



**Final**  
**U.S. Space Force – Space Systems Command Flight Tests**  
**Environmental Assessment / Overseas Environmental Assessment**

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**1 September 2022**

**Volume I – Chapters 1.0 through 7.0**

U.S. Space Force – Space Systems Command  
Launch Enterprise, Small Launch & Targets Division  
Kirtland Air Force Base, New Mexico

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## Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation	NMFS	National Marine Fisheries Service
AFB	Air Force Base	NOAA	National Oceanic and Atmospheric Administration
AFI	Air Force Instruction	NOTAM	Notice to Airmen
APE	Area of Potential Effects	NTM	Notice to Mariners
BOA	Broad Ocean Area	PACAF	Pacific Air Force
CES	Civil Engineer Squadron	PRSC	Pacific Air Forces Regional Support Center
CEQ	Council on Environmental Quality	PRST	Pacific Range Support Team
CFR	Code of Federal Regulations	RMI EPA	Republic of the Marshall Islands Environmental Protection Authority
CO <sub>2e</sub>	Carbon Dioxide Equivalent	RMI	Republic of the Marshall Islands
CRMP	Cultural Resources Management Plan	RTS	Ronald Reagan Ballistic Missile Defense Test Site
DAF	Department of the Air Force	SAR	Same As Report
dB	decibel(s)	SHPO	State Historic Preservation Officer
DOD	Department of Defense	SOP	Standard Operating Procedure
DPS	Distinct Population Segment	SSC	Space Systems Command
EA/OEA	Environmental Assessment / Overseas Environmental Assessment	SSC/LEX	Space Systems Command, Launch Enterprise, Small Launch & Targets Division
EIAP	Environmental Impact Analysis Process	U.S.	United States
EO	Executive Order	U.S.C.	United States Code
ESA	Endangered Species Act	UES	United States Army Kwajalein Atoll Environmental Standards
FONSI	Finding of No Significant Impact	USAF	United States Air Force
HPP	Historic Preservation Plan	USAG-KA	United States Army Garrison–Kwajalein Atoll
ICRMP	Integrated Cultural Resources Management Plan	USASMDC	United States Army Space and Missile Defense Command
kW	kilowatt(s)	USAKA	United States Army Kwajalein Atoll
LEB	Launch Equipment Building	USFWS	United States Fish and Wildlife Service
MBTA	Migratory Bird Treaty Act	USSF	United States Space Force
MDA	Missile Defense Agency	WPRFMC	Western Pacific Regional Fishery Management Council
MEP	Mobile Electric Power	μPa	micropascal(s)
MMPA	Marine Mammal Protection Act		
NEPA	National Environmental Policy Act		
NHL	National Historic Landmark		
NHPA	National Historic Preservation Act		

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# 1.0 Purpose of and Need for the Proposed Action

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## 1.1 Introduction

The United States (U.S.) Space Force (USSF) proposes to test a flight launch vehicle from launch facilities on Wake Island to the U.S. Army Ronald Reagan Ballistic Missile Defense Test Site (RTS), managed by the U.S. Army Space and Missile Defense Command (USASMDC), in the Kwajalein Atoll. While Wake Island is managed and controlled by the U.S. Air Force (USAF) Pacific Air Forces Regional Support Center (PRSC), the launch facilities themselves are controlled and operated by the U.S. Missile Defense Agency (MDA). The test mission would require two test flights, which would be executed by the U.S. Space Force (USSF) – Space Systems Command (SSC) Launch Enterprise, Small Launch and Targets Division, located at Kirtland Air Force Base (AFB), New Mexico. The Department of the Air Force (DAF) has environmental management and oversight authority for USSF and is therefore the lead agency for this National Environmental Policy Act (NEPA) analysis. On 21 April 2022, the USASMDC and MDA were requested by the DAF to become Cooperating Agencies.

The DAF, with the USASMDC and MDA as Cooperating Agencies, in accordance with the President's Council on Environmental Quality (CEQ) and USAF regulations for implementing the National Environmental Policy Act (40 Code of Federal Regulations [CFR] Section 1502.14 and 32 CFR Section 989.8, respectively) prepared this Environmental Assessment / Overseas Environmental Assessment (EA/OEA) to analyze the environmental impacts from the test launch of up to two flight test demonstrations from Wake Island toward the RTS. The OEA is required pursuant to Executive Order (EO) 12114 2-4(a).

Following review of the proposed test flight program, the DAF determined that an EA/OEA is required to assess the potential environmental effects from the flight test activities that would occur. This analysis includes the assessment of environmental impacts at Wake Island, Gagan Islet, and in the Republic of the Marshall Islands (RMI), which operates under a Compact of Free Association (Compact) with the United States and follows regulatory provisions of the NEPA. With contract support from the USASMDC, the DAF prepared this EA/OEA in accordance with the following regulations, statutes, and standards:

- NEPA of 1969 (Public Law 91-190, 42 United States Code [U.S.C.] §§ 4321-4347)
- 40 CFR 1500-1508, CEQ's Regulations on Implementing NEPA (September 2020)
- 32 CFR 989, Environmental Impact Analysis Process (EIAP)
- EO 12114 Environmental Effects Abroad of Major Federal Actions
- Department of Defense (DOD) regulations for implementing Executive Order 12114 (32 CFR Part 187, Environmental Effects Abroad of Major Department of Defense Actions)

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- Environmental Standards and Procedures for United States Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands, 16th Edition (USASMDC 2021), (UES)
- Air Force Instruction (AFI) 32-7091 Environmental Management Outside the United States

## **1.2 Purpose of the Proposed Action**

The Purpose of the Proposed Action is to test and demonstrate a flight launch vehicle, including the vehicle itself, boosters, vehicle guidance and control systems, and flight termination system.

## **1.3 Need for the Proposed Action**

The Proposed Action is needed to provide adequate vehicle data for testing and refining the technology, as well as the collection of scientific data from the launch and operation of the test vehicle.

## **1.4 Scope of the Environmental Assessment/Overseas Environmental Assessment**

This EA/OEA assesses the potential environmental impacts from reasonably foreseeable activities that could occur during the proposed USSF SSC Flight Tests. It includes analysis of test operations which would occur on Wake Island and Gagan Islet. At Wake Island, flight test vehicles would be launched from an existing test pad. At Gagan Islet and the RTS, operations would take place using existing facilities.

## **1.5 Interagency and Intergovernmental Coordination and Consultations**

Interagency and intergovernmental coordination is an integral part of EA/OEA preparation. As part of early coordination and consultations, DAF notified and consulted with relevant federal and state agencies on the Proposed Action and alternatives to identify potential environmental issues and regulatory requirements associated with project implementation. The following discussions summarize the agency coordination and consultations. Upon completion of consultations, the EA/OEA will be updated to reflect any regulatory considerations, and additional public notice would be conducted if significant revisions are necessary.

### **Coordination with the RMI**

The DAF acknowledges it shall apply NEPA to its activities under the Compact and its related agreements as if the Marshall Islands were the United States (Compact of Free Association, as

Amended, Section 161(a)(2)). For all activities within the RMI, including territorial waters of the RMI, the standards and procedures in the UES (USASMDC 2021) also apply. Under the UES, the DAF must coordinate with UES appropriate agencies including the Republic of the Marshall Islands Environmental Protection Authority (RMI EPA), U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and U.S. Army Corps of Engineers; providing agencies with an opportunity to review and comment on activities potentially affecting the environment (USASMDC 2021). The DAF began coordination with UES appropriate agencies in February 2022.

### **Consultation with the National Marine Fisheries Service – RMI**

In accordance Section 3-4 of the UES, DAF initiated coordination with the NMFS Pacific Islands Regional Office on 10 February 2022, for the purpose of (1) providing information about proposed USSF SSC Flight Tests Program activities; (2) to discuss potential effects on Endangered Species Act (ESA)-listed marine species, designated critical habitats, and species protected under Section 3-4 of the UES; and (3) to discuss the consultation process as specified in the UES. To support consultation with the NMFS, the DAF prepared a Biological Assessment to evaluate the effects of Proposed Action activities at U.S. Army Kwajalein Atoll (USAKA) locations on species listed under the UES. DAF initiated informal consultation with the NMFS Pacific Islands Regional Office for potential effects on the UES-consultation species on 10 February 2022 (**Appendix A**). On 13 June 2022, NMFS issued a Letter of Concurrence with DAF's conclusion that the Proposed Action may affect but is not likely to adversely affect ESA-listed and UES-consultation species (**Appendix A**).

### **Consultation with the Advisory Council on Historic Preservation, the Alaska State Historic Preservation Officer, and the National Park Service National Historic Landmark Program**

In accordance with Section 106 (54 U.S.C. 306108) of the National Historic Preservation Act (NHPA) (as Amended through 2016, 16 U.S.C. 470f), DAF initiated consultation with the Alaska State Historic Preservation Officer (SHPO), Office of History and Archaeology, regarding the Proposed Action and Alternatives in this EA/OEA (**Appendix B**). Given its isolated location within the Pacific Ocean, Wake Atoll itself does not have an on-island SHPO; therefore, the Alaska SHPO provides cultural resources support for potential adverse effects on historic properties remotely from its location in Anchorage, Alaska. On 13 June 2022 the Alaska SHPO issued a Letter of Concurrence with DAF's finding of No Historic Properties Adversely Affected from the Proposed Action.

The DAF concurrently initiated and completed consultation with the U.S. Advisory Council on Historic Preservation (ACHP) in Washington, D.C. The entirety of Wake Atoll was designated the Wake Island National Historic Landmark (NHL) in 1985. By virtue of this designation, Wake Atoll also was automatically listed in the National Register of Historic Places (National Register). On 27 July 2022, ACHP issued a letter of response noting under the revised regulations (Section 800.5), it is no longer necessary to submit a determination of No Adverse Effect to the

## *1.0 Purpose of and Need for the Proposed Action*

ACHP for review if the State Historic Preservation Officer and/or Tribal Historic Preservation Officer agree with your determination, even if a National Historic Landmark (NHL) is involved.

In accordance with 36 CFR part 800.10, the DAF initiated and completed consultation with the National Park Service National Historic Landmarks Program. Because there are special requirements for protecting NHLs, federal agencies are required to consult with the NHL Program Manager. For Wake Atoll, this is the Manager for Regions 8, 9, 10, and 12 located in San Francisco, California. Projects with the potential to adversely affect historic properties must be reviewed by the NHL Program Manager. On 7 July 2022 National Park Service issued a Letter of Concurrence with DAF's finding of No Adverse Effect for the Proposed Action.

### **Coordination with the 611 Air Support Group Civil Engineer Squadron – Joint Base Elmendorf-Richardson, Alaska**

The DAF coordinated with the 611 Civil Engineer Squadron (CES) Cultural Resources Manager at Joint Base Elmendorf-Richardson in Anchorage, requesting the most current cultural resources documents related to Wake Atoll, including, but not limited to, the Integrated Cultural Resources Management Plan (ICRMP) and its associated inventory of historic properties (611 CES 2020) (Appendix B). These documents have been approved from July 2020 through September 2024. DAF also submitted and requested a review of the draft and final EA/OEA by the 611 CES Cultural Resources Manager.

## **1.6 Public Notification and Review**

In accordance with the CEQ and USAF regulations for implementing NEPA, during the 30-day review period the DAF solicited comments on this Preliminary Final EA/OEA from interested and affected parties. When providing input on the EA/OEA, the DAF requested that comments be substantive in nature. Generally, substantive comments are regarded as those specific comments that challenge the analysis, methodologies, or information in the EA/OEA as being factually inaccurate or analytically inadequate; that identify impacts not analyzed or developed and evaluate reasonable alternatives or feasible mitigations not considered by the DAF; or that offer specific information that may have a bearing on the decision, such as differences in interpretations of significance, scientific, or technical conclusions, or cause changes or revisions in the proposal. Non-substantive comments are generally considered to be those comments that are non-specific; express a conclusion, an opinion, agree, or disagree with the proposals; vote for or against the proposal itself, or some aspect of it; state a position for or against a particular alternative; or otherwise state a personal preference or opinion. All substantive comments, either written or verbal, received during the 30-day public comment period, were given full and equal consideration in the preparation of the Final EA/OEA.

A Notice of Availability (Appendix C) for this Preliminary Final EA/OEA, and the Draft Finding of No Significant Impact (FONSI), was published in local newspapers for U.S. Army Garrison-Kwajalein Atoll (USAG-KA) on 8/9, 15, and 23 July 2022 (**Table 1-1**). The public comment period was from 11 July – 9 August 2022. The Preliminary Final EA/OEA and Draft FONSI were available over the Internet at <http://ussf-ssc-eaoea.govsupport.us>. A list of agencies and organizations that were sent a Notice of Availability of the document is provided in **Chapter 7.0**. Copies of the EA/OEA and Draft FONSI were placed in the Grace Sherwood Library, Kwajalein Island; the Roi-Namur Library, Marshall Island and the Wake Island Airport Lobby, Wake Atoll. Refer to Appendix D for correspondence with agencies and organizations.

A total of 35 comments were received from agencies. Comment letters from NMFS, USEPA Region 9, and USFWS are included in **Appendix D**. All comments received were considered in the development of this Final EA/OEA, and the comment response matrix is included in **Appendix E**. Of the 35 comments submitted, there were 14 substantive comments submitted by federal agencies (i.e., USFWS and USEPA Region IX). No additional comments were received after the end of the Preliminary Final EA/OEA public comment period.

Table 1.1 Newspaper Publication for the Notice of Availability		
State or Country	City/Town	Newspaper
Republic of the Marshall Islands	Majuro	Marshall Islands Journal
	U.S. Army Garrison Kwajalein Atoll	Kwajalein Hourglass

## *1.0 Purpose of and Need for the Proposed Action*

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## 2.0 Description of the Proposed Action and Alternatives

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Two alternatives are assessed in this EA/OEA: the Proposed Action and the No Action Alternative. Other DOD ocean test facilities were initially considered but eliminated from environmental analysis. The particular equipment being tested under the Proposed Action requires the technical resources available at the RTS and Wake Island for the collection of relevant data.

### 2.1 No Action Alternative

Under the No Action Alternative, the USSF SSC Flight Tests would not occur at Wake Island, and all existing or future launch operations would continue.

### 2.2 Proposed Action

The Proposed Action is to integrate and launch two flight test vehicles from Wake Island to RTS in the Kwajalein Atoll.

#### 2.2.1 Flight Scenario

The Proposed Action would consist of one flight demonstration and a second, optional flight demonstration. The two demonstration flights would launch from Wake Island towards RTS in the Kwajalein Atoll and release spent booster(s) at RTS.

The flight test vehicle motors are solid rocket motors and will be stored and handled in the MDA Missile Assembly Building at Wake Island. Fuel management for the rockets is not applicable.

#### 2.2.2 Pre-Launch Preparations and Launch Activities

Pre-launch preparations would include transport of vehicle components to Wake Island. All transportation and handling requirements for the components would be accomplished in accordance with DOD, DAF, and U.S. Department of Transportation policies and regulations to safeguard the materials from fire or other mishap. Transportation of all materials and equipment to Wake Atoll will be conducted with appropriate biosecurity measures in place to reduce the potential for accidental transport and introduction of pest organisms. Biosecurity requirements are detailed in the Wake Island Biosecurity Management Plan (PRSC 2015) and include requirements for a biosecurity inspection of and use of pest interception methods on all containers and cargo being sent to Wake Island.

## *2.0 Description of the Proposed Action and Alternatives*

During final preparations prior to launch, the launch vehicle would undergo functional checks, electrical checks, arming/enable procedures, and battery charging.

The USSF SSC mission would not require any major site preparation. The mission would use structures and a pad that are already in place. There is no requirement for new construction or clearing of vegetation. A conex box (steel shipping container) would be transported to Wake Atoll to be utilized as a temporary Launch Equipment Building (LEB) and placed directly next to the current LEB (the current LEB is unusable).

The flight test range extends from Wake Atoll towards RTS in the Kwajalein Atoll. RTS and the Pacific Range Support Team (PRST) are located at USAG-KA at USAKA. All range operations are conducted in accordance with USAG-KA/RTS and PRST policies and procedures, and applicable DOD Range Commanders Council Standards. PRST uses models to predict launch hazards to the public and onsite personnel prior to every launch. These models calculate the risk of injury resulting from toxic gases, debris, and blast overpressure from both normal launches and launch failures. Launches are postponed if the predicted risk of injury exceeds allowable limits.

RTS Range Safety is responsible for flight safety until intercept or impact. Prior to conducting each flight test operation, RTS Range Safety officials request the issuing of Notices to Airmen (NOTAMs) from the Federal Aviation Administration and Notices to Mariners (NTMs) from the U.S. Coast Guard. These notices identify all hazard areas to avoid. Prior to the test event, the impact areas and closure times would be distributed to the Pacific Air Forces Regional Support Center (PRSC) and personnel located on Wake Island.

At Wake Atoll, a flight destruct package is required in every launch vehicle. A premature flight termination could become necessary if the launch vehicle guidance and control system were to malfunction, and the vehicle strayed out of its planned trajectory. The launch vehicle Flight Termination System provides command destruct capability throughout flight. RTS Range Safety is responsible for flight safety until impact into the Broad Ocean Area (BOA).

### **2.2.3 Launch Day Demonstration Elements**

The demonstration will be launched from Wake Island towards Kwajalein Atoll.

### **2.2.4 Terminal Operations**

Test flight activities on Gagan Islet would take place only at existing facilities or in previously disturbed areas which are typically used to support RTS activities, including the pier, helipad area, and maintained areas surrounding the helipad or facilities. No proposed activities would occur in the shallow, nearshore waters of Gagan Islet. There will be no vegetation clearing, construction, or heavy equipment operation on Gagan Islet.

Post-test operations at RTS would involve retrieval of all personnel and equipment from Gagan Islet. Any flight test vehicle components or debris is expected to sink to the ocean bottom in the deep-water RTS test range where water depths are generally 2,000 to 13,000 feet (600 to 4,000 meters). No vehicle components or debris would impact on land or in reef or other shallow-water areas. A post-test evaluation of the terminal test location would be conducted to ensure that all debris sank to the ocean floor. In the event that test debris is found on the ocean surface or is otherwise visible under the surface, debris would be cleaned up to minimize the possibility of entanglement or ingestion by marine wildlife.

### **2.2.5 Personnel Requirements**

Approximately 60 personnel would be required for activities on Wake Island and approximately 30 at Kwajalein Atoll. Personnel would be needed for a few weeks for each launch.

## **2.3 Alternative Actions**

There are no other viable alternatives to the Proposed Action. Although computer simulations, modeling, and other laboratory tests are typically used during the design and early evaluation of new aerospace systems, 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 and thus were eliminated from further consideration.

Under the No Action Alternative, the proposed flight tests from Wake Island to RTS would not be conducted.

## **2.4 Comparison of Environmental Consequences of the Proposed Action and the No Action Alternative**

The No Action Alternative would result in continued anticipated environmental impacts from routine operations at Wake Island, downrange and USAKA. Potential environmental consequences for the USSF SSC Flight Tests are summarized in **Table 2-1** and under the analysis for each location (**Sections 4.2.1, 4.2.2, and 4.2.3**).

## **2.5 Avoidance and Minimization Measures**

Avoidance and minimization measures are designed to avoid, minimize, rectify, reduce, or compensate for potential adverse effects to various environmental resources during implementation of the Proposed Action. These measures are listed under the applicable resource area in **Chapter 4.0**.

## 2.0 Description of the Proposed Action and Alternatives

Table 2-1. Comparison of Potential Environmental Consequences		
Locations and Resources Affected	No Action Alternative	Proposed Action
<b>Wake Island</b>		
<b>Biological Resources</b>	Under the No Action Alternative, ongoing flight testing would continue at Wake and established conservation measures for biological resources would continue.	<p>Proposed pre-launch activities have the potential to impact biological resources through disturbance from human activity, exposure to hazardous materials, and risk of introduction of invasive species. Overall, pre-launch activities would have no or negligible impact on biological resources on Wake Island.</p> <p>Proposed flight test activities have the potential to impact biological resources through elevated noise levels, exposure to hazardous materials, and exposure to heat and exhaust emissions. Nominal launch activities would have no to negligible impacts to vegetation, short-term and minor impacts to terrestrial wildlife, and no to minor impacts to marine wildlife in the Wake Island region of influence.</p>
<b>Cultural Resources</b>	Under the No Action Alternative, ongoing flight testing would continue at Wake and established protection of cultural resources would continue.	Launch activities have the potential to adversely affect resources within the direct and indirect cultural resources areas of potential effects (APE). However, given the scattered nature of historic properties within the APEs and the distance of the identified resources from the launch pads, including two Cold War properties, not associated with the NHL, any effects from the two proposed launches would be minimal and no adverse effects are expected. The Alaska SHPO, National Park Service and the Council of Historic Properties concurred with this determination in letters on 13 June, 7 July and 27 July 2022 respectively ( <b>Appendix B</b> ).
<b>Hazardous Materials/Waste</b>	Under the No Action Alternative, ongoing flight testing would continue at Wake and established hazardous materials/waste and ground hazard area standard operating procedures (SOPs) will continue to be implemented.	Overall, hazardous material and waste activities would have a less than significant impact on Wake Island. Hazardous and non-hazardous wastes would be properly disposed of in accordance with applicable federal, state, local, DOD, and DAF regulations.

Table 2-1. Comparison of Potential Environmental Consequences

Locations and Resources Affected	No Action Alternative	Proposed Action
<b>Wake Island (Continued)</b>		
<b>Infrastructure</b>	Under the No Action Alternative, Wake Island will continue to provide utilities for ongoing flight testing.	The paved roadway network on Wake Island has been adequately maintained to move equipment and personnel. No significant impacts to infrastructure are anticipated. It is anticipated that the current water supply and wastewater system are adequate to support the temporary increase in personnel during the implementation of the Proposed Action.
<b>Noise</b>	Under the No Action Alternative, ongoing flight testing would generate short-term noise on Wake Island.	Overall, noise activities associated with the Proposed Action would have a less than significant impact on Wake Island. Standard procedures, as specified in Air Force Instruction 48-127 (Occupational Noise and Hearing Conservation Program), would be followed during launch activities to ensure proper hearing protection for personnel on the island.
<b>Safety and Occupational Health</b>	Under the No Action Alternative, ongoing flight testing would continue to follow established safety protocols on Wake Island.	Overall, activities associated with the Proposed Action would have a less than significant impact on as it relates to safety and occupational Health on Wake Island. To ensure the protection of all persons and property, SOPs have been established and implemented for the Ground Hazard Areas. These SOPs include establishing road control points and clearing the area using vehicles and helicopters (if necessary). Road control points are established prior to launches.
<b>Water Resources</b>	Under the No Action Alternative, the implementation of launch SOPs will reduce the potential for on-pad failure or explosion and thus the potential risk of impact on water resources.	Overall, activities associated with the Proposed Action would have a less than significant impact on water resources on Wake Island. Implementation of launch SOPs would reduce the potential for on-pad failure or explosion and thus the potential risk of impact on water resources.

## 2.0 Description of the Proposed Action and Alternatives

Table 2-1. Comparison of Potential Environmental Consequences		
Locations and Resources Affected	No Action Alternative	Proposed Action
<b>Broad Ocean Area</b>		
<b>Biological Resources</b>	Under the No Action Alternative, ongoing flight testing would continue across the BOA. There would be no change in baseline conditions in the region of influence.	Biological resources in the BOA region of influence have the potential to be impacted by elevated noise levels, physical injury due to falling vehicle components, and hazardous materials and debris. The Proposed Action would have no to minor impacts on marine wildlife in the BOA. The effects of the proposed action on ESA-listed species would be discountable or insignificant and no take of species protected under the ESA, Marine Mammal Protection Act (MMPA), or Migratory Bird Treaty Act (MBTA) is expected. While there is a greater chance of injury or disturbance for some common and widely distributed pelagic wildlife species, proposed activities would not change the population size or distribution of any wildlife species. There would be no adverse impacts to environmentally sensitive habitats including marine national monuments or essential fish habitat.

Table 2-1. Comparison of Potential Environmental Consequences

Locations and Resources Affected	No Action Alternative	Proposed Action
<b>USAKA</b>		
<b>Biological Resources</b>	<p>Under the No Action Alternative, ongoing flight testing would continue with reentry impacts in the Kwajalein Atoll area. The consequences for biological resources at USAKA would remain the same as those concluded for other programs.</p> <p>Marine mammals and other important marine wildlife have the potential to be affected by launch vehicle impacts in the deep ocean waters, but the potential for harm is extremely low and any effects are expected to be limited to short-term behavioral disturbance with no impacts on local populations.</p>	<p>On Gagan Islet, proposed pre-launch and flight test activities have the potential to impact biological resources through disturbance from human activity. Overall, pre-launch activities would have no or negligible impact on biological resources on Gagan Islet as there would be no vegetation clearing, vehicle component impacts or debris, construction, or heavy equipment operation on Gagan Islet. All proposed activities on Gagan Islet would take place at existing facilities or in previously disturbed areas which are typically used to support RTS activities.</p> <p>The Proposed Action has the potential to impact marine biological resources in the Kwajalein Atoll due to elevated noise levels, physical injury due to falling components, human activity and equipment operation, and hazardous materials and debris. The impacts to marine wildlife would be minor. While some common wildlife species have the potential to be harmed or disturbed by proposed activities, the Proposed Action would have no to negligible impacts to numbers, distributions, or populations of any wildlife species. The effects of proposed activities on ESA- and UES-listed species would be discountable or insignificant and no take of species protected under the UES, ESA, or MMPA is expected.</p> <p>DAF has consulted and coordinated with the NMFS and the USFWS on the potential effects of test activities on UES-listed species. DAF requested NMFS concurrence that proposed activities may affect but are not likely to adversely affect UES-consultation species. The NMFS concurred with this determination in a 13 June 2022 letter (<b>Appendix A</b>). For the Proposed Action it is anticipated that the effects overall from USSF SSC flight tests would be similar in nature to that of prior missions.</p>

## 2.0 Description of the Proposed Action and Alternatives

Table 2-1. Comparison of Potential Environmental Consequences		
Locations and Resources Affected	No Action Alternative	Proposed Action
USAKA (Continued)		
Climate Change	Under the No Action Alternative, ongoing flight testing would continue at RTS. There would be no change in baseline conditions in the RMI from the USSF SSC flight test.	The test flights do not originate from an RMI launch site or range; therefore, emissions released during flight test are not anticipated to impact climate characteristics at the RMI.



## **3.0 Affected Environment**

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This chapter describes the environmental resources that may be affected by the Proposed Action. The information provided serves as a baseline point of reference for understanding potential impacts. The affected environment is concisely described, with components of concern described in greater detail. This EA/OEA evaluates the potential impacts of performing two flight tests on the Wake Atoll and Gagan Islet environments. All reference documents will be made available from the project manager upon reasonable request.

### **3.1 Wake Island**

Wake Island is a part of Wake Atoll, a coral atoll in the middle of the North Pacific Ocean. The atoll consists of three islands: Wake, Wilkes, and Peale islands. The "V" shaped atoll has approximately 1,826 acres of dry land mass and 25 miles of coastline and is surrounded by a barrier reef. Wake Island is an unorganized, unincorporated territory of the United States, part of the United States Minor Outlying Islands, administered by the Department of the Interior Office of Insular Affairs.

Wake Island is less than 3 square miles in area and is located about 2,460 miles west of Hawaii and 1,590 miles east of Guam. Wake Island was developed as a stopover and refueling site for military and commercial aircraft transiting the Pacific during and after the 1940s. The island's airstrip has been used by the U.S. military and some commercial cargo planes, as well as for emergency landings. It is primarily an emergency divert airfield or planned stopover location on cross-Pacific military flights.

Access to the island is restricted and all current activities on the island are managed by the DAF and a civilian base operations and maintenance services company. Because of events that occurred during World War II, Wake Island was designated an NHL (Thompson 1984; McAllaster and Davidson 2011). By virtue of the NHL designation, the U.S. Department of Interior, National Park Service also listed Wake Island on the National Register. The boundary of the NHL extends to the outer edge of the reef that surrounds the three Wake Atoll islands (Wake, Wilkes, and Peale).

Wake Atoll, including Wake Island, is also a National Wildlife Refuge (managed by the USFWS) because of the valuable wildlife resources present out to 200 nautical miles from shore. Wake Atoll may be the oldest living atoll in the world, and it was made part of the Pacific Remote Islands Marine National Monument, which sustains many endemic species including corals, fish, shellfish, marine mammals, seabirds, water birds, land birds, insects, and vegetation not found elsewhere. The deeper, offshore Pacific Remote Islands Marine National Monument waters of Wake Atoll may contain significant objects of scientific interest that are part of a highly pristine deep sea and open ocean ecosystem with unique biodiversity, including a number of undersea

### 3.0 Affected Environment

mountains ("seamounts") that may provide habitat for colonies of deep-water corals many thousands of years old.

#### Rationale for Environmental Resources Analyzed

In compliance with NEPA, CEQ, and DAF EIAP regulations and guidelines, this EA/OEA focuses only on those environmental resources considered potentially subject to impacts from the Proposed Action. Biological resources, cultural resources, hazardous materials/waste, infrastructure, noise, safety and occupational health, water, and BOA are the environmental resource areas of concern requiring discussion for Wake.

The remaining environmental resources were not analyzed further because negligible impacts to these resources are anticipated as a result of implementing the Proposed Action. This section explains why air quality, airspace, climate change, geology and soils, global environment, land use, and socioeconomics/environmental justice were dismissed from detailed analysis in this EA/OEA.

**Air Quality:** No ambient air quality monitoring data are known to be available for Wake Island; however, it is believed that there are no air pollution problems at Wake Island due to the strong trade winds quickly dispersing local emissions. Additionally, there are no other islands within several hundred miles of Wake Atoll that could be affected by air pollutants generated on Wake Island (MDA 2015). According to the Wake Island EA (USASSDC 1994b), launch operations make up the largest source of uncontrolled emissions into the atmosphere. These emissions are produced during lift-off in the ground cloud and along the launch trajectory.

Launches from Wake Island previously analyzed in the 1994 Wake Island EA include the same or similar launch vehicle components and estimated emissions that are still sufficient for establishing emissions of the Stage-1 and Stage 2 engines for normal launches and early termination scenarios. See **Table 3-1** for estimated emissions. The use of portable generators to provide electricity to range support equipment was also considered and found to produce no significant impact to air quality.

Table 3-1. Emission Factors Associated with the Proposed Action		
Pollutant	Number of Launches (Mobile Sources)	Total Action Estimated Emissions (tpy)*
Al <sub>2</sub> O <sub>3</sub> (Aluminum oxide)	2	9.5
CO (Carbon monoxide)		5.8
HCl (Hydrochloric acid)		5.3
CO <sub>2</sub> (Carbon dioxide)		0.5

\*Note: tpy – tons per year

The results of the analysis from the Wake Island EA concluded that for both normal launches and early termination scenarios, relevant National Ambient Air Quality Standards would not be

exceeded for distances greater than 0.6 mile from the launch site. Therefore, no significant impacts to air quality would be expected from the launch of the USSF SSC launch vehicle.

**Airspace:** Wake Island is located in international airspace. Therefore, no formal airspace restrictions surround it. The only air traffic control facility available is the control tower. According to the Wake Island Launch Center Supplemental EA (USASMDC 1999), flight test vehicle launches are short-term discrete events and flight test vehicles launched with trajectories of 87 degrees elevation would remain clear of the route for the one military aircraft that makes regularly scheduled trips to the island and should pose no impacts.

Launch activities would be coordinated with the Central Air Reservation Facility and the Oakland Air Route Traffic Control Center Oceanic Control-5 Sector and would be governed by procedures of the International Civil Aviation Organization. This coordination would minimize the potential for impacts to regional airspace. NOTAMs would be issued as necessary to provide information to all aircraft transiting the area.

**Climate Change:** Based on the emission constituents from other long-term ongoing activities on Wake Island, it is not anticipated that the emission activities associated with the execution of a USSF SSC flight test would reach or exceed 0.0075 tons for carbon oxide equivalent (CO<sub>2e</sub>). For the global environment, increased energy use related to the Proposed Action would result in an increased generation of carbon dioxide. It is expected that emissions from the additional workforce and increased flight activity would not make a substantial contribution to greenhouse gas emissions or climate change.

**Geology and Soils:** The Proposed Action requires limited ground-disturbing activities during launch preparation, thus no impacts to soils are expected. The chemical characteristics of soils in the vicinity of the launch could be altered by deposition from the launch exhaust plume.

**Land Use:** Launch activities associated with the Proposed Action are consistent with current land use practices, policies, and controls for Wake Island. No impacts on current land use patterns would result from the Proposed Action.

**Socioeconomics/Environmental Justice:** The USSF SSC mission would require approximately 60 temporary duty personnel during the launch campaign. These personnel would be housed in existing billets, which can more than accommodate the limited and temporary increase in transient personnel. Therefore, no impact to housing and thus to socioeconomic resources is anticipated from flight test activities.

#### 3.1.1 Biological Resources – Wake Island

Biological resources are defined as native or naturalized vegetation and wildlife and the habitats in which they occur. Plant and plant communities are referred to as vegetation, and animal species are referred to as wildlife. Habitat is defined as the biotic and abiotic conditions that

### 3.0 Affected Environment

support plant or animal species. Within this EA/OEA, biological resources are divided into four major categories: (1) terrestrial vegetation, (2), terrestrial wildlife, (3) marine resources, and (4) environmentally sensitive habitats. Environmentally sensitive habitats are those areas designated by the USFWS or NMFS as critical habitat for ESA-listed species or other sensitive habitats such as wetlands, habitats limited in distribution, or important seasonal use areas for wildlife (e.g., breeding areas, feeding areas, or migration routes). In this EA/OEA, special status species refers to those species listed by federal agencies. All biological resources in the region of influence have been considered and evaluated for potential impacts from proposed activities. Discussion of the affected environment in this section focuses on important or sensitive biological resources with the potential to be affected by the Proposed Action. Species or habitats with low sensitivity or that would not be impacted are not discussed in detail in this section.

#### 3.1.1.1 Region of Influence

The region of influence encompasses the areas subject to the effects of the Proposed Action including the terrestrial environment at Wake Island near the launch pad and test support facilities and the marine environment under the over-ocean flight corridor near Wake Island.

The following federal regulatory requirements apply to biological resources within the affected environment of the Proposed Action:

- Endangered Species Act (ESA);
- Magnuson-Stevens Fishery Conservation and Management Act;
- Marine Mammal Protection Act (MMPA);
- Migratory Bird Treaty Act (MBTA);
- Executive Order 13089, Coral Reef Protection;
- Executive Order 13158, Marine Protected Areas;
- Executive Order 13112, Invasive Species;
- Executive Order 13751, Safeguarding the Nation from the Impacts of Invasive Species; and
- Presidential Proclamation 8336, Pacific Remote Islands Marine National Monument Expansion.

#### 3.1.1.2 Affected Environment

Wake Atoll supports a diverse assemblage of biological resources. The islands and shallow reefs of the lagoon and surrounding ocean sustain habitats that support vegetation and wildlife of many species. Several of these species are protected through various means such as the ESA, MMPA, and MBTA. The best available information for biological resources in the region of influence is described in the Integrated Natural Resource Management Plan (INRMP) (PRSC 2017), the Integrated Flight Tests at Wake Atoll Final Environmental Assessment (MDA 2015),

and in the Environmental Assessment for Management of Invasive Vegetation on Wake Island Airfield (PRSC 2019). This information is incorporated here by reference, and briefly summarized in this section. Biological resources at Wake Island Airfield are managed under the installation's Integrated Natural Resource Management Plan (PRSC 2017) and the Wake Island Biosecurity Management Plan (PRSC 2015) details processes and procedures in place to protect Wake Island biological resources from pest species.

#### Terrestrial Vegetation

Native vegetation communities on Wake Atoll were significantly disturbed during World War II and subsequent developments (MDA 2015, PRSC 2017). In addition to widespread human disturbance and DOD test activities, Wake Atoll is subject to periodic natural disturbances and harsh environmental conditions which impact vegetation and limit natural vegetation to mostly pioneer species with broad ecological tolerance (MDA 2015, PRSC 2019). Native vegetation has been displaced in large tracts on Wake Island by invasive plants, most notably ironwood (*Casuarina equisetifolia*; MDA 2015, PRSC 2019).

Vegetation in the region of influence on Wake Island is a changing mosaic of *Tournefortia* scrub, ironwood forest, and *Cordia subcordata* trees interspersed with dense stands of naupaka (*Scaevola gaudichaudiana*) and cotton (*Abutilon albescens*) as well as primarily invasive ruderal and mowed/maintained vegetation (**Figure 3-1**; MDA 2015, PRSC 2019). The areas immediately surrounding the proposed launch pad and test support facilities are maintained in low vegetation cover by mowing (MDA 2015).

No plant species listed under the ESA are known to occur in the region of influence at Wake Island.

#### Terrestrial Wildlife

Many migratory and nesting birds inhabit Wake Atoll including more than 30 species of seabirds, migratory shorebirds, land birds, and waterfowl (MDA 2015, PRSC 2017, PRSC 2019). Both Wilkes and Peale Islands support large populations of resident and migratory seabirds and visiting winter resident shorebirds and waterfowl (MDA 2015). On Wake Island, there is less habitat for nesting birds; however, a number of birds are known to nest in the region of influence, including wedge-tailed shearwaters (*Puffinus pacificus*), white-tailed tropicbird (*Phaethon lepturus*), white terns (*Gygis alba*), and waterfowl species (**Figure 3-1**; MDA 2015). Black-footed albatross (*Phoebastria nigripes*) and Laysan albatross (*Phoebastria immutabilis*) also breed at Wake Atoll and have been observed in the region of influence (**Figure 3-1**; MDA 2015). Native bird populations at Wake Atoll are relatively large but have been significantly impacted by human disturbance and invasive species such as cats (*Felis catus*) and rats (*Rattus* spp.; MDA 2015, PRSC 2019).

### 3.0 Affected Environment

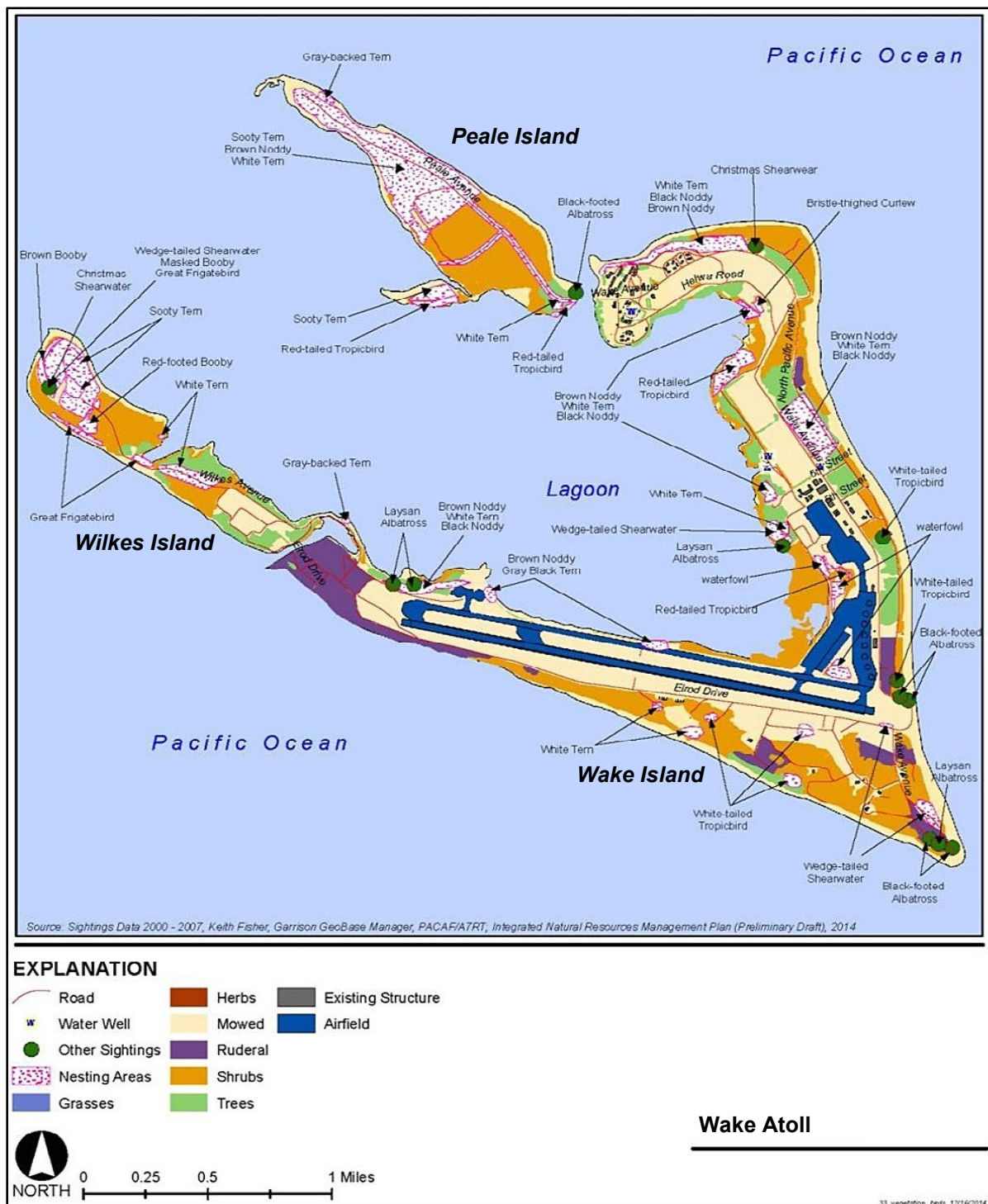


Figure 3-1. Vegetation and Bird Sightings and Nesting Areas, Wake Atoll

Many of the migratory seabirds, shorebirds, and occasional vagrant waterbirds that can be found on Wake Atoll are protected under the MBTA. A full list of birds known to occur at Wake Atoll that are protected under the MBTA can be found in Table 3-3 of PRSC 2019.

Other terrestrial wildlife on Wake Atoll includes insects, land crabs, reptiles, and invasive mammals. Invasive mammals currently on Wake Atoll islands include rats (MDA 2015, PRSC 2019, Stanford 2022). Reptiles on Wake Island include various species of geckos and skinks as well as green sea turtles (*Chelonia mydas*) which haul out on Wake Island (PRSC 2017, PRSC 2019). At least 148 species of arthropods are known to occur on Wake Atoll including several species of hermit crabs and other land crabs (PRSC 20017).

The only wildlife species listed under the ESA that is known in the terrestrial region of influence at Wake Island is the green sea turtle which hauls out on Wake Atoll beaches. This species is discussed further in the *Marine Biological Resources* subsection below.

#### **Marine Biological Resources**

Marine habitats in the region of influence at Wake Atoll include the nearshore shallow lagoons and coral reefs as well as deeper offshore waters under the vehicle flight corridor. Because of the limited potential for effects to marine species in the region of influence, marine resources are only briefly summarized in this section.

Reef communities at Wake Atoll provide habitat for more than 300 species of fish, 100 species of corals, 39 other macroinvertebrate species, and 19 species of macroalgae (MDA 2015). Of these coral species, three ESA-listed coral species are known to occur along the southern portion of Wake Atoll: *Acropora globiceps*, *Acropora retusa*, and *Acropora speciosa* (PRSC 2019).

Nearshore waters of Wake Atoll support relatively large populations of humphead wrasse (*Cheilinus undulatus*), grey reef sharks (*Carcharhinus amblyrhynchos*), black tipped reef sharks (*Carcharhinus melanopterus*), and bumphead parrotfish (*Bolbometopon muricatum*; MDA 2015). Other common nearshore fish include groupers, porgies, jacks, and large giant moray eels (*Gymnothorax javanicus*; MDA 2015).

Two species of sea turtles, both protected under the ESA, are likely to occur in the nearshore waters of Wake Atoll: green and hawksbill (*Eretmochelys imbricata*) sea turtles. Of these, green turtles may also occur in terrestrial habitats at Wake Atoll where they may haul out in beach habitats (PRSC 2019). Green sea turtles are frequently sighted in nearshore waters of Wake Atoll (MDA 2015, PRSC 2019). Any green sea turtles in the region of influence would likely belong to the ESA-endangered Central West Pacific distinct population segment (DPS; NMFS and USFWS 2015). There has been one documented observation of a hawksbill turtle in nearshore waters at Wake Atoll (Pautzke 2022 personal communication), just offshore of Wilkes

### 3.0 Affected Environment

Island. These endangered sea turtles are known to occur in offshore pelagic waters within the region and may occur in the nearshore waters of Wake Atoll occasionally (MDA 2015).

Marine mammals which occur in waters offshore of Wake Atoll include several species of cetaceans: blue whale (*Balaenoptera musculus*), fin whale (*B. physalus*), humpback whale (*Megaptera novaeangliae*), Cuvier's beaked whale (*Ziphius cavirostris*), sperm whale (*Physeter macrocephalus*), bottlenose dolphins (*Tursiops truncatus*), and spinner dolphins (*Stenella longirostris*; MDA 2015, PRSC 2019). ESA-endangered Hawaiian monk seals (*Neomonachus schauinslandi*) have been occasionally sighted at Wake Island; however, the species has not been observed there for decades (MDA 2015). All these marine mammal species are protected under the MMPA, and four whale species are listed as endangered under the ESA (blue, fin, and sperm whales, and the Western North Pacific DPS of humpback whale). While the whales may be present intermittently near Wake Atoll, they are expected to spend most of their time in deeper waters in the surrounding BOA.

#### Environmentally Sensitive Habitats

**Marine National Monuments.** U.S. Marine National Monuments are designated within U.S. exclusive economic zones (200 nautical miles [370 kilometers] from the territorial sea baseline). There is one marine national monument in the region of influence. Pacific Remote Islands Marine National Monument is approximately 495,189 square miles in area around seven islands and atolls: Baker, Howland, and Jarvis Islands; Johnston, Wake, and Palmyra Atolls; and Kingman Reef (**Figure 3-2**). The Monument includes 165 known seamounts that are hotspots of species diversity and abundance (NOAA 2020). Several U.S. and internationally endangered, threatened, and depleted species thrive at the Monument, including giant clams, pearl oysters, coconut crabs, fishes, reef sharks, and dolphins. The Monument also provides important migratory shorebird and seabird habitat. Additionally, the Pacific Remote Islands Marine National Monument is listed on the United Nations Educational, Scientific and Cultural Organization (UNESCO) tentative list of World Heritage sites (nominated by U.S. Department of the Interior in 2017). The Pacific Remote Islands Marine National Monument designation includes prohibitions on commercial and non-commercial fishing without a permit (50 CFR § 665.933).

**National Wildlife Refuges.** The Wake Atoll National Wildlife Refuge includes 774 square miles of submerged lands and waters surrounding Wake Atoll within U.S. territorial seas (out to 12 nautical miles [22 kilometers] from the territorial sea baseline; **Figure 3-2**; USFWS 2014). The refuge provides important seabird and migratory shorebird habitat, as well as coral reefs that support large populations of fishes (USFWS 2014). Wake Atoll Refuge supports 12 species of resident nesting seabirds and 6 migratory shorebird species (USFWS 2014).



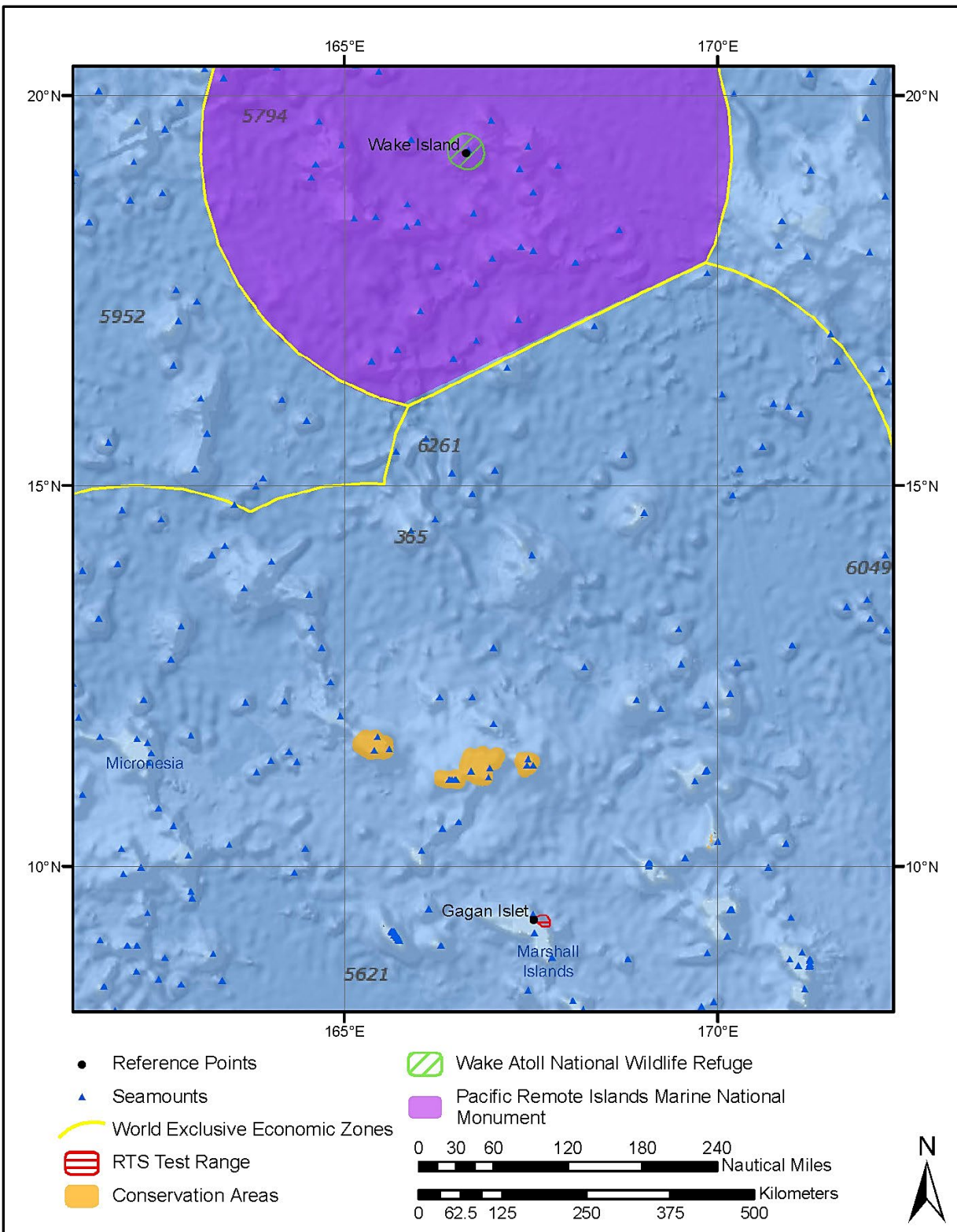


Figure 3-2. Environmentally Sensitive Habitats in the Wake Island and BOA Regions of Influence

**Essential Fish Habitat.** Essential fish habitat has been designated around Wake Atoll and other Pacific remote islands by the Western Pacific Regional Fishery Management Council (WPRFMC 2009). Essential fish habitat is defined as waters and substrate necessary to a species or species group for spawning, breeding, feeding, or growth to maturity (WPRFMC 2009). The WPRFMC developed essential fish habitat designations for bottomfish and seamount groundfish, crustaceans, precious corals, pelagic species, and coral reef ecosystem species (WPRFMC 2009). The current essential fish habitat designations for these groups at Wake Atoll are described in detail in the Fishery Ecosystem Plan for the Pacific Remote Islands Area (WPRFMC 2009) and are incorporated here by reference. No designated habitat areas of particular concern within the essential fish habitat occur in the region of influence.

#### 3.1.2 Cultural Resources – Wake Island

Cultural resources are prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources that have been determined eligible for inclusion in the National Register of Historic Places (National Register) or significant under the National Historic Landmarks program are known as historic properties.

The USAF has obligations under Sections 106 and 110 of the NHPA to protect any significant cultural resources on Wake Atoll and to mitigate any adverse effects on these resources. The entire atoll is within the Wake Island NHL. A higher standard of protection is required for elements of the landmark under Section 110(f) of the NHPA than for other resources listed on the National Register. (USAF, 611 CES 2020)

Federal laws of primary relevance to cultural resources management at Wake Island Atoll are the Historic Sites Act of 1935, which authorized the designation of national historic sites and landmarks, and NHPA of 1966, as amended, which created the legal framework for considering the effects of federal undertakings on historic properties. The Historic Sites Act is implemented by 36 CFR 65, National Historic Landmarks. The NHPA is implemented by 36 CFR 800, Protection of Historic Properties. Also relevant is Executive Order 11593, “Protection and Enhancement of the Cultural Environment,” which directs federal agencies to inventory the cultural resources in the areas they control and to record to professional standards any historic properties that their undertakings would alter or destroy. (USAF, 611 CES 2020)

The management of cultural resources at Wake Island Atoll presents special challenges. Wake Atoll is one of the United States Outlying Minor Islands. The atoll is remotely located, logistics are difficult, and access is restricted. Because it is an unorganized, unincorporated U.S. territory under military control, there is no local or State Historic Preservation Officer (SHPO). However, the state of Alaska SHPO has agreed to undertake cultural resources management oversight responsibilities there.

The ICRMP (USAF, 611 CES 2020) is required by AFMAN 32-7003 § 2.17.1. It is designed to assist the PRSC and Detachment 1, PRSC (Det. 1, PRSC) in meeting their cultural resources management responsibilities while supporting the military mission of Wake Island Atoll. By fulfilling its cultural resources stewardship responsibilities, PRSC not only meets USAF and federal compliance requirements, but also facilitates the commemoration and understanding of a battle that stirred the patriotism and imagination of the American public in the dark early days of American involvement in World War II. The ICRMP integrates cultural resources management with the installation environmental review and management process.

Site preparation activities, maintenance, and repair activities have the greatest likelihood of adversely affecting cultural resources at Wake Island Atoll; therefore, the installation operations support maintenance crews, and any site preparation activity crews deployed to Wake Atoll must be informed of the nature of the cultural resources at Wake Atoll and the crew's responsibilities regarding these resources. Respect for and maintenance of Wake Island NHL features is of primary concern, but training should also include managing and maintaining historically significant structures that do not contribute to the NHL, the possibility of subsurface archaeological features, and restrictions on removing artifacts from Wake Atoll NHL, including from underwater wrecks. (USAF, 611 CES 2020)

#### **3.1.2.1 Region of Influence**

The region of influence under NEPA is also known as the Area of Potential Effects (APE) under the NHPA. For this EA/OEA, the APE is confined to Wake Island, as there is no potential for adverse effects to occur at the other locations. Within Wake Island, the Region of Influence/APE encompasses the test vehicle integration, test, and launch facilities (direct APE) and the area surrounding the launch area where activities could affect any nearby NHL features or two identified Cold War-era historic properties (indirect APE).

#### **3.1.2.2 Affected Environment**

##### **Prehistory**

There is no archaeological evidence for prehistoric settlement on Wake Atoll. While there is limited evidence that the atoll was occasionally visited by small groups of Pacific Islanders during prehistoric periods, the long and dangerous ocean voyages, a lack of fresh ground water, sparse rainfall, and a lack of other essential resources on the atoll would have discouraged semi-permanent or permanent settlement (Spennemann 2000). Seabird plumage, albatross wing bones used as tattooing chisels, and a rare orange flower (*kio*) found on Wake Atoll have been noted as part of Marshallese oral traditions and in the 1960s, civilian personnel working on Wake Atoll reported finding Polynesian adze heads; however, those reports are unconfirmed (Hitchcock 2003). Given the harsh environment and what is known from modern studies of the atoll the probability of prehistoric occupation is remote (Verhaaren and Kullen 2015).

#### History

A brief history of Wake Atoll is provided herein to demonstrate the significance of the atoll and its designation as an NHL for activities during World War II. A discussion of two Cold War-era properties is also included; however, they are not included in the NHL designation. Additional details can be found in the 2020 ICRMP (USAF, 611 CES 2020) and various other documents contained in **Chapter 5.0** (References).

The earliest recorded visit by Europeans was that of the Spaniard Álvaro de Mendaña in 1568, who named the atoll San Francisco. Mendaña's visit was followed in 1796 by the British Captain William Wake, who named the atoll for himself although he did not set foot on the islands or claim the atoll for the British Crown. The atoll's largest island still bears his name.

Between 1796 and 1841, various Pacific Ocean explorers and commercial whaling ships sighted or briefly visited the atoll (Urwin 1997; Spennemann 2000b); however, it was not until 1841 that the remaining two islands were named during an expedition led by U.S. Navy Commander Charles Wilkes, accompanied by a naturalist named Titian Peale. Wake Atoll was ultimately claimed for the U.S. in 1898.

By the mid-1930s, a war between the U.S. and Japan seemed increasingly likely to American military planners and the U.S. Navy began actively considering Wake Atoll as a potential base from which to support the American Pacific fleet. At this time, Pan Am was seeking rights and leases on a string of Pacific islands, including Wake, for the development of pioneering trans-Pacific air service. Pan Am would use long-range water-landing "flying boats" and was looking for sheltered lagoons and harbors to develop. The U.S. Navy considered cooperation between itself and civilian firms a legitimate means for the development of commercial facilities in the Western Pacific that could later be used by the U.S. Navy, if necessary (Jackson 1996; Foothill Engineering Consultants 2000; USAF, 611 CES 2020).

In December 1934, President Franklin D. Roosevelt granted administrative control of Wake Atoll to the U.S. Navy Department. The following year, a survey party attached to the USS *Nitro* visited the island and reported to the Chief of Naval Operations that the island had military potential and was suitable as a location for a seaplane and submarine base. Members of the party inscribed "USS Nitro" and "3-9-35" on a coral boulder (Wake Atoll Cultural Site WK 06), which remains intact on the lagoon shore of Wilkes Island as part of a historical interpretive area (Jackson 1996; Foothill Engineering Consultants 2000; USAF, 611 CES 2020).

In January 1941, construction began for an airfield, seaplane base, submarine base, and various supporting structures. By the end of 1941, there were more than 1,700 military and civilian personnel on Wake Atoll. After the attack on Pearl Harbor on 7 December 1941, Wake Atoll was swept into World War II, but could not withstand Japanese naval assaults and landings, and the atoll fell under Japanese control, which lasted from 23 December 1941, through the end of the war in 1945 (USAF, 611 CES 2020).

After World War II ended, the U.S. Navy established a Naval Air Facility on the atoll that was active between November 1945 and March 1946. During that time, the runway was improved and expanded. The Naval Air Facility was disestablished in June 1947, and all facilities were turned over to the Civilian Aeronautics Administration (later the U.S. Federal Aviation Administration) which ultimately also took over maintenance and operations at aviation facilities on Guam and Midway from the military. The last of the buildings from this period were demolished in 2008 (USAF, 611 CES 2020).

During the early years of the Cold War, Wake Atoll became an important refueling stop between the U.S. West Coast and Korea. Historical records reveal that aircraft carrying supplies for the Korean War (1950-1953) were landing on Wake Atoll every twenty minutes and the atoll's population doubled (Aaron 2008). Numerous improvements were made to the atoll's infrastructure during these years that included paving and extending the existing runway to 7,000 feet to accommodate the increase in air traffic (completed in 1951) and construction of additional power and pump stations. Following a devastating typhoon in 1952 (Super Typhoon Olive) (Lodi News Sentinel 1952) that destroyed 85 to 95 percent of the atoll's buildings and structures, additional construction and damage reconstruction began that included a fire station, dormitories, a dining hall, a new taxiway, a terminal building (Building 1502), and a new control tower (Building 1601) (Aaron 2008; USAF, 611 CES 2020).

As the conflict in Vietnam intensified during the 1970s, Wake again regained its importance as an essential refueling stop, and in 1973, the atoll gained an additional new mission as an Army missile testing location, and briefly served as a transient station for Vietnamese refugees. In April and May 1975, over 12,000 refugees were processed through Wake Island on their way to new homes in the U.S. (611 CES 2020).

The atoll remained under U.S. Air Force administration until 1994; however, there were few military personnel stationed there. The bulk of the work was conducted by American contractors supervising a primarily Filipino workforce.

With no other pressing use, the atoll was deemed a good place for test missile launches, beginning in 1974 in support of the Army's Advanced Ballistic Missile Defense Agency discrimination programs. Seven Athena launches were scheduled for Wake Island in 1974 towards the Kwajalein Instrument Complex (Aaron 2008). This was the first of a series of Army missile testing programs funded by the Army and minimally supported by the Air Force (611 CES 2020).

In 1987, as part of the Strategic Defense Initiative, known to the press as "Star Wars," the (USASMDC selected Wake Island as a test location for Project Starbird anti-missile defenses and set up facilities south of the runway near Peacock Point. (611 CES 2020).

During the early 1990s, Wake Atoll supported various military operations, including Desert Shield, FIREY VIGIL, and Desert Storm and, in 1994, operated under a caretaker permit from

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the Air Force while the U.S. Army assumed administrative command to support increased missile testing; the permanent military presence remained small. Wake Atoll became known as the Wake Island Launch Center during this decade and an adjunct to the U.S. Army Kwajalein Atoll's Reagan Test Site. Army missions focused on the Theater Missile Defense system in support of the Ballistic Missile Defense Organization's target and defensive missile systems. In support of the mission, target missiles are launched from Wake Island and intercepted by defensive missiles launched by U.S. Army's Kwajalein Atoll. Missiles are not kept at Wake but are instead shipped there and launched for specific tests (Aaron 2008). In 1999, the Army's mission was further expanded to include liquid propellant missiles which are used as targets for anti-missile interceptors (611 CES 2020).

In January 2000, the Air Force determined that there was no longer an operational necessity for Wake Island and operations were scaled back to limited operations, defined as contingency support, emergency divert, and direct island support. (611 CES 2020).

On 1 October 2010, the U.S. Navy and USAF combined Hickam AFB and Pearl Harbor Naval Station, Hawaii, into a single installation designated Joint Base Pearl Harbor-Hickam. As part of this designation, management responsibility of the Wake Island Airfield was transferred to the 611 Air Support Group (611 ASG), subsequently renamed Pacific Air Force (PACAF) Regional Support Center (PRSC) (611 CES 2020). In 2022, Wake Atoll is operated by the USAF through Joint Base Elmendorf-Richardson, Alaska, and continues to serve mostly military purposes. The atoll's long mission as a refueling and emergency landing station for trans-pacific flights continues. In addition to its designation as an NHL, the atoll is situated within the Pacific Remote Islands Monument which provides important seabird and migratory shorebird habitat, and vibrant coral reefs that support large populations of fish (NOAA 2020).

#### **Status of Cultural Resources in 2022**

Wake Island in its entirety and all of the buildings and structures contained therein, were designated an NHL in 1985 in order to preserve both the battlefield where important World War II events occurred, and Japanese and American structures from that period. Many of the Japanese structures were constructed with American labor. A group of 98 American prisoners of war were forced to build these defenses until mid-1943, when they were executed by the Japanese. These structures include several pillboxes, bunkers, and aircraft revetments. The Wake Island NHL nomination package defines the landmark's boundaries as "the outer edge of the reef that surrounds the Wake Island so as to include the reef, the three islands, and the lagoon, which includes a number of historic shipwrecks and possible other artifacts." The Pan American facilities and the U.S. Naval submarine and aircraft base, constructed prior to World War II, are also included in the NHL (Verhaaren and Kullen 2015).

The period of significance of the NHL is accepted to be 1941-1945, although a 2011 Historic American Landscape Survey notes that the cultural resources and evolution of changes to the pre-war and World War II cultural landscape, focuses on the establishment of the Pan American

Airways seaplane base in 1935 and the U.S. Navy and Japanese occupations of the atoll throughout World War II. As a result, the historic period for the Wake Atoll cultural landscape is considered to be 1935-1945 (McAllaster and Davidson 2011).

In addition, a Cold War-era (1946-1989) survey of 33 Wake Atoll buildings and structures was conducted in 2007 (Aaron 2008). Although not part of the NHL, two of the 33 buildings (Buildings 1502 and 1601) were determined National Register-eligible under the Wake Atoll historic context. Building 1502 (Base Operations/Terminal-air passenger) was constructed in 1962. In a 2007 Memorandum of Agreement (MOA) between the USAF and the ACHP, the USAF agreed to treat Building 1502 as if it were eligible for listing in the National Register. The building was subsequently documented to an appropriate level of Historic American Building Survey standards before remodeling commenced (documentation completed in 2008). In 2009, the National Park Service reviewed documentation regarding Building 1502 and determined that it was individually eligible for National Register listing under Criterion A. The Keeper of the National Register concurred in 2010; therefore, Building 1502 must continue to be managed as a National Register-eligible property. Building 1502 is in the vicinity of the project area associated with this EA/OEA in the airfield area (USAF 611 CES 2020).

Building 1601 (Wake Island Control Tower) was completed in 1957 and heavily damaged by Typhoon Ioke in 2006. While part of Building 1601 remains in use, the tower itself was determined to be unsafe and a 2014 MOA with the Alaska SHPO provides for partial demolition of the building. Consultation included the National Park Service, Pacific West Region, National Historic Landmarks; the USFWS, and the ACHP and all declined to participate. Mitigation for the demolition of the control tower included Level II Historic American Building Survey recordation; development of an education program at Wake Atoll and brochure to address stewardship of historic properties at Wake Atoll; and historic preservation training at Wake Air Station. Demolition of the tower portion of Building 1601 is scheduled by the end of 2025. The remaining portion of the building is used by MDA and continues to be treated as a historic property. Building 1601 is situated in the vicinity of the project area associated with this EA/OEA in the airfield area (USAF 611 CES 2020). A list of the 33 Cold War-era properties assessed in 2007 and their National Register eligibility is provided as an attachment to the 2020 ICRMP (USAF 611 CES 2020).

In 1996, the USAF prepared a Historic Preservation Plan (HPP) for the Wake Island NHL, which outlined preservation and management alternatives for the atoll. A Cultural Resources Management Plan (CRMP) was subsequently completed in 2000 that updated the HPP. As of 2022, data from the 1996 HPP and the 2000 CRMP have been updated and incorporated into the 2020 ICRMP described in Section 3.1.

The post World War II development of Wake Island has been surveyed and evaluated by the USAF, most recently in connection with resource conditions assessments following Super Typhoon Ioke, which devastated the atoll in 2006. The postwar resources do not contribute to

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the NHL. The USAF has evaluated the post war resources as not eligible for the National Register. The Keeper of the National Register concurred with this determination in March 2010 (USAF 2010). The northwestern third of Peale Island and the entirety of Wilkes Island have been completely (100 percent) inventoried and all cultural resources recorded. The central portion and southeast end of Peale Island and the Peacock Point area of Wake Island also have been inventoried; however, much of the atoll remains to be surveyed (Verhaaren and Kullen 2015).

#### **3.1.3 Hazardous Materials/Waste – Wake Island**

##### **3.1.3.1 Region of Influence**

The region of influence is the area within the boundaries of the test vehicle integration, test, and launch facilities on Wake Atoll.

##### **3.1.3.2 Affected Environment**

Operations using hazardous materials at Wake are limited to aircraft flight and maintenance activities, base operations and infrastructure support activities, and infrequent flight test launches. Jet fuel is the hazardous material used in the greatest quantity at Wake. In the event of a jet fuel spill, existing spill control contingency plans would be implemented to minimize the area of potential contamination and to expedite cleanup efforts.

#### **3.1.4 Infrastructure – Wake Island**

##### **3.1.4.1 Region of Influence**

The region of influence is the area within the boundaries of the test vehicle integration, test, and launch facilities on Wake Atoll.

##### **3.1.4.2 Affected Environment**

###### **Utilities**

###### *Water*

Potable water is supplied by a reverse osmosis system on Wake. Two groundwater wells are used to obtain water for the reverse osmosis process. (Phillips 2022)

The fire suppression system is not operational; however, the fire station is continually staffed in the event of an emergency (Phillips 2022). Wake has a medical clinic staffed by a medical technician and one full-time physician. Security is provided as an alternate duty by Base Operation Support contractor personnel. (MDA 2012)



### *Wastewater*

A series of nine lift stations are used to collect and move sewage towards a sand mound dispersal system and drying bed. Where solids are decanted off and brought to the solid waste accumulation area for disposal. Although their full design capacity is not known, the sewer system and treatment plant adequately served the 1960s' peak base population. (Phillips 2022)

### *Solid Waste*

There is one primary solid waste disposal/discarding area and several closed satellite dumps or landfills at Wake Atoll. The primary solid waste disposal/discarding area is located on the south side of Wake Island, and a closed asbestos landfill is located on the south side of Wilkes Island. Wake Atoll does not have a solid waste landfill, but operates a solid waste dump for accumulating burn residue and ash from open burning and incineration.

### *Electricity*

The current Power Plant was brought online on 17 May 2008. This facility is located in the north quadrant of the island. This facility has the capability of producing 1,755 kilowatts (kW) (1.755 megawatts) of power. The Power Plant consists of three 585-kW capacity engines that also have the capability of producing 650 kW of power if connected to a 1,000-watt switch. The Installation added a fourth engine in 2013, which increased the capacity output by an additional 585 kW. There are three MEP-12 (Mobile Electric Power) backup engines with a capacity of 750 kW each. Five MEP-10 generators have also been added to the inventory. A maximum peak load of 1,432 kW was recorded on 19 October 2010, at which time there were approximately 300 individuals (contractors and active duty) on island. An Installation Electrical Study was completed on 28 December 2010.

## **3.1.5 Noise – Wake Island**

### **3.1.5.1 Region of Influence**

The region of influence is primarily those areas closest to the activities (launch pad) of the Proposed Action.

### **3.1.5.2 Affected Environment**

Natural background sound levels on Wake are relatively high because of wind and surf. Background levels can mask the approach of trucks on base roads, and personnel are not always aware of aircraft landings. No measurements of ambient sound levels are known to be available. (MDA 2012) Anthropogenic sources of noise at Wake are from airfield operations and base maintenance activities.

Flight test vehicle launches are another noise source on Wake. Maximum A-weighted sound pressure level contours during flight vehicle launches vary from approximately 115 decibels (dB) near Launch Pad #2, to less than 95 dB on the western ends of Peale and Wilkes. The 95-dB

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contour covers almost all of the Wake Island Launch Center, including Launch Pad #1 (USASSDC 1994a). Launch vehicles generate impulse-type noise for a brief period during the launch and only a few launches occur per year. Personnel engaged in flight test vehicle launch operations are inside reinforced concrete shelters and do not require hearing protection. Other island personnel and spectators are evacuated beyond the Launch Hazard Area, where they do not require hearing protection. With the exception of diesel generators, other environmental noise sources do not exist on the island.

#### **3.1.6 Safety and Occupational Health – Wake Island**

##### **3.1.6.1 Region of Influence**

The region of influence is the area associated with motor handling, storage, testing and integration, launch pad area, and ground hazard area(s) on Wake Atoll.

##### **3.1.6.2 Affected Environment**

###### **Range Control**

The launch range extending from Wake towards RTS, Kwajalein Atoll is under the jurisdiction of RTS. RTS controls all range operations, and all procedures are conducted in accordance with the Range Safety Manual (MDA 2004) and RTS policies and procedures. In the event of a catastrophic event (e.g., natural disaster, hazardous materials spill, aircraft, or flight test vehicle mishap), Operations Plan 355-1, Wake Island Disaster Preparedness Plan, would be implemented.

To ensure the protection of all persons and property, standard operating procedures (SOPs) have been established and implemented for the Ground Hazard Areas. These SOPs include establishing road control points and clearing the area using vehicles and helicopters (if necessary). Road control points are established prior to launches. This allows security forces to monitor traffic that passes through the Ground Hazard Areas. Before a launch, the Ground Hazard Area is cleared of the public to ensure that, in the unlikely event of early flight termination, no injuries or damage to persons or property would occur. After the Range Safety Officer declares the area safe, the security force gives the all-clear signal, and the spectators, that were previously located beyond the Launch Hazard Area, where they do not require hearing protection, are allowed to reenter the area.

###### **Broad Ocean Area Clearance**

Range Safety officials manage operational safety for projectiles, targets, launch vehicles, and other hazardous activities on Wake. Prior to a hazardous operation proceeding, the range is determined to be cleared using inputs from instrumentation sensors, visual surveillance of the range, and radar data.

### **3.1.7 Water Resources – Wake Island**

#### **3.1.7.1 Region of Influence**

The region of influence is the area within the boundaries of the launch pad area of Wake Atoll.

#### **3.1.7.2 Affected Environment**

The average annual precipitation on Wake Island is 35 inches. Due to the relatively small area of the island and the high permeability of the soil, all precipitation rapidly runs from the land into the ocean, the lagoon, or filters into the soil. Other than the water collected in the catchment basins, there is virtually no fresh surface water on the island. The primary source of potable water on Wake Island is desalinization of ground water. There are no sources of fresh ground water on the island (MDA 2007).

## **3.2 Broad Ocean Area**

For purposes of this assessment, the BOA is defined as the flight path over deep offshore waters from Wake Atoll, over the Pacific Ocean, to the splashdown area of the launch vehicle components.

The BOA consists of the open ocean and sea floor environments that may be affected by the Proposed Action, including the salient physical and chemical properties of the ocean, the characteristics of its different ecosystems or communities, and the biological diversity of animal and plant life that live in deeper water as well as in and just above the surface waters of the sea.

### **3.2.1 Biological Resources – BOA**

Biological resources are defined as in **Section 3.1.1**.

#### **3.2.1.1 Region of Influence**

The region of influence encompasses the areas subject to the effects of the Proposed Action in the BOA including the area under the flight corridor and spent booster drop zones. The BOA of the action area is assumed to be in deep ocean waters greater than 12 nautical miles (22 kilometers) from land areas.

Federal regulatory requirements which apply to biological resources within the affected environment of the Proposed Action include those listed in **Section 3.1.1.1** as well as Executive Order 12114, Environmental Effects Abroad of Major Federal Actions.

#### **3.2.1.2 Affected Environment**

This section summarizes existing information on plant and animal species and habitat types in the BOA region of influence with special emphasis on the presence of any special-status

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species. Because the potential for impacts to biological resources in the region of influence is limited, biological resources are only briefly summarized for the study area rather than providing detailed species-specific descriptions.

The waters in the study area consist of deep ocean waters with both pelagic and benthic habitats. Pelagic areas support communities of planktonic (drifting) and nektonic (swimming) organisms. Benthic communities are made up of marine organisms that live on or near the sea floor such as bottom dwelling fish, mollusks, crustaceans, and echinoderms. There are no terrestrial habitats in the BOA region of influence. However, some seabirds that breed on land and forage in the open ocean area of the Pacific have the potential to occur in the region of influence. ESA-listed species with the potential to occur in the study area are listed in **Table 3-2**. No designated critical habitat for any special status species occurs in the BOA region of influence.

Table 3-2. ESA-listed Species with the Potential to Occur in the BOA Region of Influence		
Common Name	Scientific Name	Federal Listing Status
<b>Marine Mammals</b>		
Sei whale	<i>Balaenoptera borealis</i>	E
Blue whale	<i>B. musculus</i>	E
Fin whale	<i>B. physalus</i>	E
Humpback whale <sup>1</sup> – Western North Pacific DPS	<i>Megaptera novaeangliae</i>	E
Sperm whale	<i>Physeter macrocephalus</i>	E
<b>Birds</b>		
Band-rumped storm-petrel	<i>Oceanodroma castro</i>	E
Newell's shearwater	<i>Puffinus auricularis newelli</i>	T
<b>Sea Turtles</b>		
Loggerhead turtle – North Pacific Ocean DPS	<i>Caretta caretta</i>	E
Green turtle – Central West Pacific DPS	<i>Chelonia mydas</i>	E
Leatherback turtle	<i>Dermochelys coriacea</i>	E
Hawksbill turtle	<i>Eretmochelys imbricata</i>	E
Olive ridley turtle	<i>Lepidochelys olivacea</i>	T
<b>Fish</b>		
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	T
Oceanic giant manta ray	<i>Manta birostris</i>	T

Abbreviations: DPS = Distinct Population Segment, E = federal endangered; T = federal threatened.

<sup>1</sup> Humpback whales in the region of influence may belong to the ESA-endangered Western North Pacific DPS or the Hawai'i DPS which is not listed under the ESA.

### Marine Biological Resources

At least 23 cetacean species have the potential to occur in the BOA region of influence, including five ESA-listed species (**Table 3-2**). Some of these species such as humpback whales, short-finned pilot whales (*Globicephala macrorhynchus*), killer whales (*Orcinus orca*), spinner dolphins, and bottlenose dolphins, have more coastal distributions. The most common species in the region of influence likely include Fraser's dolphins (*Lagenodelphis hosei*), spinner dolphins, striped dolphins (*Stenella coeruleoalba*), dwarf sperm whales (*Kogia sima*), and pantropical spotted dolphins (*Stenella attenuata*; U.S. Navy 2019).

While no terrestrial habitat occurs in the BOA region of influence, many seabirds have wide ranging foraging and non-nesting season distributions. It is likely that a number of pelagic seabird species may forage or rest at sea in the region of influence. Two special status species have the potential to occur in the region of influence: Newell's shearwater (*Puffinus auricularis newelli*) and band-rumped storm-petrel (*Oceanodroma castro*). Both species are protected under the ESA and MBTA. At-sea, these birds feed on small fish, squid, and crustaceans that they take from the ocean surface (USFWS 2005, USFWS 2015). Little information is available for the pelagic distribution of these birds in the Pacific. The marine range of band-rumped storm-petrels is believed to extend through the Northwestern Hawaiian Islands and tropical Pacific, especially near the Equatorial Counter Current (USFWS 2005). Newell's shearwaters have been primarily recorded in the tropical Pacific between 9-12°N and 160-120°W. However, these birds have been observed and collected at Guam, Saipan, Wake Island, Johnston Atoll, and American Samoa (Pyle and Pyle 2009). Little is known about the abundance and distribution of these birds in the open ocean, but it is likely that the distribution and abundance of the pelagic food supply determines the marine distribution of seabirds and that their distributions are patchy and seasonal.

Five species of sea turtle, all of which are listed under the ESA (**Table 3-2**), have the potential to occur in the BOA region of influence. Green turtles and hawksbill turtles are the most abundant species in the region of influence; however, the other species are likely to occur at very low densities. Each sea turtle species has unique life history characteristics that result in different patterns of distribution and abundance in the Pacific (detailed in U.S. Navy 2019), but all are likely to occur in deep-water open ocean habitats at some stage in their life cycle.

The diversity and abundance of fish species in the western Central Pacific have substantial ecological and economic importance. The major fisheries in the Central Pacific include several tuna species, marlin, swordfish, sharks, dolphinfish, and wahoo (U.S. Navy 2019). Two special-status fish species have the potential to occur in the BOA region of influence: oceanic whitetip shark (*Carcharhinus longimanus*) and oceanic giant manta ray (*Manta birostris*). The highly migratory oceanic whitetip shark is a widespread species in tropical and subtropical waters of the world and is usually found far offshore in the open ocean, on the outer continental shelf, or around oceanic islands in deeper waters (Young et al. 2018). Giant manta rays spend the majority of their time in deep water, with occasional visits to coastal areas (Defenders of Wildlife

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2015) where they are commonly sighted along productive coastlines with upwelling and near offshore pinnacles and seamounts (Marshall et al. 2011).

A large diversity of benthic and pelagic invertebrates are also likely to occur in the BOA region of influence. The greatest diversity of invertebrates in these waters occurs in the epipelagic zone where available sunlight enables primary production by phytoplankton and algae. Hotspots for diversity tend to occur near underwater features such as seamounts, submarine canyons, and shelf breaks where upwelling occurs, as well as in areas where warm and cold-water currents converge (UNEP 2006). Deep-water benthic habitats also support a diversity of invertebrates including echinoderms, sponges, tube worms, anemones, mollusks, and crustaceans (UNEP 2006). While many species of deep-water benthic and pelagic invertebrates are likely to occur in the BOA, the density and distribution of these organisms are largely unknown. No ESA-listed invertebrates are known to occur in the region of influence.

#### Environmentally Sensitive Habitats

**Marine National Monuments.** The Pacific Remote Islands Marine National Monument, as described in **Section 3.1.1** and shown in **Figure 3-2**, occurs in the BOA region of influence.

**Seamounts.** A number of seamounts are located within the BOA region of influence (**Figure 3-2**). Seamounts are underwater bathymetric features comparable to terrestrial mountains. Seamounts are known to be areas 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 Pacific Ocean support productive commercial fisheries (Miyamoto and Kiyota 2017). The productive waters associated with these seamounts also help support populations of seabirds like the Laysan albatross and black-footed albatross, which tend to forage and aggregate around seamounts due to higher prey density (Nishizawa et al. 2015).

**Essential Fish Habitat.** Essential fish habitat has been designated around Wake Atoll out to the U.S. exclusive economic zone (200 nautical miles [370 kilometers]) as described in **Section 3.1.1.2**.

### 3.3 U.S. Army Kwajalein Atoll

For more than 20 years, Kwajalein Atoll has been the terminal location for Intercontinental Ballistic Missile and other flight tests. Vehicle impacts from these tests have occurred and continue to occur on and in the deep ocean waters of the RTS test range. All U.S. Government activities that occur on USAKA and RTS areas, the Kwajalein Mid Atoll Corridor, or elsewhere in the RMI have been subject to regulations in the UES since December 1995 (USASMDC 2021). The proposed flight test activities are consistent with the ongoing RTS mission and are well within the limits of current operations of RTS and USAG-KA.

Gagan Islet is one of the 11 islands used by USAG-KA under the terms of the Military Use and Operating Rights Agreement. It is 6 acres in size and uninhabited. Radar, optical sensing, and telemetry equipment are located on Gagan Islet. Support facilities include a helipad, a pier, a marine ramp, and two finger jetties. Most of the facilities are located on the southwest end (USASMDC 2014).

#### Rationale for Environmental Resources Analyzed

In compliance with NEPA, CEQ, and DAF EIAP regulations and guidelines, this EA/OEA focuses only on those environmental resources considered potentially subject to impacts from the Proposed Action. Biological and climate change are the environmental resource areas of concern requiring discussion for USAKA.

The remaining environmental resources were not analyzed further because negligible impacts to these resources are anticipated as a result of implementing the Proposed Action. This section explains why air quality, airspace, cultural, geology and soils, hazardous material and waste, infrastructure, land use, noise, safety and occupational health, socioeconomics/environmental justice, transportation, and water were dismissed from detailed analysis in this EA/OEA.

**Air Quality:** Negligible adverse impacts on air quality are expected from flight tests that would be conducted at or around Gagan Islet. Emissions are anticipated to disperse with the prevailing winds. Therefore, the implementation of the Proposed Action would have no significant impact on air quality.

**Airspace:** The proposed activities are well within the limits of current operations at Gagan Islet. Thus, there would be no effects on airspace.

**Cultural:** There are no known marine cultural resources (e.g., shipwrecks) within areas of the BOA beneath the proposed flight paths.

**Geology and Soils:** The Proposed Action requires no ground-disturbing activities for the implementation of the Proposed Action; thus, no impacts to soils are expected.

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**Hazardous Material and Waste:** No additional hazardous material management plans for flight test or impact activities would be required as a result of the Proposed Action.

**Infrastructure:** The Proposed Action would not require the use of any electric power, natural gas, potable water, wastewater management, storm water drainage, or solid waste management.

**Land Use:** Launch activities associated with the Proposed Action are consistent with current land use practices, policies, and controls for Gagan Islet. No impacts on current land use patterns would result from the Proposed Action.

**Noise:** No significant impacts to ambient noise levels are anticipated from the flight test segment of the Proposed Action. In general, noise levels associated with post-test operations would be similar to those generated during pre-test preparation. Thus, no significant impacts to ambient noise levels are expected.

**Safety and Occupational Health:** All flight tests under the Proposed Action would continue to be conducted in accordance with established health and safety related policies and procedures, for the protection of onsite military personnel and contractors, and the general public. The missile flight paths would not cross over populated areas/islands. NTMs and NOTAMs would be published to warn ships and aircraft to avoid potential impact areas within established range Warning Areas offshore, and in international waters and airspace.

**Socioeconomics/Environmental Justice:** There are no permanent residents on Gagan Islet; personnel visit temporarily to prepare for tests or planned maintenance activities. Thus, there would be no disproportionately high or adverse environmental or human health effects on low-income or minority populations due to the Proposed Action.

**Transportation:** The USSF SSC mission would not require the use of roadways, parking areas, and access control points.

**Water:** No water resources at Gagan Islet would be used or affected by support of the Proposed Action.

#### 3.3.1 Biological Resources – USAKA

Biological resources are defined as in **Section 3.1.1**. In this section, special status species at USAKA are those species protected under the UES, specifically UES Section 3-4.

##### 3.3.1.1 Region of Influence

The region of influence encompasses the areas subject to the effects of the Proposed Action at Gagan Islet, including the areas where human activity would occur as part of pre-launch and flight test activities on Gagan Islet, and in deep offshore waters. The deep offshore waters of the



RTS test range region of influence would include those areas potentially subject to flight test activities including elevated noise levels, impact of vehicle components, human activity, and equipment or vessel operation. The deep offshore waters of the RTS test range where flight test activities would occur are generally from 2,000 to 13,000 feet (600 to 4,000 meters) deep. No Proposed Action activities are expected to take place in shallow, nearshore habitats.

Regulatory requirements which apply to biological resources within the affected environment of the Proposed Action include those listed in **Section 3.1.1.1** as well as Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, and requirements of the UES.

#### 3.3.1.2 Affected Environment

The best available information for biological resources in the USAKA region of influence is described in the environmental assessments for the U.S. Army's Hypersonic Flight Test 3 (pages 3-65 to 3-66 in U.S. Army 2021) and for Kwajalein Missile Impact Scoring System (KMISS) Refurbishment (pages 3-3 to 3-45 in USASMDC 2014) which are incorporated here by reference and summarized in this section.

##### Terrestrial Vegetation

Vegetation on Gagan Islet is primarily managed vegetation (USASMDC 2014). Areas of native littoral forest occur on portions of the islet, but no vegetation communities or plant species of concern occur on Gagan Islet (USASMDC 2014).

##### Terrestrial Wildlife

Terrestrial habitats on Gagan Islet provide foraging and nesting habitat for several bird species. At least eight bird species have been observed on Gagan Islet during surveys of the islet, including reef herons (*Egretta sacra*), Pacific golden plovers (*Pluvialis fulva*), ruddy turnstones (*Arenaria interpres*), wandering tattlers (*Tringa incana*), whimbrels (*Numenius phaeopus*), black noddies (*Anous minutus*), great crested terns (*Thalasseus bergii*), and black-naped terns (*Sterna sumatrana*; USASMDC 2014). Black-naped terns are known to nest in open areas on Gagan Islet and the littoral forest provided nesting habitat for white terns and black noddies (USASMDC 2014).

##### Marine Biological Resources

The deep offshore waters of the RTS offshore of Gagan Islet provide habitat for benthic and pelagic marine wildlife, including some species protected under the UES and the U.S. ESA.

A number of cetacean species have the potential to occur in deeper offshore waters of Kwajalein Atoll (**Table 3-3**; U.S. Army 2021). All of the marine mammals listed in **Table 3-3** are UES-consultation species listed in Section 3-4 of the UES (USASMDC 2021). All of these marine mammals are protected under the MMPA, and four species are listed under the U.S. ESA. The densities of most marine mammal species are expected to be very low in the deep

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waters of Kwajalein Atoll, although sperm whales have been observed in the vicinity of Illeginni Islet on many occasions (U.S. Army 2021).

Only the green turtle and hawksbill turtle are known to occur in the waters of the RMI (U.S. Army 2021). Green turtles are more common, while hawksbills are considered rare (U.S. Army 2021, Maison et al. 2010). Sea turtles are highly migratory and may utilize different marine habitats during various life stages. Adult green and hawksbill turtles are known to use nearshore seagrass beds and coral reefs; however, hatchling and juvenile turtles may be found more often in the open ocean (U.S. Army 2021).

Table 3-3. UES-Consultation Species with the Potential to Occur in the Region of Influence					
Scientific Name	Common Name	UES-Consultation Species Listing Status <sup>(1)</sup>			
		ESA	MMPA	RMI Statute	UES 3-4.5.1(a)
Marine Mammals					
<i>Balaenoptera musculus</i>	Blue whale	E	Migratory	1	
<i>B. physalus</i>	Fin whale	E	Migratory		
<i>Delphinus delphis</i>	Short-beaked common dolphin			2	
<i>Feresa attenuata</i>	Pygmy killer whale		Resident		
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale		Migratory		
<i>Grampus griseus</i>	Risso's dolphin		Resident		
<i>Kogia breviceps</i>	Pygmy sperm whale		Migratory		
<i>Megaptera novaeangliae</i>	Humpback whale (Western North Pacific DPS)	E <sup>(2)</sup>	Migratory		
<i>Mesoplodon densirostris</i>	Blainville's beaked whale		Migratory		
<i>Orcinus orca</i>	Killer whale		Resident		
<i>Peponocephala electra</i>	Melon-headed whale		Resident		
<i>Physeter macrocephalus</i>	Sperm whale	E	Resident	1	
<i>Stenella attenuata</i>	Pantropical spotted dolphin			2	
<i>S. coeruleoalba</i>	Striped dolphin			2	
<i>S. longirostris</i>	Spinner dolphin		Resident	2	
<i>Tursiops truncatus</i>	Bottlenose dolphin		Resident		
Reptiles					
<i>Chelonia mydas</i>	Green turtle (Central West Pacific DPS)	E		1,3	
<i>Eretmochelys imbricata</i>	Hawksbill turtle	E		3	

Table 3-3. UES-Consultation Species with the Potential to Occur in the Region of Influence					
Scientific Name	Common Name	UES-Consultation Species Listing Status <sup>(1)</sup>			
		ESA	MMPA	RMI Statute	UES 3-4.5.1(a)
Fish					
<i>Alopias superciliosus</i>	Bigeye thresher shark				x
<i>Carcharhinus longimanus</i>	Oceanic whitetip shark	T			
<i>M. birostris</i>	Oceanic giant manta ray	T			
<i>Sphyrna lewini</i>	Scalloped hammerhead (Indo-West Pacific DPS)	T			
<i>Thunnus orientalis</i>	Pacific bluefin tuna				x

Sources: USASMDC 2021, NOAA 2021a, U.S. Army 2021

(1) UES-Consultation Species Listing Status based on Appendix 3-4A of the UES (USASMDC 2021).

RMI Statutes: 1 = Endangered Species Act 1975, Title 8 MIRC Chapter 3; 2 = Marine Mammal Protection Act 1990, Title 33 MIRC Chapter 2; 3 = Fisheries Act 1997, Title 51 MIRC Chapter 2;

UES Section 3-4.5.1(a): X = Contained in RMI Environmental Protection Agency letter, 12 March 2015, or RMI Environmental Protection Agency letter, 28 September 2016

(2) The DPSs of humpback whales likely in the Action Area (Oceania DPS) are not listed under the ESA; however, there is some uncertainty about to which DPS whales in the Action Area belong.

Abbreviations: DPS = Distinct Population Segment, E = ESA Endangered, ESA = U.S. Endangered Species Act, MMPA = Marine Mammal Protection Act, T = ESA Threatened, UES = United States Army Kwajalein Atoll Environmental Standards (USASMDC 2021 Section 3-4.5.1).

Five special status fish species have the potential to occur in the deep offshore waters of Kwajalein Atoll (**Table 3-3**). The two most likely special status fish species in the deep waters of the region of influence are the scalloped hammerhead shark (*Sphyrna lewini*) and the oceanic giant manta ray (U.S. Army 2021). While the bigeye thresher shark (*Alopias superciliosus*), oceanic whitetip shark, and Pacific bluefin tuna (*Thunnus orientalis*) are known to occur in the Marshall Islands and have been documented as being caught in local fisheries, little is known about their abundance, distribution, or seasonality in this area (U.S. Army 2021).

Little is known about invertebrate species assemblages in the deep offshore waters of Kwajalein Atoll; however, these areas may support a variety of pelagic and deep-water benthic invertebrates (U.S. Army 2021). 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), and include a diversity of deep-water coral and sponge species. The potential composition of benthic invertebrate communities in the region of influence is unknown; however, if coral species do

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occur in the Kwajalein Atoll area, those species would likely be UES coordination species (U.S. Army 2021, USASMDC 2021).

#### **3.3.2 Climate Change – USAKA**

Climate is determined by the long-term pattern of oceanic and atmospheric conditions at a location. Climate is described by statistics, such as means and extremes of temperature, precipitation, and other variables, and by the intensity, frequency, and duration of weather events (NOAA 2021b). Emissions of pollutants into the air can result in changes to the climate, including impacts on local air quality (USEPA 2020).

The weather in the Marshall Islands is tropical – hot and humid but tempered by trade-winds which prevail throughout the year. Two seasons are recognized: a wet season that occurs between May and November and a drier season between December and April (Pacific RISA 2022). According to the recent reports on Climate Change (International Panel on Climate Change 2021), the following factors are projected to be of the most concern to the Pacific Islands before 2050: mean air temperature, atmospheric surface CO<sub>2</sub>, ocean acidity, relative sea level, marine heatwave, coastal flooding, coastal erosion, heavy precipitation, and extreme heat. 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°F (0.20°C) per decade between 1960 and 2011 (Pacific Climate Change Science Program 2011) and mean air temperatures have increased 1-2°C in the RMI since the 1950s (The Nature Conservancy n.d.). Sea level in the RMI rose approximately 0.3 inches (0.7 centimeters) per year between 1993 and 2011 (Pacific Climate Change Science Program 2011) with tide gauge data indicating a rise of approximately 5-6 inches since between 1968 and 2015 (The Nature Conservancy n.d.). Rising sea levels and ocean temperatures have increased the vulnerability of this island nation to tropical storms and typhoons, spring tides, and drought. From May 2021 to April 2022, four high tide flooding days were recorded at Kwajalein Island (NOAA 2022). In 2013 and 2016, RMI declared states of disaster for prolonged and unseasonal drought and required international assistance (USAID 2021). Another consequence of increasing global CO<sub>2</sub> 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 (Pacific Climate Change Science Program 2011). Ocean acidification and ocean temperatures are expected to continue to rise in the next several decades (Australian Bureau of Meteorology 2014).

## 4.0 Environmental Consequences

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### 4.1 No Action Alternative

The ongoing flight tests and related operations were taken into consideration in describing the Affected Environment in **Chapter 3.0** and have been fully assessed in prior environmental documents referenced in this EA/OEA. Under the No Action Alternative, tests conducted from Wake and supported by USAG-KA would continue for other ongoing programs. As such, the No Action Alternative would not change the existing conditions in the affected environment and there would be no impacts.

### 4.2 Proposed Action

A review of the potential environmental issues on the USSF SSC mission pre-launch preparations and launch activities are presented in this section. No major or significant environmental concerns have been identified. The environmental effects for the USSF SSC flight tests overall are similar to prior missions and within the envelopes of prior missions.

The mission team has referenced several prior EAs including the Integrated Flight Tests at Wake Atoll Final EA, 2015; Theater High Altitude Area Defense (THAAD) Pacific Test Flights EA, 2002; Missile Defense Agency Flexible Target Family EA, 2007; and the Wake Island EA, 1994.

The 2015 EA evaluated launch vehicles launching from Wake Atoll. The only land-launched vehicle identified in the EA was the Aegis Readiness Assessment Vehicle-B (ARAV-B), a solid propellant Short Range Ballistic Missile, smaller than the USSF SSC launch vehicle. Two of the prior EAs (MDA 2007, USASSDC 1994b) analyzed launch of larger solid propellant target vehicles (up to 56,418 pounds) from Wake Atoll. The 56,418 pounds is the total propellant weight of LV-2 evaluated in the 2007 MDA EA for Flexible Target Families. The USSF SSC launch vehicle is well enveloped by the 2007 EA.

Because other launch vehicles analyzed are substantially larger than the proposed launch vehicle for the USSF SSC, overall effects associated with the Proposed Action are expected to be within the limits identified by the prior analyses that resulted in findings of no significant impact. The environmental consequences associated with the Proposed Action are presented below for each resource area.

### 4.2.1 Wake Island

#### 4.2.1.1 Biological Resources – Wake Island

As described above, the consequences of flight test activities on biological resources on Wake Island have been evaluated for other programs (pages 104-117 of MDA 2015, pages 4-91 through 4-93 of MDA 2007) and the USSF SSC test activities fall within the envelope evaluated for these programs. Analyses of environmental consequences in these documents are incorporated here by reference and the consequences for biological resources are summarized in this section. All biological resources in the region of influence have been considered and evaluated for potential impacts from proposed activities. Discussion of environmental consequences in this section focuses on important or sensitive biological resources with the potential to be affected by the Proposed Action. Species or habitats with low sensitivity or that would not be impacted are not discussed in detail in this section.

#### Pre-Launch Preparations

On Wake Island, proposed pre-launch activities have the potential to impact biological resources through disturbance from human activity, exposure to hazardous materials, and risk of introduction of invasive species. Overall, pre-launch activities would have a negligible impact on biological resources on Wake Island.

Proposed activities would be conducted in compliance with the Wake Island Biosecurity Management Plan (PRSC 2015) which includes measures to avoid the introduction of invasive species (MDA 2015). Measures include cleaning of all equipment and personal gear prior to shipment or transport to Wake Island and inspection of arriving aircraft for pest species (MDA 2015). The requirements from this plan will be implemented for all materials and equipment being transported to and from Wake Island to reduce the risk or accidental introduction of invasive species. Biosecurity requirements include a biosecurity inspection of and use of pest interception methods on all containers and cargo being sent to Wake Island. If pests are detected in shipments to Wake Island upon arrival, containers would be sealed until the appropriate measures are taken in coordination with installation command and the USAF 611 CES biosecurity manager.

Visual inspections of all equipment and other materials would be completed at the point of origin prior to loading materials into containers bound for Wake Atoll. If any evidence of invasive or pest species were discovered on equipment or in containers, the shipment would be decontaminated using U.S. Environmental Protection Agency approved fumigants, power washers, and other tools to ensure the shipment is free of invasive alien species.

Pre-launch activities would not impact vegetation as all activities are planned on existing launch sites or previously disturbed areas which are regularly used for test activities. Similarly, there would be negligible impacts to terrestrial wildlife due to pre-launch activities. While some bird species are known to use and even nest in the peacock point area, test activities regularly occur

there. Birds that use this area are likely habituated to the regular pre-launch preparation activities which occur for other test programs and would occur for USSF SSC testing. Pre-launch activities would have no impacts on marine wildlife, including hauled out green sea turtles.

### **Launch and Flight Test Activities**

On Wake Island, proposed flight test activities have the potential to impact biological resources through elevated noise levels, exposure to hazardous materials, and exposure to heat and exhaust emissions.

Nominal launch activities would have no to negligible impacts to vegetation. The launch areas at Wake Island are regularly used for launch of various sized vehicles and vegetation continues to thrive in the immediate areas surrounding launch pads (MDA 2015). The USSF SSC launch vehicle falls within the size and thrust envelope of launch vehicles typically tested at Wake Island, and the impacts to vegetation are expected to be negligible.

Terrestrial wildlife has the potential to be impacted by launch related activities such as launch noise and emissions. Expected noise levels are up to 120 dB at the launch site and would attenuate to 100 dB at 20 feet (6 meters) from the launch site and would be less than 82 dB in beach habitats (at least 275 feet or 84 meters from the launch site). At maximum sound levels, launch noise would last up to several seconds. Birds close to the launch pad, including migratory birds, might be temporarily disturbed by launch noise. It is likely that any disturbance would be limited to a startle reflex or birds temporarily leaving the area. Elevated noise levels due to launch would last on the order of seconds and birds are expected to return to normal behaviors and locations within minutes or hours of launch. If launch activities occur during the nesting season, white-tailed tropicbirds, white terns, and wedge-tailed shearwaters nesting on Peacock Point might be flushed from their nests. It is not expected that any nests would be destroyed by launch activities and birds would be expected to return to their nests soon after launch as this would be a single, short duration event. Nesting birds on Wilkes and Peale Islands are not expected to be impacted by Proposed Action activities. Green sea turtles occasionally haul out on beaches of Wake Atoll. Based on expected noise levels in beach habitats during launch, any hauled-out green sea turtles are not expected to be affected by launch activities. Any response would likely be limited to a brief startle reaction and turtles would be expected go back to their normal behaviors within seconds of launch. Other wildlife near the launch site also may exhibit momentary startle reactions, but no wildlife is expected to be physically harmed by launch activities.

A launch mishap on the launch pad could impact wildlife species such as migratory birds, which nest within the Launch Hazard Area. Implementation of launch safety procedures helps to minimize the potential for on-pad failure and the potential for impacts to wildlife.

#### *4.0 Environmental Consequences*

There would be no to minor impacts to marine wildlife near Wake Island due to proposed activities. For nominal activities, only elevated noise levels would extend into the marine environment. Elevated noise levels due to launch and vehicle flight are not expected to physically harm any marine wildlife and at most, might cause a brief startle reaction in marine wildlife at the surface. While no estimates of elevated noise levels are available for the USSF SSC launch vehicle, the vehicle is within the size and thrust range for other vehicles tested at Wake Island (MDA 2015, MDA 2007). Any launch or flight noise would be discrete and short duration events and sound pressures would attenuate rapidly as distance from the launch pad increases. Furthermore, there would be a substantial attenuation of sound at the air-water interface which would decrease the intensity of sounds entering the marine environment. As with other test programs utilizing Wake Island, no physical injury to marine wildlife is expected due to elevated noise levels. Any realized behavioral reaction, such as startle reaction or diving below the surface, would be expected to be short-duration and animals would return to normal behaviors within minutes of the noise.

No impacts to essential fish habitat or other environmentally sensitive habitats are expected in nearshore habitats for nominal launch activities. For nominal flight tests, no launch vehicle components or other debris would splash down in nearshore habitats, designated essential fish habitat, the Wake Atoll Wildlife Refuge, the Wake Atoll exclusive economic zone, or the Pacific Remote Islands Marine National Monument.

#### **Avoidance and Minimization Measures**

The avoidance and minimization measures listed below would be implemented to reduce the anticipated impacts which would result from implementation of the Proposed Action.

- Proposed activities would be conducted in compliance with the Wake Island Biosecurity Management Plan (PRSC 2015) which includes measures to avoid the introduction of invasive species. Measures include cleaning of all equipment and personal gear prior to shipment or transport to Wake Island and inspection of arriving aircraft for pest species. The requirements from this plan will be implemented for all materials and equipment being transported to and from Wake Island to reduce the risk or accidental introduction of invasive species. Biosecurity requirements include a biosecurity inspection of and use of pest interception methods on all containers and cargo being sent to Wake Island. If pests are detected in shipments to Wake Island upon arrival, containers would be sealed until the appropriate measures are taken in coordination with installation command and the USAF 611 CES biosecurity manager.
- Visual inspections of all equipment and other materials would be completed at the point of origin prior to loading materials into containers bound for Wake Atoll. If any evidence of invasive or pest species is discovered on equipment or in containers, the shipment would be decontaminated using U.S. Environmental Protection Agency approved fumigants, power washers, and other tools to ensure the shipment is free of invasive alien species.



- Proposed activities would involve no vehicles use on or modification of the beach/dune environment.
- No native dune vegetation would be removed as part of the Proposed Action.
- Any project-related debris, trash, or equipment would be removed from Wake Atoll.
- No project-related materials would be stockpiled in the intertidal zone, reef flats, sandy beach and adjacent vegetated areas, or stream channels.
- Project personnel would not approach within 100 feet of basking sea turtles.
- Nighttime work would be avoided during the sea turtle nesting and hatching season (May through November) when possible.
- Use of project-related lighting on or near beaches would be minimized and project-related lights would be shielded so the light is not visible from any beach.
  - If lights can't be fully shielded or if headlights must be used, fully enclose the light source with light filtering tape or filters when possible.
- Measures would be incorporated into the operation of facilities adjacent to the beach to reduce ambient outdoor lighting such as:
  - turning lights off when not in use;
  - minimizing light intensity to the lowest level feasible and, when possible, utilizing timers and motion sensors; and
  - where feasible, reducing the height of exterior lighting to below 3 feet and pointed downward or away from the beach.

#### 4.2.1.2 Cultural Resources – Wake Island

The cultural resources direct APE (project area) for USSF SSC Flight Test activities encompasses the Wake Island pads where the flight test vehicle will be launched. Activities involve solely the analysis, testing, and launch of up to two flight tests vehicles from the launch pad area. There are no known subsurface prehistoric, historic, or traditional cultural resources within the direct APE and no requirements for new facility or infrastructure construction, clearing of vegetation, trenching, or other ground disturbance. In addition, the entirety of the direct APE has been heavily disturbed from previous construction and decades of operational use; therefore, no adverse effects on prehistoric, historic, or traditional cultural subsurface resources within the direct APE are expected.

Within the vicinity of the Wake Island launch pads (indirect APE), there is a scattering of identified above ground resources associated with the NHL and its association with the atoll's World War II history. There are also two identified resources that are individually significant under the atoll's Cold War-era historic context. The Cold War-era resources are Building 1502,

#### 4.0 Environmental Consequences

which is situated approximately 4,000 feet from the launch pads, and Building 1601, which is situated approximately 3,000 feet from the launch pads. There are no proposed modifications for any above ground resources within the indirect APE, and the only potential effects would occur from vibrational effects for a brief period of time during the launch phase or the remote possibility of an aborted launch or unexpected failure of the launch vehicle on the launch pad (or after launch) which could create falling debris. There would be no sonic booms generated by the launches. Given the scattered nature of historic properties within the indirect APE and the distance of the identified resources from the launch pads, including the two Cold War properties, any effects from the two proposed launches would be minimal and no adverse effects are expected.

#### **Avoidance and Minimization Measures**

The intentional or incidental collection of cultural resources anywhere within the NHL is prohibited. Launch-associated personnel would be cautioned about such activities and briefed on the penalties that could be incurred if sites are damaged or destroyed.

Consultation and coordination with the various agencies described in **Section 1.5** of this EA/OEA has been completed with agreement that there will be No Adverse Effects on historic properties or the NHL from the proposed activities. A response from the 611<sup>th</sup> CES was received on 12 April 2022, providing a copy of the most current ICRMP and providing direction for consultation with appropriate agencies. A response from the Alaska SHPO was received on 9 June 2022; a response from the NPS National Historic Landmarks Program was received on 7 July 2022; and a response from the ACHP was received on 27 July 2022. Copies of consultation and coordination response letters are provided in Appendix B of this EA/OEA.

The Alaska SHPO and the NPS National Historic Landmarks Program requested to be notified in the event of unexpected archaeological discoveries during project activities; therefore, if archaeological or historical resources are unexpectedly encountered (particularly human remains), all work in the vicinity of the find will be halted, the resources protected, and the two agencies and the Installation Commander notified. Subsequent actions will follow the guidance provided in Section 7.4 of the 2020 Wake Island Airfield ICRMP.

The ACHP indicated that under their revised streamlined Section 106 review process, it is no longer necessary to submit a determination of No Adverse Effect for review if the State Historic Preservation Officer agrees with that determination, even if an NHL is involved. Copies of the SHPO and NPS concurrence letters were provided to the ACHP at the time consultation was initiated.

#### **4.2.1.3 Hazardous Materials/Waste – Wake Island**

All potential hazardous materials identified for the USSF SSC mission fall within the maximum limitations for launch vehicles and payloads as specified in the 2015 Wake Island EA and USAF 2010 Conventional Strike Missile Demonstration FONSI/EA. Hazardous materials can be

broken out into three areas: (1) ordnance, (2) batteries, and (3) radio-frequency emitting systems. See **Appendix F** for a list of examples of hazardous chemicals and materials for the launch from Wake Island. Many of the materials will stay with the vehicles, so the actual quantities, weight, and volumes of materials that may be left behind for disposal would be less.

In addition to the ordnance, batteries and radio-frequency emitting systems used in the launch vehicle, processing and integration activities for the launch vehicle would require the use of small quantities of lubricants, paints, sealants, and solvents (less than 10 pounds).

Personnel would manage all hazardous materials and wastes in accordance with well-established policies and procedures. Hazardous and non-hazardous wastes would be properly disposed of in accordance with applicable federal, state, local, DOD, and DAF regulations. All hazardous waste is moved from the satellite accumulation sites to a main hazardous waste accumulation site to await transportation off-site via barge. Hazardous material and waste-handling requirements would not exceed current capacities and management programs would not have to change. Impacts due to use of hazardous materials during processing of launch vehicles would be measurable but are mitigated through appropriate management and conservation measures and would therefore be minimal. Overall, hazardous material and waste activities would have a less than significant impact on Wake Island.

### 4.2.1.4 Infrastructure – Wake Island

When the Proposed Action is implemented, the number of personnel on the island would increase during the USSF SSC launch campaign, but proper scheduling and coordination of activities would prevent the island's accommodations and infrastructure from being overtaxed. During mission surges, the island population can reach 250, but normally averages 120 transient personnel. The USSF SSC mission would require approximately 60 temporary duty personnel, substantially less than previous surges. Water conservation practices would continue to be implemented. It is anticipated that the current water supply and wastewater system are adequate to support the temporary increase in personnel during the implementation of the Proposed Action. The paved roadway network on Wake Island has been adequately maintained to move equipment and personnel. Currently, one flight is scheduled every other week to transport passengers and cargo; however, all aircraft operations and service activities are managed by base operations, which is manned 24 hours a day. Wake Island will continue to comply with its National Pollutant Discharge Elimination System Permit MW0020338. Overall, impacts to infrastructure are anticipated to be less than significant.

### 4.2.1.5 Noise – Wake Island

The Wake Island EA used analysis for launch vehicle noise predictions for targets, which was based on empirical data from both solid- and liquid-fueled rocket motors to determine the maximum sound levels produced. It was determined that at the launch site the noise level could reach 120 dB, main base buildings would be subjected to maximum levels between 105 and 110

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dB, and base housing would experience maximum levels between 100 and 105 dB. These maximum levels would last for several seconds and then taper off as the vehicle moves away from the launch site. Standard procedures, as specified in Air Force Instruction 48-127 (Occupational Noise and Hearing Conservation Program), would be followed during launch activities to ensure proper hearing protection for personnel on the island. Overall, noise activities associated with the Proposed Action would have a less than significant impact on Wake Island.

##### 4.2.1.6 Safety and Occupational Health – Wake Island

The Proposed Action at Wake Island has the potential to impact personnel safety related to the transport, storage, and launch. USSF SSC preflight activities, including the transportation and storage of potentially hazardous materials, are considered routine and would be conducted in accordance with applicable Air Force Space Command (AFSPC) Manual 91-710. No substantial health and safety impacts are expected. Overall, activities associated with the Proposed Action would have a less than significant impact on Wake Island.

Functioning as an Air Force installation, all operational activities at Wake Island Launch Center are subject to Air Force health and safety regulations. These governing regulations include Air Force Manual (AFMAN) 91-201, Explosive Safety Standards. The primary existing hazards at Wake Island are associated with aircraft refueling and base infrastructure support. Typical hazards include the handling and use of hazardous materials, exposure to noise from aircraft operations, and physical safety associated with the use of heavy equipment and support operations. These hazards are managed and controlled through implementation of safety programs, procedures, and the use of safety equipment (USASMDC 1999).

As described in **Section 2.2.2 (Pre-launch Preparations and Launch Activity)**, all range operations are conducted in accordance with the USAG-KA/RTS and PRST policies and procedures, and applicable DOD Range Commanders Council Standards. In the event of a catastrophic event (e.g., natural disaster, hazardous materials spill, aircraft or missile mishap), Operations Plan 355-1, Wake Island Disaster Preparedness Plan, would be implemented.

To ensure the protection of all persons and property, SOPs have been established and implemented for the Ground Hazard Areas. These SOPs include establishing road control points and clearing the area using vehicles. Road control points are established prior to launches. This allows security forces to monitor traffic that passes through the Ground Hazard Areas. Before a launch, the Ground Hazard Areas are cleared of all non-mission essential personnel to ensure that, in the unlikely event of early flight termination, no injuries or damage to persons or property would occur.

Ordnance safety includes procedures to prevent premature, unintentional, or unauthorized detonation of ordnance.

Wake Atoll still contains a substantial amount of ordnance from World War II. In the event that unexploded ordnance is accidentally discovered during operations on the island, work ceases, and explosive ordnance demolition crews from Army units stationed in Hawaii or USAG-KA/RTS dispose of the munitions.

Ordnance associated with launch vehicle launches is delivered to Wake Island by aircraft to the on-base airfield, and then over land by truck transport for delivery to its point of storage. When ready, ordnance would be transported to an assembly building for processing. All ordnance is transported in accordance with U.S. Department of Transportation regulations.

Wake has defined Explosive Safety Quantity Distance arcs. The arcs are generated by launch pads, ordnance storage area, ordnance handling pad, and the launch vehicle assembly/test buildings.

Range Safety officials manage operational safety for projectiles, targets, launch vehicles, and other hazardous activities on Wake Island. Prior to a hazardous operation proceeding, the range is determined to be cleared using inputs from instrumentation sensors, visual surveillance of the range, and radar data.

##### **4.2.1.7 Water Resources – Wake Island**

Overall, the Proposed Action is anticipated to have less than significant impacts on water resources. Diesel powered generators would be in use throughout the USSF SSC launch campaign to supply power to entry control point guard shacks and to power the heating/cooling system for thermal conditioning the motors. Personnel from the project office would be responsible for refueling diesel generators, using fuel cans which they would fill at the fuel pumps on Wake. MDA personnel would train all project office personnel to perform these duties.

The limited quantities of any hazardous waste that could be produced by launch activities would consist mostly of used or excess solvents and cleaners and would not represent a substantial increase in the quantities of hazardous waste currently generated. Spills or leaks would be handled according to standard spill response protocol, which includes delineating the extent of the contamination and removing it. Existing spill prevention procedures would be implemented to decrease the risk of accidental release of potentially hazardous substances to water resources and containment berms would be used; therefore, less than significant impacts would be anticipated.

Debris from on-pad failure or explosion could adversely impact water resources. However, implementation of launch SOPs would reduce the potential for on-pad failure or explosion and thus the potential risk of impact on water resources.

### 4.2.2 Broad Ocean Area

#### 4.2.2.1 Biological Resources – BOA

Biological resources in the BOA region of influence have the potential to be impacted by elevated noise levels, physical injury due to falling vehicle components, and hazardous materials and debris. All biological resources in the region of influence have been considered and evaluated for potential impacts from proposed activities. Discussion of environmental consequences in this section focuses on important or sensitive biological resources with the potential to be affected by the Proposed Action. Species or habitats with low sensitivity or that would not be impacted are not discussed in detail in this section.

The Proposed Action may result in elevated noise levels both in-air and underwater. No sonic boom is expected. Elevated noise levels would occur under the vehicle flight path as well as at the splashdown locations for launch vehicle components. No model estimates of noise levels are available for splashdown of vehicle components; therefore, the peak noise levels have been estimated based on the size characteristics of the vehicle components compared to the component sizes for other test vehicles (U.S. Navy 2019) for which splashdown noise estimates are available. Using peak sound pressure estimates for other test vehicle stages (U.S. Navy 2019), the peak sound pressures are expected to be less than 218 dB re 1 micropascal ( $\mu\text{Pa}$ ) for splashdown of the booster(s). The methodology for estimating the range to potential effects for wildlife are detailed in the Flight Experiment-2 EA (U.S. Navy 2019) and are incorporated here by reference. The potential impact of elevated sound levels on wildlife were based on the standard sound effect thresholds for effects to marine wildlife as detailed by NOAA Fisheries (NOAA 2018), summarized in environmental analyses for recent tests (U.S. Navy 2019, USAF and USASMDC 2019), and are incorporated here by reference.

Splashdown of the spent booster(s) may create sound pressures above the temporary auditory injury threshold for wildlife but only over small areas (approximately 6 feet [2 meters] from splashdown for baleen whales, 41 feet [13 meters] for *Kogia* whales, and 131 feet [40 meters] for fish). Some common wildlife such as common fish species may be exposed to elevated sound pressures high enough to cause temporary injury or behavioral disturbance. However, elevated sound pressures would not change the population size or distribution of any species and sound impacts would be less than significant. Based on their low densities in the region of influence, no special-status species are expected to be injured by elevated sound pressures. While unlikely, based on the low density of special-status species in the region of influence and the small number of tests (two total), any effects of elevated sound levels would be limited to short-duration behavioral responses. Animals would be expected to return to normal behaviors within minutes of the short-duration (no more than a few seconds) sound and no lasting effects are expected. Overall, elevated noise levels would have minor impacts to marine wildlife in the region of influence.

Physical injury due to direct contact from splashdown of vehicle components is not expected to impact marine mammals, sea turtles, seabirds, or fish in the region of influence. As with other recent DOD test programs with similar vehicle component splashdowns in the Central Pacific Ocean (U.S. Navy 2019, USAF 2020, USAF 2021, U.S. Army and U.S. Navy 2022), the chances of any individual special-status wildlife being injured are extremely low and no special-status animals are expected to be injured or otherwise adversely affected by vehicle splashdown. While there is a greater chance of physical injury for some common and widely distributed pelagic wildlife species, direct contact would not change the population size or distribution of any common wildlife species.

Hazardous material and debris release in the BOA is not likely to adversely impact marine mammals, sea turtles, seabirds, or fish. The area affected by the dissolution of chemicals would be relatively small because of the size of the launch vehicle components and the minimal amount of residual materials they would contain. Any chemicals introduced to the water column would be quickly diluted and dispersed. Any components or debris would sink to the ocean bottom, where depths in the BOA reach thousands of feet and most special-status marine wildlife and their prey are not likely to occur. Due to the low density and patchy distribution of special-status species in the BOA, the likelihood of an animal coming into contact with hazardous materials from vehicle components is extremely low and no impacts are expected.

With regards to special-status species, the DAF has evaluated the potential effects on these species under the requirements of the ESA, MMPA, and MBTA. The DAF has concluded that all the effects of the Proposed Action on ESA-listed species in the BOA would be discountable or insignificant. Based on analyses of several DOD vehicle flight test programs with the same or similar activities in the Central Pacific Ocean BOA (U.S. Navy 2019, USAF 2020, USAF 2021, U.S. Army and U.S. Navy 2022) and subsequent review of these analyses by the NMFS and USFWS (NMFS 2021, NMFS 2019a, NMFS 2019b, USFWS 2019) the DAF has concluded that the effects of the Proposed Action on ESA-listed marine mammals, sea turtles, and fish would be the same as under other DOD programs where the NMFS has concurred with the conclusion that that these test activities may affect but are not likely to adversely affect ESA-listed species in the region of influence. The DAF has consulted with the NMFS for potential effects and has requested their concurrence that proposed activities may affect but are not likely to adversely affect marine ESA-listed species. On 13 June 2022, NMFS issued a Letter of Concurrence with DAF's conclusions for ESA-listed species (**Appendix A**). The DAF has concluded that the Proposed Action would have no discernable effect on ESA-listed seabirds in the BOA. The Proposed Action would not result in incidental take of any marine mammal species protected under the MMPA or of birds protected under the MBTA in the BOA.

The exact location of vehicle component splashdown in the BOA is not available at this time, but vehicle components are not planned to splash down in the U.S. exclusive economic zone near Wake Atoll where essential fish habitat has been designated and where a marine national monument occurs. No impacts to essential fish habitat are expected as a result of the Proposed

#### 4.0 Environmental Consequences

Action. Similarly, no part of the Proposed Action is expected to adversely impact the Pacific Islands Marine National Monument.

##### **Avoidance and Minimization Measures**

The avoidance and minimization measure listed below would be implemented to reduce the anticipated impacts from implementation of the Proposed Action.

- Vessel operations will not involve any intentional ocean discharges of fuel, toxic wastes, or plastics and other solid wastes that could potentially harm marine life.
  - All equipment will be inspected daily, prior to use, for leaks, structural integrity, and potential pollutants prior to the start of transportation/installation activities. Equipment will be cleaned of any petroleum-based product or other potential polluting material that could be released into the marine environment.
  - A spill kit will be maintained onsite. Any spills will be responded to immediately to prevent discharge.
- During vessel operations, ship personnel would use SOPs to monitor for marine mammals and sea turtles and to avoid potential vessel strikes.
  - When piloting vessels, vessel operators shall alter course to move at least 164 feet (50 meters) from marine mammals and sea turtles, and maintain this distance. Vessel operators and survey crew leaders will maintain a proper lookout for marine mammals and other sea-life.
  - If marine mammals or sea turtles are observed within 164 feet (50 meters) of the vessel, the vessel operator shall reduce the speed to 10 knots or less until the species are beyond 164 feet (50 meters).
  - If sea turtles are observed within 164 feet (50 meters) of the vessel, the vessel operator shall reduce the speed, if practicable, to 5 knots or less.
  - If despite efforts to maintain the distances and speeds described above, a marine mammal or sea turtle approaches the vessel, the engine shall be put in neutral until the animal is at least 40 feet (12 meters) away, and then slowly move away to the prescribed distance. Operation will not resume until the protected species has departed the immediate area of its own volition. If maintaining a 40 foot (12 meter) distance is not possible due to high sea turtle density, reduce vessel speeds to 5 knots.
  - During movement, marine vessels should maintain speed and a straight course (i.e., no swerving) in the event spinner dolphins or other dolphins ride along the wake of the bow.
  - Marine mammals, sea turtles and other ESA-listed motile species shall not be encircled or trapped between multiple vessels or between vessels and the shore.



- Vessel operations will cease during adverse meteorological conditions or sea state.
- Project personnel would not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA-listed marine species.

### **4.2.3 U.S. Army Kwajalein Atoll**

#### **4.2.3.1 Biological Resources – USAKA**

All biological resources in the region of influence have been considered and evaluated for potential impacts from proposed activities. Discussion of environmental consequences in this section focuses on important or sensitive biological resources with the potential to be affected by the Proposed Action. Species or habitats with low sensitivity or that would not be impacted are not discussed in detail in this section.

#### **Terrestrial Activities**

On Gagan Islet, proposed pre-launch and flight test activities have the potential to impact biological resources through disturbance from human activity. There will be no vegetation clearing, vehicle component impacts or debris, construction, or heavy equipment operation on Gagan Islet. Overall, pre-launch activities would have no or negligible impact on biological resources on Gagan Islet.

Proposed terrestrial activities would not impact vegetation as all activities are planned at existing RTS locations which are previously disturbed areas with little vegetation. All test personnel deployed to Gagan Islet would receive training regarding the presence and potential nesting of migratory bird species on Gagan Islet the importance of not disturbing nesting birds. With implementation of training, there would be negligible to minor short-term impacts to terrestrial wildlife due to terrestrial activities. While some bird species are known to use and even nest on Gagan Islet, test activities are not expected to disturb birds to the extent that they would abandon nests or suffer nest failure. Birds that use this area are likely habituated to the regular activities which occur for other test programs at RTS on Gagan Islet. Bird activity on Gagan Islet is expected to remain normal both during and after proposed test activities.

#### **Marine Activities**

As with the BOA, the Proposed Action has the potential to impact marine biological resources in the deep waters of Kwajalein Atoll due to elevated noise levels, physical injury due to falling components, human activity and equipment operation, and hazardous materials and debris. No vehicle components or debris would impact in reef or other shallow-water areas.

Splashdown of components may create sound pressures above the temporary auditory injury threshold for wildlife but only over small areas. Maximum sound pressures are estimated to be less than 240 dB re 1  $\mu$ Pa at 10 feet from the terminal location based on sound pressure levels for other test programs (USAF 2021). Some common wildlife such as common fish species may

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be exposed to elevated sound pressures high enough to cause temporary injury or behavioral disturbance. However, elevated sound pressures would not change the population size or distribution of any species and sound impacts would be less than significant. Based on their low densities in the region of influence, no special-status species are expected to be injured by elevated sound pressures. While unlikely, based on the low density of special-status species in the region of influence and the small number of tests (two total), any effects of elevated sound levels would be limited to short-duration behavioral responses. Animals would be expected to return to normal behaviors within minutes of the short-duration (no more than a few seconds) sound and no lasting effects are expected. Overall, elevated noise levels would not significantly impact marine wildlife in the region of influence.

Physical injury due to direct contact from splashdown of components or debris is not expected to impact special-status marine mammals, sea turtles, seabirds, or fish in the region of influence. As with other recent DOD test programs with similar vehicle component splashdowns in the Kwajalein Atoll area (U.S. Navy 2019, USAF 2021), the chances of any individual special-status wildlife being injured are extremely low due to their low densities and distributions in RMI waters. No special-status animals are expected to be injured or otherwise adversely affected by vehicle splashdown. While there is a greater chance of physical injury for some common and widely distributed pelagic wildlife species, direct contact would not change the population size or distribution of any common wildlife species in the Kwajalein Atoll or in RMI waters.

Hazardous material and debris release at Kwajalein Atoll is not likely to adversely impact marine wildlife. Any chemicals introduced to the water column would be quickly diluted and dispersed. Any components or debris is expected to sink to the ocean bottom, where waters are deep and most special-status marine wildlife and their prey are not likely to occur. As a conservation measure, the Proponents would conduct a post-test evaluation of the terminal test location to ensure that all debris sank to the ocean floor. In the event that test debris is found on the ocean surface or is otherwise visible under the surface, debris would be cleaned up to minimize the possibility of entanglement or ingestion by marine wildlife. Due to the low density and patchy distribution of special-status species in the BOA and the planned cleanup of any floating debris, the likelihood of an animal coming into contact with hazardous materials from vehicle components is extremely low and no impacts are expected.

Human activity would have minor impacts on marine wildlife in the Kwajalein Atoll area. Marine wildlife in this area could be exposed to vessel traffic; however, only a small number of vessel trips would be required in this area to deploy and retrieve instrumentation sensors, equipment, and personnel to Gagan Islet and the Kwajalein Atoll area. Post-flight operations would only include a small number of vessel trips to retrieve instrumentation sensors and any visible, floating debris. While marine mammals and sea turtles must surface to breathe and are known to bask at the ocean surface, these are highly mobile animals capable of avoiding vessels, and they may already be used to some vessel traffic in the Kwajalein Atoll area. All vessels would abide by SOPs for avoiding marine mammal and sea turtle collisions including adjusting speed

and direction as needed based on ocean conditions, visibility, and safety, to avoid marine wildlife. Any noise and visual stimuli from operations would be of relatively low intensity and would not be expected to produce more than a momentary reaction from individual wildlife and is not expected to disrupt important behaviors such as reproduction, foraging, and daily or seasonal movements. No impacts to numbers, distributions, or populations of any wildlife species would be anticipated to result from proposed activities. Given that special-status species density in this area is low and seasonal, the chances of any special status individual being impacted by human disturbance or being struck by a vessel are very low.

With regards to special-status species, the DAF has evaluated the potential effects on these species under the requirements of the UES, ESA, MMPA, and MBTA. Pursuant to the ESA and UES, DAF has concluded that the all effects of the Proposed Action on ESA-listed and UES-consultation species at Kwajalein Atoll would be discountable or insignificant. Based on analyses of several DOD vehicle flight test programs with the same or similar activities at Kwajalein Atoll or in other ocean areas (U.S. Navy 2019, USAF 2021, U.S. Navy 2015) and subsequent review of these analyses by the NMFS and USFWS (NMFS 2021, NMFS 2019a, USFWS 2019) the DAF has concluded that the effects of the Proposed Action on consultation marine mammals, sea turtles, and fish would be the same as under other DOD programs where the NMFS has concurred with the conclusion that that these test activities may affect but are not likely to adversely affect ESA-listed and UES-consultation species in the region of influence. The DAF initiated informal consultation with the NMFS under Section 7 of the ESA and Section 3-4 of the UES and requested NMFS concurrence that the Proposed Action may affect but is not likely to adversely affect ESA-listed and UES-consultation species. On 13 June 2022, NMFS issued a Letter of Concurrence with DAF's conclusions for ESA-listed and UES-consultation species (**Appendix A**). The Proposed Action would not result in incidental take of any marine mammal species protected under the MMPA and would have no significant adverse effect on birds protected under the MBTA in the region of influence.

#### **Avoidance and Minimization Measures**

The avoidance and minimization measures listed below would be implemented to reduce the anticipated impacts which would result from implementation of the Proposed Action.

- Vessel operations will not involve any intentional ocean discharges of fuel, toxic wastes, or plastics and other solid wastes that could potentially harm marine life.
  - All equipment will be inspected daily, prior to use, for leaks, structural integrity, and potential pollutants prior to the start of transportation/installation activities. Equipment will be cleaned of any petroleum-based product or other potential polluting material that could be released into the marine environment.
  - A spill kit will be maintained onsite. Any spills will be responded to immediately to prevent discharge to the lagoon or other water sources and reported in accordance with the Kwajalein Environmental Emergency Plan.

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- The Action Proponents will conduct a post-test evaluation of the terminal test location to ensure that all debris sank to the ocean floor. In the event that test debris is found on the ocean surface or is otherwise visible under the surface, debris will be cleaned up to minimize the possibility of entanglement or ingestion by marine wildlife.
- During vessel operations, ship personnel would use SOPs to monitor for marine mammals and sea turtles and to avoid potential vessel strikes.
  - When piloting vessels, vessel operators shall alter course to move at least 164 feet (50 meters) from marine mammals, UES-listed fish, and sea turtles, and maintain this distance. Vessel operators and survey crew leaders will maintain a proper lookout for marine mammals and other sea-life.
  - If marine mammals, UES-listed fish, or sea turtles are observed within 164 feet (50 meters) of the vessel, the vessel operator shall reduce the speed to 10 knots or less until the species are beyond 164 feet (50 meters).
  - If sea turtles are observed within 164 feet (50 meters) of the vessel, the vessel operator shall reduce the speed, if practicable, to 5 knots or less.
  - If despite efforts to maintain the distances and speeds described above, a marine mammal, UES-listed fish, or sea turtle approaches the vessel, the engine shall be put in neutral until the animal is at least 40 feet (12 meters) away, and then slowly move away to the prescribed distance. Operation will not resume until the protected species has departed the immediate area of its own volition. If maintaining a 40 foot (12 meter) distance is not possible due to high sea turtle density, reduce vessel speeds to 5 knots.
  - During movement, marine vessels should maintain speed and a straight course (i.e., no swerving) in the event spinner dolphins or other dolphins ride along the wake of the bow.
  - Marine mammals, sea turtles, and other ESA or UES-listed motile species shall not be encircled or trapped between multiple vessels or between vessels and the shore.
- Every effort will be made to anchor the vessels in sandy bottom areas or substrates free of UES-consultation species. Where possible divers will assist in placing and securing the anchor. In the event this is not possible, no anchoring will take place at that location and operations will occur from a floating/drifting vessel or the vessel will be relocated to a compliant anchoring area.
- Vessel operations will cease during adverse meteorological conditions or sea state.
- Project personnel would not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA or UES-listed marine species.

#### 4.2.3.2 Climate Change – USAKA

Climate change impacts occurring on the RMI include a rise in sea level and ocean temperature. Additionally, there are other project-related emissions from fixed and mobile sources at RTS. However, these changes and activities are unlikely to significantly affect the ability to implement the Proposed Action.

As noted in Section 3.3.2, according to the recent reports on Climate Change (International Panel on Climate Change 2021), the following factors are projected to be of the most concern to the Pacific Islands before 2050: mean air temperature, atmospheric surface CO<sub>2</sub>, ocean acidity, relative sea level, marine heatwave, coastal flooding, coastal erosion, heavy precipitation, and extreme heat. Trends in the RMI are consistent with global patterns of warming and sea level rise. The test flights do not originate from an RTS launch site or range; therefore, emissions released during the Proposed Action flight test are not anticipated to impact climate characteristics at RMI.

### 4.3 Cumulative Impacts

Cumulative impacts are defined by the CEQ in 40 CFR 1508.7 as “impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.” The cumulative impacts could occur as a result of multiple projects occurring simultaneously within the same vicinity. Thus, each resource is analyzed in terms of its ability to accommodate additional effects of the Proposed Action in combination with past, present, or reasonably foreseeable future projects within this timeframe. All past, present, and reasonably foreseeable future actions listed on Tables 4-1 and 4-2 will continue to occur regardless of the execution of the Proposed Action.

#### 4.3.1 Wake Island

**Table 4-1** summarizes past, present, and reasonably foreseeable future actions within the vicinity of the project area that could interact with the implementation of the Proposed Action.

Table 4-1. Wake Island Projects			
Action		Description of Project	Status
1.	Launch activities	Various launch activities from other DOD programs	Ongoing

#### Biological Resources – Wake Island

The Proposed Action would not meaningfully contribute to cumulative impacts to biological resources at Wake Atoll. Wake Island is routinely used for DOD test activities and the existing biotic environment at Peacock Point has been shaped by these routine testing activities. The

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Proposed Action would occur under existing conservation measures implemented by the USAF at Wake Island, including the Integrated Natural Resources Management Plan and Biosecurity Plan (MDA 2015). The two proposed flight tests for the Proposed Action would have negligible impacts on biological resources and no cumulative impacts on biological resources are expected.

##### **Cultural Resources – Wake Island**

When reviewed against ongoing and reasonably foreseeable actions at Wake Island, the proposed activities associated with this EA/OEA would have no appreciable cumulative effects on cultural resources. Cumulative impacts to cultural resources from the Proposed Action in conjunction with other Wake Island projects would be not significant.

##### **Hazardous Material and Waste – Wake Island**

Hazardous material used and any hazardous waste generated would be very similar to material and waste presently generated on Wake Island. All materials would be stored and handled according to appropriate health and safety procedures, and all hazardous waste generated during the operation would be handled in accordance with applicable regulatory requirements. Cumulative impacts to hazardous materials and hazardous waste would be not significant.

##### **Infrastructure – Wake Island**

The use of infrastructure facilities at Wake for launch activities has been analyzed in previous documents (i.e., Wake Island Launch Center Supplemental EA, 1999; MDA Wake Island Supplemental EA, 2007) which concluded no cumulative impacts to infrastructure and transportation would be expected from implementing launch test activities. Because the USSF SSC activities would only use a small portion of Wake Island and for only a few weeks at a time for two flight tests, no impacts are anticipated from the Proposed Action; therefore, cumulative impacts to transportation would not be significant.

##### **Noise – Wake Island**

Personnel in the immediate vicinity of launch pad activities would utilize proper ear protection. All facilities associated with the USSF SSC operations would adhere to the requirements of DAF Occupational Safety and Health Standard 48-20, Occupational Noise and Hearing Conservation Program.

##### **Safety and Occupational Health – Wake Island**

Flight test launch operations within the military have been conducted for many years. Safety requirements have been developed based on DAF and other applicable health and safety regulations. While there would be risks associated with launch activities, the use of standard safety procedures minimizes the risks. The probability for a launch mishap is very low.

The increased use of fuels, explosives, and the performance of two launch related activities would represent a small increase in the potential safety risk at Wake. No cumulative impacts to health and safety are predicted as a result of the Proposed Action.

### Water – Wake Island

No cumulative effects to water resources are anticipated as a result of the Proposed Action.

### 4.3.2 Broad Ocean Areas

#### Biological Resources – BOA

No significant cumulative impacts to biological resources in the BOA are anticipated from implementation of the Proposed Action. No additive or interactive effects with other actions have been identified that would significantly contribute to cumulative impacts.

### 4.3.3 U.S. Army Kwajalein Atoll

**Table 4-2** summarizes past, present, and reasonably foreseeable future actions within the vicinity of the project area that could interact with the implementation of the Proposed Action.

Table 4-2. USAKA Projects			
Action		Description of Project	Status
1.	Minuteman III Flight Testing	Minuteman III missile annual missile flight tests. The post-boost vehicle fragments impact in a predetermined area of the ocean northeast of USAKA in the RMI.	Ongoing
2.	Minuteman III Reentry Vehicle Impacts at Kwajalein Missile Impact Scoring System (KMISS)	Minuteman III missile annual missile flight tests.	Ongoing
3.	U.S. Air Force Air-Launched Rapid Response (ARRW)	The DAF ARRW system program would consist of two booster test flights and four ARRW flight tests designed to prove various aspects of the system's capabilities. Booster test flights would consist of the booster, shroud, and inert payload.	Future
4.	Navy Flight Experiment-2 (FE-2)	The U.S. Navy SSP FE-2 Proposed Action would consist of a flight test designed to prove various aspects of the system's capabilities. The FE-2 launch vehicle consists of a three-stage STARS booster system. This test would be designed to collect data to provide a basis for ground testing, modeling, and simulation of payload performance. The Proposed Action entails ground preparations for the flight test; launch and flight test; impact of the payload; and post launch operations.	Future

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Table 4-2. USAKA Projects (Continued)

Table 4-2. USAKA Projects (Continued)			
Action		Description of Project	Status
5.	Tactical Boost Glide Flight Testing–Defense Advance Research Project (DARPA)	Mobile At-Sea System and the Kwajalein Mobile Range Safety System onboard the U.S. Motor Vessel <i>Worthy</i> .	Future
6.	Hypersonic Flight Test-3 (FT-3)	The U.S. Army FT-3 Proposed Action would consist of a flight test designed to prove various aspects of the launch vehicle and payload system's capabilities. The Proposed Action is an FT-3 launch from PSCA, flight over the Pacific Ocean BOA, and payload impact at Illeginni Islet. Deep-water impact zones are also analyzed as possible payload impact locations. USAG-KA and RTS support of the FT-3 flight test would include base support, range safety, flight test support, and test instrumentation.	Future
7.	Ground Based Strategic Deterrent (GBSD) Test Program	Action would implement booster development, flight testing of the proposed GBSD weapon system, and GBSD FTU training for a new ICBM weapon system that would eventually replace the aging Minuteman III weapon system. Implementation of the test program would include facility construction or modifications at Hill Air Force Base, Vandenberg Space Force Base (VSFB), and Dugway Proving Ground. GBSD flight test activities would be conducted from VSFB and include target impacts at USAKA in the RMI.	Future
8.	Flight Test Aegis Weapon System-44 (FTM-44)	Flight test of an Aegis BMD-equipped vessel using the SM-3 Block IIA guided missile (MDA)	Future
9.	Glory Trip (GT)	Air Force's Glory Trip. An unarmed Minuteman III intercontinental ballistic missile launched from VSFB, California, with impact near USASMD's Ronald Reagan Ballistic Missile Defense Test Site on Kwajalein Atoll in the RMI. Validate and verify the effectiveness, readiness, and accuracy of the weapon system and to ensure the United States' nuclear deterrent is safe, secure, reliable, and effective to deter 21st century threats and reassure America's allies.	Future
10.	FTX-42	Tracking Exercise Flight Test (MDA)	Future
11.	FTT-25	Intercept Flight Test (MDA)	Future
12.	FTG-17	Intercept Flight Test (MDA)	Future
13.	GM CTV	Non-Intercept Launch Event (MDA)	Future



### **Biological Resources – USAKA**

Implementation of the Proposed Action at USAKA is not expected to result in significant cumulative impacts on biological resources. It is possible that testing activities at USAKA/RTS could have additive effects on biological resources including long-term addition of man-made objects to the ocean, cumulative amounts of hazardous materials in the habitats at Gagan Islet, or increased frequency of disturbance events. While these cumulative impacts are possible, a number of protective measures are in place under the UES. These measures include biennial monitoring of biological resources at Gagan Islet. Considering the protective measures in place to detect and respond to any long-term or cumulative impacts to biological resources at USAKA, cumulative impacts resulting from implementation of the Proposed Action would not be significant.

### **Climate Change – USAKA**

The magnitude of climate change beyond the next few decades will depend primarily on the amount of greenhouse gases (especially carbon dioxide) emitted globally. Implementation of the Proposed Action at USAKA is not expected to result in significant cumulative impacts on climate change.

## **4.4 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898)**

Proposed activities would be conducted in a manner that would not substantially affect human health and the environment and would not create Environmental Justice concerns. No native population resides at Wake, which is occupied by military and contractor personnel. No native population resides at Gagan Islet. Marshallese are located on other islands in the Kwajalein Atoll (i.e., Ebeye, Majuro). This EA/OEA has identified no effects that would result in disproportionately high or adverse effect on minority or low-income populations in the area (Kwajalein Atoll). The activities also would be conducted in a manner that would not exclude persons from participating in, deny persons the benefits of, or subject persons to discrimination because of their race, color, national origin, or socioeconomic status.

## **4.5 Federal Actions to Address Protection of Children from Environmental Health Risks and Safety Risks (Executive Order 13045, as Amended by Executive Order 13229)**

This EA/OEA has not identified any environmental health and safety risks that may disproportionately affect children, in compliance with Executive Order 13045, as amended by Executive Order 13229.

#### *4.0 Environmental Consequences*

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## 5.0 References

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- Aaron, J. 2008. *Cultural Resources Inventory and Determination of Eligibility of Post-World War II Cultural Resources at Wake Atoll*, prepared by Engineering-Environmental Management, Inc., Englewood, CO, for the U.S. Air Force, 15th Airlift Wing, 15 Civil Engineer Squadron, Environmental Division, Hickam Air Force Base, HI.
- Australian Bureau of Meteorology. 2014. Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia.
- Defenders of Wildlife. 2015. A Petition to list the Giant Manta Ray (*Manta birostris*), Reef Manta Ray (*Manta alfredi*), and Caribbean Manta Ray (*Manta c.f. birostris*) as Endangered, or Alternatively as Threatened, Species Pursuant to the Endangered Species Act and for the Concurrent Designation of Critical Habitat. Submitted to the U.S. Secretary of Commerce acting through the National Oceanic and Atmospheric Administration and the National Marine Fisheries Service.
- Downey, K. 2019. "The US Military is Pouring Hundreds of Millions of Dollars Into Tiny Wake Island." In Honolulu Civil Beat, 15 October 2019. Available online: <https://www.civilbeat.org/2019/10/the-u-s-military-is-pouring-hundreds-of-millions-of-dollars-into-tiny-wake-island/>. Accessed April 2022.
- Foothill Engineering Consultants. 2000. *Cultural Resources Management Plan for Wake Island Airfield*, prepared by Foothill Engineering Consultants, Inc., Golden, CO, for the Air Force Center for Environmental Excellence, Brooks AFB, TX, and 15th Civil Engineer Squadron – Environmental Planning Element, Hickam AFB, HI.
- Hitchcock, L. 2003. *Cultural Resources Questions*. Manuscript in the possession of L. Hitchcock prepared at Wake Island. As cited in the *Integrated Cultural Resources Management Plan, Wake Island Airfield*, July 2020.
- International Panel on Climate Change. 2021. Climate Change Information for Regional Impact and for Risk Assessment. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. V. Masson-Delmotte, P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.). Cambridge University Press. doi: 10.1017/9781009157896.014.

## 5.0 References

- Jackson, T. L. 1996. *Historic Preservation Plan for Wake Island Airfield, Wake Island*, prepared for U.S. Army Corps of Engineers, Pacific Ocean Division, Fort Shafter, HI, April 1996.
- Kelley, C., J. Konter, and B. R. C. Kennedy. 2017. First Deep Exploration in the Wake Unit of the Pacific Remote Islands Marine National Monument. Pages 68-71 in Bell, K. L. C., J. Flanders, A. Bowman, and N. A. Raineault, eds. 2017. New frontiers in ocean exploration: The E/V Nautilus, NOAA Ship Okeanos Explorer, and R/V Falkor 2016 field season. *Oceanography* 30(1), supplement. Available online: <https://doi.org/10.5670/oceanog.2017.supplement.01>.
- Kelley, C., C. Mah, M. Malik, and K. Elliott. 2018. Laulima O Ka Moana: Exploring Deep Monument Waters Around Johnston Atoll. Pages 80-81 in Raineault, N. A., J. Flanders, and A. Bowman, eds. New frontiers in ocean exploration: The E/V Nautilus, NOAA Ship Okeanos Explorer, and R/V Falkor 2017 field season. *Oceanography* 31(1), supplement, 126 pp. Available online: <https://doi.org/10.5670/oceanog.2018.supplement.01>.
- Leeper, K. B. 2014. Comments provided on the *Integrated Flight Tests at Wake Island Preliminary Draft Environmental Assessment*. September 10, 2014. As cited in the *Integrated Cultural Resources Management Plan, Wake Island Airfield*, July 2020.
- Lodi News Sentinel. 1952. "750 on Wake Escape Death In Big Storm." Wednesday September 17, pg. 5.
- Maison, K. A., I. K. Kelly, and K. P. Frutchey. 2010. Green Turtle Nesting Sites and Sea Turtle Legislation throughout Oceania. NOAA Technical Memo NMFS-F/SPO-110. September 2010.
- Marshall, A., M. B. Bennett, G. Kodja, S. Hinojosa-Alvarez, F. Galvan-Magana, M. Harding, G. Stevens, and T. Kashiwagi. 2011. *Manta birostris*. The IUCN Red List of Threatened Species 2011: e.T198921A9108067. Available online: [www.iucnredlist.org](http://www.iucnredlist.org). Downloaded March 2016.
- McAllaster, W. and J. Davidson. 2011. *Historic American Landscape Survey (HALS), Wake Island (Wake Island National Historic Landmark), HALS No. UM-1*, prepared by Mason Architects, Inc., and Helber, Hastert, and Fee, Planners, Inc., Honolulu, HI, May 2011.
- McClain, C. R., L. Lundsten, J. Barry, and A. DeVogelaere. 2010. Assemblage structure, but not diversity or density, change with depth on a northeast Pacific seamount. *Marine Ecology*, 31(1), 14-25.
- MDA (Missile Defense Agency). 2004. *Mobile Launch Platform Environmental Assessment*. June 2004.
- MDA. 2007. *Flexible Target Family Environmental Assessment*. October 2007. Available online: [https://www.mda.mil/global/documents/pdf/env\\_target\\_ftf\\_ea.pdf](https://www.mda.mil/global/documents/pdf/env_target_ftf_ea.pdf)

- MDA. 2012. *Integrated Flight Tests at U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site (USAKA/RTS)*. July 2012.
- MDA. 2015. *Integrated Flight Tests at Wake Atoll Final Environmental Assessment*. May. Available online: [https://www.mda.mil/global/documents/pdf/env\\_WakeAtoll\\_IFT\\_FinalEA\\_2015\\_05\\_15.pdf](https://www.mda.mil/global/documents/pdf/env_WakeAtoll_IFT_FinalEA_2015_05_15.pdf)
- Miyamoto, M. and M. Kiyota. 2017. Application of association analysis for identifying indicator taxa of vulnerable marine ecosystems in the Emperor Seamounts area, North Pacific Ocean. *Ecological Indicators*, 78, 301-310.
- Morgan, N. B., S. Cairns, H. Reiswig, and A. R. Baco. 2015. Benthic megafaunal community structure of cobalt-rich manganese crusts on Necker Ridge. *Deep-Sea Research I*, 104, 92-105.
- The Nature Conservancy. n.d. Climate Projections and Impacts for the Republic of the Marshall Islands (RMI). Internet website: [https://reefresilience.org/wp-content/uploads/ClimateSummary\\_RMI.pdf](https://reefresilience.org/wp-content/uploads/ClimateSummary_RMI.pdf)
- Nishizawa, B., D. Ochi, H. Minami, K. Yokawa, S. Saitoh, and Y. Watanuki. 2015. Habitats of two albatross species during the non-breeding season in the North Pacific Transition Zone. *Marine Biology*, 162, 743-752.
- NMFS (National Marine Fisheries Service). 2019a. Formal Consultation under the Environmental Standards for United States Army Kwajalein Atoll Activities in the Republic of the Marshall Islands: Biological Opinion and Formal Consultation under Section 7 of the Endangered Species Act for Flight Experiment-2 (FE-2). September 2019.
- NMFS. 2019b. Formal Consultation under the Environmental Standards for United States Army Kwajalein Atoll Activities in the Republic of the Marshall Islands: Biological Opinion and Formal Consultation under Section 7 of the Endangered Species Act for the Air-launched Rapid Response Weapon Flight Tests. July 2019.
- NMFS. 2021. Endangered Species Act – Section 7 Consultation for the Ground Based Strategic Defense (GBSD) Test Program. Pacific Islands Region of NMFS. March 2021.
- NMFS and USFWS (National Marine Fisheries Service and United States Fish and Wildlife Service). 2015. Endangered and Threatened Species; Identification and Proposed Listing of Eleven Distinct Population Segments of Green Sea Turtle (*Chelonia mydas*) as Endangered or Threatened and Revision of Current Listings. 80 FR 15272. March 2015.

## 5.0 References

- NOAA (National Oceanic and Atmospheric Administration). 2018. 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) – Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. April 2018.
- NOAA. 2020. Pacific Remote Islands Marine National Monument. Internet website. Last updated by Pacific Islands Regional Office June 2020. [www.fisheries.noaa.gov/pacific-islands/habitat-conservation/pacific-remote-islands-marine-national-monument](http://www.fisheries.noaa.gov/pacific-islands/habitat-conservation/pacific-remote-islands-marine-national-monument).
- NOAA. 2021a. Species Directory. Internet website: <https://www.fisheries.noaa.gov/species-directory>. Accessed 2021.
- NOAA. 2021b. Climate. Internet website: <https://www.noaa.gov/education/resource-collections/climate#:~:text=Climate%20is%20determined%20by%20the,and%20duration%20of%20weather%20events>.
- NOAA. 2022. The State of High Tide Flooding and 2022 Outlook. NOAA Tides & Currents. Internet website: [https://tidesandcurrents.noaa.gov/HighTideFlooding\\_AnnualOutlook.html](https://tidesandcurrents.noaa.gov/HighTideFlooding_AnnualOutlook.html). Accessed August 2022.
- Pacific Climate Change Science Program. 2011. Current and future climate of the Marshall Islands.
- Pacific RISA. 2022. Marshall Islands. Internet website: <https://www.pacificrisa.org/places/republic-of-the-marshall-islands/#:~:text=sites%20%5B5%5D.-,Climate,which%20prevail%20throughout%20the%20year.&text=The%20recorded%20annual%20temperature%20averages,Station%20in%202007%20%5B7%5D>.
- Parrish, F. A. and A. R. Baco. 2007. State of Deep Coral Ecosystems in the Pacific Islands Region: Hawai'i and the U.S. Pacific Territories. pp. 155-194. In: S. E. Lumsden, T. F. Hourigan, A. W. Bruckner, and G. Dorr (eds.) The State of Deep Coral Ecosystems of the United States. NOAA Technical Memorandum CRCP-3. Silver Spring MD. 365 pp.
- Pautzke, S. 2022. Personal communication from Sarah Pautzke, NOAA Fisheries Pacific Islands Regional Office, to David Fuller, U.S. Army Space and Missile Defense Command. March 2022.
- Phillips, M. 2022. Comments (communications) provided by MacKenzie Phillips on the Preliminary Final EA/OEA via comment matrix for “chg 611 CES Comments on USSF Flight Test EA”.
- PRSC (Pacific Air Forces Regional Support Center). 2015. Wake Island Biosecurity Management Plan. Edition 4.0. June 2015.

- PRSC. 2017. Integrated Natural Resources Management Plan Wake Island Airfield; Kōke`e Air Force Station, Kaua`i, Hawai`i; and Mount Ka`ala Air Force Station, O`ahu, Hawai`i. April 2017.
- PRSC. 2019. *Draft Final Environmental Assessment for Management of Invasive Vegetation on Wake Islands Airfield, Wake Atoll, Pacific Ocean*. November 2019.
- Pyle, R. L. and P. Pyle. 2009. *The Birds of the Hawaiian Islands: Occurrence, History, Distribution, and Status*. B.P. Bishop Museum, Honolulu, HI, U.S.A. Version 1. December 2009.
- Spennemann, D. H. R. 2000. The Wreck of the *Libelle* and other Early European Visitors to Wake Island, Central Pacific. Available online: <http://marshall.csu.edu.au/Marshalls/html/Wake/WakeVisitors02-Text.html>. Document accessed April 2022.
- Stanford, J. 2022. Comments(communications) provided by James Stanford on the Preliminary Final EA/OEA via comment matrix for “chg 611 CES Comments on USSF Flight Test EA.”
- Thompson, E. N. 1984. “National Register of Historic Places Inventory – Nomination Form for Wake Island.” U.S. Department of the Interior, National Park Service, 1984.
- U.S. Army. 2021. *Environmental Assessment/Overseas Environmental Assessment for Hypersonic Flight Test-3 Activities*. April 2021.
- U.S. Army and U.S. Navy. 2022. *Joint Flight Campaign Programmatic Environmental Assessment/Overseas Environmental Assessment*. February 2022.
- U.S. Navy. 2015. *Environmental Assessment Atlantic Test Ranges Expansion of Unmanned Systems Operations*. Naval Air Warfare Center, Aircraft Division. September 2015.
- U.S. Navy. 2019. *Final Environmental Assessment/Overseas Environmental Assessment for Flight Experiment 2 (FE-2)*. December 2019.
- UNEP (United Nations Environment Programme). 2006. Ecosystems and Biodiversity in Deep Waters and High Seas. UNEP Regional Seas Reports and Studies No. 178. UNEP/ IUCN, Switzerland 2006. ISBN: 92-807-2734-6.
- Urwin, G. J. W. 1997. *Facing Fearful Odds: The Siege of Wake Island*, University of Nebraska Press, Lincoln, NE.
- USAF (United States Air Force). 2010. *Final Environmental Assessment Addressing the Demolition and Construction of Facilities on Wake Atoll*. September 2010. As cited in *Integrated Flight Tests at Wake Atoll Final Environmental Assessment* (MDA 2015).

## 5.0 References

- USAF, 611 CES (Civil Engineer Squadron). 2020. *Integrated Cultural Resources Management Plan Wake Island Airfield*. July. Updates the 1996 Historic Preservation Plan and 2000 Cultural Resources Management Plan for Wake Island Atoll as required by AFI.
- USAF. 2020. *Air-Launched Rapid Response Weapon (ARRW) Environmental Assessment/Overseas Environmental Assessment*. July 2020.
- USAF. 2021. *Final Ground Based Strategic Deterrent Test Program Environmental Assessment / Overseas Environmental Assessment*. June 2021.
- USAF and USASMDC (United States Air Force and United States Army Space and Missile Defense Command). 2019. *Biological Assessment for the Air-launched Rapid Response Weapon*. January 2019.
- USAF Space and Missile Systems Center. 2010. *Finding of No Significant Impact and Environmental Assessment for Conventional Strike Missile Demonstration*. August 2010.
- USAID (United States Agency for International Development). 2021. The Republic of the Marshall Islands Climate Change Country Profile. Internet website: <https://www.climatelinks.org/resources/republic-marshall-islands-climate-change-country-profile>
- USASMDC (United States Army Space and Missile Defense Command). 1999. *Wake Island Launch Center (WILC) Supplemental Environment Assessment*. October. Available online: [https://www.mda.mil/global/documents/pdf/env\\_wake\\_fsea\\_99.pdf](https://www.mda.mil/global/documents/pdf/env_wake_fsea_99.pdf)
- USASMDC. 2014. *Kwajalein Missile Impact Scoring System Refurbishment Environmental Assessment*. April 2014.
- USASMDC. 2021. Environmental Standards and Procedures for United States Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands (UES), 16th Edition.
- USASSDC (United States Army Space and Strategic Defense Command). 1994a. *Theater Missile Defense Hera Target Systems Environmental Assessment*. January 1994.
- USASSDC. 1994b. *Wake Island Environmental Assessment*, January. Available online: [https://www.mda.mil/global/documents/pdf/env\\_wake\\_ea\\_94.pdf](https://www.mda.mil/global/documents/pdf/env_wake_ea_94.pdf)
- USEPA (United States Environmental Protection Agency). 2020. Air Quality and Climate Change Research. Available online: <https://www.epa.gov/air-research/air-quality-and-climate-change-research>



- USFWS (United States Fish and Wildlife Service). 2005. Regional Seabird Conservation Plan, Pacific Region, U.S. Fish and Wildlife Service, Migratory Birds and Habitat Programs, Pacific Region, Portland Oregon.
- USFWS. 2014. Wake Atoll National Wildlife Refuge. About the Refuge. Available online: [https://www.fws.gov/refuge/Wake\\_Atoll/about.html](https://www.fws.gov/refuge/Wake_Atoll/about.html). Last updated November 2014. Accessed July 2021.
- USFWS. 2015. Proposed Rule to list 49 Species from the Hawaiian Islands as Endangered. 80 FR 58820-58909. September 2015.
- USFWS. 2019. Letter of Concurrence for Flight Experiment-2 under Section 7 of the ESA. Pacific Islands Fish and Wildlife Office. July 2019.
- Verhaaren, B. T. and D. Kullen. 2015. *Argonne National Laboratory Integrated Cultural Resources Management Plan October 2015 – September 2020 for Wake Island Airfield, 611th Civil Engineer Squadron, PACAF Regional Support Center Alaska*. May 2015.
- WPRFMC (Western Pacific Regional Fishery Management Council). 2009. Fishery Ecosystem Plan for the Pacific Remote Island Area. September 2009.
- Young, C. N., Carlson, J., Hutchinson, M., Hutt, C., Kobayashi, D., McCandless, C. T., Wraith, J. 2018. Status review report: oceanic whitetip shark (*Carcharhinus longimanus*). Final Report to the National Marine Fisheries Service, Office of Protected Resources. December 2017. 170 pp.

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