Endangered Species Act (ESA) Section 7(a)(2) and Environmental Standards of the United States Army Kwajalein Atoll Activities in the Republic of the Marshall Islands Biological Opinion and Conference

Action Agency:	The Department of the Navy Strategic Systems Programs and the United States Army Space and Missile Defense Command
Federal Action:	Navy Conventional Prompt Strike Weapon System Flight Tests Activities
Consultation Conducted by:	National Marine Fisheries Service, Pacific Islands Region, Protected Resources Division
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TABLE OF CONTENTS

1 Introduction ... 6

1.1 Consultation History ... 7

1.2 Proposed Federal Action ... 8

1.2.1 CPS launch vehicle ... 9
1.2.2 Pre-Launch Preparations and Operations ... 10
1.2.3 Vehicle Launch and Flight ... 16
1.2.4 Terminal Phase operations ... 17
1.2.5 Proposed Best Management Practices ... 19

1.3 Action Area ... 22

1.4 Analytical Approach ... 22

2 Status of the Listed Resources ... 35

2.1 Climate Change ... 36

2.2 Status of the Species ... 38

2.2.1 Humphead Wrasse ... 38
2.2.2 Bumphead Parrotfish ... 41
2.2.3 Corals ... 42
2.2.4 *Tectus niloticus* (Top Shell Snail) ... 46
2.2.5 Clams ... 47

3 Environmental Baseline ... 49

4 Effects of the Action ... 55

4.1 Stressors ... 56

4.2 Fish ... 61

4.2.1 Exposure ... 61
4.2.2 Response ... 65

4.3 Corals ... 66

4.3.1 Exposure ... 66
4.3.2 Response ... 67

4.4 Mollusks ... 69

4.4.1 Exposure ... 69
4.4.2 Response ... 70

5 Cumulative Effects ... 71

6 Integration and Synthesis ... 72

6.1 Fish ... 72

6.2 Corals ... 74

6.3 Mollusks ... 76

7 Conclusion ... 77

8 Incidental Take Statement ... 77

8.1 Amount or Extent of Take ... 78

8.2 Reasonable and Prudent Measures ... 79

8.3 Terms and Conditions ... 80

8.4 Conservation Recommendations ... 80

8.5 Reinitiation of Consultation ... 81

9 Not Likely to Adversely Affect Determinations ... 81

9.1 Stressors Not Likely to Adversely Affect Listed Resources ... 81

9.1.1 Exposure to Elevated Sound ... 90
9.1.2 Direct Contact ... 94
9.1.3 Exposure to Hazardous Materials, Waste and Discharges ... 97
9.1.4 Collisions with Vessels ... 98

9.2 Critical Habitats Not Likely Adversely Affected ... 100

9.2.1 Exposure to elevated sounds ... 103
9.2.2 Direct contact ... 104
9.2.3 Exposure to Hazardous Materials, Wastes, and Discharges ... 105

9.3 Conclusion ... 105

10 Literature Cited ... 106

ACRONYMS

BE	Biological Evaluation
BOA	Broad Ocean Area
C-HGB	Common Hypersonic Glide Body
CFR	Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPUE	Catch per Unit Effort
CPS	Conventional Prompt Strike Weapon
cm	Centimeter(s)
dB	Decibel(s)
DPS	Distinct Population Segment
EEZ	U.S. Exclusive Economic Zone
ESA	Endangered Species Act
ESU	Evolutionarily Significant Units
ft.	Feet
FR	Federal Register
FTS	Flight Termination System
GBR	Great Barrier Reef
GHG	Greenhouse Gas
Hz	Hertz
IFKW	Insular False Killer Whales
in	Inch(es)
IPCC	Intergovernmental Panel on Climate Change
ITS	Incidental Take Statement
ITP	Incidental Take Permit
kg	Kilogram(s)
KMISS	Kwajalein Missile Impact Scoring System Test Range
LCM	Landing Craft Mechanized
LCU	Landing Craft Utility
m	Meter(s)
MHI	Main Hawaiian Islands
mi	Miles
MM	Minuteman test programs
mm	Millimeter(s)
nm	Nautical Mile(s)
NMFS	National Marine Fisheries Service (aka NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
OPAREAs	Existing Naval Operating Areas
OPR	Office of Protected Resources
PBFs	Physical and Biological Features
PCEs	Primary Constituent Elements
PIRO	Pacific Islands Regional Office
PRD	Protected Resources Division
PTS	Permanent Threshold Shift
RCP	Representative Concentration Pathway

RMI	Republic of the Marshall Islands
RTS	Ronald Reagan Ballistic Missile Defense Test Site
SPL	Sound Pressure Level
TTS	Temporary Threshold Shift
UES	The standards and procedures described in the Environmental Standards and Procedures for U.S. Army Kwajalein Atoll (USAKA) activities in the Republic of Marshall Islands, 17th edition.
U.S.	United States
USAKA	U.S. Army Kwajalein Atoll
USAG-KA	U.S Army Garrison, Kwajalein Atoll
USFWS	US Fish and Wildlife Service
USASMDC	U.S. Army Space and Missile Defense Command

1 INTRODUCTION

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1536(a)(2)) requires each federal agency to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. The ESA requires federal action agencies to consult with National Marine Fisheries Service (NMFS) when the action may affect a listed species or its designated critical habitat under our jurisdiction (50 CFR 402.14(a)).

The Republic of the Marshall Islands (RMI) has agreed to allow the U.S. Government to use certain areas within the RMI, including eleven islets at Kwajalein Atoll that are administered by U.S. Army Kwajalein Atoll (USAKA). The Compact of Free Association (Compact), as Amended in 2024, governs the relationship between the United States and RMI Governments (48 U.S.C. 1921). Section 161 the Compact obligates the U.S. to apply the National Environmental Policy Act of 1969 (NEPA) to its actions in the RMI as if the RMI were a part of the U.S. The Endangered Species Act of 1973, as amended (ESA) does not apply at USAKA. Instead, the Compact specifically requires the U.S. Government to develop and apply environmental standards that are substantially similar to several U.S. environmental laws, including the ESA and the Marine Mammal Protection Act (MMPA). The standards and procedures described in the Environmental Standards and Procedures for U.S. Army Kwajalein Atoll (USAKA) activities in the Republic of Marshall Islands (USAKA Environmental Standard or UES, 17th Edition) were developed to satisfy that requirement. As such, the U.S. Government must apply the UES to its activities at USAKA and for all USAKA activities in the RMI. Section 3-4 of the UES is derived primarily from 50 CFR 17, 23, 402, 424 and 40-452. Those parts of 50 CFR establish the implementing procedures of the ESA, therefore, this biological opinion was written in a manner that considers and complies with the ESA, as applicable.

Section 7(b)(3) of the ESA and the UES requires that at the conclusion of consultation, we provide a biological opinion (opinion) stating whether the Federal agency's action is likely to jeopardize ESA/ UES-listed species or destroy or adversely modify designated critical habitat. If we determine that the action is likely to jeopardize listed species or destroy or adversely modify critical habitat, in accordance with the ESA section 7(b)(3)(A) and UES section 3-4.5.3(e), we provide a reasonable and prudent alternative that allows the action to proceed in compliance with section 7(a)(2) of the ESA and section 3-4.5.3(f) of the UES. If incidental take is reasonably certain to occur, ESA section 7(b)(4) and UES section 3-4.5.3(e) requires us to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes reasonable and prudent measures that the Director considers necessary or appropriate to

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Under the ESA, the term "take" is defined by the ESA as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. We further define "harass" as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Application and Interpretation of the Term Harass Pursuant to the Endangered Species Act: NMFS Guidance Memo May 2, 2016). NMFS defines harm as "an act which actually kills or injures fish or wildlife." 50 C.F.R. 222.102. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering.

minimize such impacts and terms and conditions to implement the reasonable and prudent measures.

We prepared this opinion and ITS in accordance with section 7(b) of the ESA, sections 161 and 3-4 of the UES, and using the implementing regulations at 50 CFR part 402. We completed a pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). Following signature and finalization, this document will be available at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome].

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act (89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015). We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

1.1 Consultation History

The proposed federal action addressed by this biological opinion is the Navy Conventional Prompt Strike (CPS) Weapon System Flight Tests Activities within the Atlantic and Pacific BOA, and within the territorial waters of Kwajalein Atoll, in the Republic of the Marshall Islands as leased by U.S. Army Kwajalein Atoll (USAG-KA).

On December 8 2023, NMFS Pacific Island Regional Office's Protected Resources Division (PRD) received a letter requesting formal consultation pursuant section 3-4 of Environmental Standards and Procedures for USAKA activities in the Republic of Marshall Islands (UES, 17th Edition) for the Navy CPS Weapon System Flight Tests Activities. On December 20, 2023, NMFS PRD requested a meeting to provide technical assistance related to the project and to update the species list. On January 11, 2024, U.S. Army Space and Missile Defense Command (USASMDC), Navy Strategic Systems Programs (Navy), and NMFS PRD met and agreed that a supplement to the BA was needed

On January 29, 2024, a request for consultation pursuant to section 7(a)(2) of the ESA was received by NMFS's Office of Protected Resources (OPR). On February 6, 2024, NMFS OPR sent a request meeting to discuss technical information and provide technical assistance related to the ESA portion of the project, biologically important areas, and ESA-listed species that may occur in the action area. On February 13, 2024, USASMDC, Navy, and NMFS OPR met resulting in the need for an updated BA.

On March 11, 2024, OPR and PRD met to discuss the consultation requirements under the ESA and UES. We coordinated with OPR to determine that although the action includes activities that occur in the Atlantic, Pacific, and RMI, the most effective and efficient way to analyze these activities was a joint UES and ESA consultation as was done in the past with FE-2, ARRW, and MMIII. On April 5, 2024, all parties met and decided that all activities under the CPS Test Program were a single project, therefore, only a single ESA-UES consultation will be conducted, with NMFS PRD leading the consultation In addition, on April 5, 2024, NMFS PRD received the addendum to the UES BA.

On May 30, 2024, NMFS received an updated ESA BA and on June 11, 2024 NMFS responded with additional technical questions related to vessel transit and two additional species that may occur in the action area.

On July 3, 2024, the action agency responded with all technical information needed to analyze vessel transits and added Ozette lake sockeye salmon to the action. Therefore, we have received the necessary information to evaluate the proposed action and, per your request, acknowledge the initiation of formal consultation as of July 3, 2024.

1.2 Proposed Federal Action

Section 161 of the Compact requires that the U.S. apply standards that are substantially similar to the ESA. Therefore, under the ESA (50 CFR 402.02), the term "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas (see 50 CFR 402.02). The Department of the Navy Strategic Systems Programs and U.S. Army Space and Missile Defense Command proposes to conduct the Navy CPS weapon system (missile) flight tests within the Atlantic and Pacific BOAs. The CPS flight tests will include pre-flight preparations and payload impacts within the BOAs and at Kwajalein Atoll in the Republic of the Marshall Islands (RMI). The proposed action would include up to eight flight test launches, at up to eight different sea-based launch locations per year, conducted over a 10-year period (80 over 10-years) beginning in fiscal year 2025. Up to eight missile flights are expected to terminate within deep ocean waters of the Pacific and Atlantic BOAs or Kwajalein Missile Impact Scoring System (KMISS) test range per year (up to 80 over 10 years). However, the USASMDC/Navy may elect up to one land-based target per year (10 over 10 years) at Illeginni Islet. No more than eight flight tests will occur per year throughout the flight test program. All missile flight tests will be conducted from at-sea launched sites, launched from existing naval vessels operating in Pacific and Atlantic BOAs with ocean-based or land-based payload target locations. After launch, flight tests would include vehicle flight over the Pacific and/or Atlantic Oceans and would involve splashdown of spent boosters and fairings and sea-based payload impacts in the Pacific and Atlantic BOAs.

Within the RMI, launches will occur from within the Pacific BOA, include vehicle flight over the Pacific Ocean and would involve splashdown of spent boosters and fairings with payload target sites at the deep-water KMISS test range and the land target site on Illeginni Islet at the Ronald Reagan Ballistic Missile Defense Test Site (RTS). While actions that are wholly in the Atlantic or Pacific BOA will not occur at USAKA, these activities are part of the larger action and would not occur but for that larger action, in this case the Navy Conventional Prompt Strike Weapon System Flight Tests action. We are required to include the consequences of other activities that are caused by the proposed action.

The proposed action will consist of pre-flight preparations in the BOA and at USAKA, the CPS flight test across the BOAs with two motor splash downs, payload impact, and post-flight impact data collection, debris recovery, and clean-up operations for flights that terminate in the BOA and at USAKA. The following subsections include descriptions of the proposed activities related to the CPS weapon system flight tests scheduled to occur until 2035.

1.2.1 CPS launch vehicle

The CPS launch vehicle will consist of a 2-stage booster system (Table 1) and payload system. Figure 1 shows the CPS missile component characteristics. The first stage motor is 5 meters (m) (16.4 feet [ft]) long with a diameter of 1 m (3.28 ft). The second stage motor is 2 m (6.56 ft) long with a diameter of 1 m and the payload is 3 m (9.84 ft) long and 1 m in diameter. The amount of solid propellant in the two boosters of the vehicle totals approximately 9,000 kilograms (kg; 20,000 pounds [lbs]). The missile will be encased in a launch canister (Figure 1) for safe handling, fielding and to protect the missile from damage.

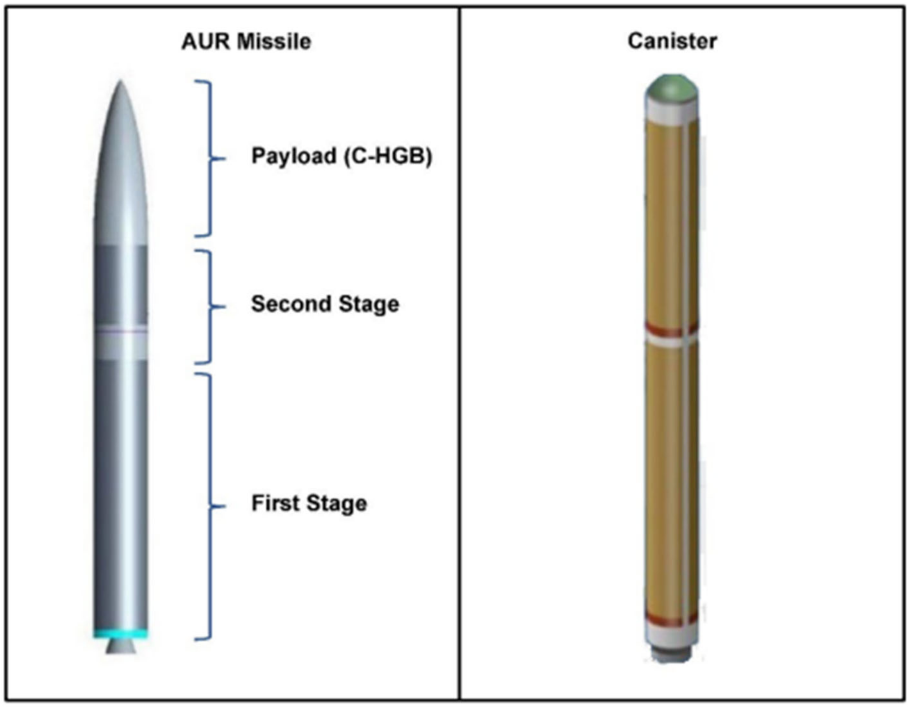
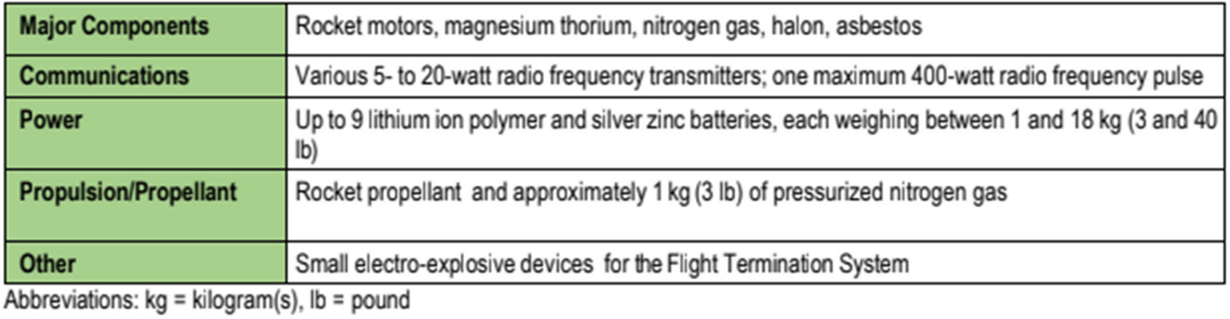


Figure 1.CPS Missile Components

Table 1 details the launch vehicle and payload system characteristics. A Common Hypersonic Glide Body (C-HGB) will be used as the missile payload (Figure 1). The C-HGB payload is a hypersonic glider designed to deliver a conventional warhead payload. After launch, the booster system will release the missile in the upper atmosphere. The C-HGB payload will then glide to the predetermined target location without any propulsion. The C-HGB payload will not contain any propellants or radioactive materials. Flight test payloads may be conventional or may be inert and incorporate a mass simulator.

Table 1.CPS Launch Vehicle and Payload System Characteristics.

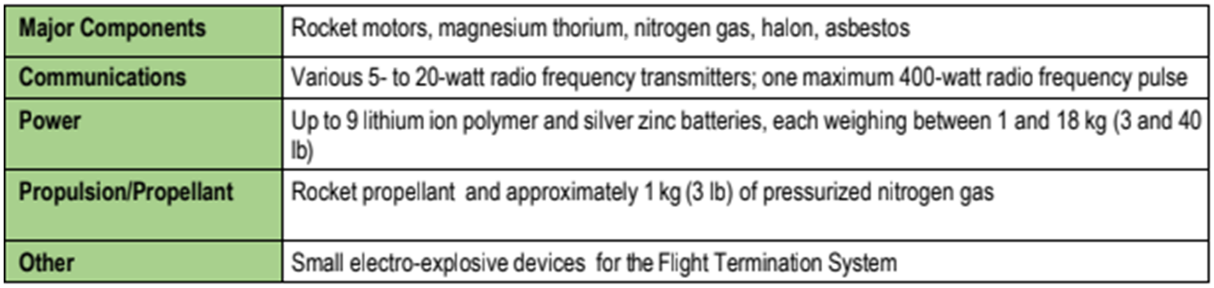


Major Components	Rocket motors, magnesium thorium, nitrogen gas, halon, asbestos
Communications	Various 5- to 20-watt radio frequency transmitters; one maximum 400-watt radio frequency pulse
Power	Up to 9 lithium ion polymer and silver zinc batteries, each weighing between 1 and 18 kg (3 and 40 lb)
Propulsion/Propellant	Rocket propellant and approximately 1 kg (3 lb) of pressurized nitrogen gas
Other	Small electro-explosive devices for the Flight Termination System

Abbreviations: kg = kilogram(s), lb = pound

Table 2 details the payload characteristics. Up to 454 kg (1,000 lbs) of tungsten alloy will be contained in the payload. The flight test vehicle will carry a Flight Termination System (FTS). Project personnel will activate the FTS only if the vehicle were to deviate from its course or should other problems occur during flight. The FTS serves as a destruct package that would stop forward thrust when activated, causing the vehicle to terminate flight and fall into the ocean.

Table 2.CPS Payload Characteristics.



Major Components	Rocket motors, magnesium thorium, nitrogen gas, halon, asbestos
Communications	Various 5- to 20-watt radio frequency transmitters; one maximum 400-watt radio frequency pulse
Power	Up to 9 lithium ion polymer and silver zinc batteries, each weighing between 1 and 18 kg (3 and 40 lb)
Propulsion/Propellant	Rocket propellant and approximately 1 kg (3 lb) of pressurized nitrogen gas
Other	Small electro-explosive devices for the Flight Termination System

1.2.2 Pre-Launch Preparations and Operations

The proposed CPS flight tests would occur within the ocean areas shown in Figure 2 for the Atlantic region and in Figure 3 for the Pacific region. Figure 4 shows the CPS target sites (KMISS and Illeginni islet) within the Kwajalein Atoll. In all instances, test launches would be conducted at least 93 km (50 nm) offshore within the Atlantic and Pacific BOAs. In most cases, test launches will occur within the existing naval operating areas (OPAREAs), sea ranges, and range complexes shown on Figure 2 and Figure 3. However, some launches could occur from more distant locations in international waters within the ocean areas. No launches are planned to occur within the Marine National Monuments, National Marine Sanctuaries, critical habitat, or biologically important areas for sei whale feeding, minke whale feeding, or North Atlantic right whale migration in the Atlantic Ocean located in the ocean study areas (Figure 6 and Figure 7).

Figure 2. Atlantic CPS Flight Test Activity Area

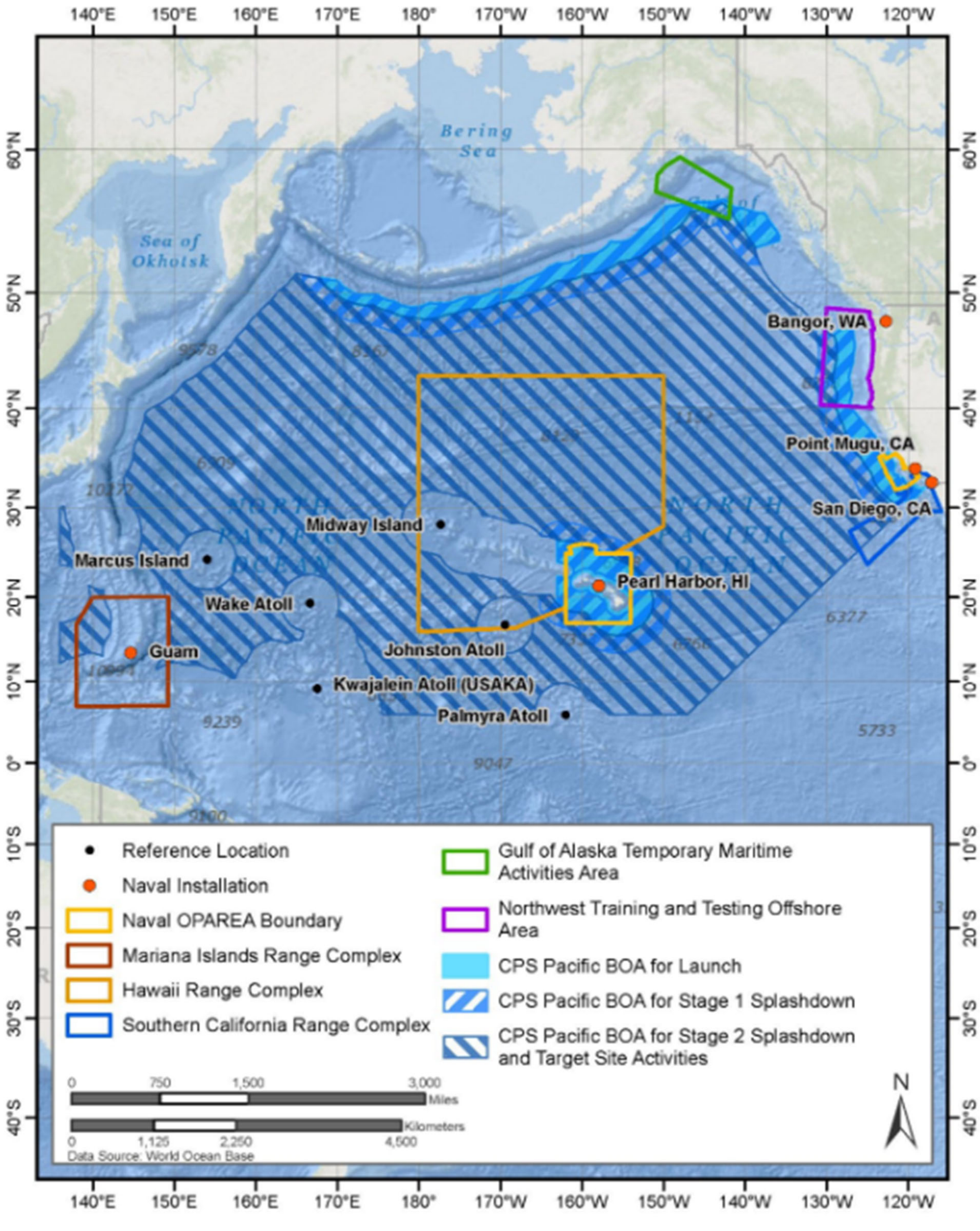
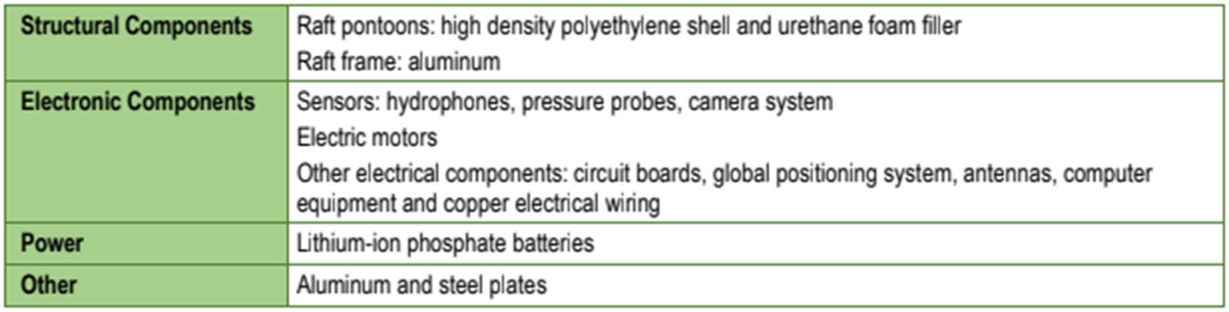


Figure 3.Pacific CPS Flight Test Activity Area

Broad Ocean Area Target Sites
Target sites will be located in the BOA. All BOA payload target sites will be at least 370 km (200 nm) offshore in international waters. The Navy will place self-stationing instrumented rafts, equipped with radar, telemetry, and acoustic and optical sensors, around the target sites in the Atlantic and Pacific BOAs, to the C-HGB ocean impact. The rafts will use battery powered trolling motors to maintain position, no anchoring systems will be used. Naval personnel may deploy up to 12 sensor rafts from a support ship before each flight test, before departing to a safe zone.

For some target sites in the BOA, a floating target raft may be used. Floating target rafts will be pontoon rafts approximately 3 m wide by 4 m long (11 ft by 13 ft). When flight tests involve a floating target raft, project personnel will deploy the target raft from a support ship prior to the flight test. The target raft will remain on-station for several hours using small electric motors, no anchoring will occur. Target rafts will include several sensors and scoring devices. A list of characteristics for the target raft is presented in Table 3.

Table 3. Target Raft Characteristics.



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

One deep ocean site will be at USAKA. KMISS is an approximately 290 km^2 (110 mi^2) deep-ocean target site just east of Kwajalein Atoll, and is part of the RTS. It is located just off of Gagan Islet (Figure 5) with depths ranging from 2,100 to 3,700 m (7,000 to 12,000 ft). KMISS uses fixed underwater hydrophones to detect and locate surface impacts of missiles in all weather conditions (Navy and USASMDC 2023). KMISS has been used for missile impact scoring for a number of other missile test programs (e.g. NMFS 2019a, NMFS 2021a, NMFS 2021b). The KMISS optical and electronic sensors and system support equipment are already in place on Gagan Islet and in the offshore ocean waters. Therefore, no pre-flight activities would occur at Gagan Islet.

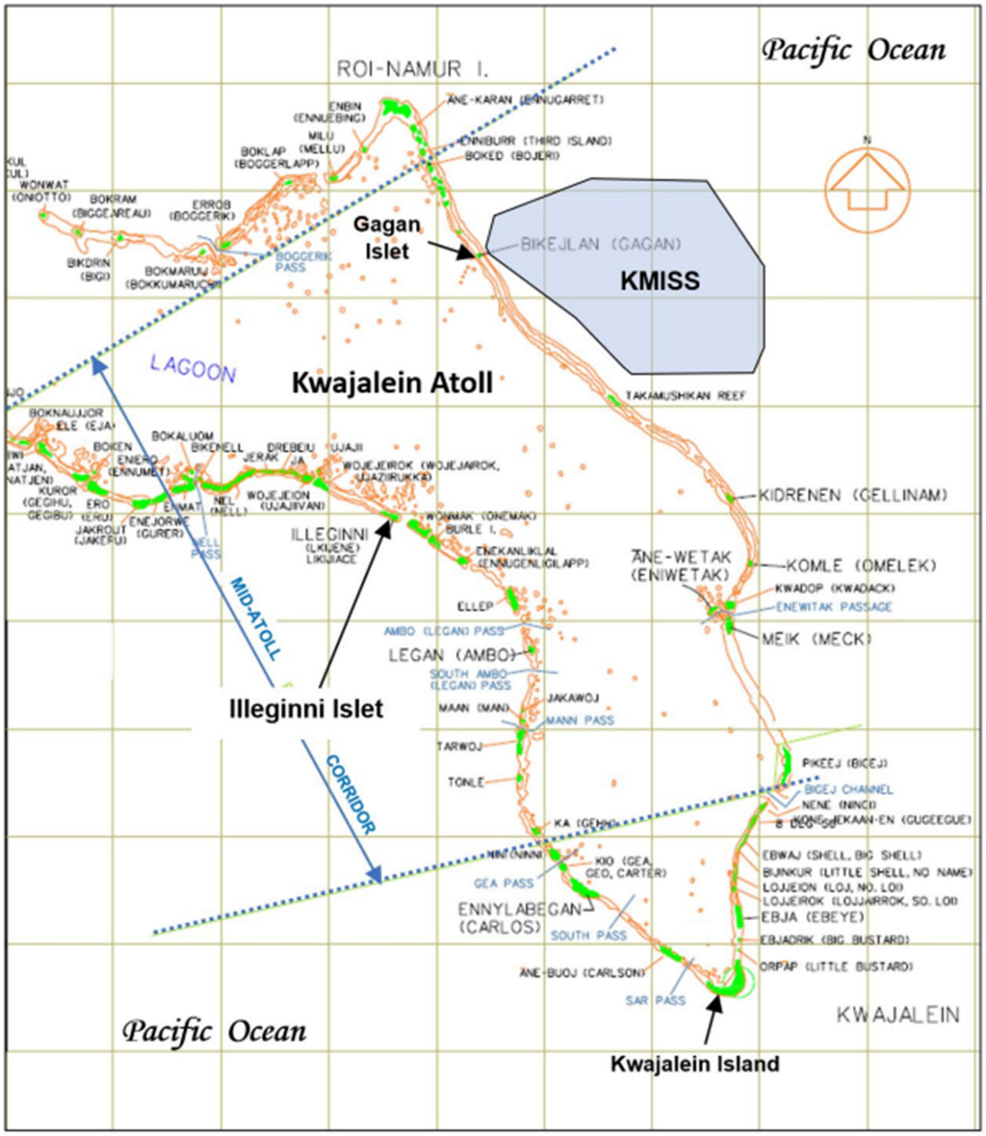


Figure 4. Kwajalein Atoll CPS Target Activity Areas.

Land Based Target Site

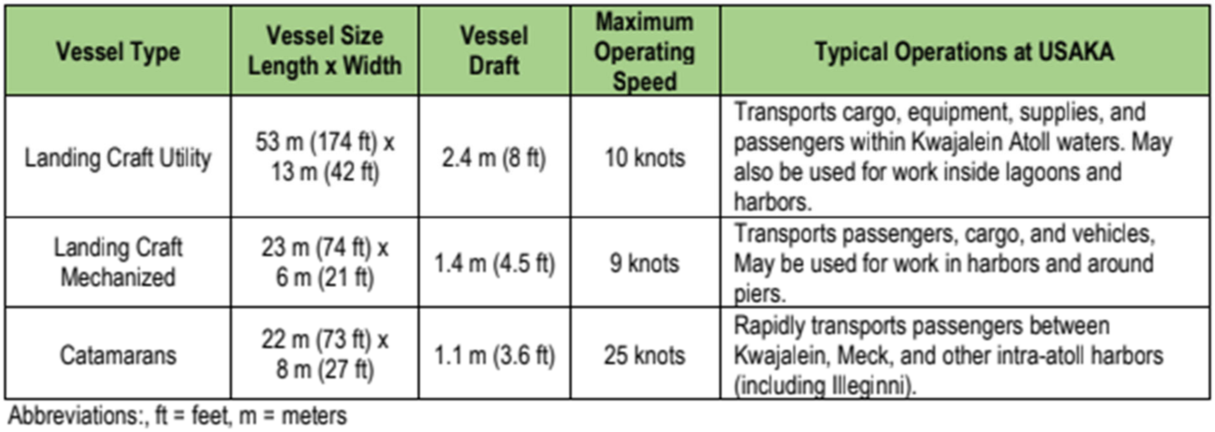
Illeginni islet is the only proposed land-based payload site for this action. Illeginni is part of the RTS and the Navy anticipates one land impact per year (10 over 10 years) would occur throughout the CPS flight test program. The target site at Illeginni is an approximate 7.6-acre area on the west end of the islet that includes the islet's helipad (Figure 5). The target site on Illeginni has been used as a target site by the U.S. military for various hypersonic missile programs since the early 1990s (NMFS 2019a, NMFS 2019b NMFS 2021a, NMFS 2021b, Navy and USASMDC 2023). A payload impact within the islet's forested area or in the adjacent reef and shallow waters is not expected.

Figure 5. Illeginni islet, Kwajalein Atoll Target Site.

During pre-launch activities, elevated levels of human activity will occur in terrestrial and marine environments for several weeks. Human activity and equipment operation in marine environments at Kwajalein Atoll would involve vessel traffic to and from Illeginni and the use of sensor rafts. Fixed wing aircraft and helicopters will be used to conduct overflights and transport equipment and personnel to Illeginni. Most of the human activity and equipment operation related to the proposed action would take place in terrestrial environments at Illeginni. Project personnel will place equipment at the target site in preparation for an impact.

USAKA personnel will deploy up to 12 sensor rafts around Illeginni. A landing craft utility vessel (LCU) will be used to deploy the sensor rafts in the lagoon or ocean waters. Sensor rafts will not be deployed in less than 3 m (10 ft) of water. Additional information on the vessels typically used to support flight test activities at USAKA are described in Table 4.

Table 4. Vessels used at USAKA to Support Flight Test Activities.



Vessel Type	Vessel Size Length x Width	Vessel Draft	Maximum Operating Speed	Typical Operations at USAKA
Landing Craft Utility	53 m (174 ft) x 13 m (42 ft)	2.4 m (8 ft)	10 knots	Transports cargo, equipment, supplies, and passengers within Kwajalein Atoll waters. May also be used for work inside lagoons and harbors.
Landing Craft Mechanized	23 m (74 ft) x 6 m (21 ft)	1.4 m (4.5 ft)	9 knots	Transports passengers, cargo, and vehicles, May be used for work in harbors and around piers.
Catamarans	22 m (73 ft) x 8 m (27 ft)	1.1 m (3.6 ft)	25 knots	Rapidly transports passengers between Kwajalein, Meck, and other intra-atoll harbors (including Illeginni).

Abbreviations:, ft = feet, m = meters

The exact number of support ships, which would operate within Kwajalein Atoll to support proposed CPS activities, and the exact number of vessel and aircraft trips per CPS flight test are unknown. Based on typical USAG-KA and RTS vessel operations supporting flight test activities at USAKA, it is anticipated that multiple vessel round-trips would occur to and from Illeginni Islet from Kwajalein islet. It is estimated that CPS pre-flight activities will take four weeks to complete and that a LCU or a Landing Craft Mechanized (LCM) vessel will transit to Illeginni two to three times per week. Therefore, we can expect approximately 12 vessel trips to and from Illeginni to Kwajalein harbor for this phase of the project.

1.2.3 Vehicle Launch and Flight

All proposed CPS flight tests will involve launches from sea-going vessels. Several existing naval surface ships and submarines have been modernized to accommodate the new missile systems and launch canisters. All launches will be conducted from surface and subsurface firing platforms that are under the control of the Naval Sea Systems Command. In addition to the launch vessels, two to three additional smaller ships and watercraft will be used downrange to support the CPS flight tests. These support vessels will host various sensor systems, including telemetry, radar and support target placement and recovery operations at designated target sites.

Other small ships will be used in the terminal area to support pre-flight tests target placement and set-up. All vessels used will operate in accordance with applicable navigation rules, including international laws and regulations, and monitor for marine mammals and sea turtles to avoid potential vessel strikes. Prior to downrange support ship and watercraft operations, Navy personnel will use the Navy's Protective Measures Assessment Protocol to identify applicable environmental mitigation requirements which minimize potential impacts to protected marine species.

Vessel operations for a typical Navy CPS flight test would involve the following:

a) One launch platform vessel – This will be a vessel less than 600 ft in length with a maximum speed of 15 knots. This vessel will transit within the BOA from a naval port (typically CONUS, Hawaii, or Puerto Rico) to the launch area and then back to port. The Navy expects the vessel will be at sea for up to 30 days with a straight-line travel distance of no more than 3,000 nautical miles (nm). CPS activities involving this vessel would include vessel transits, onboard preflight checks, and CPS weapons system launch.

b) One terminal area support vessel –This will be a vessel less than 250 ft in length with a maximum speed of 12 knots. This vessel would transit within the BOA from a port to the terminal area and then back to port. The Navy expects the vessel will be at sea for up to 30 days with a straight-line travel distance of no more than 3,000 nm. CPS BOA activities involving this vessel would include vessel transit, onboard preflight checks, and deploying any rafts or mission equipment, which will be recovered after the flight test.

c) Two mid-range support vessels – Two vessels less than 250 ft in length will be positioned between the launch and terminal impact locations. These vessels would transit within the BOA from a port within the action area to the designated area and then back to port. The support vessels will either have a maximum speed of 12 knots or be a smaller vessel such as a yacht or unmanned surface vessel with maximum speeds of 12 to 40 knots. The Navy expects the vessels will be at sea for up to 30 days with a straight-line travel distance of no more than 3,000 nm. CPS activities involving these vessels would include vessel transits, onboard preflight checks, and onboard sensor operations.

Once the launch vessel has reached the designated launch point in the BOA and is cleared by range safety to commence testing, the missile will be launched. During the boost phase following launch, the first-stage motor would burn out downrange and separate from the second stage. Farther into flight, the second stage would burn out and separate, then the payload adapter would be jettisoned from the payload. The spent booster stages and payload adapter would splash down in the BOA at different points downrange. All booster and payload adapter splashdown locations will be within the BOAs and would occur at least 370 kilometers (200 nm) offshore of any land areas. The payload would continue flying towards the predesignated sea-based or land-based target site before impact.

The CPS missile flight paths will be designed to avoid Bermuda in the Atlantic, Marcus Island in the Pacific, and all other populated islands. With the exception of the land-based target site and KMISS, no missile components are expected to splash down or impact within territorial seas or exclusive economic zones. Additionally, the Navy will plan all missile component splashdowns and payload impacts to avoid Marine National Monuments, National Marine Sanctuaries, critical habitat, and biologically important areas. If flight data indicate insufficient energy for the payload to reach the target site, project personnel will direct the vehicle to descend in a controlled termination into the BOA. This termination will result in a splash down within the BOA.

1.2.4 Terminal Phase operations

Following the launch of the CPS vehicle, the launch vessel will depart from the launch point and return to its homeport. Downrange sensor support ships will return to their homeports. Additional post-flight activities are described below.

Broad Ocean Area Target Sites
Naval personnel will retrieve all instrumented rafts and search for any floating debris before returning to port. All or most of the missile components will sink to the ocean floor, including spent boosters stages. However, project personnel will recover any visible payload or other missile debris found floating to the extent practicable.

If a target raft was used, the support vessels will return to the BOA target site and retrieve the target. During recovery, naval personnel will load the target raft(s) onto the vessels and transport them back to shore, along with any visible debris practicable. The tests will not involve any intentional sinking or abandonment of the target raft(s) or test components on the target raft(s) (e.g., sensors and motors). It is possible that materials on the target raft(s) might be inadvertently dislodged from a raft during a flight test. If materials are dislodged from the target raft, it is expected that most materials would sink (e.g., metal components) or be cleaned up during post-test operations if found floating (e.g., pontoon foam filler material). All lithium-ion batteries used on target rafts will be recovered unless they are inadvertently damaged beyond the point of safe retrieval/recovery. While there is some potential for a target raft to be sunk or for test materials on the raft to be dislodged or not recovered, the Navy considers this unlikely to occur.

Land-based Target Site

For payload impacts at Illeginni, USAKA personnel will arrive via aircraft or surface vessel to secure the area. The payload impact is expected to form a crater up to several feet in diameter and eject soil over a wide area. At Illeginni, soil containing residual concentrations of beryllium, depleted uranium, and tungsten from prior intercontinental ballistic missile and other flight tests could be scattered over the area (Navy and USASMDC 2023). Once the site is cleared for safe entry, test support personnel would conduct an impact assessment of the site, and initiate cleanup, recovery operations and soil remediation.

Any visible payload debris will be recovered to the extent practicable. The portable sensor equipment brought on island during pre-flight test preparations will be removed. Project personnel will backfill the crater using heavy equipment and make all appropriate repairs to island-based structures. The use of heavy equipment in the nearshore marine environment is not expected since shallow water and reef habitats will not be targeted. However, if test debris enters the nearshore marine environment, including the reef flat, test personnel will manually recover debris. In addition, soil and groundwater samples will be taken at Illeginni to ensure that concentrations of heavy metals, such as beryllium, uranium (as a surrogate for depleted uranium), and tungsten, do not exceed established UES standards (USAKA 2021).

While not planned or expected, if a payload were to inadvertently impact outside the island target site in adjacent shallow waters, SCUBA divers will attempt to recover debris manually. For an inadvertent impact in Illeginni‘s coral reef, reef flat, or in shallow waters less than 3 m (10 ft) deep, project personnel will conduct an inspection within 24 hours. Representatives from NMFS and USFWS will also be invited to inspect the site as soon as practical after the test. The inspectors will assess any damage to coral and other natural and biological resources and, in coordination with the Navy and USAG-KA representatives, decide on any response measures that may be required (DON 2019b*)*.

Post-test human activity in marine areas near Illeginni Islet will involve vessel traffic to and from Illeginni Harbor and the collection of sensor rafts. Similar vessels and aircraft described in Table 4, section 1.2.2 Pre-Launch Preparations, are expected. USAG-KA expects the same number of vessel trips (12). Therefore, we can expect approximately 24 vessel trips to and from Illeginni Harbor to Kwajalein Harbor for this project. Human activity in the nearshore marine environment will be limited to the area near the payload land impact where debris enters the water. In the event of an unexpected shoreline or reef-flat payload impact, several measures and procedures will be in place (See section 1.2.5 Best Management Practices) to guide post-test activities to avoid impacts to consultation organisms. If divers are required to search for payload debris on the adjacent reef flat, they will be briefed before operations about coral fragility and provided guidance on how to carefully retrieve the small pieces of payload debris.

1.2.5 Proposed Best Management Practices

A summary of the proposed best management practices (BMPs) related to the CPS flight tests that are part of the proposed action follows:

Atlantic and Pacific BOAs

- Test launches will be conducted at least 93 km offshore.
- No launches, test component splashdowns, or payload impacts will occur within Marine National Monuments National Marine Sanctuaries, Biologically Important Areas or critical habitat located in the ocean study areas. No launch activities or anchoring are planned to occur within these areas.
- Vessel operations will not involve any intentional ocean discharges of fuel, toxic waste, or plastics and other solid wastes that could potentially harm marine life.
- Surface ship launch platforms and support vessels will maintain a 460 m buffer around whales, and 180 m around other marine mammals and sea turtles (except bow-riding dolphins).
- CPS missile flight paths will avoid Bermuda in the Atlantic, Marcus Island in the Pacific, and any other populated islands.
- All booster and payload adapter splashdown locations will be within the ocean study areas and would occur at least 370 km offshore of any land areas.
- All BOA target locations for payload impact will be at least 370 km offshore in international waters.
- A 2,300 m mitigation zone around a target location will be established. Support vessels will monitor to the best extent practical. If a marine mammal is spotted in the zone and communications are available with the launch platform, launch will be delayed by 30 minutes or until the marine mammal is observed to leave the mitigation zone.
- For the sea-based target sites in the BOA, support ship personnel will search for any visible floating debris. Any visible C-HGB or other test debris found floating will be recovered, as much as practicable.
- Support vessels will survey an at-sea impact area for 30 minutes after impact to ensure no injury to protected species (marine mammals, sea turtles, sharks, manta rays). This measure can be done concurrently with debris retrieval.
- Sightings of any injured terrestrial or marine species within the vicinity of the impact area will be reported to USFWS or NMFS via Military Sealift Command.

USAKA

- During travel to and from payload target sites, including Illeginni Islet, ship personnel will monitor for marine mammals and sea turtles to avoid potential ship strikes. Vessel operators will adjust speed or raft deployment based on the presence of special-status species and on lighting and turbidity conditions.
- A helicopter or fixed-wing aircraft overflight in the vicinity of the KMISS or Illeginni Islet target site will be conducted during the week prior to the test and as close to launch as safely practical to survey for marine mammals and sea turtles. Any sightings or the lack of sightings will be recorded and reported according to the procedures detailed below.
- Any marine mammal or sea turtle opportunistic sightings collected during ship travel, overflights, and deployment of sensor rafts in the vicinity of the Illeginni Islet or KMISS target sites will be recorded and reported according to the procedures detailed below.

- Pre-flight test monitoring by qualified personnel will be conducted on Illeginni Islet for sea turtles or sea turtle nests. For at least 8 weeks, preceding the launch, pre-test personnel will survey Illeginni Islet weekly for sea turtles, sea turtle nesting activity, and sea turtle nests. If possible, personnel will inspect the area within days of the launch. Sea turtles or sea turtle nest observations near the target site or the lack of observations will be recorded and reported according to the procedures detailed below.
- Post-test overflight monitoring of the impact area will be conducted to survey for dead or injured cetaceans and sea turtles.
- Sightings of any dead or injured marine mammals or sea turtles by project personnel will be reported immediately to USASMDC and USAG-KA Environmental Office; USASMDC will as soon as possible, and within 24 hours, inform the RMI Environmental Protection Authority, NMFS, and USFWS. USAG-KA aircraft pilots or vessel operators otherwise operating near the impact and test support areas will also report any opportunistic sightings of dead or injured marine mammals or sea turtles through the procedures detailed.
- For all surveys and incidental observations, data will be recorded including location, date, time, species, and number of individuals or reports of no sightings when animals are not seen on surveys. Observations will be reported to the USAG-KA Environmental Office, the RTS Range Directorate, the Flight Test Operations Director, and USASMDC.
- USASMDC and the USAG-KA Environmental Office would maintain records of these observations and USASMDC will distribute survey reports to the RMI Environmental Protection Authority, NMFS, and USFWS within 6 months of completion of each fiscal year.
- Vessel and heavy equipment operators will inspect and clean equipment for fuel or fluid leaks prior to use or transport and will not intentionally discharge fuels or waste materials into terrestrial or marine environments.
- Any accidental spills from support equipment operations will be contained and cleaned up and all waste materials will be transported to Kwajalein Islet for proper disposal.
- Response to releases of oil, fuels, and lubricants into the USAKA environment will be in accordance with the Kwajalein Environmental Emergency Plan (KEEP; UES §3-6.5.8).
- All equipment and packages/materials shipped from the United States to RTS will be inspected prior to shipment and washed if necessary to prevent the introduction of animals, plants, and seeds.
- Following an Illeginni Islet land-impact test, soil and groundwater samples will be collected at various locations around the payload impact site and samples will be tested for metals (not limited to, but including arsenic, barium, cadmium, chromium, and lead).
- Testing results exceeding the UES standards would trigger an immediate investigation of the soil on Illeginni Islet, as detailed in the UES § 3-6.5.8. Coordination will be initiated with the Defense Program, USASMDC, RMI Environmental Protection Authority, and the other UES Appropriate Agencies to determine the scope and methods/procedures to be followed during the investigation and any subsequent soil removal or other remediation activities.
- Following completion of a flight test at KMISS, a vessel or aircraft from USAG-KA would inspect the ocean impact area for any floating debris. Any visible debris found floating will be recovered, as much as practicable.

- To avoid impacts on coral heads in waters near Illeginni Islet, sensor rafts will be located in waters at least 3 m (10 ft.) deep.
- If an inadvertent impact occurs on the reef, reef flat, or in shallow waters less than 3 m (10 ft.) deep, an inspection by project personnel will occur within 24 hours. Representatives from NMFS, USFWS, and RMI Environmental Protection Authority will be offered the opportunity to inspect the site as soon as practical after the test. The inspectors would assess any damage to coral and other natural and biological resources and, in coordination with RTS representatives, decide on any response measures that may be required.
- If any man-made debris were to enter the marine environment and divers were required to search for payload debris on the adjacent reef flat, they will be briefed prior to operations about coral fragility and provided guidance on how to retrieve the small pieces of payload debris that they will be looking for.
- In the event of a payload impact that affects the reef at Illeginni Islet, personnel will secure or remove from the water any substrate or coral rubble from the ejecta impact area that may become mobilized by wave action.
    - Ejecta greater than 15 centimeters (cm; 6 inches) in any dimension will be removed from the water or positioned such that it will not become mobilized by expected wave action, including replacement in the payload crater.
    - If possible, coral fragments greater than 15 cm (6 inches) in any dimension will be positioned on the reef such that they will not become mobilized by expected wave action and in a manner that will enhance their survival (i.e., away from fine sediments with the majority of the living tissue [polyps] facing up).
    - UES consultation coral fragments that cannot be secured in-place will be relocated to suitable habitat where they are not likely to become mobilized.
- In the event of a payload impact that affects the reef at Illeginni Islet, impacts on top shell snails and clams will be reduced.
    - Any living top shell snails or clams that are buried or trapped by rubble will be rescued and repositioned.
    - Any living top shell snails or clams that are in the path of any heavy equipment that must be used in the marine environment will be relocated to suitable habitat.
- Test personnel will be briefed on Best Management Practices and conservation requirements and the requirement to adhere to them during test activities.
- When feasible, within 1 day after the land impact test at Illeginni Islet, USAKA RTS environmental staff will survey the islet and the near-shore waters for any injured wildlife or damage to sensitive habitats (i.e., sea turtle nesting habitat). Any impacts to protected biological resources will be documented and reported to the UES Appropriate Agencies via USASMDC, with USFWS, RMI Environmental Protection Authority, and NMFS offered the opportunity to inspect the impact area to provide guidance on mitigations.
- Debris recovery and site cleanup will be performed for the land impact. To minimize long-term risks to marine life, all visible project-related man-made debris will be recovered during post-flight operations. In all cases, recovery and cleanup will be conducted in a manner to minimize further impacts on biological resources.
- During post-test recovery and cleanup, should personnel observe highly mobile endangered, threatened, or other species requiring consultation moving into the area,

work will be delayed until such species are out of harm's way or leave the area of their own volition.

- Within 6 months of completion of each fiscal year, USASMDC would provide a report to NMFS, USFWS, and RMI Environmental Protection Authority. The report would identify: (1) the flight test and date; (2) the target site; (3) the results of the pre- and post-flight surveys; (4) the identity and quantity of affected UES consultation resources (include photographs and videos as applicable); and (5) the disposition of any relocation efforts.

1.3 Action Area

Under the ESA, the action area is defined by regulation as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). Section 161 of the Compact requires that the U.S. apply standards that are substantially similar to the ESA. Therefore, the action area for the proposed activities encompasses the full extent of the action's modifications to land, water, and air. For this action, the full extent of direct and indirect effects is the radiating noise from vessel transits, missile launch, missile flights (sonic booms) over the BOAs, and the shock waves that occur during booster splashdown and payload impact

The action area for this consultation begins when the launch vessel departs from its homeport and moves to the launch location inside the Atlantic and Pacific BOAs, where the sonic boom of the accelerating missiles would reach the ocean surface. Then extends from the launch location across the Atlantic or Pacific Ocean along a relatively narrow band of ocean area directly under the flight path of the missile, where the sonic boom and spent missile components are expected to impact the surface (Figure 2 and Figure 3). The flight path includes test flights over the waters of the U.S. exclusive economic zone (EEZ). However, flight paths will avoid Bermuda in the Atlantic, Marcus Island in the Pacific, and all other populated islands. The CPS flights will occur at a high altitude over the BOA and may occur in areas of U.S territorial or EEZ waters. However, no debris will enter U.S. territorial or EEZ waters, flights and debris will avoid National Marine Monuments, National Marine Sanctuaries, critical habitats, and biologically important areas (Figure 6 and Figure 7). The Atlantic and Pacific BOA action areas will occur entirely outside of U.S. territorial seas, which extend seaward up to 22 km (12 nm) from the territorial coastline, and most activities would occur outside EEZs which extend out to 370 km (200 nm) from the coast.

The action area also includes the area of and around Kwajalein Atoll, RMI. An area of over 2,900 km^2 (1,100 square miles [mi^2]), where the payload would impact the target areas (Figure 4), as well as the vessel transit routes, areas immediately around support vessels and sensor rafts used to monitor the payload impacts, and the down-current extent of any plumes that may result from discharges of wastes or toxic chemicals such as fuels and/or lubricants associated with the machinery used for this activity.

1.4 Analytical Approach

The Navy and USASMDC determined the proposed action is not likely to adversely affect the species shown in Table 4 or critical habitat for the Northwest Atlantic Ocean DPS of loggerhead sea turtles, the leatherback sea turtle, North Atlantic Right Whale, the Central America DPS and the Mexico DPS of humpback whales, or the proposed critical habitat of the North Atlantic DPS green sea turtles (Figure 6 and Figure 7). Our concurrence is documented in the Not Likely to Adversely Affect Determinations section (Section 9).

Table 5. Common name, scientific name, ESA or UES status, for not likely to adversely affect consultation species considered in this consultation.

Common name	**Scientific Name**	**Listing status under the ESA or UES**	**Critical Habitat Designated under the ESA**	**Occurrence within the action area**$^{+}$
Marine Mammals				
Bottlenose Dolphin	*Tursiops sp.*	UES		USAKA
Bottlenose Dolphin, Pacific	*Tursiops gilli*	UES		USAKA
Common Dolphin	*Delphinus delphis*	UES		USAKA
Risso's Dolphin	*Grampus griseus*	UES		USAKA
Spinner Dolphin	*Stenella longirostris*	UES		USAKA
Spinner Dolphin, Costa Rican	*Stenella longirostris centroamericana*	UES		USAKA
Spinner Dolphin, Eastern	*Stenella longirostris orientalis*	UES		USAKA
Spinner Dolphin, Whitebelly	*Stenella longirostris longirostris*	UES		USAKA
Spotted Dolphin, Coastal	*Stenella attenuata graffmani*	UES		USAKA
Spotted Dolphin, Offshore	*Stenella attenuata*	UES		USAKA
Striped Dolphin	*Stenella coeruleoalba*	UES		USAKA
Blainville's Beaked Whale	*Mesoplodon densirostris*	UES		USAKA,
Sei whale	*Balaenoptera borealis*	Endangered		USAKA, Atlantic BOA, Pacific BOA
Blue whale	*Balaenoptera musculus*	Endangered, UES		USAKA, Atlantic BOA, Pacific BOA
Fin whale	*Balaenoptera physalus*	Endangered, UES		USAKA, Atlantic BOA, Pacific BOA
Gray whale-Western North Pacific DPS	*Eschrichtius robustus*	Endangered		Pacific BOA
North Atlantic right whale	*Eubalaena glacialis*	Endangered	01/27/2026	Atlantic BOA

Common name	**Scientific Name**	**Listing status under the ESA or UES**	**Critical Habitat Designated under the ESA**	**Occurrence within the action area**$^{+}$
			(revised) 81 FR 4838	
North Pacific right whale	*Eubalaena japonica*	Endangered	04/08/2008 73 FR 19000	Pacific BOA
Humpback whale	*Megaptera novaeangliae*			
Central America DPS		Endangered	April 21, 2021 86 FR 21082	Pacific BOA
Mexico DPS		Threatened	April 21, 2021 86 FR 21082	Pacific BOA
Western North Pacific DPS		Endangered, UES	April 21, 2021 86 FR 21082	USAKA, Pacific BOA
Sperm whale	*Physeter macrocephalus*	Endangered		USAK, Atlantic BOA, Pacific BOA
False killer whale	*Pseudorca crassidens*	UES		
Main Hawaiian Islands Insular DPS		Endangered	8/23/2018 83 FR 35062	Hawaiian insular Pacific, Pacific BOA
Killer Whale	*Orcinus orca*	UES		USAKA
Melon-Headed Whale	*Peponocephala electra*	UES		USAKA
Pygmy Killer Whale	*Feresa attenuata*	UES		USAKA
Pygmy Sperm Whale	*Kogia breviceps*	UES		USAKA
Short-Finned Pilot Whale	*Globicephala macrorhynchus*	UES		USAKA
Guadalupe fur seal	*Arctocephalus townsendi*	Threatened		Pacific BOA
Steller sea lion-western DPS	*Eumetopias jubatus*	Endangered	06/15/1994 (revised) 59 FR 30715	Pacific BOA
Hawaiian monk seal	*Neomonachus schauinslandi*	Endangered	09/21/2015 (revised) 80 FR 50925	Hawaiian insular Pacific

Common name	Scientific Name	Listing status under the ESA or UES	Critical Habitat Designated under the ESA	Occurrence within the action area[+]
Sea Turtles				
Loggerhead turtle	*Caretta caretta*			
North Pacific Ocean DPS		Endangered, UES		Pacific BOA
Northeast Atlantic Ocean DPS		Endangered		Atlantic BOA
Northwest Atlantic Ocean DPS		Threatened	08/11/2014 79 FR 39855	Atlantic BOA
Green turtle	*Chelonia mydas*			
Central North Pacific DPS		Threatened	Proposed 07/19/2023 88 FR 46572	Hawaiian insular Pacific, Pacific BOA
Central South Pacific DPS		Endangered	Proposed 07/19/2023 88 FR 46572	Pacific BOA
Central West Pacific DPS		Endangered, UES	Proposed 07/19/2023 88 FR 46572	USAKA, Pacific BOA
East Pacific DPS		Threatened	Proposed 07/19/2023 88 FR 46572	Pacific BOA
North Atlantic DPS		Threatened	Proposed 07/19/2023 88 FR 46572	Atlantic BOA
South Atlantic DPS		Threatened	Proposed 07/19/2023 88 FR 46572	Atlantic BOA
Leatherback turtle	*Dermochelys coriacea*	Endangered, UES	01/26/2012 77 FR 4170	USAK, Atlantic BOA, Pacific BOA
Hawksbill turtle	*Eretmochelys imbricata*	Endangered, UES		USAK, Atlantic BOA, Pacific BOA
Kemp’s ridley turtle	*Lepidochelys kempii*	Endangered		Atlantic BOA
Olive ridley turtle	*Lepidochelys olivacea*			

Common name	Scientific Name	Listing status under the ESA or UES	Critical Habitat Designated under the ESA	Occurrence within the action area$^+$
All other populations (not Mexico's Pacific coast breeding population)		Threatened, UES		USAKA, Pacific BOA
Mexico's Pacific coast breeding population		Endangered		Pacific BOA
Fish				
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*			
Carolina DPS		Endangered	08/17/2017 82 FR 39160	Atlantic BOA
Chesapeake Bay DPS		Endangered	08/17/2017 82 FR 39160	Atlantic BOA
Gulf of Maine DPS		Threatened	08/17/2017 82 FR 39160	Atlantic BOA
New York Bight DPS		Endangered	08/17/2017 82 FR 39160	Atlantic BOA
South Atlantic DPS		Endangered	08/17/2017 82 FR 39160	Atlantic BOA
Oceanic whitetip shark	*Carcharhinus longimanus*	Threatened, UES		USAKA, Atlantic BOA, Pacific BOA
Giant manta ray	*Mobula (Manta) birostris*	Threatened, UES		USAKA, Atlantic BOA, Pacific BOA
Chum salmon	*Oncorhynchus keta*			
Hood Canal Summer run ESU		Threatened	09/02/2005 70 FR 52629	Pacific BOA
Coho salmon	*Oncorhynchus kisutch*			
Lower Columbia River ESU		Threatened	2/24/2016 81 FR 9251	Pacific BOA
Central California Coast ESU		Endangered	05/05/1999 64 FR 24049	Pacific BOA
Oregon Coast ESU		Threatened	02/11/2008 73 FR 7815	Pacific BOA

Common name	**Scientific Name**	**Listing status under the ESA or UES**	**Critical Habitat Designated under the ESA**	**Occurrence within the action area**$^{+}$
Southern Oregon/ Northern California Coasts ESU		Threatened	05/05/1999 64 FR 24049	Pacific BOA
Steelhead Trout	*Oncorhynchus mykiss*			
California Central Valley DPS		Threatened	9/02/2005 70 FR 52488	Pacific BOA
Central California Coast DPS		Threatened	9/02/2005 70 FR 52488	Pacific BOA
Lower Columbia River DPS		Threatened	9/02/2005 70 FR 52488	Pacific BOA
Middle Columbia River DPS		Threatened	9/02/2005 70 FR 52488	Pacific BOA
Northern California DPS		Threatened	9/02/2005 70 FR 52488	Pacific BOA
Snake River Basin DPS		Threatened	9/02/2005 70 FR 52488	Pacific BOA
Puget Sound DPS		Threatened	02/24/2016 81 FR 9252	Pacific BOA
South-Central California Coast DPS		Threatened	9/02/2005 70 FR 52488	Pacific BOA
South California DPS		Endangered	9/02/2005 70 FR 52488	Pacific BOA
Upper Columbia River DPS		Threatened	9/02/2005 70 FR 52488	Pacific BOA
Upper Willamette River DPS		Threatened	9/02/2005 70 FR 52488	Pacific BOA
Sockeye salmon	*Oncorhynchus nerka*			
Snake River ESU		Endangered	12/28/1993 58 FR 68543	Pacific BOA
Ozette Lake ESU		Threatened	09/02/2005 70 FR 52629	Pacific BOA
Chinook Salmon				

Common name	Scientific Name	Listing status under the ESA or UES	Critical Habitat Designated under the ESA	Occurrence within the action area^{+}
California Coastal ESU	*Oncorhynchus tshawytscha*	Threatened	9/02/2005 70 FR 52487	Pacific BOA
Central Valley Spring-Run ESU		Threatened	9/02/2005 70 FR 52487	Pacific BOA
Sacramento River Winter-Run ESU		Endangered	06/16/1993 58 FR 33212	Pacific BOA
Lower Columbia River ESU		Threatened	9/02/2005 70 FR 52487	Pacific BOA
Puget Sound ESU		Threatened	9/02/2005 70 FR 52487	Pacific BOA
Snake River Fall ESU		Threatened	12/28/1993 58 FR 68543	Pacific BOA
Snake River Spring/Summer-run ESU		Threatened	10/25/1999 64 FR 57399	Pacific BOA
Upper Columbia River Spring ESU		Endangered	9/02/2005 70 FR 52487	Pacific BOA
Upper Willamette River ESU		Threatened	9/02/2005 70 FR 52487	Pacific BOA
Small tooth sawfish	*Pristis pectinata*	Endangered	09/02/2009 74 FR 45353	Atlantic BOA
Atlantic salmon – Gulf of Maine DPS	*Salmo salar*	Endangered	08/10/2009 (revised) 74 FR 39903	Atlantic BOA
Scalloped hammerhead shark	*Sphyrna lewini*			
Central and Southwest Atlantic DPS		Threatened		Atlantic BOA
Eastern Atlantic DPS		Endangered		Atlantic BOA
Eastern Pacific DPS		Endangered		Atlantic BOA
Indo-West Pacific DPS		Threatened, UES		Pacific BOA

Common name	**Scientific Name**	**Listing status under the ESA or UES**	**Critical Habitat Designated under the ESA**	**Occurrence within the action area**[+]
Bigeye Thresher Shark	*Alopias superciliosus*	UES		USAKA
Shortfin Mako Shark	*Isurus oxyrinchus*	UES		USAKA
Pacific Bluefin Tuna	*Thunnus orientalis*	UES		USAKA
Corals				
	Acanthastrea brevis	UES		USAKA
	Acanthastrea hemprichii	UES		USAKA
	Acropora aculeus	UES		USAKA
	Acropora acuminata	UES		USAKA
	Acropora aspera	UES		USAKA
	Acropora dendrum	UES		USAKA
	Acropora donei	UES		USAKA
	Acropora globiceps	Threatened, UES	Proposed 11/30/2023 88 FR 83644	USAKA, insular Pacific
	Acropora horrida	UES		USAKA
	Acropora jacquelineae	Threatened, UES		USAKA
	Acropora listeri	UES		USAKA
	Acropora lokani	Threatened, UES		USAKA, insular Pacific
	Acropora palmerae	UES		USAKA
	Acropora paniculata	UES		USAKA
	Acropora pharaonis	Threatened, UES		USAKA, insular Pacific
	Acropora retusa	Threatened, UES	Proposed 11/30/2023 88 FR 83644	USAKA, insular Pacific
	Acropora rudis	Threatened, UES		USAKA

Common name	Scientific Name	Listing status under the ESA or UES	Critical Habitat Designated under the ESA	Occurrence within the action area^{+}
	Acropora speciosa	Threatened, UES	Proposed 11/30/2023 88 FR 83644	USAKA, insular Pacific
	Acropora striata	UES		USAKA
	Acropora tenella	Threatened, UES		USAKA, insular Pacific
	Acropora vaughani	UES		USAKA
	Acropora verweyi	UES		USAKA
	Alveopora allingi	UES		USAKA
	Alveopora fenestrata	UES		USAKA
	Alveopora verrilliana	UES		USAKA
	Anacropora spinosa	Threatened, UES		USAKA, insular Pacific
	Astreopora cucullata	UES		USAKA
	Barbattoia laddi	UES		USAKA
	Cyphastrea ocellina	UES		USAKA
	Euphyllia paradivisa	Threatened, UES	Proposed 11/30/2023 88 FR 83644	USAKA, insular Pacific
	Galaxea astreata	UES		USAKA
	Isopora crateriformis	Threatened, UES	Proposed 11/30/2023 88 FR 83644	USAKA, insular Pacific
	Isopora cuneata	UES		USAKA
	Leptoseris incrustans	UES		USAKA
	Leptoseris yabei	UES		USAKA
	Millepora foveolata	UES		USAKA
	Millepora tuberosa	UES		USAKA
	Montipora australiensis	Threatened, UES		USAKA, insular Pacific
	Montipora calcarea	UES		USAKA

Common name	Scientific Name	Listing status under the ESA or UES	Critical Habitat Designated under the ESA	Occurrence within the action area[+]
	Montipora caliculata	UES		USAKA
	Montipora lobulata	UES		USAKA
	Montipora patula	UES		USAKA
	Pachyseris rugosa	UES		USAKA
	Pavona bipartita	UES		USAKA
	Pavona cactus	UES		USAKA
	Pavona decussata	UES		USAKA
	Pavona diffluens	Threatened, UES		USAKA, insular Pacific
	Physogyra lichensteini	UES		USAKA
	Pocillopora danae	UES		USAKA
	Pocillopora elegans	UES		USAKA
	Porites horizontalata	UES		USAKA
	Porites napopora	Threatened, UES		USAKA, insular Pacific
	Porites nigrescens	UES		USAKA
	Seriatopora aculeata	Threatened, UES		USAKA, insular Pacific
	Turbinaria mesenterina	UES		USAKA
	Turbinaria Stellulata	UES		USAKA
Mollusks				
Black-Lip Pearl Oyster	*Pinctada margaritifera*	UES		USAKA
Top Shell Snail	*Trochus maximus*	UES		USAKA
Giant Clam	*Tridacna gigas*	Proposed endangered, UES		USAKA

[+]USAKA= Kwajalein atoll territorial waters and the Mid-atoll coordinator. Atlantic BOA = all Atlantic waters in the action area, Pacific BOA=all Pacific waters in the action area, Hawaiian insular Pacific = the Hawaiian Island chain, and insular Pacific = the nearshore waters of pacific islands of the action area

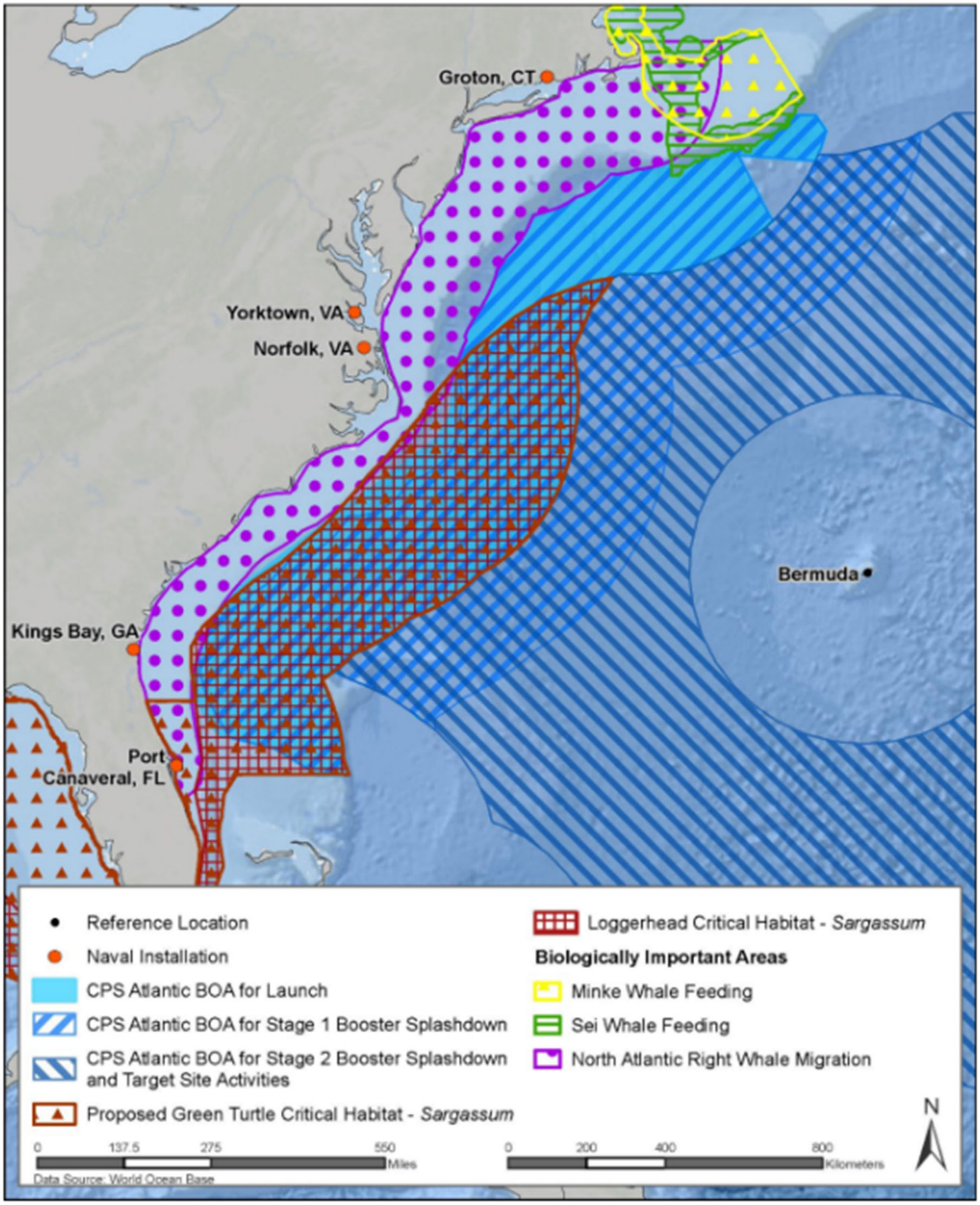


Figure 6. Designated and Proposed Critical Habitat and Biologically Important Areas in the Atlantic BOA.

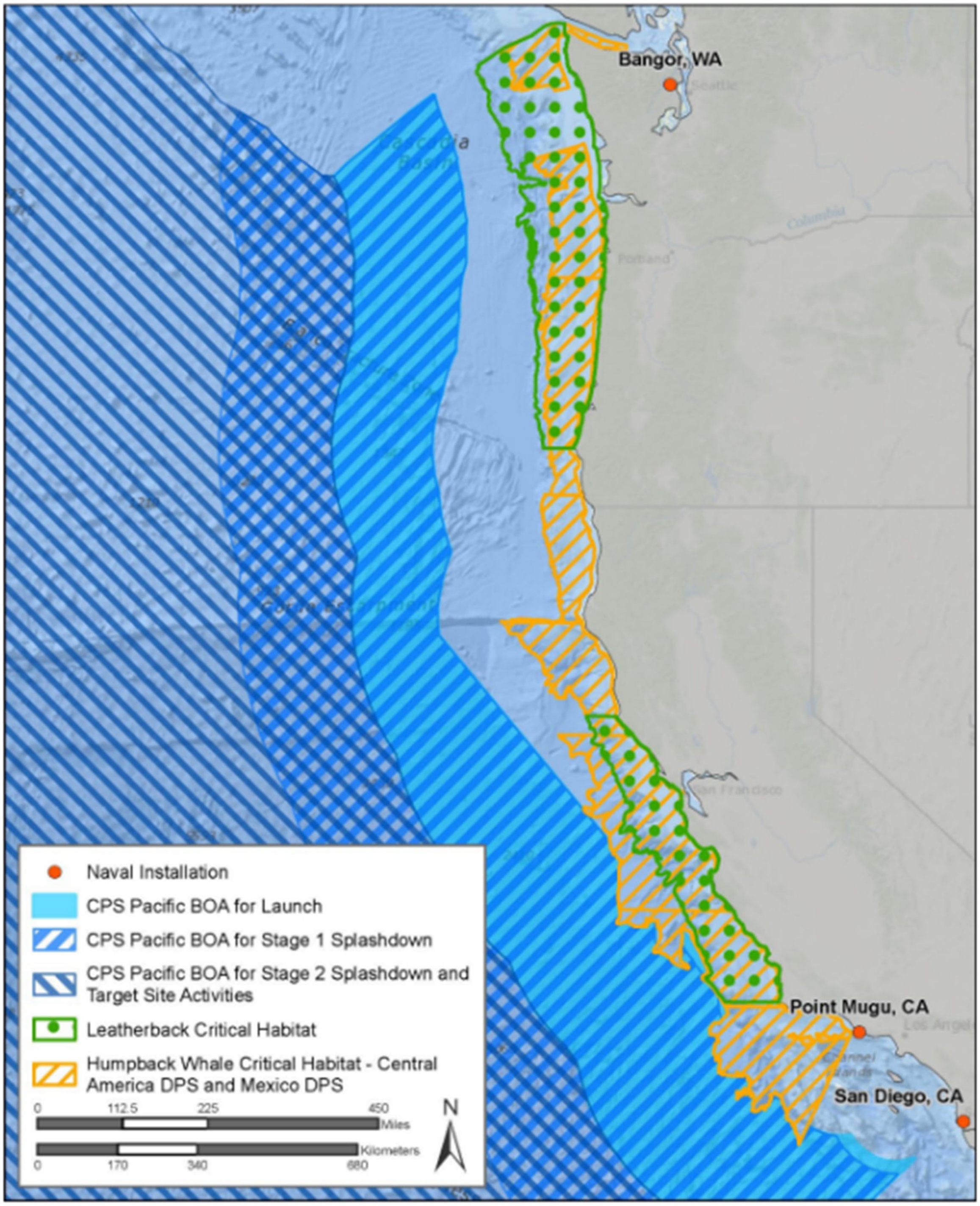


Figure 7. Designated and Proposed Critical Habitat and Biologically Important Areas in the Pacific BOA.

This biological opinion includes a jeopardy analysis. The jeopardy analysis relies upon the regulatory definition of jeopardize the continued existence of a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species:

- Evaluate the range wide status of the species expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species.
- Evaluate the effects of the proposed action on species using an exposure–response approach
- Evaluate cumulative effects
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species, analyze whether the proposed action is likely to directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action

We used available data to describe the CPS Test Flight location(s) and its stressors. Data from previous Navy, USASMDC, and USAK-GA test programs (USASMDC/ARSTRAT 2015, NMFS 2019a, NMFS 2019b U.S. Air Force 2020, NMFS 2021a and 2021b) impacts such as acoustic monitoring of missile launch, booster splashdown, payload approach, and payload impact along with post launch data represent the best data available on test flight location(s) because it has been collected under similar test flight programs since the early 2000s.

The stressors associated with the CPS test flight produce responses that range from exposed but not adversely affected (such as loud sounds causing organisms to alter their normal behavior), to more long term effects such as avoidance of feeding or resting areas, injury, and death (immediate, or later in time following injury). Survival from injury is a function of an individual's prior health condition, environmental conditions, severity of injury, indicators of the severity of stress and injury and other variables (Swimmer and Gilman 2012; Hall and Roman 2013).

We analyzed historic test flight data, including the result of those tests, and the Navy and USAKA's current species density distributions to inform our estimation of probable future interactions. Military training and testing at Kwajalein Atoll has been ongoing since World War II. Testing of missile programs at Kwajalein began in 1959 for the Nike Zeus missile program. The Minuteman (MM) I program began in 1962, MMII began in 1965, and MMIII began in 1970. In addition to the MM program, anti-ballistic missiles (ex. THAAD), and other missile development and testing take place at the RTS, along with other military training and testing activities, and commercial missile launches. Therefore, the analysis presented in the biological evaluations (Navy and USASMDC 2023 and 2024b) and its addendum (Navy and USASMDC 2024a) present the best information available to analyze effects of the action.

The quantitative estimates of species distribution and abundance within the potentially affected areas at Illeginni Islet are based on surveys of 136 sites around the 11 USAKA islets, including four sites around Illeginni (NMFS 2014b). Species observed to occur on reef flat, crest, and gently sloping substrates around USAKA islets at depths less than or equal to 35 feet water depth were considered as potentially being present within the MMIII, FE-1, THAAD, FE-2, and FE-3 impact area and hence the CPS impact area. Because the available survey information also includes the observed distribution and abundance of the affected consultation species in numerous habitat types around the 11 USAKA islets and at 35 survey sites throughout the mid-atoll corridor, we believe that the existing information also serves as a reasonable foundation to estimate the distribution and abundance of these organisms throughout USAKA. Analyses of effect of MMIII reentry vehicles (USAFGSC and USASMDC/ARSTRAT 2015) and FE-1 and FE-2 payload impact (US Navy 2017; 2019) at Illeginni Islet were conducted based on coral, mollusk, and fish densities extrapolated from coral presence and abundance from similar reef habitats throughout USAKA.

In 2017, NMFS-PIRO completed a report with revised density estimates for many consultation species based on 2014 assessments of the reefs adjacent to the impact area at Illeginni Islet (NMFS 2017a and 2017b). The areas surveyed for this assessment encompassed the entire action area's reef habitat on the lagoon side and 99% of the reef area on the ocean side (NMFS 2017a and 2017b). Additionally, NMFS and USFWS conducted harbor surveys within USAKA in 2023 to provide data for the USAKA operations. Based on coverage area of these assessments, these data are considered the best available information for fish, coral and mollusk species presence and density in the action area. Therefore, we believe that the existing information also serves as a reasonable foundation to estimate the distribution and abundance of these organisms throughout USAKA.

2 STATUS OF THE LISTED RESOURCES

This Opinion examines the status of each species that is likely to be adversely affected by the proposed action (Table 5). The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' reproduction, numbers, or distribution for the jeopardy analysis.

As mentioned above, the action area includes no designated critical habitat within USAKA, thus it is not considered in this Opinion. Given that all likely to be adversely affected resources are listed only under the UES, our jeopardy determinations must be based on an action's effects on the continued existence of UES-protected species within USAKA. Because the continued existence of listed species depends on the fate of the populations that comprise them, the viability (probability of extinction or probability of persistence) of listed species depends on the viability of their populations.

Table 6. Common name, scientific name, ESA, or UES status, for likely to adversely affect consultation species considered in this consultation.

Common name	**Scientific Name**	**Listing status under the ESA or UES**	**Critical Habitat Designated under the ESA**	**Occurrence within the action area**+
Fish				
Humphead Wrasse	*Cheilinus undulatus*	UES		USAKA
Bumphead Parrotfish	*Bolbometopon muricatum*	UES		USAKA
Corals				
	Acropora microclados	UES		USAKA
	Acropora polystoma	UES		USAKA
	Cyphastrea agassizi	UES		USAKA
	Heliopora coerulea	UES		USAKA
	Pavona venosa	UES		USAKA
	Turbinaria reniformis	UES		USAKA
Mollusks				
Horse's Hoof Clam	*Hippopus hippopus*	Proposed threatened, UES		USAKA
Fluted Giant clam	*Tridacna squamosa*	Proposed threatened, UES		USAKA
Small Giant Clam	*Tridacna maxima*	Proposed threatened, UES		USAKA
Top Shell Snail	*Trochus niloticus*	UES		USAKA

+USAKA= Kwajalein atoll territorial waters and the Mid-atoll coordinator

2.1 Climate Change

Future climate will depend on warming caused by past anthropogenic emissions, future anthropogenic emissions and natural climate variability. NMFS' policy (NMFS 2016) is to use climate indicator values projected under the Intergovernmental Panel on Climate Change (IPCC)'s Representative Concentration Pathway (RCP) 8.5 when data are available or best available science that is as consistent as possible with RCP 8.5. RCP 8.5, like the other RCPs, were produced from integrated assessment models and the published literature; RCP 8.5 is a high pathway for which radiative forcing reaches >8.5 W/m^2 by 2100 (relative to pre-industrial values) and continues to rise for some amount of time. A few projected global values under RCP 8.5 are noted in Table 7. Presently, the IPCC predicts that climate-related risks for natural and human systems are higher for global warming of 1.5 ºC but lower than the 2 ºC presented in Table 7 (IPCC 2018, 2022). Changes in parameters will not be uniform, and the IPCC projects that areas like the equatorial Pacific will likely experience an increase in annual mean precipitation under scenario 8.5, whereas other mid-latitude and subtropical dry regions will likely experience decreases in mean precipitation. Sea level rise is expected to continue to rise well beyond 2100 and while the magnitude and rate depends upon emissions pathways, low-lying coastal areas, deltas, and small islands will be at greater risk (IPCC 2018, 2022).

Table 7. Projections for certain climate parameters under Representative Concentration Pathway 8.5 (values from Table 2.1 IPCC 2014; see Figure 3.4 in IPCC 2022).

Projections	**Scenarios (Mean and likely range)**	
	Years 2046-2065	**Years 2081-2100**
Global mean surface temperature change (ºC)	2.0 (1.4-2.6)	3.7 (2.6-4.8)
Global mean sea level increase (m)	0.30 (0.22-0.38)	0.63 (0.45-0.82)

In this assessment, we rely on systematic assessments of available and relevant information to incorporate climate change in a number of ways. We address the effects of climate, including changes in climate, in multiple sections of this assessment: Status of the Listed Resources (Section 2), Environmental Baseline (Section 3), and Integration and Synthesis (Section 6). In the Status of Listed Resources and the Environmental Baseline we present an extensive review of the best scientific and commercial data available to describe how the listed species and its designated critical habitat is affected by climate change—the status of individuals, and its demographically independent units (subpopulations, populations), and critical habitat in the action area and range wide.

We do this by identifying species sensitivities to climate parameters and variability, and focusing on specific parameters that influence a species health and fitness, and the conservation value of their habitat. We examine habitat variables that are affected by climate change such as sea level rise, temperatures (water and air), pH, and changes in weather patterns (precipitation), and we try to assess how species have coped with these stressors to date, and how they are likely to cope in a changing environment. We look for information to evaluate whether climate changes affect the species' ability to feed, reproduce, and carry out normal life functions, including movements and migrations.

We review existing studies and information on climate change and the local patterns of change to characterize the Environmental Baseline and Action Area changes to environmental conditions that would likely occur under RCP 8.5, and where available we use changing climatic parameters (magnitude, distribution, and rate of changes) information to inform our assessment. In our exposure analyses, we try to examine whether changes in climate related phenomena will alter the timing, location, or intensity of exposure to the action. In our response analyses we ask, whether and to what degree a species' responses to anthropogenic stressors would change as they are forced to cope with higher background levels of stress caused by climate-related phenomena.

2.2 Status of the Species

This section consists of narratives for the ESA and/or UES consultation species occurring in the action area that may be adversely affected by the proposed action. These status summaries provide the point of reference for our analyses of whether or not the action's direct and indirect effects are likely to appreciably reduce a species' probability of surviving and recovering in the wild. Each species' narrative presents a summary of:

1. The species' distribution and population structure (which are relevant to the distribution criterion of the jeopardy standard)
2. The status and trend in abundance of the species and affected population(s) (which are relevant to the numbers criterion of the jeopardy standard)
3. Information on the reproduction of the species and affected population(s) (which is a representation of the reproduction criterion of the jeopardy standard)
4. Natural and anthropogenic threats to the species and/or affected population(s) (which helps explain our assessment of a species' likelihood of surviving and recovering in the wild)
5. Recent conservation activities for the species and/or affected population(s) (which also helps explain our assessment of a species' likelihood of surviving and recovering in the wild)

More detailed background information on the general biology and ecology of these species can be found in status reviews and recovery plans for the various species as well as the public scientific literature.

2.2.1 Humphead Wrasse

In October 2012, NMFS was petitioned to list the humphead wrasse (*Cheilinus undulatus*) as threatened or endangered under the ESA and to designate critical habitat for the species. In February 2013, in its 90-day finding, NMFS determined that this action may be warranted, and initiated a status review to determine whether the species would be officially listed (78 FR 13614, February 28, 2013). In September 2014, NMFS determined that ESA listing of the humphead wrasse was not warranted (79 FR 57875; September 26, 2014). However, this species remains protected under the UES and is therefore a consultation species.

Distribution and Population Structure

The humphead wrasse is widely distributed on coral reefs and nearshore habitats throughout much of the tropical Indo-Pacific Ocean. We incorporate by reference pages 7 through 10 and 14 through 16 of the Status Review Report (Graham et al, 2015) and briefly summarize it here along with information not included in the status review.

The biogeographic range of the humphead wrasse span from 30° N to 23° S latitude and includes the Red Sea south to Mozambique in the Indian Ocean from southern Japan in the northwest Pacific south to New Caledonia in the south Pacific an into the central Pacific Ocean including French Polynesia. The humphead wrasse has been recorded from many islands of Oceania including Kwajalein Atoll, but appears to be absent from the Hawaiian Islands, Johnston Island, Easter Island, Pitcairn, Rapa, and Lord Howe Island with the exception of occasional waifs (Graham et al, 2015).

Both juveniles and adults utilize reef habitats. Juveniles inhabit denser coral reefs closer to shore and adults live in deeper, more open water at the edges of reefs in channels, channel slopes, and lagoon reef slopes. Several studies note juvenile association with branching *Acropora* spp. Adult Humphead wrasse are most often encountered on outer reef slopes and reef passes/channels at depths of only a few meters to at least 60 m; other reports document humphead wrasses to depths of up to 100 m (Graham et al, 2015). Personal observations from NMFS biologists that are familiar with the species note that the species has been observed on deep dives and caught at depths > 100 m and up to ~180 m by deep gillnet (Graham et al, 2015) Existing data on the recorded depth observations of humphead wrasse are either qualitative or incompletely analyzed. While there is limited knowledge of their movements, it is believed that adults are largely sedentary over a patch of reef and during certain times of the year, they move short distances to congregate at spawning sites (Graham et al, 2015). Humphead wrasse density increases with hard coral cover, where smaller fish are found in areas with greater hard coral cover (Graham et al, 2015).

Status and Trends of Abundance
We incorporate by reference pages 17 through 27 of the Status Review Report (Graham et al, 2015) and briefly summarize it. Although humphead wrasses are widely distributed, natural densities are typically low, even in locations where habitats are presumably intact. Unfished or lightly fished areas have densities ranging from 2–27 individuals per 10,000 m^2 of reef. At sites near human population centers or at fished areas, densities are typically lower by tenfold or more and in some locations humphead wrasse are rarely observed (Graham et al, 2015). Total abundance throughout its range is difficult to estimate because survey methods may not cover all habitable areas. Existing information suggests that humphead wrasse populations are most abundant and stable in the Indian Ocean.

The humphead wrasse are known to occur near Illeginni Islet. The humphead wrasse appear to occur in low densities throughout the Kwajalein Atoll area in NMFS and USFWS biennial surveys. Occurrence records of humphead wrasse suggest a broad, but scattered distribution at USAKA with observations of the species at 26% (32 of 125) of sites at 10 of the 11 surveyed islets since 2010. Adult humphead wrasses have been recorded in seaward reef habitats at Illeginni Islet (shallowest depths approximately 5 m deep; NMFS and USFWS 2018). Although encountered on numerous occasions at USAKA, direct density measures of humphead wrasse have not been obtained. The adults of this species may range very widely, with typically four or fewer individuals observed within a broad spatial reef area (Personal Communication Dr. Robert Schroeder, NMFS). Humphead wrasse have been observed at Illeginni in nearby ocean-side and lagoon habitats (USFWS 2011, USFWS and NMFS 2012, NMFS and USFWS 2018).

Shallow inshore branching coral areas with bushy macro-algae, such as those that may exist along the shallow lagoon reef flat at Illeginni Islet, have been noted as potential essential nursery habitat for juvenile humphead wrasse (NMFS 2014a, Graham et al, 2015). Recent settler and juvenile numbers are presumed to greatly exceed 20 in such habitat (Tupper 2007) and might be grossly approximate to range from zero to 100 within the lagoon-side waters of Illeginni (NMFS 2017a)

Reproduction
We incorporate by reference pages 10 through 14 of the Status Review Report (Graham et al, 2015) and briefly summarize it. Humphead wrasse have been observed to aggregate at discrete seaward edges of deep slope drop-offs to broadcast spawn in the water column; they do not deposit their eggs on the substrate. This type of behavior is not known at Illeginni Islet, but it may exist; given that similar habitat would occur in nearby waters along drop-off outer reef

areas. Field reports reveal variable humphead wrasse spawning behavior, depending on location. Spawning can occur daily, over several and all months of the year, coinciding with certain phases of the tidal cycle (usually after high tide) and possibly lunar cycle (Graham et al, 2015). Spawning can reportedly occur in small (< 10 individuals) or large (>100 individuals) groupings, which can take place daily in a variety of reef types (Graham et al, 2015). Humphead wrasse may spawn at local spawning sites (i.e. "resident" spawner) or migrate many miles to aggregate at a reproductive site. Based on available information, it is estimated that the typical size of female sexual maturation for the humphead wrasse occurs at 45–50 cm FL for females (5–7 years) and 70 cm FL (9 years) for males.

The flow dynamics of developing fish eggs and larvae around Illeginni Islet are not understood. Initial flow may be away from the islet, with future return or larval/adult source dynamics from another area. No information exists to support any reasonable estimation of potential CPS impacts to humphead wrasse eggs and developing larvae (NMFS 2014a).

<u>Threats to Species</u>
We incorporate by reference pages 41 through 67 and 76 through 92 of the Status Review Report (Graham et al, 2015). Below we list the impacts identified as threats to Humphead wrasse and provide specific page numbers in Graham et al. (2015) where details, references, and justifications may be found:

- Habitat destruction, modification, or curtailment (Graham et al. 2015 concluded a moderate level of threat)
    - Destructive fishing practices such as cyanide poisoning, muro-ami, and blast fishing. (pages 41-43)
    - The loss of and/or modification of juvenile nursery areas and adult habitats (pages 43-44)
- Overutilization for commercial, recreational, scientific or educational purposes (Graham et al, 2015 concluded a moderate level of threat the species that depends largely upon jurisdictions)
    - Artisanal, commercial, and IUU fishing including for the live reef food fish trade, marine aquarium trade, and mariculture (pages 44-50)
- Inadequacy of existing regulatory mechanisms (Graham et al. 2015 concluded a moderate level of threat)
    - Domestic and international fisheries management authorities and regulations (pages 51-61)
- Natural and other man made factors. (Graham et al. 2015 concluded a low level of threat on the species over 0-25 years and moderate effects over the foreseeable (26-50 years) future, the latter due to concerns of increased climate change and pollution-related impacts on the species)
    - Life history characteristics and competition (pages 61-62)
    - Climate Change (pages 62-65)
    - Pollution and marine debris (pages 65-67)

However, the ERA team concluded that the threats are not a significant risk to the extinction of the species.

<u>Recent Conservation Activities</u>

Humphead wrasse is listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix II, and has been retained as a consultation species under the UES.

2.2.2 Bumphead Parrotfish

In January 2010, NMFS was petitioned to list the bumphead parrotfish (*Bolbometopon muricatum*), as threatened or endangered under the ESA and to designate critical habitat for the species. In April 2010, in its 90-day finding, NMFS determined that this action may be warranted, and initiated a status review to determine whether the species would be officially listed (75 FR 16713, April 02, 2010). In November 2012, NMFS determined that ESA listing of the humphead wrasse was not warranted (73 FR 66799; November 7, 2012). However, this species remains protected under the UES and is therefore a consultation species.

Distribution and Population Structure
We incorporate by reference pages 10 through 19 of the Status Review for bumphead parrotfish (Kobayashi et al. 2011) and briefly summarize it here along with information not included in the status review. The bumphead parrotfish is widespread across the Indo-Pacific, occurring primarily in tropical and subtropical waters. Juvenile bumphead parrotfish enter a pelagic phase that lasts approximately 25 days (Taylor et al. 2018). Adults prefer barrier and fringing reefs during the day, sheltering in caves and shallow, sandy lagoons at night. Bumphead parrotfishes forage in high-energy forereefs with high structural complexity, while sheltered lagoons are important for recruitment. Therefore, bumphead parrotfishes require both types of habitat.

Status and Trends of Abundance
We incorporate by reference pages 20 through 27 of the Status Review (Kobayashi et al. 2011) and briefly summarize it here along with information not included in the status review. Densities of bumphead parrotfish vary among reefs within their geographic range. Densities are generally higher in areas further from human populations. Maximum reported density was 5.17 fish per 1,000 m^2 (0.00517 per m^2) in Palau (Kobayashi et al. 2011). This is a substantially higher estimate than most reported in the Central Pacific with densities of 1.41 to 1.92 per 1,000 m^2 reported in surveys in Papua New Guinea, 1.10 in Micronesia, 0.45 in the Northern Mariana Islands and Guam, 0.42 to 0.91 in the Solomon Islands, and 0.00 in the Marshall Islands (Kobayashi et al. 2011). While data is insufficient to evaluate overall abundance, site-specific research suggests historical depletion of bumphead parrotfish populations primarily due to overexploitation.

During biennial surveys of USAKA islets between 2010 and 2018, only one bumphead parrotfish was recorded on an outer reef slope of Kwajalein Islet in 2016 (NMFS and USFWS 2018). However, recently NMFS biologists have observed this species in Legan Harbor (2 adults), Eniwetok Harbor (4 adults), and Gagan Harbor (6 adults) (S. Kolinski personal communication 2024). Since the bumphead parrotfish has been observed recently in harbors of USAKA, including at Legan Islet, which is 16 km (10 miles) from Illeginni Islet, it is possible that this species would occur in Illeginni reef habitats in low densities.

Reproduction
We incorporate by reference pages 35 through 43 of the Status Review (Kobayashi et al. 2011) and summarize it here briefly along with information not included in the status review. Bumphead parrotfish are generally functional gonochoristic, in contrast to the majority of parrotfishes that are protogynous hermaphrodites. Females reach sexual maturity at a length of

between 500 and 700 mm and an age of 7 to 11 years, while males mature slightly earlier in life and at a smaller size. They mate in large aggregations often exhibiting lek-like behavior. Evidence also suggests that older females may exhibit selective fertilization, prioritizing fitter males (Taylor et al. 2018). Spawning intervals are highly synchronized with the lunar cycle. Bumphead parrotfish lay eggs that are pelagic and likely take only 20 hours to 3 days to hatch. Newly hatched juveniles eventually settle in shallow lagoons following their pelagic phase.

Threats to Bumphead parrotfish
We incorporate by reference pages 58 through 67 of the recovery plan (Kobayashi et al. 2011) and briefly summarize it here. Below we list the impacts identified as threats to bumphead parrotfish and provide specific page numbers in Kobayashi et al. (2011) where details, references, and justifications may be found.

- Habitat Loss (Kobayashi et al. 2011 concluded a high threat level.)
    - Juvenile habitat is at risk as shallow lagoons are exposed to pollution, modification, and harvest pressure (page 58)
- Overutilization (Kobayashi et al. 2011 concluded that overutilization is a primary threat to bumphead parrotfish, with a high threat level.)
    - Bumphead parrotfish are highly prized by spear fishermen (page 58)
    - They are valued commercially and are culturally significant for many coastal communities (page 58)
    - Large aggregations of adults in shallow lagoons at night are particularly vulnerable (page 59)
    - Bumphead parrotfish of all size classes are vulnerable (page 60)

However, the Biological Review Team concluded that the threats are not a significant risk to the extinction of the species.

Recent Conservation Activities
The Management Report (NMFS 2012) summarizes current efforts to mitigate present threats to bumphead parrotfish. We incorporate by reference that information from pages 21 through 101 and 138 through 150 of NMFS (2012) and summarize it below. Currently, no international regulatory mechanisms address threats to bumphead parrotfish. However, the bumphead parrotfish has been retained as a consultation species under the UES.

2.2.3 Corals

As candidate species for listing under the ESA, these six coral species became consultation species under UES section 3-4.5.1 n(a), and retained that status, per the wishes of the RMI Government, after we determined that listing under the ESA was not warranted (77 FR 73220, 79 FR 53852).

Distribution and Population Structure
We incorporate by reference pages 147 through 149, 217 through 218, 233 through 234, 381 through 382, 417 through 418, and 449 through 450 of the Status Review Report (Brainard et al. 2011) and briefly summarize it here.

Acropora microclados, Acropora polystoma, Cyphastrea agassizi, Heliopora coerulea, Pavona venosa, and Turbinaria reniformis are broadly distributed across the Indo-Pacific region (Figure 8). Each of the six different corals have specific ranges, depths, and distributions that affect their population structure. Table 8 describes each specific corals range, the distribution, depth, and gives the most recent density estimate available for the Illeginni impact area.

Figure 8. The generalized range of the UES listed Indo-pacific corals.

Table 8.The reported range wide depth, abundance, distribution, and density of the UES-listed corals (Brainard et al. 2011, NMFS 2014b, and NMFS 2017a).

	Depth range	**Global Abundance**	**Global Distribution**	**Distribution at USAKA**	**Density within the Illeginni impact area**
A. microclados	5 to 20 m	uncommon	See SRR maps (Fig. 7.5.44 and 7.5.45, p. 218).	All USAKA islets 34 of 35 sites within the mid-atoll corridor	0.0017 colonies/m2.
A. polystoma	3 to 10 m.	uncommon	See SRR maps (Fig. 7.5.60 and 7.5.61, p. 234).	All USAKA islets 34 of 35 sites within the mid-atoll corridor	0.0017 colonies/m2
C. agassizi	3 to 20 m	uncommon	See SRR maps (Fig. 7.21.2 and 7.21.3, p.417-418).	7 of 11 USAKA islets 14 of 35 sites within the mid-atoll corridor	0.0013 colonies/m2
H. coerulea	0-60 m and can be dominant at 0-1.2 m to at least 20 m.	common	See SRR maps (Fig. 7.2.2 and 7.2.3, p. 148).	All USAKA islets 32 of 35 sites within the mid-atoll corridor	0.45 colonies/m2.

	Depth range	Global Abundance	Global Distribution	Distribution at USAKA	Density within the Illeginni impact area
P. venosa	2 to 20 m	uncommon but distinctive	See SRR maps (Fig. 7.15.18 and 7.15.19, p. 382).	All USAKA islets 16 of 35 sites within the mid-atoll corridor	0.0013 colonies/m2.
T. reniformis	0-40 m	common	See SRR maps (Fig. 7.24.10 and 7.24.11, p. 449-450).	6 of 11 USAKA islets 9 of 35 sites within the mid-atoll corridor	0.0013 colonies/m2.

Status and Trends of Abundance

We incorporate by reference pages 5 through 7, 147 through 149, 217 through 218, 233 through 234, 381 through 382, 417 through 418, and 449 through 450 of the Status Review Report (Brainard et al. 2011) and briefly summarize it here along with information not previously included in the documents.

The six coral species considered in this document are found in varied abundances within their geographic ranges, within USAKA, and the Illeginni impact area (Table 8). Occurrence records suggest a broad, but scattered distribution at USAKA with observations of the *A. microclados* 82% (78 of 95), *A. polystoma* 0.03% (3 of 95)*, C. agassizi* 24% (23 of 95)*, H. coerulea* 63% (60 of 95)*, P. venosa* 41% (39 of 95)*, and T. reniformis* at 24% (23 of 103) of coral surveyed since 2008. All are listed under the UES. While monitoring in select reefs has revealed possible localized increases in abundance of some ESA and UES listed corals (e.g. *A. globiceps and I. crateriformis*), data and monitoring of large-scale abundance of the six coral species considered here are insufficient to elucidate overall trends. However, there is new evidence that under conditions that stress other corals such as high temperatures, hardier blue coral (*H. Coerulea*) becomes highly aggressive against neighboring corals and can begin to dominate a reef system (Atrigenio et al. 2020). Given that the most critical threats to these corals are increasing while other threats continue or increase as well, the overall abundance of all six coral species across their respective ranges are likely decreasing.

Reproduction

We incorporate by reference pages 8 through 10, 149, 218, 234, 383, 450, and 481, of the Status Review Report (Brainard et al. 2011) and briefly summarize it here. *A. microclados* and *A. polystoma* are hermaphroditic spawners; releasing gametes of both sexes. They also reproduce through fragmentation, where broken pieces continue to grow to form new colonies (Brainard et al. 2011). The reproductive characteristics of *C. agassizi* are undetermined, but its congeners include a mix of hermaphroditic spawners and brooders (Brainard et al. 2011). *T. reniformis* is a gonochoric spawner (separate sexes), releasing gametes of one sex, or the other that become fertilized in the water, and while the reproductive characteristics of *P. venosa* are unknown, six of its congeners are gonochoric spawners (Brainard et al. 2011).

H. coerulea colonies have separate sexes. Fertilization and early development of eggs begins internally, but the planula larvae are brooded externally under the polyp tentacles. Larvae are considered benthic, as they normally distribute themselves by crawling away vice drifting in the plankton (Brainard et al. 2011)

Threats to all UES-listed Corals

We incorporate by reference pages 29 through 63 the Indo-Pacific Reef-building Corals: General Status Assessment (Smith 2019). Below we list the impacts identified as threats to the UES listed corals described above and provide specific page numbers in NMFS (2019) where details, references, and justifications may be found:

- Global Climate Change (Smith 2019 concluded a high level of threat)
  - Ocean warming that contributes to bleaching events, disease outbreaks, and can mortality (pages 33-38).
  - Ocean acidification which impedes corals' ability to produce their calcium carbonate skeletons, dissolves reef structures, and reduces coral reproduction (pages 38- 42).
  - Sea level rise by requiring corals to grow quickly to keep up with rising sea levels, degrading water quality through increased coastal erosion, and compounding the effects of other simultaneous threats such as warming-induced bleaching and ocean acidification. (pages 42-43)
- Fishing (Smith 2019 concluded a moderate level of threat, that may rise to high risk in some jurisdictions with large human populations, pages 43-46)
- Land-based Sources of Pollution (Smith 2019 concluded a high level of threat)
  - Sediment and turbidity (pages 46-47)
  - Excessive nutrient levels can change ecosystem structure, increase turbidity and be detrimental to coral reproduction (page 48)
  - Contaminants can cause physiological impairment, impaired photosynthesis, bleaching, reduced growth, DNA damage, and lead to reproductive failure. (pages 49-50)
- Disease or Predation (Smith 2019 concluded a moderate level of threat on the species that may increase with future climate conditions)
  - Coral disease (pages 50-52)
  - Crown of thorns sea star outbreaks are increasing (page 53)
  - Environmental stressors that lead to predator outbreaks (e.g., land-based sources of pollution) have increased.
- Collection and trade (Smith 2019 concluded a moderate level of threat)
- Other threats (Smith 2019 concluded a low level of threat on the species that may increase with future conditions)
  - Changes in ocean circulation and tropical storms (page 56)
  - Human induced physical damage (page 56)
  - Invasive species (page 57)
  - Salinity (page 57)
- Interaction of threats (Smith 2019 concluded a high level of threat that is will likely increase in the foreseeable future)
  - Potential simultaneously or sequentially effects have been observed (e.g. ocean warming causes coral bleaching, and bleached corals are more susceptible to diseases, corals with reduced calcification are more sensitive to bleaching and diseases, pages 57-58)
  - There is uncertainty about how the pathways interact and where the effects will occur.

- Inadequacy of Existing Regulatory Mechanisms (Smith 2019 concluded that national, state, local, and other regulatory mechanisms were generally ineffective at preventing or sufficiently controlling local threats to these species, pages 58-62)

Conservation of Coral Species
A. microclados, A. polystoma, C. agassizi, H. coerulea, P. venosa, and T. reniformis are listed in CITES Appendix II, and have been retained as a consultation species under the UES.

2.2.4 *Tectus niloticus* (Top Shell Snail)

The top shell snail is also sometimes referred to as *Rochia nilotica* or *Trochus*. It is a broadly distributed marine gastropod, and is a consultation species under UES section 3-4.5.1 (a).

Distribution and Population Structure
The top shell snail is distributed in sub-tropical to tropical waters of the Indo-Pacific region. They are indigenous to Yap, Palau, and Helen Reef in Micronesia, but have been introduced to nearly every island group across the Indo-Pacific region (Smith 1987). Individuals migrate into deeper water as they grow (Heslinga et al. 1984) with maximum reported depth being 24 m (Smith 1987).

Status and Trends of Abundance
Data are insufficient to determine current population levels and trends across its range, including in the RMI. The top shell snail is a hardy species that is commonly relocated between island groups with high success. Dobson (2001), reports that top shell snails can survive out of the water for up to 36 hours when kept cool and damp. Top shell snails relocated to a new reef area and left undisturbed for a brief period will typically resume normal behaviors with no measurable effects, assuming the relocation site supports adequate forage and shelter. The top shell snail is estimated to be scattered across the submerged hard pavement reef areas, including the intertidal and/or inshore rocky areas of the Illeginni impact area, at a density of up to 0.09 individuals/m^2. Occurrence records suggest a broad, but scattered distribution at USAKA with observations of the species at 57% (59 of 103) of sites at 11 of the 11 surveyed islets since 2008. They are observed at Illeginni and at 12 of 35 sites within the mid-atoll corridor (NMFS 2014b).

Reproduction
Top shell snails breed spawn on a lunar cycle. Jin et al. (2004) looked at spawning rates off Chuuk Island, Micronesia and reported an increase in spawning rates in April and May, and June and July but spawning individuals were present throughout the year. Larvae are known to be short-term lecithotrophic (relying solely on the yolk sac for nutrition) which, under favorable conditions, spend only a few days drifting before the settle out into the benthic environment and become nonplanktonic juveniles (Heslinga et al. 1984). There is a high probability that recruitment occurs within a few days and near their point of origin. Larvae recruit to shallow intertidal zones, typically along exposed (seaward) shores.

Threats to the Top Shell Snail
The top shell is highly susceptible to over-exploitation. It is an edible species, whose shells are also commercially important in the mother of pearl button industry (Heslinga et al. 1984). They are slow moving and are easily spotted by reef-walkers and snorkelers. Inventories at Illeginni note aggregated piles of Trochus shells on the reef (NMFS 2017a) Unregulated or poorly regulated harvesting has led to their depletion across their range. Although top shell snails are probably beginning to be affected by impacts associated with anthropogenic climate change

(described in more detail in the Environmental Baseline section below), no significant climate change-related impacts to its populations have been observed to date.

Conservation of the Species
The top shell is afforded protection at USAKA as a consultation species under the UES (USAKA 2021).

2.2.5 Clams

Hippopus hippopus, Tridacna squamosa and Tridacna maxima are broadly distributed across the Indo-Pacific region. *H. hippopus* and *T. squamosa* were added as consultation species under UES section 3-4.5.1 (a) due to a 2017 90 day finding (82 FR 28946, June 26, 2017). *H. hippopus* is proposed for listing as a threatened species under the ESA (89 FR 60498). Similarly, the giant clam species *T. squamosa* and *T. maxima* were proposed for listing based on their similarity to other giant clam species (89 FR 60498; July 25, 2024). As specified in the UES, any species proposed for listing under the ESA is then considered a UES consultation species subject to consultation requirements and procedures of the UES. Even though ESA protection for *T. squamosa* and *T. maxima* only includes a prohibition on the import and export of derivative parts and products (not whole, identifiable clams) of these species, full UES consultation requirements apply to these species as long as it is listed under the UES, effective July 25, 2024.

Distribution and Population Structure
We incorporate by reference pages 5 through 7, 66, and 179 through 181 of the Giant Clams Status Review finding (Rippe et al. 2024) and briefly summarize it here. We include additional supplemental information where appropriate. *H. hippopus,* also known as the horse hoof clam, *T. squamosa,* also known as the fluted giant clam, and *T. maxima,* commonly known as the small giant clam, are all giant clam species with distinct morphological differences that set them apart. However, all three giant clams are in the subfamily Tridacninae, which is markedly stenothermal (i.e., they are able to tolerate only a small range of temperature) and thus restricted to warm waters. Giant clams are typically found living on sand or attached to coral rock and rubble by byssal threads but they can be found in a wide variety of habitats, including live coral, dead coral rubble, boulders, sandy substrates, seagrass beds, macroalgae zones, etc.

These species have specific ranges, depths, and distributions that affect their population structure. Table 9 describes each specific clams range, the distribution, depth, and gives the most recent density estimate available for the Illeginni impact area.

Table 9. The reported depth, abundance, distribution and density of the UES-listed clams (CITES 2004a, bin Othman et al. 2010, Neo et al. 2017, NMFS 2017b, 82 FR 28946).

	Depth range	**Global Distribution**	**Distribution at USAKA**	**Density within the Illeginni impact area**
H. hippopus	0-6 m	See SR maps (Fig. 17, p. 66).	9 of 11 USAKA islets 9 of 35 sites within the mid-atoll corridor	0.006 individuals /m^2.
T. squamosa	0-20 m	See SR maps (Fig. 32, p. 179).	6 of the 11 USAKA islands 24 of 35 sites within the mid-atoll corridor	0.0011 individuals /m^2.

	Depth range	**Global Distribution**	**Distribution at USAKA**	**Density within the Illeginni impact area**
T. maxima	1-15 m	Broad geographic range that extends W. from the Red Sea and eastern Africa to the Pitcairn Islands in the E. Pacific, and from the GBR in the S. to southern Japan in the N.	11 of the 11 USAKA islands 35 of 35 sites within the mid-atoll corridor	0.0014 individuals /m^2.

Status and Trends of Abundance

We incorporate by reference pages 5 through 7, 68 through 89, and 186 through 201 of the Giant Clams Status Review finding (Rippe et al. 2024) and briefly summarize it here along with information not previously included in the document. Abundance data and robust estimates of population trends are lacking for most locations where these species occur. However, available survey data and qualitative accounts consistently indicate that all giant clam species have suffered significant population declines over the last 50 years. The clam species considered in this document are found in varied abundances within their geographic ranges, within USAKA, and the Illeginni impact area (Table 9). Surveys of USAKA show *H. hippopus* and *T. maxima* to be widely distributed across the USAKA islets, the mid-atoll corridor, and the variety of habitat types sampled (NMFS 2017b). NMFS (2017b) further suggests the distribution for *T. squamosa* is more confined to the central portion of Kwajalein Atoll, but it appears to be widespread across habitat types. These clam species tended to occur as scattered individuals with *H. hippopus* at 33 %, *T. squamosa* at 38% and *T. maxima* at 81 % of the 109 surveyed stations (NMFS 2017b). All are listed under the UES.

Reproduction

We incorporate by reference pages 7 through 12 of the Status Review finding (Rippe et al. 2024) and briefly summarize it here. All giant clam species are classified as protandrous functional hermaphrodites, meaning they mature first as males and develop later to function as both male and female, but otherwise, giant clams follow the typical bivalve mollusk life cycle. At around five to seven years of age, giant clams reproduce via broadcast spawning, in which several million sperm and eggs are released into the water column where fertilization takes place. Giant clam spawning can be seasonal; for example, giant clams can spawn year round but research suggests that some may follow a lunar cycle or have seasonal restrictions. However, this can be area and species specific. Once fertilized, the eggs hatch into free-swimming trochophore larvae for around 8 to 15 days (according to the species and location) before settling on the substrate. During the pediveliger larvae stage (the stage when the larvae is able to crawl using its foot), the larvae crawl on the substrate in search of suitable sites for settlement and metamorphose into early juveniles within 10 to 29 days of spawning.

Threats to the Species

We incorporate by reference pages 29 through 63 the Status Review finding (Rippe et al. 2024) Below we list the impacts identified as threats to the UES listed giant clams described above and provide specific page numbers in NMFS (2024) where details, references, and justifications may be found:

- Global Climate Change (Rippe et al. 2024 concluded a significant risk to giant clams)
  - Ocean warming that contributes to bleaching events, disease outbreaks, and can mortality will reduce the three-dimensional complexity of reef habitats (pages 21).
  - Like corals ocean warming can lower growth, reproductive success and lead to bleaching or mortality (pages 53-56)
  - Ocean acidification, which impedes corals' ability to produce their calcium carbonate skeletons, dissolves reef structures, and reduces coral reproduction (pages 21). This may also be true for some giant clams (pages 56-87
  - Reductions in coral cover will lead to reduced habitat rugosity for giant clams (page 21)
- Coastal Development (Rippe et al. 2024 concluded a moderate level of threat, that may rise to high risk in some jurisdictions with large human populations, pages 22-23)
- Overutilization for Commercial, Recreational, Scientific, or Educational Purposes (Rippe et al. 2024 concluded that this is the most significant threat to giant clams)
  - Historical and ongoing harvest and poaching of clams is unsustainable (pages 24-35)
  - Commercial shell harvest and fishing pressure likely lead to population declines and local extinctions (pages 35-41)
  - International trade for aquaria (page 41-44)

Additional threats to giant clams may also include disease, pollution, sedimentation, and predation. However, threats differ between species and locations. For example, *H. hippopus* has a higher risk of being impacted by human development then *T. squamosa*, which was analyzed as having a low risk. Research also suggests that *T. maxima* distribution decreases near human development (Noe et al. 2017). Please refer to the Giant Clams Status Review (Rippe et al. 2024) for more information about species-specific risk.

Conservation of the Species

H. hippopus, *T. squamosa* and *T. maxima* are listed in CITES Appendix II, are proposed for listing under the ESA and are consultation species under the UES.

3 ENVIRONMENTAL BASELINE

The UES does not specifically describe the environmental baseline for a Biological Opinion. However, under the ESA, the environmental baseline is defined by regulation (50 CFR 402.02). Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone completed formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The impacts to listed species or designated critical habitat from Federal agency activities or existing Federal agency facilities that are not within the agency's discretion to modify are part of the environmental baseline. We apply the ESA standards consistent with the intent of the UES agreement in our effects analysis.

The following section of this biological opinion addresses global climate change, fisheries, coastal development, vessels, armed conflict, direct take, pollution from chemicals and marine debris, and ocean noise from a variety of sources and effects these stressors have on listed resources within the action area. Some of these stressors have resulted in mortality or serious injury to individual animals (e.g., fishing, direct take), whereas other stressors (e.g., noise) may induce sublethal responses like changes in behavior that could impact important biological functions such as feeding or breeding.

The Atlantic and Pacific BOAs encompasses approximately 13,855,400 km^2 (Figure 2) and 48,676,700 km^2 of open ocean (Figure 3). Where shipping, military testing and training activities, fishing, and other Federal activities affect the species that frequent those waters. The BOA portions of the action area are composed mostly of deep ocean waters and the airspace above those waters. The action area occurs entirely outside of the U.S. territorial seas, 22 km from the coastline, with most activities occurring outside of 370 km. Therefore, most of the activities will take place on the high seas.

The Marshall Islands consist of 29 atolls and five islands aligned in two roughly parallel northwest-southeast chains: the northeastern Ratak Chain and the southwestern Ralik Chain. The total land area is about 181.3 km^2, and the total lagoon area is about 11,655 km^2. Kwajalein Atoll (2,849 km^2) is located near the center of the island group, about eight degrees above the equator, and is one of the largest coral reef atolls in the world (Figure 5).

Kwajalein Atoll was the site of heavy fighting during World War II (1940s), when the U.S. took it from the Japanese. U.S. and Japanese forces heavily modified many of the islets during dredge and fill construction operations. More recently, the RMI has provided 11 islets at Kwajalein Atoll for use by the U.S. Government as part of the RTS. Located on the west-central side of the atoll, Illeginni Islet is 31 uninhabited acres of land area with several buildings (some abandoned), towers, roadways, a helipad, and a dredged harbor area. The small islet has been used as a target-testing site by the U.S. military for various hypersonic missile programs since the early 1990s. Hundreds of U.S. personnel live on some of the islets, and Marshallese workers commute daily between the U.S. occupied islets and the ones on which they reside. Vessel traffic occurs regularly between the islets, and to and from the atoll. This includes fishing boats, personnel ferries, and military service craft, visiting military ships, and cargo vessels that supply the people of Kwajalein Atoll. For more than 20 years, USAKA has participated in testing hypersonic vehicles from ICBMs and other flight tests launched from Vandenberg AFB and other locations. Vehicle impacts from such tests have occurred and continue to occur on, near Illeginni Islet, and in adjacent ocean waters.

On May 16, 2005, we issued a letter of concurrence (LOC) with the U.S. Air Force's "not likely to adversely affect" determination for sea turtles and marine mammals under our jurisdiction. It is important to note that sea turtles are under the jurisdiction of the FWS while in terrestrial habitats, whereas they are under our jurisdiction when in marine habitats. Therefore, any impacts on hauled-out or nesting adult turtles, eggs in nests, or hatchlings before they reach the water, were considered in the 2005 FWS Opinion, not in our LOC. Additional information on past consultations that are part of the environmental baseline are listed below in Table 10.

Table 10. Previous missile test flight actions consulted on at USAKA

Action	Date	Consultation type	Consultation	Anticipated amount of take	Result of activities †
Minuteman III operations	July 29, 2015	Formal	LAA but will not jeopardize the continued existence of the listed species	Up to 49,645 coral colonies, and 117 top shell snails	Ongoing activities until 2030
Flight Experiment 1 (FE-1)(PIR-2017-10125; I-PI-17-1504-AG)	May 5, 2017	Formal	LAA but will not jeopardize the continued existence of the listed species	Up to 10,417 coral colonies, 4 top shell snails, 90 clams, and 108 humphead wrasses.	No take quantified
ARRW Flight Tests (PIRO-2019-00639; I-PI-19-1751-AG)	July 30, 2019	Formal	LAA but will not jeopardize the continued existence of the listed species	Up to 10,417 coral colonies, 4 top shell snails, 90 clams, and 108 humphead wrasses.	Unknown
Terminal High Altitude Area Defense (THAAD) (PIRO-2019-01962; I-PI-19-1769-AG).	July 4, 2019	Informal	NLAA	n/a	Unknown
Flight Experiment-2 (FE-2) (PIR-2019-02607; I-PI-19-1782-AG).	Sept. 29, 2019	Formal	LAA but will not jeopardize the continued existence of the listed species	Up to 10,404 coral colonies, 4 top shell snails, 75 clams, and 108 humphead wrasses	No take quantified
Ground Based Strategic Defense (GBSD) flight. (PIRO-2020-03355; I-PI-20-1884-AG).	March 15, 2021	Formal	LAA but will not jeopardize the continued existence of the listed species	Up to 31,224 coral colonies, 9 top shell snails, 219 clams, and 324 humphead wrasses,	Ongoing activities until 2029
Hypersonic Flight Test-3 (FT-3) (PIRO-2020-03120; I-PI-20-1865-AG)	March 26, 2021	Formal	LAA but will not jeopardize the continued existence of the listed species	Up to 14 coral colonies, 1 top shell snail, 2 clams, and 108 humphead wrasse.	No take quantified
Space Force Missile Flight Tests (PIRO-2023-00027; I-	Feb. 18, 2022	Informal	NLAA	n/a	Unknown

Action	Date	Consultation type	Consultation	Anticipated amount of take	Result of activities †
PI-23-2111-DG).					
PATRIOT Operational Test (PIRO-2023-00027; I-PI-23-2111- DG).	Feb. 7, 2023	Informal	NLAA	n/a	Unknown

†Unknown = after action reports have not been received or it is unknown if the action has been completed.

Direct take through harvest continues in the RMI for several of the UES consultation species. For example, sea turtles, black lip pearl oysters, and top shell snails (all of which are UES consultation species) are considered a food source or of economic value by many RMI nationals. Aquaculture has been identified as an important source of income for island communities and is increasing as part of the Marshall Islands Fisheries Development plan. Giant clam, top shell snails, and coral aquaculture has joined black lip pearl oyster cultivation in the RMI (MIMRA 2022). Local people collect wild oysters, clams, and snails for their edible flesh and the shells, which are used to make decorative items. Although RMI nationals are unlikely to take any of these species from USAKA-controlled islets, low numbers of black lip pearl oysters, clams, and some corals are likely taken by U.S. personnel who are unaware of their status as UES-protected species. The level of exploitation is unknown, and no concerted research or management effort has been made to conserve these species in the RMI. No information is currently available to quantify the level of impact direct take is having on consultation species in the Marshall Islands.

Nearshore fisheries around Kwajalein Atoll consist primarily of subsistence and recreational fishing for coral reef and pelagic species. Contemporary fishing methods include boat-based and land-based hook-and-line fishing (handline or rod-and-reel), net fishing (cast, gill, drag, and surround net), spear fishing, hook and gaff, and gleaning (Hensley and Sherwood 1993).

Marine debris continues to accumulate in the ocean and along shorelines within the action area. Despite the development, wartime impacts, and human utilization of marine resources mentioned above, the atoll's position at the center of the Pacific Ocean is far from highly industrialized, and its human population remains relatively low. Consequently, the water quality level of the lagoon and the surrounding ocean is very high, and the health of the reef communities, along with the overall marine environment of Kwajalein Atoll, borders on pristine.

As mentioned briefly in the status of species section, anthropogenic climate change stressors are affecting marine ecosystems across the globe. As a global phenomenon, impacts are also likely occurring at Kwajalein Atoll and in the action area. Globally averaged annual surface air temperatures have increased by about 1.8 ºF (1.0 ºC) over the last 115 years (1901 to 2016; Wuebbles et al. 2017). The earth's climate is now the warmest in the history of modern civilization. Global average sea level has risen by about seven to eight inches since 1900, with almost half of that rise occurring since 1993. Global average sea levels are expected to continue to rise by at least several inches in the next 15 years, and by one to four feet by 2100 (Wuebbles et al. 2017). In addition to increases in ocean temperatures and sea level rise, other global changes include increasing ocean acidification, higher than normal king tides, and increased storm intensities. While current research is documenting these global and regional changes, specific scientific documentation describing the effects of these climate stressors in the action area is lacking.

We incorporate by reference pages 25 through 52 of the Status Review Report (Brainard et al. 2011) and pages 29 through 43 of the Indo-Pacific Reef-building Corals: General Status Assessment (Smith 2019), and pages 19 through 23 and 52 through 58 of the Giant Clams Status Review Finding (Rippe et al. 2024) and summarize them here long with information not included. Climate change-induced elevated water temperatures, altered oceanic chemistry, and rising sea level are contributing to a degradation in the health of coral reef ecosystems and are likely beginning to affect corals and mollusks found in the action area. The anthropogenic release of CO^2 and other greenhouse gasses is considered the largest contributor to global climate change, and it is expected that the release of those gasses is not only likely to continue, but the rate of their release is expected to increase during the next century (Brainard et al. 2011).

Globally, ocean acidification is adversely affecting many species of corals and other calcareous species like mollusks. We note that ocean acidification will likely not affect all regions uniformly, as seawater carbonate dynamics are highly dependent on many local-scale factors, such as temperature, proximity to land-based runoff, proximity to sources of oceanic CO^2, salinity, nutrients, as well as ecosystem-level photosynthesis and respiration rates. Therefore, different species and areas may experience differences in their responses to this stressor.

Increasing thermal stress due to rising water temperatures has already had significant effects on most coral reefs around the world. It has been linked to widespread and accelerated bleaching and mass mortalities of corals around the world over the past 25 years (Brainard et al. 2011). Between 1998 and 2015, the greatest warming was recorded in the Southern Ocean, the tropical/subtropical Pacific Ocean, and the tropical/subtropical Atlantic Ocean (Smith 2019). This resulted in an increase in marine heatwaves, including those that cause bleaching and death of corals. During the years 1983, 1987, 1995, 1996, 1998, 2002, 2004, 2005, 2014, 2015, 2016, and 2017 widespread warming-induced coral bleaching and mortality was documented in many Indo-Pacific reef coral communities, with 2014-2017 considered a single 3-year event (Smith 2019). Field observation and models both predict increasing frequency and severity of bleaching events, causing greater coral mortality and allowing less time to recover between events

Elevated temperatures are known to induce bleaching in giant clams. Widespread bleaching of giant clams was observed in the central Great Barrier Reef, Austral, in 1997-1998 and populations of *T. squamosa* and *T. crocea* around Mannai Island, Thailand suffered extensive bleaching in mid-2010 due to prolonged exposure to temperatures averaging 32.6°C (Rippe et al. 2024). Bleaching was recorded in every *T. squamosa* specimen observed (n = 12), of which only four individuals recovered while the remaining two-thirds died.

As the atmospheric concentration of CO^2 has increased, there has been a corresponding reduction in the pH of ocean waters (acidification). As ocean acidity increases, the calcium carbonate saturation state of the water decreases. Increased ocean acidity has the potential to lower the calcium carbonate saturation state enough to slow calcification in most corals and may increase bioerosion of coral reefs. It is thought to adversely affect fertilization, larval settlement, and zooxanthellae acquisition rates for corals, and can induce bleaching more so than thermal stress, and tends to decrease growth and calcification rates (Brainard et al. 2011).

Ocean acidification may also pose a significant risk to giant clams, based primarily on experimental evidence from other shelled mollusks. Two comprehensive literature reviews concluded that the consequences of ocean acidification for calcifying marine organisms (and mollusks in particular) are likely to be severe, as they rely on the uptake of calcium and carbonate ions for shell growth and calcification. Yet, while many studies have demonstrated a negative effect on the growth of marine mollusks, some species have shown no response or even a positive growth response to ocean acidification. More consistent evidence demonstrates that early life stages of shelled mollusks are highly sensitive to ocean acidification, with observed impacts including smaller-sized embryos and larvae, decreased shell thickness, increased larval development time, reduced survival, reduced metamorphosis, shell abnormalities, and altered behavior. The effects specifically related to giant clams are inconclusive and research ongoing.

The synergistic effects of ocean acidification and warming may be greater than the effect of acidification alone for these species. By the middle of this century, ocean acidity could lower calcium carbonate saturation to the point where the reefs may begin to dissolve (Brainard et al. 2011, Smith 2019) and coral reef taxa may not have the ability to acclimatize effectively to such rapidly occurring environmental changes. However, the implications of these changes are not clear in terms of population level impacts, and data specific to the action area are lacking. In particular, there is no comprehensive assessment of the potential impacts of climate change within the action area or specific to UES-protected marine species.

In addition to the uncertainty of the rate, magnitude, and distribution of future climate change and its associated impacts on temporal and spatial scales, the adaptability of species and ecosystems are also unknown. Impact assessment models that include adaptation often base assumptions (about when, how, and to what conditions adaptations might occur) on theoretical principles, inference from observed observations, and arbitrary selection, speculation, or hypothesis (see review in Smit et al. 2000). Impacts of climate change and hence its ‘seriousness’ can be modified by various adaptations (Tol et al. 1998). Ecological systems evolve in an ongoing fashion in response to stimuli of all kinds, including climatic stimuli (Smit et al. 2000). The effects of global climate change, the most significant of which for corals are the combined direct and indirect effects of rising sea surface temperatures and ocean acidification, are currently affecting corals on global scales. The return frequency of thermal stress-induced bleaching events has exceeded the ability of many reefs and coral species to recover there. Smith et al. (2019) report that the global climate change-related threats of ocean warming, ocean acidification, and sea-level rise, to be the most important to the extinction risk of Indo-Pacific reef-building corals currently and in the foreseeable future, the most important of which is ocean warming.

However, predicting how global climate change may influence particular species remains poorly understood, especially in understudied areas such as USAKA. The effects of global climate change could act synergistically on corals affected by the proposed action. The ability of impacted species to respond to the effects of the proposed action could be reduced due to the effects of elevated temperatures and increased ocean acidity, and the longer it takes for impacted species to recover from the effects of the proposed action, the more likely it becomes that the effects of climate change would synergistically impact those species. However, the degree to which those synergistic impacts may affect species over the time required for them to recover from project impacts is unknown. Over the long-term, climate change-related impacts could influence the biological trajectories of UES-protected species on a century scale (Parmesan and

Yohe 2003). However, due to a lack of scientific data, the specific effects climate change could have on these species in the future are not predictable or quantifiable to any degree that would allow for more detailed analysis in this consultation (Hawkes et al. 2009).

4 EFFECTS OF THE ACTION

Under the ESA regulations (50 CFR 402.02), effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action but that are not part of the action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. For this proposed action, we determined it would not cause any other activities.

We use a stepwise approach to analyze effects to species and critical habitat:

1. Identify those physical, chemical, or biotic effects of the proposed action that directly or indirectly affect the action area (hereafter using the term stressors).
2. Identify the species and/or critical habitat likely to co-occur with these stressors in space and time (exposure).
    a. For species, estimate the number, age or life stage, and other pertinent characteristics (e.g. gender) of the individuals and the populations or subpopulations those individuals represent.
        i. If estimating the number is not possible, use a habitat-based analysis.
    b. For critical habitat, if applicable, identify the physical or biological features exposed.
3. Identified the probability of an unplanned shoreline strike (missed target) at the land-based target site, Illeginni Islet.
    a. Determined the likelihood the action agency will miss their intended target
        i. Given the CPS missile's reliability rate of 80%, there is only a 20% chance of an unplanned shoreline strike.
        ii. Using a probability-based analysis, found that it is reasonable to assume that up to 2 out of the 10 possible flight tests at Illeginni may miss their intended target and result in a shoreline impact.
4. Determine if/how exposed species and critical habitat will likely respond to the exposure.
    a. For species, determine the individual’s probable response and if it is likely to have consequences on its fitness (growth, survival, annual reproductive success, etc.).
        i. If using a habitat-based analysis, explain the changes in habitat and the consequences to individuals.
        ii. Determine what consequences the effects on individuals have on the populations those individuals represent (changes in the population’ abundance, reproduction, spatial structure and connectivity, growth rates, etc.).
    b. For critical habitat, if applicable, examine the relationships between the habitat changes and physical and biological features and overall value of the affected area.

4.1 Stressors

Stressors associated with the proposed action include:

1. Exposure to Elevated Sound
2. Direct Contact
3. Exposure to Hazardous Materials, Wastes and Discharges
4. Collisions with Vessels

We determined that exposure to elevated sound, direct contact, exposure to hazardous materials, wastes and discharges and vessel traffic are not likely to adversely affect any ESA-listed species or designated critical habitats (Table 5). We also determined that exposure to elevated sounds, hazardous materials, wastes and discharges and vessel traffic are not likely to affect any UES-listed species (Table 5 and Table 6). Moreover, we determined that exposure to direct contact is not likely to adversely affect any of the UES-listed marine mammals, sea turtles, and elasmobranchs listed in Table 5. There is no listed critical habitat within the RMI. The rationale for those determinations are documented in Section 9.1. As a result, in this section we focus on the stressor, exposure to direct contact, that is likely to adversely affect two fish species (humphead wrasse and bumphead parrotfish), six UES-listed corals, and four mollusks species' (*Tectus niloticus* and three giant clams; Table 6) at the land-based target site.

Therefore, the species likely to be adversely affected are in the vicinity of Illeginni, where one land strike expected per year over 10 years (10 total) may occur. However, we note that the CPS Flight Test Program may fire up to eight flight tests per year over 10 years (80 total) that may impact any of the ocean areas within the Atlantic or Pacific BOAs or KMISS. These ocean areas represent the range of the not likely to adversely affect species documented in Section 9.

<u>Direct contact from Payload impact</u>

The CPS payload will be traveling at hypersonic velocity when it impacts Illeginni islet. The kinetic energy released into the substrate would be similar to the detonation of high explosives. The force of payload impact on land will result in crater formation and likely result in ejecta and/or shock waves radiating out from the point of impact.

The payload will effectively "explode", with some of its mass reduced to very fine particles ("aerosolized") and the remainder reduced to a range of fragment sizes. The substrate at the impact site would be blasted into a range of fragment sizes ranging from powder to larger rocks toward the outer edges of the crater. Some debris and substrate rubble would remain in the crater. The remainder will be thrown from the crater (ejecta). Initially, some of the ejecta would be moving at high velocity (bullet speeds). Some ejecta would move laterally, some would travel upward then fall back down up to 91 m from the impact site (Figure 9, Navy USASMDC 2023). The substrate immediately around the crater will be covered by larger chunks of ejecta from the outer edges of the crater as well as finer material that was thrown more vertically before falling back down. The movement of ejecta away from the crater would act to spread it out (scatter) over an increasing area, with decreasing available material being scattered over the 91 m debris area. The velocity of the ejecta would also diminish with distance. The intensity of the payload impact and the uniformity of exposure to both the ejecta and any associated shock wave would decrease with distance from the point of impact.

Craters from MMIII payload land impacts have been documented to be 6 to 9 m in diameter and 2 to 3 m deep (USASMDC/ARSTRAT 2015). Empirical observations of historical reentry vehicle impacts from MMIII tests in very shallow waters found that most debris was contained within the crater and ejecta were concentrated within 1.5 to 3 m of the crater rim (USAFGSC and USASMDC/ARSTRAT 2015). As with MMIII reentry vehicles, FE-1, FE-2, THAAD, or FE-3 tests, we estimate that the payload land impact may produce ejecta and debris concentrated near the impact site and extending outward to 91 m (Figure 1).

A land-based payload strike will cause a shock wave to move out from the impact site. Shock waves can move through the air or through oscillatory waves that cause ground borne vibrations (shaking). Shock wave propagation after an explosion can be complex and depends greatly on the environment in which they occur, with underwater shock waves decreasing rapidly with distance from the impact site. The assumptions for CPS cratering and shock waves are based on payload impacts from previous flight test programs that had payload impacts on Illeginni Islet. Empirical evidence from Minuteman III (MMIII) payload impact cratering and shock waves are used as estimates for the Proposed Action.

Shock wave/ground borne vibration propagation was estimated in MMIII using seismic magnitude and the kinetic energy of the reentry vehicle yielding a maximum seismic magnitude of 0.1, corresponding to a Richter magnitude of approaching zero. Therefore, it is assumed that ground borne vibrations from the impact would not travel long distances (e.g., miles or kilometers). However, despite the ground borne vibrations not traveling long distances, shaking would be expected to be present in areas in and adjacent to the impact crater. Therefore, models were used to estimate the potential for structural damage to ground based species. The following equation was used to estimate the localized ground borne vibration in terms of peak particle velocity (USASMDC/ARSTRAT 2015.)

$$PPV = k\,(D \sqrt{W}) - 1.6$$

Where:

- PPV = peak particle velocity
- k= geophysical constant (assumed to be 100)
- D = distance
- W = energy measured in TNT equivalents

The USASMDC/ARSTRAT applied upper bound mission parameters (i.e. maximum reentry vehicle mass and velocity) and thresholds for structural damage in buildings (i.e. window breaking and plaster cracking) of 5.4 inches/s. This yielded a critical radius of potential effects of 37.5 m from the point of impact. USASMDC/ARSTRAT (2015) considered it likely that these effects would propagate into the submerged seafloor for impacts close to or on the beach. Furthermore, empirical evidence from MMIII tests corroborates these predictions. Therefore, it is estimated that payload land impact may produce the propagation of shock waves near the impact site and extending outward to approximately 37.5 m through the adjacent reef (Navy and USASMDC 2023). Given the lack of data available on the effects of shock waves/ground borne vibrations on listed species, this is the best available science on which to base our analyses. Since there is no data available to differentiate this stressor from other direct or indirect effects of direct contact or the actual amount take that may occur by shock waves, these analyses should be regarded as an overestimate and those of maximum effect.

A shoreline payload impact outside of the anticipated target area is unplanned and unexpected for the Proposed Action but a payload land impact near the shoreline could result in the dispersal of soil and rubble onto the shallow nearshore reef flat. In this Opinion, the anticipated miss of a payload land impact at Illeginni islet is a shoreline strike, which would result in effects that would extend outward from the point of strike. This is a reasonable scenario for our consideration due to the CPS vehicles accuracy (80%), that the proposed action is a flight test of a new system, and the target's proximity to the marine environment. In addition, while the action agency does anticipate a shoreline strike, the USASMDC/Navy cannot guarantee precisely where impact will occur.

Therefore, the following analyses assume a shoreline impact where the ejected debris could enter the nearshore marine environment, similar to the approach used for the analyses of effects for other recent flight test programs (MMIII, FE-1, THAAD, FE-2, and FE-3). The potential direct contact area to the marine environment is approximately 13,008 m^2 in a half circle extending out from the shoreline (Figure 9).

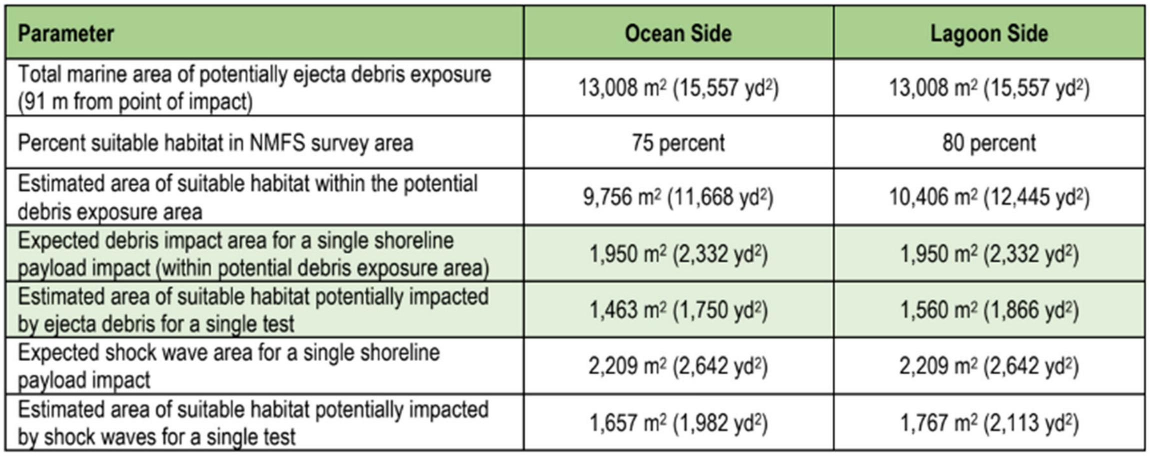
Figure 9. Estimated Maximum Direct Contact and Shock Wave Areas at Illeginni Islet (Navy USASMDC 2023).

Habitat suitability for consultation species is lowest along the water's edge and with the exception of sandy patches, typically increases with distance from shore. Based on the 2014 NMFS surveys and the best professional judgment of NMFS survey divers, approximately 80 percent of the lagoon-side survey area and 75 percent of the ocean-side survey area (Figure 9) are considered potentially viable habitat for consultation species (NMFS 2019a and b, Navy and USASMDC 2023).

It is reasonable to assume that the effects of direct contact (debris fall and shock waves) would not occur evenly across an entire area of potentially viable habitat. Thus, the actual habitat area that would be affected is considered to be a proportion of the total estimated viable habitat. While there is no data available to identify this unknown proportion or the actual amount of viable habitat that may be affected by debris fall or shock waves, it is reasonable to assume chunks of ejecta would be scattered across the area; affecting a small proportion of the suitable habitat.

Based on these assumptions and the size of the crater, the Navy/USASMDC estimates the debris may cover a maximum area of 1,960 m^2, as far as 91 m from the point of impact, with debris density decreasing as distance from the impact point increases. Using the estimates of suitable habitat and assuming the ejecta would only cover approximately 1,950 m^2 on only one side of the islet for a given test (i.e., either on the lagoon or ocean sides of the islet); the area of lagoon-side and ocean-side suitable habitat which may be impacted by debris for each test was calculated (Table 11). This likely results in an overestimate of the area of potential effect because habitat suitability for consultation species is lowest along the water's edge (where debris is more likely to occur) and with the exception of sandy patches, suitable habitat typically increases with distance from shore (NMFS 2019a and b), while the concentration of ejected debris would decrease with distance from shore. Although the exact shape of the affected area is impossible to estimate, the seaward portion of such an area is conceptually illustrated as a rough semi-circle on the lagoon and ocean sides of Illeginni Islet with a radius of 91 m (Figure 9).

Table 11. Estimated Marine Areas with the Potential to be impacted by Ejecta Debris and Shock Waves from a Shoreline Impact.



Parameter	Ocean Side	Lagoon Side
Total marine area of potentially ejecta debris exposure (91 m from point of impact)	13,008 m^2 (15,557 yd^2)	13,008 m^2 (15,557 yd^2)
Percent suitable habitat in NMFS survey area	75 percent	80 percent
Estimated area of suitable habitat within the potential debris exposure area	9,756 m^2 (11,668 yd^2)	10,406 m^2 (12,445 yd^2)
Expected debris impact area for a single shoreline payload impact (within potential debris exposure area)	1,950 m^2 (2,332 yd^2)	1,950 m^2 (2,332 yd^2)
Estimated area of suitable habitat potentially impacted by ejecta debris for a single test	1,463 m^2 (1,750 yd^2)	1,560 m^2 (1,866 yd^2)
Expected shock wave area for a single shoreline payload impact	2,209 m^2 (2,642 yd^2)	2,209 m^2 (2,642 yd^2)
Estimated area of suitable habitat potentially impacted by shock waves for a single test	1,657 m^2 (1,982 yd^2)	1,767 m^2 (2,113 yd^2)

Abbreviations: m^2 = square meters, NMFS = National Marine Fisheries Service, yd^2 = square yards

In addition, the area within the shock wave range of effect (37.5 m) and potential habitat (Table 11) would be completely contained within the area at risk for ejecta impacts (91 m; Table 11). Therefore, the analysis of direct contact from the payload impact uses the larger area at risk and likely overestimates the effects on species under NMFS' jurisdiction.

Note: For the six coral species, two fish species, and four mollusks species that are likely to be adversely affected by the proposed action, the effects are expected to be practically identical. Addressing the species individually would significantly increase the length of this Opinion with no discernible improvement in the evaluation. Therefore, all six coral species are referred to together as "corals", unless an individual species needs to be identified due to some unique sensitivity or response. The same is true for the three clam species.

4.2 Fish

4.2.1 Exposure

This section analyzes the proposed action's potential for exposing the UES-listed humphead wrasse to direct contact by the CPS payload, ejecta, or shock wave thereof during the one land impact per year (10 over 10 years) that are planned to occur on Illeginni Islet throughout the CPS flight test program, using the assumptions described above in section 4.1 and the analytical approach discussed in section 1.4. However, we note that, unlike other species discussed in this Opinion, the humphead wrasse (*Cheilinus undulatus*) and Bumphead parrotfish (*Bolbometopon muricatum*) were not observed during the 2014 surveys for the most recent assessment of consultation organisms at Illeginni Islet (NMFS 2017a).

Humphead wrasse were recorded on other surveys conducted in this area and recorded in both ocean-side and lagoon-side habitats adjacent to the impact area. Given that the humphead wrasse is a highly mobile species, the extrapolation methods for estimating density that were previously used for impact analysis are still considered the best available data. Humphead wrasse densities were estimated by NMFS based on quantitative data collected during the 2008 species inventory, recent impact assessments on natural substrates at USAKA and, for egg and fish recruit derivations, from the literature (NMFS 2014a). *C. undulatus* typically occurs in broadly distributed low numbers and have been intermittently seen near Illeginni islet. Therefore, it is possible that an estimated eight adults and up to 100 juveniles may occur within the entire potential ocean-side and lagoon-side affected areas (see Table for in NMFS 2017a).

The bumphead parrotfish is a cryptic species that occurs throughout the Indo-Pacific where adults inhabit deeper coral reefs and juveniles primarily inhabit shallow (0-10 m) mangrove, coral reef lagoon, seagrass beds, and areas with plumose, fleshy algae or patch *Turbinaria* spp. or *Acropora* spp. coral formations (NMFS 2012, Sundberg et al. 2015). Reported densities of bumphead parrotfish in reef habitats vary greatly throughout their range with the maximum reported density was 5.17 fish per 1,000 m^2 (0.00517 per m2) in Palau (Kobayashi et al. 2011). This is a substantially higher estimate than most reported in the Central Pacific with densities of 1.41 to 1.92 per 1,000 m^2 reported in Papua New Guinea, 1.10 in Micronesia, 0.45 in the Northern Mariana Islands and Guam, 0.42 to 0.91 in the Solomon Islands, and 0.00 in the Marshall Islands (Kobayashi et al. 2011).

Biennial surveys of the USAKA islets between 2010 and 2018, observed only one bumphead parrotfish on an outer reef slope of Kwajalein Islet in 2016 (NMFS and USFWS 2018). However, this parrotfish species has been recorded recently in the harbors of USAKA, including at Legan Islet which is 16 km from Illeginni Islet. NMFS biologists have observed this species in Legan Harbor (2 adults), Eniwetok Harbor (4 adults), and Gagan Harbor (6 adults) (S. Kolinski personal communication 2024). Based on the known survey data, described above, it is likely that bumphead parrotfish densities in the Marshall Islands would be relatively low and below the range-wide total abundance presented by Kobayashi et al. (2011) which was 0.7 fish per 1,000 m^2 (Figure 11 in Kobayashi et al. 2011).

The UES-listed fish species have the potential to be injured if exposed to direct contact from a payload impact or debris. However, fish are generally not found at the surface where they would be most vulnerable to effects from direct contact. Humphead wrasse are most commonly found in waters a few meters to at least 60 m deep (NMFS 2019) and any debris would rapidly lose velocity upon entering the water. In addition, humphead wrasses observed near Illeginni Islet are usually observed beyond the reef crest around 91 m from the shoreline (shallowest depths approximately 5 m deep) (NMFS and USFWS 2018, NMFS 2019). Bumphead parrotfish have not been observed at Illeginni, but it is reasonable to assume that they may in and/or adjacent to the reef or occupying the Harbor.

Habitat suitability for consultation species is lowest along the water's edge and with the exception of sandy patches, typically increases with distance from shore. Habitat for juvenile humphead wrasse is often higher along reef flats and slopes. Adult Humphead wrasse are most often encountered on outer reef slopes and reef passes/channels. Based on the 2014 NMFS surveys and the best professional judgment of NMFS survey divers, approximately 80 percent of the lagoon-side survey area and 75 percent of the ocean-side survey area (Figure 9, above) are considered potentially viable habitat for consultation fish (NMFS 2019; U.S. Army 2020).

Using these estimates of suitable habitat and assuming the ejecta would be either distributed on the lagoon or ocean sides of the islet (i.e., half of debris on one side); approximately 1,463 m^2 of lagoon-side suitable habitat and 1,560 m^2 of ocean-side suitable habitat may be impacted by debris. (Table 11). Therefore, the Navy/USASMDC calculated the maximum number of humphead wrasse that may be affected by debris entering the water based on the estimated area of suitable habitat that ejecta might cover in the marine environment and the density of *C. undulatus* in the impact area. Therefore, if the eight adult and 100 juvenile humphead wrasse estimated (NMFS 2017a) to be in the potential direct contact area were distributed evenly across suitable reef habitat in the area, the density of fish would be 0.0008 per m^2 ocean side and 0.0096 per m^2 lagoon side (Table 12).

Using the same percentage of habitat discussed above, the maximum number of bumphead parrotfish that may be affected by debris entering the water can be calculated based on the estimated area of suitable habitat that ejecta might cover in the marine environment and the density of *B. muricatum* in the impact area. Therefore, based on reported densities for this species throughout their range, densities in the Marshall Islands are estimated to be less than the range average of 0.7 individuals per 1,000 m^2. If it is assumed that the reliability rate of the CPS system is 80% during flight testing, only 20 % of the planned payload impacts (2 out of 10) would miss the intended target and result in a shoreline strike (unplanned shoreline strike). Therefore, we expect that up to 32 humphead wrasse (2 adults and 30 juveniles) and two bumphead parrotfish may be exposed to the combined effects of a payload strike.

Table 12. Navy/USASMDC Estimated Numbers of Consultation Coral Colonies and Individual Mollusks and Fish Potentially Exposed to Debris and Shock Waves Generated by a Shoreline Payload Impact.

Species	OceanSide Single Test				Lagoon Side Single Test				Estimated number of Colonies or Individuals Exposed for all tests involving land impact[1]
	Mean Colonies or Individuals (per m^2)	99% UCL (per m^2)	Number of Colonies or Individuals affected by debris (mean to UCL)	Number of Colonies or Individuals affected by Shock Waves (mean to UCL)	Mean Colonies or Individuals (per m^2)	99% UCL (per m^2)	Number of Colonies or Individuals affected by debris (mean to UCL)	Number of Colonies or Individuals affected by Shock Waves (mean to UCL)	
Fish									
Cheilinus undulatus adults [2]	0.0008	n/a	1.17	0	n/a	-	-	-	11.70
Cheilinus undulates juveniles[2]	-	n/a	-	-	n/a	0.0096	14.98	0	149.76
Bolbometopon muricatum	0.0007	n/a	1.02	0	0.00007	n/a	1.09	0	11.99
Fish subtotal			**2.19**				**16.07**		**173.45**
Corals									
Acropora microclados	0.0004	0.0017	0.59 to 2.49	0.66 to 2.82	-	-	-	-	12.48 to 53.03
Acropora polystoma	*≤0.0004*	0.0017	0.59 to 2.49	0.66 to 2.82	-	-	-	-	12.48 to 53.03
Cyphastrea agassizi	-	-	-	-	0.0003	0.0013	0.47 to 2.03	00.53 to 2.30	9.98 to 43.25
Heliopora coerulea	-	-	-	-	0.16	0.45	249.60 to 702	282.75 to 795.24	5,323.52 to 14,972.40
Pavona venosa	-	-	-	-	0.0003	0.0013	0.47 to 2.03	00.53 to 2.30	9.98 to 43.25

Species	OceanSide Single Test				Lagoon Side Single Test				Estimated number of Colonies or Individuals Exposed for all tests involving land impact[1]
	Mean Colonies or Individuals (per m^2)	99% UCL (per m^2)	Number of Colonies or Individuals affected by debris (mean to UCL)	Number of Colonies or Individuals affected by Shock Waves (mean to UCL)	Mean Colonies or Individuals (per m^2)	99% UCL (per m^2)	Number of Colonies or Individuals affected by debris (mean to UCL)	Number of Colonies or Individuals affected by Shock Waves (mean to UCL)	
Turbinaria reniformis	-	-	-	-	≤0.0003	0.0013	0.47 to 2.03	00.53 to 2.30	9.98 to 43.25
Coral subtotal			**1.17 to 4.97**	**1.33 to 5.63**			**251 to 708.08**	**284.34 to 802.13**	**5,378.42 to 15,208.22**
Mollusks									
Hippopus hippopus	0.0003	0.0015	0.44 to 2.19	0	0.002	0.006	3.12 to 9.36	0	31.20 to 93.60
Tridacna squamosa	-	-	-	-	0.0003	0.0011	0.31 to 1.72	0	3.12 to 17.16
Tridacna maxima	-	-	-	-	0.0005	0.0014	0.78 to 2.18	0	7.80 to 21.84
Tectus niloticus	-	-	-	-	0.00006	0.0003	0.09 to 0.47	0	0.94 to 4.68
Mollusks subtotal			**0.44 to 2.19**				**4.31 to 13.73**		**43.06 to 137.28**

Notes: The coral and mollusk species in this table were observed during a 2014 survey of reef areas offshore of the Illeginni Islet target site (NMFS 2017a and 2017b).

1 The estimated number of colonies or individuals exposed for the maximum number of Navy CPS tests with land impact (one per year over years) was calculated based on the mean and 99% UCL number of colonies or individuals exposed during a single test multiplied by ten possible land-impact tests over the life of the program.

2 The density of humphead wrasse in the Action Area is based on the total number recorded by NMFS in 2008 (NMFS-PIRO 2017a) and does not represent a mean.

Abbreviations: N/A = not applicable, m^2 = square meter, UCL = upper confidence limit, “-“= species or life stage not known to occur in this portion of the Action Area at this time.

4.2.2 Response

The most significant effect a payload impact would have to listed species results from direct contact with ejecta and shock waves, which can injure or kill UES-listed fish species. An individual animal could be exposed to ejecta hitting and traveling through the water and from the shock wave produced from the main projectile's impact. Potential injuries may include cuts, gashes, bruises, broken bones, rupture, or hemorrhage of internal organs, amputation, or other broken body parts, any of which could result in an animal's death. Since the arcs (the affected area on the lagoon and the affected area on the ocean) were drawn and estimated based on shoreline strikes on each side, the model assumes mishits on every test, which is highly unlikely to occur. Furthermore, it assumes that ejecta will uniformly spread, especially to the outer extents of those circles (~91 m away). Humphead wrasses were observed beyond the reef crest past the edges of those arcs, while no bumphead parrotfish have been observed at Illeginni islet. As mentioned in previous sections, the USASMDC/ARSTRAT observed the majority of ejecta stayed within a few meters of the impact area and the density of ejecta is expected to decrease with distance from the point of impact (USAFGSC and USASMDC/ARSTRAT 2015). The depth of the water in the 91 m radius is expected to be less than 3 m. Ejecta is also likely to lose velocity the further it travels from the source.

As noted in the Status of the Species section of this Opinion, neither fish species are considered surface-dwelling fish where they would be the most vulnerable to strikes. Graham et al. (2015) reports that humphead wrasse are most often encountered on outer reef slopes and reef passes/channels at depths of only a few meters to at least 60 m (Randall 1978); other reports document humphead wrasses to depths of up to 100 m (Russell 2004; Zgliczynski et al. 2013). Graham et al. (2015) further notes from personal observations from NMFS biologists familiar with the species and documented observations on deep dives that the species was caught at depths greater than 100 m and up to approximately 180 m by deep gillnet (G. Davis pers. comm. as cited in Graham et al. 2015). Kobayashi et al. (2011) reports that bumphead parrotfish are most often encountered in the high-energy zone of fore reefs and in open waters adjacent to the reef, however, this species has distinct diurnal patterns that influence where the fish may be found. Additional information on groups of adult bumphead parrotfish reports that they may be found together foraging among fore reef, reef flat, reef pass, and clear outer lagoon habitats at depths of 1-30 meters (Donaldson and Dulvy 2004 as cited in Kobayashi et al. 2011). On impact, parts of the payload and substrate will explode into numerous pieces from "aerosolized" bits to mid-sized rocks. The largest sized ejecta is likely to travel through the air slower than smaller and lighter pieces, and fall closer to the source. When ejecta hits the water, it slows down quickly before falling to the reef or substrate. Furthermore, ocean conditions are dynamic in the nearshore (i.e. waves, currents, etc.), projectiles would lose the majority of their energy within a few inches of the surface. These fish species are large and motile and will likely flee from falling debris as it hits the water.

As described in the analyses above, we expect up to 32 humphead wrasse and two Bumphead parrotfish could experience mortality as the result of direct payload impacts from all 10 payload strikes, ejecta, and ground-based shock wave, but more likely minor injury if any, will occur. We believe that both fish species discussed above, are widely distributed at the USAKA islets around the atoll, and that the potentially impacted area represents a very small fraction (not currently quantifiable) of habitat at Illeginni, and likely below 1% of habitat at USAKA. We further believe that the distribution and abundance of these fish in similar habitat areas outside of the potentially impacted zones would be similar to their estimated distribution and abundance within the impacted zones, and as such, these 32 humphead wrasse and two bumphead parrotfish likely represent an inconsequential fraction of their species found at Illeginni and across USAKA, and their loss would be virtually indistinguishable from natural mortality levels in the region.

4.3 Corals

4.3.1 Exposure

This section analyzes the proposed action's potential for exposing the six UES-listed corals in Table 6 to direct contact by the CPS payload, ejecta, or shock wave thereof during the one land impact per year (10 over 10 years) that are planned to occur on Illeginni Islet throughout the CPS flight test program, using the assumptions described above in section 4.1 and the analytical approach discussed in section 1.4.

The corals considered in this Opinion have been observed on surveys throughout USAKA and within the Illeginni impact area at varying densities (Table 8) and have the potential to be injured or killed if exposed to direct or indirect effects of direct contact from a payload impact. There is a chance that a CPS payload could strike the water's edge along the lagoon or ocean shoreline at Illeginni. In an unplanned shoreline strike, as with past flight tests (e.g. FE-1, FE-2, THADD or FE-3), we estimate that the payload land impact may produce ejecta and debris concentrated near the impact site and extending outward to 91 m.

A land-based payload strike may also cause a shock wave concentrated near the impact site and extending outward to 37.5 m. As described above, shock waves move through the ground as oscillatory waves that cause ground borne vibrations (shaking). Ground borne vibrations associated with the shock waves would cause underwater substrates close to the impact area/crater to move, crack, or form crevasses. Coral mortality or injury could occur due to the impact of these shock waves/vibrations. Empirical evidence from MMIII tests corroborates the predictions of the propagation of shock waves associated with impact at approximately 37.5 m through the adjacent reef from the point of impact on the shoreline (USAFGSC and USASMDC/ARSTRAT 2015). These reef impacts were based on observations of damaged corals. However, we note that at this time, it is nearly impossible to differentiate between reef damage from ejecta and those that can be attributed to ground borne vibration. The shock wave impact area is fully contained within the 91 m ejecta area, therefore, to calculate exposure to direct contact for corals, the 91 m impact area will be used and these analyses should be regarded as a conservative estimate and those of maximum effect.

In 2017, NMFS completed a report with revised density estimates for many consultation species based on 2014 assessments of the reefs adjacent to the impact area at Illeginni Islet (NMFS-PIRO 2017a and 2017b). Based on the 2014 NMFS surveys and the best professional judgment of NMFS survey divers, approximately 80 percent of the lagoon-side survey area and 75 percent of the ocean-side survey area are considered potentially viable habitat for consultation corals (NMFS 2019; U.S. Army 2020). Using these estimates of suitable habitat and assuming the ejecta would either be distributed on the lagoon or ocean sides of the islet (i.e., debris on one side); approximately 1,560 m^2 of lagoon-side suitable habitat and 1,463 m^2 of ocean-side suitable habitat may be impacted by debris.

The Navy/USASMDC calculated the number of potential coral exposures to direct contact based on the density of coral colonies reported by NMFS in 2017 (NMFS 2017a, Table 8) and the percentage of habitat suitability for consultation species within the potential impact area (91m). The 99% upper confidence level of the bootstrap mean densities for the potentially affected consultation species in the area was multiplied by the areal extent of potentially affected suitable habitat to estimate the number of coral colonies that may be adversely affected by a payload land impact at Illeginni Islet. However, using the same assumptions described above, if it is assumed that that the reliability rate of the CPS system is 80% during flight testing, only 20 % of the planned payload impacts (2 out of 10) would miss the intended target and result in a shoreline strike (unplanned shoreline strike), then up to 3,042 corals may be exposed to the combined effects of a payload strike, and would be adversely affected by the exposure. (Table 13). Based on new information available for the CPS flight test, the number of species anticipated to be adversely affected is different from what was anticipated for previous flight tests.

Table 13. Estimated Numbers of Consultation Coral Colonies or Individuals Potentially Exposed to Debris and Shock Waves Generated by a Shoreline Payload Impact(s).

Corals	OceanSide Single Test		Lagoon Side Single Test		Colonies Affected for all tests
Acropora microclados	0.0017	5.31			10.62
Acropora polystoma	0.0017	5.31			10.62
Cyphastrea agassizi			0.0013	4.3	8.66
Heliopora coerulea			0.45	1,497.24	2,994.48
Pavona venosa			0.0013	4.33	8.66
Turbinaria reniformis			0.0013	4.33	8.66
Coral total		**10.62**		**1.510.23**	**3,041.70**

4.3.2 Response

The most significant effect of a payload impact to listed species would result from direct contact with the payload, ejecta and shock waves, which can injure or kill UES-listed corals. Coral mortality or injury could occur from impact by debris, eject or through shock/vibration. Any corals directly beneath the payload or within the crater radius are expected to be instantly killed, with very little left of the organisms that would be recognizable. Beyond the crater, corals would be exposed to ejecta and the ground borne shock wave. Corals immediately beyond the crater would likely experience mortality from impact by high-velocity ejecta and from burial under mobilized crater material. Corals exposed to the ground borne shock wave could experience injury or mortality due to substrate cracking, fragmentation, or becoming dislodged.

For corals, we estimated that there could be up to 3,042 impacted coral colonies in the action area. The response of corals to ejecta and the ground borne shock wave would depend largely on the scale and intensity of the exposure. Impact by high-velocity dense ejecta (rock or metal), could fracture the hard structure of corals and would likely injure or destroy soft tissues. Fracturing would depend largely on the size and intensity of the impact and on the morphology of the impacted coral. Plate-forming and branching corals are more easily broken than large massive or encrusting forms. Fractures due to payload impact are expected to range from pulverization of colonies in and close to the crater, to cracks and/or loss of branches in colonies toward the outer edge of effect. Additionally, exposure to the ground-based shock wave could also fracture or dislodge coral colonies out to about 37.5 m from the payload impact. Because coral skeletons are hard rock-like structures that are rigidly fixed to the hard substrate through which the shock wave would travel, much of the available energy in the substrate can be transferred directly into the coral's skeletal structure. If the shock wave is intense enough, the coral's structure may crack or fracture and/or it may become unattached from the substrate. At close ranges, impact by lower velocity and/or lower density ejecta could affect the soft tissues of corals, ranging from burial to scouring away all or most of the living polyps and interconnecting soft tissues from a colony. At greater ranges, localized damage of a small part of a colony is possible.

Partial fracturing of a coral skeleton and/or dislodgement of a coral from the substrate due to ejecta impact or from exposure to the ground-based shock wave would injure the soft tissues at and around the break. Re-growth of soft tissues has energetic costs that could slow other growth and reproduction. Exposed areas of coral skeleton are prone to bioerosion and overgrowth by algae and certain sponges. Large areas of damaged or dead tissue could result in the introduction of algae that may prevent the regeneration of healthy coral tissue, or that may overcome the whole colony. Damaged and stressed tissues may also be more susceptible to infection by coral diseases that may hinder or prevent healing to the point that the colony dies. Pulverization of a colony's structure, deep burial, or loss of a large proportion of a colony's soft tissue would likely result in the mortality of the colony.

Fragmentation is a form of asexual reproduction in some branching corals, resulting in the development of new, but genetically identical colonies. As described in the Status Review Report (Brainard et al. 2011) and briefly summarized above *Acropora* species successfully colonize through fragmentation and translocation of fragments by storm-driven waves. However, not all coral fragments, or dislodged colonies would be expected to survive. Survival would depend largely on where a fragment falls and how it is oriented after it settles on the substrate. A fragment or colony is likely to die if the living tissue is on the underside of the fragment or if the fragment settles into fine sediments. Additionally, in areas that experience regular high surf, such as the ocean side reef at Illeginni, loose coral fragments and colonies could repeatedly become mobilized by the waves. This reduces the likelihood of their survival, and potentially injures additional coral colonies should the fragments be cast against them.

Based on the best available information, we believe that the 3,042 coral colonies, identified above in Table 13; represent a reasonable estimate of the number of corals that may be adversely affected by the proposed action. This would be due to the combined direct and indirect effects of exposure to direct payload impact, ejecta, and ground-based shock waves. This represents the maximum possible impact associated with this action over 10 years. Based on the best information available, we believe that these corals are all widely distributed around the atoll, and that the potentially impacted area represents a very small fraction (not currently quantifiable) of coral-occupied habitat at Illeginni, and likely below 1% of coral-occupied habitat at USAKA. As described above in section 2.2, we further believe that the distribution and abundance of these coral species in similar habitat areas outside of the potentially impacted zones would be similar to their estimated distribution and abundance within the impacted zones and as such, these 3,042 colonies likely represent an inconsequential fraction of their species found at Illeginni, across USAKA and the Indo-Pacific.

4.4 Mollusks

4.4.1 Exposure

The UES-listed top shell snail and giant clams may be exposed to direct contact by the CPS payload, ejecta, or shock wave thereof during the one land impact per year (10 over 10 years) that are planned to occur on Illeginni Islet throughout the CPS flight test program. This section analyzes the proposed action's potential for exposure using the assumptions described above in section 4.1 and analytical approach discussed in section 1.4.

The mollusks considered in this Opinion have been observed on surveys throughout USAKA and within the Illeginni impact area at varying densities (Table 9) and have the potential to be injured or killed if exposed to direct or indirect effects of direct contact from a payload impact. There is a chance that a CPS payload could strike the water's edge along the lagoon or ocean shoreline at Illeginni. In that an unplanned shoreline strike, as with past flight tests (e.g. FE-1, FE-2, THADD or FE-3), we estimate that the payload land impact may produce ejecta and debris concentrated near the impact site and extending outward to 91 m.

A land-based payload strike will also cause a shock wave concentrated near the impact site and extending outward to 37.5 m. Ground borne vibrations associated with the shock waves may cause underwater substrates close to the impact area/crater to move, crack, or form crevasses. Mollusk injury could occur due to the impact of these shock waves/vibrations. Empirical evidence from MMIII tests corroborates the predictions of the propagation of shock waves associated with impact at approximately 37.5 m through the adjacent reef from the point of impact on the shoreline (USAFGSC and USASMDC/ARSTRAT 2015). These reef impacts were based on observations of damaged corals. However, we note that at this time, it is nearly impossible to differentiate between reef damage from ejecta and those that can be attributed to ground borne vibration. The shock wave impact area is fully contained within the 91m ejecta area, therefore, to calculate exposure to direct contact for mollusks, the 91 m impact area is used and these analyses should be regarded as a conservative estimate and that of maximum effect.

As previously described, approximately 80 percent of the lagoon-side survey area and 75 percent of the ocean-side survey area are considered potentially viable habitat for consultation species (NMFS 2019; U.S. Army 2020). Using these estimates of suitable habitat and assuming the ejecta would be equally distributed on the lagoon and ocean sides of the islet (i.e., half of debris on each side), the number of potential top shell snail and clam exposures to direct contact was calculated based on the density of mollusks reported by NMFS in 2017 (NMFS 2017a and 2017b). The 99% upper confidence level of the bootstrap mean densities for the potentially affected consultation species in the area was multiplied by the areal extent of potentially affected suitable habitat to estimate the number of mollusks that may be adversely affected by ejecta and/or shock wave effects by a payload land impact at Illeginni Islet. Therefore, if it is assumed that that the reliability rate of the CPS system is 80% during flight testing, only 20 % of the planned payload impacts (2 out of 10) would miss the intended target and result in an unplanned shoreline strike, then up to 28 mollusks may be exposed to the combined effects of a payload strike (Table 12, above), and would be adversely affected by the exposure.

4.4.2 Response

The most significant effect a payload impact would have to listed species would result from direct contact with the payload, ejecta and shock waves, which can injure or kill UES-listed mollusks. Mollusk mortality or injury could occur from impact or by shock/vibration. Any mollusks directly beneath the payload or within the crater radius are expected to be instantly killed, with very little left of the organisms that would be recognizable. In the case of the top shell snail, the Navy/USASMDC estimated that there would be up to one top shell snail in the area of impact pictured in Figure 9. As described above, the effects of exposure to ejecta and shock wave is expected to quickly diminish to insignificance with distance from the payload impact site. Impact by high-velocity dense ejecta (rock or metal) immediately around the crater could penetrate or fracture an exposed snail's shell, either killing the animal directly, or leaving it vulnerable to predation. Conversely, with movement away from the payload impact site, ejecta would become slower, and the ejecta would have to penetrate increasing water depth to affect the snails. Considering the conical shape and thickness of a top shell snail's shell, most ejecta that may strike one that is underwater and at any distance from the payload impact site is likely to be deflected without imparting a significant proportion of its kinetic energy to the shell or the animal within.

Mollusks habitat suitability is lowest along the water's edge and typically, increases with distance from shore, mollusks density would be lowest in the area immediately adjacent to the payload impact site, where ejecta effects and shock wave vibration would be greatest. Conversely, in the areas where mollusk density would be highest, ejecta would be slower and vibration may not occur. Ejecta would have to penetrate several feet of water to affect mollusks. Based on this, on the robust nature of top shell snails and giant clams (see Section 2), and the characteristics of their shells, most ejecta that may strike these mollusks is likely to be deflected without imparting any significant proportion of its kinetic energy to the shell or the animal within. In this situation, ejecta impact would result in little more than inducing the affected top shell snail to briefly adhere more tightly to the substrate or inducing the affected clam to close before resuming normal behaviors. The range of adverse effects from burial and shock waves would likely be similarly restricted to the area along the water's edge, further restricting the number of individuals that may be affected by the proposed action.

Mollusks immediately around the payload crater may also be buried by ejecta. The potential for burial, and the depth of the material under which a mollusk may be buried would likely decrease quickly with distance from the payload impact site. Mortality could result if the animal is crushed, smothered, or permanently pinned beneath rubble. Non-lethal effects could include energetic costs and/or foraging impacts, particularly if a clam is unable to filter feed due to debris.

Unlike corals, top shell snails are not rigidly attached to the substrate. Instead, they adhere to the reef using a muscular foot. Whereas rigidly attached corals and clams would be directly linked to the substrate such that the energy could readily travel into and along its skeletal structure, the muscular foot of the top shell snail would act to isolate the snail's shell from the vibration, and to reduce the transfer of the energy to other soft tissues and organs. However, exposure to intense ground borne shock waves close to the impact site could injure the soft tissues of mollusks. Mortality of the animal is possible if the injury is significant enough. The range to the onset of significant injuries for mollusks' exposed to a ground based payload impact shock wave is unknown, but it is likely much less than that estimated for corals (37.5 m). Non-lethal effects to top shell snails could include bruising of the foot and other tissues, which may have energetic costs and/or may have reproductive impacts.

Similarly, exposure to intense ground borne shock waves could injure the soft tissues of clams. Mortality is possible if the injury is significant enough. The range to the onset of significant injuries for clams exposed to a ground based payload impact shock wave is unknown. Clams can be buried in substrate or attached to corals, which means they would be directly linked to the substrate such that the energy could readily travel into the shell and affect soft tissues and organs. Non-lethal effects could include bruising of the tissues, which may have energetic costs and/or may have reproductive impacts.

As described in the exposure analyses above, we expect that up to 28 mollusks may be exposed to the combined direct and indirect effects of the payload land strikes in the proposed action (Table 12, above), and would be adversely affected by the exposure. We believe that these mollusks are widely distributed at all of the USAKA islets around the atoll, and that the potentially impacted area represents a very small fraction (not currently quantifiable) of mollusk-occupied habitat at Illeginni, and likely below 1% of habitat at USAKA. As described above at 2.2, we further believe that the distribution and abundance of these mollusks in similar habitat areas outside of the potentially impacted zones would be similar to their estimated distribution and abundance within the impacted zones, and as such, these 28 mollusks likely represent an inconsequential fraction of their species found at Illeginni and across USAKA, and their loss would be virtually indistinguishable from natural mortality levels in the region.

5 CUMULATIVE EFFECTS

The UES does not specifically describe "cumulative effects" for a biological opinion. However, Section 161 of the Compact provides that for U.S. Government activities requiring the preparation of an environmental impact statement (EIS) under NEPA, the U.S. Government shall comply with environmental standards that protect public health and safety and the environment that are comparable to the U.S. environmental statutes, including the Endangered Species Act. Although not all USAKA actions that require formal consultation also require the preparation of an EIS, such as this action, we analyze cumulative effects in all USAKA consultations as that term is defined in the ESA implementing regulations. Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). A conclusion reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available (50 CFR 402.17). Future Federal actions at USAKA that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to the UES.

NMFS searched for information on future State, tribal, local, or private actions that were reasonably certain to occur in the Action Area. Most of the Action Area is outside of territorial waters of the United States of America, which would preclude the possibility of future state, tribal, or local action that would not require some form of federal funding or authorization.

While we considered various state managed vessel-based fisheries, which exist in nearshore Pacific, and Atlantic waters, we do not believe they will overlap in geographical space with military activities. These state managed fisheries would only overlap the vessel paths from this action when they transit to/from their homeports, and we consider the probability of exposure to impacts from transiting vessels by the ESA-listed resources considered in this biological opinion to be discountable.

We also considered various RMI managed impacts that will overlap with the action area at USAKA. The impacts of RMI coastal development, fisheries interactions, vessel groundings, direct take, marine debris, and global climate change are not only expected to continue, they are likely to intensify over time. The intensification of those impacts is expected to cause cumulative effects on UES-protected marine species at USAKA. Continued growth of the human population at Kwajalein Atoll would likely result in increased coastal development, fishing pressure, vessel traffic, and pollution of the marine environment. The primary effects we would expect from USAKA-based subsistence and recreational fisheries or boating would include injury and mortality from improper anchoring and fishing or the collection of corals or reef associated mollusks, as well as possible changes in local prey numbers and distribution. NMFS is not aware of any other actions that are likely to occur in the Action Area during the foreseeable future

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the Environmental Baseline (Section 3).

6 INTEGRATION AND SYNTHESIS

The Integration and Synthesis section is the final step in assessing the risk that the proposed action poses to species and critical habitat. In this section, we add the Effects of the Action (Section 4) and the Cumulative Effects (Section 5) to the Environmental Baseline (Section 3), and in light of the Status of the Listed Resources (Section 2), formulate our opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution.; or (2) appreciably diminish the value of critical habitat as a whole for the conservation of the species.

6.1 Fish

As described in the Effects of the Action section, a total of up to 32 humphead wrasse and twoBumphead parrotfish could be harassed, injured, or killed through some combination of exposure to direct payload impact, ejecta, and ground-based shock wave.

As discussed in the Status of Listed Species section, humphead wrasses are commonly observed at Kwajalein Atoll, and have been observed at 10 of the 11 surveyed islets since 2010. Observations suggest a broad but scattered distribution with observations of the species at 26% of the sites surveyed since 2010. Adult humphead wrasses have been recorded in seaward reef habitats at Illeginni Islet (shallowest depths approximately 5 m deep). Although encountered on numerous occasions at USAKA, direct density measures of humphead wrasse have not been obtained. Conversely, between 2010 and 2018, only one bumphead parrotfish was recorded at

Kwajalein Harbor. However, recently NMFS biologists have observed 12 adults in three harbors around USAKA, one approximately 16 km (10 miles) from Illeginni Islet. Therefore, while no direct density measures of bumphead parrotfish have been made, it's reasonable to assume that this cryptic fish species inhabits USAKA‘s waters. It is important to recognize that survey data for USAKA is incomplete. Only a small portion of the total reef area around the USAKA islets have been surveyed, especially the deeper waters where adult humphead wrasse or bumphead parrotfish are likely to live.

As discussed in the Environmental Baseline and Cumulative Effects section, the effects of continued flight-testing, coastal development, direct take, and climate change are expected to continue and for climate change in particular expect to worsen in the future. Although many actions at USAKA beyond what are described in the Environmental Baseline and Cumulative Effects sections are uncertain, we do have expected estimates for the actions described above in those sections, and we acknowledge that there are other federal actions occurring in the Atoll (previous, ongoing and known future actions) impacting these species. For example, the FE-1, ARRW, FE-2, and FE-3 testing could remove up to 108 humphead wrasse for each project, and the GBSD tests may remove up to 324 humphead wrasse (for a total of up to 1,188 humphead wrasse cumulatively), while previous actions, did not include the bumphead parrotfish due to a lack of previous sighting data and their suspected occurrence only at Kwajalein island, which was outside of the action area.

PRD has considered the action’s impacts with the other threats incurring on these species, and even assuming the highest level of take expected to occur (loss of individuals due to this action) added to other losses discussed in the Environmental Baseline and Cumulative Effects sections, we do not expect these actions to result in appreciable reduction of the species. The proposed action is anticipated to result in the injury or death of up to 32 humphead wrasse (30 juveniles and 2 adults) and two bumphead parrotfish at Illeginni during a single unplanned shoreline strike. However given that, observations of adult humphead wrasse occur at roughly 26 percentage of all survey sites, that unfished or lightly fished areas have densities between 2–27 individuals per 10,000 m^2 of reef, which far exceeds the available habitat within the impact area, that estimates of juvenile humphead wrasse are based on habitat type, and estimated at 0–100 within the only the lagoon side of the impact area (NMFS 2014a), there is considerable uncertainty that indicate that this may be an overestimate.

We also note that bumphead parrotfish have not been sighted within the Illeginni impact area. Furthermore, flow dynamics of developing fish eggs and larvae around Illeginni Islet are not understood. Initial flow may be away from the islet, with future return or larval/adult source dynamics from another area. Therefore, we are reasonably certain that the individuals affected represent a small portion of the total number of UES-listed fish found at Illeginni, and an even smaller proportion of the population across USAKA. In the context of this action, the potential loss of humphead wrasses by the action is not expected to significantly affect reproduction or to impede the recovery of these species across USAKA and the mid-atoll corridor.

Therefore, when taken in context with the status of the species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate humphead wrasses at Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

In the context of this action, the potential loss of bumphead parrotfish by the action is not expected to significantly affect reproduction or to impede the recovery of these species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of the species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate bumphead parrotfish at Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

6.2 Corals

As described in the Effects of the Action section, up to 3,042 colonies of UES-consultation corals (six species) could be killed through some combination of exposure to direct payload impact, ejecta, and ground based shock wave. Over 99% of the colonies are from just one highly abundant, widely distributed, and highly aggressive species within USAKA, *H. coerulea.*

As discussed in the Status of Listed Species, abundance and trend data are lacking for these corals at USAKA. However, they are all widely distributed around the atoll, with four of the six corals being known to occur at all 11 USAKA islets. Others are known to occur on at least half of the USAKA islets. All six species have also been observed at survey sites in the mid-atoll corridor, with three found at over 30 of the 35 sites. It is important to recognize that survey data for USAKA is far from complete. Only a small portion of the total reef area around the USAKA islets and mid-atoll corridor has been surveyed, and surveys to specifically identify and quantify these species are yet to be done. A survey was completed at Illeginni Islet in the MMIII reef impact area, which is also the area that has been analyzed for impacts from the CPS payload and the results suggest that the estimate for corals in the area may be lower than what has been estimated (NMFS 2017a).

As discussed more fully in the Environmental Baseline and Cumulative Effects sections, the effects of continued flight testing, coastal development, fisheries interactions, direct take, and climate change are expected to continue and likely worsen in the future for these corals. Although many actions at USAKA beyond what are described in the Environmental Baseline and Cumulative Effects sections are uncertain, we do have expected estimates (for the actions described above in those sections, and we acknowledge that there are other federal actions occurring in the Atoll (previous, ongoing and known future actions) impacting these species. For example, the FE-1 testing could remove up to 10,417 coral colonies, the ARRW testing may remove up to 10,417 colonies, the FE-2 testing could remove up to 10,404 colonies, FE-3 testing may remove up to 14 colonies, and the GBSD testing would remove up to 31, 224 colonies (for a total of up to 62,476 colonies cumulatively). PRD has considered the action's impacts with the other threats incurring on the species, and even assuming the highest level of take expected to occur (loss of individuals due to this action) added to other losses discussed in the Environmental Baseline and Cumulative Effects sections, we do not expect these actions to result in appreciable reduction of the species. The proposed action is anticipated to result in the injury or mortality of up to 3,042 coral colonies at Illeginni Islet during a single unplanned shoreline strike (Table 14). These coral colonies represent an extremely small fraction of the total number of colonies found at Illeginni, and even less around USAKA.

In the context of this action, the potential loss of these *A. microclados* colonies is not expected to significantly affect reproduction or to impede the recovery of their species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of these species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate any of the *A. microclados* considered in this Opinion from Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

In the context of this action, the potential loss of these *A. polystoma* colonies is not expected to significantly affect reproduction or to impede the recovery of their species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of these species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate any of the *A. polystoma* considered in this Opinion from Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

In the context of this action, the potential loss of these *C. agassizi* colonies is not expected to significantly affect reproduction or to impede the recovery of their species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of these species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate any of the *C. agassizi* considered in this Opinion from Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

In the context of this action, the potential loss of these *Heliopora coerulea* colonies is not expected to significantly affect reproduction or to impede the recovery of their species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of these species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate any of the *H. coerulea* considered in this Opinion from Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild

In the context of this action, the potential loss of these *P. venosa* colonies is not expected to significantly affect reproduction or to impede the recovery of their species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of these species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate any of the *P. venosa* considered in this Opinion from Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild

In the context of this action, the potential loss of these *T. reniformis* colonies is not expected to significantly affect reproduction or to impede the recovery of their species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of these species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate any of the *T. reniformis* considered in this Opinion from Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild

6.3 Mollusks

As described in the Effects of the Action section, a total of up to 28 mollusks could be killed through some combination of exposure to direct payload impact, ejecta, and ground based shock wave.

As discussed in the Status of Listed Species, top shell snails have been reported at all of the 11 USAKA islets as well as at 59 of 103 survey sites throughout Kwajalein Atoll including all four survey sites on Illeginni. The clam species have been reported at most of the USAKA islets, (9 for *H. Hippopus*, 6 for *T. Squamosa* and 11 for *T. maxima*) as well as at 9, 24, and 35, respectively, out of 35 survey sites in the mid-atoll corridor. It is important to recognize that survey data for USAKA is far from complete. Only a small portion of the total reef area around the USAKA islets has been surveyed, and surveys to specifically identify and quantify these species are yet to be done. As such, it is possible that the distribution and abundance of mollusks at USAKA is higher than the current information can confirm.

As discussed more fully in the Environmental Baseline and Cumulative Effects sections, the effects of continued flight testing, coastal development, direct take, and climate change are expected to continue and likely worsen in the future for this species. Although many actions at USAKA, beyond what are described in the Environmental Baseline and Cumulative Effects sections are uncertain, we do have expected estimates for the actions described above in those sections, and we acknowledge that there are other federal actions occurring in the Atoll (previous, ongoing and known future actions) impacting these species. For example, the FE-1, ARRW, FE-2 and FE-3 testing could remove up to 13 top shell snails and 257 giant clams. While the GBSD testing could remove up to nine top shell snails and 219 giant clams (for a total of up to 22 top shell snails and 476 giant clams cumulatively). We note that *T. maxima* was proposed for listing under the ESA on July, 25, 2024 and added to the UES at that time, and as such, is not included in the take estimates described above. However, surveys of USAKA show *T. maxima* to be widely distributed across the USAKA islets, the mid-atoll corridor, and a variety of habitat types sampled and occurring at 81 percent of the 109 locations surveyed (NMFS 2017b). Therefore, we believe *T. maxima* to be widespread at Kwajalein Atoll. PRD has considered the action's impacts with the other threats incurring on the species, and even assuming the highest level of take expected to occur (loss of individuals due to this action) added to other losses discussed in the Environmental Baseline and Cumulative Effects sections, we do not expect these actions to result in appreciable reduction of the species. The proposed action is anticipated to result in the injury or death of up to 28 mollusks (2 top shell snails, 19 *H. hippopus*, 3 *T. squamosa*, and 4 *T. maxima*) at Illeginni during a single unplanned shoreline strike.

The affected mollusks represent a small fraction of the total number of top shell snails found at Illeginni, and an even smaller proportion of the population across USAKA. In the context of this action, the potential loss of 2 top shell snails across the area is not expected to significantly impact reproduction or to impede the recovery of these species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of the species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate top shell snails at Illeginni, or appreciably reduce the likelihood of their survival and recovery across

USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

The affected mollusks represent a small fraction of the total number of giant clams found at Illeginni, and an even smaller proportion of the population across USAKA. In the context of this action, the potential loss of 19 *H. hippopus* across the area is not expected to significantly impact reproduction or to impede the recovery of these species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of the species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate *H. hippopus* at Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

In the context of this action, the potential loss of 3 *T. squamosa* across the area is not expected to significantly impact reproduction or to impede the recovery of these species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of the species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate *T. squamosa* at Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

In the context of this action, the potential loss of 4 *T. maxima* across the area is not expected to significantly impact reproduction or to impede the recovery of these species across USAKA and the mid-atoll corridor. Therefore, when taken in context with the status of the species, the environmental baseline, cumulative impacts and effects, the proposed action is not likely to eliminate *T. maxima* at Illeginni, or appreciably reduce the likelihood of their survival and recovery across USAKA including the mid-atoll corridor, and therefore will not reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

7 CONCLUSION

After reviewing and analyzing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the six UES-protected corals considered in this Opinion, the top shell snail, humphead wrasse, bumphead parrotfish, or three species of giant clams. As described in Section 1, designated critical habitat has been identified near the homeports in the Pacific and Atlantic BOAs for the Northwest Atlantic Ocean DPS of loggerhead sea turtles, the leatherback sea turtle, and the Central America DPS and the Mexico DPS of humpback whales and the proposed critical habitat of the North Atlantic DPS green sea turtles. NMFS concludes the proposed action may affect, but is not likely to adversely affect or modify designated critical habitat for the Northwest Atlantic Ocean DPS of loggerhead sea turtles, the leatherback sea turtle, and the Central America DPS and the Mexico DPS of humpback whales or the proposed critical habitat of the North Atlantic DPS green sea turtles.

8 INCIDENTAL TAKE STATEMENT

Section 9(a) of the ESA prohibits taking of endangered species. In the case of threatened species, section 4(d) of the ESA leaves it to the Secretary’s discretion whether and to what extent to extend the statutory 9(a) take prohibitions, and directs the agency to issue regulations it considers necessary and advisable for the conservation of the species. The UES does not specifically describe "take" for a biological opinion. However, under section 161 of the Compact and the UES, the ESA provides the basis for determining the level of incidental take, so the ESA definitions will be used for this Opinion.

The term "incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (50 CFR 402.02). The proposed action results in the incidental take of humphead wrasse, bumphead parrotfish*,* six coral species (*A. microclados, A. polystoma, C. agassizi, H. coerulea, P. venosa, and T. reniformis*)*, Tectus niloticus* and three clam species (*H. hippopus*, *T. squamosa, and T. maxima***).** Under the terms of ESA section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the reasonable and prudent measures and terms and conditions of this incidental take statement (ITS).

Consistent with the decision in *Center for Biological Diversity v. Salazar*, 695 F.3d 893 (9th Cir. 2012), we have included an incidental take statement to serve as a check on the no-jeopardy conclusion by providing a reinitiation trigger if the level of take analyzed in the biological opinion is exceeded. In addition, 50 CFR 402.14(i)(3), without regard to 9(a) prohibitions, provides that in order to monitor the impacts of incidental take, "the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the ITS."

8.1 Amount or Extent of Take

Section 7 regulations and UES section 3-4.5.3(e) require NMFS to specify the impact of any incidental taking as the amount or extent of such taking (50 C.F.R. §402.14(i)(1)(i)). The amount of take represents the number of individuals that are expected to be taken by the proposed action

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

1. We expect that up to 3,042 colonies of UES consultation corals (as quantified in Table 14, below) could be wounded or experience complete mortality, up to 2 top shell snail, up to 26 clams, up to 32 humphead wrasse (2 adult and 30 juveniles) and up to 2 parrotfish could be wounded or killed by the proposed action due to direct contact from a single CPS test flight shoreline payload impact, ejecta, and/or shock waves at the land-based target location.

Table 14. Expected Take of Marine UES consultation species at the land-based target due to the CPS flight test activities due to a one shoreline impact (over a 10- year period).

Species	**Scientific Name**	**Colonies or Individuals Affected for all tests**
Coral		
	Acropora microclados	11
	Acropora polystoma	10

Species	**Scientific Name**	**Colonies or Individuals Affected for all tests**
	Cyphastrea agassizi	9
	Heliopora coerulea	2,994
	Pavona venosa	9
	Turbinaria reniformis	9
Coral total		**3,042**
Fish		
Humphead wrasse adult	*Cheilinus undulatus*	2
Humphead wrasse juveniles	*Cheilinus undulatus*	30
Bumphead parrot fish	*Bolbometopon muricatum*	2
Fish total		**34**
Mollusks		
Top shell snails	*Trochus niloticus*	2
Giant clam	*Hippopus hippopus*	19
Giant clam	*Tridacna squamosa*	3
Giant clam	*Tridacna maxima*	4
Mollusks total		**28**

8.2 Reasonable and Prudent Measures

Reasonable and prudent measures are actions the Director considers necessary or appropriate to minimize the impacts if the incidental take on the species (50 CFR 402.02). We determine that the following reasonable and prudent measures, as implemented by the terms and conditions that follow, are necessary and appropriate to minimize the impacts of the proposed action on threatened and endangered species and to monitor the level and nature of any incidental takes.

1. The Navy/ USASMDC shall ensure the proposed action has a monitoring and reporting program sufficient to confirm the amounts and extents of take are not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

8.3 Terms and Conditions

Section 161 of the Compact obligates the U.S. to apply environmental standards that are substantially similar to the U.S. ESA, therefore, in order to be exempt from the prohibitions of section 9 of the ESA the Federal action agency must comply with the following terms and conditions. If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action may lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:
    a. The Navy/ USASMDC shall ensure the following monitoring will occur:
        i. The Navy/USASMDC will record the number of colonies or individual animals injured or killed as a result of a CPS payload impact.
    b. The Navy/USASMDC shall assign appropriately trained and qualified personnel to record all suspected incidences of take of any UES-consultation species.
    c. The Navy/USASMDC shall utilize digital photography to record any UES-consultation species found injured or killed in or near the ocean target areas and/or at Illeginni. As practicable: 1) Photograph all damaged corals and/or other UES-consultation species that may be observed injured or dead; 2) Include a scaling device (such as a ruler) in photographs to aid in the determination of size; and 3) Record the GPS location of the photograph.
    d. Within 60 days of completing post-test cleanup and restoration, provide photographs and records to the USAKA environmental office. USAKA and our biologists will review the photographs and records to identify the organisms to the lowest taxonomic level accurately possible to assess impacts on consultation species.
    e. The Navy/ USASMDC shall report to NMFS immediately if any of the take indicators in Section 8.1 are exceeded.
    f. The Navy/ USASMDC shall provide annual reports to NMFS by February 15 that detail the results of the monitoring above for the previous calendar year. The report shall identify: 1) The flight(s) test and date(s); 2) The target area; 3) The results of the pre- and post-flight surveys; 4) The identity and quantity of affected resources (include photographs and videos as applicable); and 5) The disposition of any relocation efforts. All reports should be emailed to EFHESAconsult@noaa.gov and ron.dean@noaa.gov.

8.4 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

1. The Navy or USASMDC should monitor for cetaceans within USAKA waters to establish Kwajalein Atoll based densities using already established hydrophone systems. Cetacean densities in the RMI are relatively uncertain. Therefore, establishing USAKA based cetacean densities will help inform future actions and consultations within RTS. These density estimates can also inform stock assessments; recovery plans, status reviews, and actions for several UES, ESA, or MMPA listed species by providing

essential information on species distribution, habitat use, and migratory patterns. For example, the recovery plans for Sei whales (action 6.0), Blue whales (action 3.0), and Sperm whales (action 2.0) among others, list developing or expanding population assessments and monitoring as a priority recovery action for recovery.

2. The Navy or USASMDC should complete Programmatic Consultations for their flight test program within the RTS, vessel activities in and around Kwajalein Atoll, and for other routine activities that are occurring. Programmatic consultations for these activities will increase operational efficiency for the Department of Defense by reducing project timelines.

8.5 Reinitiation of Consultation

This concludes formal consultation for the Navy Conventional Prompt Strike Weapon System Flight Tests Activities. Under 50 CFR 402.16(a), reinitiation of consultation is required and shall be requested by the Federal agency, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

1. If the amount or extent of taking specified in the incidental take statement is exceeded;
2. If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
3. If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or
4. If a new species is listed or critical habitat designated that may be affected by the identified action.

9 NOT LIKELY TO ADVERSELY AFFECT DETERMINATIONS

9.1 Stressors Not Likely to Adversely Affect Listed Resources

The applicable standard for a “not likely to adversely affect” determination is that the effects of an action are reasonably certain to be discountable, insignificant, or completely beneficial (USFWS & NMFS 1998). Discountable effects are those extremely unlikely to occur. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Beneficial effects are contemporaneous positive effects without any adverse effects. We determined the following stressors are not likely to adversely affect any listed species or designated critical habitats.

Note: Within the 30 marine mammal species, six sea turtle species, 62 coral species, 16 fish species, and six mollusks species that are not likely to be adversely affected by the proposed action, the effects are expected to be practically identical. Addressing the species individually would significantly increase the length of this Opinion with no discernible improvement in the evaluation. Therefore, all marine mammal, sea turtle, coral species, fish, and mollusks species are referred to together, unless an individual species needs to be identified due to some unique sensitivity or response. Table 15 describes the stressors that have the potential to affect consultation species under NMFS’ jurisdiction in each specific geographic area (Pacific or Atlantic BOA or USAKA). A number (e.g. 1-4) indicates that the species could be impacted by the listed stressor. Any species without a specific number listed in the “NLAA Stressors associated with the proposed action” column are not expected to be impacted by that listed stressor, and therefore, will not be discussed further. All LAA stressors have been previously addressed in this Opinion.

Table 15. Common name, scientific name, occurrence area, and stressors associated with the proposed action: (1) Exposure to Elevated Sound, (2) Direct Contact, (3) Exposure to Hazardous Materials, Wastes and Discharges, and (4) Collisions with vessels.

Common name	Scientific Name	Occurrence within the action area+	NLAA Stressors associated with the proposed action	LAA stressors associated with the proposed action
Marine Mammals				
Bottlenose Dolphin	*Tursiops sp.*	USAKA	1,2,3,4	
Bottlenose Dolphin, Pacific	*Tursiops gilli*	USAKA	1,2,3,4	
Common Dolphin	*Delphinus delphis*	USAKA	1,2,3,4	
Risso's Dolphin	*Grampus griseus*	USAKA	1,2,3,4	
Spinner Dolphin	*Stenella longirostris*	USAKA	1,2,3,4	
Spinner Dolphin, Costa Rican	*Stenella longirostris centroamericana*	USAKA	1,2,3,4	
Spinner Dolphin, Eastern	*Stenella longirostris orientalis*	USAKA	1,2,3,4	
Spinner Dolphin, Whitebelly	*Stenella longirostris longirostris*	USAKA	1,2,3,4	
Spotted Dolphin, Coastal	*Stenella attenuata graffmani*	USAKA	1,2,3,4	
Spotted Dolphin, Offshore	*Stenella attenuata*	USAKA	1,2,3,4	
Striped Dolphin	*Stenella coeruleoalba*	USAKA	1,2,3,4	
Blainville's Beaked Whale	*Mesoplodon densirostris*	USAKA,	1,2,3,4	
Sei whale	*Balaenoptera borealis*	USAKA, Atlantic BOA, Pacific BOA	1,2,3,4	
Blue whale	*Balaenoptera musculus*	USAKA, Atlantic BOA, Pacific BOA	1,2,3,4	
Fin whale	*Balaenoptera physalus*		1,2,3,4	

Common name	**Scientific Name**	**Occurrence within the action area^{+}**	**NLAA Stressors associated with the proposed action**	**LAA stressors associated with the proposed action**
Gray whale-Western North Pacific DPS	*Eschrichtius robustus*		1,2,3,4	
North Atlantic right whale	*Eubalaena glacialis*	Atlantic BOA	1,2,3,4	
North Pacific right whale	*Eubalaena japonica*	Pacific BOA	1,2,3,4	
Humpback whale	*Megaptera novaeangliae*			
Central America DPS		Pacific BOA	1,2,3,4	
Mexico DPS		Pacific BOA	1,2,3,4	
Western North Pacific DPS		USAKA, Pacific BOA	1,2,3,4	
Sperm whale	*Physeter macrocephalus*	USAK, Atlantic BOA, Pacific BOA	1,2,3,4	
False killer whale	*Pseudorca crassidens*	USAKA	1,2,3,4	
Main Hawaiian Islands Insular DPS		Hawaiian insular Pacific, Pacific BOA	1,3,4	
Killer Whale	*Orcinus orca*	USAKA	1,2,3,4	
Melon-Headed Whale	*Peponocephala electra*	USAKA	1,2,3,4	
Pygmy Killer Whale	*Feresa attenuata*	USAKA	1,2,3,4	
Pygmy Sperm Whale	*Kogia breviceps*	USAKA	1,2,3,4	
Short-Finned Pilot Whale	*Globicephala macrorhynchus*	USAKA	1,2,3,4	
Guadalupe fur seal	*Arctocephalus townsendi*	Pacific BOA	1,2,3,4	
Steller sea lion-western DPS	*Eumetopias jubatus*	Pacific BOA	1,2,3,4	
Hawaiian monk seal	*Neomonachus schauinslandi*	Hawaiian insular Pacific	3,4	
Sea Turtles				
Loggerhead turtle	*Caretta caretta*			

Common name	**Scientific Name**	**Occurrence within the action area$^+$**	**NLAA Stressors associated with the proposed action**	**LAA stressors associated with the proposed action**
North Pacific Ocean DPS		Pacific BOA	1,2,3,4	
Northeast Atlantic Ocean DPS		Atlantic BOA	1,2,3,4	
Northwest Atlantic Ocean DPS		Atlantic BOA	1,2,3,4	
Green turtle	*Chelonia mydas*			
Central North Pacific DPS		Hawaiian insular Pacific, Pacific BOA	1,2,3,4	
Central South Pacific DPS		Pacific BOA	1,2,3,4	
Central West Pacific DPS		USAKA, Pacific BOA	1,2,3,4	
East Pacific DPS		Pacific BOA	1,2,3,4	
North Atlantic DPS		Atlantic BOA	1,2,3,4	
South Atlantic DPS		Atlantic BOA	1,2,3,4	
Leatherback turtle	*Dermochelys coriacea*	USAK, Atlantic BOA, Pacific BOA	1,2,3,4	
Hawksbill turtle	*Eretmochelys imbricata*	USAK, Atlantic BOA, Pacific BOA	1,2,3,4	
Kemp’s ridley turtle	*Lepidochelys kempii*	Atlantic BOA	1,2,3,4	
Olive ridley turtle	*Lepidochelys olivacea*			
All other populations (not Mexico’s Pacific coast breeding population)		USAKA, Pacific BOA	1,2,3,4	
Mexico’s Pacific coast breeding population		Pacific BOA	1,2,3,4	
Fish				

Common name	Scientific Name	Occurrence within the action area^{+}	NLAA Stressors associated with the proposed action	LAA stressors associated with the proposed action
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*			
Carolina DPS		Atlantic BOA	1,2,3	
Chesapeake Bay DPS		Atlantic BOA	1,2,3	
Gulf of Maine DPS		Atlantic BOA	1,2,3	
New York Bight DPS		Atlantic BOA	1,2,3	
South Atlantic DPS		Atlantic BOA	1,2,3	
Oceanic whitetip shark	*Carcharhinus longimanus*	USAKA, Atlantic BOA, Pacific BOA	1,2,3	
Giant manta ray	*Mobula (Manta) birostris*	USAKA, Atlantic BOA, Pacific BOA	1,2,3	
Chum salmon	*Oncorhynchus keta*			
Hood Canal Summer run ESU		Pacific BOA	1,2,3	
Coho salmon	*Oncorhynchus kisutch*			
Lower Columbia River ESU		Pacific BOA	1,2,3	
Central California Coast ESU		Pacific BOA	1,2,3	
Oregon Coast ESU		Pacific BOA	1,2,3	
Southern Oregon/ Northern California Coasts ESU		Pacific BOA	1,2,3	
Steelhead Trout	*Oncorhynchus mykiss*			
California Central Valley DPS		Pacific BOA	1,2,3	
Central California Coast DPS		Pacific BOA	1,2,3	
Lower Columbia River DPS		Pacific BOA	1,2,3	

Common name	Scientific Name	Occurrence within the action area[+]	NLAA Stressors associated with the proposed action	LAA stressors associated with the proposed action
Middle Columbia River DPS		Pacific BOA	1,2,3	
Northern California DPS		Pacific BOA	1,2,3	
Snake River Basin DPS		Pacific BOA	1,2,3	
Puget Sound DPS		Pacific BOA	1,2,3	
South-Central California Coast DPS		Pacific BOA	1,2,3	
South California DPS		Pacific BOA	1,2,3	
Upper Columbia River DPS		Pacific BOA	1,2,3	
Upper Willamette River DPS		Pacific BOA	1,2,3	
Sockeye salmon	*Oncorhynchus nerka*			
Snake River ESU		Pacific BOA	1,2,3	
Ozette Lake ESU		Pacific BOA	1,2,3	
Chinook Salmon	*Oncorhynchus tshawytscha*			
California Coastal ESU		Pacific BOA	1,2,3	
Central Valley Spring-Run ESU		Pacific BOA	1,2,3	
Sacramento River Winter-Run ESU		Pacific BOA	1,2,3	
Lower Columbia River ESU		Pacific BOA	1,2,3	
Puget Sound ESU		Pacific BOA	1,2,3	
Snake River Fall ESU		Pacific BOA	1,2,3	
Snake River Spring/Summer-run ESU		Pacific BOA	1,2,3	

Common name	Scientific Name	Occurrence within the action area^{+}	NLAA Stressors associated with the proposed action	LAA stressors associated with the proposed action
Upper Columbia River Spring ESU		Pacific BOA	1,2,3	
Upper Willamette River ESU		Pacific BOA	1,2,3	
Small tooth sawfish	*Pristis pectinata*	Atlantic BOA	1,2,3	
Atlantic salmon – Gulf of Maine DPS	*Salmo salar*	Atlantic BOA	1,2,3	
Scalloped hammerhead shark	*Sphyrna lewini*			
Central and Southwest Atlantic DPS		Atlantic BOA	1,2,3	
Eastern Atlantic DPS		Atlantic BOA	1,2,3	
Eastern Pacific DPS		Atlantic BOA	1,2,3	
Indo-West Pacific DPS		Pacific BOA	1,2,3	
Bigeye Thresher Shark	*Alopias superciliosus*	USAKA	1,2,3	
Shortfin Mako Shark	*Isurus oxyrinchus*	USAKA	1,2,3	
Pacific Bluefin Tuna	*Thunnus orientalis*	USAKA	1,2,3	
Humphead Wrasse	*Cheilinus undulatus*	USAKA	1,2,3	
Bumphead Parrotfish	*Bolbometopon muricatum*	USAKA	1,2,3	
Corals				
	Acanthastrea brevis	USAKA	1,2,3	
	Acanthastrea hemprichii	USAKA	1,2,3	
	Acropora aculeus	USAKA	1,2,3	
	Acropora acuminata	USAKA	1,2,3	
	Acropora aspera	USAKA	1,2,3	
	Acropora dendrum	USAKA	1,2,3	

Common name	Scientific Name	Occurrence within the action area$^+$	NLAA Stressors associated with the proposed action	LAA stressors associated with the proposed action
	Acropora donei	USAKA	1,2,3	
	Acropora globiceps	USAKA, insular Pacific	1,2,3	
	Acropora horrida	USAKA	1,2,3	
	Acropora jacquelineae	USAKA	1,2,3	
	Acropora listeri	USAKA	1,2,3	
	Acropora lokani	USAKA, insular Pacific	1,2,3	
	Acropora palmerae	USAKA	1,2,3	
	Acropora microclados	USAKA	1,3,4	2
	Acropora polystoma	USAKA	1,3,4	2
	Acropora paniculata	USAKA	1,2,3	
	Acropora pharaonis	USAKA, insular Pacific	1,2,3	
	Acropora retusa	USAKA, insular Pacific	1,2,3	
	Acropora rudis	USAKA	1,2,3	
	Acropora speciosa	USAKA, insular Pacific	1,2,3	
	Acropora striata	USAKA	1,2,3	
	Acropora tenella	USAKA, insular Pacific	1,2,3	
	Acropora vaughani	USAKA	1,2,3	
	Acropora verweyi	USAKA	1,2,3	
	Alveopora allingi	USAKA	1,2,3	
	Alveopora fenestrata	USAKA	1,2,3	
	Alveopora verrilliana	USAKA	1,2,3	
	Anacropora spinosa	USAKA, insular Pacific	1,2,3	
	Astreopora cucullata	USAKA	1,2,3	

Common name	Scientific Name	Occurrence within the action area^{+}	NLAA Stressors associated with the proposed action	LAA stressors associated with the proposed action
	Barbattoia laddi	USAKA	1,2,3	
	Cyphastrea agassizi	USAKA	1,3,4	2
	Cyphastrea ocellina	USAKA	1,2,3	
	Euphyllia paradivisa	USAKA, insular Pacific	1,2,3	
	Galaxea astreata	USAKA	1,2,3	
	Heliopora coerulea	USAKA	1,3,4	2
	Isopora crateriformis	USAKA, insular Pacific	1,2,3	
	Isopora cuneata	USAKA	1,2,3	
	Leptoseris incrustans	USAKA	1,2,3	
	Leptoseris yabei	USAKA	1,2,3	
	Millepora foveolata	USAKA	1,2,3	
	Millepora tuberosa	USAKA	1,2,3	
	Montipora australiensis	USAKA, insular Pacific	1,2,3	
	Montipora calcarea	USAKA	1,2,3	
	Montipora caliculata	USAKA	1,2,3	
	Montipora lobulata	USAKA	1,2,3	
	Montipora patula	USAKA	1,2,3	
	Pachyseris rugosa	USAKA	1,2,3	
	Pavona bipartita	USAKA	1,2,3	
	Pavona cactus	USAKA	1,2,3	
	Pavona decussata	USAKA	1,2,3	
	Pavona diffluens	USAKA, insular Pacific	1,2,3	
	Pavona venosa	USAKA	1,3,4	2
	Physogyra lichtensteini	USAKA	1,2,3	

Common name	Scientific Name	Occurrence within the action area+	NLAA Stressors associated with the proposed action	LAA stressors associated with the proposed action
	Pocillopora danae	USAKA	1,2,3	
	Pocillopora elegans	USAKA	1,2,3	
	Porites horizontalata	USAKA	1,2,3	
	Porites napopora	USAKA, insular Pacific	1,2,3	
	Porites nigrescens	USAKA	1,2,3	
	Seriatopora aculeata	USAKA, insular Pacific	1,2,3	
	Turbinaria mesenterina	USAKA	1,2,3	
	Turbinaria reniformis	USAKA	1,3,4	2
	Turbinaria Stellulata	USAKA	1,2,3	
Mollusks				
Black-Lip Pearl Oyster	*Pinctada margaritifera*	USAKA	1,2,3,4	
Top Shell Snail	*Trochus maximus*	USAKA	1,2,3,4	
Top Shell Snail	*Trochus niloticus*	USAKA	1,3,4	2
Horse's Hoof Clam	*Hippopus hippopus*	USAKA	1,3,4	2
Fluted Giant clam	*Tridacna squamosa*	USAKA	1,3,4	2
Small Giant Clam	*Tridacna maxima*	USAKA	1,3,4	2
Giant Clam	*Tridacna gigas*	USAKA	1,2,3,4	

+USAKA= Kwajalein atoll territorial waters and the Mid-atoll coordinator. Atlantic BOA = all Atlantic waters in the action area, Pacific BOA=all Pacific waters in the action area, Hawaiian insular Pacific = the Hawaiian Island chain, and insular Pacific = the nearshore waters of pacific islands of the action area

9.1.1 Exposure to Elevated Sound

Man-made sounds can affect animals exposed to them in several ways such as non-auditory damage to gas-filled organs, hearing loss expressed in permanent threshold shift (PTS), or temporary threshold shift (TTS) hearing loss, and behavioral responses. They may also experience reduced hearing by masking (i.e., the presence of one sound affecting the perception of another sound).

NMFS (2018) described generalized hearing ranges for marine mammal hearing groups. Generalized hearing ranges were determined based on the approximately 65 dB threshold from the normalized composite audiograms, with an exception for lower limits for low-frequency cetaceans where the result was deemed biologically implausible and the lower bound of the low-frequency cetacean hearing range from Southall et al. (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 15. Sea turtle hearing was characterized in (Navy 2017) and thresholds were identified in NMFS' Multi-species Pile Driving Calculator (NMFS 2022, unpublished spreadsheet).

To develop some of the hearing thresholds of received sound sources for sea turtles, expected to produce TTS and PTS, the Navy compiled all sea turtle audiograms available in the literature in an effort to create a composite audiogram for sea turtles as a hearing group. Measured or predicted auditory threshold data, as well as measured equal latency contours, were used to influence the weighting function shape for sea turtles. For sea turtles, the weighting function parameters were adjusted to provide the best fit to the experimental data. The same methods were then applied to other species for which TTS data did not exist.

Table 16 Marine Mammal Hearing Groups (NMFS 2018).

Hearing Group	**Generalized Hearing Range***
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz

***** Represents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007) and PW pinniped (approximation).

However, because these data were insufficient to successfully model a composite audiogram via a fitted curve as was done for marine mammals, median audiogram values were used in forming the sea turtle hearing group's composite audiogram. Based on this composite audiogram and data on the onset of TTS in fishes, an auditory weighting function was created to estimate the susceptibility of sea turtles to hearing loss or damage. Sea turtles generally have a limited hearing range that appears to end near 1 kHz. It is described in detail in the technical report Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)(Navy 2017). Furthermore, sea turtle hearing appears to be affected more by particle velocity rather than sound pressure, which is what we generally use for management of sound effects for all animals.

Current data indicate that not all marine mammal species have equal hearing capabilities (e.g., Richardson et al. 1995; Wartzok and Ketten 1999; Au and Hastings 2008). To reflect this, Southall et al. (2007) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges based on available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. No direct measurements of hearing ability have been successfully completed for mysticetes (i.e., low-frequency cetaceans). Similarly, sea turtles and elasmobranchs (sharks and rays) have different ear structures and have different ranges of frequencies than marine mammals.

We used a modified version of the publicly available NMFS marine mammal sound calculator (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance, accessed July 2024), to calculate the distances for all sound sources. Thresholds for all sound types, exposure types, and hearing groups are presented in the calculator. The threshold identified in the calculator is established by NMFS (2018). We used thresholds established by the Navy (2017) for sea turtles in their projects. We grouped all species of sea turtles as one because they are similar in body type, ear structure, and hearing range. Barotrauma is predicted for all animals at 237 dB (re 1 μPa). Sea turtles exposed to peak pressures as loud as 232 dB and 204 dB for SEL could experience permanent threshold shifts (PTS) or hearing loss. We also predict that all animals may experience temporary threshold shifts (TTS) at levels 15 dB less than the PTS thresholds. For continuous underwater sound, we use a threshold for behavioral response of 160 decibels (dB) re 1 μPa (micro-Pascals) rms for sea turtles, 120 dB re 1 μPa rms for marine mammals, and 150 dB re 1 μPa rms for elasmobranchs.

The Proposed Action has the potential to expose all listed species in NMFS' jurisdiction to elevated sound pressure levels both in the air and underwater. The stressors associated with CPS activities that will result in elevated noise levels include; sonic booms, payload impact, vessel operation, and human activity and equipment operation.

Vessel noise: Disturbance from vessel or target raft noise associated with this action could cause a behavioral response in listed sea turtles, marine mammals, and elasmobranchs. Typical behavioral responses include temporarily masking communications and/or acoustic environmental cues, alteration of ongoing behaviors, and avoidance. While vessel noises may result in a behavioral response, the effect will be temporary as the vessel passes by, and any alteration of ongoing behaviors or avoidance will be limited spatially and temporally. Received noise levels would be expected to decrease with distance and anticipated effects from transiting vessels would depend on vessel size, the animal's relativity location, and tolerance to the received sound. We would expect any individuals that exhibit a temporary behavioral response to return to their baseline behavior immediately following exposure to vessel noise. The Navy/USASMDC established BMPs that when piloting transiting vessels the vessel operators will monitor for consultation species, alter course, and reduce speeds to avoid impacts. Therefore, while ESA or UES-listed species may hear some noise, we are reasonably certain vessel or target raft noise will not reach the scale of harm or harassment to sea turtles, marine mammals, and elasmobranchs, and thus are insignificant.

Launch: Brief noise will be produced during the missile launch. The Navy/ USASMDC expects a CPS missile launch to produce approximately 176 dB re 1μPa @ 15m for less than one second, 160 dB re 1μPa @ 91 m for less than two second, and 150 dB re 1μPa @ 290 m for less than three seconds in-water noise (Navy and USASMDC 2024b). These sound levels are not expected to cause PTS in consultation species beyond 2.7 m of the source or physical injury to fish beyond 0.4 meters. Moreover, for the marine mammal species with the highest density in the BOAs where launch activities will occur (sperm whales in the Atlantic) and the expected maximum number of exposures above the behavioral threshold annually (up to eight flight tests per year), we would expect only 0.5 individuals to be exposed. Even if summed across eight possible tests per year over 10 years, the maximum number of possible behavioral disturbances is four individual whales. If a launch were to exceed the threshold for inducing behavioral reactions, we are reasonably certain the effects would likely be temporary and limited to short term responses.

Given the BMPs that require Navy/USASMDC personnel to delay CPS test flight activities whenever mobile consultation species are observed near the launch sites and that test activities will resume only when these species are out of harm's way or have left the area, the availability of similar habitat nearby, the rarity of these animals in the action area, and the hearing ranges of the consultation species, we are reasonably certain that the probability of exposure to sound levels above the behavioral disturbance threshold from the launch will not reach the scale of take from harm or harassment, and is therefore insignificant.

Sonic booms: The missiles will generate sonic booms over the ocean. The sonic booms will occur with each missile launch after the vehicle speed exceeds the speed of sound. The sonic boom would be directed toward the front of the vehicle downrange of the launch site and thus would be located over the Pacific and Atlantic BOAs. It is difficult to predict the specific location, extent, duration, or intensity of sonic boom impacts on marine life. However, these anticipated sound levels would be of very short duration (milliseconds), and the size, design, and trajectory of missiles limit the magnitude of the sonic boom generated (MDA 2012). The sound level and duration associated with the boom are expected to be similar in magnitude to previously approved USAG-KA launches but would occur at very high altitudes within the missiles' flight trajectory. If sonic boom overpressures were to exceed the threshold for inducing behavioral reactions, the effects would likely be temporary and limited to short term behavioral responses, particularly when individuals are deeper than 30 meters.

The potential for a sonic boom to affect cetaceans or sea turtles was analyzed for the MMIII and FE-2 tests in which three spent rocket motors splashed down in deep ocean waters on each test (U.S. Air Force 2004, DON. 2019b). The Air Force and Navy calculated that sonic boom overpressures at the ocean surface would be near their maximum level at a distance of about 25 nm (46 km) due west of the launch site (Tooley et al. 2004,DON. 2019b). When converted to dB, this equates to 119 to 149 dB in air and 150 to 175 dB re 1 μPa in water at the surface. The duration of these overpressures was estimated to be less than 270 milliseconds, and the overpressure (sound levels) would dissipate with increasing distance and ocean depth (DON. 2019b). Based on the results of the analysis, it was concluded that it is likely that the effects of the FE-2 sonic booms in the deep ocean waters are insignificant and unlikely to result in take.

Sonic booms for this test flight are expected to be similar to other test flights (e.g. FE-2) that used the MMIII analysis. SPLs are expected to average 130 dB re 1 μPa in water near the surface for most of the vehicle flight. Near the payload impact site, sonic booms may reach 175 dB re 1 μPa for approximately 75 milliseconds (Navy and USASMDC 2024b). Given the sizes of the CPS missiles, their flight trajectory, and SPLs it's reasonable to assume that the occurrence of adverse effects from CPS-related sonic booms on these species would likely be similar or less than that of MMIII described above. Therefore, while consultation species under NMFS' jurisdiction may hear some noise, we are reasonably certain sonic booms will not reach the scale of take from harm or harassment, and thus are insignificant.

Splashdown and Payload Impact: The CPS vehicle boosters and debris will splash down within the BOAs and at KMISS. Noise levels for boosters and missile components splashdown or exposure to underwater shock/sound waves have been extensively analyzed from past flight tests and are used for a bounding estimate for this proposed action. The maximum SPL for the larger splashdown components has been estimated at 218 dB re 1 μPa and estimated to last no more than a few seconds. (Navy and USASMDC 2023, Navy and USASMDC 2024b). Booster splashdown and payload impact may create sound pressures above the TTS effect threshold for marine species over a small area. At 218 dB, the stage 1 booster splashdown may exceed the TTS effect threshold for low frequency cetaceans within 1.8 m of splashdown.

Based on densities in the action area, less than one exposure to sounds above TTS effect thresholds would be expected annually (eight tests per year) for all species considered. For the listed species in the low frequency cetacean functional hearing group with the highest estimated density in the splashdown/impact BOAs (fin whales in the Pacific BOA), the expected number of exposures to sound above the TTS threshold would be less than 0.00002 individuals annually. This analysis assumes that the maximum number of tests per year would be conducted and that all tests would take place in the portion of the Action Area (Atlantic or Pacific) with the highest species density. Even for fish species where lack of reliable density estimates did not allow for quantitative analyses, densities would not be expected to be higher than other listed species and no animal exposures to sounds above the TTS threshold are expected.

The resulting underwater shock/sound wave radiating out from the impact point could harm other cetaceans or sea turtles. Close to the impact point, the shock/sound wave might cause PTS, injure internal organs and tissues, or prove fatal. Slightly farther away, TTS or behavioral effects might occur, but with increasing distance away from the impact point, pressure levels would decrease, as would the risk for injury. Studies for MMIII flight tests have shown that underwater sound pulse levels would be on the order of 188 to 190 dB re 1 μPa at a range of 164 ft (50 m; 0.4 to 0.8 psi) from the motors' impact points (Tooley et al. 2004). However, the CPS components that will splashdown are smaller than or equal to past activities, and therefore are likely to produce lower peak SPL than larger booster and missile components (e.g., FE-2 hypersonic missiles).

Based on the results of past flight tests, species densities, and the size of the CPS missile components, it is reasonable to assume that the occurrence of adverse effects from CPS-related splashdowns and/or shock waves on these species would likely be less. Therefore, while consultation species may hear or feel some noise, we are reasonably certain splashdowns will not reach the scale of take from harm or harassment, and thus are insignificant.

9.1.2 Direct Contact

The proposed action will result in the payload impacts within the Atlantic and Pacific BOAs, KMISS and on land at Illeginni Islet. These falling components will directly contact aquatic and/or terrestrial habitats and have the potential to directly contact consultation species. Payload component contact with the land may result in cratering and ejecta radiating out from the point of impact, and/or shock waves.

Ocean impacts and Splashdown: The best available density data for marine mammals and sea turtles in the action area comes from Navy marine species density databases for naval operating areas in the central Pacific, including for the Hawai'i-Southern California Training and Testing Study Area (DON 2017) and the Mariana Islands Training and Testing Study Area (DON 2018). For a flight test, taking place in the Atlantic study area, the maximum number of estimated animal exposures for any ESA-listed species in the BOA is for sperm whales at 0.0006 individuals. This corresponds to a 1 in 1,650 chance of contacting a sperm whale during a single test in the Atlantic BOA. When summed across all possible tests per year (up to eight tests per year), the maximum number of exposures for any ESA-listed marine mammal or sea turtle species in the Atlantic BOA is less than 0.005 individuals annually.

For a flight test, taking place in the Pacific BOA the maximum number of estimated animal exposures for any ESA-listed species in the BOA is for fin whales at 0.00006 individuals. This corresponds to a 1 in 16,000 chance of contacting a fin whale during a single test in the Pacific BOA. When summed across all possible tests per year (up to eight tests per year), the maximum number of exposures for any ESA-listed marine mammal or sea turtle species in the Pacific BOA is less than 0.0005 individuals annually. For species where the ESA listing unit is a DPS (e.g., humpback whales, gray whale, and Steller sea lions) it is important to note that density and exposure estimates in the model do not distinguish between listed and non-listed DPSs. Therefore, direct contacts estimates would apply to the entire species and are likely overestimates of potential effects on listed populations.

At KMISS, the payload will fall into the ocean during the flight. To be struck by a missile component, an animal would have to be at, or very close to the surface, and directly under the component when it hits. Navy and USASMDC (2023 and 2024b) reports that the payload is about 3 m long and 1 m diameter. If the payload or other CPS component were to strike a cetacean, sea turtle, or fish near the water surface, the animal would most likely be killed or injured. Based on CPS estimates, the direct contact area for this impact is 91 m to account for payload fragmentation. The estimated number of exposures to direct contact was based on methodology used for other test programs (DON 2019a) where the expected number of animals exposed to direct contact is calculated using the direct contact area and estimated maximum seasonal density for species in the action area.

For impacts at KMISS, if maximum density data for consultation species in other areas of the central Pacific were used, the number of individuals, which may be exposed to direct contact, would be substantially less than one for all species. For a single flight test, the estimated maximum number of animal exposures is 0.002 for the species with the highest density at USAKA, spinner dolphins. This corresponds to a 1 in 590 chance of contacting a spinner dolphin during a single test with payload impact at KMISS. When summed across all tests per year, the maximum number of exposures for any UES-listed species is 0.016 individuals annually. These analyses assume that all animals would be at or near the surface 100 percent of the time and that the animals are stationary. These assumptions do not account for animals that spend the majority of time underwater or for any animal movement or potential avoidance to proposed activities, therefore these assumptions should lead to an overestimate of direct contact effect on listed species. Even if the maximum number of eight flight tests per year over 10 years is assumed, the estimated number of animal exposures is less than one individual for all species for the life of the program. Therefore, the effects of direct contact from vehicle components on consultation cetaceans and sea turtles is extremely unlikely and, therefore, discountable.

Density estimates are not available for listed fish in the ocean payload impact areas; however, these species would have similarly low densities and corresponding exposure risk. Based on that and the expectation that they would be well below the surface most of the time, we believe that the probability of their exposure to direct impact or injurious concussive force would be as low or lower than those described above. While larval stages of fish, corals, and mollusks may also be found in the BOAs and KMISS, we believe that the densities are also relatively low and will also be at depths greater than where significant impacts are expected to occur and therefore the probability that any will be impacted is extremely low. The corals considered in this consultation are restricted to shallow nearshore waters well away from the BOAs and/or KMISS. Therefore, the payload impacts at these sites would have no effect on them. Based on the best available information, we are reasonably certain that it is discountable that any of the species considered in this consultation would be exposed to payload impacts within the deep ocean areas of the BOAs or KMISS.

Land-based impacts at Illeginni: On January 11, 2005, the FWS issued a no-jeopardy Opinion regarding effects on nesting green sea turtles at Illeginni Islet for the U.S. Air Force's (USAF) Minuteman III (MMIII) testing, another missile test operation, which is conducted at the same Islet and target site. The FWS Opinion included an incidental take statement for the annual loss of no more than three green sea turtle nests, or injury or loss of up to 300 hatchlings, per year as a result of reentry vehicle impacts at Illeginni Islet. While direct estimates for cratering and ejecta field size are not available for the CPS proposed payload, cratering and ejecta are expected to be similar to previous flight tests conducted at Illeginni Islet and less than those of MMIII reentry vehicles. The Navy/USASMDC used FE-2, which is based on estimates from MMIII, as a bounding case for their analysis (Navy and USASMDC 2024b, DON 2019a). Therefore, MMIII estimates of cratering and shock waves (USASMDC/ARSTRAT 2015, DON 2019a) are used as a maximum bounding case for this proposed action.

Debris and ejecta from a land impact would be expected to fall within 91 m of the impact point on Illeginni Islet. Of the species identified in Table 15, only green and hawksbill sea turtles, and the larval stages of corals, and mollusks may occur close enough to the potential impact site at Illeginni Islet to be affected by these stressors. Therefore we believe that, with the exception of green and hawksbill sea turtles and the larval stages of corals, and mollusks, it is discountable that any of those species would be exposed to debris from the payload impact on Illeginni Islet.

Empirical evidence from previous tests corroborates predictions of the propagation of shock waves associated with impact will be approximately 37.5 m through the adjacent reef from the point of impact on the shoreline (USASMDC/ARSTRAT 2015, DON. 2019a). Although green and hawksbill sea turtles may occur around Illeginni Islet, they do so infrequently and in low numbers, and typically in waters closer to the reef edge, which is over 152.4 m from shore, where they spend the majority of their time under water. Therefore, we consider it unlikely that either turtle species would be close enough to shore to be within the range of shock wave effects, and that any exposure to ejecta would be in the form of relatively slow moving material sinking to the bottom near the animal. In the unlikely event of a turtle being within the ejecta zone during the impact, at most, an exposed animal may experience temporary behavioral disturbance in the form of slight changes in swimming direction, speed, or feeding, that would have no measurable effect on the animal's fitness, and would return to normal within moments of the exposure. Therefore, the exposure is expected to have insignificant effects.

Although coral and mollusk species may reproduce around Illeginni Islet, the densities of coral or mollusk larvae in the action area are likely to be very low except during peak spawning when density may be high over the reef for a short period of time. Since proposed flight tests are discrete events that are extremely unlikely to overlap with peak spawning densities, and with most flight tests utilizing USAKA having payload impact in KMISS, the payload impacts at Illeginni would have insignificant effects on coral and mollusk larvae concentrations of UES consultation species.

9.1.3 Exposure to Hazardous Materials, Waste and Discharges

The diffused stressors associated with the flight test activities and payload impacts within the action area: vessel waste discharge, payload fragments, and carbon emissions and greenhouse gasses, can affect both pelagic and coastal areas. All species under NMFS' jurisdiction could be exposed to materials, wastes, discharges, and run-off that contain chemicals such as tungsten, asbestos, fuel oils, gasoline, lubricants, hydraulic fluids, batteries, and other heavy metals. Various substances (e.g., rocket motors, unused propellant, battery electrolytes, and residual explosives) are likely to be introduced into the marine environment from boosters or payloads that are not consumed during flight. Substances may fall into the ocean during flight or be introduced during splashdown. The CPS launch vessels and vehicles burn fuel and emit carbon into the atmosphere during flight testing operations and transiting.

The Navy will implement BMPs to prevent the introduction of wastes and spills. If any accidental spill were to occur, it is anticipated to be small, contained, and quickly cleaned up prior to entering the aquatic environment. Any response to the releases of oil, fuels, and lubricants into the USAKA environment would be conducted in accordance with the Kwajalein Environmental Emergency Plan (UES § 3-6.5.8). All USAKA waste materials will be transported to Kwajalein Islet for proper disposal in the United States. Waste materials created by naval personnel in the BOAs will be handled in accordance with Navy policies. Although leakage, wastes, and vessel emissions could occur as a result of CPS flight test activities, given the small number of vessels, large action area, the low likelihood of a consultation species being in the vicinity, the unlikely event of a spill occurring, and the adherence to the BMPs that will prevent or minimize potential exposure from spills. Spent booster components are expected to sink to the ocean floor. Following a payload impact in deep ocean waters, fragmentation of the payload would disperse any onboard hazardous materials in water around the impact point. Most payload components would sink relatively quickly to the ocean floor and would not be recovered in waters greater than 30 m (100 ft) deep. A recovery team will inspect the impact site after the test flight to recover and remove any floating debris visible on the water's surface.

Some residual hazardous chemicals are likely to be introduced in the marine environment; however, the area affected by the dissolution of chemicals would be relatively small because of the size of the payload components and the minimal amount of residual materials they would contain. Chemicals released from propellants may include perchlorate, which is highly soluble in water, persistent, and impacts metabolic processes in many plants and animals if in sufficient concentration. However, such concentrations would be localized and are not likely to persist in the ocean. Research has demonstrated that perchlorate does not bioconcentrate or bioaccumulate, which was consistent with the expectations for a water-soluble compound (Furin 2013). It is extremely unlikely that perchlorate released into the marine environment would compromise water quality to sufficient levels or at a depth that it would result in adverse effects on listed marine mammals, sea turtles, and fish. Any chemicals introduced to the water column would be quickly diluted and dispersed by wave action, ocean currents, and the large volume of water.

CPS test components have the potential to pose an ingestion risk to marine wildlife. However, all debris is expected to sink to the ocean bottom where depths reach thousands of feet and where most ESA-listed species do not occur. Given the limited time most items will spend in the water column and that recovery personnel will recover visible debris it is not likely that these items would be accidentally ingested by listed marine mammals, sea turtles, and fish that do not typically forage on the seafloor.

Benthic associated species such as sturgeon could feed on test components that have settled on the seafloor. However, this is unlikely to occur considering the depths at which most components would be found and the relatively low density of ESA-listed sturgeon in areas where ingestible items would be expended. Fragments of sinking munitions in the water column could attract and be ingested by fast, mobile predators that chase moving prey. However, this is an unlikely scenario considering: (1) the small amount of time such objects would be in the water column and, (2) that highly mobile predators would be expected to evacuate an area where a splashdown has just occurred. In the unlikely event a listed individual may attempt to ingest a fragmented test component, it is likely that the animal would reject it, after realizing it is not a food item. If material were ingested, most ingestible-sized items would likely be spit out or passed through the digestive tract without significantly impacting the individual. Based the Navy/USASMDC's use of BMPs, large action area, low density of listed species, the probability of exposure to hazardous materials or debris from booster splashdown or a payload impact within the BOAs or at KMISS would be immeasurable, and is therefore insignificant on the consultation species under NMFS' jurisdiction.

Following a payload impact on Illeginni, fragmentation of the payload could disperse any of the residual onboard hazardous materials up to 91 m from the impact point. The majority of the payload fragments and materials are expected to remain close to the impact point on land. The Navy/ USASMDC will require terrestrial post-test clean-up activities to recover all visible man-made test debris and waste; including the evacuation and screening of the crater for payload debris, post-impact soil and groundwater sampling, or other remediation activities. After cleanup activities, only trace amounts of hazardous chemicals are expected to remain in terrestrial areas. Few, if any, hazardous materials would be expected to enter the nearshore marine environment during a normal test, only in the unplanned and unexpected event of a shoreline impact could debris be expected to enter marine habitats. If payload fragments or materials enter the nearshore environment, divers will recover any visible debris in the nearshore area including in reef habitats. If any hazardous chemicals enter the marine environment, they are expected to quickly be diluted and dispersed by the large volume of ocean water and wave action. Therefore, given the quantities of hazardous materials, the planned impact site, and the dilution and mixing capabilities of USAKA's waters, we expect that any exposure to consultation species would be immeasurable, and is therefore insignificant on all consultation species.

9.1.4 Collisions with Vessels

The proposed action would expose all listed marine species under NMFS' jurisdiction found in both the coastal and pelagic exposure categories (both potential and observed) to the risk of collision with vessels. Vessel sizes within the Atlantic and Pacific BOAs will range up to a maximum of 600 ft, but the average size is 250 ft in length. Open ocean Navy vessels have displacement hulls and travel at speeds between than 12 and 40 kts. USAKA vessel sizes range from 22 m to 53 m and travel at speeds between 25 and 9 kts, with larger vessels traveling at slower speeds. Vessel speed is an important component of the risk for a collision between a vessel and an individual from a listed species.

Marine Mammals: The Atlantic and West Pacific BOAs have limited data on vessel strike occurrence. The east and west coasts of the U.S. have some of the heaviest ship traffic associated with some of the largest ports in the country. Blue, fin, humpback, gray, and North Atlantic right whales are the most vulnerable species to ship strikes because they migrate along the coast and utilize coastal areas for feeding. The magnitude of this threat for large whale populations along the U.S. coasts could be considerably larger than that of the open ocean BOAs due to their proximity to whale critical habitats and biologically important areas. However, the proposed CPS activities will consist of relatively little vessel traffic within these high use areas (4 vessels no more than 8 times a year) and will not meaningfully increase the total vessel traffic in the Atlantic or Pacific BOAs. Navy personnel would use the Navy's Protective Measures Assessment Protocol to identify applicable environmental mitigation requirements that minimize potential impacts to protected marine species (Section 1.2.5). All watercraft would have a dedicated observer on board, adhere to maintaining minimum safety distances between listed species and vessels, and reduce speed as required. Surface ship launch platforms and other moving vessels will have a lookout on an observation platform to monitor mitigation zones, including 460 m around the vessel for whales, 180 m around the vessel for other marine mammals (except bow-riding dolphins), and within the vicinity of sea turtles.

There is limited data on vessel strikes within the Central Pacific BOA and Kwajalein Atoll, but we have no indication that the rate of striking will be higher than it is in Hawai'i. In a study by Lammers et al. (2013), 22 whale-vessel incidents were recorded from 1975 – 2003, with 14 of those occurring from 1994 –2003. The vast majority (17) of the vessel strikes were from vessels traveling at speeds over 15 knots, and nearly all of them occurred in close proximity to the coastline of the main four Hawaiian Islands (Lammers et al. 2013*).* While some vessels may temporarily travel at speeds up to 40 kts*,* most of the vessels and target rafts will be traveling at generally slow speeds ranging from stationary (holding position) to 15 knots, further reducing the probability of a vessel strike. Behaviors such as foraging, resting, socializing and taking care of young may distract an animal and decrease the ability of marine mammals to recognize approaching vessels. However, given BMPs described above that require vessel operators to monitor for listed species and maintain a distance of at least 180 m from all marine mammals, we are reasonably certain the likelihood of exposure of any individual is extremely unlikely, and therefore discountable.

Sea Turtles: Kelly (2020) documented vessel collisions with sea turtles resulting in lethal and sub-lethal injuries. Sea turtles could potentially be struck by the transiting vessels during the proposed activities. All sea turtles species listed in Table 15 may occur within the BOA action areas. However, at USAKA since all vessel activity will occur in nearshore waters only green and hawksbill sea turtles may be affected. All other turtles that may occur at Kwajalein atoll are pelagic migratory species and rarely occur. NMFS (2008) estimated 37.5 vessel strikes of green sea turtles per year from an estimated 577,872 trips per year from vessels of all sizes in Hawai'i. Recently, we estimated as many as 200 green sea turtle strikes annually in Hawai'i, making the probability of a green sea turtle strike 0.035 % (Kelly 2020). Hawksbill sea turtles likely have a much lower rate of strikes when compared to green sea turtles, with only four documented vessel strikes of hawksbill sea turtles between 1984 and 2020 in Hawaiʻi (Kelly 2020). Given sea turtle densities in other sections of the action areas, we have no indication that the rate of striking will be higher than it is for green turtles in Hawaiʻi. Increased vessel speed decreases the ability of sea turtles to recognize a moving vessel in time to dive and escape being hit, as well as the vessel operator's ability to recognize the turtle in time to avoid it. Given BMPs that require vessel operators to adjust speeds in areas where listed species are present and maintain a distance of 180 m from all sea turtles, we are reasonably certain the likelihood of exposure of any individual is extremely unlikely, and therefore discountable.

Fish and Invertebrates: Vessel strikes are not expected for consultation fish or elasmobranchs in the action area; however, these species would have similarly low densities and corresponding exposure risk. Based on that and the expectation that they would be well below the surface most of the time, we believe that the probability of their exposure to vessel strikes would be as low or lower than those described above. While larval stages of fish, corals, and mollusks may also be found, we believe that the densities are also relatively low and will also be at depths greater than where significant impacts are expected to occur and therefore the probability that any will be impacted is extremely low. The corals and mollusks considered in this consultation are restricted to shallow nearshore waters well away from vessel routes. Therefore, the vessel strikes would have no effect on them. Therefore, we are reasonably certain the exposure of any individual is extremely unlikely, and therefore discountable.

9.2 Critical Habitats Not Likely Adversely Affected

We determined the following critical habitats are not likely adversely affected by the proposed action.

Northwest Atlantic Ocean Segment of Loggerhead Critical Habitat. The action area includes Northwest Atlantic Ocean DPS loggerhead sea turtle critical habitat in the Gulf of Mexico and Atlantic Ocean (79 FR 39856). The designated critical habitat includes overlapping areas of nearshore reproductive habitat, constricted migratory habitat, breeding habitat, and *Sargassum spp.* habitat, which is comprised of primary constituent elements (PCEs) that help us identify habitat essential to the conservation of the species.

Nearshore reproductive habitat**:** We describe the Physical and Biological Features (PBFs) of nearshore reproductive habitat as a portion of the nearshore waters adjacent to nesting beaches that are used by hatchlings to egress to the open-water environment as well as by nesting females to transit between beach and open water during the nesting season. The PCEs that support this habitat are the following:

1. Nearshore waters directly off the highest density nesting beaches and their adjacent beaches, as identified in 50 CFR § 17.95(c), to 1.6 kilometers offshore;
2. Waters sufficiently free of obstructions or artificial lighting to allow transit through the surf zone and outward toward open water; and
3. Waters with minimal man-made structures that could promote predators (i.e., nearshore predator concentration caused by submerged and emergent offshore structures), disrupt wave patterns necessary for orientation, and/or create excessive longshore currents.

Constricted migratory habitat: We describe the PBF of constricted migratory habitat as high use migratory corridors that are constricted (limited in width) by land on one side and the edge of the continental shelf and Gulf Stream on the other side. PCEs that support this habitat are the following:

1. Constricted continental shelf area relative to nearby continental shelf waters that concentrate migratory pathways; and
2. Passage conditions to allow for migration to and from nesting, breeding, and/or foraging areas.

Breeding habitat: We describe the PBFs of concentrated breeding habitat as sites with high densities of both male and female adult individuals during the breeding season. Primary constituent elements that support this habitat are the following:

1. High densities of reproductive male and female loggerheads;
2. Proximity to primary Florida migratory corridor; and
3. Proximity to Florida nesting grounds.

Sargassum spp. habitat: We describe the PBF of loggerhead *Sargassum* habitat as developmental and foraging habitat for young loggerheads where surface waters form accumulations of floating material, especially *Sargassum*. The PCEs that support this habitat are the following:

1. Convergence zones, surface-water down welling areas, the margins of major boundary currents (Gulf Stream), and other locations where there are concentrated components of the *Sargassum spp.* community in water temperatures suitable for the optimal growth of *Sargassum spp.* and inhabitance of loggerheads;
2. *Sargassum spp.* in concentrations that support adequate prey abundance and cover;
3. Available prey and other material associated with *Sargassum spp.* habitat including, but not limited to, plants and cyanobacteria and animals native to the *Sargassum spp.* community such as hydroids and copepods; and
4. Sufficient water depth and proximity to available currents to ensure offshore transport (out of the surf zone), and foraging and cover requirements by *Sargassum spp.* for post-hatchling loggerheads, i.e., >10 m in depth

Detailed information on Northwest Atlantic Ocean DPS of the loggerhead sea turtles critical habitat is available at https://www.fisheries.noaa.gov/action/critical-habitat-loggerhead-sea-turtle

Leatherback Critical Habitat. We revised the critical habitat for leatherback sea turtles by designating areas within the Pacific Ocean on January 26, 2012 (77 FR 4170). This designation includes approximately 16,910 square miles along the California coast from Point Arena to Point Arguello east of the 3,000 meter depth contour; and 25,004 square miles from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000 meter depth contour. The designated areas comprise approximately 41,914 square miles of marine habitat and include waters from the ocean surface down to a maximum depth of 262 feet. Based on the natural history of leatherback sea turtles and their habitat needs, we identified the feature essential to conservation as the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae (e.g., *Chrysaora spp*, *Aurelia spp*, *Phacellophora camtschatica*, and *Cyanea spp*), of sufficient condition, distribution, diversity, abundance, and density necessary to support individual as well as population growth, reproduction, and development of leatherback sea turtles.

Detailed information on leatherback sea turtles critical habitat is available at https://www.fisheries.noaa.gov/action/critical-habitat-designation-leatherback-sea-turtles-along-us-west-coast

North Atlantic right whale. NMFS designated two units of critical habitat for the North Atlantic right whale (81 FR 4838). The areas being designated as critical habitat contain approximately 29,763 nm^2 of marine habitat in the Gulf of Maine and Georges Bank region (Unit 1) and off the Southeast U.S. coast (Unit 2). Unit 1 is for foraging habitat and Unit 2 is for calving, both occur in the action area.

The following PBFs are present in Unit 1:

1. The physical oceanographic conditions and structures of the Gulf of Maine and Georges Bank region that combine to distribute and aggregate *Calanus finmarchicus* for right whale foraging, namely prevailing currents and circulation patterns, bathymetric features (basins, banks, and channels), oceanic fronts, density gradients, and temperature regimes
2. Low flow velocities in Jordan, Wilkinson, and Georges Basins that allow diapausing C. finmarchicus to aggregate passively below the convective layer so that the copepods are retained in the basins
3. Late stage *C. finmarchicus* in dense aggregations in the Gulf of Maine and Georges Bank region
4. Diapausing *C. finmarchicus* in aggregations in the Gulf of Maine and Georges Bank region

The following PBFs are present in Unit 2:

1. Sea surface conditions associated with Force 4 or less on the Beaufort scale.
2. Sea surface temperatures of 7°C to 17°C.
3. Water depths of 6-28 m, where these features simultaneously co-occur over contiguous areas of at least 231 square NM of ocean waters during the months of November through April. When these features are available, they are selected by right whale cows and calves in dynamic combinations that are suitable for calving, nursing, and rearing, and which vary, within the ranges specified, depending on factors such as weather and age of the calves.

Detailed information on North Atlantic right whale critical habitat is available at https://www.fisheries.noaa.gov/action/critical-habitat-north-atlantic-right-whales

Central America and Mexico Distinct Population Segments of Humpback Whale Critical habitat. The action area includes Central America and Mexico DPS of humpback whale critical habitat in the North Pacific Ocean (86 FR 21082). Specific areas designated as critical habitat for the Central America DPS of humpback whales contain approximately 48,521 nm^2 of marine habitat within portions of the California Current Ecosystem off the coasts of Washington, Oregon, and California. Specific areas designated as critical habitat for the Mexico DPS of humpback whales contain approximately 116,098 nm^2 of marine habitat, including areas within portions of the eastern Bering Sea, Gulf of Alaska, and California Current Ecosystem. The only PBF designated for critical habitat is prey species vary for each DPS but they are primarily euphausiids (*Thysanoessa spp., Euphausia spp., Nyctiphanes spp.,* and *Nematoscelis spp.*) and small pelagic schooling fishes, such as Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasii*), capelin (*Mallotus villosus*), juvenile walleye pollock (*Gadus chalcogrammus*), and Pacific sand lance (*Ammodytes personatus*) of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth.

Detailed information on Central America and Mexico DPSs of humpback whale critical habitat is available at https://www.fisheries.noaa.gov/action/final-rule-designate-critical-habitat-central-america-mexico-and-western-north-pacific

False Killer Whale. Critical habitat for MHI insular false killer whales (IFKW) includes the geographic area of the 45-m depth contour to the 3200-m depth contour in waters that surround the MHI from Niihau east to the Island of Hawaii. Critical habitat for the MHI IFKW consists of one essential feature comprised of four characteristics:

1. Space for movement and use within shelf and slope habitat
2. Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth
3. Waters free of pollutants of a type and amount harmful to MHI IFKW
4. Sound levels that would not significantly impair IFKW's use or occupancy.

Detailed information on MHI IFKW critical habitat is available at https://www.fisheries.noaa.gov/action/final-rule-designate-critical-habitat-main-hawaiian-islands-insular-false-killer-whale.

Proposed North Atlantic DPS Green Sea Turtle Critical habitat. Critical habitat for green sea turtles was proposed for designation by both the USFWS (88 FR 46376 and NMFS (88 FR 46572 on July 19, 2023. The only proposed critical habitat for green turtles that occurs within the Action Area is the proposed *Sargassum spp.* critical habitat for the North Atlantic DPS. This proposed critical habitat contains the *Sargassum spp.*-dominated drift community, which contains surface-pelagic foraging/resting essential features for turtles. The essential physical and biological features of the proposed *Sargassum spp.* critical habitat is that it provides sufficient food resources and refugia in waters greater than 10 m (34 ft) deep to support survival, growth, and development of post-hatchling and juvenile turtles as well as the currents which carry turtles to *Sargassum spp.*-dominated drift communities. Within the Action Area, this proposed critical habitat is essentially the same area designated as the North Atlantic DPS loggerhead sea turtle critical habitat since post-hatchling and surface-pelagic juvenile green turtles occupy the same *Sargassum spp.* habitats.

Detailed information on the proposed North Atlantic DPS Green Sea Turtle critical habitat is available at https://www.fisheries.noaa.gov/action/proposed-rule-designate-critical-habitat-green-sea-turtles

9.2.1 Exposure to elevated sounds

Exposure to the essential features of the Northwest Atlantic Ocean DPS of loggerhead sea turtle, leatherback sea turtle, Central America and Mexico DPSs of humpback whale and MHI IFKW, to an increase in elevated sounds may occur during launch, missile flight, splashdown, and vessel activities associated with the action. As discussed in the BMPS above in section 1.2.5, launch, splashdown, and payload activities will be designed to enter the ocean outside of critical habitat areas. Stage 1 booster splashdowns would occur in deep ocean waters downrange from launch and as far as 330 nm offshore of any land areas. All stage 2 splashdown and payload target sites would be outside of EEZs in international waters or within USAKA where no critical habitat is designated.

The prey species of the Central America and Mexico DPSs of humpback whale are not expected to be impacted by noise created by the action due to their position in the water column and since acoustic energy in the air does not effectively cross the air/water interface and most of the noise will reflected off the water surface (Richardson 2013). The invertebrate prey species of the Northwest Atlantic Ocean DPS of loggerhead and leatherback sea turtles are the same density as seawater and they lack air cavities that would function like the fish swim bladder in responding to pressure (Budelmann 2010). Therefore, acoustic effects, if any, to prey species would not be expected to occur on a scale necessary to affect the overall prey availability. Therefore, any potential impacts to these features are expected to be small, localized, and temporary.

Disturbance from noise associated with vessel operations proposed in this action could impair the use or occupancy of the action area during vessel operations. However, the disruption caused by acoustic disturbance will be temporary as the vessels move through the area and cease immediately once the vessel has passed. Therefore, noise is not expected to significantly diminish the quality of the habitats. As a result, we are reasonably certain the effects from elevated sound will not measurably reduce the conservation value of the physical or biological features of critical habitat for Northwest Atlantic Ocean DPS of loggerhead sea turtle, leatherback sea turtle, Central America and Mexico DPSs of humpback whale and MHI IFKW, and are therefore insignificant.

9.2.2 Direct contact

Exposure to the essential features of the Northwest Atlantic Ocean DPS of loggerhead sea turtle, leatherback sea turtle, North Atlantic right whale, Central America and Mexico DPSs of humpback whale Critical habitat and the proposed North Atlantic DPS green sea turtle critical habitats to direct contact may occur during launch and splashdowns associated with the action. However, the implemented BMPs will ensure that CPS flight tests would be designed to avoid conducting launch activities and missile component splashdown with any critical habitats (Figure 6).

However, spent stage 1 booster splashdown may occur within designated *Sargassum* critical habitat for Northwest Atlantic Ocean DPS loggerhead turtles and the proposed *Sargassum* critical habitat for North Atlantic DPS green turtles in the western Atlantic Ocean. No activities will take place in the Gulf of Mexico Sargassum critical habitat. However, given that that the Navy will plan all missile component splashdowns and payload impacts to avoid Marine National Monuments, National Marine Sanctuaries, critical habitats, and biologically important area, that any components are expected to sink to the ocean bottom where they would not affect habitat availability, and that a stage 1 booster splashdown would affect only a small (approximately 5 m^2) portion of the available *Sargassum* habitat, we are reasonably certain the effects from direct contact will not measurably reduce the conservation value of the physical or biological features of critical habitat for Northwest Atlantic Ocean DPS of loggerhead sea turtle and proposed critical habitat for the Northwest Atlantic Ocean DPS of green sea turtles, and are therefore insignificant.

9.2.3 Exposure to Hazardous Materials, Wastes, and Discharges

Exposure to the essential features of the Northwest Atlantic Ocean DPS of loggerhead sea turtle, leatherback sea turtle, North Atlantic right whale, Central America and Mexico DPSs of Humpback Whale Critical habitat and the proposed North Atlantic DPS green sea turtle critical habitats to hazardous materials, wastes, and discharges may occur during launch, splashdowns, and other activities associated with the action.

As discussed in section 9.1.3 *Hazardous Materials, Waste, and Discharges* above, the implemented BMPs will prevent any discharge into the marine environment and manage leaks or spills. Most launch, splashdown, and payload activities will be designed to enter the ocean outside of critical habitat areas. Those that do not would sink relatively quickly to the ocean floor and while some residual hazardous chemicals are likely to be introduced in the marine environment; the area affected by the dissolution of chemicals would be relatively small because of the size of the payload components and the minimal amount of residual materials they would contain. Any chemicals introduced to the water column would be quickly diluted and dispersed by wave action, ocean currents, and the large volume of water. Recovery personnel will recover any components of the launch vehicle that pose a risk of ingestion and could enter the food chain. As a result, we are reasonably certain the probability of exposure to hazardous materials, wastes, and discharges on the Northwest Atlantic Ocean DPS of loggerhead sea turtle, leatherback sea turtle, North Atlantic right whale, Central America and Mexico DPSs of Humpback Whale Critical habitat and the proposed North Atlantic DPS green sea turtle critical habitat is extremely unlikely and is therefore discountable.

9.3 Conclusion

Considering the information and assessments presented in the consultation request and available reports and information, and in the best scientific information available about the biology and expected behaviors of the consultation species under NMFS' jurisdiction listed in Table 15 all effects of the proposed action are either discountable or insignificant. We also conclude that the action is not likely to adversely affect modify or destroy the critical habitats of leatherback sea turtles, Northwest Atlantic Ocean DPS of loggerhead sea turtles, Central America and Mexico DPS of humpback and North Atlantic right whale, and not likely to adversely modify or destroy proposed critical habitat of North Atlantic DPS green sea turtle. Accordingly, we concur with your determination that the proposed action is not likely to adversely affect them.

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