tursiops truncatus*	MMPA	-	Likely

Data Sources: U.S. Army 2021, U.S. Air Force 2021, NOAA 2023b, USASMDC 2021, NMFS and USFWS 2018
Acronyms and Abbreviations: DPS = Distinct Population Segment, E = Endangered Species Act endangered, T = Endangered Species Act threatened, MMPA = Marine Mammal Protection Act, UES = United States Army Kwajalein Atoll Environmental Standards
RMI Statutes: 1 = Endangered Species Act 1975, Title 8 MIRC [Mariana Islands Range Complex] Chapter 3; 2 = Marine Mammal Protection Act 1990, Title 33 MIRC Chapter 2; 3 = Fisheries Act 1997, Title 51 MIRC Chapter 2
[1] UES Listing Status based on Appendix 3-4A of the UES (USASMDC 2021). All species in this table are considered consultation species under the UES.
[2] The minke whale and sei whale are not specifically listed in Section 3-4 of the UES but are protected under the MMPA and the sei whale is listed under the ESA. These species are therefore included as special status species.
[3] The humpback whale DPS likely in the ROI, the Oceania DPS (NOAA 2023b), is not listed under the ESA and is not a depleted stock under the MMPA, However, the UES specifies the Western North Pacific DPS which is listed as endangered under the ESA.

Fishes. UES consultation fish species have the potential to occur in the deep ROI waters (**Table 3.2.3-1**). The bigeye thresher shark (*Alopias superciliosus*), oceanic whitetip shark, shortfin mako shark (*Isurus oxyrinchus*), oceanic giant manta ray, and Pacific bluefin tuna (*Thunnus orientalis*) are more oceanic, deep-water species and are the most likely to occur in the deep waters of the ROI (U.S. Air Force 2020b). Scalloped hammerhead and reef manta rays (*Mobula alfredi*, listed as *Manta alfredi* under UES Appendix 3-4A) generally have more coastal distributions. While scalloped hammerheads and reef manta rays are less likely to occur in the deep waters of the ROI, individuals have been known to migrate further offshore (Marshall et al. 2022, FAO 2006) and these species have the potential to occur in the ROI.

Marine Reptiles. Both green and hawksbill sea turtles are likely to occur in the ROI (**Table 3.2.3-1**; Maison et al. 2010). While there is little documented evidence that three other species of sea turtles (loggerhead, leatherback, and olive ridley) occur in waters of the RMI, these species are highly migratory, are known to occur in pelagic habitats throughout the Pacific (NOAA 2023b), and have the potential to occur in deep waters of the ROI. The primary threats to sea turtles in the ROI include bycatch in commercial fisheries, ship strikes, and marine debris (Lutcavage et al. 1997). Marine debris can be a problem for sea turtles through entanglement or ingestion. In addition to the threats all sea turtle species face throughout their ranges, sea turtles near Kwajalein Atoll have the potential to be affected by local harvest. In the RMI, sea turtles are an important part of Marshallese culture; they are featured in many myths, legends, and traditions, where they are revered as sacred animals (Kabua and Edwards 2010). Eating turtle meat and eggs on special occasions remains a prominent part of the culture (Kabua and

Edwards 2010). The harvest of sea turtles in the RMI is regulated by the RMI Marine Resources Act (Kabua and Edwards 2010).

Birds. The open ocean areas of the ROI provide habitat for a number of foraging and resting seabirds, many of which are protected under the UES. Several species of boobies, frigatebirds, gulls, terns, noddies, shearwaters, petrels, and tropicbirds are coordination species under the UES (Appendix 3-4C of USASMDC 2021). No terrestrial nesting habitat for birds occurs within the deep-water ROI; however, many species of seabirds likely use portions of the ROI for feeding and resting.

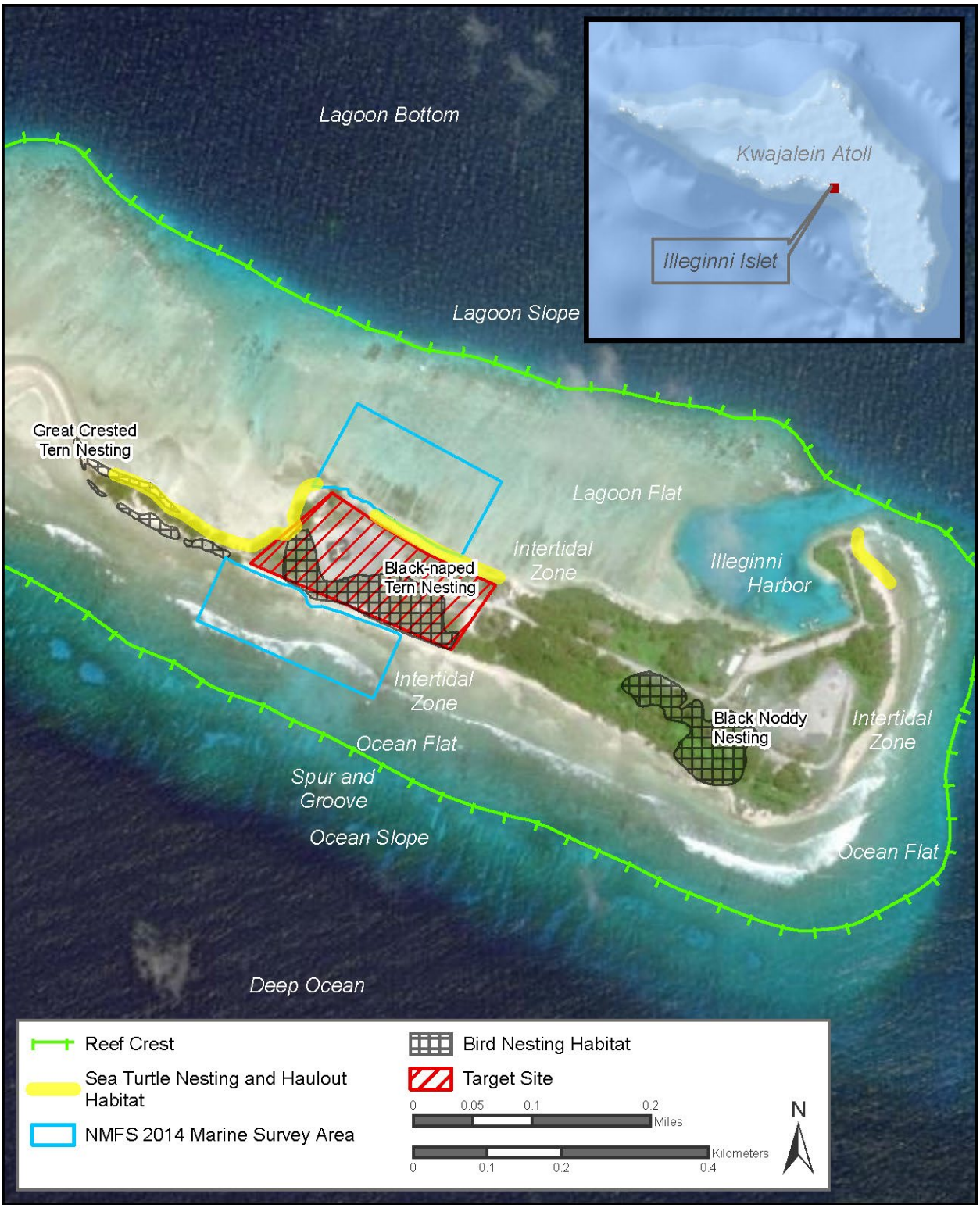
Marine Mammals. UES-protected cetaceans most likely to occur in the ROI include blue whales (*Balaenoptera musculus*), sperm whales (*Physeter macrocephalus*), short-beaked common dolphins (*Delphinus delphis*), short-finned pilot whales (*Globicephala macrorhynchus*), killer whales (*Orcinus orca*), melon-headed whales (*Peponocephala electra*), pantropical spotted dolphins (*Stenella attenuata*), striped dolphins (*Stenella coeruleoalba*), spinner dolphins, and bottlenose dolphins (*Tursiops truncatus*; U.S. Air Force 2021, Miller 2007). Minke whales are also likely to occur in the deep waters of the RMI (Miller 2007). Potential threats to cetacean species in the ROI include ingestion of marine debris, entanglement in fishing nets or other marine debris, collision with vessels, loss of prey species due to new seasonal shifts in prey species or overfishing, excessive noise above baseline levels in a given area, chemical and physical pollution of the marine environment, parasites and diseases, and changing sea surface temperatures due to global climate change (NOAA 2023b).

3.2.3.3 Affected Environment Illeginni Islet

As required under Section 3-4.9.2 of the UES, USAG-KA, with the assistance of the NMFS and USFWS, conducts biological baseline surveys every 2 years to identify and inventory special status or significant wildlife and habitats throughout USAKA. These inventories have included surveys of terrestrial, reef, and harbor habitats throughout USAKA and the mid atoll corridor, and provide the best available baseline data for habitats at Illeginni Islet.

Terrestrial Vegetation

Vegetation on Illeginni Islet is previously disturbed and managed on much of the western end of the islet, including the payload impact zone (U.S. Air Force 2021). The only native vegetation present on the islet consists of a patch of herbaceous vegetation and three patches of littoral (nearshore) forest (U.S. Air Force 2021; **Figure 3.2.3-1**). No special status vegetation species occur on Illeginni Islet.



Data Source: Illeginni Islet habitat data from USASMDC 2021; Esri World Imagery Basemap

Figure 3.2.3-1. Terrestrial Habitat and Marine Survey Areas at Illeginni Islet

Terrestrial Wildlife

Important or special-status terrestrial wildlife on Illeginni Islet include hauled-out or nesting sea turtles and several seabird species.

Birds. At least 14 species of protected migratory and resident seabirds and shorebirds have been seen breeding, roosting, or foraging on Illeginni Islet (**Table 3.2.3-2**) during biological inventories conducted by the USFWS and NMFS (NMFS and USFWS 2012). A number of shorebirds use the littoral forest, littoral shrub, and managed vegetation throughout the islet's interior, including white terns (*Gygis alba*) and black noddies (*Anous minutus*; **Figure 3.2.3-1**; NMFS and USFWS 2012). Other species such as the great crested tern (*Thalasseus bergii*) and black-naped tern (*Sterna sumatrana*) roost on the shoreline embankment and exposed inner reef (NMFS and USFWS 2012). Black-naped terns are known to nest in and near the proposed payload impact site (U.S. Air Force 2021, Fry 2017). All of these migratory and resident birds are protected under the Migratory Bird Treaty Act and are UES-coordination species. There are no known UES-consultation bird species on Illeginni Islet.

Table 3.2.3-2. UES Coordination Birds that Occur on Illeginni Islet

Common Name	Scientific Name	Common Name	Scientific Name
Brown noddy	*Anous stolidus*	Whimbrel	*Numenius phaeopus*
Black noddy	*Anous minutus*	Bristle-thighed curlew	*Numenius tahitiensis*
Ruddy turnstone	*Arenaria interpres*	Pacific golden plover	*Pluvialis fulva*
Pacific reef heron	*Egretta sacra*	Black-naped tern	*Sterna sumatrana*
Great frigatebird	*Fregata minor*	Great crested tern	*Thalasseus bergii*
White tern	*Gygis alba*	Gray-tailed tattler	*Tringa brevipes*
Godwit sp.	*Limosa* sp.	Wandering tattler	*Tringa incana*

Data Source: NMFS and USFWS 2012

Reptiles. Suitable sea turtle haulout and nesting habitat exists on the northwestern and eastern beaches of Illeginni Islet (U.S. Air Force 2021; **Figure 3.2.3-1**). However, no sea turtle nests or nesting activity has been observed on Illeginni Islet in over 25 years (U.S. Air Force 2021, USFWS 2021b). Green and hawksbill turtles are known to use the nearshore waters of Illeginni Islet, but it is unlikely that sea turtles will haul out or nest on Illeginni Islet (U.S. Air Force 2021).

Marine Vegetation

Marine habitats around Illeginni Islet include both lagoon-side and ocean-side reef flats, crests, and slopes that provide habitat for a number of macroalgae species (U.S. Air Force 2021, NMFS and USFWS 2017). The only special status algae species known to occur in the ROI is seagrass (*Halophila gaudichaudii*) which is listed as a coordination species under the UES (U.S. Air Force 2021). Seagrass forms dense beds which are sometimes found in Illeginni Harbor, as well as down the slopes in and near the harbor entrance (NMFS and USFWS 2017).

Marine Wildlife

The marine environment surrounding Illeginni Islet supports a diverse community of fishes, corals, and other invertebrates. In general, coral cover and invertebrate diversity is moderate to high on the lagoon-side reef crests and slopes and relatively high on ocean-side reef flats and ridges (U.S. Army 2021).

Invertebrates. A diverse invertebrate community exists in the shallow waters near Illeginni Islet that is typical of reef ecosystems in the tropical insular Pacific (U.S. Air Force 2021). Typical benthic invertebrates include sea anemones, sponges, corals, starfish, sea urchins, worms, bivalves, and crabs (U.S. Air Force 2021). Within the benthic invertebrate community are many coral and mollusk species that are protected as consultation or coordination species under the UES (U.S. Air Force 2021, USASMDC 2021). In 2014, NMFS surveyed the reef areas adjacent to the terrestrial impact site at Illeginni Islet (**Figure 3.2.3-1**; NMFS-PIRO 2017a, NMFS-PIRO 2017b, U.S. Air Force 2021). These surveys still represent the best available data on the invertebrate assemblages in these nearshore areas and are described in the GBSD Test EA/OEA (U.S. Air Force 2021).

Overall, NMFS recorded 37 UES coordination coral species and six UES consultation corals in these nearshore marine survey areas (**Table 3.2.3-3**; NMFS-PIRO 2017a, NMFS-PIRO 2017b). Other coral species exist in the reefs surrounding other USAKA islets, in other reefs around Illeginni Islet, and in Illeginni Harbor as described in the Navy CPS Biological Assessment for Activities at Kwajalein Atoll (DON and USASMDC 2023). However, these are the only species likely to occur offshore of the payload impact site at Illeginni Islet as adults (U.S. Air Force 2021). All of these species are relatively widespread in Kwajalein Atoll, with known occurrence in reefs at the majority of surveyed USAKA islets (**Table 3.2.3-3**).

During 2014 surveys, NMFS recorded three UES consultation mollusk species and three UES coordination mollusk species (**Table 3.2.3-3**) offshore of the proposed payload impact site (NMFS-PIRO 2017a, NMFS-PIRO 2017b). These species are the only species likely to be in the ROI; however, two other consultation species (*Tridacna gigas* and *Pinctada margaritifera*) have been recorded elsewhere at Illeginni Islet reefs and potentially occur in the ROI (U.S. Air Force 2021). All of these special status mollusk species are relatively widespread in Kwajalein Atoll, with known occurrence in reefs at the majority of surveyed USAKA islets (**Table 3.2.3-3**).

Sponges are ubiquitous on the seafloor in the ROI at all depths but are most common on hard bottom or reef substrates (U.S. Air Force 2021). The sponges that inhabit coral reefs of the RMI are generally found throughout the tropical Indo-Pacific region. All artificially planted or cultivated sponges (phylum Porifera) within the RMI are afforded protection under the RMI Marine Resources Act and are protected under the UES (USASMDC 2021, U.S. Air Force 2021). However, no cultivated sponges are known to occur in the shallow waters near Illeginni Islet (U.S. Air Force 2021).

Table 3.2.3-3. UES Consultation (red) and Coordination Invertebrate Species in Illeginni Islet Nearshore Habitats

Group Family Name Scientific Name	Common Name	Occurrence in		Number of USAKA Islets Observed on (n=11)
		Ocean-Side Survey Area	Lagoon-Side Survey Area	
Corals				
Milleporidae				
Millepora sp.		x	x	11
Helioporidae				
Heliopora coerulea	Blue coral	-	x	11
Acroporiidae				
Acropora abrotanoides		x	-	11
Acropora aculeus	Bottlebrush *Acropora*	-	-	6
Acropora aspera	Green staghorn coral	-	-	9
Acropora austera	Stony coral	x	-	11
Acropora dendrum		-	-	9
Acropora digitifera		x	x	11
Acropora gemmifera		x	-	11
Acropora humilis	Finger coral	x	-	11
Acropora latistella		x	-	11
Acropora listeri		-	-	6
Acropora microclados	Strawberry shortcake *Acropora.*	x	-	11
Acropora monticulosa		x	-	11
Acropora nana	Purple nana	x	-	10
Acropora nasuta	Branching staghorn coral	x	-	11
Acropora polystoma		x	-	6
Acropora robusta	Green robusta	x	x	10
Acropora secale	Purple tipped *Acropora*	x	-	11
Acropora speciosa		-	-	3
Acropora tenella		-	-	5
Acropora tenuis		x	x	11
Acropora vaughani		-	-	9
Alveopora verrilliana		-	-	4
Astreopora myriophthalma	Porous star coral	-	x	11
Montipora aequituberculata	Encrusting pore coral	x	-	11
Montipora caliculata		-	-	11
Montipora digitata		-	x	9
Agariciidae				
Gardineroseris planulata	Honeycomb coral	x	x	10
Leptoseris incrustans	Swelling coral	-	-	10
Pavona cactus		-	-	8
Pavona decussata	Leaf or cactus coral	-	-	5

Group Family Name Scientific Name	Common Name	Occurrence in		Number of USAKA Islets Observed on (n=11)
		Ocean-Side Survey Area	Lagoon-Side Survey Area	
Pavona duerdeni	Flat lobe coral	x	-	11
Pavona varians	Corrugated coral	x	-	11
Pavona venosa		-	x	11
Dendrophylliidae				
Turbinaria mesenterina	Vase coral	-	-	4
Turbinaria reniformis	Yellow scroll coral	-	x	11
Turbinaria stellulata	Disc coral	-	-	6
Faviidae				
Dipsaetraea (Favia) matthaii	Knob coral	x	-	11
Fungiidae				
Lobactis (Fungia) scutaria	Common razor coral	x	x	11
Lepastreidae				
Leptastrea purpurea	Crust coral	x	x	11
Lobophylliidae				
Acanthastrea brevis	Starry cup coral	-	-	9
Lobophyllia (Symphyllia) recta	Brain coral	x	-	10
Meruliniidae				
Cyphastrea agassizi	Agassiz's coral	-	x	9
Favites abdita		-	x	10
Favites pentagona	Larger star coral	-	x	9
Goniastrea edwardsi		x	-	11
Goniastrea reniformis		x	-	10
Hydnophora microconis		x	-	11
Platygyra sinesis	Lesser valley coral	x	x	11
Pocilloporiidae				
Pocillopora damicornis	Cauliflower or lace coral	-	x	11
Pocillopora eydouxi	Antler coral	x	x	11
Pocillopora meandrina	Cauliflower coral	x	-	11
Pocillopora verrucosa	Cauliflower coral	x	-	11
Poritiidae				
Porites lobata	Lobe coral	x	x	11
Porites lutea	Hump coral	x	x	11
Porites rus	Mountain cupcoral	x	-	11
Mollusks				
Trochiidae				
Rochia nilotica (Trochus niloticus)	Top shell snail	-	x	11
Cardiidae				
Hippopus hippopus	Giant clam	x	x	11
Tridacna gigas	Giant clam	-	-	11

Group Family Name Scientific Name	Common Name	Occurrence in		Number of USAKA Islets Observed on (n=11)
		Ocean-Side Survey Area	Lagoon-Side Survey Area	
Tridacna maxima	Giant clam	-	x	11
Tridacna squamosa	Giant clam	-	x	9
Margaritidae				
Pinctada margaritifera	Black-lip pearl oyster	-	-	8
Strombidae				
Lambis lambis	Spider conch	-	x	11
Lambis c.f. *truncata*	Giant spider conch	x	-	11

Data Sources: NMFS-PIRO 2017a, NMFS-PIRO 2017b, NMFS and USFWS 2017, WoRMS Editorial Board 2024
Abbreviations: "-" = not observed, "x" = observed during survey

In addition to the adults of these species, larvae and gametes of many of these marine invertebrates may be found in the ROI during and in the weeks following spawning. Concentrations of these larvae and gametes would be episodic and seasonal in the ROI and averaged over the timespan of a year, densities would be very low (U.S. Air Force 2021). Additional information about coral and mollusk reproduction, as well as threats to these species, is detailed in the GBSD Test EA/OEA (U.S. Air Force 2021) and the GBSD Kwajalein Atoll Biological Assessment (U.S. Air Force 2020b) included here by reference.

Fishes. A diversity and abundance of reef-associated fishes are found in the shallow waters near Illeginni Islet (U.S. Air Force 2021) and have been recorded during biological inventories of USAKA islets (**Table 3.2.3-1**). During the 2014 NMFS surveys of the nearshore areas adjacent to the proposed payload impact site (**Figure 3.2.3-1**), 45 fish species were recorded in the ocean-side survey area and 40 species in the lagoon-side survey area (NMFS-PIRO 2017a). The most abundant fish included *Atherinid* sp., *Chrysiptera brownriggii*, *Stethojoulis bandanensis*, *Halichoeres trimuculatus*, *Halichoeres margaritaceus*, and *Thalassoma quinquevittatum* (NMFS-PIRO 2017a). No UES consultation species were observed during these surveys. However, reef fish can be highly mobile species and the humphead wrasse (*Cheilinus undulatus*) and a *Mobula* (*Manta*) species have been observed on biological inventories at Illeginni Islet and may occur in nearshore waters (U.S. Air Force 2021). One UES coordination species, the giant coral trout (*Plectropomus laevis*) was observed in the ocean-side survey area in 2014 and has been recorded in other reef inventories near Illeginni Islet (U.S. Air Force 2021). Additional information about the occurrence and abundance of the humphead wrasse and manta ray species near Illeginni Islet can be found in the GBSD EA/OEA (U.S. Air Force 2021) and the GBSD Kwajalein Atoll Biological Assessment (U.S. Air Force 2020b) included here by reference.

Reptiles. Green and hawksbill turtles are the only sea turtles known to occur in the nearshore waters of the RMI (U.S. Air Force 2021). Green turtles are more common, while hawksbills are considered rare (U.S. Air Force 2021, Maison et al. 2010). Sea turtles have been observed fairly regularly in marine environments during biological inventories at Illeginni Islet (U.S. Air Force 2021). Dense seagrass beds, which are sometimes found in and near Illeginni Harbor, may

provide valuable foraging habitat for green turtles (U.S. Air Force 2020b). Both of these species are likely to occur in both nearshore waters of Illeginni and in deeper offshore waters. Additional information about sea turtle occurrence data and the threats to sea turtles in the ROI can be found in the GBSD EA/OEA (U.S. Air Force 2021) and the CPS Biological Assessment (DON and USASMDC 2023) included here by reference.

Environmentally Sensitive Habitats

Habitats listed in Appendix 3-4D of the UES (USASMDC 2021) are habitats listed under Section 3-4.6.1 of the UES that may trigger coordination procedures. UES coordination terrestrial habitat on and near Illeginni Islet includes terrestrial habitats used for white tern nesting, black-naped tern nesting, and sea turtle haulout (**Figure 3.2.3-1**; USASMDC 2021). These terrestrial habitats may include mixed littoral forest, mixed littoral shrub, managed vegetation, and sand/rock beach (USASMDC 2021). Black-naped terns nest in managed vegetation in and near the proposed payload impact site on Illeginni Islet (**Figure 3.2.3-1**). Potential sea turtle haulout habitat is sand and rock beaches.

Marine coordination habitats under the UES (Appendix 3-4D of USASMDC 2021) include any marine habitats used by UES consultation and coordination species, for coastal fisheries, for reef development, and for coastal buffering (USASMDC 2021). These marine habitats may include the intertidal zone, reef flats, reef crests, reef slopes, patch reefs, spurs and grooves, seagrass meadows, and consolidated bottom. Intertidal zone, lagoon flat, and ocean flat habitat occur within the ROI offshore of the proposed payload impact zone (**Figure 3.2.3-1**).

3.2.4 Geology and Soils – Kwajalein Atoll

3.2.4.1 Region of Influence

The ROI for geology and soil resources includes the areas subject to effects of the Proposed Actions including:

- KMISS deep-ocean range off Gagan Islet at RTS (**Figure 2.1.4-2**)
- Proposed impact site on the western side of Illeginni Islet (**Figure 2.1.4-3**)

3.2.4.2 Affected Environment Deep Offshore Waters

KMISS is a deep ocean sensor array located approximately 3.2 to 8.6 nm east of Gagan Islet. Within the ROI at KMISS, ocean depths ranging from 7,000 to 12,000 ft. Wave energy and grain size tend to correlate from less-energetic waves with smaller grain sizes further out to sea, to more-energetic with larger grain sizes in the emergent reef slope due to the kinetic energy of the wave action on the reef profile; additionally, larger grains are unable to be suspended in the water column as far as smaller grain sizes can (Bramante et al. 2020). Therefore, from USAKA shores to Pacific BOA the grain size transitions trend towards pebble/cobble, medium/coarse pebble, sand/pebble, medium/coarse sand, and silt/sand.

3.2.4.3 Affected Environment Illeginni Islet

Illeginni Islet runs roughly west-northwest to east-southeast; it is approximately 2,790 ft long and averages about 574 ft across. The northwestern end is a narrow finger that extends into several sandbars, while the southeastern end has a hook-shaped harbor on the north side. The lagoon side of the island consists of unconsolidated sediments that are thicker and contain a greater proportion of low-permeability back-reef sand than the ocean side. Drilling logs suggest a greater proportion of coarse, high-permeability rubble on the ocean side than the lagoon side of the islets. (RGNext 2020)

Because of previous reentry vehicle tests on Illeginni Islet, residual concentrations of beryllium and depleted uranium remain in the soil near the helipad on the west side of the islet. In 2005, soil samples collected around the helipad were analyzed to determine concentrations of beryllium and depleted uranium in the soil following a missile flight test. Soil samples were collected again following subsequent flight tests and results were reported in 2010 and 2013 (Robison et al. 2013). The observed soil concentrations of beryllium and uranium (as a surrogate for depleted uranium) in Illeginni Islet soil samples were within compliance with U.S. Environmental Protection Agency (USEPA) Region 9 Preliminary Remediation Goals as outlined in the UES (**Table 3.2.4-1**; USASMDC 2021, USEPA 2022b).

The most recent soil samples collected at Illeginni Islet were between 2018 (pre-test) and 2020 (post-test) for a flight test event. Results from the soil sampling conducted in September 2018 indicated possible beryllium and uranium above the screening levels. Beryllium was not detected in any of the 20 parent soil samples collected from the Illeginni Islet borings; however, it was detected in one of the duplicate samples with a concentration of 1.9 milligrams per kilogram (mg/kg), which exceeded the 1.1 mg/kg 2018 screening level for beryllium (DON 2019). This sample was a field duplicate of a sample in which beryllium was not detected above 0.089 mg/kg (DON 2019). This large discrepancy may be due to the heterogeneous nature of the soil matrix (described as gravelly sand; U.S. Air Force 2021). Residual concentrations of tungsten remaining in the soil following previous flight tests from other programs were below the USEPA Regional Screening Level for residential and commercial areas (**Table 3.2.4-1**; DON 2019). Uranium was detected in 26% of pre-test soil samples and 29% of post-test samples but concentrations were well below the primary UES compliance goal. Although the UES goal is used here for analysis purposes, it should be noted that the sample results for uranium were above the secondary USEPA resident soil to groundwater Regional Screening Level (**Table 3.2.4-1**; RGNext 2020, USEPA 2022d). As required under Section 3-6.5.8 of the UES soil sampling plans are currently being developed by USASMDC to ensure sampling consistency between pre- and post-test sampling events.

Table 3.2.4-1. Regulatory Limits and Historical Soil Testing Results from Illeginni Islet

Category or Study	Beryllium (Be)		Tungsten (W)		Depleted Uranium (DU)	
Regulatory Compliance Goals and Screening Levels						
UES Compliance Goals[1]	160 mg/kg		-		47 mg/kg	
USEPA RSL for Residential Soils	160 mg/kg		63 mg/kg		16 mg/kg	
USEPA RSL for Industrial Soils	2,300 mg/kg		930 mg/kg		230 mg/kg	
USEPA RSL for Resident Soil to Groundwater	20 mg/kg		2.4 mg/kg		1.8 mg/kg	
Illeginni Islet Soil Sample Testing Results						
RGNext 2020	undetected[2]		undetected[2]		9 (out of 34) pre-test samples ranged between 1.8 mg/kg and 4.3 mg/kg	
	undetected[2]		undetected[2]		7 (out of 24) post-test samples ranged between 1.8 mg/kg and 4.3 mg/kg	
DON 2019	0.089 mg/kg [3]		3.0 mg/kg		23 samples ranged between 0.72 mg/kg and 5.1 mg/kg	
Robison et al. 2013	Crater [4]: <0.0027 mg/kg	Surroundings [5]: 2.1 ± 0.58 mg/kg	-	-	Crater [4]: 1.9 ± 0.17 mg/kg	Surroundings [5]: 22 ± 8.8 mg/kg
Robison et al. 2010	2.3 ± 0.5 mg/kg [6]		-		37 ± 19 mg/kg [7]	
Robison et al. 2006 [8]	1.6 ± 0.32 mg/kg		-		24 ± 6.1 mg/kg	
Robison et al. 2005 [9]	0.027 ± 0.11 mg/kg		-		1.6 ± 0.41 mg/kg	

Acronyms and Abbreviations: mg/kg = milligrams per kilogram, RSL = Regional Screening Level, USEPA = U.S. Environmental Protection Agency

[1] Compliance Goals set by the UES (USASMDC 2021). Where UES Compliance Goals were not specified, USEPA RSLs were used as Compliance Goals instead (USEPA 2022b, USEPA 2022c, USEPA 2022d).

[2] Above Method Detection Limit, but below Limit of Quantification

[3] A duplicate sample detected 1.9 mg/kg of beryllium. This large discrepancy may be due to the heterogeneous nature of the soil matrix (gravelly sand).

[4] Mean of 8 samples taken from the berm of the crater.

[5] Mean of 16 samples taken on all sides of the helipad.

[6] Most conservative (highest) composite value for the five half-acre plots in the target area. Mean of 24 samples taken south of the helipad, within a predetermined 0.5-acre plot.

[7] Most conservative (highest) composite value for the five half-acre plots in the target area. Mean of 18 samples taken west of the helipad, within a predetermined 0.5-acre plot.

[8] Mean of 105 samples taken in the target area.

[9] Mean of 21 samples taken in the beach areas.

3.2.5 Water Resources – Kwajalein Atoll

3.2.5.1 Region of Influence

The ROI for water resources include areas subject to the effects of the Proposed Action including:

- The proposed deep ocean water impact site at KMISS (**Figure 2.1.4-2**).
- The proposed payload impact site on Illeginni Islet (**Figure 2.1.4-3**); and
- Test support facilities and vessel operation locations at Kwajalein Atoll to be used for the Proposed Action.

3.2.5.2 Affected Environment Deep Offshore Waters

KMISS is a deep ocean sensor array located approximately 3.2 to 8.6 nm east of Gagan Islet. The coastal waters are in a high-energy environment. Strong currents from tidal exchange and swells from the south and southwest are common, along with wrap-around effects from swells originating from the east (USASMDC 2014a). Surface seawater often has a pH between 8.1 and 8.3 (slightly basic), but generally is very stable with a neutral pH (U.S. Army 2021). The amount of oxygen present in seawater varies with the rate of production by plants, consumption by animals and plants, bacterial decomposition, and surface interactions with the atmosphere (U.S. Army 2021). The general composition of ocean water includes water, sodium chloride, dissolved gases, minerals, and nutrients (U.S. Army 2021). The most important physical and chemical properties are salinity, density, temperature, pH, and dissolved gases (U.S. Army 2021). For oceanic waters, the salinity is approximately 35 parts of salt per 1,000 parts of seawater (U.S. Army 2021).

3.2.5.3 Affected Environment Illeginni Islet

Freshwater resources at USAKA consist of rainwater obtained from catchments and groundwater lenses beneath the larger islands. Groundwater at Illeginni Islet is not considered a viable source of potable water as it is currently deemed to be too saline and not available year-round (U.S. Air Force 2021). Marine resources include both lagoons and the ocean, which furnish habitats in the shallow marine water for plants and animals. Numerous species are of subsistence value to the Marshallese (USASMDC 2021).

Kwajalein Atoll's geographical location gives it a tropical marine climate with a wet and a dry season. The dry season is from mid-December to mid-May when the atoll experiences east-northeasterly trade winds. The wet season is from mid-May to mid-December. Annual rainfall is approximately 100 inches with around 72% occurring during the wet season (AST 2023).

The Illeginni Islet land impact site has been used for DoD testing of payloads for decades. There has been concern about payload components leaching into groundwater on the islet due to this military testing. In 2018, seven groundwater monitoring wells were installed to facilitate pre- and post-flight test groundwater monitoring following tests that utilize the Illeginni Islet

impact site (RGNext 2020). September 2018 groundwater sampling results following a missile flight test showed beryllium was not detected, uranium was detected in three of nine samples (not exceeding the USEPA Maximum Contaminant Level screening level), and tungsten was detected in seven of nine samples (**Table 3.2.5-1**; DON 2019). In groundwater samples collected within the impact crater for that test, tungsten concentrations averaged 650 micrograms per liter (µg/L) (DON 2019). All detected tungsten concentrations exceeded the USEPA residential tap water screening level (**Table 3.2.5-1**).

A 2020 report for a flight test event described pre-test and post-test groundwater results for uranium, beryllium, and tungsten at seven wells on Illeginni Islet (RGNext 2020). The pre-and post-test sampling showed little variation in values, with beryllium remaining undetected, tungsten exceeding residential tap water screening levels, and uranium well below the USEPA maximum contaminant level for drinking water (**Table 3.2.5-1**; U.S. Air Force 2021). Tungsten was detected in 8 of the 12 groundwater samples collected (RGNext 2020). Where detected, tungsten concentrations were higher than the 2018 sample results with detected concentrations ranging from 2.3 µg/L to 990 µg/L (U.S. Air Force 2021). Although the groundwater at Illeginni Islet shows tungsten levels above the USEPA Maximum Contaminant Level, the groundwater is not potable under the UES standards.

Table 3.2.5-1. Groundwater Screening Levels and Historical Sampling at Illeginni Islet

Category or Study	Beryllium (Be)		Tungsten (W)		Depleted Uranium (DU)	
Regulatory Compliance Goals and Screening Levels						
UES Compliance Goals[1]	4 µg/L		-		-	
USEPA Maximum Contaminant Level	-		-		30 µg/L	
USEPA Regional Screening Levels (RSL)	-		0.016 mg/L (16 µg/L)		-	
Illeginni Islet Groundwater Sample Testing Results						
RGNext 2020	Pre-test: undetected	Post-test: undetected	Pre-test: 990 µg/L[2]	Post-test: 63 µg/L	Pre-test: 5.4 µg/L[3]	Post-test: 5.0 µg/L[4]
DON 2019	undetected		Crater: 650 µg/L (range of 640 to 670 µg/L)	Surroundings: 7 detections (out of 9 samples) ranged from 55 µg/L to 1,200 µg/L	3 detections (out of 9 samples) < 30 µg/L	

Abbreviations: mg/L = milligrams per liter, µg/L = micrograms per liter

[1] Where UES Compliance Goals were not specified, EPA Residential Tap water RSLs (USEPA 2022e) were used as compliance goals instead.

[2] Most conservative (highest) of 7 detections (out of 9 samples).

[3] Most conservative (highest) of 12 detections (out of 12 samples).

[4] Most conservative (highest) of 3 detections (out of 3 samples).

Except for several point and non-point sources, the marine water around USAKA is generally free of pollution. Water quality is maintained by the natural conditions of tidal and trade-wind currents that dilute and transport pollutants. Water quality can be degraded by wastewater, thermal discharges, stormwater runoff, sandblasting and construction debris, solid waste disposal, and landfill leachate.

As required under Section 3-6.5.8 of the UES, groundwater monitoring plans are currently being developed by USASMDC to ensure sampling consistency between pre- and post-test sampling events.

3.2.6 Hazardous Materials and Waste Management – Kwajalein Atoll

3.2.6.1 Region of Influence

For the analysis of hazardous materials and waste management at Illeginni Islet, the ROI is defined as the 7.6-acre impact site for CPS flight tests located on the west end of the islet, as well as the immediate area near the impact site where test-support equipment would be placed.

For the analysis of hazardous materials and waste management at KMISS, the ROI is the deep-water range area.

3.2.6.2 Affected Environment

At Illeginni Islet, the U.S. Army has previously removed all remaining hazardous materials and wastes (e.g., asbestos, polychlorinated biphenyl [PCB] items, and cans of paint) from buildings and facilities. Hazardous wastes are accumulated for up to 90 days and shipped off-island for disposal in the continental United States. At the 90-Day Storage Facility, sampling of waste is performed (for waste from uncharacterized waste streams) and waste is prepared for final off-island shipment for disposal. (U.S. Army 2021)

Illeginni Islet has been used as a target site by the U.S. military for various hypersonic missile programs since the early 1990s. Due to prior missile testing on Illeginni Islet, residual concentrations of beryllium, depleted uranium, and tungsten remain in the soil near the existing helipad on the west side of the islet as described in **Section 3.2.4.3**. Groundwater sampling results at Illeginni Islet have shown beryllium as undetected, residual concentrations of depleted uranium not exceeding the USEPA Maximum Contaminant Level screening level, and tungsten below the USEPA Regional Screening Level for residential and commercial areas (see **Section 3.2.5**). Groundwater at Illeginni Islet is saline and non-potable. (U.S. Army 2021, RGNext 2020)

The affected environment for KMISS is the deep-ocean range just off Gagan Islet as described in **Section 3.2.5.2**.

3.2.7 Environmental Justice – Kwajalein Atoll

3.2.7.1 Region of Influence

The ROI for environmental justice includes KMISS, Illeginni Islet, and other locations within Kwajalein Atoll where proposed activities would take place.

3.2.7.2 Affected Environment

RTS has been used as a target site for DoD missile flight test programs since the 1990s. Illeginni Islet and Gagan Islet are uninhabited and only DoD personnel and contractors periodically work on these islets as part of range operations and mission support. Military personnel, commercial users, recreational users, and RMI citizens utilize the atoll lagoon, ocean waters surrounding Kwajalein Atoll, and RMI airspace at Kwajalein Atoll. These populations require “equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices” (88 FR 25251 [April 26, 2023]).

Fisheries are an important component of the RMI economy and culture that depend on a heathy environment capable of supporting adequate fisheries resources. Any actions which have the potential to impact fisheries in the RMI are an environmental justice concern. In the RMI, marine fisheries have two distinct areas, offshore and coastal (FAO 2023). Coastal fishing is primarily for subsistence purposes and for sale in local and export markets. Offshore fisheries consist of commercial longlining, purse seining, and pole-and-line fishing and are focused on tuna (FAO 2023). The annual catch from RMI purse-seine vessels in 2014 was 79,562 metric tons, of which 18% was taken within the RMI EEZ (FAO 2023). Foreign offshore fleets operating within RMI waters caught over 51,000 metric tons of fish in 2014 with over 90% of the catch consisting of tuna (FAO 2023).

Subsistence and artisanal fishing are very important in the RMI, especially in the outer atolls and more remote islets where it provides residents with their primary source of animal protein (FAO 2023). Imported food has gained importance in the RMI since the 1960s, but the consumption of fish remains substantial and critically important to the outer islands (FAO 2023). Almost all artisanal catches in the RMI are marketed locally for food (FAO 2023) but part of the fisheries catch in the RMI includes non-food commodities such as mollusks, aquarium fish, and corals. Exports from the coastal commercial fisheries are primarily aquarium fish and coral going to U.S. markets and top shell snails for button factories in Asia and Europe (FAO 2023). Between 1950 and 1990, harvests from artisanal and subsistence fishing increased from 1,100 metric tons per year then stabilized at around 4,500 metric tons per year after 1990 (FAO 2023, Vianna et al. 2020). Subsistence and artisanal catches in the RMI are typically composed of approximately 75% finfishes and 25% invertebrates (Vianna et al. 2020). Top shell snails are generally exported rather than consumed locally and make up between 0.25 metric tons and 9 metric tons of the annual artisanal catch (Vianna et al. 2020). Sea turtles are an important part of Marshallese culture; they are featured in many myths, legends, and traditions, where they are

revered as sacred animals. Eating turtle meat and eggs on special occasions remains a prominent part of the culture (Kabua and Edwards 2010).

USAG-KA has conducted fish studies to evaluate the levels of pollutants in fish at USAKA after decades of testing and other military uses. USAG-KA conducted a fish study within Kwajalein Harbor in 2008 to assess human health risks (APHC 2017). In 2013, USAG-KA conducted another fish study in which fish and water samples were collected at several USAKA locations as well as locations which are not utilized by the U.S. military (APHC 2017). This study was conducted to discern whether previously observed contamination in fish tissue is specific to Kwajalein Harbor or is part of a wider contamination problem at USAKA (APHC 2017). The 2013 study revealed that contaminants of concern for human health present in fish at USAKA study sites included pesticides, PCBs, and lead (APHC 2017). Conclusions of the study were that contaminated fish consumption poses a risk for Marshallese adults and children at certain USAKA locations (APHC 2017). While historical and ongoing military and industrial activities at USAKA are contributing to contamination in the southern portion of Kwajalein Atoll, there is some evidence that, for certain substances, contamination may not be limited to USAKA military and industrial use locations but may be part of a ubiquitous problem (APHC 2017). Regardless of the causes of the fish contamination, results of these fish studies led to establishment of “no fishing” areas within Kwajalein, Illeginni, and Meck harbors as well as to several remediation projects at Kwajalein to eliminate contamination sources (U.S. Air Force 2021, APHC 2017).

The Marshall Islands Marine Resource Authority manages and regulates fishing in the RMI under the Marshall Islands Marine Resources Act of 1997. As part of this Act, the Marine Resource Authority determines the total level of fishing and allocation of fishing rights, develops fishery management plants, protects species, establishes fisheries exclusion zones, limits the taking of sea turtles and other protected species, and regulates fishing gear, among other responsibilities (FAO 2023).

3.2.8 Health and Safety – Kwajalein Atoll

3.2.8.1 Region of Influence

The ROI for USAKA includes KMISS as a potential deep ocean target, the Mid-Atoll Corridor, Illeginni Islet, and Illeginni Islet nearshore waters (**Figure 2.1.4-2**).

3.2.8.2 Affected Environment

Since the 1990s, USAKA has been used as a target site for various DoD missile test operations. Illeginni and other islets within the Mid-Atoll Corridor are uninhabited, but personnel do periodically visit and work on some of the islets as part of range operations and mission support. Military, commercial, and public users of the atoll lagoon, surrounding ocean waters, and local airspace are also a safety consideration at USAKA.

All range operations must first receive approval from the RTS Safety Office. This is accomplished through presentation of the proposed program to the Safety Office. All safety analyses, standard operating procedures, and other safety documentation applicable to

operations affecting USAKA must be provided, along with an overview of mission objectives, support requirements, and schedule. The Safety Office evaluates this information and ensures that all RTS range safety requirements (including both ground and flight safety) and supporting regulations are followed. Final responsibility and authority for the safe conduct of missile and flight test operations lies with the USAG-KA Commander (USASMDC 2021).

Range safety provides protection to installation personnel, inhabitants of the Marshall Islands, and ships and aircraft operating in areas potentially affected by missions. Specific procedures are required for the preparation and execution of missions involving missile tests. These procedures are based on regulations, directives, and flight safety plans for individual missions. The flight safety plans include evaluating risks to inhabitants and property near the flight path, calculating trajectory and debris areas, and specifying range clearance and notification procedures. Criteria used at RTS to determine debris hazard risks are in accordance with Range Commanders Council 321-20 (RCC 2020). Radar and visual sweeps of hazard areas are accomplished immediately prior to operations to assist in the clearance of non-critical personnel, ships, and aircraft. Only mission-essential personnel are permitted in hazard areas. An NTM and a NOTAM are published and circulated in accordance with established procedures to provide warning to personnel, including residents of the Marshall Islands, concerning any potential hazard area that should be avoided.

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4.0 Environmental Consequences

This chapter describes the environmental consequences of the Proposed Action and No Action Alternative on the affected environment as described in **Chapter 3.0**. For each resource area carried forward for detailed analysis, this chapter includes descriptions of the ways in which the Proposed Action might impact the affected environment, analysis of potential impacts, and conclusions regarding the expected impacts of proposed activities. **Section 4.1** evaluates the environmental consequences of the No Action Alternative and **Section 4.2** evaluates the environmental consequences of implementation of the Proposed Action. **Section 4.3** includes an evaluation of the potential for cumulative effects on environmental resources from implementation of the Proposed Action in conjunction with other past, present, and reasonably foreseeable future actions in the study areas.

4.1 No Action Alternative

Under the No Action Alternative, proposed CPS flight tests and associated activities would not occur. Other DoD actions in both the Pacific and Atlantic study areas would continue to occur as evaluated in the relevant NEPA compliance documents cited in this EA/OEA and described below. The No Action Alternative of not conducting the proposed flight testing would not meet the purpose and need for the Proposed Action (**Section 1.2**). The environmental consequences of the No Action Alternative are evaluated in this section in order to determine if the No Action Alternative would change baseline conditions as presented in **Chapter 3.0** and to compare the degree of the potential environmental effects of the Proposed Action with the expected environmental conditions that would exist if the Proposed Action did not occur.

4.1.1 Broad Ocean Area – No Action Alternative

Under the No Action Alternative, the proposed CPS flight test program described in **Section 2.1** would not be implemented within the Atlantic and Pacific BOAs. Thus, there would be no CPS sea-based testing, and no CPS-related environmental impacts from launch activities or terminal flight operations. Other ongoing DoD training and testing activities, and military range operations would continue in portions of the Atlantic and Pacific BOAs. Navy training and testing has been occurring in the BOA OPAREAs and other portions of the BOAs for decades and would continue as evaluated in the Atlantic Fleet Training and Testing EIS/OEIS (DON 2018a), Hawaii-Southern California Training and Testing EIS/OEIS (DON 2018a), and the Mariana Islands Training and Testing EIS/OEIS (DON 2020a), among other programs. As a result, the environmental conditions described for the Atlantic and Pacific BOA affected environment in **Section 3.1** are not expected to change under the No Action Alternative and no impacts are expected for any resource considered.

4.1.2 Kwajalein Atoll – No Action Alternative

Under the No Action Alternative, the Navy would not conduct the proposed CPS flight testing activities at USAKA as described in **Section 2.1**. Other DoD activities not associated with the

Proposed Action would continue to occur at USAKA, including use of KMISS and Illeginni Islet as payload impact sites for missile testing. DoD testing at both KMISS and the Illeginni land impact site as well as other USAG-KA and RTS activities would continue as evaluated for several programs including but not limited to the GBSD (now Sentinel) and Minuteman III programs (U.S. Air Force 2021). As a result, the baseline environmental conditions described for the USAKA affected environment in **Section 3.2** are not expected to change under the No Action Alternative and no impacts are expected for any resource considered.

4.2 Proposed Action

Under the Proposed Action, proposed CPS flight tests and associated activities would occur as described in **Section 2.1**. The environmental consequences of the Proposed Action are evaluated in this section based on the conditions in the affected environment and the regulatory setting described in **Chapter 3.0** and **Appendix B**. Resource-specific evaluation criteria may be defined in this section but in general, impacts are categorized as either (1) no to negligible impacts, (2) minor impacts, (3) moderate impacts, or (4) significant impacts. Negligible impacts are those where there are undetectable levels of effect. Minor impacts would be those where effects would be detectable but would not noticeably modify, impair, or improve the function, quality, viability, or quantity of the resource. Moderate impacts would be those where effects are detectable and would noticeably modify, impair, or improve the aforementioned aspects of a resource. Significant impacts would be those that substantially change the function, quality, or quantity of a resource. Impacts may also be categorized as short-term, long-term, adverse, or beneficial.

4.2.1 Broad Ocean Area – Proposed Action

4.2.1.1 Air Quality – BOA

Effects on air quality are based on estimated direct and indirect emissions associated with the Proposed Action. There are no construction/demolition activities associated with the Proposed Action. The primary sources of emissions include launch and flight of the CPS AUR and exhaust emissions from launch platform and support vessels. There are no measured emissions data available for the developmental CPS AUR missile. For analysis purposes, CPS AUR emissions were estimated based on the amount of propellant to be used in the CPS vehicle compared to similar flight test vehicles with a similar fuel type for which measured emissions were available (**Table 4.2.1.1-1**; U.S. Air Force 2020a, Blanco Camargo 2022). Estimated annual emissions from CPS vehicle launch and flight would not exceed significant indicator levels for any criteria pollutants (**Table 4.2.1.1-1**).

Vessel operations for the Proposed Action would be a small fraction of naval vessel operations and total vessel traffic in both the Pacific and Atlantic study areas. Based on estimated annual emissions from marine support vessel operations within a Pacific Navy range (DON 2004), it is anticipated that the total 10-year emissions from marine vessels supporting the CPS flight tests

would be below the Prevention of Significant Deterioration limit of 250 tons per year for criteria pollutants.

In total, the estimated annual emissions that would be generated by the CPS AUR (**Table 4.2.1.1-1**) and supporting vessels would not exceed the Prevention of Significant Deterioration significant indicator levels for pollutants or concern for criteria pollutants. Therefore, impacts to air quality from criteria pollutants in the BOAs with implementation of the Proposed Action would be minor.

Table 4.2.1.1-1. Estimated Emissions for CPS Flight Tests

Activity Source	SO_x	CO	PM_{10}	$PM_{2.5}$	HCl	NO_x	Stratospheric NO_x	CO_2	CO_2e
CPS Vehicle Launch and Flight (tons per test)	0.0001	0.0007	0.36	0.25	0.28	0.03	0.01	2.51	3.34
Annual Total Emissions (tons per year)[1]	**0.001**	**0.006**	**2.86**	**2.00**	**2.23**	**0.25**	**0.11**	**20.09**	**26.69**
Total Emissions for Proposed Action Flight Tests (tons)[2]	**0.01**	**0.06**	**28.60**	**20.03**	**22.32**	**2.55**	**1.12**	**200.95**	**266.91**
Significant Indicator Level (tons per year)	250	250	250	250	N/A	250	N/A	N/A	N/A

Acronyms and Abbreviations: CO = carbon monoxide, CO_2 = carbon dioxide, CO_2e = carbon dioxide equivalent, HCl = hydrochloric acid, N/A = not applicable, NO_x = oxides of nitrogen, $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter, PM_{10} = particulate matter less than or equal to 10 microns in diameter, SO_x = oxides of sulfur.

[1] Assuming eight flight tests per year.

[2] Assuming a total of 80 flight tests conducted over a 10-year period.

Greenhouse Gases and Social Cost

As noted by the Council on Environmental Quality, climate change is a particularly complex challenge given its global nature and the inherent interrelationships among its sources, causation, mechanisms of action, and impacts. The Council on Environmental Quality published updated guidance on January 6, 2023, regarding how to evaluate GHG emissions and climate change under NEPA, which states that agencies should quantify reasonably foreseeable direct and indirect gross and net GHG emissions increases or reductions, both for individual pollutants and aggregated in terms of carbon dioxide equivalent (CO_2e). The guidance further suggests that agencies can provide comparisons of a project's GHG emissions to metrics that may be more familiar to the public.

Implementation of the Proposed Action in the Atlantic and Pacific BOAs would contribute directly to emissions of GHGs from the combustion of the rocket propellant in the layers of the earth's atmosphere. First-stage burn would be entirely within the troposphere and stratosphere. Second-stage burn would start in the stratosphere and end either in the stratosphere or the mesosphere depending on the trajectory selected.

To estimate CPS AUR CO_2 emissions, the amount of propellant to be used in the CPS vehicle was compared to similar flight test vehicles with a similar fuel type for which measured emissions were available (Blanco Camargo 2022). Based on the amount and type of fuel, CO_2

emissions would be approximately 2.51 tons per CPS flight test launch and CO_2e (including stratospheric nitrogen oxides) would be approximately of 3.33 tons per flight test.

The social cost of GHG is the monetary value of the future net damages associated with adding one ton of that GHG to the atmosphere in a given year (USEPA 2022b). The Council on Environmental Quality January 2023 guidance states that agencies should quantify a project's reasonably foreseeable direct and indirect gross and net GHG emissions and monetize the social cost of those GHG emissions. The guidance also encourages agencies to avoid and mitigate GHG emissions to the greatest extent possible (CEQ 2023). The current federal estimated cost is $51 a ton for every additional ton of CO_2 emitted into the atmosphere (Resources for the Future 2022). Based on the estimated CO_2 emissions for the Proposed Action, he total estimated social cost of GHG would be $128.01 per flight test, $1,024.08 per year, and up to $10,240.80 for the 10-year Proposed Action (**Table 4.2.1.1-2**).

Based on the global and the U.S. GHG emissions for CO_2 the potential impact from implementation of the Proposed Action would be a less than 0.0001% increase in the global GHG levels. Therefore, Proposed Action impacts to air quality from GHGs in the BOAs would be minor.

Table 4.2.1.1-2. Estimated Greenhouse Gas Emissions Compared to Baseline Conditions and Social Cost of Greenhouse Gases

Emissions of CO_2 (tons per year)	
Estimated Proposed Action Greenhouse Gas Emissions	20.09
Global Greenhouse Gas Emissions	41,216,000,000
Proposed Action Percent of Global Emissions	0.000005%
United States Greenhouse Gas Emissions	6,340,000
Proposed Action Percent of United States Emissions	0.0003%
Social Cost of Greenhouse Gases	
Federal Social Cost for One Ton of Additional CO_2	$51.00
Proposed Action Social Cost of Greenhouse Gases Per Flight Test	$128.01
Proposed Action Social Cost of Greenhouse Gases Per Year[1]	$1,024.08
Proposed Action Total Social Cost of Greenhouse Gases[2]	$10,240.80

Sources: Global baseline emissions from Global Carbon Project 2024, United States baseline emissions from USEPA 2024

Acronyms and Abbreviations: CO_2 = carbon dioxide, CO_2e = carbon dioxide equivalent.

[1] Assuming eight flight tests per year.

[2] Assuming a total of 80 flight tests conducted over a 10-year period.

4.2.1.2 Biological Resources – BOA

Environmental consequences of the Proposed Action on biological resources are evaluated based on the best available information about species distributions and in the context of the regulatory setting discussed in **Appendix B, Section B.3.2.1** and criteria detailed in **Appendix D**.

The Proposed Action has the potential to impact biological resources in the BOA ROI through exposure to elevated sound levels, direct contact from vehicle components, exposure to hazardous materials, and vessel activity. These potential stressors for biological resources in the BOA ROI and the environmental consequences of those stressors on biological resources are described in detail in the Navy CPS Marine Biological Evaluation (DON and USASMDC 2024) and in **Appendix D**. This section provides a brief summary of consequences for biological resources in the environment described in **Section 3.1.2**, but additional analysis details relevant to this section can be found in **Appendix D, Section D.1**.

Because the Proposed Action is a Navy test action occurring primarily within existing Navy training and testing areas, proposed operations in the BOA would implement a number of standard operating procedures and mitigation measures, any of which were established in the Atlantic Fleet Training and Testing EIS/OEIS (DON 2018a), the Hawaii-Southern California Training and Testing EIS/OEIS (DON 2018b), the Mariana Islands Training and Testing EIS/OEIS (DON 2020a), and the Point Mugu Sea Range EIS/OEIS (DON 2022a). **Appendix C, Section C.3.1** details the standard operating procedures and mitigation measures to be implemented to minimize the potential effects of the Proposed Action on biological resources.

Elevated Sound Levels

The Proposed Action would result in elevated sound levels both in air and in water. Sources of elevated sound levels in the BOA ROI would include launch of the CPS flight test vehicle from a naval vessel, flight of the CPS vehicle over the ocean, splashdown of the spent boosters into the ocean and impact of the payload in deep ocean waters outside EEZs in international waters.

The potential effects of elevated sound pressures on wildlife and acoustic analysis methodology are detailed in **Appendix D, Section D.1** and DON and USASMDC 2024.

Proposed flight test noise has limited potential to affect the behavior and hearing sensitivity of wildlife. Some of the louder sounds generated by proposed activities have the potential to physically injure or cause temporary auditory injury in some of the most common and widely distributed marine wildlife such as abundant species of pelagic fish. However, given the limited number of tests per year (maximum eight per year over 10 years) and the limited potential of flight test noise to affect wildlife, elevated sound pressures would not change the relative population size or distribution of any wildlife species. For special-status species (including marine mammals and sea turtles), which generally have low densities in the ROI, it is not expected that animals would be exposed to sound pressures high enough to cause physical injury. Elevated sound levels might cause wildlife to quickly react, briefly altering their normal behavior, but wildlife are expected to return to normal behaviors within minutes of the short

duration sounds (NMFS 2019). No long-term behavioral effects or meaningful health effects are expected for any special-status species. The impacts of elevated flight test noise levels on wildlife, including special-status species, would be negligible to moderate.

Direct Contact

Biological resources in the BOA ROI may be affected by direct contact from test components entering marine habitats in the BOA, including the spent stage 1 boosters splashing down downrange of launch and up to 330 nm from land and stage 2 boosters splashing down and the CPS payload impacting in deep ocean waters outside of EEZs. These falling components would enter marine habitats and have the potential to injure marine organisms. Direct contact from flight test components is not expected to have a discernable or measurable impact on benthic or planktonic invertebrates or vegetation because of their abundance and wide distribution. The potential exists, however, for impacts to larger vertebrates in the open ocean area, particularly those that must come to the surface to breathe (e.g., marine mammals and sea turtles) or that feed at the surface (e.g., seabirds).

Based on the expected dimensions of CPS vehicle components and the best available information on marine mammal and sea turtle densities in the BOA, no direct contact with these special-status species is expected. The calculated chances for direct contact are extremely low, even when summed across eight potential tests per year over 10 years, and the impacts of direct contact on these species would be minor to non-existent.

Reliable density estimates are not available for special status fish or seabird species in the BOA. However, if it is assumed that densities of special-status fish and seabird species in the ROI are similar to densities of marine mammals, it is very unlikely that special status fish or seabirds would be exposed to direct contact. Some more common and abundant pelagic fish species may have individuals which would be exposed to direct contact; however, direct contact would not change the regional population size or distribution of these common species due to their relatively large population sizes and wide-ranging distributions in the BOA. Overall, direct contact would have minor to no impact on marine wildlife in the ROI.

Hazardous Materials

Biological resources in the BOA ROI may be affected by exposure to hazardous materials entering marine habitats or by ingestion of debris from proposed activities in the BOA. Biological resources might be exposed to materials of which the spent boosters and payload are composed or are contained within the boosters or payload (**Table 2.1.1-1** and **Table 2.1.1-2**). The propellant would be consumed during the flight tests; therefore, only a minimal residual amount of propellant would enter the ocean. All durable materials of which the AUR components are composed or that are contained within the boosters or payload are expected to sink to the ocean bottom. Booster splashdown and payload impact would occur within deep ocean waters downrange from launch and up to 330 nm from land. For tests using a floating target raft, the raft is expected to remain relatively intact and floating. Little to no floating debris would be expected and any visible debris found floating would be collected for disposal as much

as practicable. It is not planned or expected that the target raft would be sunk during Navy CPS flight test activities.

Hazardous material release in the BOA is not likely to adversely impact marine biological resources. Any hazardous material introduced into the BOA is not expected to have a discernable or measurable impact on benthic or planktonic invertebrates or vegetation because of their abundance, their wide distribution, and the protective influence of the mass of the ocean around them. The potential exists, however, for larger vertebrates in the open ocean area to be exposed, particularly those that must come to the surface to breathe (e.g., marine mammals and sea turtles) or that feed at the surface (e.g., seabirds).

Some of the chemicals contained in the spent boosters and payload are potentially harmful to marine wildlife at higher concentrations. However, components would sink to the ocean bottom and any chemicals introduced to the water column would be quickly diluted and dispersed. Most wildlife, including special-status wildlife are not likely to come into contact with test components or with chemicals at concentrations that could harm them. Any delayed release of chemicals from test components would occur in deep ocean waters and would be quickly diluted to low concentrations which would not cause harm to marine wildlife. Wildlife are unlikely to ingest or become entangled in components because they are expected to sink to the deep ocean floor where most species and their prey are not likely to occur. Hazardous materials would have negligible to minor impacts on biological resources in the BOA ROI.

Vessel Movement

The Proposed Action would involve vessel movement in the Atlantic and Pacific BOAs for approximately up to 4 weeks for each flight test. Vessel activity would include operation of surface ships and submarines as launch platforms; two to three support ships for downrange sensor coverage; a support ship and smaller watercraft for downrange target placement, clean-up activities, and recovery operations; and operation of a target raft and up to 12 self-stationing instrumented sensor rafts around the target site. No anchoring systems would be used for self-stationing rafts and rafts would be powered by small battery-powered trolling motors.

While proposed activities involve vessel operations in the BOA, operation of these vessels would occur in compliance with a number of standard operating procedures and mitigation measures to protect special-status biological resources (**Appendix C, Section C.3.1**). Ship personnel would monitor for marine mammals and sea turtles to avoid potential vessel strikes during operations. No vessel equipment is expected to pose an entanglement risk for wildlife.

Proposed vessel movement has the potential to increase strike risk for marine wildlife, especially wildlife which must surface to breathe (i.e., sea turtles and marine mammals). This risk is greatest for relatively slow-moving species and has the greatest potential for adverse impacts to special status species such as large marine mammals and sea turtles. Because Proposed Action vessel operation would only occur over a short period of time (up to 4 weeks) for each test and because these vessels are routinely used in the BOA as part of other DoD programs, the use of these vessels would not meaningfully increase vessel traffic in the BOA.

The self-stationing rafts and target rafts would be slow moving and powered by small battery-powered trolling motors; therefore, the rafts would pose very little strike risk for wildlife. With implementation of standard operating procedures and mitigation measures to detect and avoid marine mammals and sea turtles, special-status marine wildlife are unlikely to be struck by vessels operating for the Proposed Action. Vessel movement as a result of the Proposed Action would have minor to no impacts on marine biological resources in the BOA.

Consequences for Special Status Wildlife

Threatened and Endangered Species. Pursuant to the ESA, the Navy has evaluated the potential effects of the Proposed Action on ESA listed species, candidate species, and designated critical habitats in a CPS Marine Biological Evaluation (DON and USASMDC 2024). The Navy has concluded that proposed activities in the BOA would have *no effect* on ESA-listed birds and *may affect but are not likely to adversely affect* ESA-listed species of marine mammals, sea turtles, and fish in the BOA (**Table 3.1.2-1**). The Navy has initiated consultation with NMFS on the potential effects of the Proposed Action on marine ESA-listed species under Section 7 of the ESA.

Marine Mammal Protection Act. The Navy has concluded that proposed activities, including noise, would not result in take of marine mammal species in the ROI. The chances of any marine mammal being harmed by elevated sound levels, direct contact, hazardous materials, or vessel strike are extremely low. If any effects of proposed flight test noise on marine mammals were realized, they would be expected to be limited to short-duration startle response with no lasting or physiologically meaningful effects. Proposed activities are not expected to cause any disturbance to marine mammals which would result in abandonment or significant alteration of behavioral patterns. Therefore, there would be no harassment of marine mammals. The chances of direct contact from test components are extremely low and no animals are expected to be injured from direct contact, hazardous materials, or vessel strike.

Migratory Bird Treaty Act. The Navy has concluded that proposed activities would not result in any incidental take that might result in a significant adverse effect on the sustainability of a population of a migratory bird species protected under the Migratory Bird Treaty Act in the BOA ROI.

Consequences for Environmentally Sensitive Habitats

The primary ways that the Proposed Action might impact environmentally sensitive habitats is through introduction of hazardous materials or by direct contact from test components, target debris, or anchoring. Almost all of the environmentally sensitive habitats in the BOAs are in coastal, shelf, or slope areas where almost no proposed activities would occur. Implementation of proposed activities would include implementation of a number of standard operating procedures and mitigation measures to minimize potential effects to biological resources (**Appendix C**, **Section C.3.1**). Vessels may transit some biologically important areas in the BOA but would not change the quality or quantity of those habitats for marine species. Some submarine canyons and seamounts occur in the BOAs; however, test activities are not likely to

impact the quality or quantity of these habitats in the ROI. The following discussions focus on environmentally sensitive habitats which have regulatory protections.

Critical Habitat. The Proposed Action *may affect but is not likely to adversely affect* designated or proposed critical habitat for ESA listed species (DON and USASMDC 2024). With the exception of designated or proposed *Sargassum* critical habitat, designated or proposed critical habitats would not be used as launch, booster splashdown, or payload impact areas. While vehicle launch and spent stage 1 booster splashdown may occur within designated or proposed *Sargassum* critical habitat, proposed activities would not change the features necessary for sea turtle conservation and are not likely to adversely affect these critical habitats. Vessel activity might also occur within critical habitat areas but is not likely to adversely affect critical habitats. The Navy has initiated consultation with NMFS on the potential effects of the Proposed Action on designated and proposed critical habitats under Section 7 of the ESA and on threatened and endangered species as described above.

Essential Fish Habitat. Only vehicle launch from launch-platform vessels and stage 1 booster splashdown might occur within EFH and designated habitat areas of particular concern. All vessel operations related to the Proposed Action would be conducted with standard operating procedures and mitigation measures in place (**Appendix C**, **Section C.3.1**) similar to those used for routine Navy at-sea training and testing (DON 2018a, DON 2018b, DON 2020a), including prohibitions on anchoring within a 350-yard radius of live hard bottom. Navy Stage 1 booster splashdown may occur within EFH but would not significantly reduce the quality and/or quantity of EFH. The Proposed Action would have negligible adverse impacts on EFH in the Hawaiian Islands EEZ. The Navy plans to consult with the NMFS Pacific Islands Regional Office on the potential effects of the Proposed Action on EFH in the Hawaiian Islands U.S. EEZ.

Marine National Monuments and Sanctuaries. Because marine national monuments and national marine sanctuaries would be avoided during flight test planning, no booster splashdown or payload impact would occur there. Only vessel operations might occur within monuments or sanctuaries. No launch activities, anchoring or abandonment of materials are planned to occur within these areas and there would be no impacts to these marine protected areas.

4.2.1.3 Hazardous Materials and Waste Management – BOA

CPS Flight Test Vehicle

A maximum of 80 CPS AURs would be scheduled for splashdown in the Atlantic and Pacific Oceans over a 10-year period. All CPS AUR vehicle component materials, including the materials of which the boosters and fairings are composed and the materials carried within components, would be introduced in deep ocean waters of the BOAs. For analysis purposes, it is assumed that the substances carried on or of which the boosters and payload would be composed would be similar to those of the Joint Flight Campaign vehicle and payload (DON and U.S. Army 2022). Joint Flight Campaign vehicle and payload constituents which are listed as hazardous materials under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) include nitrogen gas, asbestos, lithium, silver, zinc, titanium, and copper (**Tables 2.1.1-1** and **2.1.1-2**; DON and U.S. Army 2022,40 CFR § 302.4). It is anticipated that

hazardous material input from splashdown in a given area would be below CERCLA reportable quantities. The nitrogen gas would be primarily used or expelled prior to splashdown, thus the gas contained in the boosters would be below the CERCLA reportable quantity of greater than 10 pounds at splashdown. The amount of asbestos which might be on the vehicle is unknown at this time, but it would likely be within the structure of the second stage. Lithium would be contained within batteries present on the vehicle stages and payload. The amount of lithium which would be contained within the AUR is not available, nor is that information available for the Joint Flight Campaign vehicle. However, if it is assumed that all lithium batteries on the boosters (up to nine) would be the maximum size (40 pounds) and that they would contain an average amount of lithium for these types of batteries (Pagliaro and Meneguzzo 2019), a maximum quantity of lithium on the boosters would be 4.9 pounds. Similarly, assuming the payload would have three lithium-ion batteries weighing 50 pounds, the maximum lithium content would be 2.0 pounds. CERCLA reportable quantities of lithium are greater than 10 pounds; therefore, lithium on a CPS AUR flight test would not exceed reportable quantities. The metals listed as hazardous materials under CERCLA which would be part of the CPS vehicle have reportable quantities of 1,000 pounds (for silver, zinc, and titanium) to 5,000 pounds (for copper). Quantities of these metals in the CPS vehicle are not expected to exceed CERCLA reportable quantities.

The principal source of potential impacts on water and sediment quality would be unburned rocket propellant residue and batteries. Each of the two rocket motor boosters would exhaust onboard propellant before dropping into the ocean. Rocket propellant normally contains 50 to 85% ammonium perchlorate by weight and 5 to 22% aluminum powder, a fuel additive (DON 2018a). Based on USEPA and other studies evaluating munitions constituents at military sites where explosives and propellants have been used, the USEPA concluded that perchlorate was generally not detected at ranges and that perchlorate is so soluble in water that surface accumulation (on land) does not occur (DON 2018a). Studies have concluded that the motors used in rockets and missiles are highly efficient, consuming over 99% of the rocket propellant perchlorate during use (DON 2018a). It is expected that only trace amounts, likely at undetectable levels, of propellant would remain in boosters when they splash down into the ocean (DON 2018a).

De minimus residual quantities of some hazardous materials may remain on the boosters and fairings (including batteries); these would be carried to the ocean floor by the sinking components and would undergo changes in the presence of seawater. When metals are exposed to seawater, they begin to corrode but movement of metals into the sediments or water column would be slow and restricted to a small area around the metals (DON 2018a). Residual materials would slowly dissolve and substances would be redistributed and diluted by physical ocean mixing and diffusion (DON 2018a). Any residual chemical concentration near submerged boosters would decrease over time as the leaching rate decreases and further redistribution and dilution occurs. Even at active military bombing sites, studies have revealed low concentrations of metals, generally below minimum detection limits (DON 2018a). Expected metal concentrations at BOA sites where CPS components enter the ocean would be expected to be significantly lower than at active bombing ranges given the size of the BOA and likely

distribution of CPS components. Therefore, metals would likely be undetectable in surrounding sea water and sediments.

Overall, hazardous materials are not expected to be found in concentrations high enough to adversely affect human environmental quality or habitat quality for marine life in the ROI. No detectable chemical, physical, or biological changes in water or sediment quality would be expected (DON 2018a). CPS flight test vehicle components would not contribute to floating or suspended marine debris as they are expected to sink to the ocean floor. From the cumulative aspect, it is anticipated that over the 10-year period and 80 CPS AUR splashdowns, the amount of hazardous materials in the deep ocean waters would remain below the 1,000 pounds CERCLA reportable quantity limits for nitrogen gas, silver, zinc, and titanium and the 5,000 pounds for copper. The amount of lithium deposited into the deep ocean waters over the 10-year period could exceed the greater than 10 pounds limit, but it is anticipated that the leaching rate described above would maintain a low concentration of metals, generally below minimum detection limits. Overall, based on the amount and expected post-test location of residual hazardous materials and wastes contained on the CPS flight test vehicle, hazardous materials and wastes are expected to have negligible to minor impacts on environmental quality in the ROI.

BOA Floating Targets

No hazardous materials are expected to be released for the floating target rafts. The raft would be deployed from a support ship prior to the flight test and would remain on-station for several hours using small electric motors. It is not planned or expected that target rafts would be sunk during flight test activities. All lithium-ion batteries used on the target raft for sensor operation would be recovered unless they were inadvertently damaged beyond the point of safe retrieval/recovery. It is considered unlikely that damage beyond the point of recovery would occur and lithium on the CPS AUR would not exceed reportable quantities. During post-flight activities the rafts would be loaded onto a support ship for transport back to the appropriate port. No release of hazardous material and waste is anticipated from the use of floating target rafts in the BOAs and there would be no impacts to environmental quality.

4.2.1.4 Health and Safety – BOA

Under the Proposed Action for CPS flight tests within the Atlantic and Pacific BOAs, no significant impacts on health and safety would be anticipated. CPS missile launches, and downrange sensor and target area support operations, would take place using existing naval vessels. Vessel operations would only occur when weather and sea conditions were acceptable for safe travel.

Through the application of DoD and Navy health and safety requirements identified in **Appendix B, Section B.8.2.1**, missile test programs are conducted with minimal risk to military personnel, contractors, and the general public. The launches would occur on naval vessels. Applicable safety procedures would be followed to prevent hazard risks to on-board personnel. As described in **Sections 2.1.5** and **3.1.4.2**, NOTAMs and NTMs would be issued for potential hazard areas to ensure the safety of personnel and public on aircraft and vessels.

For the CPS flight tests, range safety representatives for the Navy would closely coordinate development of risk analyses based on the trajectories, probability for system failure, and the population density of any islands near missile flight paths. Should a flight abnormality occur, the Flight Termination System destruct package on the missile or payload would be activated to stop forward thrust and flight. Computer-monitored destruct lines, based on predetermined no-impact lines along flight paths, are preprogrammed to avoid any debris from falling onto inhabited areas consistent with range safety protocols and standard operating procedures. In accordance with Range Commanders Council 321-20 (RCC 2020), Navy Range Safety officials would not allow a flight test to proceed if the calculated risk exceeds a probability of casualty for individuals within the general public that is greater than 1 in 1,000,000 for any single mission. The low potential for a flight failure, combined with the low density of vessels in the open ocean, makes any potential impact from spent booster stages or other missile debris discountable.

All BOA target sites would be outside of EEZs in international waters. For floating target rafts, applicable DoD and Navy safety procedures and regulations would be followed. Following a flight test with impact on a target raft, flight test personnel would assess the condition and safety status of the target raft before conducting necessary cleanup and equipment retrieval. All personnel would wear proper personal protective equipment, as necessary.

4.2.2 Kwajalein Atoll – Proposed Action

4.2.2.1 Air Quality – Kwajalein Atoll

Air Quality

Illeginni Islet. One flight test per year is planned to include payload impact at Illeginni Islet. The payload does not carry propellant and is not anticipated to release emissions at Illeginni. Payload impact would result in fugitive dust at the impact site. No estimates are available for emissions of criteria pollutants associated with fugitive dust created by payload impact on Illeginni Islet. Freshwater application would be used to minimize fugitive dust following impacts. Freshwater application on surfaces helps temporarily compact the soil, suppress dust, and contain/confine potential fugitive dust upon payload impact. Freshwater would not be allowed to flow to the lagoon or ocean and would evaporate in place. Terminal payload impact may volatize minor quantities of some contaminants already present on Illeginni; however, it is anticipated that any emissions associated with impact would be within the UES air quality standards. Therefore, the emissions associated with payload impact (i.e., fugitive dust and any contaminates in the fugitive dust) are anticipated to have a negligible impact on air quality at Illeginni Islet.

KMISS. The payload does not carry propellant and is not anticipated to release emissions at KMISS. Therefore, the emissions, if any, associated with payload impact are anticipated to have a negligible impact on air quality at KMISS.

Climate Change Consideration and Social Cost of Greenhouse Gases

Only the terminal portion of some CPS flight tests, which would involve payload flight and impact, would occur within Kwajalein Atoll. The payload does not carry propellant and would not

release emissions. All propellant in the CPS vehicle would have been consumed in the stratosphere and upper atmosphere (as discussed in **Section 4.2.1.1**), well before payload impacts at USAKA. Therefore, GHG emissions, if any, would be negligible at Kwajalein Atoll. Because there would be no emissions from the CPS payload impact, there is no additional estimated social cost of the Proposed Action beyond the social cost discussed for the BOA in **Section 4.2.1.1**.

No mitigation measures or adaptation strategies have been established for Illeginni Islet or KMISS as it relates to climate change consideration.

4.2.2.2 Cultural Resources – Kwajalein Atoll

No significant impacts are anticipated to occur to archaeological or historic resources at Illeginni Islet. Under the Proposed Action, the current target site on the west end of Illeginni Islet would be used as a target for CPS flight tests. Such flight tests would be in addition to the current impact activities that occur there. Previous archaeological investigations of Illeginni Islet have not found indigenous cultural materials nor evidence of subsurface archaeological deposits. Seven buildings on the islet are eligible for listing in the RMI NRHP under the Cold War Missile Defense historic context and three of those are considered historically significant. All seven buildings are located in the center and east end of the islet, away from the target site.

The west end of the islet has been used as a target site since the 1990s. The types of activities that would occur under the Proposed Action are similar to those analyzed in prior environmental analysis documents (U.S. Air Force 2021, DON 2019). Should previously unidentified cultural features be discovered during implementation of the Proposed Action, the UES (USASMDC 2021) contains procedures for handling such inadvertent discoveries.

4.2.2.3 Biological Resources – Kwajalein Atoll

Environmental consequences of the Proposed Action on biological resources are evaluated based on the best available information about species distributions and in the context of the regulatory setting and criteria presented in **Appendix B, Section B.3**.

The Proposed Action has the potential to impact biological resources in the Kwajalein Atoll ROI through exposure to elevated sound levels, direct contact from payload impact and ejecta, exposure to hazardous materials, and increased human activity and equipment operation. These potential stressors for biological resources in the ROI and the environmental consequences of those stressors on biological resources are described in detail in the Navy CPS Biological Assessment for Kwajalein Atoll Activities (DON and USASMDC 2023) and in **Appendix D**. The following subsections briefly summarize the potential stressors for biological resources in the Kwajalein Atoll ROI and the environmental consequences of those stressors in the environment described in **Section 3.2.3**, but additional analysis details relevant to this section can be found in **Appendix D, Section D.2**.

Over time and through consultation with NMFS and USFWS for RTS test activities at USAKA, several standard avoidance, minimization, and mitigation measures have been developed to

minimize the impacts of flight testing on protected species and their habitats. The measures which would be implemented as part of the Proposed Action at Kwajalein Atoll (listed in **Appendix C, Section C.3.2**) are very similar to those implemented for other recent test programs with payload impacts at Illeginni Islet and KMISS (U.S. Air Force 2021, DON 2019, U.S. Army 2021). **Appendix C, Section C.3.2** summarizes the relevant and important standard operating procedures and mitigation measures to be implemented to minimize the potential effects of the Proposed Action on biological resources.

Elevated Sound Levels

The Proposed Action would result in elevated sound levels in air and in water at Kwajalein Atoll. Sources of elevated sound levels in the ROI would include payload impact on land at Illeginni Islet or the deep ocean waters of KMISS and a sonic boom from payload flight.

The potential effects of elevated sound levels on wildlife, effect thresholds, and analysis methods are discussed in detail in the CPS Biological Assessment (DON and USASMDC 2023) and **Appendix D, Section D.1**.

Proposed flight test noise has limited potential to affect the behavior and hearing sensitivity of wildlife. Some of the louder sounds generated by proposed activities have the potential to physically injure or cause temporary auditory injury in some of the most common and widely distributed marine wildlife, such as common and abundant species of fish. However, given the limited number of tests per year (maximum eight per year terminating at USAKA) and the limited potential of flight test noise to affect wildlife, elevated sound pressures would not change the relative population size or distribution of any wildlife species. For special-status species, no physical injury is expected due to elevated sound levels. Elevated sound levels might cause wildlife to quickly react, briefly altering their normal behavior, but wildlife are expected to return to normal behaviors within minutes of the short duration sounds. No long-term behavioral effects or meaningful health effects are expected. The impacts of elevated flight test noise levels on wildlife, including special-status species would be negligible to moderate.

Direct Contact

Biological resources in the Kwajalein Atoll ROI may be affected by direct contact from test components or impact ejecta. Sources of direct contact risk at USAKA include up to eight payload impacts per year in the deep ocean waters of KMISS and a maximum of one payload impact per year on Illeginni Islet. On Illeginni Islet, biological resources might also be exposed to debris and soil to be ejected from the point of impact or from ground borne shockwaves. Debris and ejecta might cover an area extending 200 to 300 ft from the point of impact and potentially damaging shockwaves might extend out as far as 123 ft from the point of impact.

Deep Offshore Waters. In the KMISS area, the payload would impact in deep ocean waters and direct contact from payload debris is not expected to affect marine wildlife. Based on the low expected densities of special-status marine wildlife in the deep ocean waters near Kwajalein Atoll, direct contact from payload debris is considered very unlikely (DON 2019) and no animals are expected to be struck. While individuals of some more common species of fish and

invertebrates may be contacted by payload fragments, loss of these individuals would not meaningfully change the population size or distribution of these species at Kwajalein Atoll. Direct contact from payload impact or debris would have negligible impacts on marine wildlife in deep waters of the ROI.

Illeginni Islet. Because the land impact site is regularly used for DoD testing and vegetation around the helipad areas is managed, vegetation at the impact site is highly disturbed and unlikely to be negatively impacted by proposed activities. No protected vegetation species occurs within the land impact site. Some bird nesting habitat occurs within the impact site; however, this land impact site has been regularly used for training and testing activities for decades and the habitat continues to be suitable for bird nesting. To prevent birds from nesting on any support equipment after initial setup, the equipment would be appropriately covered with tarps or other materials and "scare" techniques (e.g., scarecrows, mylar ribbons, and/or flags) would be used on or near the equipment. Proposed activities are not expected to destroy or alter beach habitats suitable for sea turtle nesting. Proposed activities would not change the conditions that have shaped baseline habitat conditions at the site. Direct contact would have minor to moderate impacts on terrestrial vegetation and wildlife habitats.

Terrestrial wildlife, such as birds, in and near the payload impact site have the potential to be affected by direct contact within the impact site. Several avoidance and minimization measures would be implemented as part of the Proposed Action to protect birds (see **Appendix C, Section C.3.2**) at Illeginni Islet. With these measures in place and based on the expected number of black-naped terns with the potential to nest in the impact site, the impacts to black-naped terns and other birds from direct contact on Illeginni Islet would be minor to moderate. No sea turtle nesting has been observed on Illeginni Islet in over 25 years. Therefore, sea turtles are unlikely to occur in terrestrial habitats on Illeginni Islet and there would be no impact of direct contact on sea turtles on land or sea turtle nests.

A shoreline payload impact is not planned or expected and is considered unlikely. However, there is a chance that marine wildlife in nearshore reef habitats may be impacted by direct contact from natural debris ejected during crater formation. Based on a worst-case scenario analysis, debris and shock waves produced during a shoreline impact may injure individuals or colonies of UES coordination and consultation species. UES-consultation species which may be injured by debris as adults include six coral species, three mollusk species, and two fish species. These consultation species have all been observed at multiple Kwajalein Atoll islets and except for the coral *Acropora polystoma*, are common throughout Kwajalein Atoll. Several reef-associated fish, coral, and mollusk species listed as coordination species under the UES may also be injured or otherwise adversely affected during a shoreline impact. All of these species are present on islets throughout Kwajalein Atoll as well (**Table 3.2.3-3**). The entire reef area with the potential for direct contact effects is small in comparison to the total comparable reef area surrounding and connected to Illeginni Islet and is considered extremely small compared to the comparable reef areas in the USAKA area and in Kwajalein Atoll (DON 2019). CPS activities would not result in appreciable reduction of any population or species at Illeginni

Islet or Kwajalein Atoll and direct contact would have negligible to moderate impacts on marine wildlife in nearshore waters at Illeginni Islet.

Hazardous Materials

Biological resources in the ROI may be affected by exposure to hazardous materials entering terrestrial and marine habitats. Sources of potential exposure include materials of which the CPS payload is composed or are contained within the payload (see **Table 2.1.1-2**) and material used during operation of support vessels and equipment.

Mitigation measures and standard operating procedures would be employed to reduce potential impacts from hazardous materials as summarized in **Appendix C, Section C.3.2**. While every attempt would be made to clean up all visible metal and other fragments, it is possible and likely that some fragments would be too small to be recovered and a small amount of these heavy metals or other substances may remain in the terrestrial or marine environments at Illeginni Islet. Only trace amounts of hazardous materials are expected to remain in terrestrial areas.

Hazardous materials are not likely to adversely impact terrestrial or marine biological resources. Any hazardous material introduced into the land impact site is not expected to have a discernable or measurable impact on wildlife or vegetation because measures would be in place to clean up debris and contain any accidental spills or discharges from equipment. While some concern has been raised about the environmental effects due to the deposition and dissolution of tungsten from test activities at Illeginni Islet, no significant impacts are expected (see DON and USASMDC 2023 for a detailed description and analysis of the potential consequences of tungsten). In deep offshore waters, hazardous materials would be quickly diluted by ocean waters and debris fragments are expected to sink to the ocean bottom. Marine vertebrates, including special-status species, are unlikely to encounter chemicals at harmful concentrations. Overall, the impact of hazardous materials on biological resources at Kwajalein Atoll would be minor to negligible.

Human Activity and Equipment Operation

The Proposed Action would involve human activity and equipment operation on Illeginni Islet and other Kwajalein Atoll locations for up to 8 weeks for each flight test. Human activity and equipment operation would include aircraft and vessel operations to transport equipment and personnel; operation of self-stationing rafts in ocean and lagoon waters; personnel on Illeginni Islet to place test support equipment and for clean-up operations; and heavy equipment and truck operation to transport equipment, excavate the crater, screen debris, and backfill the crater with substrate ejected from the crater.

Vessel traffic would likely include several vessel round-trips to and from the impact sites to position the self-stationing sensor rafts and to clean up floating debris post-test. Given the low densities of rare or special status marine wildlife in the ROI, the chances of an animal being impacted by human disturbance or being struck by a vessel are very low. No anchoring would occur in nearshore habitats and all equipment and personnel arriving via vessel would load and offload at Illeginni Harbor. No debris recovery or other cleanup activities are expected to be

required in shallow nearshore waters. Impacts to marine wildlife from human disturbance or vessel operation would be negligible to minor.

Birds in and near the payload impact site on Illeginni Islet may be disturbed by human activity and equipment operation. However, measures would be in place to reduce the potential for impacts to nesting birds. Some birds may leave the area during the period of human activity and equipment operation, but no physical injury or nest abandonment is expected. Hauled-out or nesting sea turtles are unlikely to occur on Illeginni Islet and no proposed activities would occur in beach habitats. The impacts of human activity and equipment operation on terrestrial wildlife would be negligible to minor.

Consequences for Special Status Wildlife

UES Coordination and Consultation Species. The Navy has evaluated the potential effects of the Proposed Action on UES listed species and coordination habitats. The Navy has concluded that proposed activities at USAKA may affect coordination species and habitats but that those activities would not have significant effects on those resources. The Navy has completed its review of potential effects of the Proposed Action on coordination resources (pursuant to Section 3-4.6.3[a] of the UES) in this section and in **Appendix D, Section D.2** and has submitted this EA/OEA to the UES Appropriate Agencies as a preliminary review in compliance with Section 3-4.6.3(b) of the UES (USASMDC 2021).

The Navy has also concluded that the Proposed Action may affect but is not likely to adversely affect UES consultation cetaceans, sea turtles, and several fish, coral, and mollusk species; but that the Action may affect and is likely to adversely affect six UES consultation coral, three mollusk, and two fish species. The Navy has prepared a Biological Assessment (DON and USASMDC 2023) to support consultation with NMFS and USFWS as required under Section 3-4.5.3 of the UES (USASMDC 2021) and initiated consultation on December 8, 2023 (see communications in **Appendix E**).

Consequences for Environmentally Sensitive Habitats

UES Coordination Habitats. The Navy has evaluated the potential effects of the Proposed Action on UES listed species and coordination habitats. The Navy has concluded that proposed activities at USAKA may affect coordination habitats at Illeginni Islet including bird nesting habitat and nearshore marine habitats but that those activities would not have significant effects on those habitats. While temporary disturbance of some habitats may occur, DoD testing has been occurring on Illeginni Islet for decades and CPS testing would not alter tempo of that testing or the baseline condition of coordination habitats in the ROI. The Navy has completed its review of potential effects of the Proposed Action on coordination resources (pursuant to Section 3-4.6.3[a] of the UES) in this section and in **Appendix D, Section D.2** and has submitted this EA/OEA to the UES Appropriate Agencies as a preliminary review in compliance with Section 3-4.6.3(b) of the UES (USASMDC 2021).

4.2.2.4 Geology and Soils – Kwajalein Atoll

Navy CPS C-HGBs would impact the western side of Illeginni Islet and in the deep ocean waters of KMISS. This type of testing at Illeginni Islet has been previously analyzed in several environmental documents (U.S. Air Force 2004, U.S. Air Force 2010, U.S. Air Force 2021, USASMDC 2011, DON 2019). Impact within Illeginni Islet's forested area or in the adjacent reef and shallow waters would be unintentional and is unlikely to occur. The payload impact would be comparable to those in the Minuteman III tests and the Navy's Flight Experiment-2 test, which are used as bounding cases (U.S. Air Force 2004, DON 2019, RGNext 2020). For some CPS flight tests, a mass simulator may be utilized. The Navy anticipates approximately one land impact per year could occur at Illeginni Islet throughout the flight test program's 10-year period.

Based on Flight Experiment-2 post-flight test and Minuteman III reentry vehicle ejecta estimates at Illeginni Islet, CPS C-HGB impact crater ejecta would be expected to cover a semicircular area (approximately 120 degrees) extending up to 300 ft from the point of impact, with the density of ejecta decreasing with distance from the point of impact (RGNext 2020, U.S. Air Force 2021, U.S. Air Force 2004). Craters from Minuteman III reentry vehicles and Navy Flight Experiment flight tests have been documented to be 20 to 30 ft in diameter and 7 to 10 ft deep (U.S. Air Force 2004, RGNext 2020). During impact, the CPS payload particles could partially disintegrate into fugitive dust around the impact site and a short distance downwind. Based on the expected composition of the structure of the C-HGB (aluminum, steel, titanium, magnesium and other alloys, copper, fiberglass, chromate coated hardware, tungsten, plastic, Teflon, quartz, silicone) and if all payload particles were deposited into the top 1 inch of soil on Illeginni Islet, then the expected concentration of toxic heavy metals would be very low and below UES compliance goals.

The quantities of tungsten in the CPS vehicle would not exceed 1,000 pounds. The most stringent screening criteria is used for tungsten as the UES does not specify a Regional Screening Level (**Table 3.2.4-1**).

Based on historical soil testing results from Illeginni Islet (**Table 3.2.4-1**) observed soil concentrations of tungsten, beryllium, and depleted uranium on Illeginni Islet from prior impact tests do not exceed the UES Compliance Goals, and therefore do not require assessing the need for a soil cleanup operation (RGNext 2020, U.S. Air Force 2020a, U.S. Air Force 2021). Comprehensive soil analyses have shown that the concentrations of beryllium and uranium on Illeginni Islet are at the natural background concentrations found in soils on other coral atolls in the northern Marshall Islands and at other global locations, and additional missile tests would not cause redistribution of the pre-existing contaminants on the islet (RGNext 2020, Robison et al. 2005, Robison et al. 2006, Robison et al. 2010, Robison et al. 2013).

At Illeginni, no CPS post-flight test assessment or cleanup activities would occur until: (1) unexploded ordnance personnel from USAG-KA inspect the impact area, and (2) trained personnel stabilize any fugitive dust and disturbed soil by wetting/washing the site. Personnel working in the impact area would wear proper personal protective equipment, as necessary.

Once the site is cleared for safe entry, test support personnel would conduct an impact assessment of the site, and initiate cleanup and recovery operations.

Although unlikely due to the high speed of impact, any debris from the C-HGB impact on land would be recovered. Post-test recovery operations on Illeginni Islet would require the manual cleanup and removal of any visible C-HGB debris, including hazardous materials. Excavated material would be screened, and the collected C-HGB debris washed before packaging for shipment back to Kwajalein Islet and the United States for appropriate disposal. In addition, soil samples taken from Illeginni Islet would be tested to ensure that concentrations of tungsten, beryllium, and uranium (as a surrogate for depleted uranium) do not exceed established UES standards (USASMDC 2021, U.S. Air Force 2021). The crater formed by the C-HGB impacts would be backfilled using a backhoe/loader and repairs would be made to any structures on the islet, as necessary. Both test personnel and USAG-KA personnel normally would be involved in these operations.

Although unlikely due to the record of historical impact locations, if a test vehicle were to strike the shallow waters or reef flats adjacent to the proposed impact site at Illeginni, recovery/cleanup operations within 1,000 ft of the Illeginni shoreline would be conducted similarly to land operations when tide and water depth permit doing so (U.S. Air Force 2021). A backhoe would be used to excavate the crater, excavated material would be screened for debris, and the crater would be back-filled with coral and sediment ejected around the rim of the crater (U.S. Air Force 2021). The chemical and structural form of the depleted uranium and beryllium is such that they are insoluble in soil. Thus, they are not toxic to plant life on the island (no soil to plant uptake). As a result of the lack of uptake of beryllium and uranium by plants on Illeginni, there is no exposure to humans from the ingestion pathway from consumption of coconuts, Pandanus fruit, or other food crops (Robinson et al. 2005). While some studies have concluded that residual tungsten may dissolve and move through soil or groundwater, the potential effects of residual tungsten on biotic communities is largely unknown (DON 2019). Under certain environmental conditions, tungsten may dissolve and some forms of tungsten (depending on soil conditions) can move through soil (Dermatas et al. 2004). In the presence of alloying elements such as iron, nickel, and cobalt, tungsten was sorbed to clay soils and mobility was decreased; however, this sorption also depends on soil conditions such as pH and mineral and organic composition (Dermatas et al. 2004). Soils on Illeginni Islet are primarily well-drained and composed of calcareous sand poor in organic materials with a few carbonate fragments; therefore, residual tungsten is likely to mobilize into groundwater, as evidenced by the historical soil and groundwater testing results.

At KMISS, any C-HGB floating debris would be recovered and disposed of appropriately per the UES. The KMISS impact site is thousands of feet deep. Regardless of whether the C-HGB payload would remain intact or break apart upon impact, the payload would be expected to sink to the bottom and remain undisturbed. There would be a temporary increase in turbidity from the debris reaching the substrate, but the effects would be short-lived. No site recovery at KMISS would be required or necessary.

Due to the historical soil sampling results for beryllium, tungsten, and uranium being less than the UES compliance goals; due to the planned recovery/cleanup operations for the Illeginni Islet planned impact site; due to the short-term impacts of increased turbidity at KMISS; and due to the future land use of Illeginni and KMISS as impact ranges; the impacts from the Proposed Action would reasonably be expected to be adverse short-term minor impacts.

4.2.2.5 Water Resources – Kwajalein Atoll

This section describes the environmental consequences of the proposed deep ocean impact site at KMISS as well as the Proposed Action at Illeginni Islet.

Deep Offshore Waters

There are no groundwater or surface water resources within KMISS or surrounding waters that would be significantly impacted by the proposed CPS weapon system flight tests. Disturbance to ocean waters would be limited to the individual payload sinking thousands of feet to the ocean floor. No impacts would occur to water resources within KMISS from the CPS flight test.

Turbidity may be temporarily increased at the impact site. Some payload debris, including the heavy metals and other materials of which the payload is constructed, may be released into the ocean area. NASA conducted a thorough study of the seawater quality effects of missile components deposited in ocean waters in 1998 (DON 2017a). In 1998 NASA concluded that the release of hazardous materials from missiles into seawater would not be significant. The materials would be rapidly diluted and, except in the immediate vicinity of the debris, would not be found at concentrations that produce adverse effects. The payload materials are insoluble, and the depth of the Pacific Ocean is thousands of feet where light does not penetrate, levels of oxygen that might interact with materials at the surface are too low for that to occur, and water temperature differences from the upper water layers hamper any mixing between them. Any area on the ocean bottom affected by the slow dissolution of the payload debris would be relatively small, due to the size of the payload debris pieces as compared to the volume of surrounding seawater. Therefore, adverse water quality effects from the payload are expected to be minimal to insignificant. There are no plans to monitor deep water impacts in the KMISS area, where no mixing with upper layers of water occurs. Vessel operations would not involve intentional discharges of fuel, toxic wastes, or plastics or other solid wastes that could harm marine life. (USAG-KA 2022)

Illeginni Islet

The affected area for water resources is the same as described in **Section 4.2.2.4**, Geology and Soils. Illeginni Islet has no surface water; groundwater is very limited in quantity and is brackish and non-potable. Freshwater used to minimize fugitive dust following impact would not be allowed to flow to the lagoon or ocean and would evaporate in place. In the unlikely event of an accidental release of a hazardous material or petroleum product at the impact site, emergency response personnel would comply with the UES Kwajalein Environmental Emergency Plan. Historical groundwater sampling at Illeginni Islet has showed little variation in values, with beryllium remaining undetected, tungsten exceeding residential tap water screening levels

(Table 3.2.5-1), and uranium well below the USEPA maximum contaminant level for drinking water. Tungsten is one of the C-HGB structural materials for proposed flight tests.

After each flight test, any visible debris from the C-HGB impact on land would be recovered to the extent practicable. Post-test recovery operations on Illeginni Islet would require the manual cleanup and removal of any visible C-HGB debris, including hazardous materials. Excavated material would be screened, and the collected C-HGB debris washed before packaging for shipment back to Kwajalein Islet and the United States for appropriate disposal. When possible groundwater samples would be tested for concentrations of tungsten, beryllium, and uranium (as a surrogate for depleted uranium; USASMDC 2021, U.S. Air Force 2021). Both test personnel and USAG-KA personnel normally would be involved in these operations.

NASA conducted a thorough study of the seawater quality effects of missile components deposited in ocean waters and concluded that the release of hazardous materials from missiles into seawater would not be significant (U.S. Air Force 2021). The materials would be rapidly diluted and, except in the immediate vicinity of the debris, would not be found at concentrations that produce adverse effects (U.S. Air Force 2021).

The annual rainfall of approximately 100 inches would also contribute to dilution of any chemicals from the payload at the surface that may leach into the groundwater. Groundwater at Illeginni is currently considered non-potable and no impacts to water resources would be expected. Due to insolubility of beryllium and uranium there is no uptake of either element by vegetation, marine biota including fish, mollusks, shellfish, and sea mammals. If either material were even slightly soluble in sea water the soluble ions would rapidly mix with the world's oceans and be indistinguishable from the natural concentration (Robinson et al. 2005). See **Section 4.2.2.5** for a description of potential effects of tungsten on groundwater at Illeginni. Due to the planned recovery/cleanup operations for the Illeginni Islet planned impact site, the future land use of Illeginni and KMISS as impact ranges, and the short-term impacts of increased turbidity at KMISS, the impacts from the Proposed Action would reasonably be expected to be adverse short-term minor impacts.

4.2.2.6 Hazardous Materials and Waste Management – Kwajalein Atoll

Under the Proposed Action with CPS flight tests conducted at USAKA, no significant impacts on hazardous materials and waste management are expected at either KMISS or Illeginni Islet.

Other than the use of fuels and lubricants for operating transportation and other support equipment, there would be limited use of hazardous materials at USAKA in support of the CPS flight tests, whether the tests are conducted at KMISS or at Illeginni Islet. Hazardous waste must be disposed (shipped) off the island. The UES requires preparation and implementation of a contingency plan (the Kwajalein Environmental Emergency Plan), for responding to releases of oil, hazardous material, pollutants, and contaminants to the environment. Any accidental spills from support equipment operations would be contained and cleaned up in accordance with the Kwajalein Environmental Emergency Plan (USASMDC 2021). The use of lead-acid, lithium, or other batteries for support equipment would be temporary. Additionally, vessel

operations would not involve intentional discharges of fuel or other wastes that could harm marine life.

A maximum of eight CPS payload (C-HGB) impacts could be scheduled each year for testing at KMISS. No hazardous material or waste issues would be associated with testing at KMISS, as all payload materials are expected to sink to the ocean floor with little potential for impact on marine life. Any visible floating debris observed after testing would be recovered after each flight test.

At Illeginni Islet, approximately one CPS payload impact per year may occur throughout the CPS flight test program's 10-year period. All flight tests would target the west end of the islet that includes the helipad (**Figure 2.1.4-3**). C-HGB impacts on other parts of the islet, in the adjacent reef, or in shallow waters are unlikely and would be unintentional. Similar missile impact testing at the islet has been previously analyzed in several environmental documents (U.S. Air Force 2004, U.S. Air Force 2010, U.S. Air Force 2021, USASMDC 2011, DON 2019). The payload impact would be comparable to those analyzed for Minuteman III and Flight Experiment-2 flight tests, which are used as bounding cases (RGNext 2020, U.S. Air Force 2004, DON 2019). Based on prior Minuteman III reentry vehicle and Flight Experiment-2 payload impacts, the C-HGB impact would form a crater approximately 20 to 30 ft in diameter and 7 to 10 ft deep (U.S. Air Force 2004, RGNext 2020).

Prior to post-test recovery and cleanup actions on Illeginni Islet, unexploded ordnance personnel would first survey the impact site. If necessary, materials would be collected for safe disposal. As described in **Section 4.2.2.4**, test support personnel entering the impact site would also implement precautionary procedures to control fugitive dust by wetting or washing down the impact area using freshwater. Any visible C-HGB debris found would be collected as much as practicable, including hazardous materials. Loose soil material excavated at the crater would be screened, and the collected C-HGB debris washed before packaging for shipment back to Kwajalein Island and the United States for study and appropriate disposal. Following removal of all support equipment and any remaining debris from the impact site, the crater would be backfilled and, if necessary, repairs made to any damaged structures.

Although unlikely, if a CPS payload were to strike the shallow waters or reef flats within 500 to 1,000 ft of the islet shoreline, recovery and cleanup operations would be conducted similarly to land operations when tide and water depths permit. A backhoe would be used to excavate the crater. Excavated material would be screened for payload debris, and the crater backfilled with coral and sediment ejected around the crater rim. Should the payload inadvertently impact in deeper waters on the ocean side of the islet or in the atoll lagoon, a dive team from USAG-KA would be brought in to conduct underwater search and recovery operations.

The C-HGB composition is primarily aluminum, steel, titanium, magnesium and other alloys, copper, fiberglass, chromate coated hardware, tungsten, plastic, Teflon, quartz, silicone, and batteries (**Table 2.1.1-2**). For proposed testing at Illeginni Islet, the C-HGB would include either a conventional payload or a non-explosive mass simulator, and would include small pyrotechnic devices. The C-HGB, however, would not contain any propellants, beryllium, depleted uranium,

or radioactive materials. For those heavy metals which may be contained in the C-HGB, the greatest quantity would likely be tungsten. For analysis purposes in this EA/OEA, it is assumed that up to 1,000 pounds of tungsten may be contained in the C-HGB. While the exact amount of tungsten that would be in the C-HGB cannot be presented in this EA/OEA, these analyses use this maximum amount to assess potential impacts, an approach similar to other recent DoD flight tests such as the Navy's Flight Experiment-2 (DON 2019).

At impact, the C-HGB would disintegrate into small fragments and fugitive dust. From the crater formed, ejected materials could be scattered up to 300 ft away. As described in **Section 3.2.6.2**, the soil in the Illeginni Islet target area that would be ejected may contain residual concentrations of beryllium, tungsten, and depleted uranium from prior intercontinental ballistic missiles and other missile flight tests (U.S. Air Force 2004, U.S. Air Force 2021, DON 2019). At USAKA, the compliance standards for heavy metals and other hazardous materials are set by the UES (USASMDC 2021). According to UES Section 3-6.5.4(c)(5), for beryllium, USAG-KA will use an initial USEPA Regional Screening Level of 160 mg/kg for assessing the need for any cleanup. For depleted uranium, USAG-KA will use a derived screening level for insoluble uranium salts of 47 mg/kg for assessing the need for any cleanup. The UES does not specify a compliance standard for tungsten in soil. Therefore, per UES guidance, the USEPA Region IX Regional Screening Levels of 63 mg/kg for residential areas and 930 mg/kg for industrial areas are used. The regulatory limits and Illeginni Islet historical sampling results for beryllium, tungsten, and depleted uranium are summarized in **Table 3.2.4-1.**

Because the C-HGB would not contain any beryllium or depleted uranium, and because the observed soil concentrations of beryllium and depleted uranium from prior impact tests do not exceed the UES compliance standards, there is no need for soil cleanup operations at Illeginni Islet for those particular contaminants (RGNext 2020, U.S. Air Force 2020a, U.S. Air Force 2021). Comprehensive soil analyses have shown that concentrations of beryllium and uranium on Illeginni Islet are at the natural background concentrations found in soils on other coral atolls in the northern Marshall Islands and at other global locations (RGNext 2020, Robison et al. 2005, Robison et al. 2006, Robison et al. 2010, Robison et al. 2013).

It is assumed the C-HGB may contain up to 1,000 pounds of tungsten. Although tungsten was not detected in the most recent soil sample results (RGNext 2020) following other missile impact tests, soil sampling is recommended as a precaution following the first CPS flight test impact at Illeginni Islet. Depending on the sampling results would determine whether soil remediation efforts or further sampling for later flight testing is needed. With the reasonably foreseeable land use at Illeginni Islet as an active range and with the groundwater being not potable, further risk-based analysis and remediation planning is not required at this time. If in the future the land use designation changes, Illeginni Islet would be evaluated under the UES restoration requirements to determine if the new land use requires institutional controls or remediation. Therefore, impacts from implementation of the Proposed Action would be minor.

4.2.2.7 Environmental Justice – Kwajalein Atoll

Under the Proposed Action with CPS flight tests conducted at USAKA, no significant impacts on environmental justice are expected at either KMISS or Illeginni Islet. CPS activities at Kwajalein Atoll would be subject to requirements of the UES including project reviews by UES Appropriate Agencies and consultations where required. Any actions that have the potential to adversely affect environmental justice resources would require a Document of Environmental Protection, which would limit the potential for adverse impacts to environmental justice due to ongoing and future actions at Kwajalein Atoll. At Kwajalein Atoll, personnel conducting the CPS flight tests would reside only temporarily at USAG-KA. There are no permanent residents at Illeginni Islet.

The Navy has identified no human health, environmental, or other effects of the Proposed Action that would result in disproportionate or adverse effects on minority or low income-populations in the areas evaluated. Proposed activities would be conducted in a manner that would not exclude persons from participating, deny persons potential benefits, or subject persons to discrimination because of their race, color, national origin, or socioeconomic status. The Navy is providing opportunities for all members of the public to participate in the decision-making process and will fully consider public input provided as part of this process.

The Proposed Action may result in introduction of potentially hazardous materials into terrestrial and marine habitats as described in **Sections 4.2.2.4**, **4.2.2.5**, and **4.2.2.6**. Heavy metals have the potential to accumulate in sediments and benthic invertebrates and even fish have the potential to accumulate heavy metals (França et al. 2005). The potential for accumulation is metal specific and species specific, dependent on the feeding strategy of the wildlife, and in some cases on metal concentrations (Chen et al. 2016). It is not expected that proposed testing would result in hazardous material concentrations in the marine environment that would result in accumulation of these chemicals in wildlife, such as mollusks or fish, or that would significantly impact marine wildlife or human health. While the potential exists for hazardous materials resulting from flight tests to contaminate fish and impact subsistence fisheries, analyses in **Section 4.2.2.6** (Hazardous Materials and Waste Management) and **Section 4.2.2.3** (Biological Resources) indicate that hazardous materials and wastes would have negligible to minor impacts on the marine environment and fisheries species. While any additional contamination of fisheries resources could cause adverse effects on minority or low-income populations, proposed activities would have negligible (undetectable) adverse impacts on the environmental justice concern of subsistence fishing or related human health.

4.2.2.8 Health and Safety – Kwajalein Atoll

Under the Proposed Action for CPS flight tests at KMISS and at Illeginni Islet, no significant impacts on health and safety would be anticipated. As previously described, KMISS is a deep-water range just east of USAKA and Illeginni Islet is an uninhabited islet in the atoll. Both target areas fall within the RTS Mid-Atoll Corridor (**Figure 2.1.4-2**). The flight tests at USAKA would not introduce new types of activities or increase levels of risk to personnel or the public.

Through the application of DoD and Army health and safety requirements identified in **Appendix B, Section B.8.2**, missile test programs are conducted with minimal risk to military personnel, contractors, and the general public. For the CPS flight tests, range safety representatives for the Navy and RTS would closely coordinate development of risk analyses based on the trajectories, probability for system failure, and the population density of any islands near missile flight paths. Should a flight abnormality occur, the Flight Termination System destruct package on the missile or payload would be activated to stop forward thrust and flight. Computer-monitored destruct lines, based on predetermined no-impact lines along flight paths, are preprogrammed to avoid any debris from falling onto inhabited areas consistent with range safety protocols and standard operating procedures. The RTS Range Safety Office would not allow a flight test to proceed if the calculated risk exceeds the Range Commanders Council 321-20 criteria, which requires that individuals within the general public not be exposed to a probability of casualty greater than 1 in 1,000,000 for any single mission (RCC 2020).

CPS missile flight paths towards USAKA would avoid overflight of RMI communities. Precautions within the Mid-Atoll Corridor impact area at USAKA may include evacuating nonessential personnel and sheltering all other personnel remaining within the corridor. As described in **Sections 2.1.5** and **3.2.8.2**, NTMs and NOTAMs would be issued prior to flight tests to warn mariners and pilots to avoid the selected impact area. Only mission-essential vessels would be allowed in the vicinity of the impact area. Radar sweeps by RTS land-based sensors and Navy sea-based sensors, and visual sweeps, would help to ensure that the impact area is clear of non-mission ships and aircraft prior to testing.

Following each flight test impact at Illeginni Islet, unexploded ordnance personnel would first clear the impact site for safe access. Test support personnel entering the impact site would wear proper personal protective equipment, as necessary. In addition, personnel would implement precautionary procedures to control fugitive dust by wetting or washing down the impact site.

4.3 Cumulative Effects

Cumulative effects analysis is an essential component of NEPA analysis, as it allows agencies and the public to understand how the incremental effects of a proposed action may contribute to cumulative environmental problems such as air pollution, water pollution, climate change, and biodiversity loss (86 FR 55757 [October 7, 2021]). This section (1) describes past, present, and reasonably foreseeable future actions relevant to cumulative effects; (2) analyzes the incremental environmental effects the Proposed Action may have in combination with other actions; and (3) evaluates cumulative effects potentially resulting from these interactions. A definition of cumulative effects, the regulatory setting for the cumulative effects analysis, and the scope of the cumulative effect analysis are detailed in **Appendix B, Section B.9**.

4.3.1 Past, Present, and Reasonably Foreseeable Actions

Past, present, and reasonably foreseeable future actions that have potential to interact with the Proposed Action in the affected environments of the Atlantic BOA, Pacific BOA, and Kwajalein Atoll are summarized in **Table 4.3.1-1**. Given the large geographic extent of proposed activities, several global routine and ongoing human activities also have the potential to interact with the Proposed Action such as commercial, recreational, and subsistence fishing; aquaculture; academic research; coastal land development and tourism; and commercial, recreational, and government vessel activity. These global routine human activities have cumulatively contributed to global trends that have the potential to interact with Proposed Action including climate change, increased noise, accumulated marine debris, and pollution.

Past actions in the geographic extent of the cumulative effects analysis have shaped the current environmental conditions in the affected environment as described in **Chapter 3.0**. While these past actions have shaped the existing conditions in the affected environment, these activities still have the potential to have additive or interactive effects when considered with the Proposed Action and are considered in the cumulative effects analysis.

4.3.2 Cumulative Effects Analysis

For the resource areas evaluated in detail in this EA/OEA, this section evaluates the potential for cumulative effects resulting from the Proposed Action in combination with other past, present, and reasonably foreseeable future actions. For most resources included in these analyses, quantifiable data are not available to evaluate the potential for cumulative effects, and a qualitative analysis approach was undertaken. In addition, for actions where an analysis of potential environmental effects for future actions has not been completed, assumptions were made regarding cumulative effects related to this EA/OEA where possible. The analytical methodology presented in **Appendix B, Section B.9** was used to determine cumulative effects.

Analyses in **Section 4.2** do not reveal any potentially significant environmental impacts of the Proposed Action when considered alone. While some of the past, present, and future actions considered (see **Section 4.3.1**) have had or would have significant environmental impacts, no substantial interactive or additive factors have been identified which would indicate that the Proposed Action would meaningfully contribute to cumulative effects when considered with these actions. Overall, the Proposed Action when considered with other actions would not result in significant cumulative effects.

Table 4.3.1-1. Past, Present, and Reasonably Foreseeable Actions Considered in Cumulative Effects Evaluation

Action	Proponent	Location	Timeframe	Description
Atlantic Fleet Training and Testing	Navy	Atlantic BOA	Past, Present, and Future	Military readiness training and testing activities in the Atlantic Fleet Training and Testing study area located along the east coast of North America and in the Atlantic Ocean. Includes training and testing activities at Navy pier-side locations, within port transit channels, near select civilian ports, and in bays, harbors, and waterways. These training and testing activities have been conducted by the Navy in the Atlantic BOA for decades and will continue in a similar manner into the foreseeable future. Activities include training with aircraft, vessels, and weapon systems, and the use of active sonar and explosives. (DON 2018a, DON 2009a, DON 2009b)
Hawaii-Southern California Training and Testing	Navy	Pacific BOA	Past, Present, and Future	Military readiness training and testing activities in the Hawaii-Southern California Training and Testing study area in the central and eastern North Pacific. These training and testing activities have occurred in the Pacific BOA for decades and will continue in a similar manner into the foreseeable future. Activities include aircraft and vessel operations, missile and munitions testing, and use of active sonar and explosives. (DON 2018b)
Northwest Training and Testing	Navy	Pacific BOA	Past, Present, and Future	Training and testing activities in the Northwest Training and Testing study area off the west coast of the United States, including offshore waters of the Pacific Ocean. Training and testing activities have occurred in this area for decades and will continue in a similar manner into the foreseeable future for the purpose of military readiness. Activities in the offshore area include aircraft and vessel operation, use of ordnance and munitions, and the use of sonar and explosives. (DON 2020b, DON 2015b)
Mariana Islands Training and Testing	Navy	Pacific BOA	Past, Present, and Future	Ongoing and future training and testing activities conducted at sea in the Mariana Islands Training and Testing study area to ensure military readiness. Activities include air, amphibious, anti-submarine, electronic, expeditionary, mine, strike, and surface warfare training and testing. Activities involve the use or operation of vessels, aircraft, munitions, sonar, and explosives. (DON 2020a, DON 2015a)
Point Mugu Sea Range Training and Testing	Navy	Pacific BOA	Past, Present, and Future	Continuing military readiness activities at Point Mugu Sea Range in a manner similar to the training and testing the Navy has conducted there for decades. Activities at the fully instrumented Sea Range include a wide range of weapon systems research, testing, and evaluation activities, including hypersonic vehicle test programs, as well as fleet training and testing. (DON 2022a, DON 2002)
Wallops Flight Facility Operations	NASA	Atlantic BOA	Past, Present, and Future	As part of site-wide operations at Wallops Flight Facility, activities include booster and payload splashdown and recovery in the Atlantic BOA as part of orbital and suborbital rocket operations. (NASA 2018, NASA 2009)

Action	Proponent	Location	Timeframe	Description
Launch of NASA Routine Payloads	NASA	Atlantic BOA Pacific BOA Kwajalein Atoll	Past, Present, and Future	Launch of NASA routine payloads with expendable launch vehicles from launch facilities in Florida, California, Virginia, Alaska, and Kwajalein Atoll with flight and potential component splashdown in the Atlantic and Pacific Oceans. (NASA 2011)
SpaceX Falcon Launches	SpaceX and FAA	Atlantic BOA Pacific BOA	Past, Present, and Future	Launch and reentry of SpaceX vehicles from Florida and waterborne landing and recovery operations in the Atlantic and Pacific Oceans. (FAA 2020, FAA 2019)
Minuteman III Flight Testing	U.S. Air Force	Pacific BOA Kwajalein Atoll	Past, Present, and Future (through 2030)	Minuteman III intercontinental ballistic missile flight testing from Vandenberg Space Force Base, California to locations in the Pacific BOA and at Kwajalein Atoll. Past testing included reentry vehicle land impacts at Illeginni Islet. Current and future testing involves only deep-water terminal impact sites at Kwajalein Atoll and in the Pacific BOA. Involves booster splashdown and vessel activity in the Pacific BOA. (U.S. Air Force 2020a, U.S. Air Force 2013, U.S. Air Force 2004)
Missile Defense Systems Flight Tests	Missile Defense Agency	Pacific BOA	Past, Present, and Future (through 2027)	Ongoing intercept flight tests of missile defense systems in the Pacific including in the Gulf of Alaska. Activities in the Pacific BOA involve vessel operation, target and interceptor flight, and splashdown of intercept debris in the ocean. (MDA 2021)
Joint Flight Campaign	Navy and U.S. Army	Atlantic BOA Pacific BOA	Present and Future (through 2032)	Experimental flight tests for hypersonic weapons conducted from up land-based launch sites in Hawaii, Virginia, California, and Florida with payload impact in the Pacific and Atlantic Oceans. Atlantic BOA activities include booster splashdown, payload impact, and vessel activity. (DON and U.S. Army 2022)
Sentinel Flight Testing	U.S. Air Force	Pacific BOA Kwajalein Atoll	Future (2024-2030)	Implementation of the Sentinel Program (previously known as the Ground Based Strategic Deterrent Program), which is meant to replace the aging Minuteman III system, would require flight testing of the missile system. The test program would involve launches from Vandenberg Space Force Base; flight over, booster splashdown in, and reentry vehicle impact in the Pacific Ocean; and reentry vehicle impact at land or deep-water locations in Kwajalein Atoll. Up to nine flight tests per year would be conducted with a portion of these terminating at Kwajalein Atoll, including up to three total land impacts at Illeginni Islet. (U.S. Air Force 2021)
U.S. Space Force – Space Systems Command Flight Tests	U.S. Space Force	Pacific BOA	Present and Future	Two flight test demonstrations from Wake Island to a deep-water RTS site near Gagan Islet, Kwajalein Atoll. (USSF 2022)
KMISS Refurbishment	U.S. Army	Kwajalein Atoll (KMISS)	Past	Installation and maintenance of new cables and hydrophone sensors in the KMISS range at Kwajalein Atoll. (USASMDC 2014a)

Action	Proponent	Location	Timeframe	Description
Advanced Hypersonic Weapon System Flight Testing	U.S. Army	Pacific BOA Kwajalein Atoll	Past	DoD testing of advanced hypersonic weapons for conventional prompt strike capabilities. Activities include splashdown of three vehicle stages in the Pacific BOA as well as payload impact on land at Illeginni Islet or in the deep ocean waters of Kwajalein Atoll. (USASMDC 2014b, USASMDC 2011)
Flight Experiment 1 and Flight Experiment 2	Navy	Pacific BOA Kwajalein Atoll	Past	Launch of a developmental payload from a land-based launch site at Kauai Test Facility at Pacific Missile Range Facility, Hawaii with payload impact at Illeginni Islet or deep-water impact zones within Kwajalein Atoll in the RMI. Activities in the Pacific BOA included vehicle overflight, booster splashdown, and vessel activity. (DON 2019, DON 2017a)
Air-Launched Rapid Response Weapon Flight Testing	U.S. Air Force	Pacific BOA Kwajalein Atoll (Illeginni Islet)	Past	Flight testing of a developmental air-launched weapon system with flight and booster splashdown in the Pacific BOA and payload impact at Illeginni Islet at Kwajalein Atoll. (U.S. Air Force 2020c)
Hypersonic Flight Test 3	U.S. Army	Pacific BOA Kwajalein Atoll	Past	Flight test of a launch vehicle and payload system launched from Kodiak Island, Alaska with flight and booster splashdown in the Pacific BOA and payload impact at deep-water or Illeginni Islet land impact sites at Kwajalein Atoll. (U.S. Army 2021)

Acronyms and Abbreviations: BOA = Broad Ocean Area, DoD = Department of Defense, FAA = Federal Aviation Administration, KMISS = Kwajalein Missile Impact Scoring System, NASA = National Aeronautics and Space Administration, RMI = Republic of the Marshall Islands, RTS = Ronald Reagan Ballistic Missile Defense Test Site, U.S. = United States

4.3.2.1 Broad Ocean Areas – Cumulative Effects

The Proposed Action has the potential to contribute incremental effects on the ocean ecosystem, which is already experiencing and absorbing a multitude of stressors to a variety of receptors. The aggregate impacts of past, present, and other reasonably foreseeable future actions (**Table 4.3.1-1**) have resulted in effects on global ecosystems throughout the study area; however, the decline of these resources is chiefly attributable to other stressors in the environment, (including the synergistic effect of bycatch, entanglement, vessel traffic, ocean pollution, coastal zone development, and global climate change).

In general, it is not anticipated that the implementation of the Proposed Action would have meaningful contribution to the ongoing stress or cause significant collapse of any particular marine resource, but it would further cause minute impacts on resources that are already experiencing various degrees of interference and degradation. It is intended that all existing standard operating procedures and the mitigation measures described in **Appendix C** would further reduce the potential impacts of the Proposed Action in such a way that they are avoided to the maximum extent practicable and to ensure that effects do not become cumulatively significant to any marine resource.

Air Quality–BOA

The estimated annual emissions for eight proposed flight tests per year over a 10-year period (80 total flight tests) would have an incremental additive contribution to cumulative effects on air quality for criteria pollutants and GHGs, when combined with other actions occurring in the layers of Earth's atmosphere (including the stratosphere and the upper atmosphere). Global rocket emissions impact the global atmosphere through ozone depletion and deposition of particulates in the stratosphere (Ross and Vedda 2018). These global atmospheric impacts are likely to increase in the future as space traffic is projected to increase (Ross and Vedda 2018). While global rocket emissions are a minor contributor to overall human impacts on the atmosphere (Ross and Vedda 2018) actions such as the Proposed Action and other present and future actions will increase space launches/traffic over the Atlantic and the Pacific BOAs and will have cumulative effects on air quality. Overall, the Proposed Action, combined with the past, present, and future foreseeable actions, would result in minor incremental contributions to cumulative air quality effects in the Atlantic and Pacific BOAs.

Although GHG emissions would occur from the implementation of the Proposed Action, based on an estimate of GHG emissions for CPS flight test, the Proposed Action would result in minor incremental additive contributions to global GHG emissions and climate change. Overall, the Proposed Action combined with the past, present and future foreseeable actions would contribute to space traffic growth and potentially minor damage to the ozone layer/climate change. No cumulative effects of GHGs or climate change have been identified which would affect the implementation of the Proposed Action or its potential environmental impacts over the 10-year period of testing.

Biological Resources – BOA

Cumulative effects on biological resources in the Atlantic and Pacific BOAs have likely occurred due to past actions in the BOAs and will likely continue to occur in the foreseeable future. Past military training and testing in ranges throughout the BOAs may have impacted habitat quality and quantity in the area as well as biodiversity, population size, and distribution of many biological resources when taken in conjunction with other human activities. When considered alone, the Proposed Action would have negligible to moderate impacts on biological resources in the BOAs. No effects of the Proposed Action have been identified that would have interactive or meaningful additive effects on cumulative effects on biological resources. Based on the relatively small scale of proposed activities in the BOAs, the Proposed Action would have negligible to minor cumulative effects on biological resources.

Hazardous Materials and Waste Management – BOA

Cumulative effects on environmental quality resulting from hazardous materials and wastes have occurred due to past actions in the Atlantic and Pacific BOAs. As discussed in **Section 3.1.3**, pollution and marine debris from anthropogenic sources are widespread in the world's oceans and have been adversely impacting marine ecosystems and human health (Landrigan et al. 2020, NOAA 2023c). In general, there is less pollution and marine debris in deep offshore ocean areas than in nearshore coastal locations (Landrigan et al. 2020), but cumulative effects from past federal, state, public, and commercial activities have still occurred in the BOAs. When considered alone, the Proposed Action hazardous materials and wastes would have negligible to minor impact on environmental quality in the BOAs. Any contributions to cumulative effects in the BOAs would be negligible additive effects and no interactive effects have been identified. Based on the relatively small amount of potentially hazardous materials and wastes involved with proposed activities, the Proposed Action would have a negligible contribution to cumulative effects from hazardous materials and wastes in the BOAs and would not exceed any CERCLA reportable quality limit.

Health and Safety – BOA

The Proposed Action would be conducted using existing naval vessels and would operate in accordance with established Navy safety procedures to protect personnel and the public. Proposed activities would not have significant impact to health and safety and no substantial additive or interactive effects on health and safety have been identified.

4.3.2.2 Kwajalein Atoll – Cumulative Effects

The Proposed Action has the potential to contribute incremental effects on the environment at Kwajalein Atoll, which is already experiencing stressors to a variety of receptors resulting from past and ongoing military testing, commercial activities, and climate change. The aggregate impacts of past, present, and reasonably foreseeable future actions (**Table 4.3.1-1**) have resulted in environmental impacts at USAKA, specifically at Illeginni Islet; however, the decline of these resources may also be attributable to other stressors in the environment (including past and future land uses, and global climate change). In future years, it is anticipated that several DoD test programs listed in **Table 4.3.1-1** will conduct missile flight testing involving terminal

impacts at RTS ocean and land locations at USAKA. It is anticipated that between 2024 and 2029, there may be up to 17 total flight tests per year with terminal impacts at RTS target sites (USASMDC 2023). Most of these tests would involve ocean payload impacts (including at KMISS), but a subset of these tests, up to six per year, may involve payload impact on land at Illeginni Islet (USASMDC 2023). Navy CPS up to eight flight tests per year would be a part of this total anticipated 17 DoD flight tests per year with terminal impacts at USAKA. Of the up to six total land impacts anticipated per year at Illeginni Islet, Navy CPS flight testing might comprise up to one per year.

In general, it is not anticipated that the implementation of the Proposed Action would have meaningful contribution to the ongoing stress or cause significant collapse of any particular resource, but it may further cause minute impacts on resources that are already experiencing various degrees of degradation. For all resource areas discussed in this section, requirements of the UES, including a Document of Environmental Protection, provide a protective mechanism to reduce the possibility that U.S. activities at USAKA would result in significant cumulative effects on the environment. The UES establishes a set of standards and procedures for all U.S. activities at Kwajalein Atoll and is updated every 2 years. It is intended that the Navy CPS Document of Environmental Protection (which would need to be renewed or modified after 5 years), other regulatory compliance with the UES, existing standard operating procedures, and the mitigation measures described in **Appendix C** would further reduce the potential impacts of the Proposed Action in such a way that they are avoided to the maximum extent practicable and to ensure that impacts do not become cumulatively significant to any resource area.

Climate Change – Kwajalein Atoll

Climate change is a notable concern in the RMI as the impacts of climate change are more pronounced in this island nation. The islets of Kwajalein Atoll are an average of 5.9 ft above sea level and have a total land area of just over 6 square miles. Climate change has the potential to have substantial impacts on terrestrial and marine ecosystems at Kwajalein Atoll, including the human environment, and may contribute to cumulative environmental effects. According to recent reports on by the International Panel on Climate Change, the factors projected to be of the most concern to the Pacific Islands before 2050 include mean air temperature, atmospheric CO_2 at the surface, ocean acidity, relative sea level, marine heatwaves, coastal flooding, coastal erosion, heavy precipitation and pluvial (rain) flood, and extreme heat (IPCC 2021). Trends in the RMI are consistent with global patterns of warming and sea level rise as detailed in **Section 3.2.1.2**.

Given the increasing rates of sea level rise and the low elevation of Kwajalein Atoll islets, it is possible that cumulative effects of GHG emissions and global climate change might adversely affect implementation of the Proposed Action by making the land-based target site unusable for payload impact and associated data collection. Based on the current rate of sea level rise and the estimated elevation of Illeginni Islet, it is not expected that sea level rise would affect implementation of the Proposed Action over the 10-year implementation period. It is also possible that cumulative effects related to climate change would affect the potential

environmental consequences of the Proposed Action on environmental resource topics considered in this EA/OEA.

The potential cumulative effects of climate change in conjunction with proposed activities and other past, present, and reasonably foreseeable actions are considered in this section.

Air Quality – Kwajalein Atoll

It is anticipated that the emissions related to fugitive dust generated at payload impact at Illeginni Islet would be within UES air quality standards and below the significant indicator level. GHG (emissions for the CPS flight test activities within Kwajalein (Illeginni and KMISS) would have minor, if any, incremental contributions to global emissions of GHGs. Taken together with ongoing DoD test activities at Kwajalein Atoll, Proposed Action impacts, including up to one land impact per year at Illeginni Islet and eight splashdowns at KMISS would have a negligible contribution to cumulative air quality effects at Kwajalein Atoll.

Cultural Resources – Kwajalein Atoll

The Proposed Action would not significantly impact cultural resources at Kwajalein Atoll and no interactive or additive effects have been identified which would contribute to cumulative effects on cultural resources.

Biological Resources – Kwajalein Atoll

Cumulative effects on biological resources at Kwajalein Atoll have likely occurred due to past military actions, commercial and subsistence fisheries, and the impacts of climate change. In addition to cumulative effects at Kwajalein Atoll, global effects of direct and indirect human effects on biological resources such as global trends in the loss of coral reef ecosystems and threats to marine animal populations may contribute to the relative significance of cumulative effects at USAKA. Taken as a whole, current available data do not allow for quantitative characterization of cumulative effects on nearshore and terrestrial biological resources at Illeginni Islet; therefore, cumulative effects were primarily evaluated using a qualitative approach. Climate change-induced elevated water temperatures, altered oceanic chemistry, and rising sea level may be contributing to changes to coral reef ecosystems, and are likely beginning to affect corals and mollusks found at USAKA (NMFS and USFWS 2021). Climate change is a global phenomenon and widespread coral bleaching events have been recorded throughout the Tropical Pacific (Eakin et al. 2018), including multiple coral bleaching events that have occurred at USAKA between 2012 and 2018 (NMFS and USFWS 2021). NMFS has stated that coral bleaching events in the RMI are likely to increase in frequency because ocean waters are expected to reach severe coral bleaching temperatures annually within the next 20 years (NMFS and USFWS 2021).

Military testing will likely continue to occur at KMISS and Illeginni Islet in the foreseeable future; however, all future U.S. activities at USAKA and in Kwajalein Atoll would be subject to provisions of the UES including project reviews by UES Appropriate Agencies and consultations on protected resources where required. Any actions likely to adversely affect protected biological resources would require a Document of Environmental Protection which would limit

the potential for cumulative effects to biological resources due to ongoing and future actions at Kwajalein Atoll. Furthermore, agreements under the UES require biennial monitoring of terrestrial and marine biological resources at USAKA islets which provides a protective mechanism to detect and respond to any realized cumulative effects. The proposed testing locations at USAKA have been used for similar DoD testing for decades with no evidence of cumulative effects to biological resources. There is evidence that past DoD and industrial activities at Kwajalein Atoll, when taken together, have had substantial adverse impacts on the levels of certain contaminants in lagoon reef fishes, including in Illeginni and Kwajalein harbors, and giant clams (APHC 2017). In recent years, the U.S. Army has implemented a number of measures to identify and reduce ongoing contamination impacts on reef and lagoon fishes, including halting the use of a number of chemicals, modification of activities such as sand blasting, and conducting several remediation projects to eliminate potential source contaminants (APHC 2017). While steps are being taken to identify and reduce or eliminate the sources of contaminants, it is likely that existing contamination within USAKA waters will continue to impact lagoon reef communities in the near future.

When considered alone, the Proposed Action would have negligible to moderate impacts on biological resources at Kwajalein Atoll. No effects of the Proposed Action have been identified that would have interactive or meaningful additive contribution to cumulative effects on biological resources. Based on the relative scale of proposed activities and the lack of observable cumulative effects from past DoD testing, the Proposed Action would have a negligible to minor contribution to cumulative effects on biological resources.

Geology and Soils – Kwajalein Atoll

Continued military testing at the land impact site on Illeginni Islet has the potential to result in cumulative effects on soils on the islet and in adjacent marine sediments. Testing of military payloads at Illeginni Islet has the potential to result in accumulations of heavy metals and other materials in the soil there. Because of this potential, all test programs utilizing Illeginni Islet (including Navy CPS) have a requirement for post-test or periodic soil sampling as part of Document of Environmental Protection requirements. Past sampling has included requirements to test uranium, beryllium, and tungsten levels. After decades of DoD land impacts at Illeginni Islet, soil testing results have indicated that no potential contaminants exceed the reference levels specified in the UES and none of the measured levels are expected to pose human health or ecosystem risks. Because of testing requirements and standards set forth in the UES for response to any exceedance of reference levels cumulative effects on geology and soils are not expected. Taken alone, proposed activities would have minor short-term impacts to geology and soils at Illeginni Islet and would have negligible impact on the risk of cumulative effects.

Water Resources – Kwajalein Atoll

As with geology and soils, continued military testing at Illeginni Islet has the potential to result in cumulative effects on water quality on the islet and in adjacent marine waters. The continued use of military materials with tungsten components is one of the primary concerns with regards to cumulative effects at Illeginni Islet. While the details of potential effects of tungsten on environmental systems are not well understood, continued monitoring of groundwater tungsten

levels at Illeginni Islet is planned after future DoD tests involving land impacts at Illeginni Islet (U.S. Air Force 2021). All programs conducting flight testing with impacts at Illeginni Islet (including Navy CPS) are required to conduct post-test or periodic water sampling as part of program Documents of Environmental Protection requirements. Taken alone, the Proposed Action is expected to have minor impacts on water resources. No interactive effects with those of past, present, or future actions have been identified but the proposed up to one land impact per year would be expected to have negligible to minor additive effects on cumulative effects on water resources at Illeginni Islet.

Hazardous Materials and Waste Management – Kwajalein Atoll

Taken together, past, present, and future actions at USAKA have likely resulted in cumulative hazardous materials and waste management impacts. Continued use of the KMISS range for DoD testing has the potential to result in accumulation of marine debris. Continued use of the land impact site at Illeginni Islet has the potential to result in deposition of heavy metals in the soils at the impact site. Accumulation of larger debris is not expected; however, it is possible that small quantities of heavy metals and other materials could accumulate at the site. As described in the geology and soils section, protective measures are in place due to requirements of the UES and all test programs are required to conduct soil and groundwater sampling after land impacts at Illeginni Islet. After decades of DoD testing at Illeginni Islet and KMISS, no significant accumulation of hazardous materials has been detected above the reportable quantity limit as listed in the UES, Table 3-6C (which is based on U.S. regulations). Continued soil and groundwater testing at Illeginni Islet and established response procedures for exceedance of levels specified in the UES substantially reduce the risk of cumulative hazardous materials impacts. Taken alone, the Proposed Action is not expected to result in exceedance of any screening levels for any materials contained in the CPS payload and there would be no significant impacts. Given the protective measures in place to prevent cumulative effects for hazardous materials and wastes at Kwajalein Atoll, no cumulative effects are anticipated.

Environmental Justice – Kwajalein Atoll

Cumulative effects on environmental justice resources at Kwajalein Atoll have likely occurred due to past military actions and commercial and subsistence fisheries. As discussed above for biological resources, there is evidence that past DoD and industrial activities at Kwajalein Atoll have had substantial adverse impacts on the levels of contaminants potentially hazardous to human health in food fishes (APHC 2017). While generally higher in industrial locations such as Kwajalein Harbor, contaminants such as PCBs, pesticides, and metals are found at locations across the southern half of Kwajalein Atoll (APHC 2017). The U.S. Army has implemented a number of measures to reduce ongoing contamination impacts on reef and lagoon fishes, including halting the use of a number of chemicals, modification of activities such as sand blasting, and conducting several remediation projects to eliminate potential source contaminants (APHC 2017). However, contaminant concentrations in lagoon reef food fish are high enough that they have adversely impacted recreational and subsistence fishing through implementation of several fishing closure areas in the atoll and may adversely affect public health, especially for Marshallese relying on subsistence fishing (APHC 2017). While steps are being taken to identify

and reduce or eliminate the sources of contaminants and to implement fishing closures in contaminated areas, it is likely that existing contamination within USAKA waters will continue to impact fishing and has the potential to impact human health of subsistence fishers in the near future.

Military testing will continue at KMISS and Illeginni Islet; however, all future U.S. activities at USAKA and in Kwajalein Atoll would be subject to provisions of the UES including project reviews by UES Appropriate Agencies and consultations where required. Taken alone, the Proposed Action would not result in disproportionately high or adverse effects on human health or environment for minority or low income-populations. While the potential exists for negligible additive contributions to cumulative effects on subsistence fisheries, the Proposed Action would have negligible impacts (i.e., undetectable levels of effect) on cumulative effects to topics of environmental justice concern in the RMI.

Health and Safety – Kwajalein Atoll

All ongoing activities at KMISS and Illeginni Islet take place within an active U.S. Army testing range and are therefore conducted in accordance with applicable U.S. Army and other federal and state safety standards and requirements. The Proposed Action would not result in significant impacts to health and safety and would not result in any additive or interactive effects on health and safety that would contribute to cumulative effects.

5.0 Other Considerations Required by NEPA

5.1 Consistency with Other Federal, State, and Local Laws, Plans, Policies, and Regulations

In accordance with 40 CFR § 1502.16(c), analysis of environmental consequences shall include discussion of possible conflicts between the Proposed Action and the objectives of federal, regional, state, and local land use plans, policies, and controls. **Table 5.1-1** identifies the principal federal and state laws and regulations that are applicable to the Proposed Action and indicates if the Proposed Action would be in compliance with these laws and regulations.

Table 5.1-1. Summary of Consistency with Other Laws, Plans, Policies, and Regulations for the Proposed Action

Applicable Laws, Executive Orders, Policies, and Guidance	Status of Compliance
Laws	
National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.); Council on Environmental Quality NEPA implementing regulations (40 CFR §§ 1500-1508; Navy Procedures for Implementing NEPA (32 CFR § 775 and OPNAVINST 5090.1E)	This Environmental Assessment/Overseas Environmental Assessment (EA/OEA) has been prepared to meet requirements under NEPA and Navy implementing procedures. This EA/OEA presents the best available information to describe the human and physical environment and provides a full analysis of the potential environmental consequences of the Proposed Action and alternatives to support public involvement, informed decision making, and interagency coordination and consultation.
Clean Air Act (42 U.S.C. § 7401 et seq.)	Conformity applies only to federal actions in nonattainment and maintenance areas. Before implementing any federal action in an air quality nonattainment or maintenance area, the Navy shall complete a General Conformity applicability analysis per 40 CFR § 93.154 to ensure the action does not interfere with a state's plan to attain and maintain the National Ambient Air Quality Standards (known as State Implementation Plans). In accordance with the Clean Air Act, Section 176(c), any action that negatively affects the implementation or goals of the State Implementation Plan is not allowed to proceed.
Clean Water Act (33 U.S.C. § 1251 et seq.)	The Navy has determined that proposed activities would not be a significant contributor of pollutants to waters of the United States, would not result in ocean discharges that may result in unreasonable degradation of the marine environment, and that no permitting under the Clean Water Act is required for the Proposed Action.
Coastal Zone Management Act (16 U.S.C. § 1451 et seq.)	The Navy has determined that the Proposed Action is consistent to the maximum extent practicable with the Coastal Zone Management Act. The proposed locations for Conventional Prompt Strike (CPS) activities do not contain any coastal zone resources as defined under the Coastal Zone Management Act of 1972.
National Historic Preservation Act (NHPA) (Section 106, 16 U.S.C. § 470 et seq.)	The Navy will comply with Section 106 of the NHPA for the land target site at U.S. Army Kwajalein Atoll (USAKA) as required and under the various regulatory conditions described in **Appendix B**, **Section B.2.2**.
Endangered Species Act (ESA) (16 U.S.C. § 1531 et seq.)	The Navy has complied with consultation requirements under Section 7 of the ESA for those locations and proposed activities which may affect species listed or proposed for listing, or critical habitats designated under the ESA as discussed in **Appendix A, Section A.1.1** and biological resource sections of **Chapter 4.0**.

Applicable Laws, Executive Orders, Policies, and Guidance	Status of Compliance
Laws (Continued)	
Marine Mammal Protection Act (MMPA) (16 U.S.C. § 1361 et seq.)	The Navy has coordinated with the National Marine Fisheries Service (NMFS) regarding potential impacts to marine mammals and has complied with requirements of the MMPA. The Navy has determined that proposed activities would not result in the taking of marine mammals as defined under the MMPA (detailed in the biological resources sections of **Chapter 4.0**) and that no permitting under the MMPA is required.
Migratory Bird Treaty Act (16 U.S.C. § 703-712)	The Navy has determined that the Proposed Action would not result in the intentional take of migratory birds or incidental take of migratory birds which would result in a significant adverse effect on a population of migratory birds (detailed in the biological resource sections of **Chapter 4.0**). The Navy has coordinated with the U.S. Fish and Wildlife Service and is compliant with requirements of the Migratory Bird Treaty Act.
Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSA) (16 U.S.C. § 1801 et seq.)	The Navy has determined that the Proposed Action would not significantly reduce the quantity or quality of any Essential Fish Habitat (EFH) or habitat areas of particular concern as detailed in the biological resource sections of **Chapter 4.0**. The Proposed Action would have negligible adverse impacts on EFH in the Hawaiian Islands exclusive economic zone and the Navy plans to consult with the NMFS Pacific Islands Office on these potential effects.
American Antiquities Act (54 U.S.C. § 320301 et seq.)	The Navy's policies for cultural resources management address its responsibilities as a federal land manager under the American Antiquities Act. No additional regulatory compliance under the Antiquities Act is required for marine national monuments. The U.S. Armed Forces are exempt from marine national monument prohibitions and the Navy has concluded that the Proposed Action would not damage or destroy monument resources or result in any abandonment of materials within marine national monuments.
National Marine Sanctuaries Act (16 U.S.C. § 1431 et seq.)	The Navy has complied with requirements under the National Marine Sanctuaries Act and has determined that the Proposed Action would not injure sanctuary resources as detailed in **Section 4.2.1.2.**
Marine Protection, Research and Sanctuaries Act (33 U.S.C. § 1401 et seq)	Through implementation of the Navy's Environmental Readiness Program (OPNAVINST 5090.1E), the Navy complies with all applicable federal and international laws and regulations pertaining to marine pollution, and the jettison or discharge of materials from ships and aircraft. The Proposed Action does not involve ocean dumping as defined under Marine Protection, Research and Sanctuaries Act Section 3(f) because the primary purpose of this federal activity would not be disposition of material and any depositing of debris or other materials into ocean waters would be incidental. Furthermore, as clarified by the U.S. Senate, if "material from missiles and debris from gun projectiles and bombs ultimately come to rest in the protected waters. Such activities are not covered by this Act" (Senate Report Number 92-451).
U.S. Public Law 108-188, Compact of Free Association Amendments Act of 2003	Under the Compact of Free Association, the United States and the Republic of the Marshall Islands (RMI) declared that NEPA was to be applied to all U.S. Government activities in the RMI and agreed to develop standards for environmental protection substantively similar to several U.S. environmental protection laws (e.g., Clean Water Act, ESA, and Clean Air Act). The USAKA Environmental Standards (UES; USASMDC 2021) serves as the environmental standards under the compact for all U.S. Government activities that occur on the U.S. Army Garrison Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAG-KA/RTS) controlled islands and the mid-atoll corridor as well as all USAG-KA/RTS activities within the RMI. The Navy has prepared this EA/OEA to comply with the NEPA requirements in the compact as well as for compliance with some provisions of the UES. The Navy plans to comply with all requirements set forth in the UES before implementation of the Proposed Action.

Applicable Laws, Executive Orders, Policies, and Guidance	Status of Compliance
Executive Orders (EOs)	
EO 12088, Federal Compliance with Pollution Control Standards	Through implementation of the Navy's Environmental Readiness Program (OPNAVINST 5090.1E), the Department of the Navy continues to comply with all applicable federal and international laws and regulations pertaining to pollution prevention and control at sea and on land.
EO 12114, Environmental Effects Abroad of Major Federal Actions	The Navy is compliant with EO 12114 and Department of Defense (DoD) implementing regulations which require federal agencies to evaluate the environmental consequences of federal actions outside the United States to facilitate informed decision-making. This EA/OEA serves as documentation of the need of and environmental effects of the Proposed Action.
EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations	The Navy is compliant with requirements of EO 12898 as described in **Section 4.2.2.7** and **Appendix B**, **Section B.7.2.1**. The Navy determined that proposed activities would not have a disproportionately high or adverse effect on minority or low income-populations.
EO 13045, Protection of Children from Environmental Health Risks and Safety Risks	The Navy determined that there would be no environmental health and safety risks that may disproportionately affect children and is compliant with EO 13045.
EO 13089, Coral Reef Protection	The Navy has complied with EO 13089 by identifying proposed activities that may affect U.S. coral reef ecosystems, has evaluated the effects of proposed activities on these ecosystems, and has determined that proposed activities would not substantially degrade the conditions of U.S. coral reef ecosystems, as discussed in the biological resource sections of **Chapter 4.0**.
EO 13158, Marine Protected Areas	The Navy has complied with EO 13158 by identifying the marine protected areas that have the potential to be affected by the Proposed Action and evaluating potential effects to natural or cultural resources that are protected by each marine protected area. The Navy has measures in place to avoid harm to the natural and cultural resources that are protected by marine protected areas as detailed in **Chapter 3.0**, **Chapter 4.0**, and **Appendix C**.
EO 13840, Ocean Policy to Advance the Economic, Security, and Environmental Interests of the United States	The Navy would comply with requirements of EO 13840 as requested and required by the interagency Ocean Policy Committee established under this EO and has coordinated with other federal agencies on ocean related matters to the extent appropriate and consistent with national security interests and statutory requirements.
EO 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis	In compliance with EO 13990, the Navy used science to consider the reduction of greenhouse gas emissions, bolster resilience to the impacts of climate change, and prioritize environmental justice. The Navy has analyzed the potential for disproportionate and adverse human health and environmental effects (including risks) and hazards of activities on communities with environmental justice concern. The Navy is analyzing and tracking potential emission impacts of criteria pollutants and greenhouse gases in the United States and abroad. The Navy has measures in place to reduce emissions and build climate resilience and reduce climate threat.
EO 14008, Tackling the Climate Crisis at Home and Abroad	In compliance with EO 14008, the Navy has put the climate crisis as a focal point. In May 2022, the Navy released its Climate Action 2030 report, which is a comprehensive plan to both protect its equipment and personnel from the effects of climate change and to dramatically slash the department's annual emissions. The Navy is analyzing and tracking potential emission impacts of criteria pollutants and greenhouse gases in the United States and abroad. The Navy has measures in place to reduce emissions, build climate resilience, and reduce climate threat.

Applicable Laws, Executive Orders, Policies, and Guidance	Status of Compliance
Executive Orders (Continued)	
EO 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All	In compliance with EO 14096, the Navy has analyzed the potential for disproportionate and adverse human health and environmental effects (including risks) and hazards of federal activities on communities with environmental justice concern of proposed activities. The Navy is providing opportunities for all members of the public to participate in the decision-making process and will fully consider public input provided as part of this process. In addition, Kwajalein Atoll would be subject to provisions of the UES including project reviews by UES Appropriate Agencies and consultations where required. Any actions that have the potential to adversely affect environmental justice resources would require a Document of Environmental Protection which would limit the potential for adverse impacts to environmental justice due to ongoing and future actions at Kwajalein Atoll.

Acronyms and Abbreviations: CFR = Code of Federal Regulations, OPNAVINST = Chief of Naval Operations Instruction, U.S.C. = United States Code

5.2 Relationship Between Short-Term Use of the Environment and Long-Term Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one site reduces future flexibility in pursuing other options, or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

Operations related to the Navy CPS would not significantly impact the long-term natural resource productivity in any of the Proposed Action areas. The Proposed Action would not result in any impacts that would significantly reduce environmental productivity or permanently narrow the range of beneficial uses of the environment.

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7.0 List of Preparers

The Navy CPS EA/OEA was prepared collaboratively by the Navy, USASMDC, and contractor support staff. **Table 7-1** lists the U.S. Government personnel and contractor staff who were primarily responsible for preparing or were directly responsible for reviewing this document.

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Abbreviations: B.A. = Bachelor of Arts, B.S. = Bachelor of Science, J.D. = Juris Doctor, M.A. = Master of Arts, M.S. = Master of Science, Ph.D. = Doctor of Philosophy

Note: Cells with gray shading indicate no data was provided or available.

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