Final Environmental Assessment

For The

Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System

At the Fleet Test and Evaluation Center
Barbers Point O‘ahu, Hawai‘i and Surrounding Ocean

Naval Undersea Warfare Center Division, Keyport

Pacific Detachment

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Action Proponent:	Naval Undersea Warfare Center Division, Keyport
For Further Information:	Mr. Marcom C. Leonillo, NUWC Keyport, Pacific Detachment 1894 Wasp Blvd JBPHH, HI 96860-5809 Phone Number: (808) 472-1702

The Commanding Officer, Naval Undersea Warfare Center Division, Keyport (NUWC Keyport), proposes to upgrade and modernize the existing Middle Pacific (MIDPAC) Surface Group SSRNM Surface Ship Radiated Noise Measurement (SSRNM) testing and operations. The Proposed Action would install and operate a fixed SSRNM system, consisting of a hydrophone array, an undersea data transmission cable (trunk cable) in the ocean off Nānākuli, Oʻahu, Hawaiʻi, and a shore station cable landing at the Fleet Technical Evaluation Center (FTEC), Barbers Point, Oʻahu, Hawaiʻi, Honolulu County. The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site (FORACS). The hydrophones would receive noise (i.e., propulsion, ship machinery and flow noise) coming from vessels as they operate. Data from the hydrophones would be transmitted to shore through a trunk cable for analysis. The cable would be installed into a shore bypass conduit under the shoreline, intertidal and near shore zones. FTEC is located on US Coast Guard (USCG) property. The Navy is the lead agency and the USCG is a cooperating agency for this Proposed Action. As such the Navy will take the lead role for consultation.

The purpose of the Proposed Action is to provide a safe, reliable, low-maintenance, high-fidelity SSRNM system to serve the MIDPAC Surface Group and visiting vessels in close proximity to Joint Base Pearl Harbor-Hickam (JBPHH). The need for the Proposed Action is to improve SSRNM testing efficiency, effectiveness, safety, and to minimize fleet fuel consumption related to SSRNM testing.

In addition, the Environmental Assessment (EA) considers an Alternative Action (construct hydrophone array, substitute a radio frequency transmission buoy for the cable landing, operations remaining the same) and the No Action Alternative (no construction, operations continue using only portable equipment). This EA describes the existing environment and analyzes the potential environmental impacts of the alternatives on climate and air quality, geology and soils, water quality, marine biology, terrestrial biology, land and water use, archaeology and historic properties, recreation, noise and socioeconomics. The analyses show that no significant impacts to the human environment would be expected.

Executive Summary

Title of Proposed Action: Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System, Oʻahu, Hawaiʻi

The Commanding Officer, Naval Undersea Warfare Center Division, Keyport (NUWC Keyport), proposes to upgrade and modernize existing MIDPAC Surface Group SSRNM testing and operations. The Proposed Action includes the installation and operation of a fixed SSRNM system, consisting of a hydrophone array, an undersea data transmission cable (trunk cable) in the ocean off Nānākuli, Oʻahu, Hawaiʻi, and a shore station cable landing at the Fleet Technical Evaluation Center (FTEC), Barbers Point, Oʻahu, Hawaiʻi, Honolulu County. The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site (FORACS). The hydrophones would receive noise (i.e., propulsion, ship machinery and flow noise) coming from vessels as they operate. Data from the hydrophones would be transmitted to shore through a trunk cable for analysis. The cable would be installed into a shore bypass conduit under the shoreline, intertidal and near shore zones. FTEC is located on US Coast Guard (USCG) property.

The purpose of the Proposed Action is to provide a safe, reliable, low-maintenance, high-fidelity SSRNM system to serve the Middle Pacific (MIDPAC) Surface Group and visiting vessels in close proximity to Joint Base Pearl Harbor-Hickam (JBPHH). The need for the Proposed Action is to improve SSRNM testing efficiency, effectiveness, safety, and to minimize fleet fuel consumption related to SSRNM testing.

In addition to the Preferred Alternative described above, the EA analyzes two additional alternatives. Under the Alternative Action, the same fixed array system described in the Preferred Alternative would utilize an anchored buoy that has radio data transmission capability in place of the shore station cable landing. Under the No Action Alternative, SSRNM testing would continue to occur as follows: test personnel would use either a portable hydrophone array deployed over the side of a small support vessel or sonobuoys deployed from the fleet vessel being tested to take noise measurements and transmit via radio data transmission. This EA describes the existing environment and analyzes the potential environmental impacts of the alternatives on climate and air quality, geology and soils, water quality, marine biology, terrestrial biology, land and water use, archaeology and historic properties, recreation, noise and socioeconomics. The Navy is the lead agency and the USCG is a cooperating agency for this Proposed Action. As such the Navy will take the lead role for consultation.

The EA concludes that implementation of the Proposed Action would not significantly impact the human environment. The anticipated impacts from implementing each alternative are summarized in Table 1 in comparative matrix form. The conclusion of no significant impacts for the Preferred Alternative is based on the following reasons:

- Neither construction equipment nor SSRNM maintenance nor operations would cause significant air quality effects.
- By applying industry best management practices to drill fluid management during onshore construction, the Preferred Alternative would not affect geology or soils, water quality or terrestrial or marine biology.

- Construction and operation of the SSRNM system, including the implementation of Best Management Practices would not adversely affect Endangered or Threatened Marine Mammals or Turtles, Marine Mammals, Fish, Essential Fish Habitat, and Vegetation.
- The Preferred Alternative would not significantly impact invertebrates.
- Although precious coral habitat exists within the affected environment, no established beds of precious coral are located along the proposed trunk cable route or at the hydrophone anchor locations.
- Diver-assisted cable laying would avoid adverse effect to live coral or the coral reef ecosystem.
- Operation of the SSRNM would cause no long-term impacts to individual migratory birds or populations, or Threatened or Endangered seabirds or other seabirds. During construction, birds might depart during construction (early morning hours). They would likely return to the area following a decrease in activity (evening hours).
- Restorative landscaping after construction would rectify the potential effects on ‘Ewa hinahina critical habitat by construction work, resulting in no adverse effect on critical habitat of this threatened or endangered terrestrial plant. No construction efforts would occur in the area containing a threatened or endangered terrestrial plant. There would be no significant impact on terrestrial animals.
- After construction and during SSRNM test operations, there would be no change in land or water use.
- During planning for the development of the FTEC, Hawai‘i State has previously concluded there would be no potential for archeological properties at this site.
- Recreational activities in the Barbers Point area would not be disrupted by offshore construction vessels or SSRNM operations.
- The construction noise at the FTEC would stop at 5:30 PM daily to avoid adverse impact to the surrounding community.
- FTEC is an industrial facility located within the Campbell Industrial Park. Construction is in an area that is away from resident minority groups.

The Alternative Action, (Semi-Fixed Array – Radio Data Transmission), also would be expected to cause negligible and short-term environmental effects to marine resources including benthic organisms and water quality. The Alternative Action would require semiannual vessel traffic associated with radio buoy maintenance but there would be no impacts associated with the horizontal drilling, etc. There would be no changes from the existing FTEC involving land use under the Alternative Action. The potential impacts of that activity are summarized in Table 1.

Under the No Action Alternative, there would be continuation of the “portable” deployed hydrophone array from support vessel, or through the use of expendable sonobuoys deployed from the small support vessel. The potential environmental effects to the marine resources including benthic organisms and water quality would be negligible and short-term as noted in Table 1.

Table 1. SSRNM Comparative Impact Summary

Environmental Resource	Preferred Alternative	Alternative Action	No Action
Climate and Air Quality	Negligible emissions, well below de minimis air pollutant levels Not significant	Negligible emissions well below attainment de minimis levels Not significant	Negligible emissions over a short-duration Not significant
Geology and Soils	Minor drilling effects Contractor drill fluid management plan required Not significant	No effects on geologic formations Not significant	Expended sonobuoys would not significantly affect sediments Not significant
Water Quality	Minor sediment suspension during cable laying Contractor drill fluid management plan required Not significant	Minor sediment suspension during cable laying Not significant	Expended sonobuoys would not significantly affect water quality Not significant
Marine Mammals	Avoidance reaction not significantly affecting behavioral patterns Negligible collision or entanglement risk No acoustic disturbance from positioning modem Vessel lookouts required/clearance zone Not significant; no takes under the MMPA	Avoidance reaction not significantly affecting behavioral patterns Negligible collision or entanglement risk No acoustic disturbance from positioning modem Vessel lookouts required/clearance zone Not significant; no takes under the MMPA	Avoidance reaction not significantly affecting behavioral patterns Negligible collision or entanglement risk Negligible strike risk from expendables Not significant
Sea Turtles	Avoidance reaction not significantly affecting behavioral patterns Negligible collision or entanglement risk Vessel lookouts required/clearance zone Not significant	Avoidance reaction not significantly affecting behavioral patterns Negligible collision or entanglement risk Vessel lookouts required/clearance zone Not significant	Avoidance reaction not significantly affecting behavioral patterns Negligible collision or entanglement risk Negligible strike risk from expendables Not significant
Fish	Negligible impacts on pelagic and demersal fish Short duration of construction and small footprint Not significant	Negligible impacts on pelagic and demersal fish Short duration of construction and small footprint Not significant	Negligible impacts on pelagic fish Negligible strike risk from expendables Not significant
Planktonic Marine Invertebrates	No relevant water quality impacts to affect plankton Not significant	No relevant water quality impacts to affect plankton Not significant	No significant water quality impacts to affect plankton Not significant
Demersal and Benthic Invertebrates	Negligible effects over an insignificant area Not significant	Negligible effects over an insignificant area Not significant	No significant water quality impacts to affect demersal and benthic invertebrates Not significant
Corals	Trunk cable hand-laid to avoid live coral growth; cable weighted for long-term stability No known precious corals along the cable route Negligible impacts not significant	Trunk cable hand-laid to avoid live coral growth; cable weighted for long-term stability No known precious corals along the cable route Negligible impacts not significant	No effect, no impact
Threatened and Endangered Marine Mammals and Sea Turtles	May Affect, but is Not Likely to Adversely Affect (NLAA) ESA-listed species or critical habitat No significant impact	May Affect, but is Not Likely to Adversely Affect (NLAA) ESA-listed species or critical habitat No significant impact	May Affect, but is Not Likely to Adversely Affect (NLAA) ESA-listed species or critical habitat

Environmental Resource	Preferred Alternative	Alternative Action	No Action
Marine Vegetation	Trunk cable hand-laid to avoid impacts to vegetation of the coral ecosystem Shore bypass conduit avoids the majority of macroalgae growth No significant impact	No significant impact	No significant impact
Seabirds	No significant impact on water quality, fish and plankton prey habitat Short term temporary disturbance from construction. No significant impact	No significant impact on water quality, fish and plankton prey habitat Short term temporary disturbance from construction. No significant impact	No effect, no impact
Threatened and Endangered Seabirds	No disruption of prey and feeding No effect to ESA-listed seabirds No significant impact	No disruption of prey and feeding No effect to ESA-listed seabirds No significant impact	No disruption of prey and feeding Unlikely contact, collision or effect No effect to ESA-listed seabirds No significant impact
Terrestrial Plants and Animals	Short term temporary disturbance from construction. in industrial area No significant impact	No effect, no impact	No effect, no impact
Threatened and Endangered Terrestrial Species	Best management practices required May Affect, but is Not Likely to Adversely Affect (NLAA) ESA-listed species or critical habitat No significant impact	Best management practices required May Affect, but is Not Likely to Adversely Affect (NLAA) ESA-listed species or critical habitat No significant impact	No effect, no impact
Essential Fish Habitat	Short construction duration, small footprint Best management practices required No significant impact	Short construction duration, small footprint Best management practices required No significant impact	No adverse effects No significant impact
Migratory Bird Treaty Act Species	Unlikely contact, collision or effect, no takes No significant impact	Unlikely contact, collision or effect, no takes No significant impact	Unlikely contact, collision or effect, no takes
Land and Water Use	No significant impact	No effect, no impact	No effect, no impact
Cultural Resources	No adverse historical affect and therefore no significant impact on the Barbers Point Lighthouse. No effect on marine archeology resources	No effect, no impact	No effect, no impact
Recreation	No disruption of recreational opportunities No significant impact	No significant impact	No significant impact
Noise	Naturally attenuated construction noise in air would be acceptable (≤65 dB) and not significant Marine noise levels would be typical of marine traffic in the area and not significant Construction at the FTEC would stop at 5:30 PM daily to avoid adverse impact to the surrounding community.	Marine noise levels would be typical of marine traffic in the area and not significant	Marine noise levels would be typical of marine traffic in the area and not significant

ABBREVIATIONS, ACRONYMS, & SYMBOLS

Term	Definition
§	Section
µ	micro (e.g. 1 µm = 0.000001 m)
ac	acre = 43560 sq ft or 0.404 ha
ACHP	Advisory Council on Historic Preservation
AMA	Achyranthes Management Area
BE	Biological Evaluation
CFR	Code of Federal Regulations
CWA	Clean Water Act
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DBEDT-OP	State of Hawai‘i Department of Business, Economic Development and Tourism, Office of Planning
DOH-CWB	State of Hawai‘i Department of Health, Clean Water Branch
DPS	distinct population segment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FMP	Fishery Management Plan
FORACS	Fleet Operational Readiness Accuracy Check Site
ft	foot
FTEC	Fleet Technical Evaluation Center
ftm	fathom = 1.8288 m = 6 ft
FTSF	Fleet Test Support Facility
GPS	Global Positioning System
GHG	Greenhouse gasses
ha	hectare = 10000 sq m
HAPC	Habitat Area of Particular Concern
HAR	Hawai‘i Administrative Rules
hr	hour
ICPC	International Cable Protection Committee
in	inch
km	kilometer = 0.621 mi = 0.540 NM
kt	nautical miles per hour
MCB	Kaneohe Bay Marine Corps Base
MHI	Main Hawaiian Islands
mi	statute mile = 1.609 km
mm	millimeter
MMPA	Marine Mammal Protection Act
MPA	Marine Protected Area
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MUS	Management Unit Species
NAAQS	National Ambient Air Quality Standards
NHPA	National Historic Preservation Act
nm	nautical mile = 6076 ft
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSF	National Science Foundation
NUWC Keyport	Naval Undersea Warfare Center Division, Keyport
NUWCPACDET	Naval Undersea Warfare Center Pacific Detachment, Pearl Harbor
NWHI	Northwest Hawaiian Islands
^{o}C	degrees Celsius
^{o}F	degrees Fahrenheit
psu	practical salinity units
RF	Radio Frequency
SESEF	Shipboard Electronics Systems Evaluation Facility

Term	Definition
SHPO	State Historic Preservation Officer
SPCC	Spill Prevention, Control and Countermeasures
sq ft	square feet
SSRNM	Surface Ship Radiated Noise Measurement
T	Tesla, an SI derived unit of magnetic field strength
U.S.C.	United States Code
UNEP	United Nations Environment Programme
USACE	The US Army Corps of Engineers, Honolulu District
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VHF	Very High Frequency
WETS	Kaneohe Bay Wave Energy Test System
WPRFMC	Western Pacific Regional Fishery Management Council
WQC	Water Quality Certification
yd	yard

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1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 Summary of the Proposed Action

The Commanding Officer, Naval Undersea Warfare Center Division, Keyport (NUWC Keyport), proposes to upgrade and modernize existing MIDPAC Surface Group SSRNM testing and operations.

The Preferred Alternative includes the installation and operation of a fixed SSRNM system, consisting of a hydrophone array, an undersea data transmission cable (trunk cable) in the ocean off Nānākuli, Oʻahu, Hawaiʻi, and a shore station cable landing at the Fleet Technical Evaluation Center (FTEC), Barbers Point, Oʻahu, Hawaiʻi (Figure 1).

The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site (FORACS). The hydrophones would receive noise[1] (i.e., propulsion, ship machinery and flow noise) coming from vessels as they operate. Data from the hydrophones would be transmitted to shore through a trunk cable for analysis. The cable would be installed into a shore bypass conduit under the shoreline, intertidal and near shore zones.

Under the Alternative Action, the same fixed array system described in the Preferred Alternative, would utilize an anchored Radio Frequency (RF) Data Transmission Buoy (radio buoy), in place of the shore station cable landing. The trunk cable would connect the hydrophone array at the FORACS to the anchored radio buoy, near FTEC.

Under the No Action Alternative, the Navy would continue to use a portable hydrophone array deployed from a support vessel, or expendable sonobuoys deployed from the test ship.

The U.S. Coast Guard is the landowner of the FTEC property where the SSRNM Cable landing would terminate for the Preferred Alternative, and in accordance with 40 CFR 1501.6, is a cooperating agency for this EA. The Navy will take the lead role for consultation.

During preparation of this EA, the Navy consulted with the public, regulatory agencies and private concerns. A draft version of the EA was made available for public review in November 2014 with a newspaper publication of availability (Appendix A); no comments were received from the public. The Navy also consulted with federal and State regulatory agencies. Agency comments have been addressed in this final version of the EA. Correspondence between the Navy and resource agencies is included in the Appendices noted:

- National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service (USFWS) on the effects to threatened and endangered species under Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531 *et seq*.) (Appendix B).
- NMFS on the effects to essential fish habitat under the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA) (16 U.S.C. § 1801 *et seq*.) (Appendix B).
- State of Hawaiʻi on federal consistency with the State Coastal Management Plan under the Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. § 1451 *et seq*.) (Appendix C).

[1] Noise is defined as unwanted sound.

- State of Hawai‘i on effects to archeological and historic properties under The National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. § 470 *et seq*.) (Appendix D).

1.2 Background

SSRNM testing is conducted on Navy ships to evaluate their waterborne acoustic characteristics while underway. In order to maintain readiness certification, U.S. Navy ships are required to undergo SSRNM testing every 18 months according to Navy Surface Force Readiness Manual (DON 2012b). These tests provide information to determine corrective actions to reduce a ship's acoustic noise, thus reducing vulnerability to undersea warfare threats. NUWC Keyport has been conducting SSRNM testing at the FORACS for over 35 years. Currently SSRNM testing is performed using portable systems either a hydrophone array deployed over the side of a small support vessel (20-40 ft), or sonobuoys deployed from the fleet vessel being tested to take noise measurements.

During a typical test, a ship follows a planned set of maneuvers past the portable array or deployed sonobuoys. During each pass the array receives the ship's radiated noise and transmits it to computer equipment for analysis. Personnel operate computer systems at the shore station while additional personnel are onboard the ship to monitor systems, operate shipboard components and record data. Communication from the ship to the shore station is conducted via Very High Frequency (VHF) radio. On average up to ten SSRNM tests are conducted in the FORACS per year.

Figure 1. Preferred Alternative – Fixed/Cabled Array – FTEC Shore Station Landing

1.3 Purpose and Need

The purpose of the Proposed Action is to provide a safe, reliable, low-maintenance, high-fidelity SSRNM system to serve the MIDPAC Surface Group and visiting vessels in close proximity to JBPHH. The need for the Proposed Action is to improve SSRNM testing efficiency, effectiveness, safety, and to minimize fleet fuel consumption related to SSRNM testing. In order to maintain readiness certification, U.S. Navy ships are required to undergo SSRNM testing every 18 months according to Navy Surface Force Readiness Manual (DON 2012b). These tests provide information to determine corrective actions to reduce a ship's acoustic noise, thus reducing vulnerability to undersea warfare threats.

A fixed system would provide several advantages over the portable systems that are currently used. For fixed systems, data quality is better, availability and safety are improved, and logistics

are far simpler. Portable systems are normally used at remote locations or for temporary purposes. These systems have comparatively limited bandwidth and data fidelity, and they depend on the availability and operation of a small support vessel, which restricts their use to favorable weather conditions. Fixed systems can be operated in poor small craft weather conditions; may be operated by fewer personnel; and do not require the deployment and recovery of an array over the side of a support vessel, improving safety and logistics.

The proposed location of the fixed SSRNM array (Preferred Alternative and Alternative Action) is within a well-established range (FORACS), providing close proximity to JBPHH without encroaching on commercial marine activities or having the acoustic noise measurement fouled by other shipping noise.

1.4 Relevant Laws, Regulations, and Executive Orders

The following is a discussion of the primary Federal laws relevant to implementing the Proposed Action.

1.4.1 National Environmental Policy Act of 1969

The National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] Section [§] 4321 *et seq*.), as amended, requires federal agencies to prepare an Environmental Impact Statement for federal actions that have the potential to significantly affect the quality of the human environment, including both natural and cultural resources. Environmental Assessments are developed to determine whether an action may significantly the environment. If the action is determined not to have significant impacts, then the federal agency issues a Finding of No Significant Impact (FONSI). If the action is determined to have significant impacts, then the federal agency will prepare an Environmental Impact Statement. This EA has been prepared pursuant to the NEPA as implemented by the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations Parts 1500-1508 [40 CFR 1500-1508]); and Navy policy found in the Environmental Readiness Program Manual, M-5090.1, of 10 January 2014.

1.4.2 National Historic Preservation Act of 1966

The National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. § 470 *et seq*.) established a national policy for the preservation of historic properties as well as the National Register of Historic Places (NRHP), Advisory Council on Historic Preservation (ACHP), and State Historic Preservation Officers (SHPO). Section 106 of the NHPA requires federal agencies having direct or indirect jurisdiction over a proposed federal or federally-assisted undertaking to take into account the effects of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP. Federal agencies shall also afford the ACHP a reasonable opportunity to comment on such undertakings.

1.4.3 Coastal Zone Management Act of 1972

The U.S. Congress noted in the Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. § 1451 *et seq*.) a national interest in the effective management, beneficial use, protection and development of the coastal zone. While areas under the control of the Federal Government are, by definition, excluded from the state's coastal zone, federal agency activities within or outside the zone that affect any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of an approved State Coastal Zone Management (CZM) program. If the federal agency

proponent determines that an effect on coastal resources is reasonably foreseeable, a consistency determination is submitted to the affected state.

1.4.4 Endangered Species Act of 1973

Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531 *et seq.*) requires that federal agencies ensure that Proposed Actions are not likely to jeopardize the continued existence of federally threatened or endangered species or result in the destruction or adverse modification of designated critical habitat. Regulations implementing the ESA require that the federal agency determine if federally threatened or endangered species or critical habitat are present in the area affected by the Proposed Action and consult with the appropriate resource agencies, NMFS and USFWS, when the agency proponent determines that a Proposed Action may affect a federally threatened or endangered species or critical habitat. If incidental take is anticipated, the resource agency would issue an incidental take statement at the conclusion of formal consultation as long as the take would not jeopardize the continued existence of listed species or adversely modify designated critical habitat.

1.4.5 Marine Mammal Protection Act of 1972

The Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S.C. § 1361 *et seq.*) was enacted to protect and conserve marine mammal species, or population stocks of those species, so that they continue to be significant functioning elements in the ecosystem of which they are a part. Consistent with this objective, management goals should include maintaining or returning marine mammals to their optimum sustainable population. The MMPA established, with limited exceptions, a moratorium on the taking of marine mammals in waters or on lands under U.S. jurisdiction.

Authorizations of incidental take and exemptions from these prohibitions are available for specified purposes if certain findings are made by NMFS, and the permissible methods of taking, means of effecting the least practicable adverse impact on the species or stock and its habitat, and requirements pertaining to mitigation, monitoring, and reporting are set forth. Any marine mammal listed as endangered or threatened under the ESA automatically has depleted status under the MMPA.

According to the MMPA, "take" means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." "Harassment" was further defined in the 1994 amendments to the MMPA, which provided two levels of harassment: Level A (potential injury) and Level B (potential behavioral disturbance).

The National Defense Authorization Act of Fiscal Year 2004 (Public Law 108-136) amended the definition of harassment, removed the "specified geographic area" requirement, and removed the small numbers provision as applied to military readiness activities or scientific research activities conducted by or on behalf of the federal government consistent with Section 104(c)(3) (16 U.S.C. § 1374(c)(3)) (DON 2013). A "military readiness activity" is defined as "all training and operations of the Armed Forces that relate to combat" and the "adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use." For military readiness activities, the relevant definition of harassment is any act that

- injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild ("Level A harassment") or

- disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering to a point where such behavioral patterns are abandoned or significantly altered ("Level B harassment") (16 U.S.C. § 1362(18)(B)(i) and (ii)).

1.4.6 Magnuson-Stevens Fishery Conservation and Management Act of 1976

The Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA) (16 U.S.C. § 1801 *et seq*.) is the governing authority for all fishery management activities that occur within its jurisdictional waters or Exclusive Economic Zone (EEZ) (200 nautical miles [nm] or 370 kilometers [km] from shore). Essential Fish Habitat (EFH) is defined by the Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, and growth to maturity." An area within a designated EFH that is particularly important and/or sensitive is a Habitat Area of Particular Concern (HAPC). Regional Fishery Management Councils, established under the Act, are responsible for preparing and amending fishery management plans (FMPs) for each fishery under their authority that requires conservation and management. Section 305(b)(2) of the MSA requires all Federal agencies to consult with NMFS on all actions or Proposed Actions authorized, funded, or undertaken by the agency that may adversely affect EFH (50 CFR 600.905(b)).

1.4.7 Clean Water Act of 1972

The Clean Water Act (CWA) of 1972 (33 USC § 1251 *et seq*.) is the primary federal law that protects the nation's waters, including lakes, rivers and coastal areas. The primary objective of the CWA is to restore and maintain the integrity of the nation's waters. Section 404 of the CWA requires a permit for discharge of dredged or fill material into waters of the U.S. The U.S. Army Corps of Engineers (USACE) issues this permit. Section 401 of the CWA requires a Water Quality Certification (WQC) be obtained from the state (or territory) for actions that require a federal permit (typically a USACE 404 permit) to conduct an activity, construction, or operation that might result in discharge of dredged or fill material into waters of the United States. The State of Hawai‘i Department of Health, Clean Water Branch (DOH-CWB) issues the WQC for Hawai‘i waters under Hawai‘i Administrative Rules (HAR) Chapter 11-54, Water Quality Standards.

Section 402 of the CWA establishes the National Pollution Discharge Elimination System (NPDES) program, which regulates point source discharges of pollutants into waters of the U.S. The state of Hawai‘i is the permitting authority for NPDES permit issuance under HAR Chapter 11-55, Water Pollution Control. NPDES permit coverage is required for discharges of stormwater associated with industrial activities, including construction activities that disturb a land area of one or more acre (ac) (0.4 hectare [ha]) or more or that are part of a larger common plan of development that disturbs a land area of one or more acre (ac) (0.4 hectare [ha]) or more and discharge stormwater from the construction site to waters of the U.S. as well as non-stormwater discharges to waters of the U.S.

1.4.8 Rivers and Harbors Act of 1899

The Rivers and Harbors Act of 1899 (33 U.S.C. § 403 *et seq*.) prohibits the unauthorized obstruction or alteration of any navigable waters of the U.S. The US Army Corps of Engineers,

Honolulu District (USACE) administers Section 10 of this law through its procedures at 33 CFR 322 in providing permits for structures or work in or affecting navigable waters.

1.4.9 Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act (MBTA) prohibits the taking, possessing, or killing of migratory birds. The statute also grants full protection to any bird parts, including feathers, eggs, and nests. In addition, the Act makes it illegal to disturb the nests of any native birds without a permit from USFWS or to incubate wild bird eggs.

The 2003 National Defense Authorization Act provides that the Armed Forces may take migratory birds incidental to military readiness activities provided that, for those ongoing or proposed activities that the Armed Forces determine may result in a significant adverse effect on a population of a migratory bird species, the Armed Forces confers and cooperates with the USFWS to develop and implement appropriate conservation measures to minimize or mitigate such significant adverse effects (50 CFR 21.15).

1.4.10 Clean Air Act

The purpose of the Clean Air Act (42 U.S.C. § 7401 *et seq*.) is to protect and enhance the quality of the nation's air resources to promote the public health and welfare and the productive capacity of its population. To fulfill the act's purpose, federal agencies classify air basins according to their attainment status under the National Ambient Air Quality Standards (40 CFR 50) and regulate emissions of criteria pollutants and air toxins to protect the public health and welfare.

Noncriteria air pollutants that can affect human health are categorized as hazardous air pollutants under Section 112 of the Clean Air Act. The U.S. Environmental Protection Agency (USEPA) identified 188 hazardous air pollutants such as benzene, perchloroethylene, and methylene chloride. Section 176(c)(1) of the Clean Air Act, commonly known as the General Conformity Rule, requires federal agencies to ensure that their actions conform to applicable implementation plans for achieving and maintaining the National Ambient Air Quality Standards for criteria pollutants.

1.4.11 Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance

Executive Order 13514 (74 FR 52117) was signed in October 2009 to establish an integrated strategy toward sustainability in the federal government and to make reduction of greenhouse gas (GHG) emissions a priority for federal agencies. The Department of Defense (DOD) developed a Strategic Sustainability Performance Plan that identifies performance-based goals and subgoals, provides a method to meet the goals (including investment strategies), and outlines a plan for reporting on performance.

1.4.12 Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

This EO was signed on February 11, 1994. It requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations in the United States and its territories and possessions. The Environmental Protection Agency (EPA) and the Council on Environmental Quality (CEQ) have emphasized

the importance of incorporating environmental justice review in the analyses conducted by federal agencies under the NEPA and of developing protective measures that avoid disproportionate environmental effects on minority and low-income populations.

2 ALTERNATIVES

2.1 Preferred Alternative: Fixed/Cabled Array – FTEC Landing

The Preferred Alternative involves a vertically suspended hydrophone array anchored within the FORACS about 3.5 mi (5.6 km) offshore and approximately 6.3 mi (10.2 km) from FTEC. Data communications would be through a trunk cable between the array and FTEC shore station. The trunk cable would be laid on the ocean floor from the hydrophone array to the reef ledge, where divers would hand lay the cable in shallow areas to avoid live corals. The cable would then be routed through a shore bypass conduit to the FTEC shore station. The shore bypass conduit would be installed using horizontal directional drilling (HDD) techniques. See Figure 2 for details.

The Fixed/Cabled Array system would provide the following benefits:

- Increased availability as dictated by ship schedules without weather delays
- Improved data quality and fidelity
- Improved operator safety, by eliminating the need for support craft and crew
- Consistency with technological advancements in vessel silencing and detection technologies

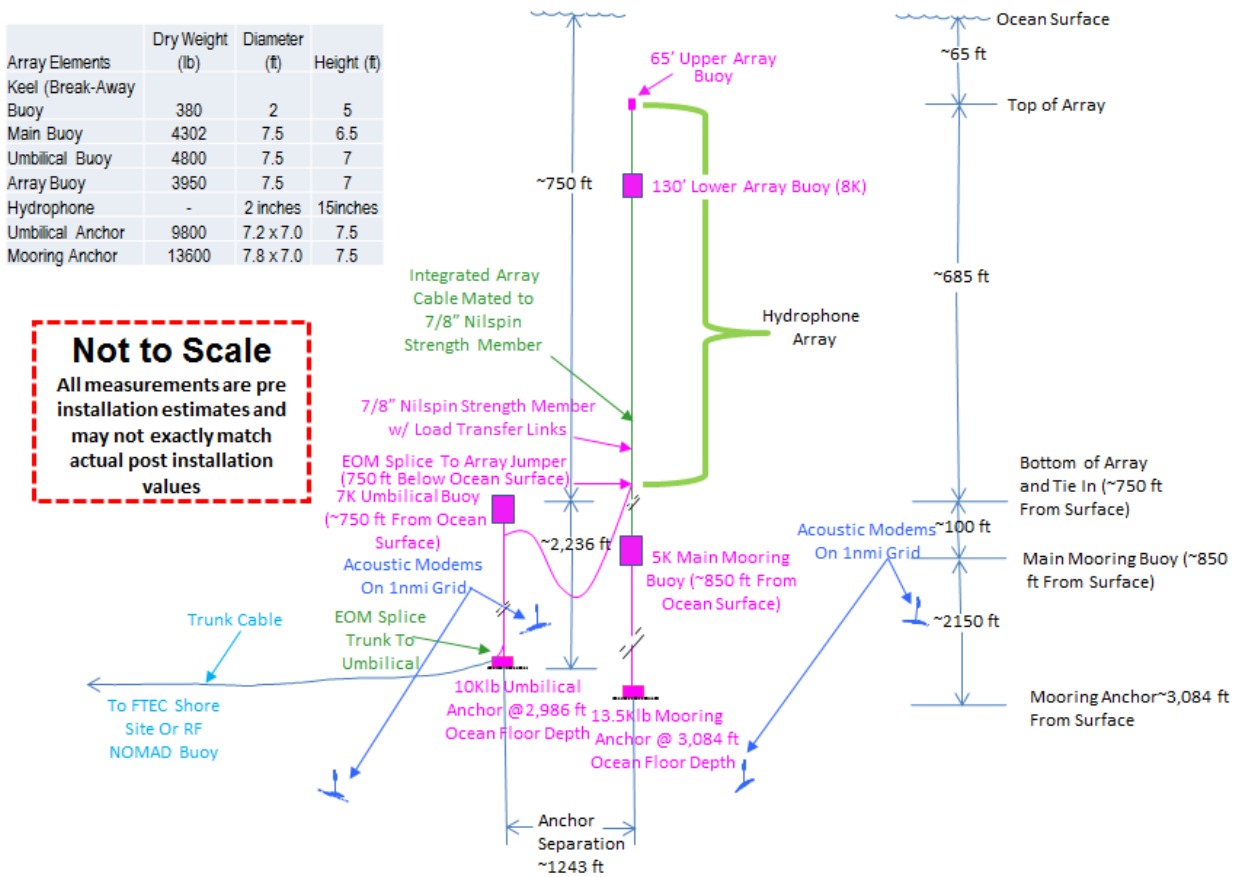


Figure 2. SSRNM Hydrophone Array Configuration

2.1.1 Hydrophone Array

The proposed array is a 685 ft (208.8 m) cable with hydrophones mounted at intervals, all suspended from the seafloor (Figure 2). Hydrophones are passive (listen only) marine acoustic devices. The hydrophones considered for use are cylindrical in shape and approximately 2 inches in diameter and 15 inches long and would be directly affixed to the array cable. The array would be anchored within the FORACS (21°20'33.85"N, 158°11'8.18"W) at a depth of about 3,084 ft (940 m). The top of the array would be suspended approximately 65 ft (19.8m.) below the ocean surface. An Upper Array Buoy, Lower Array Buoy, and Main Mooring Buoy keep the entire hydrophone array aligned and linear. Each buoy is approximately 7.5 ft (2.3 m) in diameter and 7 ft (2.1 m) tall. The hydrophone array would be designed to meet a 15-year service life. Additionally, the vertical moorings, and as much of the cabling as practicable, will be removed as part of decommissioning at the end of system's life.

Construction activities on the ocean during hydrophone array installation would involve one vessel in the affected area offshore for a period of about three days:

- Small Anchor Handling vessel (100- 200 ft)

Active acoustic positioning modems would be used on the array to help calculate the position of the hydrophone array. No tactical sonar or other such acoustic generation would be used. Five active acoustic positioning modems would be used: four located on the seafloor around the array anchor and one affixed to the top of the array (Figure 2). These devices would operate during installation to identify their location on the seafloor and infrequently during operation to determine the position of the array in the water column during tests. The acoustic modem source parameters are given in Table 2.

Table 2. Acoustic Modem Source Parameters (Teledyne Benthos modem)

Activity	Sound Pressure Level (dB re 1 µPa)	Frequency (kHz)	Pulse Length (seconds)	Duty Cycle (%)	Beam (angles)
Modem Transmit	160	9.66 to 14.5	1.25	31.2	omni-directional
Modem Response	160	9.66 to 14.5	0.2	20	omni-directional

Data from the hydrophones and positioning modems would be transmitted to shore via an umbilical cable suspended above the seafloor and anchored with a separate dead-weight anchor. The umbilical assembly supports the trunk cable under varying stress loads from the larger hydrophone array as it shifts in ocean currents.

2.1.2 Shore Bypass Conduit

Using Horizontal Directional Drilling (HDD), a shore bypass conduit would be installed from the FTEC shore station, beneath the shoreline, intertidal and near-shore shallows to an exit location approximately 2,000 ft (610 m) offshore at a depth of 20 ft (6 m) (Figure 3). The HDD system for this project would use 6-inch (15.2 cm) outside-diameter steel pipe (4 in [10.2 cm] inside diameter) which would be left in place to be used as the bypass conduit. The depth of the 8-inch (20.3 cm) HDD drill bore underground is estimated to be 50 ft (15 m) below the seafloor.

HDD drilling is conducted using drilling fluid containing non-toxic bentonite (sodium montmorillonite) and fresh water. The drilling fluid lubricates the cutting head, seals the bore annulus and removes cuttings from the bore. The drilling fluid is managed with a closed-cycle reclamation system that pumps drilling fluid containing drill cuttings from a 10x10x10-ft (3x3x3-m) drill entry pit, mechanically separates the cuttings from the used drill fluid, and then recycles cleared drill fluid through the drill pipe string to the cutting head. The fluid then flows back to the entry pit through the bore outside of the drill pipe string to be recycled.

HDD operators monitor drill fluid pressure to maximize the efficient use of the drilling fluid. The drilling fluid lubricates the cutting head, removes cuttings from the bore and seeps into the surrounding media, sealing the bore and containing the drill fluid under pressure[2]. If bentonite seeps excessively into the surrounding earth, a drop in pressure is observed by the operator. If this occurs, the drill operation is shut down while the bentonite fluid forms a better seal, allowing a gradual drilling fluid pressure increase and reactivating the drill head.

The HDD contractor would be required to prepare a drill fluid management plan for review and approval by Navy before work could begin. The objective of the plan is to manage the volume of drilling fluid released at the drill bore exit; to detect unintentional release; and to provide an organized, timely and minimum impact response to unintentional release. Navy would require the contractor's plan to be consistent with industry best management practices and standards promulgated by the North American Society for Trenchless Technology (NASTT 2008) and the American Society of Testing and Materials (ASTM 2011). These practices and standards identify HDD design; material selection; site investigations; utility surveys; worker and public safety; site layout; unintentional release; drilling fluid pressure management; and HDD drilling operations. During construction, adherence to the contractor's management plan would minimize the potential of inadvertent release of drill fluid. If inadvertent release of bentonite should occur, the plan would specify actions to be taken and those responsible. Adherence to these procedures insures that there would be no significant impact due to drill fluid management during onshore construction.

During the final stage of drilling, bentonite addition to the drilling fluid would be discontinued, and only water would be used to avoid the release of bentonite when the bore exits the seabed. After the conduit is installed, a precast concrete vault placed into the entry pit receives the conduit, protects and distributes trunk cabling, and provides access to electrical connections.

The following section, Section 2.1.3, Trunk Cable, describes installation and routing of the trunk cable on the seafloor. Construction required to route the trunk cable at the FTEC is discussed subsequently in Section 2.1.4, Shore Station.

[2] The pressures used for HDD should not be confused with the pressures used in natural gas mining in a process sometimes known as "fracking." Pressures used in HDD drilling are much less than that required to break (fracture) the surrounding geologic formation. Fracturing is undesirable in this drilling operation.

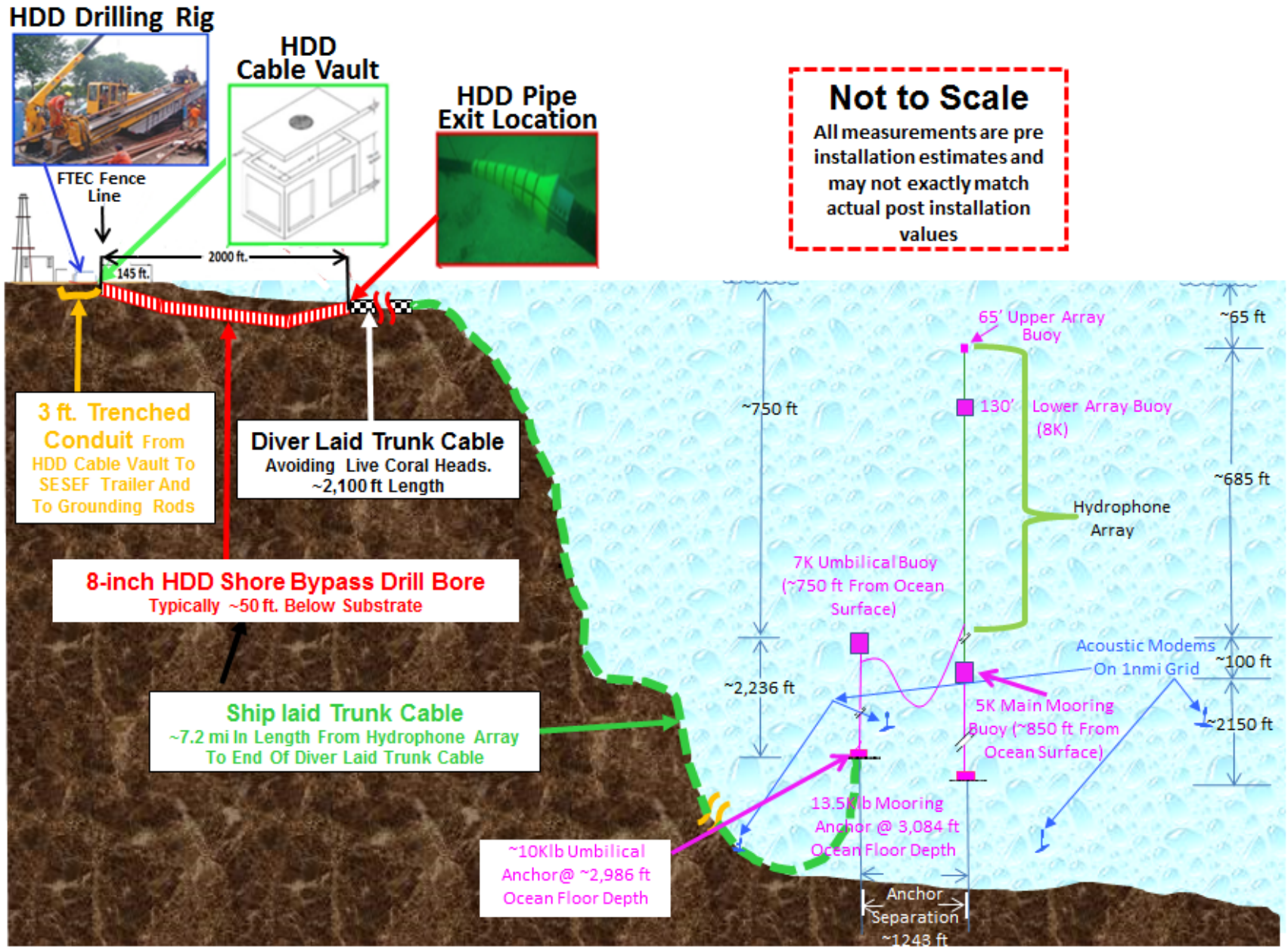


Figure 3. Preferred Alternative – Fixed/Cabled Array – FTEC Shore Station Landing and Hydrophone Array Concept

2.1.3 Trunk Cable

Data communications would be through polyethylene-sheathed, 8 mi (12.9 km) long, approximately 1.5-inch (40 mm) diameter trunk cable between the array and FTEC shore station. The trunk cable would be routed from the array across the seafloor and up, crossing the ledge of the fringing reef (reef crest) and on to the shore bypass conduit exit on the seafloor, about 2,000 ft (610 m) from the shoreline at the FTEC.

The proposed cable route was previously diver surveyed (Hatke 2012). During cable installation, weighted cable would be deployed from the ship on floats and divers would then manually place it on the sea floor to avoid live coral, between the conduit exit and a sand chute on the reef crest (Figure 4). Split galvanized ballast weights would be attached to the cable approximately every 50 ft (15.2 m) to prevent rolling, shifting, and lift due to wave-induced surge. This weighting construct is consistent with recommendations provided in reference (Sound & Sea Technology 2014). The entire trunk cable is constructed with outer armoring for protection from disturbance, seismic and storm surge hazards.

Construction activities on the ocean during trunk cable installation would involve three vessels in the affected area offshore for a period of about three weeks:

- Small Dive Support Vessel (30 – 60 ft)
- Small Support Vessel (20 – 40 ft)
- Medium displacement Cable Layer (200 – 400 ft), e.g. CS INTREPID, 1,700 ton displacement

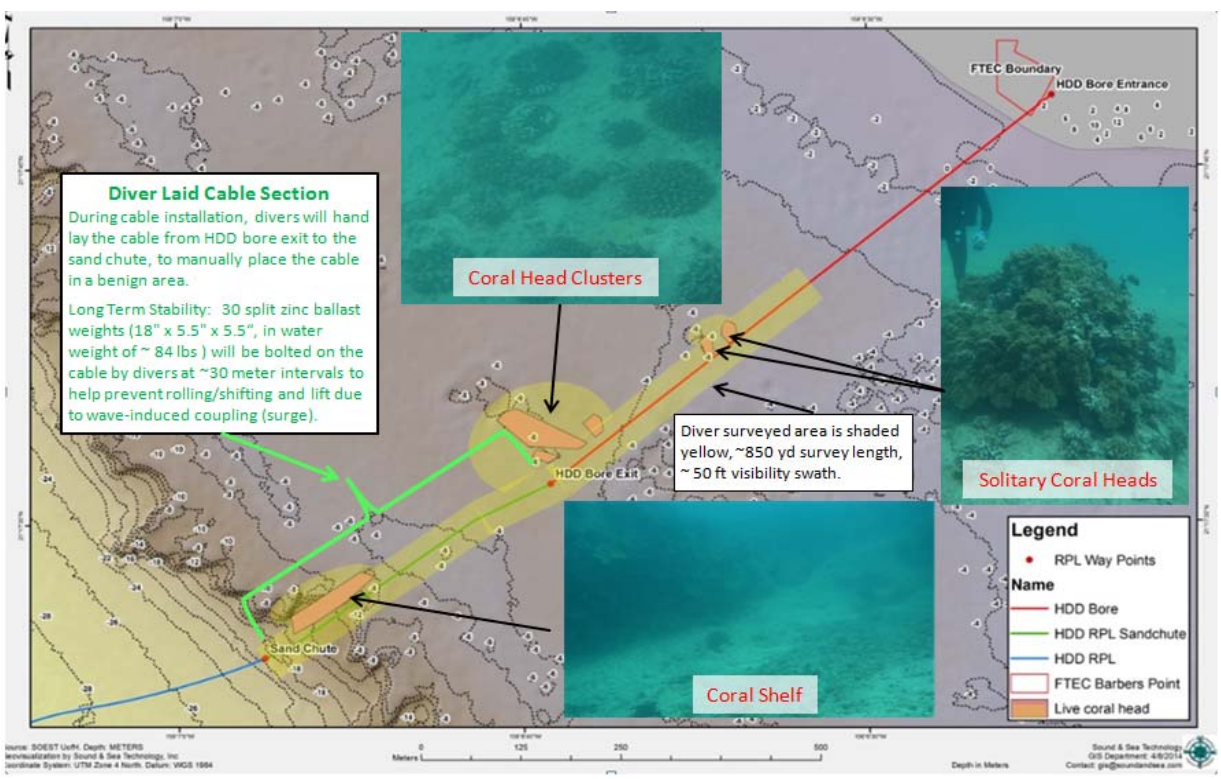


Figure 4. Coral Avoidance along the SSRNM Trunk Cable Route

2.1.4 Shore Station

The FTEC shore station would include conduits, cabling, electronics and vault facilities designed to conduct and process hydrophone array data. The shore bypass conduit terminates 145 ft (44 m) landward in an underground concrete vault. The trunk cable would then be routed via an underground conduit to system computers inside an existing building. Electrical grounding rods would be installed inside the FTEC shore station fenced area. Excavations would be backfilled; the surface returned to grade and landscaped compatible with the USCG restoration plan (USCG 2013).

The HDD construction site would be located at an area that is mostly cleared and has been used for construction access in the past. The construction site abutting the FTEC outside the FTEC fence-line to the east is estimated to be 9,200 sq. ft (0.21 ac = 0.09 ha). Of this area, approximately 2,615 sq. ft (0.06 ac or 0.02 ha) of native and non-native vegetation east of the FTEC fence-line would be removed during construction (Figure 5).

The SSRNM system components to be installed underground or within existing facilities at FTEC would include:

- Data processing – Electronic equipment that collects and transmits data.
- Cable housing – Trunk cable linking the array to the shore station would pass via an underground precast concrete cable vault 8 ft x 7 ft x 8 ft high (2.4 m x 2.1 m x 2.4 m) and trenched conduit 3 ft (0.9 m) deep.
- Grounding rods – Three to five copper grounding rods would be installed down to 30 ft (9.1 m) below ground. The rods would be connected to the facility's electrical system with entrenched cables.

2.1.5 Operations and Maintenance

SSRNM testing is conducted on Navy ships to evaluate their waterborne acoustic characteristics while underway. All classes of naval vessel may be tested at the range, including tactical vessels such as aircraft carriers, cruisers, destroyers, and submarines. Support vessels would also undergo acoustic testing. The use of tactical sonars would not occur as part of these tests, but fathometers are likely to be used. However, shipboard operations on the range are covered under the HSTT EIS/OEIS and therefore are not considered part of this assessment.

Prior to conducting tests, the range would briefly operate the acoustic positioning modem system (about seven seconds) to determine the position of the hydrophone array. Otherwise, testing would involve only the passive collection of in-water sounds. During a test, a single ship would perform a planned set of maneuvers under various operational modes and speeds, passing by the array several times. Specialists would be embarked onboard the ship to monitor systems, direct propulsion configurations, and collect and record data. No support vessels would be involved with acoustic testing.

The hydrophone array would measure ambient sea noise as well as the tested ship's waterborne acoustic signature, which would be transmitted through the trunk cable to the FTEC shore station. Personnel at the FTEC shore station would operate computer systems and other equipment to record, process, and analyze the vessel's acoustic signature. The total time to mobilize personnel and equipment, conduct a test, and demobilize is about five days. Actual testing would likely require several hours of vessel operations on the range, over one or two days. Up to ten acoustic tests would be conducted annually. Operational maintenance would be

limited to annual servicing of batteries in each of the four acoustic modems that make up the grid. Approximately every 12 months, a small support vessel would approach the known location of each of the acoustic modems and acoustically initiate their release from the pyramid mooring anchor. Modems are recovered and taken to a shore based lab, where they are cleaned and batteries are replaced. Modems are then deployed again in the same way they were initially installed. This total evolution requires approximately three days for completion.

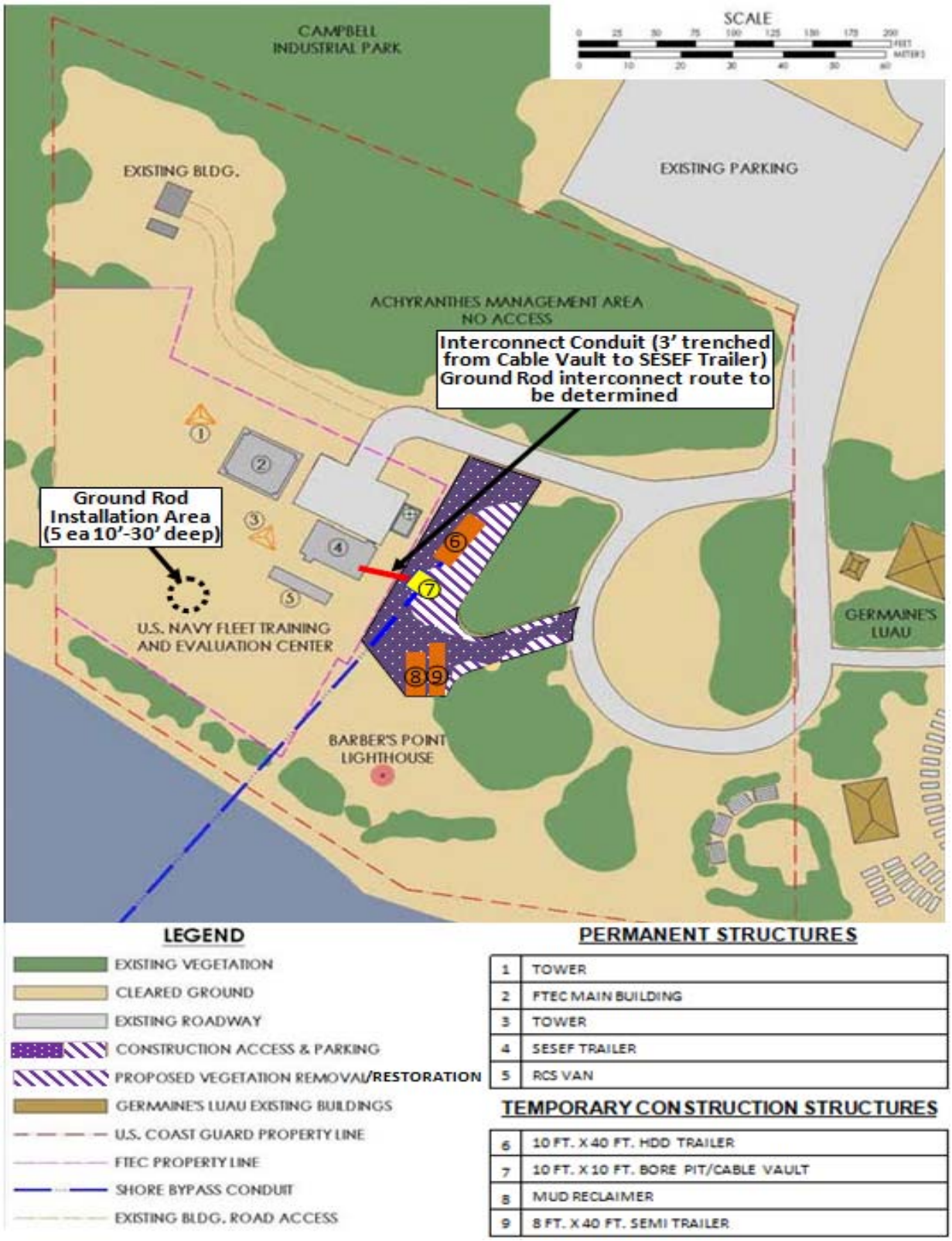


Figure 5. Fixed/Cabled Array – FTEC Shore Station Landing HDD Construction Site Layout

2.2 Alternative Action: Fixed Array – Radio Buoy Data Transmission

Under the Alternative Action, the same fixed array system described in the Preferred Alternative, would be utilized. An anchored Radio Frequency (RF) Data Transmission Buoy (radio buoy), would be used in place of the shore station cable landing, (Figure 6 and Figure 7) thus eliminating the need to land the trunk cable at the FTEC as discussed in Section 2.1.2. A trunk cable would connect the hydrophone array at the FORACS to the anchored radio buoy, near FTEC.

2.2.1 Hydrophone array

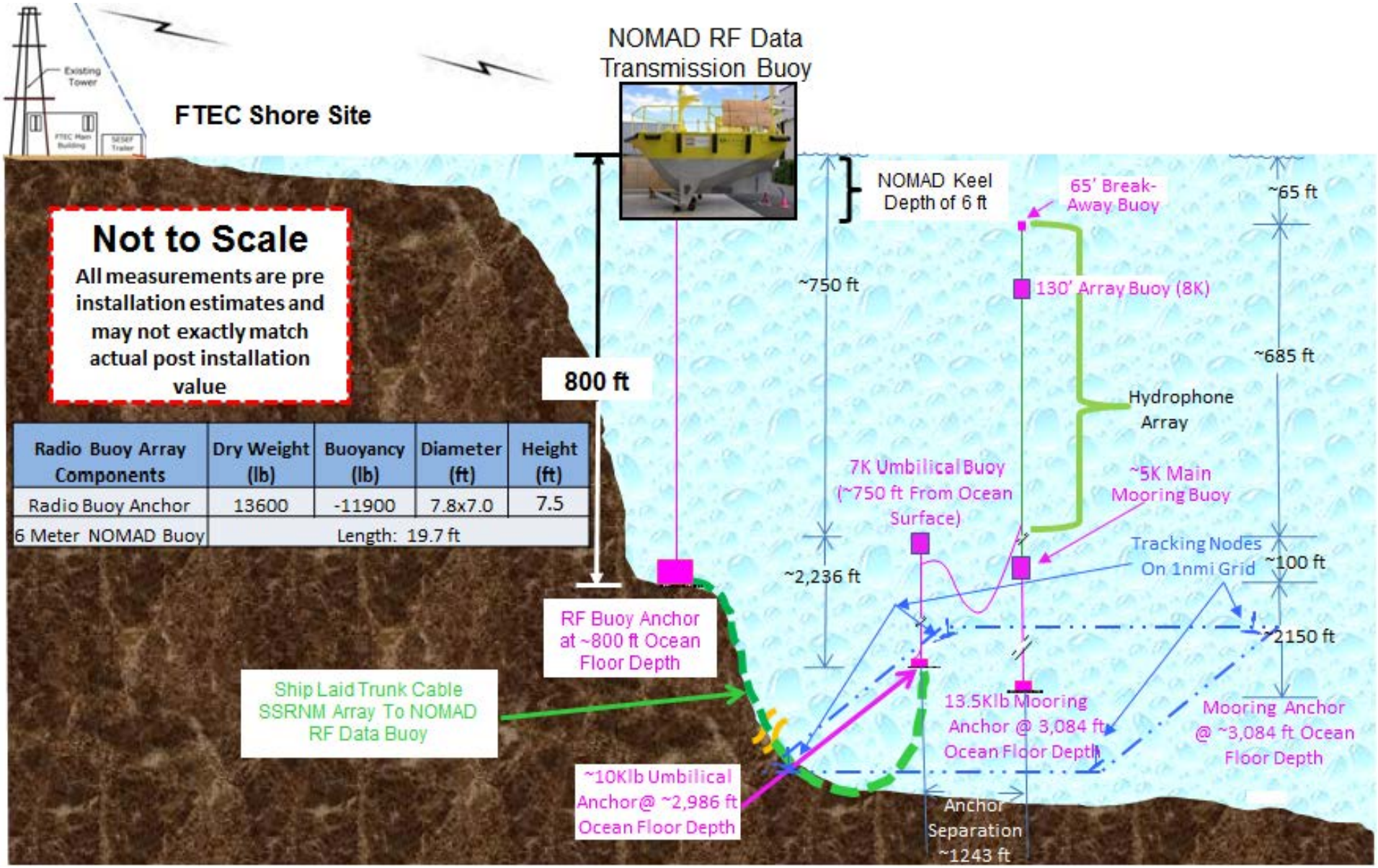
The hydrophone array under the Alternative Action is identical to the array described in the Preferred Alternative, Section 2.1.1. It is a 685 ft (208.8 m) cable with hydrophones mounted at intervals, all suspended from the seafloor. Hydrophones are cylindrical in shape and approximately 2 inches in diameter and 15 inches long and are directly affixed to the array cable. The array would be anchored within the FORACS (21°20'33.85"N, 158°11'8.18"W) at a depth of about 3,084 ft (940 m) (Figure 6). The top of the array would be suspended approximately 65 ft (19.8m.) below the ocean surface. A Break-Away Buoy, Array Buoy, and Main Mooring Buoy keep the entire hydrophone array aligned and linear (Figure 2). Each buoy is approximately 7.5 ft (2.3 m) in diameter and 7 ft (2.1 m) tall. The hydrophone array would be designed to meet a 15-year service life.

Construction activities on the ocean during hydrophone array installation would involve one vessel in the affected area offshore for a period of about three days:

- Small Anchor Handling vessel (100- 200 ft)

Data from the hydrophones would be transmitted to the trunk cable via an umbilical cable suspended above the seafloor and anchored with a separate dead-weight anchor. The umbilical assembly supports the trunk cable under varying stress loads from the larger hydrophone array as it shifts in ocean currents.

Figure 6. Alternative Action – Semi-Fixed Array – Radio Buoy Data Transmission Plan



Not to Scale

All measurements are pre installation estimates and may not exactly match actual post installation value

Radio Buoy Array Components	Dry Weight (lb)	Buoyancy (lb)	Diameter (ft)	Height (ft)
Radio Buoy Anchor	13600	-11900	7.8x7.0	7.5
6 Meter NOMAD Buoy	Length: 19.7 ft			

Figure 7. Alternative Action – Semi-Fixed Array – Radio Buoy Data Transmission Concept

2.2.2 Trunk Cable

The trunk cable would connect the hydrophone array along the same route as the Preferred Alternative but would end at a depth of 800 ft at the radio buoy anchor. The trunk cable for the Alternative Action would be 6.5 mi (10.1 km) between the hydrophone array and its terminus at the radio buoy. Installation would use the same methods as those that would be used for the Preferred Alternative. Water use during cable installation would involve two vessels in the affected area offshore for a period of about three weeks:

- Small Support Vessel (20 – 40 ft)
- Medium displacement Cable Layer (200 – 400 ft), e.g. CS INTREPID, 1,700 ton displacement

2.2.3 Radio Buoy

The buoy with radio transmitter would be anchored along the designated cable route at an ocean depth of 800 ft (243.8 m). The radio buoy would be a 6-meter (20 ft) NOMAD (Navy Oceanographic Meteorological Automatic Device) surface buoy or equivalent. A representative buoy is shown in Figure 7.

Alternative Action construction activities on the ocean during radio buoy installation would involve one vessel in the affected area offshore for a period of about one day:

- Small Anchor Handling vessel (100- 200 ft)

2.2.4 Shore Station

The shore station would contain the same electronic data analysis components and operate the same way as it would for the Preferred Alternative. However, it would not include any shore cable landing, underground utilities, or HDD construction. Instead the shore station would communicate by radio transmission and reception with the radio buoy.

2.2.5 Operations and Maintenance

SSRNM testing, its purpose and the number of tests conducted under the Alternative Action would be identical to the Preferred Alternative. The only operational difference under this alternative is that data from the hydrophones would be transmitted from the radio buoy to the shore station via VHF radio. Therefore, maintenance requirements would differ. The radio buoy would require on-site maintenance every six to 12 months for inspection, replenishment and cleaning.

Operations and Maintenance activities for the radio buoy on the ocean under the Alternative Action would involve two vessels in addition to annual modem servicing:

- Small Support Vessel, between (20 – 40 ft)
- Coastal Buoy tender, e.g. USCG Keeper Class (100-200 ft)

In these maintenance events, a small support vessel (20-40 ft [6-12 m]) would travel to and from the site at speeds up to 12 knots and tie off directly to the buoy. Chemical products would include the use of cleaning solutions (i.e., for solar panel glass), lubricants, electrolyte, and fuel for a generator. At the completion of the tasking the personnel would return to the local harbor in which they departed. The buoy also may require a hull cleaning every five years, in which a

buoy tender (100-200 ft [30-61 m]) would retrieve the buoy, transport it to shore for cleaning and return the cleaned buoy.

2.3 No Action – Portable SSRNM Testing

The No Action Alternative does not support the purpose and need and therefore, is not considered a reasonable alternative. However, the No Action Alternative is carried forward for analysis to provide a benchmark for comparison of the magnitude of the environmental effects of the Preferred Alternative and Alternative Action. Under the No Action Alternative, no installation of hydrophones or cables would be conducted. SSRNM testing would continue to occur as follows: test personnel would use either a hydrophone array deployed over the side of a small support vessel, or sonobuoys deployed from the fleet vessel being tested to passively receive noise measurements and transmit data via radio frequencies (RF) to the vessel under test. On average, ten SSRNM tests are conducted and ten to 15 sonobuoys are used each year.

Existing SSRNM-specific maintenance requirements include shore-based maintenance of the portable hydrophone array which is maintained and stored ashore during non-operational periods. By design, expended sonobuoys sink to the bottom on completion of the test. The No Action Alternative does not use positioning modems.

Operations and Maintenance activities under the No Action Alternative would typically involve the following vessels:

- Small Support Vessel, between (20 – 40 ft)
- Fleet Vessel Under Test

3 AFFECTED ENVIRONMENT

3.1 Introduction

The affected environment for this analysis is the leeward coast of O‘ahu, Hawai‘i and includes ocean and land areas. The ocean portion of the affected environment lies between Barbers Point and Mā‘ili Point, and seaward approximately 5 nm (9.3 km). The upland site is the FTEC Barbers Point and contiguous properties. This chapter describes the environmental setting and baseline conditions of the environmental resources within the affected environment.

The Navy used information about the affected environment directly from the recently-completed HSTT EIS/OEIS (DON 2013). Descriptions of the affected environment in the HSTT documentation are summarized here where relevant to the Proposed Action. The HSTT EIS/OEIS is available online at: http://hstteis.com/default.aspx. This baseline information has been augmented with additional information from the literature to provide additional relevant detail about the affected environment for this Proposed Action.

3.2 Climate and Air Quality

The climate of the affected environment determines the type and frequency of weather events expected during the year. Individual weather events would affect precipitation and runoff ashore and wind, wave and sediment suspension at sea. The prevailing trade winds provide strong, regular regional ventilation that quickly disperses air pollutants and breaks up inversion layers. Frequent rainfall on windward sides of the islands washes dust and other air pollutants out of the atmosphere. During mild Kona (i.e., absence of daily trade winds) weather, local air pollutant concentrations may temporarily increase and volcanic organic gases emissions from the Island of Hawaii may temporarily affect the other islands in the Main Hawaiian Islands (DON 2013).

The affected environment lies in leeward lowlands southwest of the Wai‘anae mountains and receives less than 19.6 inches (50 cm) of precipitation a year. Most of the annual precipitation occurs during the rainy season from November to April (DON 2005). At Barbers Point, monthly rainfall can be up to two inches during winter. Summers are dry with less than one inch of rain per month (US Climate Data 2014).

Northeast trade winds are dominant and generally define the relatively dry climate of O‘ahu’s leeward shore. During the winter months, however, storms would occur with heavy rains and winds from the west or northwest. These storms are associated with cold fronts moving west to east. Less frequent Kona winds are from the south or south-southwest. They occur annually during the winter months and are associated with storm events known for disrupting shallow ocean waters, coral reefs and shoreline features in the affected environment (National Weather Service 2013).

Tropical storms and, rarely, hurricanes can affect the Hawaiian Islands. Their counterclockwise rotational winds strike the east and south-facing shorelines. More importantly, these storms would generate large sea swell that periodically damage shallow water habitats in the affected environment (Kolinski et al. 2005; Jokiel et al. 2011).

The island of O‘ahu is in attainment with National Ambient Air Quality Standards (NAAQS) (Hawaii Department of Health 2012; Hawaii Department of Health 2013). Air quality monitoring stations on O‘ahu reported no exceedances of air quality standards during either the 2011 or 2012 reporting years. Data from the Kapolei monitoring station located in the Kapolei

Business Park, immediately north of the Campbell Industrial Park provides a good indication of air quality in the affected environment. The State also analyzes the air pollutant sources in the Campbell Industrial Park and Kahe Valley (Hawaii Department of Health 2012). During the 2012 reporting year, none of the pollutants measured exceeded federal or state standards. There is no indication today's air quality has deteriorated from these reports.

3.3 Geology and Soils

The soils and sediments in the affected environment are the base (substrate) on which many plants and animals live. Human inhabitation and activity in the affected environment is also related to the structure of the surface soils and underlying rock formations. It is important to understand the geological formation of the leeward coast of O‘ahu in assessing the potential impacts of the Preferred Alternative.

The island of O‘ahu was built by two shield volcanoes, Wai'anae to the northwest and Ko‘olau to the southeast. These two volcanoes erupted successively along the Hawaiian hotspot between 4 and 2.5 million years ago and merged into one land mass across the central Schofield Plateau. As a result of several million years of weathering, both of the prehistoric volcanoes have subsequently collapsed into the Hawaiian Deep, removing most of the original island in massive submarine landslides (Moore et al. 1989; Coombs et al. 2004). Wai‘anae's growth was marked by multiple collapse and deformation events, resulting in complex mass wasting of the volcano's southwest flank (Wai‘anae Slump). The slump complex, one of the largest in Hawai‘i, covers an area of 5500 square kilometers (Coombs et al. 2004).

South and west of Barbers Point the seafloor has been the depository of terrigenous volcanic sediments (basaltic and andesitic sand, silt and clay) eroded mostly from the Wai‘anae mountain range and the Schofield Plateau. Offshore, there is loose sand (and silt and clay) atop the reef pavement. This material is derived both from in situ erosion of the reef itself and some from terrigenous sediment deposition.

The Preferred Alternative SSRNM trunk cable route extends from the fringing reef crest to the submarine slope of Wai‘anae mountain range. The cable route runs from the fringe reef crest off Barbers Point, northerly along the steep island slope at depths ranging from about 328 ft to 2,297 ft (100 m to 700 m), and then dips downslope to 3,280 ft (1,000 m). Off Nānākuli, the cable route turns upslope to the hydrophone array site at a depth of about 3,000 ft (914 m).

The submarine slope of O‘ahu between Barbers Point and Ka'ena Point shows evidence of submarine slumping and debris flows, both as sharp cuts or canyons in the steeper slopes and heaps of jumbled, lumpy debris at the toe of the slope. The geologic events that cause such slumps are relatively rapid and can be both episodic (i.e. associated with events such as tsunamis or hurricanes) and chronic (resulting from ongoing wind and wave erosion).

The rocky shoreline at Barbers Point is about 3 ft (0.9 m) above sea level, lying at the edge of the ‘Ewa coastal plain. In general, the area is covered with a rather thin sandy soil over a raised calcareous reef platform and occasional patches of calcareous reef (Foote et al. 1972; USCG 2012). A Navy survey of the FTEC site conducted in 1998 confirmed the FTEC to be covered with a thin veneer of sand over reef bedrock (DON 1998).

3.4 Bathymetry and Waves

The contour of the ocean floor (bathymetry) as it descends from the shoreline influences the dissipation of wave energy against the shoreline. Bathymetry, and its effect on waves and sunlight penetration, affects the distribution of organisms, as well as the structure and function of marine ecosystems. An ocean wave is generated by the wind; the wave size is determined by the force of the wind and the distance over which the wind blows. Water in the wave moves in a circular motion; this movement extends down to a distance of one half of the wavelength. As large waves, called swell, reach shallow shorelines, the wave energy would be dissipated against the bottom. As the wave progresses towards shore over decreasing depths, the circular motion of the water in a wave gradually changes from a circular motion, to an elliptical motion, and then to a horizontal back and forth current which can suspend sediments.

The Hawaiian Archipelago is composed of high islands, reefs, banks, atolls, and seamounts (DON 2013). Off the leeward coast of O‘ahu, a fringing reef forms a submerged reef flat which extends seaward to a reef crest (Section 3.3). From the reef crest in the shallow, well-lit, warm ocean surface waters (epipelagic zone), the bottom slopes sharply downward through a zone of decreasing temperatures (mesopelagic zone), to the proposed array location in lightless and very cold waters (bathypelagic zone).

Above about 656 feet (200 m), the ocean water receives light from the sun, is relatively warm and is mixed by winds and wave action. Many familiar fish and coral communities are found here. Between 200 and 1000 m the ocean habitats rapidly change from negligible sunlight penetration to no sunlight penetration. Below 1000 m no light penetrates and the water is very near freezing.

Oceanic waves arriving at the reef crest can be large enough to influence the character of habitats and organisms of the reef flat between the crest and shore. Waves from Kona storms (south to southwesterly) and the southern swell have the most effect on water quality (especially turbidity), currents and temperatures in the affected environment even though they occur occasionally. Along the leeward coast, Kona storm waves are large (3-6 m) and steep (8-10 sec interval) waves that would suspend bottom sediments and cloud the ocean waters (create turbidity) along the reef flat between the shore and the reef crest. Most of the year, however, the southern swell produces coastal waves of widely varying heights (0.3 – 3 m) (DON 2005).

3.5 Water Quality

Ocean water quality determines not only the relative health of marine organisms, but also is a vector for pollutants that might be discharged into the ocean. The quality of the ocean waters near shorelines is regulated by federal and State laws and must be considered during planning for any proposed federal action.

Ocean temperatures in the affected environment range from about 21.0 ^{o} to 21.5^{o} C between 20 and 1,000 m water depths (Nihous 2010). Surface salinity ranges between 34.5 and 35.0 practical salinity units (psu) (Zweng et al. 2013). The depth of the surface layer varies and is underlain by three distinct water layers characterized by decreasing temperatures down to about 12° C at 1,000 m water depth (Nihous 2010).

Population growth is the primary cause of impacts on the coastal water quality of the Hawaiian Islands. The coastal waters of the Hawaiian Islands are affected by different kinds of marine debris, garbage and solid wastes that deposit toxic chemicals and nutrients in the ocean. In

addition to large quantities of marine debris, PCBs have been deposited in the marine environment because of urbanization (DON 2013). Urban land use typically results in water quality contaminants such as nitrogen, phosphorous, suspended solids, sediments, pesticides, and herbicides, as well as fecal contamination. Agricultural runoff contains the same water quality contaminants as urban runoff, but has higher concentrations of pesticides, herbicides, and sediments.

A survey for the National Coastal Condition Report III of 50 stations across the main islands and 29 stations along the southern shore of Oahu, mostly near heavily urbanized areas, resulted in an overall water quality index of "good" (DON 2013). Marine microbiological and chemical water quality sampling conducted by Hawai‘i State has focused on shoreline water quality (Hawaii Department of Health 2014b), and can be used to represent marine water quality in the affected environment. The State characterizes marine waters within the affected environment as either open coastal or oceanic. The affected environment does not include embayment marine waters. There are several open coastal water quality stations located in or near the affected environment. For most of these stations, Hawai‘i State has concluded that data are not sufficient to determine whether the applicable water quality standards are being attained within the affected environment, or, in the case of the monitoring site at Campbell Industrial Park, that water quality standards for turbidity are not being attained.

Tropical storms can substantially affect re-suspension (turbidity) and distribution of bottom sediments (Section 3.4) (DON 2013). Relevant to the Preferred Alternative, occasional cyclonic and Kona storm waves would cause increased turbidity in the affected environment. Sediments suspended from the reef flat during storm events can have a greater influence on water clarity, and the biological productivity of corals and other photosynthetic organisms than typical surf conditions (DON 2005; DON 2013).

Aspects of climate change that influence water quality include decreasing ocean pH (i.e., more acidic), increasing water temperatures, and increasing storm activity. Changes in pH outside of the normal range can make it difficult for marine mollusks to grow and maintain their shells. Many of those creatures are at the base of the marine food chain, such as phytoplankton, so changes may reverberate through the ecosystem. Rising water temperatures can be detrimental to coastal ecosystems. For example, in waters that are warmer than normal, coral colonies appear to turn white (bleaching) because they expel symbiotic microbes (zooxanthellae) that give them some of their colors. These microbes are important for coral survival because they provide the coral with food and oxygen, while the coral provides shelter, nutrients, and CO_2 supporting zooxanthellae photosynthesis. Rising seawater temperatures combined with decreasing ocean pH can be especially detrimental to corals (DON 2013). Storm waves and suspended sediments (turbidity) can inflict additional stress on coral.

3.6 Marine Biology

This section addresses biological resources found in the affected environment. Much of the information has been obtained from the HSTT EIS/OEIS (DON 2013). The section is organized about major groupings of marine biological according to taxonomic nomenclature and water column habitat characteristics. Marine mammals, sea turtles, marine fish, marine invertebrates, marine vegetation and seabirds are addressed here. The section ends with three subsections addressing topics of special interest: threatened and endangered marine species, essential fish habitat and migratory birds.

3.6.1 Marine Mammals

The presence of marine mammals in the affected area, relative abundance, and known threats to the species and their habitats are discussed in this section. Marine mammals are a broad taxonomic group of marine animals including seals, whales, otters and walruses. Marine mammals all rely on the ocean for food. However, some marine mammals reproduce in the ocean such as whales, while others would reproduce ashore such as seals. All marine mammals in the United States are protected under the MMPA (Section 1.4), and some species receive additional protection under the ESA.

Marine mammals have an important role in the ecosystem food web as predators which makes them susceptible to threats from human activities including hunting, indirect capture with fish harvest (bycatch) and entanglement in fishing gear and ship strikes. Additional threats include habitat disturbance and pollution in coastal areas.

Twenty-five marine mammals are reported in the HSTT EIS/OEIS with possible or confirmed presence in and around the Hawaiian Islands (Table 3). Of these, seven species are either listed as depleted under the MMPA or endangered under the ESA. Based on survey records and available data for the affected environment, of the species, only the Humpback Whale, False Killer Whale, and Hawaiian Monk Seal have been actually observed within or are likely to occur within or adjacent to the affected environment. Also see Section 3.6.7 for additional discussion of marine mammals regarding compliance with the Endangered Species Act.

Several species of marine mammals once inhabited or transited Hawaiian waters, but have not been sighted in recent years (DON 2013). These species are not included in this analysis because their presence in the affected area is highly unlikely. Excluded species are sei whale (*Balaenoptera borealis*), North Pacific right whale (*Eubalaena japonica*), fin whale (*Balaenoptera physalus*), blue whale (Balaenoptera musculus), and sperm whale (*Physeter macrocephalus*),

Species that may be present in the affected area are identified in Table 3, including threatened and endangered species. Those species identified as threatened or endangered are discussed with more detail in Section 3.6.7, Threatened and Endangered Marine Species. Additional general information about marine mammals can be found in the HSTT EIS (DON 2013).

Table 3. Marine Mammals Potentially Present in the Affected Area.

Common Name	Taxon	Main Hawaiian Islands (MHI) Abundance	Occurrence in the Affected Environment	ESA/MMPA Status
Order Cetacea				
Suborder Mysticeti (baleen whales)				
Family Balaenopteridae (rorquals)				
Humpback whale	*Megaptera novaeangliae*	4,491	Seasonal; throughout known breeding grounds during winter and spring (most common November through April)	Endangered/ Depleted

Common Name	Taxon	Main Hawaiian Islands (MHI) Abundance	Occurrence in the Affected Environment	ESA/MMPA Status
Bryde's whale	*Balaenoptera brydei/ edeni*	469	Uncommon; distributed throughout the Hawaii Exclusive Economic Zone	n/a[3]
Minke whale	*Balaenoptera acutorostrata*	478	Regular but seasonal occurrence (November – March)	n/a
Family Kogiidae (pygmy and dwarf sperm whale)				
Pygmy sperm whale	*Kogia breviceps*	7,138	Stranding numbers suggest this species is more common than infrequent sightings during survey (Barlow 2006) indicated	n/a
Dwarf sperm whale	*Kogia sima*	17,519	Stranding numbers suggest this species is more common than infrequent sightings during survey (Barlow 2006) indicated	n/a
Family Delphinidae (dolphins)				
Killer whale	*Orcinus orca*	349	Uncommon; infrequent sightings	n/a
False killer whale	*Pseudorca crassidens*	1,6544	Regular	Endangered/ Depleted
Pygmy killer whale	*Feresa attenuata*	956	Year-round resident	n/a
Short-finned pilot whale	*Globicephala macrorhynchus*	8,870	Commonly observed around main Hawaiian Islands and Northwestern Hawaiian Islands	n/a
Melon-headed whale	*Peponocephala electra*	2,950	Regular	n/a
Bottlenose dolphin Hawaiian Islands Stock Complex	*Tursiops truncatus*	3,215	Common in both shallow (1000 m or less) and deep offshore waters	n/a
Pantropical spotted dolphin	*Stenella attenuata*	8,978	Common; primary occurrence between 330 and 13,122 ft depth	n/a
Striped dolphin	*Stenella coeruleoalba*	13,143	Occurs regularly year-round but infrequent sighting during survey (Barlow 2006)	n/a
Spinner dolphin Hawaiian Island Stock Complex	*Stenella longirostris*	no data	Common year-round; rest in nearshore waters during the day and move offshore to feed at night	n/a
Rough-toothed dolphin	*Steno bredanensis*	8,709	Common throughout the main Hawaiian Islands and Hawai'i Exclusive Economic Zone	n/a
Fraser's dolphin	*Lagenodelphis hosei*	10,226	Tropical species only recently documented within Hawai'i Exclusive Economic Zone (2002 survey)	n/a

[3] Not endangered, threatened, depleted or strategic in the affected environment. All marine mammals are protected under the MMPA.
[4] Main Hawaiian Islands insular (nearshore) and Hawai'i pelagic (offshore) combined.

Common Name	Taxon	Main Hawaiian Islands (MHI) Abundance	Occurrence in the Affected Environment	ESA/MMPA Status
Risso's dolphins	*Grampus griseus*	2,372	Have been considered rare but multiple sightings in Hawai'i Exclusive Economic Zone during various surveys conducted between 2002 and 2012	n/a
Family Ziphiidae (beaked whales)				
Cuvier's beaked whale	*Ziphius cavirostris*	15,242	Year-round occurrence but difficult to detect due to diving behavior	n/a
Blainville's beaked whale	*Mesoplodon densirostris*	2,872	Year-round occurrence but difficult to detect due to diving behavior	n/a
Longman's beaked whale	*Indopacetus pacificus*	1,007	Considered rare; however, multiple sightings during 2010 survey	n/a
Suborder Pinnipedia				
Family Phocidae (true seals)				
Hawaiian monk seal	*Monachus schauinslandi*	1,212	Predominantly occur at Northwestern Hawaiian Islands; approximately 153 in Main Hawaiian Islands	Endangered/ Depleted

3.6.2 Sea Turtles

Sea turtles are present in coastal and open ocean waters of the affected environment. Five sea turtles are found in the affected environment; all are protected under the Endangered Species Act (ESA) as endangered or threatened. The general biology and nesting presence of sea turtles in the affected environment are listed in Table 4 (DON 2013) and discussed below.

Based on survey records and available data for the affected environment, only the Green Sea Turtle, Hawksbill Sea Turtle have been actually observed within or are likely to occur within or adjacent to the affected environment. Other ESA-listed sea turtles are not included in this analysis because their presence in the affected area is highly unlikely. Excluded sea turtles include leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*) and olive ridley sea turtle (*Lepidochelys olivacea*). Also see Section 3.6.7 for additional discussion of sea turtles regarding compliance with the Endangered Species Act.

Table 4. Sea Turtles in the Affected Environment

Common Name	Taxon	Occurrence in the Affected Environment	ESA Status
Family Cheloniidae (hard-shelled sea turtles)			
Green sea turtle	*Chelonia mydas*	Present as adults. Nesting primarily in French Frigate Shoals of the NWHI and feeding in the coastal areas of the MHI	Threatened
Hawksbill sea turtle	*Eretmochelys imbricata*	Present as adults. Nest on only beaches of the main islands, primarily along the south coast of Hawaii and the east end of Molokai	Endangered

Adult female Sea turtles lay eggs on sandy beaches; young hatch after incubation and return to the ocean. Little information is available about a sea turtle's stage of life after hatching. Open-

ocean juveniles spend an estimated two to 14 years drifting, foraging, and developing. Because of the general lack of knowledge of this period, it has been described as "the lost years." After this period, juvenile hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*), loggerhead (*Caretta caretta*), and green (*Chelonia mydas*) turtles settle into coastal habitat. Leatherback turtles remain primarily in the open ocean throughout their lives, except for mating in coastal waters and females going ashore to lay eggs. All species can migrate long distances across large expanses of the open ocean, primarily between nesting and feeding grounds (DON 2013).

Threats to sea turtles, similarly to marine mammals, are derived mostly from human activity. Because the shoreline at the FTEC is rocky and not suitable for turtle nesting, no nesting habitat or activity exists in the affected environment. Adult sea turtles can be at risk from fishing and habitat degradation. Fishing can injure or drown juvenile and adult sea turtles. Habitat degradation can limit the availability of food and bycatch in commercial fisheries. Ship strikes and marine debris are primary threats in the offshore environment.

3.6.3 Marine Fish

The distribution and abundance of fishes depends greatly on the physical and biological factors of the marine ecosystem, such as salinity, temperature, dissolved oxygen, population dynamics, predator and prey interaction oscillations, seasonal movements, reproduction and life cycles, and recruitment success (Table 5) (DON 2013). One species present within the affected environment (scalloped hammerhead shark [*Sphyrna lewini*]) had been proposed for listing, under the ESA, but the population segment in the central Pacific was not included in the Final Rule effective September 2, 2014 (79 FR 38213).

Table 5. Major Taxonomic Groups of Marine Fishes within the Affected Environment.

Major Marine Fish Groups		**Presence in affected environment**	
Group Name (Representative Species Group [# species in Hawai‘i])	Description	Open Ocean	Coastal Waters
Jawless fishes (Order Myxiniformes [1] and Order Petromyzontiformes [0])	Primitive fishes with an eel-like body shape that feed on dead fishes or are parasitic on other fishes	Water column, seafloor	Seafloor
Sharks, rays, and chimaeras (class Chondrichthyes [56])	Cartilaginous (non-bony) fishes, many of which are open ocean predators	Surface, water column, seafloor	Surface, water column, seafloor
Eels and bonefishes (Order Anguilliformes [108], Order Elopiformes [2])	Undergo a unique larval stage with a small head and elongated body; very different from other fishes	Surface, water column, seafloor	Surface, water column, seafloor
Smelt and salmonids (Orders Argentiniformes, Osmeriformes [18], and Salmoniformes [0])	Osmeriformes are smelt and allies Salmoniformes are trout, salmon and relatives Argentiniformes are smallish silvery or dark and generally bathypelagic ocean fishes.	Open ocean – Osmeriformes and Salmoniformes Seafloor – (Argentiniformes only), surface, water column	Surface, water column
Cods (Orders Gadiformes [41] and Ophidiiformes [26])	Important commercial fishery resources (cods), associated with bottom habitats, also includes some deepwater groups	Water column, seafloor	Water column, seafloor
Toadfishes and anglerfishes (Orders Batrachoidiformes [0] and Lophiiformes [58])	Includes the toadfishes and the anglerfishes, a lie-in-wait predator	Seafloor	Seafloor

Major Marine Fish Groups		Presence in affected environment	
Group Name (Representative Species Group [# species in Hawai‘i])	Description	Open Ocean	Coastal Waters
Mullets, silversides, needlefishes, and killifish (Orders Mugiliformes [4], Atheriniformes [3], Beloniformes [25], and Cyprinodontiformes [0])	Small-sized nearshore/coastal fishes, primarily feed on organic debris; also includes the surface-oriented flyingfishes	Surface	Surface, water column, seafloor
Oarfishes, squirrelfishes, dories (Orders Lampridiformes [0], Beryciformes [32], Zeiformes [4])	Primarily open ocean or deepwater fishes, except for squirrelfishes (reef-associated)	Surface, water column, seafloor	Surface, water column, seafloor
Pipefishes and seahorses (Order Gasterosteiformes [3])	Small mouth with tubular snout and armor like scales; gives birth to live young and shows a high level of parental care	None	Surface, water column, seafloor
Order Prciformes, Snappers, drums, and croakers (families Sciaenidae [0] and Lutjanidae [13])	Important game fishes and common predators of all marine waters; sciaenids produce sounds with their swim bladders	Surface, water column, seafloor	Surface, water column, seafloor
Order Prciformes, Groupers and seabasses (Family Serranidae [23])	Important game fishes with vulnerable conservation status; some have a hermaphroditic strategy in which females become males as they mature	Water column, seafloor	Surface, water column, seafloor
Order Prciformes, Wrasses, damselfishes (Family Pomacentridae [18]), and parrotfishes (families Labridae [47] and Scaridae [7])	Primarily reef-associated fishes with a hermaphroditic strategy in which females become males as they mature	Water column, seafloor	Surface, water column, seafloor
Order Prciformes, Gobies and blennies (families Gobiidae [35] and Blennidae [0])	Gobies are the largest and most diverse Family of marine fishes, mostly found in bottom habitats of coastal areas	Surface, water column, seafloor	Surface, water column, seafloor

Overfishing is the most serious threat that has led to the listing of ESA-protected marine species, with habitat loss also contributing to extinction risk. Overfishing occurs when fishes are harvested in quantities above a sustainable level. Overfishing impacts targeted species, and non-targeted species (or “bycatch” species) that often are prey for other fishes and marine organisms. Bycatch may also include seabirds, turtles, and marine mammals. Additionally, in recent decades the marine fishes being targeted have changed such that when higher-level predators become scarce, different organisms on the food chain are subsequently targeted; this has negative implications for entire marine food webs (DON 2013).

Pollution primarily impacts coastal fishes that occur near the sources of pollution. Pollutants in the marine environment that may impact marine fishes include organic pollutants (e.g., pesticides, herbicides, polycyclic aromatic hydrocarbons, flame retardants, and oil), inorganic pollutants (e.g., heavy metals), and debris (e.g., plastics and wastes from dumping at sea). Entanglement in abandoned commercial and recreational fishing gear has also caused pollution-related declines for some marine fishes; some species are more susceptible to entanglement by marine debris than others. Other human-caused stressors on marine fishes are the introduction of non-native species, climate change, aquaculture, energy production, vessel movement, and underwater noise (DON 2013).

As part of the development of an electricity facility at Campbell Industrial Park at Barbers Point, the Hawaiian Electric Company (HECO) has followed changes in coral reef fish communities in

the affected environment for decades. The HECO studies have monitored 16 stations in waters from 12 to 40 ft (5 to 12 m) offshore from the southeast coast of Barbers Point to Nānākuli Beach Park about 4.9 miles (7.9 km) to the northwest (Brock 2011; Jokiel et al. 2011; Brock 2012).

The HECO identified 139 species of fish within the affected environment during the 2007-2011 reporting period (Brock 2011; Brock 2012). These fish were grouped into five feeding guilds as follows:

- 88 species of carnivores which are species feeding on smaller fishes and invertebrates living on the coral reef,
- 22 species of herbivores (feeding on algae),
- 14 species of planktivores (species that feed on zooplankton),
- 8 species of coral feeders (feeding on coral tissue or mucous), and
- 7 species of omnivores (species that feed on both algae and small animals).

A major finding of the HECO monitoring program was that the shallow nearshore off the leeward coast exhibits a long term cycle of major storm damage followed by recovery. The major storm event in January 1980, Hurricane Iwa in November 1982, and Hurricane Iniki in September 1992, each severely impacted coral reef communities in the Barbers – Kahe Point area, reducing the number of fish species. The most recent monitoring resulted in long-term fish diversity measures not significantly different from the earlier, pre-storm diversity measures. These data indicate a cycle of storm damage and recovery of a robust fish community that thrives despite the major effects of coastal storms.

3.6.4 Marine Invertebrates

Invertebrates are animals without backbones, and marine invertebrates are a large, diverse group of at least 50,000 species. Because marine invertebrates occur in all habitats, activities that affect the water column or the seafloor could impact numerous zooplankton (invertebrates not generally visible to the naked eye), eggs, larvae, larger invertebrates living in the water column, and benthic invertebrates that live on or in the seafloor. The greatest densities of marine invertebrates are usually on the seafloor; therefore, activities that contact the seafloor have a greater potential for impact (DON 2013). Marine invertebrates also include members that are protected under the ESA or managed under the MSA.

All marine invertebrate taxonomic groups are represented in the affected environment. Major invertebrate phyla and the general zones they inhabit in the affected environment are listed in Table 6. Throughout the marine invertebrate section, organisms may be referred to by their phylum name or, more generally, as marine invertebrates.

In November 2012, NOAA proposed listing 66 reef-building coral species under ESA. Of these, three proposed as Threatened are found in Hawaiian waters (77 FR 73219):

- *Acropora paniculata*
- *Montipora dilatata/flabellata/turgescens*
- *Montipora patula/verrilli*

On September 10, 2014, NOAA finalized the listing of protected reef-building coral species. The three Hawai‘i species were excluded from the final rule (79 FR 53851) effective October 10, 2014.

Table 6. Major Taxonomic Groups of Marine Invertebrates in the Affected Environment.

Major Invertebrate Groups		Presence in affected environment	
Common Name (Species Group)	**Description**	**Open Ocean**	**Coastal Waters**
Foraminifera, radiolarians, ciliates (Phylum Foraminifera)	Benthic and pelagic single-celled organisms; shells typically made of calcium carbonate or silica.	Water column, seafloor	Water column, seafloor
Sponges (Phylum Porifera)	Benthic animals; large species have calcium carbonate or silica structures embedded in cells to provide structural support.	Seafloor	Seafloor
Corals, hydroids, jellyfish (Phylum Cnidaria)	Benthic and pelagic animals with stinging cells.	Water column, seafloor	Water column, seafloor
Flatworms (Phylum Platyhelminthes)	Mostly benthic; simplest form of marine worm with a flattened body.	Water column, seafloor	Water column, seafloor
Ribbon worms (Phylum Nemertea)	Benthic marine worms with a long extension from the mouth (proboscis) from the mouth that helps capture food.	Water column, seafloor	Seafloor
Round worms (Phylum Nematoda)	Small benthic marine worms; many live in close association with other animals (typically as parasites).	Water column, seafloor	Water column, seafloor
Segmented worms (Phylum Annelida)	Mostly benthic, highly mobile marine worms; many tube-dwelling species.	Seafloor	Seafloor
Bryozoans (Phylum Bryozoa)	Lace-like animals that exist as filter feeding colonies attached to the seafloor and other substrates.	Seafloor	Seafloor
Cephalopods, bivalves, sea snails, chitons (Phylum Molluska)	Mollusks are a diverse group of soft-bodied invertebrates with a specialized layer of tissue called a mantle. Mollusks such as squid are active swimmers and predators, while others such as sea snails are predators or grazers and clams are filter feeders.	Water column, seafloor	Water column, seafloor
Shrimp, crab, lobster, barnacles, copepods (Phylum Arthropoda – Crustacea)	Benthic or pelagic; some are immobile; with an external skeleton; all feeding modes from predator to filter feeder.	Water column, seafloor	Water column, seafloor
Sea stars, sea urchins, sea cucumbers (Phylum Echinodermata)	Benthic predators and filter feeders with tube feet.	Seafloor	Seafloor

Notes: Benthic = A bottom-dwelling organism; Pelagic = relating to, living, or occurring in the waters of the ocean or the open sea.

Marine invertebrates live in all of the world's oceans, from warm shallow waters to cold deep waters. They inhabit the seafloor and water column in all of the large marine ecosystems and open-ocean areas in the affected environment. Marine invertebrate distribution is influenced by habitat, ocean currents, and water quality factors such as temperature, salinity, and nutrient content. The higher number of species (diversity) and abundance of marine invertebrates in coastal habitats, compared with the open ocean, is a result of more nutrient availability from terrestrial environments and the variety of habitats and substrates found in coastal waters (DON 2013).

Marine invertebrates in the affected environment inhabit coastal waters and seafloor habitats, including rocky intertidal zones, coral reefs and deep-water slopes. The intertidal zone is exposed to air at low tide and covered by water at high tide. At least 15 species of intertidal crab live in sandy beaches in the intertidal zone, feeding on algae and detritus (DON 2013).

3.6.4.1 Foraminiferans, Radiolarians, Ciliates (Phylum Protozoa)

Foraminiferans, radiolarians, and ciliates are minute singled-celled organisms, sometimes forming colonies of cells, belonging to the Phylum Protozoa. They are found in the water column and seafloor of the world's oceans and form diverse and intricate shells out of calcium carbonate. The shells of foraminifera that live in the water column eventually sink to the deep seafloor, forming sediments known as foraminiferan ooze. Foraminifera feed on diatoms and other small organisms. Their predators include copepods and other zooplankton. Radiolarians are microscopic organisms that form glass-like shells made of silica. Radiolarian ooze covers large areas of the ocean floor. Ciliates are protozoans with small hairs (cilia) that are used to feed and move around (DON 2013).

3.6.4.2 Sponges (Phylum Porifera)

Sponges include over 8,000 marine species worldwide, and are classified in the Phylum Porifera. Sponges are bottom-dwelling, multi-cellular animals that can be best described as an aggregation of cells that perform different functions. Sponges are largely sessile (not mobile), except for their larval stages, and are common throughout the affected environment at all depths. Sponges reproduce both sexually and asexually. Water flowing through the sponge provides food and oxygen and removes wastes. Many sponges form calcium carbonate or silica spicules or bodies embedded in cells to provide structural support. Sponges provide homes for a variety of animals, including shrimp, crabs, barnacles, worms, brittle stars, sea cucumbers, and other sponges (DON 2013).

3.6.4.3 Corals, Hydroids, Jellyfish (Phylum Cnidaria)

Corals are in a class of animals that also includes anemones and soft corals. The individual unit is referred to as a polyp, and most species occur as colonies of polyps. Reef-building corals in the photic zone, shallower than approximately 656 ft (200 m), usually host microscopic photosynthetic algae that provide extra energy to the corals. All corals feed on small planktonic organisms or dissolved organic matter, although some shallow-water corals derive most of their energy from their symbiotic algae.

There are over 10,000 marine species of corals, hydroids, and jellyfish worldwide. Members of this group are found throughout the affected environment at all depths. Hydroids are colonial animals similar in form to corals. Hydroids have both flexible and rigid skeletons, but are not considered to be habitat-forming. Jellyfish are motile as larvae, sessile as an intermediate colonial polyp stage, and motile as adults. They are predatory at all stages and, like all Cnidaria, use tentacles equipped with stinging cells to capture prey. Jellyfish are an important prey species for a range of organisms, including some sea turtles and ocean sunfish (DON 2013).

Corals are the primary living structural components of Hawaii's subtidal zone. Approximately 250 species of corals are found within the main Hawaiian Islands (Maragos et al. 2004). Six species of corals dominate Hawaiian waters: lobe coral (*Porites lobata*), finger coral (*Porites compressa*), rice coral (*Montipora capitata*), sandpaper rice coral (*Montipora patula*), cauliflower coral (*Pocillopora meandrina*), and blue rice coral (*Montipora flabellata*) (Friedlander et al. 2005). The Northwestern Hawaiian Islands have at least 57 species of stony coral, including seven genera of the table coral *Acropora*, which is infrequent in the main Hawaiian Islands but abundant and widespread in the French Frigate Shoals region (DON 2013).

Deepwater corals potentially are present in the affected environment, including black corals, pink corals, red corals, gold coral, and bamboo coral. These species attach to relatively steep banks with strong currents that provide a steady stream of small algae and animals that drift in the water (plankton) to feed on, as well as minimal sedimentation that would inhibit colonization and growth of these slow-growing species (DON 2013). Presently, there are no coral listed or under consideration for listing identified in the direct vicinity of the cable route.

General threats to marine invertebrates include overexploitation and destructive fishing practices, habitat degradation from pollution and coastal development, disease, and invasive species. These threats are compounded by global threats to all marine life, including the increasing temperature and decreasing pH of the ocean from pollution linked to global climate change (DON 2013).

3.6.4.4 Flatworms (Phylum Platyhelminthes)

Flatworms include between 8,000 and 20,000 marine species, and are the simplest form of marine worm. The largest single group of flatworms is parasites commonly found in fishes, seabirds, and whales. The life history of parasitic flatworms plays a role in the regulation of populations for the marine vertebrates they inhabit. Ingestion by the host organism is the primary dispersal method for parasitic flatworms. As parasites, they are not typically found in the water column, outside of a host organism. The remaining groups are non-parasitic carnivores, living without a host. Flatworms are found throughout the affected environment living on rocks in tide pools and reefs, or within the top layer of sandy areas (DON 2013).

3.6.4.5 Ribbon Worms (Phylum Nemertea)

Ribbon worms include approximately 1,000 marine species worldwide. Ribbon worms are bottom-dwelling, predatory marine worms that are equipped with a long extension from the mouth (proboscis) that helps them capture food. Some species are also equipped with a sharp needle-like structure that delivers poison to kill prey. Ribbon worms occupy an important place in the marine food web as prey for a variety of fish and invertebrates and as a predator of other bottom-dwelling organisms, such as worms and crustaceans. Ribbon worms are found throughout the affected environment in soft-bottom habitat (DON 2013).

3.6.4.6 Round Worms (Phylum Nematoda)

Round worms are small and cylindrical, and are abundant in sediments and in host organisms as parasites. Round worms are one of the most widespread marine invertebrates, with population densities of one million organisms per 11 square feet (ft2) (1 m2) of mud. This group has a variety of food preferences, including algae, small invertebrates, annelid worms, and organic material from sediment. Like free-living flatworms, parasitic nematodes provide important ecosystem services by regulating populations of other marine organisms by causing illness or mortality in less viable organisms. Round worms are found throughout the affected environment (DON 2013).

3.6.4.7 Segmented Worms (Phylum Annelida)

Segmented worms include approximately 12,000 marine species worldwide. Segmented worms are the most complex group of marine worms, with a well-developed respiratory and gastrointestinal system. Different species of segmented worms may be highly mobile or burrow

in the seafloor. Most segmented worms are predators; others are scavengers, deposit feeders, filter feeders, or suspension feeders of sand, sediment, and water.

The variety of feeding strategies and close connection to the seafloor make Annelids an integral part of the marine food web. Burrowing in the seafloor and agitating the sediment increases the oxygen content of the seafloor and makes important buried nutrients available to other organisms. This ecosystem service allows bacteria and other organisms, which are also an important part of the food web, to flourish on the seafloor. Segmented worms are found throughout the affected environment inhabiting rocky, sandy, and muddy areas of the seafloor (DON 2013).

3.6.4.8 Bryozoans (Phylum Bryozoa)

Bryozoans are small lace-like, colony-forming animals. Bryozoans attach to a variety of surfaces, including rocks, shells, wood, and algae, and feed on particles suspended in the water. Bryozoans are found throughout the affected environment. As a biofouling organism, bryozoans can interfere with boat operations and clog industrial water intakes and conduits (DON 2013).

3.6.4.9 Squid, Bivalves, Sea Snails, Chitons (Phylum Molluska)

Approximately 27,000 marine species are classified in the Phylum Molluska. Octopus and squid (cephalopods), sea snails and slugs (gastropods), clams and mussels (bivalves), and chitons (polyplacophorans) are mollusks with a muscular organ called a foot, which is used for mobility. Sea snails and slugs eat fleshy algae and a variety of invertebrates, including hydroids, sponges, sea urchins, worms, and small crustaceans, as well as detritus. Clams, mussels, and other bivalves feed on plankton and other suspended food particles. Chitons use rasping tongues, known as radula, to scrape food (algae) off rocks. Squid and octopus are active swimmers at all depths, and use a beak to prey on a variety of organisms, including fish, shrimp, and other squids. Octopuses mostly prey on fish, shrimp, eels, and crabs. Important commercial, ecological, and recreational species of Molluska in the affected area include various species of squid, the endemic cuttlefish (*Euprymna scolopes*), bivalves (clams and mussels), and limpets (*Cellana exarata* and *Cellana sandwicensis*), also called opihi (DON 2013).

3.6.4.10 Shrimp, Crab, Lobster, Barnacles, Copepods (Phylum Arthropoda)

Shrimp, crab, lobster, barnacles, and copepods are animals with skeletons on the outside of their body. Shrimp, crabs, and lobsters are typically carnivorous or omnivorous predators or scavengers, preying on mollusks (primarily gastropods, such as limpets, sea snails and slugs), other crustaceans, echinoderms (such as starfish, urchins, and sea cucumbers), small fish, algae, and sea grass. Barnacles and copepods feed by filtering algae and small organisms from the water. The Hawaiian spiny lobster is an important commercial, ecological, and recreational species of Crustacea in the affected environment (DON 2013).

3.6.4.11 Sea Stars, Sea Urchins, Sea Cucumbers (Phylum Echinodermata)

Phylum Echinodermata has over 6,000 marine species, such as sea stars, sea urchins, and sea cucumbers. Sea stars (asteroids), sea urchins (echinoids), sea cucumbers (holothuriods), brittle stars and basket stars (ophuiroids), and feather stars and sea lilies (crinoids) are symmetrical around the center axis of the body. Many echinoderms are either scavengers or predators on organisms that do not move, such as algae, stony corals, sponges, clams, and oysters. Some species filter food particles from sand, mud, or water. Important commercial, ecological, and

recreational species of echinoderm in the affected area include helmet urchins, the burrowing sea urchin (*Echinometra mathaei*), sea cucumbers, and sea stars (DON 2013).

3.6.5 Marine Vegetation

This section provides an overview of marine vegetation found in the affected environment. Marine vegetation in the coastal waters of O‘ahu includes planktonic forms, larger marine algae (seaweed) and vascular plants (seagrass). No ESA listed species are found in the affected environment (DON 2013). The major taxonomic groups consist of five groups of marine algae and one group of flowering plants (Table 7).

Table 7. Marine Vegetation Groups in the Affected Environment.

Marine Vegetation Group		Presence in Affected Environment	
Common Name (Species Group)	**Description**	**Open Ocean**	**Coastal Waters**
Dinoflagellates (phylum Dinophyta)	Most are photosynthetic single-celled algae that have two whip-like appendages (flagella); Some live inside other organisms. Some produce toxins that can result in red tides or ciguatera poisoning.	Sea surface	Sea surface
Blue-green algae (phylum Cyanobacteria)	Many form mats that attach to reefs and produce nutrients for other marine species through nitrogen fixation.	Sea surface	Seafloor
Green algae (phylum Chlorophyta)	Marine species occur as unicellular algae, filaments, and large seaweeds.	None	Sea surface, seafloor
Diatoms, brown and golden-brown algae (phylum Heterokontophyta)	Single-celled algae that form the base of the marine food web; brown and golden-brown algae are large multi-celled seaweeds that form extensive canopies, providing habitat and food for many marine species.	Sea surface	Sea surface, seafloor
Red algae (phylum Rhodophyta)	Single-celled algae and multi-celled large seaweeds; some form calcium deposits.	Sea surface	Seafloor
Seagrass, cordgrass, and mangroves (phylum Spermatophyta)	Flowering plants, which are adapted to salty marine environments in mudflats, marshes, intertidal and subtidal coastal waters, providing habitat and food for many marine species.	None	Seafloor

Factors that influence the distribution and abundance of vegetation in the affected environment are the availability of light and nutrients, water quality, water clarity, salinity level, seafloor type (important for rooted or attached vegetation), currents, tidal schedule, and temperature. In the marine photic zone, marine algae and flowering plants provide oxygen, food, and habitat for many organisms (DON 2013).

Environmental stressors on marine vegetation are products of human activities (industrial, residential, and recreational) and natural occurrences. Human-made stressors that act on marine vegetation include excessive nutrient input (pollutants, such as fertilizers), siltation (the addition of fine particles to the ocean), pollution (oil, sewage, and trash), climate change, shading from structures, habitat degradation from construction and dredging, and invasion by exotic species. The great diversity of algae makes generalization difficult but, overall, algae are resilient and colonize disturbed environments (DON 2013).

3.6.5.1 Dinoflagellates (Phylum Dinophyta)

Dinoflagellates are predominantly marine algae, with an estimated 1,200 species living in surface waters of the ocean worldwide. Most dinoflagellates can use the sun’s energy to produce food through photosynthesis and also can ingest small food particles. Photosynthetic dinoflagellates

are important primary producers in coastal waters. Organisms such as zooplankton (microscopic animals that drift passively in the water column), feed on dinoflagellates.

Dinoflagellates are also valuable for their close relationship with reef-building corals. Some species of dinoflagellates (zooxanthellae) live inside corals. This mutually beneficial relationship provides shelter and food (in the form of coral waste products) for the dinoflagellates; in turn, the corals receive essential nutrients produced by dinoflagellates (DON 2013).

3.6.5.2 Blue-Green Algae (Phylum Cyanobacteria)

Blue-green algae are key primary producers in the marine environment, and provide valuable ecosystem services such as producing oxygen and nitrogen. The blue-green algae Prochlorococcus is responsible for a large part of the oxygen produced globally by photosynthetic organisms. Other species of blue-green algae have specialized cells that convert nitrogen gas into a form that can be used by other marine plants and animals (nitrogen fixation). In nutrient-poor waters of coral reef ecosystems in the Hawaiian archipelago in the Hawaiian portion of the affected environment, blue-green algae are an important source of food. Coral reefs in Hawaii exposed to physical and biological disturbance may be colonized by highly productive or invasive blue-green algae that may persist if animals that feed on them are not present (DON 2013).

3.6.5.3 Green Algae (Phylum Chlorophyta)

Green algae are important primary producers that play a key role at the base of the marine food web. Green algae are found in areas with a wide range of salinity, such as bays and estuaries, and are eaten by various organisms, including zooplankton and snails. Green seaweeds harvested for human consumption in Hawaii's coastal waters include *Ulva fasciata*, *Enteromorpha prolifera,* and *Codium edule* Invasive green algae represent a serious threat to coral reefs, and may displace, outcompete, or hybridize with non-invasive native green algae species, resulting in the loss of native biodiversity or alteration of ecosystem processes. Green algae are a valuable food source for green sea turtles (DON 2013).

3.6.5.4 Diatoms, Brown and Golden-brown Algae (Phylum Heterokontophyta)

Brown and golden-brown algae are single-celled (diatoms) and large multi-celled marine species with structures varying from fine filaments to thick leathery forms. Most species are attached to the seafloor in coastal waters, although a free-floating type of brown algae (*Sargassum*) occurs in the affected environment (DON 2013).

3.6.5.5 Red Algae (Phylum Rhodophyta)

Red algal species exist in a range of forms, including single and multicellular forms, from fine filaments to thick calcium carbonate crusts. Within the affected environment, they occur in coastal waters, primarily in reef environments. Representative native species in Hawaii include *Laurencia* spp., *Gracilaria coronopifolia*, *Hypnea cervicornis*, and *Gracilaria parvispora*. Many Rhodophyta species support coral reefs by hardening the reef and by cementing coral fragments, and are food for various sea urchins, fishes, and chitons (DON 2013).

3.6.5.6 Seagrass, Cordgrass and Mangrove

Seagrasses are submerged aquatic vegetation that form extensive underwater meadows (or beds). They are a group of approximately 60 species and are found in shallow-water depths and various temperatures and salinity ranges throughout many parts of the world and are among the most

productive habitats in the ocean. Hawaiian seagrass is a native species found at 1.6–3.1 ft (0.5–0.9 m) in subtidal, sandy areas surrounding reefs, in bays, or in fishponds. It occurs in coastal waters of Oahu near Mamala Bay (southern coast), in Maunalua Bay (southeastern coast), in Kaneohe Bay (northeast coast), in coastal waters of Maui, in the inner reef flats of southern Molokai, at ‘Anini Beach on the northern shore of Kauai, and at Midway Atoll in the Northwestern Hawaiian Islands (DON 2013).

Two seagrass species have been identified in O‘ahu waters: *Halophila hawaiiana* and *H. dicepiens*. *H. hawaiiana* is found predominantly in sandy protected shallows. This species is declining due to its restricted depth range, invasive algal species such as *Avrainvillea amadelpha* and shoreline development (IUCN 2010b). *H. decipiens*, similar to *H. hawaiiana*, is reported on O‘ahu at depths to 6.6 ft (2.0 m) (McDermid et al. 2002; IUCN 2010a). Neither species are likely to be found along the southwest coast of O‘ahu off Barber’s Point, as this area is not a typical seagrass habitat of shallow protected lagoons and shorelines.

Mangroves are a group of woody plants that have adapted to salt water flooded environments with tidal and salinity fluctuations in the tropics and subtropics. Since the introduction of this species to Hawai‘i, mangroves have invaded intertidal areas formerly devoid of trees. The red mangrove, considered to be an invasive species in the main Hawaiian Islands, is well established in the MHI (DON 2013). There are no mangroves found within the affected environment as the affected environment is rocky and not conducive to mangrove establishment.

3.6.6 Seabirds

Seabirds are a diverse group that are adapted to living in marine environments and use coastal (nearshore) waters, offshore waters (continental shelf), or open ocean areas. Many seabirds spend most of their lives at sea and come to land only to breed, nest, and occasionally rest. Most species nest in groups (colonies) on the ground of coastal areas or oceanic islands, where breeding colonies number from a few individuals to thousands.

The Hawaiian Islands are important habitat for seabirds. Despite low levels of localized production, recent research estimates that 15 million seabirds inhabit the Hawaiian Islands; 22 species of seabirds regularly nest in the Hawaiian Islands, and many more pass through during migration to and from their breeding grounds elsewhere in the Pacific. The entire world populations of Hawaiian petrels and Newell’s shearwaters and more than 95 percent of the world’s Laysan and black-footed albatrosses nest in the NWHI (DON 2013).

Most of the seabird species found within the affected environment would dive, skim, or grasp prey at the water’s surface or within the upper portion 3.3 to 6.6 ft (1 to 2 m) of the water column (DON 2013). Foraging strategies are species specific such as plunge-diving or pursuit diving. Plunge-diving, as utilized by terns and pelicans, is a foraging strategy in which the bird hovers over the water and dives into the water to pursue fish. Diving behavior in terns is limited to plunge-diving during foraging and in general, tern species do not usually dive deeper than 3 ft (0.9 m) (DON 2013). Pursuit divers, a common foraging strategy of seabirds of the Family Alcidae, usually float on the water and dive under to pursue fish and other prey. They most commonly eat fish, squid, and crustaceans (DON 2013).

This section introduces the three major taxonomic groups of seabirds that occur in the affected environment (Table 8). Representatives of these three groups are found in the open ocean and

protected bays, estuaries and rivers. These seabirds, in general, are present in the air, at the water surface and beneath the water surface (DON 2013).

Table 8. Descriptions and Examples of Major Taxonomic Groups of Seabirds in the Affected Environment.

Major Seabird Group		Presence in Affected Environment	
Common Name (Species Group)	**Description**	**Open Ocean**	**Bays, Estuaries and Rivers**
Albatrosses, petrels, shearwaters, and storm-petrels (Order Procellariiformes)	Group of largely pelagic seabirds, fly nearly continuously when at sea, soar low over the water surface to find prey, some species dive below the surface	Airborne, surface, water column	Airborne, surface, water column
Tropicbirds, boobies, pelicans, cormorants, and frigatebirds (Order Pelecaniformes)	Diverse group of large, fish-eating seabirds with four toes joined by webbing, often occur in large flocks near high concentrations of bait fish.	Airborne, surface, water column	Airborne, surface, water column
Phalaropes, gulls, noddies, terns, skua, jaegers, and alcids (Order Charadriiformes)	Diverse group of small to medium sized shorebirds, seabirds and allies inhabiting coastal, nearshore, and open-ocean waters	Airborne, surface, water column	Airborne, surface, water column

Threats to seabird populations in the affected environment include human-caused stressors such as incidental mortality from interactions with commercial and recreational fishing gear, predation by introduced species, disturbance and degradation of nesting areas by humans and domesticated animals, noise pollution from construction and other human activities, nocturnal collisions with power lines and artificial lights, collisions with aircraft, and pollution, such as that from oil spills and plastic debris. Disease, volcanic eruptions, storms, and harmful algal blooms are also threats to seabirds. In addition, seabird distribution, abundance, breeding, and other behaviors are affected by cyclical environmental events, such as the El Niño Southern Oscillation and Pacific Decadal Oscillation in the Pacific Ocean (DON 2013).

3.6.6.1 Albatrosses, Petrels, Shearwaters, and Storm-Petrels (Order Procellariiformes)

The Procellariiformes is a large Order of open ocean seabirds. These species are generally long-lived, breed once a year, and lay only one egg. They have extremely broad distributions and include all marine birds that spend most of their lives at sea and exclusively feed in the open ocean, primarily on fish, crustaceans, and crabs. Some species feed around fishing boats or become injured from longline gear. They nest in colonies on remote islands uninhabited by people. Representative species include Laysan albatross, Northern fulmar, mottled petrel, pink-footed shearwater, and Wilson's storm-petrel. Three of these species are protected under the ESA: short-tailed albatross, Hawaiian petrel and Newell's shearwater.

3.6.6.2 Tropicbirds, Boobies, Pelicans, Cormorants, and Frigatebirds (Order Pelecaniformes)

The Pelecaniformes Order includes anhingas, pelicans, gannets and boobies, tropicbirds, cormorants, and frigatebirds. There are 14 species representing five families that occur in the affected environment, all having webbed feet and eight toes, and all have a throat sac, called a gular sac (DON 2013). This sac is highly developed and visible in pelicans and frigatebirds but is also readily apparent in boobies and cormorants. Pelicans use the sac to trap fish, frigatebirds use it as a mating display and to feed on fish, squid, and similar marine life, and cormorants and

boobies utilize the sac for heat regulation. These birds nest in colonies, but individual birds are monogamous (DON 2013). Representative species within the affected environment include white-tailed tropicbird, boobies and frigatebirds.

3.6.6.3 Phalaropes, Gulls, Noddies, Terns, Skua, Jaegers, and Alcids (Order Charadriiformes)

Species in the Order Charadriiformes occupy diverse habitats. Some species in this Order spend most of their time at sea (e.g., jaegers, skuas, alcids), whereas others are more coastal or near shore (e.g., gulls). Many charadriiforms inhabit marine and freshwater wetlands; others spend most of their lives in or near the ocean. Many species breed in colonies, and some species lay more than one egg (DON 2013). Representative species within the affected environment include gulls, black noddy, Arctic and white terns, South polar skua, and pomerine jaeger.

3.6.7 Threatened and Endangered Marine Species

ESA-listed marine species that might occur within the affected environment and/or during the given timeframe are listed in Table 9. Critical habitat for the Hawaiian monk seal has been proposed within the project area.

Table 9. ESA-Listed Marine Species within the Affected Environment

Common name	Status / Critical Habitat	Taxon	Likelihood of Presence in the Affected Environment
Mammals			
Hawaiian monk seal	E / Proposed Critical Habitat	*Monachus schauinslandi*	Individuals likely present and critical habitat proposed in the area
Humpback whale	E	*Megaptera novaeangliae*	Humpback whales seasonally present November through April. The system installation would occur outside of humpback season, but humpback whales could interact with the system after it is installed.
False killer whale (Insular Hawaiian DPS)	E	*Pseudorca crassidens*	Likely present
Reptiles			
Green sea turtle	T	*Chelonia mydas*	Likely present
Hawksbill sea turtle	E	*Eretmochelys imbricata*	Likely present

3.6.7.1 Humpback Whale

Humpback whales are designated as depleted under the MMPA and listed as endangered under the ESA. Based on evidence of population recovery in many areas, the species is being considered by NMFS for removal or downlisting from the United States Endangered Species List. Humpback whales in the affected area are of the Central North Pacific stock, consisting of winter and spring populations of the Hawaiian Islands that migrate to northern British Columbia and Alaska, the Gulf of Alaska, the Bering Sea, and Aleutian Islands (DON 2013).

The Central North Pacific stock of humpback whales occurs throughout known breeding grounds in the Hawaiian Islands during winter and spring (November through April). Peak occurrence is from late February through early April, with a peak in acoustic detections in March. During this

time period, primary occurrence is expected from the coast to 50 nm offshore. The greatest densities of humpback whales (including calves) are in the four-island region consisting of Maui, Molokai, Kahoolawe, and Lanai, as well as Penguin Bank and around Kauai. Sightings of humpback whales are relatively low in the affected environment as reported by the Hawaiian Islands Humpback Whale National Marine Sanctuary (Figure 8).

Entanglement in fishing gear poses a threat to individual humpback whales throughout the Pacific, including Hawai‘i. Humpback whales, especially calves and juveniles, are vulnerable to ship strikes. Younger whales spend more time at the surface, are less visible, and are found closer to shore, thereby making them more susceptible to collisions. No reports of ship collisions with humpback whales have been attributed to Navy vessels. Humpback whales are potentially affected by loss of habitat, loss of prey (for a variety of reasons including climate variability), underwater noise, and pollutants.

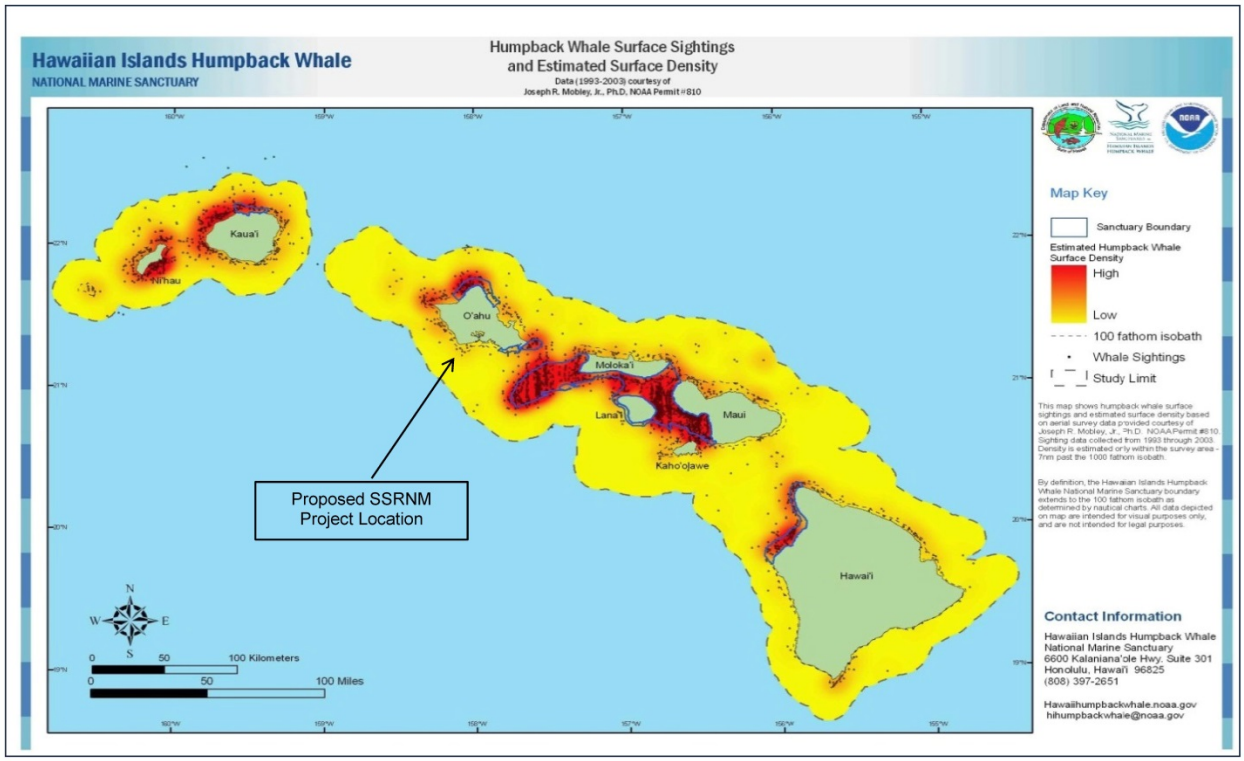


Figure 8. Humpback Whale Surface Sightings 1993-2003. Retrieved from [http://hawaiihumpbackwhale.noaa.gov/documents/images/whaledensityl.jpg 2/12/2013](http://hawaiihumpbackwhale.noaa.gov/documents/images/whaledensityl.jpg)

3.6.7.2 False Killer Whale

The NMFS currently recognizes three stocks of false killer whale in Hawaiian waters: the Hawaii pelagic stock, the Northwestern Hawaiian Islands stock, and the Main Hawaiian Islands insular stock. The Main Hawaiian Islands insular stock, which might be present in the affected area was listed as endangered under the ESA in 2012.

A documented historic decline has been the result of various non-Navy factors that include the small population size of this stock, evidence of decline of the local Hawaii stock, and incidental take by commercial fisheries. Based on recent estimates, approximately eight false killer whales from the Main Hawaiian Islands insular and Hawaii Pelagic stocks are killed or seriously injured by commercial longline fisheries each year (DON 2013).

False killer whales feed primarily on deep-sea cephalopods and fish (Odell and McClune 1999). They prefer larger fish species, such as mahi mahi and tunas. This species is believed to be preyed on by large sharks and killer whales. In Hawaiian waters, false killer whales are particularly susceptible to fishery interactions and entanglements (DON 2013).

3.6.7.3 Hawaiian Monk Seal

The Hawaiian monk seal is a pinniped endemic to the Hawaiian Islands, listed as an endangered species under the ESA in 1976 (NOAA 2013b). They are a member of the "true seal" Family (Phocidae), with silvery-grey-colored backs and lighter creamy coloration on their underside; newborns are black. Approximately 1,100 Hawaiian monk seals remain, but the population is declining.

Monk seals primarily occur around the Northwest Hawaiian Islands (NWHI), with the population's six main reproductive sites occurring on Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island and French Frigate Shoals. Smaller breeding sub-populations occur on Necker Island and Nihoa Island. Designated critical habitat for the Hawaiian monk seal includes all beach areas, lagoon waters, and ocean waters out to a depth of 20 ftm (36.5 m, 119.8 ft) around Kure Atoll, Midway Islands (except Sand Island), Pearl and Hermes Reef, Lisianski Island, Laysan Island, Gardner Pinnacles, French Frigate Shoals, Necker Island, Nihoa Island, and Maro Reef (NOAA 2013b).

In 2010 only about 153 individuals were present in and around the Main Hawaiian Islands (MHI), with 30 to 40 individuals identified on O‘ahu annually (NOAA 2010a). Monk seals are generally solitary and do not appear to be territorial on land. They are generalist benthic feeders; prey includes fish, cephalopods and crustaceans. NOAA has proposed extending the critical habitat around the MHI, including the ocean and terrestrial areas around O‘ahu (NOAA 2013b). Additional detail about the species and its distribution can be found in the HSTT EIS/OEIS (DON 2013).

3.6.7.4 Hawaiian Monk Seal Proposed Revised Critical Habitat

With the exception of the Kalaeloa Commercial Harbor, the Barbers Point area and the western shoreline along Nānākuli is proposed for designation as revised critical habitat (PRCH) for Hawaiian monk seals. PRCH would include a 16 ft (5 m) shoreline zone and ocean waters out to the 1,640 ft (500 m) contour (Figure 9). The proposed cable landing at the FTEC shore station at Barbers Point is the only part of the affected environment that is within PRCH. In the recently-proposed critical habitat revision, NOAA notes that the ocean areas off Barbers Point, extending into the FORACS are "utilized frequently" by Hawaiian monk seals (NOAA 2013b), and the area is a known haul out site. The area is thought to provide three of the six habitat features identified as essential in the proposed rule to designate PRCH (76 FR 32026): (3) Marine areas from 0 to 500 meters in depth preferred by juvenile and adult monk seals for foraging; (5) Marine areas with adequate prey quantity and quality; and (6) Significant areas used by monk seals for hauling out, resting, or molting. The other three features (1) Areas characteristics

preferred by monk seals for pupping and nursing; (2) Shallow sheltered aquatic areas adjacent to locations preferred by monk seals for pupping and nursing; and (4) Areas with low levels of anthropogenic disturbance are not found within the affected environment. No pupping is known to occur in the area, the nearshore waters are inconsistent with preferred weaning habitat as described in the proposed rulemaking, and the Campbell Industrial Park, Kalaeloa Air Field, and the Ko'olina resort complex occupy the majority of the Barbers Point area.

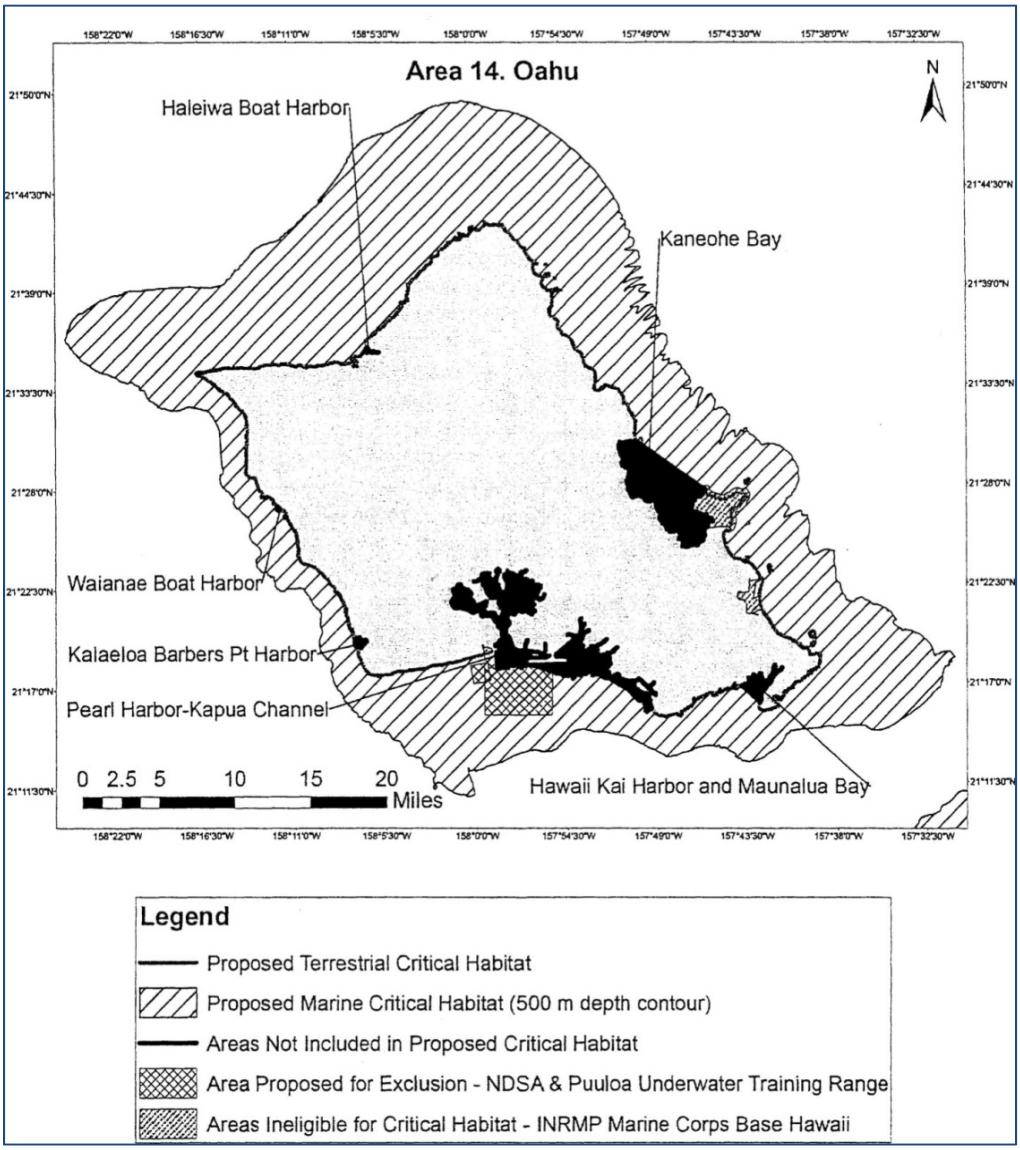


Figure 9. Hawaiian Monk Seal Proposed Critical Habitat around O'ahu (NOAA 2011)

3.6.7.5 Green Sea Turtle

The green sea turtle is found in tropical and subtropical coastal and open ocean waters, between the 30 degrees of latitude, both north and south. Major nesting beaches are found throughout the

western and eastern Atlantic, Indian, and western Pacific Oceans, and are found in more than 80 countries worldwide (DON 2013).

The green sea turtle is the most common sea turtle species in Hawai‘i, occurring in the coastal waters of the main Hawaiian Islands throughout the year and commonly migrating seasonally to the NWHI to reproduce. The first recorded green sea turtle nest on the Island of Hawaii occurred in 2011. Green sea turtles are found in inshore waters around all of the main Hawaiian Islands and Nihoa Island, where reefs, their preferred habitats for feeding and resting, are most abundant. They are also common in an oceanic zone surrounding the Hawaiian Islands. This area is frequently inhabited by adults migrating to the Northwestern Hawaiian Islands to reproduce during the summer and by ocean-dwelling individuals that have yet to settle into coastal feeding grounds of the main Hawaiian Islands. Farther offshore, green sea turtles occur in much lower numbers and densities (DON 2013).

The green sea turtle was listed as threatened in Hawaii under the ESA in 1978 (NOAA 2014a). The green sea turtle is the largest of the hard-shelled sea turtles, growing to a maximum length of approximately 4 ft (1.2 m) and weighing up to 440 lb (200 kg). Adults are herbivorous, feeding on sea-grasses, sea lettuce, and algae (DON 2013). The Hawaiian green sea turtle is genetically distinct from other green sea turtle populations, nesting primarily in French Frigate Shoals of the NWHI and feeding in the coastal areas of the MHI. The Hawaiian green sea turtle population has been recognized by NOAA as a distinct population segment that has increased in abundance and that delisting might be appropriate (NOAA 2012; NOAA 2014a). No critical habitat is designated around Hawai’i (NOAA 2014a).

Green turtles are known to occur in the affected environment and are known to bask at Paradise Cove, northwest of Barbers Point. No nesting sites have been identified in the affected environment (Parker and Balazs 2010).

Threats can include:

- Harvest of eggs and adults
- Incidental capture in fishing gear
- Fibropapillomatosis disease
- General threats to marine turtles: debris and pollution

3.6.7.6 Hawksbill Sea Turtle

The hawksbill sea turtle has been listed as endangered under the ESA since 1973. The hawksbill sea turtle grows to a length of 25 to 35 in (63.5 to 89 cm), with a corresponding weight of 100 to 150 lb (45 to 60 kg). The carapace has “tortoiseshell” coloration, ranging from dark to golden brown, with streaks of orange, red, or black. The head of the hawksbill sea turtle is elongated and tapers to a beak-like mouth, from which the species gets its name. The shape of the mouth allows it to reach into holes and crevasses of coral reefs to find sponges, which are the primary food source for adults (NOAA 2013a). Hawksbill sea turtles are solitary nesters, making the development of a population estimate or trend from nesting beaches difficult.

Hawksbills are the second-most-common species in the offshore waters of the Hawaiian Islands, yet they are far less abundant than green sea turtles (DON 2013), but are likely present in the affected environment. The lack of hawksbill sightings during aerial and shipboard surveys likely reflects the species’ small size and difficulty in identifying them from a distance. Hawksbill turtles are migratory, returning to their natal beaches every two to three years to lay eggs along

the beach. Only a few hawksbill turtles were nesting in the MHI as of 1998 (NOAA and USFWS 1998) and no hawksbill nests have been documented on the leeward shore of O‘ahu (Parker and Balazs 2010). They are known to nest on only beaches of the main islands, primarily along the south coast of Hawaii and the east end of Molokai. There is no critical habitat in Hawaii.

In O‘ahu waters, the following threats exist (NOAA and USFWS 1998):

- Directed take for shell value
- Natural disasters such as hurricanes and tsunamis
- Algae/seagrass/reef degradation due to coastal construction, sedimentation and non-point source pollution
- Environmental contaminants near developed shorelines
- Debris (entangle/ingest) such as discarded fishing gear, plastic bags, “6-pack” rings, Styrofoam, etc.
- Boat collisions
- Marina/dock development

3.7 Terrestrial Biology

The affected environment on shore is the FTEC compound, surrounding property owned by the US Coast Guard and adjacent properties. The FTEC compound is administered by the Navy under license to the US Coast Guard and is surrounded on the north, east and south by US Coast Guard property. Property contiguous with the USCG property to the west is owned by the City and County of Honolulu. Germaine’s Luau manages the land to the east. Land use in the area is zoned as industrial (City and County of Honolulu 2013).

3.7.1 Plants and Animals

Most vegetation in, and immediately surrounding the FTEC has been removed. Between the FTEC and Germaine’s Luau, the area is crossed with access roadways and packed sand pathways. The Coast Guard described the plants found in several patches of native and non-native low coastal vegetation in the area immediately east of the FTEC. These include native species *Heliotropium curassavicum* (nena), *Portulaca lutea* (‘ihi), *Sesuvium protulacastrum* (akulikuli), *Jacquemontia ovalifolia* subsp. *sandwicensis* (pa‘uohiiaka), and non-native species *Portulaca pilosa*, and *Youngia japonica*. Around the Barbers Point lighthouse and near the rocky shore, vegetation includes small tress and compact shrubs such as native species *Scaevola taccada* (naupaka), *Hibiscus tiliaceus* (hau), *Sesuvium protulacastrum* (akulikuli), *Jacquemontia ovalifolia* subsp. *sandwicensi*s (pa‘uohiiaka) and non-native species *Pluchea indica* (Indian fleabane), *Prosopis pallida* (kiawe), *Batis maritima* (pickleweed) and *Nicotiana glauca* (tree tobacco). No noxious weeds were found on this site (USCG 2013).

Fauna include feral cats and dogs, Indian mongoose (*Herpestes javanicus*), rodents and small reptiles such as lizards (DON 1998). Also likely to be found at this site are arthropods such as ants, wasps, carpenter bees and giant centipede (Imada et al. 2010).

3.7.2 Threatened and Endangered Terrestrial Species

All ESA-listed terrestrial species that might occur within the affected environment are listed in Table 10. Based on survey records and available data for the affected environment, of the species, only the ‘Ewa hinahina and Ōpe‘ape‘a have been actually observed within or are likely

to occur within or adjacent to the affected environment. Critical habitat for the ‘Ewa hinahina exists within the affected environment.

Short Tailed Albatross, Newell's Shearwaters, and Hawaiian Petrels are very rare in near-shore and coastal areas of Oahu and these species would also not be expected to occur within the project area, and will therefore not be carried forward for detailed analysis.

Table 10. ESA-Listed Terrestrial Species within the Affected Environment and Likelihood of Occurrence

Common name	Status / Critical Habitat	Taxon	Likelihood of Presence in the Affected Environment
Mammals			
Hawaiian hoary bat (Ōpe‘ape‘a)	E	*Lasiurus cinereus semotus*	Possibly but unlikely; might migrate to shore from Waianae range
Plants			
Round-leaved chaff-flower (‘Ewa hinahina)	E / Critical Habitat	*Achyranthes splendens* var. *rotundata*	Individual plants not present, critical habitat present

3.7.2.1 ‘Ewa Hinahina

The Round-leaved chaff-flower, or ‘Ewa hinahina (*Achyranthes splendens* var. *rotundata*) is an endemic shrub listed as endangered in 2012. It occurs naturally at low elevations, generally from sea level to 100 ft, in open, dry areas. Achyranthes splendens is well adapted to low rainfall areas and requires very little moisture, if any, once it has become established (Duvauchelle 2010).

The ‘Ewa hinahina has been identified near the FTEC in the past, although no individuals of this plant have been observed in the affected area since the mid 1990’s. The USCG and Navy have established a fenced, 1.5 ac (0.6 ha) Achyranthes Management Area (AMA) just north of the FTEC access road to preserve the ‘Ewa hinahina and its habitat. The HDD construction activity would be located ≥60 ft (≥18 m) to the south of the AMA and separated from the AMA by the FTEC access road. The AMA would not be affected.

The Coast Guard has prepared a Restoration and Management Plan for the Barbers Point Lighthouse Site that covers USCG lands, including the FTEC compound and the construction site for this Action (USCG 2013). Although the ‘Ewa hinahina is not now found in the affected area – neither in the AMA nor in the FTEC or adjacent property – the Management Plan was prepared for Navy and other users to follow in restoring the site to critical habitat within the Coast Guard’s jurisdiction.

A confirming field survey of the FTEC site conducted by Navy biologists in 2014 found no ‘Ewa hinahina plants within the proposed limits of construction for the Action. There are no threatened or endangered animals or habitat reported for the FTEC.

The 4 ac (2 ha) O‘ahu critical habitat Coastal Unit 14 has been designated as critical habitat for the ‘Ewa hinahina and several other threatened or endangered species (USFWS 2012). As described in the 2012 listing, Coastal Unit 14 contains a proper mixture of vegetation associations and moisture regime to support listed species. It also contains “unoccupied habitat that is essential to the conservation of this species by providing the [resources] necessary for the expansion of the existing wild populations” (USFWS 2012). The USCG has prepared a

Restoration and Management Plan for the Barbers Point Lighthouse Site which considers habitat restoration for all the listed species by focusing on elimination of non-native plants and restoration of native plant associations (USCG 2013).

3.7.2.2 Ōpeʻapeʻa

The Hawaiian hoary bat, or Ōpeʻapeʻa (*Lasiurus cinereus semotus*) was listed as endangered in 1970. It is a nocturnal mammal historically observed throughout the MHI, but now only regularly observed on Hawaiʻi, Kauaʻi and Maui. The Ōpeʻapeʻa forages on insects in open areas near forests and over open water. It roosts during the day in native and non-native tree foliage. The Ōpeʻapeʻa pups during late summer and early fall, typically producing a pair of twins.

Decline in the population on Oʻahu is thought to be related to the loss of native tree cover during the late 1800's. This is especially relevant for the Barbers Point – Campbell Industrial Park area that has been disturbed with agriculture, urbanization and industrialization activities throughout the past century. Threats to species recovery include loss of habitat, particularly roosting sites, possibly pesticides, introduced insects and disease (USFWS 1998).

Observations of the Ōpeʻapeʻa have been reported in the on the eastern side of Oʻahu in the Koʻolau mountain range and, to a lesser extent the Waiʻanae mountain range. Department of the Army natural resource studies indicate this species is observed more often in August and September and might forage in coastal areas near the forested mountain areas (USFWS 1998; USFWS 2011; DOA 2012). Recent observations reported in these studies indicate a wider distribution on Oʻahu than do historical observations. There are no recorded observations of the Ōpeʻapeʻa at or near the FTEC. There are some trees in the area, however, that might serve as roosting sites, especially in the AMA to the north. There are no trees in the FTEC. The distance between the Waianae range and the affected environment crosses the heavily industrialized Campbell Industrial Park and urbanized ʻEwa plain area to reach the Barbers Point area. Based on available information, it is possible, but unlikely the Ōpeʻapeʻa occurs in the affected environment.

3.8 Essential Fish Habitat

Following an ecosystem approach, the WPRFMC has designated EFH for five fishery management units (FMU) in the Hawaiian Islands:

- Pelagics
- Bottomfish
- Crustaceans
- Deep Sea and Precious Corals
- Coral Reef Ecosystems

The Hawaiian Islands FEP (Western Pacific Regional Fishery Management Council 2009b) defines the EFH for bottomfish, crustacean and precious coral management unit species (MUS). These include only species that are known to be present within EEZ waters around the Hawaiʻi Archipelago. The Pelagic FEP defines the EFH for pelagic species as all areas of pelagic fishing operations in the EEZ or high seas, for any domestic fishing vessels that ship or land Pacific MUS. Although, some pelagic MUS are known to occur within the boundary of the Hawaiian

Islands FEP, they are managed under the separate Pelagic FEP (Western Pacific Regional Fishery Management Council 2009a).

The affected environment coincides with the EFH for all five FMUs (Table 11). Further, as defined by the Hawai‘i Archipelago FEP, the affected environment coincides with a bottomfish Habitat Area of Particular Concern (HAPC) on the seafloor bottom as it slopes from the reef crest to 918 ft (280 m). Table 11 presents the definitions of the EFH and HAPC for each management unit. No pelagic, crustacean or precious coral HAPCs coincide with the affected area. Because the affected environment covers a long distance, extending below the epipelagic and into the mesopelagic zone, different action components would affect different EFHs. Because the FEP treats seamounts separately, it is important to recognize that there are no seamounts within the affected environment, so they are not included in the discussion here. Table 11 also presents postulated association between certain Action components and EFH and HAPC.

Table 11. Essential Fish Habitat (EFH) and Habitats of Particular Concern (HAPC) Intersecting the Affected Environment

Management Unit	EFH	EFH Intersects Affected Environment	HAPC	HAPC Intersects Affected Environment	Action Component Potentially Affecting EFH
Pelagic	Eggs and Larvae: the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 656 ft (200 m)	Yes	Water column down to 3,280 ft (1,000 m) that lies above seamounts and banks	No	Conduit exit Diver-assist trunk cable Vessel-laid trunk cable
Bottomfish	Eggs and larvae: the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 1,310 ft (400 m) Juvenile/adults: the water column and all bottom habitat extending from the shoreline to a depth of 1,310 ft (400 m)	Yes	All slopes and escarpments between 130 and 920 ft (40 and 280 m)	Yes	Conduit exit Diver-assist trunk cable Vessel-laid trunk cable
Crustaceans	Spiny Lobster: Eggs and larvae: the water column from the shoreline to the outer limit of the EEZ down to a depth of 490 ft (150 m) Juvenile/adults: all of the bottom habitat from the shoreline to a depth of 330 ft (100 m)	Yes	All banks in the Northwest Hawaiian Islands with summits less than or equal to 100 ft (30 m) from the surface	No	Conduit exit Diver-assist trunk cable Vessel-laid trunk cable
	Deepwater shrimp: Eggs and larvae: the water column and associated outer reef slopes between 1,805 and 2,295 ft (550 and 700 m) Juvenile/adults: the outer reef slopes at depths between 985 and 2,295 ft (300 and 700 m)	Yes	No HAPC designated for deepwater shrimp.	Not applicable	Vessel-laid trunk cable
Precious Corals	Shallow-water precious corals 60 – 300 ft (45 – 91 m): EFH has also been designated for three beds known for black corals in the Main Hawaiian Islands between Milolii and South Point on the Big Island, the Auau Channel, and the southern border of Kauai Deep-water precious corals 450 – 4,500 ft (150 to 750 fm): EFH for Precious Corals is confined to six known precious coral beds located off Keahole Point, Makapuu, Kaena Point, Wespac bed, Brooks Bank, and 180 Fathom Bank	Yes	The Auau Channel is a HAPC for shallow water black corals The Makapuu bed, Wespac bed, Brooks Banks bed are HAPCs for deep water precious corals	No	Hydrophone array and umbilical anchors Vessel-laid trunk cable
Coral Reef Ecosystems (CRE)	EFH for the Coral Reef Ecosystem MUS includes the water column and all benthic substrate to a depth of 330 ft (100 m) from the shoreline to the outer limit of the EEZ	Yes	Includes all no-take Marine Protected Areas identified in the CRE-FMP, all Pacific remote islands, as well as numerous existing Marine Protected Areas, research sites, and coral reef habitats throughout the western Pacific	Yes	Conduit exit Diver-assist trunk cable Vessel-laid trunk cable

3.8.1 Pelagic EFH

The western Pacific pelagic fishery management area is broad, including fishing operations in the EEZ or on the high seas for any U.S. persons or vessels fishing, landing or transporting Pelagic MUS (50 CFR 665.798). Pelagic MUS include tuna, billfish, sharks, squid and other pelagic fish (Table 12). The pelagic or open ocean ecosystem is very large compared with any other marine ecosystem; however, other oceanic communities are vitally important to pelagic species in part because of the food-poor nature of much of the pelagic environment. Research has shown a clear link between the nearshore and oceanic ecosystems in the Hawaiian Islands, which in turn affects the presence and abundance of the pelagic predator species (Benoit-Bird et al. 2001). For example, warm waters closer to shore are convergence zones which bring up nutrient rich waters and create high productivity areas resulting in high densities of predator species, such as tuna, foraging.

Table 12. Western Pacific Pelagic Management Unit Species (MUS) (50 CFR 665.800)

English common name	Scientific name
Tunas:	
Albacore	*Thunnus alalunga*
Bigeye tuna	*Thunnus obesus*
Pacific bluefin tuna	*Thunnus orientalis*
Yellowfin tuna	*Thunnus albacares*
Skipjack tuna	*Katsuwonus pelamis*
Kawakawa	*Euthynnus affinis*
Other tuna relatives	*Auxis* spp., *Scomber* spp., *Allothunnus* spp.
Billfishes:	
Black marlin	*Istiompax indica*
Striped marlin	*Kajikia audax*
Pacific blue marlin	*Makaira nigricans*
Shortbill spearfish	*Tetrapturus angustirostris*
Swordfish	*Xiphias gladius*
Sailfish	*Istiophorus platypterus*
Sharks:	
Pelagic thresher shark	*Alopias pelagicus*
Bigeye thresher shark	*Alopias superciliosus*
Common thresher shark	*Alopias vulpinus*
Silky shark	*Carcharhinus falciformis*
Oceanic whitetip shark	*Carcharhinus longimanus*
Blue shark	*Prionace glauca*
Shortfin mako shark	*Isurus oxyrinchus*
Longfin mako shark	*Isurus paucus*
Salmon shark	*Lamna ditropis*
Other pelagic fishes:	
Mahimahi (dolphinfish)	*Coryphaena* spp.
Wahoo	*Acanthocybium solandri*
Moonfish	*Lampris* spp.
Oilfish	Gempylidae
Pomfret	Bramidae
Squid:	
Diamondback squid	*Thysanoteuthis rhombus*
Neon flying squid	*Ommastrephes bartramii*
Purpleback flying squid	*Sthenoteuthis oualaniensis*

The pelagic fishery is one of the most dominant fisheries in the Hawaii Islands, where 32 species are managed as part of the Pelagic MUS (Western Pacific Regional Fishery Management Council 2009a). Because of the relative close proximity to the islands (i.e., within several miles), fish including tuna and swordfish species, along with other billfish and pelagic sharks, are targeted by both commercial and recreational/subsistence fishers. Migration of pelagic species is not well known, although it is understood that most pelagic species make daily migrations, inhabiting shallow surface waters during the night and deepwater during the day (Western Pacific Regional Fishery Management Council 2009a).

3.8.2 Bottomfish EFH

The bottomfish MUS includes commercially and subsistence/recreationally important species (Table 13). Except for several of the major commercial species, very little is known about the life histories, habitat utilization patterns, food habits, or spawning behavior of most adult bottomfish. However, the distribution of adult bottomfish is closely linked to suitable physical habitat. As the Hawaiian Islands have steep drop offs and narrow shelf ecosystem, as such the 100 ftm isobath (600 ft / 183 m) is commonly used as an index of bottomfish habitat. Adult bottomfish are usually found in habitats characterized by a hard substrate of high structural complexity, like those found in coral reefs. The diver-laid portion of the trunk cable and the vessel-laid trunk cable would pass through areas where these fish are found and through bottomfish HAPC between 130 and 920 ft (40 and 280 m).

Table 13. Hawaii Bottomfish Management Unit Species (MUS) (50 CFR 665.201)

English common name	Scientific name	Local name
Silver jaw jobfish	*Aphareus rutilans.*	Lehi
Gray jobfish	*Aprion virescens.*	Uku white papio, ulua au
Giant trevally	*Caranx ignobilis.*	kea
Black jack	*Caranx lugubris.*	ulua la`uli
Sea bass	*Epinephalus quernus.*	hpu`upu`u
Red snapper	*Etelis carbunculus.*	Ehuonaga, `ula`ula
Longtail snapper	*Etelis coruscans.*	koa`e
Blue stripe snapper	*Lutjanus kasmira.*	ta`ape
Yellowtail snapper	*Pristipomoides auricilla.*	kalekale
Pink snapper	*Pristipomoides filamentosus.*	`pakapaka
Pink snapper	*Pristipomoides seiboldii.*	kalekale
Snapper	*Pristipomoides zonatus.*	gindai
Thicklip trevally	*Pseudocaranx dentex.*	pig ulua, butaguchi
Amberjack	*Seriola dumerili.*	kahala

Many of these species are also likely to be associated with the coral reefs in the affected environment. The MUS from this FMU can be found with Crustaceans MUS and the Coral Reef Ecosystems in, and around the deeper coral reefs, on the fringing reef slope between about 100 and 500 ft (30 and 152 m). Bottomfish are typically territorial and, because of their bright coloring, conspicuous during the day. Bottomfish are not evenly distributed within their natural habitat; instead, they are found dispersed in a non-random, patchy fashion depending on available resources (e.g., prey and cover).

3.8.3 Crustacean EFH

Five species and one genus are currently managed as Crustacean MUS by the WPRFMC. There are four Crustacean MUS (Table 14) that might be found in the affected environment. Only the vessel-laid trunk cable section might affect bottomfish EFH for the deepwater shrimp MUS. Adults of the Crustacean MUS favor sheltered areas with rocky or sandy bottom. The spiny lobster is restricted mainly to windward surf zones of oceanic reefs (e.g., NWHI) (Pitcher 1993). Ten management areas have been established to manage harvesting of the spiny lobster in the NWHI; none of these areas are located in the affected environment. Adult spiny lobsters are typically found on rocky substrate in well-protected areas, such as in crevices and under rocks (Holthuis 1991; Pitcher 1993). Adult and small juvenile spiny lobsters prefer depths less than 33 ft (10m), but can be found at depths of around 360 ft (110m) (Western Pacific Regional Fishery Management Council 2001). The ridgeback spiny lobster likely occurs on rocky bottoms; it is known from depths between 32 and 442 ft (10 and 135 m). The Chinese slipper lobster prefers to live in coral or stone reefs with a sandy bottom (Holthuis 1991). Fishery takes of the Chinese slipper lobster are at depths of 65 to 230 ft (20 to 70 m). The Kona crab is found in a number of environments, from sheltered bays and lagoons to surf zones, but prefers sandy habitat in depths of 78 to 377 ft (24 to 115 m) (Smith 1993; Poupin 1998; Western Pacific Regional Fishery Management Council 1998). Each species can be found along the reef crest coral reef ecosystem in the affected environment.

Table 14. Hawaii Crustacean Management Unit Species (MUS) (50 CFR 665.241)

English common name	Scientific name	Local name
spiny lobster	*Panulirus marginatus, Panulirus penicillatus*.	Ula
slipper lobster	Scyllaridae.	ula papapa
Kona crab	*Ranina ranina*.	papa`i kua loa
deepwater shrimp	*Heterocarpus* spp.	-

3.8.4 Precious Coral EFH

Hawaii precious coral management unit species are any coral of the genus Corallium. Management targets precious coral species of the genus Corallium within the EEZ around Hawai‘i (Table 15). There are no fishing permit areas: established beds, conditional beds or refugia of precious coral within the affected environment. These are located east, north and northwest of O‘ahu. However, the affected environment does intersect with the remainder of the EFH, managed as a fishing permit “exploratory area” (50 CFR 665.261).

Table 15. Hawaiian Precious Coral Management Unit Species (MUS) (50 CFR 665.261)

English common name	Scientific name
Pink coral (also known as red coral)	*Corallium secundum, Corallium regale, Corallium laauense.*
Gold coral	*Gerardia* spp., *Callogorgia gilberti, Narella* spp., *Calyptrophora* spp.
Bamboo coral	*Lepidisis olapa, Acanella* spp.
Black coral	*Antipathes griggi, Antipathes grandis, Antipathes ulex.*

3.8.5 Coral Reef Ecosystem EFH

Coral are the primary living structural component of Hawaii's subtidal zone, with an average of about 20.3 percent coral coverage in the MHI (Friedlander et al. 2005). Approximately 250 species of corals are found within the MHI, and six species of coral dominate the waters of O'ahu: lobe coral (*Porites lobata*), finger coral (*Porites compressa*), rice coral (*Montipora capitata*), sandpaper rice coral (*Montipora patula*), cauliflower coral (*Pocillopora meandrina*), and blue rice coral (*Montipora flabellata*) (Friedlander et al. 2005).

Hawaii coral reef ecosystem MUS include both "currently harvested" and "potentially harvested" coral reef species. The listed MUS spend the majority of their life within waters less than or equal to 300 ft deep (50 CFR 665.221). Eighty-three species including surgeonfish, triggerfish, jacks, sharks, squirrelfish, flagtail, rudderfish, wrasse, goatfish, mullet, eel, octopus, parrotfish, barracuda, butterflyfish, and featherduster worms are listed as currently harvested and an additional 57 species are listed as potentially harvested, including plants, invertebrates and mollusks. These MUS – too numerous to tabulate here – receive special protections under fishing rules and permitting. Because essentially all coral reefs are classified as HAPC, the affected environment includes coral reef ecosystem HAPC.

The coral reefs of the affected environment appear to be resistant to wave and sediment damage and are described as a patch reef; a reef that is mostly limestone with live corals growing in patches, frequently separated by areas of sediment or sand channels. Jokiel *et al.* (2011) described the area as an exposed limestone reef with low coral cover and evidence of hurricane damage. Kolinski et al. (2005) measured regrowth during storm intervals in the area and pointed out that coral species assemblages found here (*Porites* spp. and *Montipora* spp.) are hearty species of coral that can survive in high energy environments such as breaking waves and can temporarily survival burial under sediments. *Pocillopora meandrina*, also found in the area, is a relatively fast-growing species that can colonize other areas through fragmenting.

Coral cover is low in the affected environment, and has fluctuated in recent years, because of disturbances and recovery processes from storm such as Hurricane Iniki in 1992 (Coles 1998) (Coles 1998). In 2002, coral cover at Kahe Point was approximately 15 percent (Jokiel 1998). Kolinski et al. (2005) estimated a coral cover of less than 20 percent, with *Porites lobata* and *Pocillopora meandrina* being the most common species. Photographs of the area taken along the Action shore bypass conduit route support descriptions provided by Kolinski et al. (2005) and the Coral Reef Assessment & Monitoring Program (Jokiel et al. 2011) of the relative low density of live coral in the area and relative low visibility (typical sediment suspension). Study results on the growth rates of corals in this area indicate that the affected environment is well suited to support coral growth and can quickly recover following disruptive events such as major hurricanes (Jokiel et al. 2011).

3.9 Migratory Bird Treaty Act

A variety of bird species would be encountered in the affected environment including those listed under the MBTA. The MBTA is the primary legislation in the U.S. established to protect migratory birds. The MBTA prohibits taking, killing, or possessing migratory birds unless permitted by regulation. Of the 1,007 species protected under the MBTA, 105 of these might occur in and/or around the affected environment (Table 16). The area from the beach to about 10 NM offshore provides a migration corridor and supports nonbreeding and transient pelagic

seabirds. Pelagic seabirds are generally widely distributed, but they tend to congregate in areas of higher productivity and prey availability (Haney 1986).

Migratory shorebirds in the Order Charadiiformes that have been observed in the affected environment include the pacific golden plover (*Pluvialis fulva*), the wandering tattler (*Heteroscelus incanus*), and the ruddy turnstone (*Arenaria interpres*). These birds generally feed along the shoreline and do not nest in the area (DON 1998). The shoreline at the FTEC is rocky with limited opportunities for foraging.

Table 16. Major Taxonomic Groups of Birds Within the Affected Environment

Common Name	Description
Albatrosses, petrels, shearwaters, and storm-petrels (Order Procellariiformes)	Group of largely pelagic seabirds, fly nearly continuously when at sea, soar low over the water surface to find prey, some species dive below the surface.
Tropicbirds, boobies, pelicans, cormorants, and frigatebirds (Order Pelecaniformes)	Diverse group of large, fish-eating seabirds with four toes joined by webbing, often occur in large flocks near high concentrations of bait fish.
Phalaropes, gulls, noddies, terns, skua, jaegers, and alcids (Order Charadriiformes)	Diverse group of small to medium sized shorebirds, seabirds and allies inhabiting coastal, nearshore, and open-ocean waters

3.10 Land and Water Use

Marine traffic in the Barbers Point area includes a variety of Naval, bulk fuel, commercial and pleasure craft Anchorages, wrecks, obstructions and buoys between ‘Ewa and Wai‘anae are indicative of a relatively high level of ship traffic in the affected environment. The Kalaeloa Barbers Point harbor is located only about 2 miles northwest along the coast from the FTEC site. Two bulk fuel offload anchorages are located to the southeast off the ‘Ewa Beach shoreline. The proposed shore bypass conduit exit location is in shallow water, accessible by small pleasure and commercial craft, but not larger vessels such as the bulk fuel and Navy vessels.

The leeward coast of O‘ahu is dotted with obstructions and wrecks, most within 1.5 nm (2.8 km) of the shore (NOAA 2014b), four bulk petroleum anchorages (33 CFR 110.236) near Barbers Point, the Barbers Point Marine Protected Area (MPA) which restricts certain types of fishing, a National Data Buoy Center (NDBC) oceanographic buoy monitoring station 51204 Barbers Point (NOAA 2014b), and a Mooring Buoy “MAH.” The closest of these to the proposed cable route are:

- Petroleum anchorage D – located about 0.3 nm (0.6 km) north of the trunk cable route and about 0.5 nm southwest of Campbell Industrial Park.
- NDBC Buoy 51204 – located about 0.4 nm (0.7 km) south-southeast of the trunk cable route and about 1.4 nm southwest of the FTEC.
- Mooring Buoy “MAH” – located about 0.3 nm (0.6 km) east of the trunk cable route, 0.6 nm (1.1 km) south of the proposed hydrophone array and 3.0 nm (4.8 km) offshore to the west of the Ko‘olina resort area.

Ashore, the FTEC is surrounded by the Kapolei City Campbell Industrial Park. Land use in the area is classified as heavy and marine industrial, commercial and recreational, including the Campbell Industrial Park, Kalaeloa Barbers Point Harbor, Kalaeloa Airport, The Barbers Point Beach Park, Germaine’s Luau and the Barbers Point lighthouse (DON 1998; Hawaii Department of Health 2012; City and County of Honolulu 2013).

Eastward, along the ‘Ewa shore within two miles (3.2 km) of the FTEC, The City and County of Honolulu manages the Kalaeloa Regional Park (Barbers Point Beach Park) and the USFWS manages the Kalaeloa Unit of the Pearl Harbor National Wildlife Refuge. This area was once part of the former Barbers Point Naval Air Station and included in the Pearl Harbor National Wildlife Refuge to protect the endangered ‘Ewa hinahina. This is the only remaining area of undisturbed land use on the ‘Ewa plain (USFWS 2010).

3.11 Archeology and Historic Properties

No archaeological resources are located in the affected environment. Previous archaeological investigations in the FTEC included an archaeological inventory survey for the Shipboard Electronic Systems Evaluation Facility (SESEF) shore station (OGDEN 1996). No cultural remains were identified. Subsurface testing revealed a thin layer of aeolian sand and/or silt overlying calcareous bedrock.

After World War II, three Japanese submarines were scuttled in an area about 5 nautical miles (9.3 km) south-southwest of Barbers Point. The closest charted wreck to Barbers Point is about 4 nautical miles (nm) (7.4 km) along the shore toward Ewa Beach, lying about 0.8 nm (1.4 km) offshore. As discussed in Section 3.10, several wrecks and obstructions are located within the affected environment off the leeward coast, but none of these wrecks are near the proposed trunk cable route.

The FTEC construction site is located approximately 100 ft (30 m) west of the Barbers Point Lighthouse. The Barbers Point Lighthouse is noted in the National Park Services’ Maritime Properties Inventory of historic maritime resources, but is still an active lighthouse. The original 40-ft high coral tower was built in 1888. A light keeper’s house and cistern were also built at Barbers Point. The light keeper’s house was rebuilt in 1915 and located west of the tower. In 1933, funds were allocated to reconstruct the tower. The new reinforced concrete tower, which stands today, was built adjacent to the coral tower. The old tower was demolished soon after the new tower was built. The FTEC towers are clearly visible from the lighthouse site.

3.12 Recreation

Private and public recreation is available near the FTEC site. Immediately beyond the Lighthouse to the east is Germaine’s Luau and Barbers Point Beach Park. The Germaine’s Luau is a well-established private evening entertainment facility open to private access daily from about 5:00 PM. Barbers Point Beach Park is located about 500 ft beyond Germaine’s Luau to the east and is open to public access during daylight hours.

Directly offshore from Barbers Point, the water is shallow out to the proposed trunk cable route as it runs over the reef crest. This area is situated near bulk petroleum anchorages just offshore from the Barbers Point Beach Park and clearly visible from the park. Although private and public recreation is available, the shore site is not easily accessible and the reef break is not conducive to desirable surfing or diving conditions.

The Kalaeloa Barbers Point Harbor is located about two nm northwest of the Preferred Alternative area. The recreational harbors in the Honolulu area are about 12 nm east of the Preferred Alternative area. The nearest swimming beach is the Nānākuli Park, about six nm to the northwest. The nearest lifeguarded beach is the Ala Moana Magic Island Lagoon in downtown Honolulu. There is a small probability that small craft private recreational boating and fishing activity could occur just offshore from the FTEC, but there are no nearby ramps or

marinas where small boats would be put in. Larger sport fishing vessels would originate from the major harbors, primarily those near Honolulu, and go well offshore in search of pelagic fish.

3.13 Noise

Noise is undesired sound. Noise also refers to all sound sources that may interfere with detection of a signal (background noise) and the combination of all of the sounds at a particular location (ambient noise) (DON 2013).

The Preferred Alternative includes construction ashore at the FTEC and Barbers Point Lighthouse site, an area zoned Industrial by the City and County of Honolulu. As discussed in the land use section above, industrial operations, including scrap metal stockpiling, concrete materials movement and roadways are in operation during daylight hours.

The hydrophones used in the Preferred Alternative and Alternative Action do not include the active generation of sounds in the water. To the contrary, the SSRNM testing listens to sounds generated by Navy surface vessels in controlled test events. Similarly, construction vessels would generate noise in the water from propellers, on-board engines, movement of materials on deck, etc. The Preferred Alternative and Alternative Action do include occasional use of high-frequency, low-power positioning modems on the array to help calculate the position of the hydrophone array (Section 2.1.1).

3.14 Socioeconomics

As discussed above, the affected environment is surrounded on land by heavy and marine industrial, commercial and recreational land uses. There are a variety of industrial and commercial activities including public power generation, cement dry materials storage and handling, metal recycling and bulk petroleum handing. The Barbers Point lighthouse, Germaine's Luau and the Barbers Point Beach Park appear incongruous with these surrounding area activities. A single road provides access for the Luau, the lighthouse and the FTEC.

Germaine's Luau provides family-oriented evening luau events that begin about 5:30 PM each evening. Guests arrive by either their own vehicles or busses from outside the area, usually resorts around O‘ahu. Parking for the Luau is located just north of the Achyranthes Management Area.

The Barbers Point lighthouse is located between Germaine's Luau to the east and the FTEC to the west. There is no dedicated access or parking for the lighthouse. It is a functional USCG navigation beacon and not open for public visitation.

The industrial park includes heavy industry such as concrete dry material storage and handling, bulk petroleum handling, heavy metals recycling, manufacturing and public power generation. The nearest residential areas are the Kapolei housing developments about 2 miles to the north. There are no residential areas or schools in the industrial park. The area is not popular for shore fishing.

Because of the industrial and commercial nature of land use in the area, there are no resident minority populations. Employees of the industrial and commercial activities are most likely representative of the O‘ahu population in general. Visitors to the Luau are primarily tourists who are visiting O‘ahu.

4 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This section identifies aspects of the Preferred Alternative, Alternative Action and No Action Alternative that could cause environmental impacts. The section discusses, in general, the components of the alternatives identified in Section 2.0 and how environmental effect might be generated. Then, the following sections discuss the degree of effect anticipated to the affected environment. In general, many of the effects generated from the Preferred Alternative and Alternative Action would be one-time events, occurring over a short three-week construction period. Also, in several instances, the relatively small footprint of the Preferred Alternative and Alternative Action can be considered to offer negligible environmental effect.

This impact assessment considers relevant information in a recent EA prepared for The MCB Kaneohe Bay Wave Energy Test Site (WETS) EA (DON 2014), particularly as the analysis relates to HDD drilling. The WETS EA, available from the Navy point of contact identified on the EA Cover Sheet, is incorporated by reference into this EA.

In sections following this one, elements of the affected environment are considered with regard to general effects identified here and any additional effects to special species or ecosystems of concern. Potential interactive effects are also addressed in the following sections. Potential cumulative impacts are considered in Section 5.

4.1.1 Preferred Alternative

4.1.1.1 Hydrophone Array

Under the Preferred Alternative, installation of the hydrophone array could affect air, water, marine life, and certain protected marine species and ecosystems. The hydrophone array and its components would be installed from a support vessel by lowering the anchor, floats, cables and electronic equipment into the ocean. Dead-weight anchors would be set on the surface of the sea floor. The hydrophone array, umbilical and positioning modem nodes would be suspended from these anchors. Because the equipment is all suspended, there are no anchor chains or cables to drag across the bottom.

Configuration

The top of the array would be suspended approximately 65 ft (19.8 m) below the ocean surface. The upper array buoy, lower array buoy, and main mooring buoy keep the entire hydrophone array vertically aligned. Each buoy is approximately 7.5 ft (2.3 m) in diameter and 7 ft (2.1 m) tall. The installed array would be suspended in the water column, consisting of one primary cable and attached electronic communications cable. These cables would be attached to one another to form a single assembly suspended from the buoys. No equipment would drag across, or scour the bottom.

The hydrophone array assembly has no hooks, netting or loosely hanging ropes or cables. It would sway slowly as a unit with shifting surface ocean currents. The array assembly, steel anchor assemblies, cables and onboard electronic system exteriors are ruggedly constructed of steel, stainless steel or polyethylene for a long service life. Because the purpose of these equipment assemblies is to function for 15 years, they would be designed not to corrode or fail in the marine environment. The electronic components would be covered with inert surfaces that

do not leak and do not have toxic properties that might leach into the water and adversely affect marine ecosystems.

At the upper reaches of the array in the water column (< 200 m), the array would offer a minor potential to attract and/or divert fish because of its physical presence. It would be visible to fish and marine mammals in the relatively clear water at these depths. The upper reaches of the array assembly would become covered with microscopic and macroscopic marine growth in time.

Anchors

The dead-weight anchors for the hydrophone array and buoys would disturb a relatively small bottom area no larger than the anchors themselves. Array installation would cover and disturb a total of 144 sq ft (less than one-one hundredth of an acre) of existing benthic habitat at the array installation site:

- Array mooring anchor (1, each 64 sq ft [8 ft x 8 ft / 2.4 m x 2.4 m])
- Umbilical anchor (1, each 64 sq ft [8 ft x 8 ft / 2.4 m x 2.4 m])
- Positioning modem node anchors (4, each 4 sq ft [2 ft x 2 ft / 0.6 m x 0.6 m])

Vessel Support

A small Anchor Handling Vessel would be used to install the hydrophone array. We estimate this vessel would operate for not more than three, 24-hour days to conduct the installation. Operation of this vessel in the affected environment would emit combustion products into the air, release petroleum, oil and lubricants into the water and affect marine life directly or indirectly. These vessels are typical work vessels, similar to others in the islands and are regulated under EPA and USCG vessel rules, and, would therefore pose only minimal air quality effects to the affected environment.

GHG emissions would be generated in the manufacturing, assembly, transportation and installation of the hydrophone array, scientific measurement equipment, anchor moorings, trunk cable, utility vault, and ancillary electrical transmission and monitoring equipment. However, most of the GHG emissions would be temporary in nature. Once the equipment is installed, the operation is not expected to generate incremental levels of GHGs that would significantly impact global, regional or local climate conditions when considered together with other relevant past, present or reasonably foreseeable projects. The HDD Preferred Alternative would have slightly higher GHG emissions, due to the energy required to drill the HDD bore hole. However, its cumulative impacts to global, regional or local climate conditions would be insignificant.

On 13 May 2010, the EPA issued a final rule that established a commonsense approach to addressing GHG emissions from stationary sources under the CAA permitting programs (40 CFR Parts 51, 52, 70, and 71)[5]. This final rule sets thresholds for greenhouse gas emissions that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. The Preferred Alternative does not involve any new or existing industrial facilities or stationary sources subject to the greenhouse gas tailoring rule.

[5] See also 75 FR 31514

Positioning Modem

The SSRNM is a passive acoustic array used to measure the radiated noise emitted from surface ships. To improve measurement accuracy, active positioning modems are used to determine the position of the array during operation. After the hydrophone array and positioning modems are installed, but before the first operational use, each positioning modem would be located by surveying activity consisting of a single ping transmitted from the surface to a modem followed by measuring the response time of that ping, repeated four to five hundred times to obtain the necessary statistical tolerance to precisely locate the position of the modem on the seafloor. The surveying process would be repeated for all four modems. In operation during each test trial, three positioning fixes are taken. Each location fix requires a total of four transmissions, one from the tracking transducer on the array and one each simultaneously from the four nodes on the bottom. The array position needs to be known only once per trial. However, a position may have to be requested more than once if it is not read properly.

The following assessment is applicable to both the Preferred Alternative and the Alternative Action and the potential impacts and effects on marine mammals. Other species could potentially be affected, but from a criteria perspective marine mammals are considered more sensitive to the effects of underwater acoustic pings. While this assessment is primarily qualitative the quantitative technical parameters of the acoustic modems are given in in the Section 2.0 Alternatives.

For Navy NEPA documentation, the criteria for assessing potential effects of underwater acoustics on marine mammals are focused on the hearing of the marine mammals as the most likely physiological effect. The following assessment considers both Cetacean and Phocinae (monk seal) criteria for temporary hearing loss, which is technically identified as temporary threshold shift (TTS). The Phocinae are the most sensitive seals from a hearing perspective.

The energy content of the emitted acoustic signals during installation and during a single operation is compared against the physiological criteria developed for Navy acoustic analysis (Finneran and Jenkins 2012). Behavioral disturbance is also considered, but this is only assessed with respect to the range to minimal peak levels instead of just the energy content. Some acoustic sources are defined as "de minimis" when either the source is too quiet to have any real potential for effect, or if the source frequency range is outside of the range of hearing for marine mammals or if region of emitted sound is confined to a small underwater volume. Although the SSRNM positioning modems would not qualify as de minimis under the Navy acoustic analysis criteria because of the frequency and omni-directional beam pattern, the source level is so low that it would affect a small underwater volume and be near a de minimis level.

Because the array is installed in fairly deep water, the analysis of energy accumulation at distance from the source is based on a spherical spreading concept along with the small amount of absorption. Using spherical propagation and accounting for acoustic absorption, the largest radius for potential TTS is less than 20 ft (6 m) during SSRNM operation. This is a very small radius in the ocean water column of about 3,000 ft (914 m). Given the very small radius for potential TTS, it is highly unlikely that a marine mammal would be present in a close enough proximity to the array to experience TTS when the modem is in use.

Using a peak sound-pressure-level of 120 dB (re 1 μPa) to indicate a probability of zero for individual behavioral response, this analysis estimates a peak pressure level of any ping from the modems would be below this threshold at approximately 525 ft (160 m). Therefore, the

probability of a marine mammal experiencing TTS effects during operation of the positioning modem is very low due to the low source level. When considering individual behavioral response, the radius to the threshold for a zero probability of behavioral response is somewhat larger: about 525 ft (160 m).

The foregoing discusses SSRNM array operations that generate four positional modem "fixes." This operation has a negligible risk of causing TTS effects to a marine mammal because the effective range for the most sensitive marine mammals is less than 20 ft (6 m). The probability of behavioral disturbance is very low because of the relatively small range (525 ft [160 m]) of a zero probability of behavioral harassment.

The surveying activity during the installation process is of greater concern, however. We estimate that the modem surveying activity could accumulate sound energy enough to cause physiological effect to a marine mammal, but only if that marine mammal remained within an approximate 656 ft (200 m) radius of the modem throughout the entire installation process. Because the modem source level is low, there would be an unlikely probability of Level A Harassment or behavioral pattern disturbance to a point where such behavioral patterns are abandoned or significantly altered.

4.1.1.2 Shore Bypass Conduit

Installation of the shore bypass conduit could affect air, water, earth, marine life and terrestrial life, certain protected marine and terrestrial species and ecosystems, land and water use, archeology and cultural resources, recreation, noise and socioeconomics. The shore bypass conduit and its components would be installed using the HDD method which involves work at the HDD bore entry at the FTEC ashore, and at the HDD bore exit about 2,000 ft (610 m)seaward.

The HDD method would be used to install a shore bypass conduit from the FTEC shore station, beneath the shoreline, intertidal and near-shore shallows to an exit location approximately 2,000 ft (610 m) offshore at a depth of 20 ft (6 m) (Figure 3). This method effectively bypasses and causes no direct effects to sensitive nearshore tidal and subtidal habitats between the HDD bore entry at 145 ft (44 m) ashore and the HDD bore exit at 2,000 ft (610 m) offshore. There would be no direct surface effects from the HDD conduit installation to shore, intertidal and near-shore subtidal resources between the HDD entry and the HDD bore exit.

During HDD drilling, the proper management of the bentonite drilling fluid seals the bore annulus to avoid pressure fracturing, release of drilling fluid and/or potential aquifer cross-contamination. HDD operators monitor drill fluid pressure to maximize the efficient use of the drilling fluid and avoid release of the drill fluid. The HDD contractor's drill fluid management plan, required by the Navy, would specify these procedures. Adherence to the management plan insures that there would be no significant impact due to drill fluid management during onshore construction.

During the final stage of the HDD process, operators would replace the use of bentonite with fresh water about 150 ft before exit, and only fresh or sea water would be used in the drilling system for the remainder of the operation. This method avoids discharge of bentonite materials into the ocean when the bore exits the seafloor.

The HDD drilling technique proposed here is equivalent in size to the one described in the WETS EA (DON 2014). As stated in the WETS EA, it is unexpected that the acoustic noise

emanated from drilling through the substrate below the sea floor would have much impact on the marine mammals, sea turtles, birds and fish of the area. The acoustic bathymetry for both areas is similar (flat shelf with similar depths for the first two thousand feet), and the noise levels from the drill itself would be expected to be similar as well. Consequently, the analysis given in the Kaneohe Bay EA should be equally applicable to the Preferred Alternative with respect to the types of acoustic impact in the marine environment. As concluded in the WETS EA, not much impact is expected as the sound level of the drilling noise as the drill head nears the underwater surface at the end of the bore is less than the noise levels of vessels used during construction.

4.1.1.3 Trunk Cable

Under the Preferred Alternative, installation of the trunk cable could affect air, water, marine life, certain protected marine species and ecosystems, archeology and cultural resources. The trunk cable would be installed from sea from work vessels as required. It is pulled into and through the completed shore bypass conduit and into the cable vault where it is connected to the shore station electronic components. After construction, the trunk cable requires no preventive maintenance work.

Construction activities on the ocean during cable installation would involve three vessels in the affected area offshore for a period of about three weeks. These vessels would be on station, sometimes anchored, to install the trunk cable at the HDD bore exit, the diver-laid and vessel-laid cable route, and hydrophone installation sites. During this work, these vessels would be expected to emit combustion products from engines. These mobile source air emissions are one-time and temporary during the installation work.

Support vessels would anchor at the diver-supported cable laying site which has a patch reef bottom. Anchors for support vessels would likely be Danforth-type anchors that set themselves in sandy sediments. Anchoring would be relatively infrequent, occurring only during cable installation and diver-support cable laying. Anchors would be purposefully set in sandy areas of the patch reef, avoiding damage to corals. At this location, anchors would disturb sandy sediments and benthic communities.

Installation of the trunk cable would cause some environmental effect along the seafloor, but precautions would be taken to minimize and avoid adverse environmental impacts in shallower zones. The 7.6 mi, polyethylene sheathed trunk cable would cover 5,016 sq ft over a narrow, 1.5 in strip of bottom, likely damaging the less mobile marine life found in the sediments along this path. There is a possibility precious coral could exist along the cable route, but it is unlikely the cable would directly contact the coral colonies. When considered along with the damage caused by two, 8 ft x 8 ft (2.4 m x 2.4 m) dead-weight anchors of the hydrophone array installation, a total affected seafloor rises to 5,144 sq ft (0.04 ha). This area is an insignificant footprint in comparison to the seafloor over the entire affected environment, about 28,000 ac (11,331 ha).

Damage would occur to smaller, less mobile invertebrates such as segmented worms, small crustaceans and mollusks. Larger, more mobile organisms, including demersal bottomfish and crustaceans, would avoid the cable as it is positioned by divers in shallow water, and the cable ship in deeper waters.

Between the shore bypass conduit and reef crest, the cable would be manually positioned to avoid live coral. The cable would be designed to be stable; it would be weighted with split galvanized ballast weights to prevent rolling, shifting, and lift due to wave-induced surge. After

installation, exposed portions of the trunk cable would present a suitable hard substrate habitat; attracting attaching organisms such as anemones and barnacles.

These benthic effects would occur over a very thin strip of the seafloor along its length. The cable passes from well-lit, warm shallow waters down to poorly-lit, cold deep zones. These ecosystems are fairly distinct, marked by dramatically different light and temperatures. Along the cable route, descending in depth, habitats change from high diversity and density to low diversity and density of organisms. Because of the thin width of effects to the ecosystem at any one depth, the effect of the trunk cable on that area would not change the character of the ecosystem relative to the depth zone. At shallow depths, this effect would damage a few invertebrates in and on the sand between live coral heads of the patch reef. As the cable is installed down the sloping seafloor, the number of affected benthic invertebrates and demersal organisms would decrease to a negligible level.

Under the Preferred Alternative, two vessels would be used during the diver assisted cable laying out to the reef crest: Small Support Vessel and Small Dive Support vessels. These vessels would operate on site for no more than five, ten-hour days.

Under the Preferred Alternative, support vessels might anchor near the HDD bore exit and diver-assisted cable lay. These anchoring events would occur over a short timeframe, less than one week. This anchoring would be necessary to conduct cable laying operations. Small vessel anchors are typically fluke or plough anchors that dig into the sediments to hold the vessel against currents and winds.

The cable laying ship will lay trunk cable at slow speeds to maximize contact with the bottom. It is important to pay out cable at a slow speed, between 0.5 and 2 kt so as to maintain the cable angle as near vertical as practicable. This technique allows the cable to conform to the bottom contours and avoids suspending the cable between two seafloor hills. A suspended submarine cable is at risk of damage. The slower laying speed allows the cable to conform to the seafloor, maximizing its service life.

4.1.1.4 Shore Station

Under the Preferred Alternative, excavation and construction could affect air, water, earth, terrestrial life, certain protected terrestrial species and ecosystems, land use, archeology and cultural resources, recreation, noise and socioeconomics. The shore station and its components would be installed with excavating equipment, an HDD drill rig and supporting equipment over a three-week construction timeframe.

The FTEC shore station would include conduits, cabling, electronics and vault facilities designed to conduct and process hydrophone array data. The shore bypass conduit terminates 145 ft (44 m) landward in an underground concrete vault. The trunk cable would then be routed via an underground conduit to system computers inside an existing building. Electrical grounding rods would be installed inside the FTEC shore station fenced area. Excavations would be backfilled; the surface returned to grade and landscaped compatible with the USCG restoration plan (USCG 2013).

The HDD construction site would be located at an area that is mostly cleared and has been used for construction access in the past. The construction site located outside the FTEC fence-line is estimated to be 9,200 sq ft (0.09 ha). Of this area, approximately 2,615 sq ft (0.02 ha) of native and non-native vegetation east of the FTEC fence-line would be removed during construction.

The Coast Guard has prepared a Restoration and Management Plan for the Barbers Point Lighthouse Site that includes the FTEC compound and the construction site for this Preferred Alternative (USCG 2013). Although the 'Ewa hinahina is not now found in the affected environment – neither in the AMA nor in the FTEC or adjacent property – the Management Plan was prepared for Navy and other users to follow in restoring the site to critical habitat within the Coast Guard's jurisdiction.

Shore Station construction would clear, excavate and compact soils in the 9,200 sq ft area (0.09 ha) outside the FTEC. Most of this area has been previously disturbed by construction. The Preferred Alternative calls for clearing the construction site, excavating the HDD entry pit, installing the bypass conduit and excavating and installing the connecting cables and grounding rods at the FTEC. This work requires a drill rig, earth moving equipment and support vehicles. The HDD construction includes the HDD drill rig and drill entry pit, drilling fluid reclamation system, drill pipe storage, bentonite storage and parking. Support vehicles and materials are stored on existing roadways and cleared areas. This equipment would operate at the FTEC for about three weeks. The HDD drill bore entry is located within the entry pit that functions as a holding area for drilling fluid returning through the bore annulus. Upon completion of the underground submarine cable conduit, the cable vault is installed at the drill entry site. Operating communications cable and electrical grounding rods and wiring are entrenched (3 ft x 3 ft / 1 m x 1 m) between the vault and the existing SESEF operations trailer. The HDD drilling rig and supporting vehicles described in Section 2.1.4 and Figure 5 would produce construction noise and combustion emissions during the three week construction duration. On completion of the trunk cable landing and connection to the operating equipment in the FTEC, the excavations are all returned to pre-existing grade and the area landscaped consistent with the USCG management plan.

This work would clear vegetation and disturb existing soils and the underlying calcareous rock formation, but in a limited 9,200 sq ft (0.09 ha) area. No clearing would occur in excess of that shown in Figure 5. Existing roadways would be used to transport equipment and store materials. The disturbance would be one-time during the three-week construction period. Post construction vegetation would support the sustainability objectives of the USCG.

4.1.1.5 Operations and Maintenance

Under the Preferred Alternative, no preventive maintenance routines would be needed at the array site, trunk cable or shore bypass conduit. Indeed, one of the objectives of the Preferred Alternative is to reduce time and cost of the SSRNM evolution by not using small craft to conduct the measurement. Operations would include the use of five active acoustic positioning modems that would cause some acoustic effect in the ocean. There are four located on the bottom around the array anchor and one affixed to the top of the array. During operations, these devices operate infrequently, determining the position of the array in the water column during tests. During each test trial, three positioning fixes are taken. Each location fix requires a total of four transmissions, one from the tracking transducer on the array and one each simultaneously from the four nodes on the bottom. The array position needs to be known only once per trial. However, a position may have to be requested more than once if it is not read properly.

As discussed in Section 4.1.1, multiple pings during the installation surveying operation would be unlikely to substantially impact marine life. During operation of the SSRNM array, the

positioning modems would operate much less with five or fewer pings during any one test, not accumulating enough energy to affect marine life.

Electromagnetic fields (EMF) are generated by electrical currents passing through cables, but such fields are less than natural EMF of the earth's geomagnetic field. The earth's geomagnetic field varies with latitude between 30 and 70 microTesla (μT); higher near the poles and lower near the equator. In the Hawai'i region of the Pacific Ocean, the geomagnetic field is about 35 μT (Normandeau/Exponent et al. 2011). While it is possible to shield underwater cables from emitting electrical currents into the environment, it is not possible to shield EMF from these cables. The magnetic flux density or EMF of a long thin cable is directly proportional to the amount of current passing through the cable. Additionally, the EMF that is generated by underwater cables decreases rapidly away from the cable. Researchers from the Monterrey Bay Aquarium Research Institute and the Monterey Bay National Marine Sanctuary conducted an impact study of a 95 km submarine cable that had been in place for eight years off the California coast (Kogan et al. 2006). This cable supports a hydrophone array roughly similar to the Preferred Alternative. The study found few changes in benthic fauna abundance or distribution. Exposed portions of the cable provided new habitat for anemones. Also, some fishes were more abundant near the cable, presumably due to the greater habitat complexity introduced by the cable. Surface-laid cable in the nearshore areas that were subject to frequent wave activity can be undercut by wave surge and currents. Where the cable was suspended in this way, it was subject to strumming that caused abrasion to both to the cable itself and to rocky bottom features.

United Nations Environment Programme (UNEP) and the International Cable Protection Committee (ICPC) collaborated on a review of the environmental impacts of submarine telecommunications cabling (Carter et al. 2009). These authors report none or minimal impacts on benthos, fish and marine mammals based on review of several studies, including the California study discussed above. One of the most extensive field studies on the effects of EMF on marine life was done by the Collaborative Offshore Wind Research into the Environment (COWRIE) from 2002 through 2009 (Gill et al. 2009). The results of this effort failed to demonstrate that EMF produced by a submarine cable would change fish swimming patterns or feeding behavior.

Typical underwater or submarine power cables typically carry a maximum of 1600 Amperes (A) of alternating current (A/C). Using the values of a submarine power cable with 1600A A/C, the magnetic flux density or magnetic field produced by this cable would be 3.2 milliTesla (mT) within 10 cm of the cable, but fall to 0.050 mT, within the range of the earth's natural geomagnetic field, just six meters from the cable. Simple tank-based experiments demonstrated that almost no marine animals would make an attempt to leave an area with a magnetic field of 2.8 mT, the strength of a magnetic field that might exist very near (within 30 cm) of this cable. Other measurements and predictions of submarine cable EMF have confirmed that the EMF is relatively small. EMF measurements on the order of 35 to 50 μT (50 A^{rms} at 11 kV and 60 A^{rms} at 33 KV respectively) were measured at the surface of three-phase submarine power cables (CMACS 2003).

The current flowing in the SSRNM array cable is much less than power cables: 1.15 A maximum, at < 200 V. The expected EMF levels from the SSRNM cabling would be 0.0767 μT at 30 cm, much less than the typical submarine cable (i.e. 2.8 μT), which is also a fraction of the earth's geomagnetic field. Because of this and lack of conclusive EMF-caused biological effects, SSRNM trunk cable EMF would have negligible effects on marine life.

Carter et al. (2009) also report that many cables would self-bury in shifting sand "waves" where the cable is stable and sand waves move across the cable, alternately burying and exposing the cable over time. Under the Preferred Alternative, the trunk cable would be weighted in the diver-laid portion of its route to ensure stability on the seafloor during storm events (Sound & Sea Technology 2014).

4.1.2 Alternative Action

4.1.2.1 Hydrophone Array

The proposed array under the Alternative Action and sources of environmental effect are identical to the array effects described in Section 4.1.1.1. Under the Alternative Action, installation of the hydrophone array could affect air, water, marine life, and certain protected marine species and ecosystems. The hydrophone array (Section 2.1.1 and Figure 3) and its components would be installed from a support vessel by lowering the anchor, floats, cables and electronic equipment into the ocean. Dead-weight anchors would be set on the surface of the sea floor. The hydrophone array, umbilical and positioning modem nodes would be suspended from these anchors. Because the equipment is all suspended, there are no anchor chains or cables to drag across the bottom.

4.1.2.2 Trunk Cable

Under the Alternative Action, installation of the trunk cable could affect air, water, marine life, certain protected marine species and ecosystems, archeology and cultural resources. The trunk cable (Section 2.2.2 and Figure 6) would be installed entirely at sea from work vessels as required. The trunk cable would connect the hydrophone array along the same route as the Preferred Alternative, but would end at a depth of 800 ft at the radio buoy anchor. Although installation would use the submarine cable installation as the Preferred Alternative, installation would be completed earlier.

Construction activities on the ocean during cable installation would involve three vessels in the affected area offshore for a period of about three weeks. These vessels would be on station, sometimes anchored, to install the trunk cable at the HDD bore exit, the diver-laid and vessel-laid cable route, and hydrophone installation sites. During this work, these vessels would be expected to emit combustion products from engines. These mobile source air emissions are one-time and temporary during the installation work.

Installation of the trunk cable would cause some environmental effect along the seafloor. Under the Alternative Action, the trunk cable would terminate at a radio buoy anchored at the 800 ft contour. Under the Alternative Action, the trunk cable would be 6.5 mi (10.4 km) miles long and covering 4,290 sq ft over a narrow, 1.5-inch strip of bottom, likely damaging the less mobile marine life found in the sediments along this path. There is a possibility precious coral could exist along the cable route, but it is unlikely the cable would directly contact the coral colonies. When considered along with the damage caused by two, 8 ft x 8 ft dead-weight anchors of the hydrophone array installation and one 8 ft x 8 ft dead-weight anchor of the radio buoy installation, a total affected seafloor under this alternative would be about 4,482 sq ft. This area amounts to only about 0.1 ac, an insignificant footprint in comparison to the seafloor over the entire affected environment, about 28,000 ac (45 sq mi) and almost no difference, relative to the affected environment, from the Preferred Alternative.

The trunk cable coverage would affect the smaller invertebrates such as segmented worms, small crustaceans and mollusks. Larger, more mobile organisms, including demersal bottomfish and crustaceans, would avoid the cable as it is positioned by the cable ship. After installation, the trunk cable would present a suitable hard substrate habitat; attracting attaching organisms such as anemones and barnacles, primarily at the shallowest portions near the termination at 800 ft

Under the Alternative Action, two vessels would be used during the diver assisted cable laying out to the reef crest: Small Support Vessel (20-40 ft) and Small Dive Support (30-60 ft) vessels. These vessels would operate on site for no more than five, ten-hour days.

4.1.2.3 Radio Buoy

Under the Alternative Action, a 6-meter NOMAD buoy or equivalent would be anchored in 800 ft of water just offshore of the shore station at Barbers Point. The buoy would be anchored with a single-point, 64 sq ft dead-weight anchor similar to that used to anchor the hydrophone array. Installation of the radio buoy could affect air, water, marine life, certain protected marine species and ecosystems, archeology and cultural resources. The radio buoy (Section 2.2.3 and Figure 6) would be installed from sea from work vessels as required.

The anchor would cover and destroy benthic habitat over 64 sq ft area at the 800 ft depth. This anchor is equal in design to the hydrophone array anchors and effects to the benthic environment would be as discussed in the previous section. The small size of this anchor in relation to the size of the affected environment would cause an insignificant footprint with negligible environmental effects. The anchor cable would be vertically suspended by the NOMAD buoy and, similar to the hydrophone anchors, would not scour or drag across the seafloor. Under the Alternative Action, a Small Anchor Handling vessel would be used to install the radio buoy for no more than three, 24-hour days.

The radio buoy would communicate with the shore station via radio. While such equipment emits electromagnetic energy, some of these systems are the same as, or similar to, civilian navigational aids and radars at local airports and television weather stations. Radio waves and microwaves emitted by transmitting antennas are a form of electromagnetic energy collectively referred to as radio frequency radiation. Radio frequency energy includes frequencies ranging from 0 to 3,000 gigahertz. Exposure to radio frequency energy of sufficient intensity at frequencies between 3 kilohertz and 300 gigahertz can adversely affect people and marine life that come into close contact with RF antennae during operation. Because of safety concerns, the Navy requires heights and angles of electromagnetic energy transmissions to be designed following specific guidance to protect humans from electromagnetic energy transmissions (DON 2013). An RF antenna placed on the radio buoy might affect a marine bird if the bird flies near the antenna while operating. The RF antenna would be located above the buoy and other potential roosting sites. Because of this design and the low probability of seabird and antennae in proximity, the probability of a seabird being adversely affected by RF radiation is negligible.

4.1.2.4 Shore Station

Under the Alternative Action, there would be no environmental effects from construction. The shore station would contain the same electronic data analysis components and operate the same way as it would for the Preferred Alternative. However, data would be received by radio from the offshore radio buoy, rather than by cable. Because no exterior earthwork or construction

would be conducted, there would be no direct environmental effects caused by installation of radio equipment under the Alternative Action.

4.1.2.5 Operations and Maintenance

Operations and maintenance under the Alternative Action could affect air, water, marine life, and certain protected marine species and ecosystems. Maintenance of the radio buoy would require semiannual preventive maintenance visits to replenish fuel, clean and refurbish the buoy equipment. No preventive maintenance is required for the trunk cable and hydrophone array. During preventive maintenance of the radio buoy, a small support vessel would transit to and from the site and tie off directly to the buoy. About once a year, a buoy tender vessel would retrieve the buoy for hull cleaning ashore.

During buoy maintenance, cleaning solutions (i.e., for solar panel glass), lubricants, electrolyte, and fuel for a generator would be used. Maintenance personnel, if Navy, would follow existing JBPHH spill prevention and countermeasure instructions and, if contractor, would follow a Navy-approved contractor-prepared SPCC that specifies how the various chemical products would be handled and contingency planning for emergency events. The greatest volume of chemical product carried by the maintenance vessel would be diesel fuel used to refuel the NOMAD buoy. Other cleaning and refurbishing materials would be carried in far lesser volumes of a gallon or less for each. Onboard fuel tanks would be designed to be consistent with applicable USCG regulations. Also, as discussed, spill contingency planning would specify how to manage these materials and what to do in an emergency. The relatively low volumes of cleaning materials, lubricants and fuel would not be released into the ocean under normal operations, thus posing no environmental effects during operations.

The NOMAD buoy would require periodic hull cleaning. This operation would be conducted ashore where cleaning debris could be contained, transported and disposed of as approved by local, state and federal regulations. When these products are managed as specified by local rules, there is little to no potential for chemical release.

Under the Alternative Action, two vessels would be used to conduct preventive maintenance. The Small Support Vessel would operate no more than two, ten-hour days to conduct semiannual preventive maintenance, refueling and refurbishment onboard the buoy. Not more than once per year, a Buoy Tender would retrieve the buoy, take it ashore for hull cleaning, and then replace the buoy over two, 24-hour days.

No additional personnel would be required to manage the FTEC facility during the SSRNM test events. Because there would be no change to the number of personnel or frequency of visits, there would be no change from existing traffic conditions under the Alternative Action.

4.1.3 No Action

4.1.3.1 Hydrophone Array

Under the No Action Alternative, a hydrophone array would be deployed over the side of a small support vessel, or passive sonobuoys would be deployed from the fleet vessel being tested. The array is constructed, maintained and stored ashore.

4.1.3.2 Shore Station

Data are stored onboard and/or transmitted by radio to the existing FTEC shore station during the portable SSRNM test.

4.1.3.3 Operations and Maintenance

Operations and maintenance under the No Action Alternative could affect air, water, pelagic marine life, and protected pelagic marine species and ecosystems. The small support vessel operates for no more than two, ten-hour days, up to ten times annually. Potential impacts are similar to those associated with operational use of support vessels for the Preferred Alternative and Alternative Action (primarily emissions of mobile source combustion gases and minor amounts of petroleum, oil and lubricants.) In addition, there is the potential for impacts associated with use of the array and expended sonobuoys. There are no potential acoustic impacts associated the portable hydrophone array or sonobuoys.

4.2 Climate and Air Quality

4.2.1 Preferred Alternative

The level of air quality pollutants and greenhouse gas levels in the affected environment are low as O‘ahu is in attainment with the National Ambient Air Quality Standards (NAAQS). Therefore the General Conformity Rule does not apply. As discussed in Section 4.1.1, installation and operation of the Preferred Alternative, including the hydrophone array, bypass conduit, trunk cable and operations and maintenance would affect air quality to a small degree through petroleum fueled vehicles and construction equipment use.

Support vessel use would generate combustion products from diesel and/or gasoline engines. These mobile exhaust emissions are not regulated. To assess the risk of adverse air quality effects during installation of the shore bypass conduit and shore station, we estimated annual emission rates for the use of a larger ship and an HDD drill. Estimated emissions would be a small fraction of a de minimis threshold of 100 tons per year for non-attainment areas (Table 17).

Table 17. Estimated Emissions (tons/year) for Criteria Pollutants

Source	Horsepower	Total Hours	Load factor	SO_2	CO	PM^{10}	$PM^{2.5}$	NO_x	VOC
Ship	2000	120	25	9.29	0.05	0.02	0.02	0.52	0.00
HDD Drill Rig	300	168	80	0.07	0.10	0.02	0.02	0.30	0.03
Drill Fluid Recycling	300	168	80	0.07	0.10	0.02	0.02	0.30	0.03
Total				9.4	0.3	0.1	0.1	1.1	0.1

The hydrophone array and trunk cable would be installed with a cable laying ship and support vessel. These two vessels would emit combustion products, but the levels from two vessels would not be much different, not adding to a level reaching the de minimis threshold. This work is a one-time event conducted over a period of only three weeks, further reducing the potential for substantial impact. Expected emissions from these vessels would be at similar levels as those

estimated in Table 17, still well below attainment de minimis levels, and therefore, not be significant.

Operational maintenance would be limited to annual servicing of batteries in each of the four acoustic modems that make up the grid. A small support vessel is used to retrieve, refurbish and replace the acoustic modems at 12-month intervals. This level of small vessel use would emit even less combustion product than construction and well below attainment de minimis levels, and therefore, not be significant.

Personnel commute trips to the FTEC would cause mobile source emissions from personally owned vehicles, but would not differ from the existing condition. As with construction, these activities produce negligible, well below de minimis air pollutant level emissions, and therefore, the effect would not be significant.

Greenhouse gas emissions absorb energy, resulting in the slowing or prevention of heat loss back into space. The key greenhouse gases emitted by human activities include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. The Preferred Alternative is anticipated to release minor amounts of greenhouse gases to the atmosphere since internal combustion engines are used during the installation and maintenance of the SSRNM system. The engines are mobile sources that could include the HDD unit, excavation equipment, generators and various surface crafts and are not large enough to have any noticeable effect on climate change. The Preferred Alternative does not involve any new or existing industrial facilities or stationary air sources subject to the greenhouse gas tailoring rule. The rule sets thresholds for greenhouse gas emissions that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs. There would be no significant impact to air quality from the Preferred Alternative.

4.2.2 Alternative Action

The level of air quality pollutants and greenhouse gas levels in the affected environment are low as O‘ahu is in attainment with the National Ambient Air Quality Standards (NAAQS). Therefore the General Conformity Rule does not apply. As discussed in Section 4.1.1, installation and operation of the Alternative Action, including the hydrophone array, radio buoy, trunk cable and operations and maintenance would affect air quality to a small degree through petroleum fueled vehicles and equipment operation. Due to the increased requirement for maintenance of the radio buoy, some additional pollutants would be emitted by maintenance vessels spread over the 15-year program life.

The Alternative Action would pose negligible risk to the level of greenhouse gas levels in the affected area. The air quality effects would be from vessel propulsion emissions during cable installation. No construction would occur at the FTEC. Support vessels would emit mobile-source combustion products during maintenance operations nominally for an estimated five day maintenance effort, occurring twice each year. Under the Alternative Action, offshore cable laying would continue for three weeks and not involve diver supported cable laying or support vessel support associated with shore bypass conduit installation. During this time, there would be short-term, temporary and negligible increases in air emissions offshore along the lee of O‘ahu.

SSRNM system operations are electronic and create no emissions. However, under the Alternative Action, the offshore radio buoy requires preventive maintenance, refueling and

refurbishment. Combustion emissions would be produced by small craft during the semiannual preventive maintenance visits to the radio buoy. The radio buoy itself also contains a diesel generator to augment onboard solar or wind energy generation, and automatically turns on if or when battery power falls below a designated level. The frequency of operation of the emergency power generation is considered negligible because the facility would operate only infrequently on the open ocean offshore from a land area that is in attainment.

Support vessel use would generate less combustion products than the Preferred Alternative from diesel and/or gasoline engines because it does not include HDD shore bypass conduit installation. Emissions produced during trunk cable, hydrophone array and radio buoy installation would be a small fraction of attainment area de minimis emissions of 100 tons/year.

The use of two support vessels during construction of the Alternative Action would emit combustion products, but would not considerably contribute to existing emissions from larger commercial and fishing vessels operating in and around the affected environment between the Kalaeloa Barbers Point Harbor and the Pearl Harbor entrance. This work is a one-time event conducted over a period of only three weeks, further reducing the potential for substantial impact. The SSRNM components of the Alternative Action at the Shore Station are identical to those of the Preferred Alternative and require no preventive maintenance over the 15-year service life. Annual maintenance is conducted on the acoustic modems as described for the Preferred Alternative. Personnel commute trips to the FTEC would cause mobile source emissions from personally owned vehicles, but would not differ from the existing condition. As with construction, these activities would produce negligible, well below de minimis air pollutant level emissions. There would be no significant impacts to air quality from the Alternative Action.

4.2.3 No Action

Under the No Action Alternative, air quality effects would not change from existing conditions. The support vessels would continue to emit mobile-source diesel combustion products during the SSRNM test events that are well below de minimis level. There would be no significant impacts to air quality from the No Action Alternative.

4.3 Geology and Soils

4.3.1 Preferred Alternative

As discussed in Section 4.1.1.2, Shore Bypass Conduit and Section 4.1.1.4, Shore Station, installing cable underground and the HDD method of installing the shore bypass conduit could affect marine geologic features because it would pass under the shoreline (approximately 50 ft [15 m]), intertidal and nearshore subtidal zones seaward to about 2,000 ft (610 m). The HDD drill operation would produce about 10 tons of cuttings mixed with bentonite drill fluid. This material would be contained on site and disposed of at the Waimanalo Gulch Sanitary Landfill, Kapolei.

The HDD conduit installation would avoid affecting the seafloor and shoreline within 2,000 ft of the shore. Because of a relatively small diameter (8 inches [20.3 cm]), the HDD bore would not adversely affect the much larger calcareous caprock formation through which it would pass. The bore is also relatively small in comparison to the size of the calcareous fringing reef platform. Following industry standards for HDD installation, site-specific pre-construction geologic surveys would confirm the characteristics of the subsurface rock. Minor subsurface route

changes, not to extend beyond the surveyed route, could be introduced to avoid apparently weak geologic formations.

The Preferred Alternative would return the topography to its original grade and landscape the construction area consistent with the USCG management plan, discussed in Section 4.1.1.4. Operations would not affect geology or soils because the installed equipment operates electronically. For these reasons, the Preferred Alternative would cause no significant impacts to geology or soils.

4.3.2 Alternative Action

Under the Alternative Action, installation of the trunk cable and hydrophone array and radio buoy on the seafloor would have no effect on underlying marine geologic features. The Alternative Action only involves placing a trunk cable and dead-weight anchors on the surface of the seafloor and does not impact the shoreline, intertidal and nearshore subtidal zones.

Operations would not affect geology or soils because it operates electronically, and does not involve excavation or drilling. The Alternative Action would have no significant impacts on geology or soils.

4.3.3 No Action

Under the No Action Alternative, up to 15 passive, expendable sonobuoys would be deployed from the fleet vessel being tested. Sonobuoy components include metal housing, batteries and battery electrodes, lead solder, copper wire, and lead used for ballast. Thermal batteries in sonobuoys are contained in a hermetically-sealed and welded stainless steel case that is 0.3 to 0.1 in. (0.07 to 0.25 cm) thick and resistant to the battery electrolytes (NAVFACENGCOM 1993). Many metals occur naturally in seawater, and several are necessary for marine organisms and ecosystems to function properly, such as iron, zinc, copper, and manganese. Other metals have adverse impacts on sediment and water quality (e.g., cadmium, chromium, lead, and mercury), but zinc, copper, and manganese may also be harmful to plants and animals at high concentrations. Because of the physical and chemical reactions that occur with metals in marine systems (e.g., precipitation), metals often concentrate in sediments. Thus, metal contaminants in sediments are a greater issue than metals in the water column (DON 2013).

In general, three things happen to materials that come to rest on the ocean floor: (1) they lodge in sediments where there is little or no oxygen below 4 in. (10.2 cm), (2) they remain on the ocean floor and begin to react with seawater, or (3) they remain on the ocean floor and become encrusted by marine organisms. As a result, rates of deterioration depend on the metal or metal alloy and the conditions in the immediate marine and benthic environment (Ankley 1996). When metals are exposed to seawater, they begin to slowly corrode, a process that creates a layer of corroded material between the seawater and uncorroded metal. This layer of corrosion removes the metal from direct exposure to the corrosiveness of seawater, a process that further slows movement of the metals into the adjacent sediments and water column. Elevated levels of metals in sediments would be restricted to a small zone around the metal, and any release to the overlying water column would be diluted. In a similar fashion, as materials become covered by marine life, the direct exposure of the material to seawater decreases and the rate of corrosion decreases. Dispersal of these materials in the water column is controlled by physical mixing and diffusion, both of which tend to vary with time and location (DON 2013).

Several studies have evaluated the potential impacts of materials from activated seawater batteries in sonobuoys that freely dissolve in the water column (e.g., lead, silver, and copper ions), as well as nickel-plated steel housing, lead solder, copper wire, and lead shot used for sonobuoy ballast (NAVFACENGCOM 1993; USCG 1994; Borener and Maugham 1998; Canadian Forces Maritime Experimental and Test Ranges 2005). Sediment was sampled adjacent to and near fixed navigation sites where batteries are used, and analyzed for all metal constituents in the batteries. Results indicated that metals were either below or consistent with background levels or were below National Oceanic and Atmospheric Administration sediment screening levels (Buchman 2008), "reportable quantities" under the Comprehensive Environmental Response, Compensation, and Liability Act § 103(a), or EPA toxicity criteria (DON 2013). Therefore, the expended sonobuoys would not significantly affect sediments, and the No Action Alternative would not significantly impact sediments.

The portable deployed hydrophone array would not contact the bottom. Because there would be no bottom contact, the portable hydrophone would not significantly impact geology or soils.

There are no excavations or drillings or other earth penetrations associated with existing SSRNM operations. Operations would not affect geology or soils. Based on the small quantity of sonobuoys expended and the analysis above, the No Action Alternative would have no significant impact on geology or soils.

4.4 Bathymetry and Waves

The bathymetry in the affected area is an important factor in assessing the impacts of the Preferred Alternative and Alternative Action on marine life. Installation of the hydrophone array and trunk cable must consider the risks posed to the trunk cable by undulating bathymetry and currents generated by waves. As discussed in Section 3.8.2.5, Coral Reef Ecosystem EFH, The shallow area around the HDD conduit exit and the diver-laid portion of the trunk cable is a patch reef which is subject to occasional damage and turbidity generated by storm waves. Occasional turbidity caused by cyclonic and Kona storms is a typical feature of the affected environment (Also see Sections 3.3, 3.4 and 3.5). Neither the Preferred Alternative, Alternative Action, nor No Action Alternative would cause any change to existing bathymetric features that might change the wave climate in the ocean of the affected environment. Increased turbidity during and after storm events will continue in the area and marine life has adapted to these conditions. The existing portable SSRNM testing does not affect bathymetry and waves in the deeper waters of these tests. Operations would not affect bathymetry or waves. There would be no significant impact on bathymetry or waves.

4.5 Water Quality

4.5.1 Preferred Alternative

Construction of the Preferred Alternative at sea would involve the use of petroleum-based fuel, oil and lubricants onboard support vessels with the potential to affect water quality during installation. As discussed in Section 4.1.2.5, Operations and Maintenance, adherence to contractor spill prevention and countermeasures planning would avoid substantial impact from these products during normal use or inadvertent spills. Generally, marine vessels will leach minor quantities of petroleum hydrocarbons into the surrounding water. This is caused by dissolution of petroleum, oil and lubricant residues from shipboard surfaces. Such residues remain on surfaces during manufacture and maintenance, in engine cooling water and in moving

deck equipment such as capstans, davits and cranes. At most, such residues fall in a range of milligrams to grams. Contractors will be required to adhere to spill prevention and countermeasures planning to avoid adverse effects from these products during normal use or inadvertent spills. Faults in shipboard systems might lead to outright spills of petroleum hydrocarbons, which are reported to the USCG and immediately cleaned. Otherwise, the hydrophone array, anchors, buoys and trunk cable placed on the ocean bottom are constructed of, and/or covered with non-toxic, inert materials that would cause no measureable effect on marine water quality.

The Preferred Alternative does not include activity that might affect water temperature, and would pose negligible risk to marine water quality because of the short duration of the work and because the work is sufficiently benign to cause only temporary resuspension of native sands. During the final stage of drilling, bentonite addition to the drilling fluid would be discontinued, and only water would be used, eliminating the potential discharge of bentonite when the bore exits the seabed. When the drill exits the bore, short-term sediment suspension would occur in the immediate area.

Temporary sediments would increase due to laying of the truck cable. Sediments suspended by the HDD conduit exit, diver activity and cable laying would rapidly disperse and/or settle back to the seabed. Coarse sediments (sand or larger) would resettle within seconds in the immediate area, whereas fines (silt to clay) would tend to drift and remain in suspension for minutes to hours, depending on particle sizes and bottom currents. There are no reports of sediment contamination in the affected area. Occasional turbidity caused by cyclonic and Kona storms is a typical feature of the affected environment (also see Sections 3.4 and 3.5). Waves from Kona storms (south to southwesterly) and the southern swell have the most effect on water quality (especially turbidity), currents and temperatures in the affected environment even though they occur occasionally. Turbidity caused by the suspended sediments during installation would be negligible and temporary compared to ambient condition which is already subject to occasional turbidity generated by storm waves.

Petroleum, oil and lubricants would be used in construction vehicles and equipment. Onshore, adherence to contractor spill prevention and countermeasures planning would avoid adverse effects from these products through normal use or inadvertent release. The contractor's SPCC plan provides requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines. The contractor's SPCC Plan would be implemented to minimize the likelihood of spills and to contain and remove any spills of petroleum-based fluids. Adherence to these procedures assures that there would be no significant impact due to spills during onshore construction. Otherwise, shore construction would not introduce toxic or hazardous substances or chemicals, organic substances, or solid wastes into bodies of water or on land exceeding regulatory standards. The sodium montmorillonite used in the drilling process is non-toxic clay that is not a hazardous substance.

Construction at the FTEC would not require dewatering, surface water discharge, or discharge of water or materials from the FTEC construction site into the ocean. The closed bentonite recycling system contains water used in the drill fluid onsite (See Section 2.1.2, Shore Bypass Conduit). The topography of the construction site is flat and the ground is pervious to water. No impervious structures would be constructed above ground that might increase surface storm water runoff after construction.

The polyethylene-jacketed trunk cable would become encrusted with marine organisms and would not be expected to decompose for decades. Inner metallic components are sealed from the surrounding media. Any by-products of corrosion or dissolution of cable components in seawater would be rapidly dispersed and diluted in the water column and would have no measurable impact on water quality.

The minor resuspension of clean, native sediments in the ocean and the lack of water quality effects from on-shore construction are indicative of negligible, insignificant impacts to water quality from the Preferred Alternative. Adherence to contractor contingency planning during construction would help to insure that no significant impacts would occur.

4.5.2 Alternative Action

The Alternative Action only involves placing a trunk cable and dead-weight anchors on the surface of the seafloor and does not impact the coastal waters closer to shore than the 800-ft depth contour. As discussed in Section 4.1.1.5, operations and maintenance of the Alternative Action would involve the use of support vessels. Therefore, the Alternative Action would cause slightly more impacts than those associated with the trunk cable and hydrophone installation described for the Preferred Alternative. However, because of the short term vessel use annually during maintenance, and adherence to spill prevention plan requirements, water quality impacts would be negligible.

There would be no construction at FTEC and no shore bypass conduit installation. Installation and operation of the hydrophone array, anchors, buoys and trunk cable on the ocean bottom involve inert materials that would cause no measureable effect on marine water quality. Due to the inert nature of the installation process, the system components and operations, the Alternative Action would cause no significant impact to water quality.

The Alternative Action does involve semiannual preventive maintenance trips by vessel to the radio buoy site. During such maintenance events, the support vessels can release minor amounts of petroleum, oil and lubricants. This is typical of vessels and within USCG regulations for commercial vessels.

The typical NOMAD buoy contains a reserve volume of diesel fuel and lead/acid batteries, both of which are contained inside internal buoy compartments. These buoys are widely used and known for their reliability with very few problems. The NOMAD buoy would likely use antifouling paint approved for such use which does not degrade marine waters. Because of the inert nature of the installation components and operations and the general lack of effect during operations, the Alternative Action would cause no significant environmental impacts.

4.5.3 No Action

There are no construction-related impacts to water quality associated with the No Action Alternative. Operations under the No Action Alternative involve one support vessel trip during each of ten annual SSRNM tests. The support vessels can release minor amounts of petroleum, oil and lubricants. This is typical of vessels and within USCG regulations for commercial vessels. Adherence to the contractor's spill prevention plan would help insure no greater impact to water quality.

Under the No Action Alternative, up to 15 passive, expendable sonobuoys would be deployed from the fleet vessel being tested. Sonobuoy components include metal housing, batteries and battery electrodes, lead solder, copper wire, and lead used for ballast. Thermal batteries in sonobuoys are contained in a hermetically-sealed and welded stainless steel case that is 0.3 to 0.1 in. (0.07 to 0.25 cm) thick and resistant to the battery electrolytes (NAVFACENGCOM 1993). Many metals occur naturally in seawater, and several are necessary for marine organisms and ecosystems to function properly, such as iron, zinc, copper, and manganese. Other metals have adverse impacts on sediment and water quality (e.g., cadmium, chromium, lead, and mercury), but zinc, copper, and manganese may also be harmful to plants and animals at high concentrations. Because of the physical and chemical reactions that occur with metals in marine systems (e.g., precipitation), metals often concentrate in sediments. Thus, metal contaminants in sediments are a greater issue than metals in the water column (DON 2013).

In general, three things happen to materials that come to rest on the ocean floor: (1) they lodge in sediments where there is little or no oxygen below 4 in. (10.2 cm), (2) they remain on the ocean floor and begin to react with seawater, or (3) they remain on the ocean floor and become encrusted by marine organisms. As a result, rates of deterioration depend on the metal or metal alloy and the conditions in the immediate marine and benthic environment (Ankley 1996). When metals are exposed to seawater, they begin to slowly corrode, a process that creates a layer of corroded material between the seawater and uncorroded metal. This layer of corrosion removes the metal from direct exposure to the corrosiveness of seawater, a process that further slows movement of the metals into the adjacent sediments and water column. Elevated levels of metals in sediments would be restricted to a small zone around the metal, and any release to the overlying water column would be diluted. In a similar fashion, as materials become covered by marine life, the direct exposure of the material to seawater decreases and the rate of corrosion decreases. Dispersal of these materials in the water column is controlled by physical mixing and diffusion, both of which tend to vary with time and location (DON 2013).

A study by the Navy examined the impacts of materials from activated seawater batteries in sonobuoys that freely dissolve in the water column (e.g., lead, silver, and copper ions), as well as nickel-plated steel housing, lead solder, copper wire, and lead shot used for sonobuoy ballast (NAVFACENGCOM 1993). The study concluded that constituents released by saltwater batteries as well as the decomposition of other sonobuoy components did not exceed state or federal standards, and that the reaction products are short-lived in seawater (DON 2013).

Therefore the portable deployed hydrophone array and expended sonobuoys would not significantly affect water quality, and the No Action Alternative would not significantly impact water quality.

4.6 Marine Biology

This section evaluates how and to what degree the activities described in Chapter 2 (Alternatives including the Preferred Alternative) potentially impact marine biological resources that occur within the affected environment.

4.6.1 Marine Mammals

4.6.1.1 Preferred Alternative

As discussed in Section 4.1.1, installation of the hydrophone array, trunk cable and positioning modems may affect marine mammals. During installation surveying of the positioning modems,

multiple pings might accumulate enough energy within 656 ft (200 m) of the modem to affect a marine mammal if the marine mammal remained in the area during the entire survey time frame. Operation of the positioning modems requires fewer pings resulting in a negligible risk of an effect to marine mammals. During operation there would be negligible effects due to EMF. In addition there is a potential for strike by a support vessel or entanglement in the hydrophone array.

During construction elevated noise associated with construction-vessel traffic and short-term changes in prey availability could occur. This noise is expected to be typical of vessel traffic in the area and occur only during installation. Furthermore, the probability of exposure of a marine mammal to the single hydrophone array is very low. Because of the flexibility of the hydrophone cable, the small size of the hydrophone array and trunk cable relative to the ocean depth zone habitat, it is not expected to pose any substantial physical barrier or collision potential to foraging marine mammals in the area. Those few marine mammals that might be exposed to installation activity would avoid the activity and installation equipment, not colliding with or becoming entangled or trapped in the hydrophone array. Smaller species such as dolphins are even less likely to become entangled or trapped.

Rarely observed marine mammals would not be likely to be encountered during the relatively short, three-week construction timeframe. Migratory whales are unlikely to be encountered because they are typically in the area during fall, winter or spring months, not during the anticipated summer construction timeframe. Other marine mammals are unlikely to be present due to habitat preferences. Blainville's beaked whale, pygmy killer whale, and pantropical spotted dolphin are typically rare from shore to the shelf break; they might occur in deepwater during installation of the hydrophone array.

Marine mammals would likely avoid the immediate vicinity of construction due to the increased human activity. However, increased construction-vessel traffic and equipment use has the potential to impact marine mammals directly by accidentally striking or disturbing individual animals. Behavioral changes would be reactive in response to vessel presence might include avoidance reactions, alarm/startle responses, alteration of swimming speed or direction of travel, vocalizations, or diving activity. Avoidance of increased human activity during the short duration of construction is unlikely to harm the animals or cause abandonment or significant alteration of behavioral patterns, therefore there will be no marine mammal takes under the MMPA.

Marine mammal lookouts would be stationed on construction vessels. During transit to and from the construction sites, lookouts would alert pilots to the presence of a marine mammal so they could adjust course and speed as necessary to maintain a safe distance consistent with prudent seamanship. Because construction vessels would operate while stationary, or at low speeds (less than 12 knots) within the relatively small construction zone and access routes during the three-week in-water construction period, and marine mammals would avoid vessels, the likelihood of a vessel strike to marine mammals would be negligible.

As discussed in Section 4.1.1.1, surveying of the positioning modems may be above de minimis source levels and may produce enough energy to cause minor TTS effects to a marine mammal, but that marine mammal would have to stay within an approximately 626 ft (200 m) radius of the array throughout the entire installation process to experience those effects. After completion of surveying, and during the routine operation of the SSRNM, there would be no significant

changes in marine mammal behavior because of the low energy output of these devices. The possibility of Level A Harassment or behavioral pattern disturbance to a point where such behavioral patterns are abandoned or significantly altered caused by the underwater sound emitted by the active positioning modems would be unlikely because the source levels are low and a duration of effect is short. To avoid potential acoustical impacts during installation and surveying of the positioning modems and potential ship strike marine mammal lookouts will be positioned on support vessels and activities will not be initiated if a marine mammal is sighted within 200 m of the vessel.

For these reasons, the Preferred Alternative would not significantly impact marine mammals. No disruption of behavioral patterns would occur such that patterns are abandoned or significantly altered and there would be no marine mammal takes under the MMPA

4.6.1.2 Alternative Action

The Alternative Action would have the same construction and operation impacts to marine mammals as for the Preferred Alternative. There would be similar potential for impacts during buoy maintenance since it would require periodic use of small craft. To avoid potential acoustical impacts during installation and surveying of the positioning modems and potential ship strike, marine mammal lookouts would be positioned on support vessels and activities would not be initiated if a marine mammal is sighted within 200 m of the vessel. Therefore the Alternative Action would not significantly impact marine mammals. No disruption of behavioral patterns would occur such that patterns are abandoned or significantly altered and there would be no marine mammal takes under the MMPA.

4.6.1.3 No Action

Under the No Action Alternative, installation of a fixed array would not occur and therefore no surveying of the positioning modems would occur. During portable hydrophone array operation marine mammals are at potential risk of collision or entanglement with the hydrophone array in the water column. Because of the small size of the hydrophone array and small size of the supporting cable relative to the ocean habitat, the array is not expected to pose any substantial physical barrier or collision potential to marine mammals. The No Action Alternative will have similar potential impacts to the Preferred Alternative and Alterative Action relative to ship strike. Positioning of marine mammal lookouts on support craft and not initiating testing when a marine mammal is observed within 200 m would avoid impacts to marine mammals.

Under the No Action Alternative, up to 15 passive, expendable sonobuoys would be deployed from the fleet vessel being tested. While disturbance or strike from an item falling through the water column is possible, it is not very likely because the objects generally sink slowly through the water and can be avoided by most marine mammals. Therefore, the discussion of expended sonobuoy strikes will focus on the potential of a strike at the surface of the water. While the probability for sonobuoy strikes exists, no strike from military expended materials has ever been reported or recorded. Due to the small number of expendable sonobuoys that would be deployed from the fleet vessel being tested, it is highly unlikely sonobuoy strikes will occur to marine mammals at or near the surface of the water. The positioning of marine mammal lookouts on support craft help further reduce the potential impacts of expended sonobuoys during the No Action Alternative. Because the No Action Alternative would not significantly affect water

quality (Section 4.5.3), there would be no significant indirect water quality impacts to the marine mammals as a result of expended sonobuoys.

Therefore the No Action Alternative would not significantly impact marine mammals. No disruption of behavioral patterns would occur such that patterns are abandoned or significantly altered and there would be no marine mammal takes under the MMPA.

4.6.2 Sea Turtles

This section discusses environmental consequences of the Preferred Alternative, Alternative Action and No Action on sea turtles and conclusions regarding impacts and significance. Please see Section 4.6.7 for the assessment of effects under ESA.

4.6.2.1 Preferred Alternative

During construction of the Preferred Alternative elevated noise associated with construction-vessel traffic and short-term changes in prey availability could occur. Sea turtles are unlikely to collide or become entangled with the hydrophone array. The probability of exposure of a sea turtle to the single hydrophone array is very low. Because of the flexibility of the hydrophone cable, the small size of the hydrophone array and trunk cable relative to the ocean depth zone habitat, it is not expected to pose any substantial physical barrier or collision potential to foraging sea turtles in the area. During operation there would be negligible effects due to EMF.

Rarely observed sea turtles would not be likely to be encountered during the relatively short, three-week construction timeframe. Sea turtles likely to be encountered would include those noted by the Navy as being commonly observed (DON 2013). Common sea turtles expected to occur in the affected environment include:

- Green sea turtle
- Hawksbill sea turtle

Sea turtles possess an overall hearing range of approximately 100 Hz to 1 kHz, with an upper limit of 2 kHz (DON 2013). The frequency range of the positioning modems (about 9-14 kHz) is well above the upper limit of sea turtle hearing. Also see Table 2 and the discussion in Section 4.1.1.1. Even if some acoustic energy from the modem signal was out-of-band (at reduced levels) the sea turtle would not hear it. Therefore, installation and operation of the hydrophone array and positioning modems are unlikely to affect sea turtles.

Because construction vessels would operate at low speeds within the relatively small construction zone and access routes during the three-week in-water construction period, the likelihood of a vessel strike to sea turtles would be discountable. During the operation there would be no vessel activity to affect sea turtle behavior (Section 4.1.1.5).

The hydrophones are acoustically passive, detecting radiated noise (i.e. propulsion, ship machinery and flow noise) from vessels, not producing noise. The positioning modems are active sound sources, but because of the high frequency (9.66-14.5 kHz) of the modems which is beyond the hearing range of sea turtles; the location of the positioning modems; and the relatively low source levels during operation (Section 4.1.1.1), no significant impacts would occur to sea turtles.

Under the Preferred Alternative, vessel movement would occur only during project installation of the hydrophone array and trunk cable, a one-time temporary event. Shore bypass conduit support vessels, diver-assisted trunk cable support vessels and hydrophone array installation

support vessels must stay on position regardless of changes in the wind, waves and currents. These vessels would not move appreciably; they would either set anchor or maintain position using dynamic positioning. Installation of the deep portions of the trunk cable would occur at relatively slow speeds, between 0.5 and 2 kt (Section 4.1.1.3). No maintenance is planned so no vessel movement would occur during system operation. Because of these slow speeds during cable laying and the temporary nature of this event, the probability a construction vessel striking a sea turtle is low.

During transit to and from offshore work sites, vessel speeds would be higher, between 5 and 15 kt, increasing the probability of a construction vessel striking a sea turtle. Visually detecting and avoiding sea turtles can reduce the probability of vessel strike under these circumstances. Therefore, Navy would include a marine mammal lookout on each construction vessel to detect and take action to avoid direct strike of sea turtles.

In summary, the Preferred Alternative might cause sea turtles to avoid human activity during the temporary construction period; such an effect is not anticipated to be significant. There is a low probability of a construction vessel striking a sea turtle while on station and onboard lookouts would avoid sea turtle strikes during transit.

4.6.2.2 Alternative Action

Under the Alternative Action, from the radio buoy to the array site, installation would have the same potential impacts to the sea turtles as the trunk cable and array installation for the Preferred Alternative. Therefore, the Alternative Action is not anticipated to cause significant impact to sea turtles.

Operations of the Alternative Action, however, would require periodic use of a small support vessel (two, 10-hour days annually) and the larger buoy tender (two, 24-hour days annually) to maintain the radio buoy. Sea turtles would likely avoid the installation of the hydrophone array, trunk cable and radio buoy (indicating behavioral disturbance) the immediate vicinity of the radio buoy due to the increased human activity there. The increased vessel traffic compared to the Preferred Alternative, especially while travelling to and from the radio buoy, would elevate the risk of impact to sea turtles directly by accidentally striking or disturbing individual animals. Behavioral changes in response to vessel presence might include avoidance reactions, alarm/startle responses, or alteration of swimming speed or direction of travel.

Under the Alternative Action, vessel movement would occur during project installation of the hydrophone array, radio buoy and trunk cable, a one-time temporary event; and during annual maintenance events. The hydrophone array and radio buoy installation support vessels must stay on position regardless of changes in the wind, waves and currents. These vessels would not move appreciably; they would either set anchor or maintain position using dynamic positioning. Installation of the deep portions of the trunk cable would occur at relatively slow speeds, between 0.5 and 2 kt (Section 4.1.1.3). No maintenance is planned so no vessel movement would occur during system operation. Because of these slow speeds during cable laying and the temporary nature of this event, the probability a construction vessel striking a sea turtle is low.

During transit to and from offshore work sites, vessel speeds would be higher, between 5 and 15 kt, increasing the probability of a construction vessel striking a sea turtle. Visually detecting and avoiding sea turtles can reduce the probability of vessel strike under these circumstances.

Therefore, Navy would include a lookout on each construction vessel to detect and take action to avoid direct strike of sea turtles.

In summary, the Alternative Action is not anticipated to have significant impacts to sea turtles. There is a low probability of a construction vessel striking a sea turtle while on station and onboard lookouts would avoid sea turtle strikes during transit. Construction is a one-time, temporary event and only semiannual maintenance events would occur. Acoustic transmissions are outside of the hearing range of sea turtles.

4.6.2.3 No Action

Under the No Action Alternative, installation of a fixed array would not occur. During hydrophone array operation, sea turtles are at potential risk of collision, entrapment or entanglement with the hydrophone array in the water column. Because of the small size of the hydrophone array and small size of the supporting cable relative to the ocean habitat, the array is not expected to pose any substantial physical barrier or collision potential to foraging sea turtles.

Under the No Action Alternative, up to 15 passive, expendable sonobuoys would be deployed from the fleet vessel being tested. While disturbance or strike from an item as it falls through the water column is possible, it is not likely because the objects generally sink through the water slowly and can be avoided by most sea turtles. Therefore, the discussion of expended sonobuoy strikes will focus on the potential of a strike at the surface of the water. There is a possibility that an individual turtle at or near the surface may be struck if they are in the target area at the point of physical impact at the time of sonobuoy deployment. While any species of sea turtle may move through the open ocean, most sea turtles will only surface occasionally. Sea turtles are generally at the surface for short periods, and spend most of their time submerged (Renaud and Carpenter 1994; Sasso and Witzell 2006). The leatherback turtle is more likely to be foraging at or near the surface in the open ocean than other species, but the likelihood of being struck by a sonobuoy remains very low. The positioning of marine mammal lookouts on support craft help further reduce the potential impacts of expended sonobuoys during the No Action Alternative. Because the No Action Alternative would not significantly affect water quality (Section 4.5.3), there would be no significant indirect water quality impacts to the sea turtles as a result of expended sonobuoys.

During transit to and from offshore work sites, vessel speeds would be higher, between 5 and 15 kt, with some probability of the test support vessel striking a sea turtle. Visually detecting and avoiding sea turtles can reduce the probability of vessel strike under these circumstances. Navy vessels provide marine mammal lookouts that also watch for sea turtles to detect and take action to avoid direct strikes. Acoustic transmissions are outside of the hearing range of sea turtles.

Therefore, the No Action Alternative would not significantly impact sea turtles.

4.6.3 Marine Fish

4.6.3.1 Preferred Alternative

The primary short-term impacts to marine fish from the construction of this system would be related to the presence of divers, minor increases in turbidity during construction of the shore bypass conduit and trunk cable laying, as discussed in Section 4.1. Effects on fish would be minimized by manually placing the trunk cable around coral heads, avoiding the coral and higher fish density and diversity associated with the coral reef ecosystem. Startle effects from diver activities would occur, but they would be similar to normal predator-prey interactions. Some fish

species might abandon areas when human activities occur, but then return after the intrusion has been removed (Popper and Hastings 2009). While some degree of localized, short-term impacts would be expected during the trunk cable laying activity, fish would not be subject to long-term adverse physiological or behavioral stress. Because of the limited construction timeframe and limited effect caused by construction activities coupled with the small size of the trunk cable footprint (Section 4.1.1.3) and limited impacts to prey species (e.g., invertebrates, Section 4.6.4), the Preferred Alternatives not expected to significantly impact fish populations in the affected environment.

During the installation of the hydrophone array and anchoring system, open-ocean pelagic fish could be displaced a small distance, but would continue on their original path as if nothing had happened. Mobile demersal species such as small fish and nektonic invertebrates can sense slight changes in pressure and avoid cable installation.

Fish hearing does not extend to the acoustic bands used by the positioning modems (DON 2013). Additionally, at the frequencies where fish (including hearing specialists) can hear, their sensitivity is an order of magnitude smaller (or more) than marine mammals. Because the acoustic source levels are low (Section 4.1.1.1), no effect is expected on any fish species from the active acoustic signals used for installing and locating the array.

During operation of the system, there would be minor effects on marine fish. After installation of the trunk cable and array, fish might be attracted to the array as habitat diversity in the area is increased, although the net effect of the SSRNM installation would be insubstantial. The submarine cable might also provide additional hard substrate habitat for benthic organisms in the area (See also Section 4.6.4.1). The upper reaches of the hydrophone array (< 656 ft [200 m]) might attract (or divert) fish because of its physical presence. The cable supporting the array within the water column is flexible and the hydrophones and mounting brackets contain no hooks or nets that could pose a snagging hazard to fish. During operation there would be negligible effects due to EMF. These effects are expected to be minor because of the benign nature of the trunk cable and hydrophone array and the relatively small footprint of the installation.

The hydrophones are acoustically passive, detecting radiated noise (i.e. propulsion, ship machinery and flow noise) from vessels, not producing noise. The positioning modems are active sound sources, but because of the location of the positioning modems and the relatively low source levels during operation (Section 4.1.1.1), no significant adverse impacts would occur to fish during construction or operation.

The relatively short duration of construction and operation, the small footprint and the ability of fish to avoid equipment placed on the bottom would pose negligible impacts on both pelagic and demersal fish in the affected environment. In addition, the incorporation of a shore bypass conduit avoids sensitive intertidal and nearshore habitats known for relatively high fish species diversity. Because this level of effect would be negligible as described above, there would be no significant impacts to fish.

4.6.3.2 Alternative Action

The construction and operation of the Alternative Action would pose the same potential effects as construction of the Preferred Alternative with regard to the hydrophone array and trunk cable. However, the Alternative Action does not include installing components on the fringing reef crest or reef platform, and therefore avoids any impacts to preferred habitat for many of fish

species found in the area. Overall, impacts from construction would be similar to or less than the Preferred Alternative, resulting in no significant impact from construction.

Operation under the Alternative Action would also involve radio buoy maintenance activity. Buoy maintenance evolutions would temporarily disturb fish use of habitat provided by the buoy itself, creating a minor short term disturbance, but result in no significant impacts to fish from operations.

4.6.3.3 No Action

Under the No Action Alternative, there would be no impacts from construction. Operation of the portable deployed hydrophone array from a support vessel would occur in the FORACS area up to ten times a year. The introduction of a hydrophone array suspended from the support craft might attract or divert fish, but only during hydrophone deployment. The hydrophones contain no hooks or nets that could pose a snagging hazard to fish. This temporary and short-lived vessel operation might cause negligible effects on pelagic fish (e.g., startling), but would have no impact on bottomfish.

Under the No Action Alternative, up to 15 passive, expendable sonobuoys would be deployed from the fleet vessel being tested. While disturbance or strike from expended sonobuoys as they sink through the water column is possible, it is not very likely because the objects generally sink through the water slowly and can be avoided by most fishes (DON 2013). Because the No Action Alternative would not significantly affect water quality (Section 4.5.3), there would be no significant indirect water quality impacts to the marine fish as a result of expended sonobuoys.

Overall, the No Action Alternative would have no significant impact on fish.

4.6.4 Marine Invertebrates

4.6.4.1 Preferred Alternative

As discussed in Section 4.1, the Preferred Alternative could temporarily affect planktonic, demersal and benthic invertebrates during construction of the hydrophone array and trunk cable. These three habitat groupings are derived for this analysis from general knowledge of marine invertebrates and habitat characteristics of invertebrates that occur in the affected area.

Planktonic Invertebrates

Planktonic invertebrates such as larval forms of coral, crustaceans, mollusks and echinoderms, small crustaceans, and various small worms would be more plentiful closer to shore, floating in the well-lit and warm surface waters. Physical movement of vessels, cables, anchors and divers might adversely affect a few individuals, but the great majority would simply be swept aside unharmed as the ship or body passes through the water. Because the Preferred Alternative would not significantly affect water quality (Section 4.5), there would be no significant indirect water quality impacts to the planktonic community as a whole in the affected environment. Therefore, due to the lack of meaningful physical and water quality impacts, the Preferred Alternative would not significantly affect planktonic invertebrates.

Demersal and Benthic Invertebrates

The extent and duration of construction poses negligible impacts to larger crustaceans, arthropods, mollusks and echinoderms in the affected environment. Inclusion of the proposed

shore bypass conduit avoids sensitive intertidal and nearshore habitats. Further, hand-laying of the trunk cable between the HDD bore exit and the fringing reef crest will keep the cable between live coral heads, on the sand bottoms and sand channels, avoiding direct impacts to the highly diverse coral ecosystems.

Physical impacts of benthic and demersal invertebrates would depend on their mobility. During the installation of the data trunk cable, data buoy, and hydrophone anchors, the larger and more mobile invertebrate forms such as crabs and spiny lobsters found on the sand bottom would avoid the disturbance of cable laying, then return to the site after construction has been completed. Demersal and pelagic invertebrates including squid, octopus and sea slugs would also avoid small-footprint cable laying disturbance. Other, less mobile forms such as hydroids, bryozoans, tube worms, tunicates, snails and clams would be directly covered by trunk cable or anchor installation (Section 4.1.1). Because the Preferred Alternative would cover a relatively small footprint in the affected environment, direct impacts to benthic invertebrates would not be significant. Demersal invertebrates would avoid installation of cables and anchors.

All invertebrate forms, including pelagic, benthic and demersal would be potentially affected by water quality in the form of increased cloudiness of the water caused by suspended sediments at the site of the disturbance. Because the conduit installation would exit the seafloor using water only, there would be no bentonite release. Resuspended sediments affecting water clarity would occur seaward of the shore bypass conduit exit and trunk cable laying at the immediate work site (Sections 4.1.1 and 4.5). Diver assisted installation of the trunk cable around the coral heads would minimize such disturbance by avoiding live coral heads.

Researchers from the Monterrey Bay Aquarium Research Institute and the Monterey Bay National Marine Sanctuary conducted an impact study of a 59-mile (95-km) submarine cable that had been in place for eight years off the California coast (Kogan et al. 2006). That cable supported a hydrophone array roughly similar to the Preferred Alternative. The study found few changes in benthic fauna abundance or distribution. Exposed portions of the cable provided new habitat for anemones. Also, some fishes were more abundant near the cable, presumably due to the greater habitat complexity introduced by the cable.

As discussed in Section 4.5, Water Quality, the minor resuspension of clean, native sediments during construction in an area that is normally turbid with wave-suspended sediments indicates negligible, insignificant impacts to water quality from the Preferred Alternative. During operations, no maintenance activity would occur to potentially affect invertebrates. Other potential effects from the trunk cable operations have been discussed in Section 4.1.1.5. The trunk cable would produce EMF around the cable. A review of the literature indicates such effects would have negligible effects on marine life. Also, the cable would be weighted in the diver-laid portion of its route to ensure stability on the seafloor during storm events. Finally, in consideration of the footprint of the trunk cable, the effects of installing the trunk cable would cover a relatively small area within the affected environment. For these reasons, installation of the trunk cable would not significantly impact demersal and benthic invertebrates.

Maintenance of the SSRNM would not require offshore activities. The trunk cable would be stable and only emit negligible levels of EMF. Therefore, there would be no significant impact to invertebrates from the Preferred Alternative.

Corals

Under the Preferred Alternative, the project would pose negligible risk to the adjacent coral reef ecosystem. As discussed in Section 3.8.2.5 the live corals along the southwest coast of O‘ahu and in the vicinity of Barber’s Point are described as a patch reef; a reef that is mostly comprised of limestone with corals growing on the limestone of the reef and frequently separated by areas of sediment or sand channels. A diver survey conducted for this project confirmed the HDD bore exit and diver-laid cable route does resemble a patch reef (Hatke 2012). Based on this survey, the HDD exit would be guided in such a way as to avoid any live coral colonies (coral head). The closest known live coral colony would be located approximately 100 ft (30.5 m) from the proposed HDD exit bore hole as estimated from bottom survey findings (Section 2.1, Figure 4).

The use of diver assisted cable laying from the shore bypass conduit exit to the reef ledge would insure that the cable would be placed a sufficient distance from any live coral colonies. In addition, the cable would be weighted to prevent it drifting along the seafloor during operations, thereby reducing the potential to scour the adjacent corals. Therefore, direct effects to corals would be avoided. Indirect effects from suspended native sediments are anticipated to be short-term and negligible, and would only occur during construction. Once installed, during operations of the SSRNM System, no long-term adverse impacts to coral in the affected environment are anticipated.

Under the Preferred Alternative, installation of the trunk cable and hydrophone array on the surface of the ocean bottom at an approximate depth of 3,084 ft (940 m) is not expected to cause significant adverse short-term or long-term impacts to precious corals. While precious coral habitat exists along the southwest coast of O‘ahu, there are no established beds of precious coral located along the proposed trunk cable route or at the hydrophone anchor locations as discussed in Section 3.8.2.4.

Maintenance of the SSRNM would not require offshore activities. The trunk cable would be hand-laid by divers avoiding direct effects to corals. Water quality impacts from suspended native sediments would be temporary and negligible. Therefore, there would be no significant impact on corals from the Preferred Alternative.

4.6.4.2 Alternative Action

Under the Alternative Action, installation of the hydrophone array, radio buoy and trunk cable on the ocean bottom might affect marine invertebrates (Section 4.1). The Alternative Action does not include the installation of a shore bypass conduit and cable in the coral reef ecosystem however. The Alternative Action is limited to the hydrophone array, trunk cable and a radio buoy at the 800-foot depth contour. The high-diversity coral reef ecosystems found in shallower waters above 330 ft (100 m) would not be affected. Offshore, the impact of the installation of the hydrophone array and trunk cable would be identical to the Preferred Alternative.

This alternative would cause similar impacts discussed for the Preferred Alternative. However, because this alternative only affects deeper water habitats, there would be less of an impact to invertebrate communities because there are fewer invertebrate individuals in deeper waters, planktonic forms reside at the surface zones, distant from the seafloor. Only invertebrate communities found in the water column and on or near the bottom at these depths would be potentially affected. Because of this general reduction in proposal scope and invertebrate density, the Alternative Action would not cause significant impacts to planktonic, benthic and demersal invertebrates.

Under the Alternative Action, installation and operation of the hydrophone array, anchors, buoys and trunk cable on the ocean bottom involve inert materials that would cause no measureable impact to nearshore coral species. The Alternative Action would pose the same potential impacts as the Preferred Alternative with regard to the installation of the trunk cable and hydrophone anchors in the deep sea environment where precious coral could exist. There are no established beds of precious coral located in the vicinity of the proposed trunk cable route or hydrophone anchors. Therefore, no significant adverse short-term or long-term impacts to precious coral are expected.

4.6.4.3 No Action

Under the No Action Alternative, installation of a fixed array would not occur and sonobuoys would not be expended in shallow water, where coral reef ecosystems exist. As with the Preferred Alternative and Alternative Action, the physical movement of vessels might adversely affect a few planktonic invertebrates, but the great majority would simply be swept aside and unharmed as the ship or body passes through the water. Physical disturbances or strikes by expended sonobuoys on marine invertebrates are possible at the water's surface, through the water column, and on the seafloor. Disturbance or strike impacts on marine invertebrates by expended sonobuoys falling through the water column are possible, but not very likely because military expended materials do not generally sink rapidly enough to cause strike injury (i.e., as opposed to fragments propelled by high explosives); and exposed invertebrates would likely experience only temporary displacement as the object passes by (DON 2013).

Military expended materials that are re-mobilized after their initial contact with the seafloor (e.g., by waves or currents) may continue to strike or abrade marine invertebrates. Secondary physical strike and disturbances from expended sonobuoys are relatively unlikely because the components are more dense than the surrounding sediments (i.e., metal), and are likely to remain in place as the surrounding sediment moves. Potential secondary physical strike and disturbance impacts may cease only: (1) when the military expended materials is too massive to be mobilized by typical oceanographic processes, (2) when the military expended material becomes encrusted by natural processes and incorporated into the seafloor, or (3) when the military expended materials becomes permanently buried. The fitness of individual organisms would be impacted directly or indirectly, but not to the extent that the viability of populations or species would be impacted.

Expended sonobuoys contain plastics containing chemicals, including persistent organic pollutants, which could indirectly affect marine invertebrates (Derraik, 2002; Mato et al., 2001; Teuten et al., 2007). Marine invertebrates may be exposed by contact with the plastic, contact with associated plastic chemical contaminants in the sediment or water, or ingestion of contaminated sediments. Most marine invertebrates are very small relative to expended sonobuoy components, so direct ingestion is unlikely. Harmful chemicals in plastics interfere with metabolic and endocrine processes in many plants and animals (Derraik, 2002). Potentially harmful chemicals in plastics are not readily absorbed to marine sediments; instead, marine invertebrates are more at risk via ingestion or bioaccumulation. Because plastics retain much of their chemical properties as they are physically degraded into microplastic particles (Singh and Sharma 2008), the exposure risks to marine invertebrates are dispersed over time. Marine invertebrates could be indirectly impacted by chemicals from plastics in expended sonobuoys, but these effects would be limited to direct contact with the material. Because of these

conditions, population-level impacts on marine invertebrates are likely to be inconsequential and not detectable. Therefore, the No Action Alternative would not cause significant impacts to marine invertebrates.

4.6.5 Marine Vegetation

4.6.5.1 Preferred Alternative

In Hawaii, there is a wide variety of larger algae forms (macroalgae), including at least 204 species of red algae, 59 species of brown algae, and 92 species of green algae. Coastal pollution, invasive species, and an increasing demand for fresh seaweed threaten native species (Friedlander et al. 2005). Most important algae species are found in shallow waters where light levels are high over the proposed shore bypass conduit. However, one very common species, *Turbinaria ornata*, is potentially is found as deep as 295 ft (30 m) among coral growths (Preskitt et al. 2014) and a likely inhabitant in and around the shallower portions of the trunk cable route. Because the HDD exit and diver-assisted cable laying would avoid live coral heads, impacts to macroalgae would be avoided.

Planktonic algae, including dinoflagellates, blue-green algae and diatoms, are generally higher in density in shallow, well-lit ocean zones. In general, plankton might be affected by chronic or accumulated pollution. The short duration and small footprint of the Preferred Alternative suggest that planktonic communities would not be indirectly affected by degradation in water quality during installation of the trunk cable and hydrophone array.

As discussed in Section 3.5, seagrasses are only present in water depths to about 6.6 ft (2 m) below MLLW. Therefore no seagrass would be expected to be present within the affected environment under the Preferred Alternative because all the system components are located at least 20 ft (18 m) below MLLW. The trunk cable and hydrophone array would be located entirely outside of seagrass habitat.

Due to the temporary nature of any potential indirect impacts to planktonic algae, the few macroalgae near the HDD bore exit, and avoidance of live coral heads, construction of the SSRNM would have no significant impacts to marine vegetation under the Preferred Alternative.

4.6.5.2 Alternative Action

There would be no adverse impacts to marine vegetation from implementation of this alternative. The Alternative Action is located only in deeper ocean waters where large algae do not occur. Planktonic algae, including dinoflagellates, blue-green algae and diatoms, are generally higher in density in shallow, well-lit ocean zones. In general, plankton might be affected by chronic or accumulated pollution. The short duration and small footprint of the Alternative Action suggest that planktonic communities would not be affected by degradation in water quality during installation of the trunk cable and hydrophone array.

Due to the depth and distance of construction from marine vegetation and the temporary nature of any potential indirect impacts, construction of the SSRNM would have no significant impacts to marine vegetation under the Alternative Action.

4.6.5.3 No Action

There is no construction associated with the No Action Alternative. Operations under the No Action Alternative would occur away from shallow waters and would have no impact on marine vegetation associated with coral ecosystems. Because the No Action Alternative would not significantly affect water quality (Section 4.5.3), there would be no significant indirect water quality impacts to planktonic forms of marine vegetation. The No Action Alternative would have no significant impact on marine vegetation.

4.6.6 Seabirds

4.6.6.1 Preferred Alternative

There should be no effect to diving seabirds from the active acoustic signals generated by the positioning modems (Section 4.1.1.1). The seabirds in the Hawaii area do not spend any appreciable time underwater (Section 3.6.6). Also, seabird hearing is not considered as sensitive as marine mammals (or even as sensitive as seals) when underwater. So if a bird did spend some amount of time underwater and was able to hear the active acoustic signals, they would have to spend a large amount of time in close proximity to the array to experience any affect. Thus no effect is anticipated.

Due to the short duration of construction and widespread availability of open ocean foraging habitat, potential physical impacts from construction vessels would be short-term and negligible. Because the components are located on the seafloor (3,084 ft [940 m]), installing the hydrophone array, the trunk cable (both diver-assisted and cable ship laying) and HDD conduit installation could temporarily disrupt foraging behavior at the surface while lowering equipment to the bottom. Operating hydrophone array and electronic systems would not impact seabirds.

Seabirds use a variety of foraging behaviors that could expose them to surface vessel activity during the trunk cable and hydrophone installation. Most seabirds plunge-dive from the air into the water or perform aerial dipping (the act of taking food from the water surface in flight); others surface-dip (swimming and then dipping to pick up items below the surface) or jump-plunge (swimming, then jumping upward and diving under water). Birds that plunge-dive typically submerge for no more than a few seconds. Exposure of plunge-dive seabirds to underwater stressors would be brief. Other seabirds pursue prey under the surface, swimming deeper and staying underwater longer than other plunge-divers (DON 2013). Exposure of these seabirds would be longer, but during the installation timeframe.

Under the Preferred Alternative, one of the five active acoustic positioning modems is located in deep water, greater than 65 feet below the surface. The remaining modems are located at the seafloor, about 3,000 feet below the surface. Operating the hydrophone array and positioning modems takes place in depth zones beyond the range or foraging abilities of seabirds. Because of the location of the positioning modems and the relatively low source levels during operation (Section 4.1.1.1), no significant adverse impacts would occur to seabirds.

The HSTT EIS/OEIS (DON 2013) reported a review of 32 terrestrial and marine species indicates that birds generally have greatest hearing sensitivity between 1 and 4 kilohertz (kHz), with an upper frequency hearing limit of 10 kHz. There is little published literature on the hearing abilities of birds underwater and no measurements of the underwater hearing of any diving birds. There are some studies of bird behavior underwater when exposed to sounds, from which some hearing abilities of birds underwater could be inferred. Common murres (*Uria aalge*) were deterred from gillnets by acoustic pingers emitting 1.5 kHz pings at 120 dB re 1

μPA; however, there was no significant reduction in rhinoceros auklet (*Cerorhinca monocerata*) bycatch in the same nets (DON 2013). Because of the higher frequencies at 9.66-14.5 kHz emitted by the positioning modems (Section 2.1.1), the short duration (one day) of the surveying activity and shorter duration of operational activity (individual pings during a test) it is unlikely that seabirds would be affected by the positioning modems either during installation or operation.

Because water quality and fish would not be significantly affected (Sections 4.5 and 4.6.3 respectively), there would be no impact to seabird prey species indirectly affecting seabirds. Therefore, because of a negligible potential to disrupt feeding behavior during the three-week construction duration, the lack of indirect prey impacts, and no anticipated acoustic impacts, the Preferred Alternative would not significantly impact seabirds.

4.6.6.2 Alternative Action

The Alternative Action would pose similar impacts on seabirds as the Preferred Alternative with respect to hydrophone installation and trunk cable installation. However, the Alternative Action would not include surface vessel activity associated with diver-assisted cable laying and HDD conduit installation. The Alternative Action would have the same negligible impacts to seabirds as those of the Preferred Alternative, perhaps to a lesser degree. Therefore, installation and operation of the Alternative Action would not significantly impact seabirds.

4.6.6.3 No Action

Under the No Action Alternative, there would be no installation of a fixed array. The No Action Alternative would have no significant impact on seabirds.

4.6.7 Threatened and Endangered Marine Species

The Navy consulted with resource agencies NOAA and USFWS on an assessment of effects (Appendix B). The discussion below addresses all issues raised by these agencies during informal consultation under the ESA.

4.6.7.1 Preferred Alternative

The primary impacts to marine mammals from construction of the Preferred Alternative would include the physical presence of support vessels, construction equipment and divers. As concluded in Section 4.6.1.1, because of the short duration of construction, there would be negligible effects to marine mammals and sea turtles that might be present.

ESA-listed marine mammals and sea turtles may avoid, but continue normal activity in the immediate vicinity of construction due to the increased human activity. Further, there are no known marine mammal or turtle strikes resulting from vessel traffic associated with SSRNM testing. Because construction vessels would operate at low speeds within the relatively small construction zone and access routes during the short, three-week in-water construction period, no strikes are anticipated. The likelihood of a vessel strike to these species is low and any behavioral changes that would occur would likely be negligible and would be discountable.

During operation, sea turtles and marine mammals are at potential risk of collision, entrapment or entanglement with the hydrophone array in the water column, or with the anchoring system on the seafloor. Although Hawaiian monk seals have one of the highest documented entanglement rates of any pinniped species (NOAA 2010b; NOAA Fisheries Service 2010), the incidents are most often associated with derelict fishing gear including gillnets, fish line, and fishhooks.

During operation there would be negligible effects due to EMF as discussed in the previous section.

There is less risk that smaller species such as ESA-listed turtles and monk seal could become entangled in hydrophone cables compared to the large whales, such as the humpback whale. Because of the small size of the hydrophone array, the lack of hooks and nets, and the small size of the supporting cable relative to the ocean habitat, the array is not expected to pose a risk of entrapment, or pose a physical barrier or collision potential that would adversely affect foraging sea turtles, monk seals, or transiting whales.

During installation of the SSRNM array, the surveying of the modems may accumulate enough energy to cause TTS effects to a marine mammal, but that marine mammal would have to stay within an approximately 656 ft (200 m) radius of the array throughout the entire installation process to experience those effects. After completion of surveying, and during the routine operation of the SSRNM, there would be no significant changes in marine mammal behavior because of the low energy output of these devices. The possibility of Level A Harassment or behavioral pattern disturbance to a point where such behavioral patterns are abandoned or significantly altered caused by the underwater sound emitted by the active positioning modems would be unlikely because the source levels are low and a duration of effect is short.

Marine Mammals

Installation of the hydrophone array, trunk cable and positioning modems may affect marine mammals. During installation surveying of the positioning modems, multiple pings might accumulate enough energy within 656 ft (200 m) of the modem to affect a marine mammal if the marine mammal remained in the area during the entire survey time frame. Operation of the positioning modems requires fewer pings resulting in a negligible risk of an effect to marine mammals. During operation there would be negligible effects due to EMF. These effects might cause marine mammals to react and avoid the area, but because of the short duration of construction and operation, these responses would not affect the population behavior patterns.

During construction of the Preferred Alternative elevated noise associated with construction-vessel traffic and short-term changes in prey availability could occur. Surface vessel noise is expected to be typical of vessel traffic in the area and occur only once during the short installation timeframe.

Because of the flexibility of the hydrophone cable, the relatively and small size of the hydrophone array and trunk cable relative to the ocean depth zone habitat, it is not expected to pose any substantial physical barrier, entrapment or collision potential to foraging marine mammals in the area. Those few marine mammals that might be exposed to installation activity would avoid the activity and installation equipment, not colliding with or becoming entangled or trapped in the hydrophone array. Smaller species such as dolphins are even less likely to become entangled or trapped.

Rarely observed marine mammals would not be likely to be encountered during the short three-week construction timeframe. Migratory whales are unlikely to be encountered under the Preferred Alternative because they are typically in the area during fall, winter or spring months, not during the anticipated summer construction timeframe. Other marine mammals are unlikely to be present due to habitat preferences.

Therefore, because of the low power and location of the positioning modems, the short duration of installation activity during the summer months and the benign nature of the hydrophone, the Preferred Alternative may affect, but is not likely to adversely affect marine mammals.

Sea Turtles

During construction of the Preferred Alternative elevated noise associated with construction-vessel traffic and short-term changes in prey availability could occur. Sea turtles are unlikely to collide or become entangled with the hydrophone array, as are marine mammals. The probability of exposure of a sea turtle to the single hydrophone array is very low. Because of the flexibility of the hydrophone cable, the relatively and small size of the hydrophone array and trunk cable relative to the ocean depth zone habitat, it is not expected to pose any substantial physical barrier or collision potential to foraging sea turtles in the area. During operation there would be negligible effects due to EMF.

Rarely observed sea turtles would not be likely to be encountered during the relatively short, three-week construction timeframe under the Preferred Alternative. Sea turtles likely to be encountered under the Preferred Alternative would include those noted by the Navy as being commonly observed (DON 2013). Common sea turtles expected to occur in the affected environment include the green sea turtle and hawksbill sea turtle.

Sea turtles possess an overall hearing range of approximately 100 Hz to 1 kHz, with an upper limit of 2 kHz (DON 2013). The frequency range of the positioning modems (about 9-14 kHz) is well above the upper limit of sea turtle hearing. Even if some acoustic energy from the modem signal was out-of-band (at reduced levels) the sea turtle would not hear it. Therefore, installation and operation of the hydrophone array and positioning modems may affect, but is not likely to adversely affect sea turtles.

The hydrophones are acoustically passive, detecting radiated noise (i.e. propulsion, ship machinery and flow noise) from vessels, not producing noise. The positioning modems are active sound sources, but because of the high frequency of the modems which is beyond the hearing range of sea turtles; the location of the positioning modems; and the relatively low source levels during operation, the Preferred Alternative may affect, but is not likely to adversely affect sea turtles.

Vessel movement would occur only during project installation of the hydrophone array and trunk cable, a one-time temporary event. Shore bypass conduit support vessels, diver-assisted trunk cable support vessels and hydrophone array installation support vessels would maintain position on site regardless of changes in the wind, waves and currents. These vessels would not move appreciably; they would either set anchor or maintain position using dynamic positioning.

Because construction vessels would operate at low speeds within the relatively small construction zone and access routes during the three-week in-water construction period, the likelihood of a vessel strike to sea turtles is negligible. During the operation of the Preferred Alternative there would be no vessel activity to affect sea turtle behavior.

During onsite installation, support vessel speeds would be relatively low, between 0.5 and 1 kt. Because of these slow speeds during cable laying and the temporary nature of this event, the probability a construction vessel striking a sea turtle is low.

During transit to and from offshore work sites, vessel speeds would be higher, between 5 and 15 kt, increasing the probability of a construction vessel striking a sea turtle. Visually detecting and

avoiding sea turtles can reduce the probability of vessel strike under these circumstances. Therefore, Navy would include a lookout on each construction vessel to detect and take action to avoid direct strike of sea turtles.

In summary, the Preferred Alternative might startle a sea turtle during the temporary construction period, but because of the short installation timeframe, startle reactions and/or avoidance of the activity would not change population behavior. There is a low probability of a construction vessel striking a sea turtle while on station or moving to and from installation sites. Implementation of best management practices will serve to minimize the potential of effect to ESA-listed species and critical habitat (Section 4.8). Onboard lookouts could identify and avoid sea turtles at the surface so that appropriate action could be taken to avoid strikes during movement. Therefore, the Preferred Alternative may affect, but is not likely to adversely affect sea turtles.

Based on the analyses presented in the Navy Biological Assessment, the Navy determined and the NMFS concurred that the Preferred Alternative would have insignificant impacts, or the likelihood of impacts would be discountable, for the marine species and proposed revised critical habitat (Appendix B). Therefore, the Navy determined that the Preferred Alternative May Affect, but is Not Likely to Adversely Affect (NLAA) ESA-listed marine species or critical habitat as summarized in Table 18.

Table 18. Summary Determination of Effects on ESA Species Likely Occurring Within the Marine Components of the Affected Environment

Common name	Status / Critical Habitat	Taxon	Determination of Effect
Humpback whale	E	*Megaptera novaeangliae*	NLAA
False killer whale (Insular Hawaiian DPS)	E	*Pseudorca crassidens*	NLAA
Hawaiian monk seal	E / Proposed Critical Habitat	*Monachus schauinslandi*	NLAA species NLAA critical habitat
Green sea turtle	T	*Chelonia mydas*	NLAA
Hawksbill sea turtle	E	*Eretmochelys imbricata*	NLAA

4.6.7.2 Alternative Action

The Alternative Action would pose the same potential impacts on ESA-listed marine mammals, critical habitat and sea turtles as the Preferred Alternative during installation of the trunk cable and hydrophone anchors. In addition, buoy maintenance would require periodic use of a small support vessel semiannually and a buoy tender semiannually. The use of these vessels is so infrequent that any increased chance for interaction would be negligible. Implementation of best management practices will serve to minimize the potential of effect to ESA-listed species and critical habitat (Section 4.8). Because the anticipated effect would not be adverse, the Alternative Action would not cause significant impacts to the monk seal or proposed critical habitat.

4.6.7.3 No Action

Under the No Action Alternative, installation of a fixed array would not occur. The continuation of the portable SSRNM testing method would continue without adverse impacts to ESA-listed species or proposed critical habitat. The No Action Alternative will have similar potential impacts to the Preferred Alternative and Alternative Action relative to ship strike. The use of marine mammal lookouts on supporting craft and not initiating testing when a marine mammal

or sea turtle is observed within 200m would avoid impacts to marine mammals and sea turtles. Therefore, a "may affect, but not likely to adversely affect" determination is appropriate.

During hydrophone array operation, there is a potential risk of collision or entanglement with the hydrophone array in the water column for marine mammals and sea turtles. Because of the small size of the hydrophone array and small size of the supporting cable relative to the ocean habitat, the array is not expected to pose any substantial physical barrier or collision potential to foraging sea turtles, monk seals, or transiting whales. Therefore, the No Action Alternative may affect, but is not likely to adversely affect ESA-listed species or proposed critical habitat. Positioning modems are not used during tests conducted with the over-the-side deployed hydrophone array and sonobuoys are passive acoustic devices (Section 2.3).

The analysis reported in Section 4.6.1.3 provides a reasonably high level of certainty that ESA-listed marine mammals would not be struck by expended sonobuoys during the No Action Alternative.

There is a possibility that an individual turtle at or near the surface may be struck if they are in the target area at the point of physical impact at the time of sonobuoy delivery. While any species of sea turtle may move through the open ocean, most sea turtles will only surface occasionally. Sea turtles are generally at the surface for short periods, and spend most of their time submerged (Renaud and Carpenter 1994; Sasso and Witzell 2006). The positioning of marine mammal lookouts on support craft help further reduce the potential impacts of expended sonobuoys during the No Action Alternative. Because the No Action Alternative would not significantly affect water quality (Section 4.5.3), there would be no significant indirect water quality impacts to ESA-listed marine mammals and sea turtles as a result of expended sonobuoys. Because the anticipated effect would not be adverse, the No Action Alternative would not cause significant impacts to the monk seal or proposed critical habitat.

4.7 Terrestrial Biology

4.7.1 Plants and Animals

4.7.1.1 Preferred Alternative

During construction, some vegetation would be removed within the construction site. SSRNM system operations are electronic and would not affect terrestrial plants or animals. The Preferred Alternative would return the topography to its original grade and landscape the construction area consistent with the USCG management plan (Section 4.1.1.4).

The presence of construction activities, personnel and equipment at the FTEC would be temporary, lasting for the three-week construction duration. Feral animals, mongoose and rodents would avoid the construction site during the day. Open excavations might trap individuals. However, as these species are aware of their surroundings and adapted to the industrial land use, direct effects during construction would be inconsequential. Implementation of best management practices will serve to minimize the potential of effect to ESA-listed species and critical habitat (Section 4.8). Therefore, the Preferred Alternative would not significantly affect plants and animals at the FTEC.

4.7.1.2 Alternative Action

The Alternative Action includes no construction work and no environmental effects at the FTEC. Implementation of best management practices will serve to minimize the potential of effect to

ESA-listed species and critical habitat (Section 4.8). The SSRNM system operations are electronic and create no direct terrestrial effects, therefore, the Alternative Action would not significantly affect plants and animals at the FTEC.

4.7.1.3 No Action

The No Action Alternative would have no significant impact on plants and animals at the FTEC.

4.7.2 Threatened and Endangered Terrestrial Species

4.7.2.1 Preferred Alternative

'Ewa hinahina

The HDD construction site would be located at an area that is mostly cleared of vegetation and has been used for construction access in the past. A negligible amount of additional vegetation would be cleared for the Preferred Alternative. Approximately 2,615 sq ft (0.02 ha) of native and non-native vegetation east of the FTEC fenceline would be cleared. Re-vegetation and soil compaction issue from the construction activities would be addressed in conjunction with the USCG 'Ewa hinahina restoration effort.

The USCG management plan calls for restoring native vegetation at the site to rectify the effects of competition from non-native species (USCG 2013). The existing vegetation is not conducive to recovery of 'Ewa hinahina such that its removal would not necessarily damage critical habitat. Clearing the existing vegetation might offer a positive effect because the existing vegetation is degrading the habitat by outcompeting 'Ewa hinahina. Soil compaction by construction equipment might damage the habitat and hinder species recovery. Restorative landscaping after construction in accordance with the Coast Guard's Management Plan (USCG 2013) could rectify the potential damage from construction work. Thus, the Preferred Alternative may affect but is not likely to adversely affect the critical habitat. Because there are no species individuals in the limits of construction and the AMA would be off limits, there will be no effect on the species.

Ōpe'ape'a

The Ōpe'ape'a has not been observed in the affected environment but it has been observed in the Waianae range, about seven miles to the north (DOA 2012). Its presence here is possible but unlikely because of the distance between the affected environment and mountainous observations. Trees suitable for roosting are present near the FTEC, but not within the FTEC or area of vegetation clearing. No trees would be removed during construction; only herbaceous vegetation would be removed. Also, no pesticides would be used in conjunction with construction or operation of the Preferred Alternative. Because of the questionable presence of the hoary bat at the FTEC and the lack of impact to roosting trees, the Preferred Alternative, both installation and operation, would have no effect on this species.

Based on the analyses presented in the Navy Biological Assessment, the Navy determined that the Preferred Alternative would have insignificant impacts, or the likelihood of impacts would be discountable, for the terrestrial species and proposed revised critical habitat (Appendix B). Therefore, the Navy concluded that the Preferred Alternative May Affect, but is Not Likely to Adversely Affect (NLAA) ESA-listed terrestrial species or critical habitat as summarized in Table 19. The USFWS concurred with this determination (Appendix B).

Table 19. Summary Determination of Effects on ESA Species Likely Occurring Within Terrestrial Components of the Affected Environment

Round-leaved chaff-flower (‘Ewa hinahina)	E / Critical Habitat	*Achyranthes splendens* var. *rotundata*	No Effect species NLAA critical habitat
Hawaiian hoary bat (Ōpe‘ape‘a)	E	*Lasiurus cinereus semotus*	NLAA

4.7.2.2 Alternative Action

‘Ewa hinahina

The Alternative Action does not involve work on shore. No terrestrial ESA-listed species or habitat would be affected by the Alternative Action therefore there would be no effect under the ESA and no significant impact to “Ewa hinahina or adverse modification of its critical habitat.

Ōpe‘ape‘a

The Alternative Action would involve installation activities at sea only; no construction at the FTEC would occur. Operation of the Alternative Action would involve electronic activities and at sea maintenance activities, without effect to roosting sites or other bat habitat attributes. Therefore, the Alternative Action, both installation and operation, would have no effect under the ESA and no significant impact on the Hawaiian hoary bat.

4.7.2.3 No Action

‘Ewa hinahina

Continuation of the existing SSRNM test program is located at sea and would have no effect and no significant impact on ‘Ewa hinahina or adverse modification of its critical habitat.

Ōpe‘ape‘a

The existing SSRNM tests are conducted entirely at sea and would have no effect under the ESA and no significant impact on the Hawaiian hoary bat.

4.8 Best Management Practices for Threatened and Endangered Species

Installation of Hydrophone Array, Trunk Cable and Shore Bypass Conduit

1. Constant vigilance would be kept for the presence of ESA-listed marine species during in-water activities such as boat operations, diving, and deployment of anchors and mooring lines.
2. Competent observers would survey the adjacent areas being worked for ESA-listed marine species. Surveys would be made prior to the start of work each day, and prior to resumption of work following any break of more than one half hour.
3. Lookouts would be stationed aboard support vessels to detect marine mammals or sea turtles at the surface so that they could adjust course and speed as necessary to maintain a safe distance consistent with prudent seamanship.
4. Vessel speed would be reduced to10 kt or less when marine mammals or sea turtles have been observed.
5. If, despite efforts to maintain a safe distance, a marine mammal or sea turtle approaches the vessel, then the vessel would disengage propulsion (neutral gearing) until the animal is at least 50 ft (15 m) away, then slowly resume course and speed.

6. Installation activities would not be initiated if a marine mammal is sighted within 656 ft (200 m) of the vessel. In-water installation and maintenance work would only begin/resume after the animals have voluntarily departed the area. If ESA-listed marine species are noticed within 50 yd (46 m) after work has already begun, that work may continue only if, in the best judgment of the project supervisor, that the activity would not affect the animal(s).
7. Divers and vessel crew would avoid interaction with ESA-listed marine species.
8. Support vessels would be anchored on sandy bottoms or calcareous rock devoid of live corals.
9. All equipment such as submarine cables, anchors and the hydrophone array would be lowered to the bottom (installed) in a controlled manner.
10. In-water tethers, as well as mooring lines for vessels and marker buoys would be kept to the minimum lengths necessary, and would remain deployed only as long as needed to properly accomplish the required task.

Installation of Shore Station and Shore Bypass Conduit

1. A contingency plan to control and clean spilled petroleum products and other toxic materials is required. The contingency plan would prevent debris and other wastes from entering or remaining in the marine environment during the project and reduce the potential for surface/ground water contamination.
2. Turbidity and siltation from project-related work would be minimized and contained through the appropriate use of erosion control practices and effective silt containment devices.
3. The Achyranthes Management Area (AMA) would be marked as "no access" on plan drawings and contractor personnel would be instructed to avoid this area.
4. Appropriate materials to contain and clean potential spills would be stored at the work site, and be readily available.
5. Project operations would be postponed or halted under unusual conditions, such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage.
6. The project manager and heavy equipment operators would perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations would be postponed or halted should a leak be detected, and would not proceed until the leak is repaired and equipment cleaned.
7. Fueling of land-based vehicles and equipment would take place at least 50 ft (15 m) away from the water, preferably over an impervious surface. Fueling of vessels would be done at approved fueling facilities.
8. All project-related materials and equipment placed in the water would be free of pollutants.
9. Vegetation and soil compaction from the construction activities would be addressed in conjunction with the USGC *'Ewa hinahina* restoration effort in accordance with the Restoration and Management Plan for the Barbers Point Coast Guard Lighthouse Site.

4.9 Essential Fish Habitat Assessment

4.9.1 Preferred Alternative

Trunk cable laying would generate minor bottom disturbances and localized increases in turbidity, affecting pelagic, bottomfish, crustacean, precious coral and coral reef ecosystem EFH. Cable laying would be a one-time event of short duration. The trunk cable would also pass through deeper slope HAPC for bottomfish, such as slopes and escarpments between 131 and 918 ft (40 and 280 m) deep. Installation of the shore bypass conduit and diver-assisted cable laying would similarly generate bottom disturbance, affecting pelagic, bottomfish, crustacean (spiny lobster) and coral reef ecosystem EFH. Installation of the hydrophone array anchors would cover portions of the bottom, potentially affecting precious coral EFH.

Direct effects to habitat generated by laying the trunk cable would be temporary, limited to the three-week construction period. Actual coverage of bottom habitat by the cable (footprint) would be insignificant. Less mobile benthic organisms and their habitat would be covered by the cable. Also, the installed cable can form a habitat substrate for attaching organisms. This habitat effect would not be adverse because of the limited duration and footprint.

The cable routing would at about 20 ft (6 m) and would continue off the reef crest via a sand chute at 50 ft (15 m) to deeper waters, passing out of coral reef ecosystem EFH at 330 ft (100 m) (Table 11). The diver-assisted portion of cable laying occurs through the patch reef above the reef crest. The cable would be positioned along sandy bottom in between coral heads and weighted; avoiding direct effects to the live coral colonies and minimizing direct effects to benthic substrate. Benthic populations, including bottomfish disturbed during conduit installation and cable laying at these shallower depths would populate the cable and disturbed areas around the cable soon after construction is complete.

The coral reef ecosystem at 100-300 ft (30-91 m), also called the "mesosphotic zone" and "twilight zone," supports a diverse assemblage of bottomfish, including a high percentage of Hawaiian endemic species. The bottomfish EFH includes HAPC along slopes and escarpments between 130 and 920 ft (40 and 280 m) A recent study conducted in the NWHI illustrates the high diversity that can occur in clear waters at these depths (Kane et al. 2014). Vessel cable laying – not diver-assisted cable laying – would be conducted within EFH for bottomfish and coral reef ecosystems. At these depths; diver access is limited to complex, mixed-gas technical diving techniques. However, because of the relatively small footprint of the cable and the patchiness of the reef structure in the affected environment (a limitation to general abundance levels), the effects from vessel-laid cable on bottomfish EFH and coral reef ecosystems EFH would be negligible and not adverse.

The remainder of the vessel-laid trunk cable and hydrophone array is not expected to have an adverse effect on pelagic, bottomfish, crustacean and precious coral EFHs because of the small footprint and the stability of the trunk cable. Pelagic EFH might be affected by the array itself during installation and while in place. However, the array is unlikely to create an entrapment or entanglement risk to pelagic fish because of its benign structure. Because to the deep seafloor depth (3,084 ft / 940 m) at which the array would be located, bottomfish EFH or HAPC and crustacean EFH and coral reef ecosystem EFH would not be affected.

Based on the analysis presented in the Navy Biological Assessment, the Navy determined and the NMFS concurred that EFH would not be adversely affected because of the implementation of

the Best Management Practices listed in section 4.8, the limited duration of the installation, limited footprint, location and placement of the trunk cable, and trunk cable stability (Appendix B).

4.9.2 Alternative Action

Under the Alternative Action, the shallowest depth of effect is 800 ft (243 m). Installation and operation of the hydrophone array, anchors, buoys and trunk cable on the ocean bottom might affect the pelagic (upper 656 ft [200 m] of the array) and precious coral (array and umbilical anchors, radio buoy anchor, and trunk cable) EFH. The effects of installing and operating the radio buoy, trunk cable and hydrophone array at these depths would be identical to the effects identified for the Preferred Alternative. Therefore, adverse but negligible, and no significant impacts to EFH or bottomfish HAPC are anticipated from implementing the Alternative Action.

4.9.3 No Action

Under the No Action Alternative, installation of a fixed array would not occur. The continuation of the portable SSRNM testing method would continue without change to EFH. As discussed in Sections 4.5 and 4.6, the use of sonobuoys would not significantly affect water quality or marine invertebrates respectively. The limited use of support vessels would be limited and not adversely affect EFH. Therefore, implementing the No Action Alternative would cause no adverse effects or significant impacts to EFH.

4.10 Migratory Bird Treaty Act

Under the MBTA regulations applicable to military readiness activities (50 CFR 21), the installation and operation of the SSRNM under the Preferred Alternative would not result in a significant adverse effect on migratory bird populations.

4.10.1 Preferred Alternative

The primary impacts to migratory birds from construction of the SSRNM under the Preferred Alternative would be associated with short-term and negligible presence of construction vessels having insignificant impact to feeding behavior and prey. Migratory birds would likely avoid the construction area due to increased activity from vessel movement and human presence during construction. While birds might depart during construction (early morning hours), they would likely return to the area following a decrease in activity (evening hours).

Because of the short duration of the proposed underwater construction, including using divers laying the trunk cable from the shore bypass conduit exit to the reef fringe, collision with surface birds pursuing prey underwater with construction machinery is unlikely. Therefore, the Preferred Alternative would not significantly impact migratory bird species and there would be no incidental take of migratory birds.

4.10.2 Alternative Action

Under the Alternative Action, ocean construction would cause similar, short duration effects for seabirds. In addition, the radio buoy would provide a roosting site for seabirds. The use of the buoy as a roosting site might create additional maintenance requirements for Navy, but would not adversely affect seabirds. The Alternative Action would not involve construction ashore. Similar to the Preferred Alternative, there would be no long-term impacts to individual migratory birds or populations during the operation of the SSRNM.

Migratory birds would likely avoid the ocean installation sites due to increased activity from vessel movement and human presence. While birds might depart during construction (early morning hours), they would likely return to the area following a decrease in activity (evening hours). The same response would occur during annual maintenance events. However, because construction would be a one-time event and maintenance would be short term events twice annually, impacts on migratory birds would be minimal. Therefore, no significant impacts would occur to migratory bird populations from the construction and operation of the Alternative Action and there would be no incidental takes of migratory birds.

4.10.3 No Action

Under the No Action Alternative, there would be no installation of a fixed array. The continuation of the portable SSRNM testing method would continue without change to surrounding migratory bird populations. Migratory birds would likely avoid the area due to increased activity from vessel movement and human presence during operation of the over-the side array, then return to the area once construction has ceased. Sonobuoys are passive instruments dropped into the ocean and would have no effect on migratory birds. Migratory birds would have already avoided the rather large fleet test vessel and not be in the same space in which the test vessel, and hand-launched sonobuoy is released. Therefore, no significant impacts would occur to migratory bird populations during normal SSRNM operations and there would be no incidental takes of migratory birds.

4.11 Land and Water Use

4.11.1 Preferred Alternative

Land use along the coast and in coastal waters (also referred to as "water use" in this EA) is regulated under the CZMA and administered by the State of Hawai‘i, Office of Planning (DBEDT-OP). Federal projects must be consistent to the maximum extent practicable with the State's Coastal Zone Management (CZM) Program.

The Hawai‘i CZM Program includes the Hawai'i Ocean Resources Management Plan (ORMP) which identifies priorities for ocean and coastal resource management. The ORMP supports effective management, beneficial use, protection, and development of the state's coastal zone. Navy has determined that the Preferred Alternative is consistent to the maximum extent practicable with the Hawai‘i CZM Program.

Navy assesses potential impacts on coastal land use as a matter of consistency with the State's CZM objectives and policies. Separately, Navy has consulted with the Office of Planning on this project in accordance with the CZMA regulations at 15 CFR 930. The State has concurred with the Navy determination of consistency (Appendix C).

Land use during construction under the Preferred Alternative would involve both terrestrial and marine construction for three-weeks. Shore station construction equipment would be similar to current and existing industrial land use character surrounding the affected environment. When viewed from Germaine's Luau, the construction equipment would be screened by existing vegetation and not easily visible. At sea, the temporary presence of vessels would not differ from the existing ocean vessel movements, which include Naval, bulk fuel, commercial and pleasure craft.

After construction and during SSRNM test operations, there would be no visible difference to the landscape or seascape and no change in land or water use. Operational maintenance would be limited to annual servicing of batteries in each of the four acoustic modems that make up the grid. A small support vessel is used to retrieve, refurbish and replace the acoustic modems at 12-month intervals. The annual maintenance event would not modify existing water use because it would use only one small support vessel conducting up to two trips out to the hydrophone site. For these reasons, the Preferred Alternative would not significantly affect coastal zone use.

4.11.2 Alternative Action

Under the Alternative Action, there would be no shore construction and no change in land use ashore. However, water use during cable installation would involve two vessels in the affected area offshore for a period of about three weeks. The temporary presence of these vessels would not differ from the existing water use, that includes Naval, bulk fuel, commercial and pleasure craft.

The installation of a new hydrophone array and its operation would occur in the FORACS range, an area reserved for such installations and testing. Under the Alternative Action, the installation of a permanent radio buoy would, however, cause a potential hazard to navigation in the area. Navy would notify the USCG of the installation to be included in the Notice to Mariners and included on charts of the area. SSRNM system operations are electronic and create no effect on land use or ocean use. After construction there would be no further change in land or water use from the existing, No Action condition.

Under the Alternative Action, there would be no change to existing conditions on shore at the FTEC. Because the radio buoy would be identified on marine charts and mariners would be notified of its presence, the Alternative Action would not significantly affect coastal zone use.

4.11.3 No Action

Existing SSRNM testing does not involve any change to land or water use. The No Action Alternative would have no effect or significant impact on coastal zone use.

4.12 Archaeology and Historic Properties

4.12.1 Preferred Alternative

Several wrecks are located off the leeward O‘ahu coast within the affected environment, but none of these sites are near the proposed trunk cable route (Sections 3.10 and 3.11). Because of no potential for the presence of significant archeological artifact at the FTEC and no wrecks along the trunk cable route or at the hydrophone array site, the Preferred Alternative would not affect historic archeological properties.

The FTEC site is covered with a thin layer of sand underlain by calcareous caprock (Sections 3.3 and 3.11). During planning for the development of the FTEC, the Hawai'i State Historic Preservation Division concluded there are no archeological resources at this site. Also, informal discussions with a leading cultural practitioner indicated that the Preferred Alternative would not impact traditional or contemporary Hawaiian cultural practices.

Excavation at the FTEC to install the shore bypass conduit and shore station electrical conduits is unlikely to unearth or damage archeological artifact because the area has been extensively developed, reducing the probability of in-tact artifacts in the area of potential effect area to a

negligible level. Navy will follow established procedures for inadvertent discovery. The Preferred Alternative would involve no above ground structures that could affect views of the lighthouse. After construction, operations would be contained inside existing FTEC facilities, no different than before construction.

Construction during the three-week construction period would not directly affect the Barbers Point lighthouse (Section 2.1.4, Figure 5), but views of the lighthouse from the west to northwest (i.e., FTEC) might be obscured by construction equipment. Views of the lighthouse from Germaine's Luau to the east would not be affected during construction. The presence of construction equipment during the three-week period might temporarily interfere with individual perceptions of the lighthouse. Because of the temporary nature of view effects, there would be no adverse historic effect and, therefore, not a significant impact.

The SHPO has been notified of the availability of this EA and the Navy's effect conclusion in furtherance of Section 106 of the National Historic Preservation Act (NHPA). The State concurred with the findings of the EA (Appendix D).

4.12.2 Alternative Action

Under the Alternative Action, several wrecks, charted and uncharted are located off the leeward O'ahu coast, but none of these sites are near the proposed trunk cable route (Section 3.10). Because the Alternative Action would not involve shore construction and has no potential to affect historic or archeological properties at-sea during offshore installation, there would be no significant impact to these resources. Operations, including maintenance of the radio buoy, would be electronic or take place on the ocean surface, not having an effect on offshore historic archeological properties.

4.12.3 No Action

The existing SSRNM testing does not involve activities that might affect archeological or historic properties. Therefore, the No Action would not cause significant impacts to these resources.

4.13 Recreation

4.13.1 Preferred Alternative

Although private and public recreation is available, the shore site is not easily accessible and the reef break is not conducive to desirable surfing or diving conditions. The offshore construction vessels under either alternative would be similar to the existing views of the bulk petroleum anchorages; recreational activities in the Barbers Point area would not be disrupted. Operational maintenance would be limited to annual servicing of batteries in each of the four acoustic modems that make up the grid. A small support vessel is used to retrieve, refurbish and replace the acoustic modems at 12-month intervals.

The Preferred Alternative includes temporary presence of workers, equipment, excavations and construction noise during working hours for the duration of construction at the FTEC shore station. Temporary construction at the FTEC would be consistent with the industrial viewshed, including concrete materials storage, scrap metals storage and industrial warehousing. The viewshed also includes existing private and Navy communications towers that are now visible from the Lighthouse and Germaine's Luau (west view). The areas to the west and north of the Preferred Alternative site are either industrial or covered with native and non-native vegetation,

with no recreational opportunities. The shore immediately beyond the FTEC fenceline is accessible to the public. Because the construction site would be situated 145 feet beyond the shoreline and would not block public roads in the area, the Preferred Alternative construction would not affect shoreline access.

The construction activity at the HDD bore entry site would be readily apparent from Germaine's Luau. Limiting construction to the day time reduces potential effects to luau patrons since the luau is an evening attraction. Ocean views from shore would not appreciably change during construction. Offshore cable installation via a cable laying vessel would be visible from shore during the day. At night, if the cable laying vessel is anchored in the area, its lights would be visible. A single vessel offshore would probably not be unusual in this area given the proximity of tanker anchorages and a nearby harbor.

Construction vessels performing work on this project would be similar to typical vessel traffic in the area entering and exiting the Kalaeloa Barbers Point Harbor, transiting back and forth to Pearl Harbor and mooring at the bulk petroleum anchorages located nearby.

The Barbers Point Beach Park is to the east of Germaine's Luau. Only the top of the Barbers Point Lighthouse is visible from the Park. The Park is bounded on the northeast by a metal recycling facility, including the sounds and views to be expected from such an industrial facility. Construction at the FTEC would likely go unnoticed by Park visitors. To insure that construction activities under the Preferred Alternative do not conflict with Germaine's Luau, the construction at the FTEC would stop at 5:30 PM daily.

The overall profile for recreational boating and fishing along the leeward shore of O‘ahu indicates the locations of the hydrophone array and trunk cable within the affected area are not a recreational resource. The proposed locations for installing the trunk cable and hydrophone array are not easily reached without lengthy transit times by small craft. These sites are not popular fishing or boating sites. There are no nearby ramps or marinas where small boats would put in. Larger sport vessels originating from Kalaeloa Barbers Point Harbor or Honolulu harbors would go well offshore beyond the installation sites in search of pelagic fish. Operations of the Preferred Alternative are all electronic and either underground or underwater, having no potential to disrupt ongoing fishing and boating that might occur there. Maintenance would involve an annual maintenance effort using one small support craft for up to two trips to the hydrophone site. This limited use will not interrupt existing recreation. Therefore the Preferred Alternative would not disrupt recreational boating or fishing.

Because there would be no conflict with existing recreation opportunities as discussed above, implementation of the Preferred Alternative would cause no significant impacts on recreation resources.

4.13.2 Alternative Action

Under the Alternative Action, there would be no temporary construction at FTEC and no HDD exit construction 2,000 ft (610 m) offshore. Installation of the radio buoy, trunk cable and hydrophone array would create the same type and level of effect as the Preferred Alternative. As with the Preferred Alternative, offshore construction vessels under the Alternative Action are few and would be on station for a one-time, three-week construction duration and would not disrupt recreational activities. SSRNM system operations are electronic and create no effect on recreation opportunities.

The presence of a radio buoy would be permanent and long-term. The buoy location would be identified in the USCG Notice to Mariners and marked as a restricted site allowing no moorage. Navigational charts would identify the radio buoy location, providing suitable notice to mariners about its presence so that it can be avoided. Semiannual maintenance visits by small support vessels and buoy tender would occur only during a single day each and not disrupt recreational patterns or opportunities. Vessels moving through the area could easily avoid the radio buoy without difficulty. For the preceding reasons, the Alternative Action would cause no significant impacts to recreation resources.

4.13.3 No Action

Existing SSRNM testing does not involve changes to recreational opportunities or resources. The small support vessel used to conduct SSRNM testing transits to the FORACS area which is a designated Navy operating area, not a popular recreational boating or fishing area. Navy operations in the area would be published in the USCG Notice to Mariners, providing ample opportunity for boaters to avoid the area. Thus, the No Action Alternative would not be a source of significant recreational impact.

4.14 Noise

In general, the assessment of noise and how it is perceived by humans and animals is complex and begins with a basic understanding of sound measurements. As discussed in Section 2.1.1, additional information about noise and its measurement can be found in the HSTT EIS/OEIS (DON 2013). Noise measurements are expressed as a logarithmic ratio of a measured value against a reference value. This ratio is called the decibel (dB) and produces a scale of measurement that is more practical to manage than linear sound pressure scales. The human threshold of hearing is 0 dB and the threshold of pain is slightly less than 140 dB. For general reference, the sound of a commercial jet aircraft taking off is about 120 dB, the sound of typing about 60 dB and the sound of a bird call is about 20 dB. Sound measurements are greatly influenced with distance from the source and the directionality of the source to the listener. Sounds are reflected and absorbed by different surface textures and the distance of these textures from the source. Consider the design of an amphitheater that emphasizes the reflection of sounds from the stage to the audience. Sound measurements are typically weighted to better reflect the way the human ear hears certain frequencies.

4.14.1 Preferred Alternative

This section addresses noise in air generated by the Preferred Alternative during construction at the FTEC shore station. Underwater noise (acoustics) is discussed in Section 4.1.1.1, Hydrophone Array, Section 4.6.1, Marine Mammals and Section 4.6.7, Threatened and Endangered Marine Species.

Construction noise at the FTEC shore station site from the HDD and associated construction equipment would cause negligible effects. The nearest sensitive noise receptors at the FTEC shore station would be visitors at the Barbers Point lighthouse (about 140 ft) pedestrian access to the Lighthouse and Germaine's Luau (about 230 ft) and Germaine's Luau entrance (about 290 ft). Construction would end by 5:30 PM and therefore, the timeframes would comply with the City and County of Honolulu noise ordinance which limits construction activities from 7:00 AM to 6:00 PM during the work week and 9:00 AM to 6:00 PM on Saturdays.

Construction noise ashore would be caused by shore construction equipment including the HDD drill rig and a backhoe excavator for only the duration of construction and working hours prescribed by local noise ordinances. Noise produced by these types of equipment is common in urban and industrial environments during normal work hours and is generally not obtrusive.

The HDD equipment would generate noise levels that require permitting by the Hawai‘i Department of Health (Hawaii Department of Health 2014a). The anticipated noise levels can be authorized when subject to time restrictions and the use of muffled equipment.

The US Department of Housing and Urban Development (HUD) considers a day-night averaged sound level inside a building of 65 dBA as acceptable (24 CFR 51.103). Sound power levels attenuate rapidly with distance. The HDD drill rig category that could be used on this project would be rated at 100,000 to 120,000 pound push/pull. The operator sound level for this type of equipment is about 92 dBA. In comparison, typical construction excavator sounds vary between about 80 and 110 dBA. Entertainment and concert sound levels vary widely, ranging from about 50 dB from background music to about 120 dB at a rock concert. Ocean shore sound is relatively quiet at 65 dB (Berger et al. 2013).

At the two points where visitors might be exposed to these construction sounds, sound attenuation by the air alone would reduce sound levels to below those which are generally considered acceptable by the HUD standard, about 65 dB. Planning calculations for this project (Sengpiel 2014) indicate the sound coming from the HDD rig, heard by the operator at 92 dB, would be attenuated to about 50 dB at the lighthouse, 45 dB at the pedestrian access to the Lighthouse and Germaine’s Luau and 42 dB at the entrance to Germaine’s Luau. These attenuated levels would not be annoying during normal construction hours. During the evening hours when the Luau is open, there would be no noise from the construction site. To insure that construction activities under the Preferred Alternative do not conflict with Germaine’s Luau, the construction at the FTEC would stop at 5:30 PM daily.

Because construction noise would be limited to working hours and would be attenuated to a level beneath a typical comfort level threshold of 65 dB, the Preferred Alternative would not significantly affect noise receptors in the affected environment.

4.14.2 Alternative Action

Under the Alternative Action, there would be no temporary construction ashore. During construction and operation of the hydrophone array, the use of acoustic tracking modems would cause negligible effect that can be discounted. Underwater noise (acoustics) is discussed in Section 4.1.1.1, Hydrophone Array, Section 4.6.1, Marine Mammals and Section 4.6.7, Threatened and Endangered Marine Species.

Under the Alternative Action, there would be no construction on shore to generate any environmental impact and therefore no significant impacts.

4.14.3 No Action

No construction would occur with the continuation of the portable SSRNM test system at sea. The No Action Alternative would have no significant impact on existing noise levels.

4.15 Socioeconomics

4.15.1 Preferred Alternative

Under the Preferred Alternative construction activities would occur only in an area surrounded by the Campbell Industrial Park and adjacent to, or within existing Navy and USCG facilities. Construction would be short term, lasting only three weeks and involve a single construction contractor to install the shore bypass conduit. After construction, the SSRNM system would not provide new employment opportunities potentially affecting the local economy. Because of the location inside an industrial area, the short duration of construction and no additional employment opportunities, the Preferred Alternative would not significantly impact the local economy.

The Preferred Alternative would not affect minority groups, children, or schools primarily because the FTEC is an industrial facility located within the Campbell Industrial Park. The nearest residential areas are located about two miles to the north (Section 3.14). The potentially affected population within the affected environment includes industrial workers and/or visitors to Germaine's Luau. This population would be made up of a mixture of O'ahu working population and tourists of diverse income levels. Thus, the potentially affected population would not constitute a resident minority or low-income population that could be disproportionally affected. The Preferred Alternative would affect workers and visitors alike. Additionally, no significant impacts have been identified. Therefore, the Preferred Alternative meets the requirements of EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, and would not significantly affect socioeconomic resources.

4.15.2 Alternative Action

The Alternative Action would only involve construction at-sea and not at the FTEC. After construction, the SSRNM system would not provide new employment opportunities potentially affecting the local economy. Because of the location inside an industrial area, the short duration of construction and no additional employment opportunities, the Alternative Action would not significantly impact socioeconomic resources.

4.15.3 No Action

The No Action Alternative would have no significant impact on the existing economy or populations.

5 CUMULATIVE IMPACTS

The following analysis considers potential cumulative impacts resulting from development projects at the FTEC and USCG property since 1998 and projects that might now be in planning. We also consider projects and activities that might affect the offshore portion of the affected environment during this timeframe. The proposed project is independent of, but follows a fence expansion project and other minor facility improvements at FTEC. Geographically, the cumulative analysis considers past, present and reasonably foreseeable project in the affected environment that is defined in Section 3.1.

5.1 Preferred Alternative

The Preferred Alternative at the FTEC shore station would not add incrementally significant environmental impacts by way of air and water quality, biological resources, land use, archeological and historical resources. Construction at the FTEC would be short-term and the result would consist of underground cabling installed in conduit and a concrete vault. No new above-ground facilities are proposed. After construction, the FTEC would appear the same as it does now. The shore bypass conduit and cable vault would not change the existing FTEC configuration. Temporary construction effects would last for about three weeks. As noted in Section 4.2, greenhouse gasses emitted will provide no significant impact to air quality or climate change.

These incremental effects might add to the accumulated impacts of FTEC upgrade projects, each of which have included separate environmental planning compliance procedures (DON 1998; DON 2012a; USCG 2012). In each case, however, the projected environmental effects were assessed as not significant and these projects at the FTEC have been completed. Projects conducted in the recent past include clearing of native and non-native vegetation, constructing new above and below ground facilities and a new security fence. This Preferred Alternative would construct only new underground electrical conduits and an underground vault.

Construction effects from the Preferred Alternative would be one time and temporary. The Preferred Alternative would include clearing of 2,615 sq ft (0.06 ac or 0.02 ha) native and non-native vegetation in an area where there are no protected ‘Ewa hinahina, but an area that is critical habitat for the plant. Clearing the existing vegetation might offer a positive effect because the existing vegetation is degrading the habitat by outcompeting ‘Ewa hinahina. The USCG is the process of awarding a contract to clear and replant this area to improve habitat conditions for the ‘Ewa hinahina in accordance with the Restoration and Management Plan (USCG 2013). Implementation of the Preferred Alternative would be coordinated with the USCG restoration work to avoid conflict of equipment, materials storage and disposition of the land following construction and before restoration actions.

Water quality in the Barbers Point area has been stressed in the past from anthropogenic causes. The principal human influence on marine water quality in this area offshore is the cooling water outfall installed to service the electrical generating facility at Campbell Industrial Park by the Hawaiian Electric Company (HECO). The original outfall of cooling water from this plant exited the outfall pipe 820 ft (250 meters) from shore on the reef flat. Shortly after the plant became operational water temperatures in the vicinity of this outfall pipe increased to the point where large areas of corals died. This pipeline was extended so that it currently dumps this warm water offshore of the reef slope where mixing with oceanic waters mitigates adverse temperature

effects (Brock 2012). The Preferred Alternative does not include activity that might affect water temperature (Sections 4.1 and 4.5) that might accumulate with temperature effects from the cooling water outfall.

Hawai‘i imports crude oil and refines it at the Barbers Point refineries into various products for distribution thorough the State. Imported crude oil now arrives via the offshore anchorages near the affected environment (Sections 3.10 and 4.10). Recently, the Hawai‘i Department of Transportation has begun planning the development of a new fuel pier inside the Kalaeloa Barbers Point Harbor. This proposal, when implemented, would provide two new dedicated fuel berths. The proposal is currently in early planning stages and the subject of an EIS that is now in preparation. At the time of this writing, several design concepts are in consideration. This proposal would likely increase commercial vessel traffic entering and leaving the Kalaeloa Barbers Point Harbor. Construction for this project would be confined to the harbor and uplands nearby. Operations might include liquid natural gas transfer in addition to petroleum. Dredging would be needed to increase the entrance channel operating depth. The Preferred Alternative would not significantly affect marine traffic in the affected area during the short term construction period. Also, there are no support vessel requirements during operations. Therefore, the Preferred Alternative would not cause effects that would accumulate with additional marine traffic associated with the Kalaeloa Barbers Point Harbor fuel pier development.

Operational improvements at the Kalaeloa Barbers Point Harbor for 24-hour access for larger vessels might be implemented in the reasonable future. Harbor managers are considering increasing operational dredging depths and channel widths to accommodate larger vessels. There are no specific plans for construction timing or an initial operating capability date at this time however. Construction of the SSRNM, including installation of the hydrophone array and laying cable might cause commercial vessels to transit via a different route when moving into one of the two offshore oil anchorages. But, such an effect would be negligible because the cable and array installation for this project would be short term, lasting about three weeks. After construction, the operations of the SSRNM would cause no change to ship traffic in the area. The change from current small support vessel use and the Preferred Alternative with no small support vessel use might reduce overall marine traffic levels and be beneficially cumulative, but insignificantly so.

The Navy conducts training and testing activities, including the use of active sonar and explosives, primarily within existing range complexes and training and testing areas located around the Hawaiian islands (DON 2013). Some of this activity occurs in the FORACS range and the SESEF range, located near Barbers Point. The complete suite of training and testing activities is discussed in the Environmental Impact Statement for Hawaii-Southern California Training and Testing (DON 2013). The Preferred Alternative would reduce vessel traffic in the FORACS range causing a cumulatively beneficial, although insignificant, effect.

5.2 Alternative Action

Because there is no shore construction, there would be no accumulation of impacts ashore under the Alternative Action. The installation of a new hydrophone array and its operation would occur in the FORACS range, an area reserved for such installations and testing. The installation of a permanent buoy would, however, cause a potential hazard to navigation in the area. Navy would notify the USCG of the installation to be included in the Notice to Mariners and included

on charts of the area. Cumulatively, the addition of a single buoy to the ocean surface in the affected area is noticeable, but not a problem for mariners and not significant.

5.3 No Action

There would be no change from existing conditions if the Preferred Alternative were not implemented. The No Action Alternative would have no significant cumulative impact.

6 AGENCIES AND PERSONS CONSULTED

During preparation of this EA, several agencies and persons were consulted. In addition to the public at large (Appendix A), Federal, State and private agencies were consulted. Their input, which has been incorporated into the EA, is gratefully acknowledged.

Federal:

United States Coast Guard, Mr. Dean Amundson

U.S. Army Corps of Engineers, Pacific Ocean Division, Ms. Michelle Lynch

U.S. Department of Commerce, National Marine Fisheries Service, Mr. Don Hubner & Mr. Richard Hall

U.S. Department of the Interior, Fish and Wildlife Service, Ms. Jiny Kim

State of Hawaii:

Department of Business, Economic Development & Tourism, Office of Planning, Coastal Zone Management Program, Mr. John Nakagawa

Department of Land and Natural Resources, State Historic Preservation Division, Mr. William Aila, Jr.

Other Organizations:

Germaine's Luau, Mr. Toby Kusaka

7 PREPARERS

Action Proponent Oversight, Naval Undersea Warfare Center Division, Keyport

Marcom C. Leonillo
Project Manager
Naval Undersea Warfare Center Division, Keyport
M.S., Public Management and Environmental Affairs, University of Indiana
B.S., Electronics Engineering, University of Hawaii
Years of Experience: 34

Natalie Crandall
Assistant Project Manager
Naval Undersea Warfare Center Division, Keyport
B.S., Business Administration, University of Maryland University College
Years of Experience: 6

Ennis Patterson
Systems Engineer
Naval Undersea Warfare Center Division, Keyport
M.S., Ocean Engineering, University of Hawaii
Years of Experience: 24

Fabio D'Angelo
NEPA Program Manager/Environmental Compliance
Naval Undersea Warfare Center Division, Keyport
B.S., Biology, University of Alaska Juneau
Years of experience: 15

Deborah Verderame
NEPA and Natural Resource Program Manager
Naval Sea Systems Command
B.S. Biology, Fordham University
B.S. Chemical Engineering, Drexel University
M.S., Chemical and Environmental Engineering, University of Maryland
Years of Experience: 32

Navy Ocean Engineering, NAVFAC Engineering and Expeditionary Warfare Center (EXWC)

Joseph Hatke, PE
Senior Cable Systems Engineer, Project Lead, Contracting Officer's Representative
B.S., Mechanical Engineering, California Polytechnic State University
Years of experience: 12

Cooperating Agency, United States Coast Guard

Dean Amundson
NEPA Program Manager, SILC
B.S., Sonoma State University
M.S., University of California Davis

Years of experience: 24

Subject Matter Contributors, Naval Facilities Engineering Command, Hawai'i

James Furuhashi
NEPA Planner
B.S., Business/Accounting, Lewis & Clark College
B.A., Architecture, University of Hawaii
Years of experience: 12

Anne Hong, PE
Environmental Engineer
B.S., Massachusetts Institute of Technology
Years of experience: 21

Cory Campora
Natural Resources Specialist
B.S., Zoology North Carolina State University
M.S., Zoology Brigham Young University
Ph.D., Entomology University of Hawaii
Years of experience: 11

Jeff Pantaleo
Archaeologist
M.A., San Diego State University
B.A., University of Hawaii
Years of experience: 35

Contractor Draft Document Preparation

<u>Sound & Sea Technology</u>

Peter W. Havens, CEP
Senior Environmental Planner
B.S., Marine Biology, UNC Wilmington
M.S., Botany, NC State University
Years of experience: 32

Michael R. Harrison, P.E.
Senior Civil Engineer & Installation Manager
B.A., Civil Engineering, University of Windsor
M.B.A., Production Management and Financing, California Lutheran University,
Years of experience: 25

Stanley A. Black, P.E.
Senior Mechanical Engineer, HDD Specialist
B.S., Mechanical Engineering, UCLA
Years of experience: 45

Jason F. Karr
Geographic Information System (GIS) Specialist

B.A., Geography, University of Washington
Post Graduate Certification: ArcObjects Development with VBA
Years of experience: 12

48 North Solutions, Inc.

Jan Brandt
Senior Environmental Planner
M.S., Urban and Regional Planning, Florida State University
Years of experience: 19

Cameron Fisher
Senior Marine Biologist
B.S., Zoology and Botany, University of Auckland
M.S., Marine Science, University of Auckland
Years of experience: 15

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9 Appendices

9.1 Appendix A – NEPA public involvement

The Navy issued a notice of availability for public review in Honolulu Star Advertiser to put the SSRNM EA out for public review. The notice was printed November 7, 8 and 9, 2014. A draft copy of the EA was available for public review and commenting from November 7 through November 21, 2014. No public comments were received in response to this posting.

NOTICE OF AVAILABILITY DRAFT ENVIRONMENTAL ASSESSMENT FOR THE SURFACE SHIP RADIATED NOISE MEASURMENT SYSTEM LEEWARD COAST OF O'AHU, HAWAI'I

Pursuant to the Council on Environmental Quality regulations implementing procedural provisions of the National Environmental Policy Act of 1969 (NEPA), and the Department of the Navy (Navy) procedures for implementing NEPA, the Navy gives notice that a draft Environmental Assessment (EA) has been prepared and currently available for public review. The draft EA is for the installation and operation of a Surface Ship Radiated Noise Measurement (SSRNM) system to improve existing Fleet SSRNM Middle Pacific Surface Group (MIDPAC) operations.

The proposed action includes the installation and operation of a fixed SSRNM MIDPAC system, consisting of a hydrophone array, an undersea data transmission cable (trunk cable) in the ocean off the leeward coast of O'ahu, Hawai'i, and a shore station cable landing at Fleet Technical Evaluation Center, Barbers Point. The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site. No significant impact on the human environment is expected.

The public is encouraged to provide comments on the EA, which is available for viewing, Nov 07 to Nov 21 at: http://www.navsea.navy.mil/nuwc/keyport/pages/Environmental%20Assessment%20SSRNM.aspx A limited number of copies are available on CD. CD requests and comments can be mailed to: NUWC DET PAC,ATTN: Code 70/SSRNM Lead,1894 Wasp Boulevard, JBPHH, HI 96860-5809, or: KYPT_WA_SSRNM_EA@navy.mil. Comments must be postmarked or received no later than November 21, 2014.
(SA656601 11/7, 11/8, 11/9/14)

9.2 Appendix B – ESA informal consultation and EFH consultation

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From: Campora, Cory E CIV NAVFAC HI <Cory.Campora@navy.mil>
Sent: Monday, November 10, 2014 7:00 PM
To: Donald Hubner; 'Richard Hall - NOAA Federal'; Aaron Nadig
Cc: Patrick Opay; Danielle Jayewardene - NOAA Affiliate; Huang, Andy D CIV NAVFAC HI, OPHE2
Subject: ESA/EFH informal consultation for a project (SSRNM) near Barber's Point lighthouse
Attachments: 20141110 SSRNM BA.pdf
Signed By: cory.campora@navy.mil

Hi Don, Richard, and Aaron,

The Navy is proposing to install a fixed Surface Ship Radiated Noise Measurement (SSRNM) system hydrophone array off the coast near the Barber's Point lighthouse.

We are submitting the attached biological assessment to informally consult under Section 7(a)(2) of the Endangered Species Act and under the Magnuson-Stevens Act on the project's potential effects on threatened and endangered species, critical habitat and Essential Fish Habitat. The biological assessment contains a description of the proposed project, the protected resources occurring in the area, and the Navy's determination of potential effects.

We ask that you review the Navy's biological assessment and request your concurrence with the Navy's determination of effects.

Please let me know if the project description isn't clear or if you need more information. I'm happy to provide whatever additional information is available, answer questions, or clarify issues related to the project. The proposed project will be carried out by the Naval Undersea Warfare Center, part of NAVSEA and a tenant on JBPHH, but our office is helping them with the consultation and permits.

Thank you for your time and support.

Very Respectfully,
Cory Campora

Cory Campora, PhD
Natural Resources Specialist
NAVFAC Hawaii, Environmental Planning (EV2)
400 Marshall Road, Bldg X-11
Joint Base Pearl Harbor-Hickam, HI 96860-3134
cory.campora@navy.mil
808-471-1170 x244

From: Richard Hall - NOAA Federal [mailto:richard.hall@noaa.gov]
Sent: Tuesday, November 18, 2014 9:23 AM
To: Campora, Cory E CIV NAVFAC HI
Cc: Danielle Jayewardene - NOAA Affiliate; Gerry Davis - NOAA Federal
Subject: Re: ESA/EFH informal consultation for a project (SSRNM) near Barber's Point lighthouse

Cory,

On November 10, 2014 the U.S. Navy submitted a biological assessment and requested a informal Essential Fish Habitat (EFH) consultation and concurrence on the Navy's determination for a project to be conducted by the Naval Undersea Warfare Center that involves the installation and operation of a fixed Surface Ship Radiated Noise Measurement (SSRNM) System on the leeward coast of Oahu between Barbers Point and Ma'ili point and seaward approximately 5 nautical miles. I have reviewed the previously mentioned biological assessment for the Habitat Conservation Division of the NOAA Fisheries Pacific Islands Regional Office (NMFS). NMFS appreciates the opportunity to provide the following comments pursuant to the EFH § 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)).

There are several connected activities that are all part of the installation of the proposed SSRNM project including: the installation of a suspended hydrophone array with anchors, the drilling of a shore bypass conduit, the laying of trunk cable, and.construction around the already existing Fleet Technical Evaluation Center (FTEC) shore station.

1. The hydrophone array consists of a 750 foot cable with ten hydrophones mounted at intervals along the cable that will be anchored in approximately 3,100 feet of water. The array is to be held in place with a 13,500 pond anchor and two 4,000 pound buoys, one at 850 feet and the other at 130 feet.

2. The bypass conduit will be drilled using Horizontal Directional Drilling (HDD) that will run beneath the shoreline, intertidal, and near-shore areas for approximately 2,000 feet from the FTEC shore station and emerge at a depth of 20 feet. The HDD system will use a 6-inch outside diameter pipe. Drilling will be performed using a drilling fluid containing non-toxic bentonite (sodium montmorillonite) which lubricates the drilling head, seals the bore annulus and removes the material cut in the drilling process. The construction site for the HDD is located along the fence-line of the FTEC shore station that has been usd for construction access in the past and is mostly cleared of vegetation. The HDD drilling site is estimated to be approximately 9,200 square feet and would require the removal of an additional 2,600 feet of native and non-native vegetation.

3. Data communication from the array is to be conducted through a 1.5 inch diameter trunk cable that will be run from the FTEC shore station and the offshore array, a distance of approximately 8 miles. The cable is to be laid out from a vessel from the array until close to shore, where divers will manually finishing laying the cable over a previously surveyed route that will be free of corals. To keep the cable in place, split galvanized ballast weights are to be attached every 100 foot to prevent movement from wave action. At the FTEC, the trunk cable will be routed via an underground conduit to the existing building. Excavations required to run the trunk cable will be backfilled and the surface returned to grade and landscaped.

Because of the scope of the proposed work and the nature of the work to be preformed, there is the potential for adverse effects related to this project from: the direct contact with corals and other benthic habitats from the placement of the array, anchors and cable for the system and the deployment of anchors from support vessels; the potential for the release of toxic substances (petroleum, hydraulic fluid, etc) into the marine environment; and a possible increase in stormwater run-off due to the removal of vegetation and development of new impervious surfaces. To avoid or minimize these potential impacts the U.S. Navy proposes to implement the following Best Management Practices (BMPs):

1. The U.S. Navy will develop a contingency plan to control and clean spilled petroleum products and other toxic materials, if necessary;

2. The U.S Navy will have appropriate materials to contain and clean potential spills stored at the work site and readily available;

3. Project operations would be postponed or halted under unusual conditions, such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage;

4. The project manager and heavy equipment operators would perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations would be postponed or halted should a leak be detected, and would bot proceed until the leak is repaired and equipment cleaned; and

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

The U.S. Navy has determined that the activities associated with the installation of the fixed Surface Ship Radiated Noise Measurement System would not adversely affect EFH due the implementation of the BMPs listed above and because of the limited duration of the installation, limited footprint, location and placement of the trunk cable, and the trunk cable stability. NMFS concurs with this determination and would like to offer the following additional measures for your consideration which will help to further avoid or minimize potential impacts from this project:

1. The array assembly, steel anchor assemblies, cables and onboard electronic system exteriors are composed of steel, stainless steel and polyethylene, and are designed to function for 15 years. Because of the size of the buoys (7 feet x 7 feet and 4000 pounds) there is the risk of significant damage to nearshore environments should they break lose and be carried inshore. If the Navy has not already done so, a decommission plan should be developed for the recover and replacement of the SSRNM that can be implemented near the end of the life expectancy for the array.

2. The project proposal includes activities that will result in the denudation of 2,615 square feet of vegetation around the FTEC shore station. This removal of vegetation may result in an increase of stormwater run-off and may lead to increased siltation of the marine environment. The U.S. Navy should identify and implement construction measures that will capture or divert stormwater run-off from directly entering the marine environment.

3. The biological assessment describes in detail the drilling process and materials to be used, but does not explain the disposition of the cuttings that result from the drilling process. NMFS recommends that all material removed from the HDD drilling process should be collected on a daily basis and properly disposed of in an authorized offsite facility designed to hold such material.

4. The biological assessment describes the use of support vessels for the deployment of the trunk cable and the dive teams to place the cable on the seafloor. To perform these activities the vessels will be required to anchor to maintain position. As practicable, the U.S. Navy should identify sandy areas where the anchors can be deployed to minimize the impact on benthic habitats.

NMFS appreciates the opportunity to review and comment on this project. If you have any questions or comments please feel free to contact me at your convenience. This concludes the EFH consultation for the installation and operation of the fixed Surface Ship Radiated Noise Measurement system.

--

Richard Hall

Fishery Policy Analyst
Pacific Islands Regional Office

NOAA Inouye Regional Center

1845 Wasp Blvd., Building 176

Honolulu, HI 96818
808-725-5018

From:	Campora, Cory E CIV NAVFAC HI <Cory.Campora@navy.mil>
Sent:	Wednesday, January 28, 2015 6:30 PM
To:	Richard Hall - NOAA Federal
Cc:	Leonillo, Marcom C CIV NAVSEA KPWA-PRLH; Crandall, Natalie J CIV NAVSEA KPWA, 70; D'Angelo, Fabio G CIV NAVSEA KPWA; Huang, Andy D CIV NAVFAC HI, OPHE2
Subject:	RE: ESA/EFH informal consultation for a project (SSRNM) near Barber's Point lighthouse
Signed By:	cory.campora@navy.mil
Follow Up Flag:	Follow up
Flag Status:	Flagged
Categories:	Red Category

Richard,

Thank you for providing NMFS' concurrence with the Navy's determination regarding effects of the action "Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System" and for providing additional measures for the Navy's consideration to help further avoid or minimize potential impacts from the project.

The original Biological Assessment for this action has been revised during the consultation portion for Section 7 of the Endangered Species Act (ESA), and once it is finalized a copy will be sent to your office for your records. The text below contains the Navy's response to your recommendations (some of the revisions in the revised Biological Assessment will reflect these recommendations accordingly):

1. The array assembly, steel anchor assemblies, cables and onboard electronic system exteriors are composed of steel, stainless steel and polyethylene, and are designed to function for 15 years. Because of the size of the buoys (7 feet x 7 feet and 4000 pounds) there is the risk of significant damage to nearshore environments should they break lose and be carried inshore. If the Navy has not already done so, a decommission plan should be developed for the recover and replacement of the SSRNM that can be implemented near the end of the life expectancy for the array.

NUWC Division Keyport, Pacific Detachment:
The Navy has developed a plan for the replacement or removal of the array assembly if the system becomes obsolete and requires decommissioning.

2. The project proposal includes activities that will result in the denudation of 2,615 square feet of vegetation around the FTEC shore station. This removal of vegetation may result in an increase of stormwater run-off and may lead to increased siltation of the marine environment. The U.S. Navy should identify and implement construction measures that will capture or divert stormwater run-off from directly entering the marine environment.

NUWC Division Keyport, Pacific Detachment:
The Navy is following the US Army Corps of Engineers' permitting process and as noted, Best Management Practices (BMPs) will be used to reduce the potential for surface/ground water contamination. No run-off to the marine environment would occur at the site. There is no associated stormwater system (impervious surface, storm drains, gutters, culverts, etc.) that run to the ocean, the location also lacks significant rainfall, is comprised of sandy pervious soil and is flat.

3. The biological assessment describes in detail the drilling process and materials to be used, but does not explain the disposition of the cuttings that result from the drilling process. NMFS recommends that all material removed from the

HDD drilling process should be collected on a daily basis and properly disposed of in an authorized offsite facility designed to hold such material.

NUWC Division Keyport, Pacific Detachment:
The HDD operation would produce about 10 tons of cuttings mixed with bentonite drill fluid. This material would be contained on site and disposed of at the Waimanalo Gulch Sanitary Landfill, Kapolei.

4. The biological assessment describes the use of support vessels for the deployment of the trunk cable and the dive teams to place the cable on the seafloor. To perform these activities the vessels will be required to anchor to maintain position. As practicable, the U.S. Navy should identify sandy areas where the anchors can be deployed to minimize the impact on benthic habitats.

NUWC Division Keyport, Pacific Detachment: The Navy concurs and when or if anchoring of support vessels is required it will occur in sandy areas to the maximum extent practicable.

Very respectfully,
Cory Campora

Cory Campora, PhD
Natural Resources Specialist
NAVFAC Hawaii, Environmental Planning (EV2)
400 Marshall Road, Bldg X-11
Joint Base Pearl Harbor-Hickam, HI 96860-3134
cory.campora@navy.mil
808-471-1170 x244

From: Donald Hubner [mailto:donald.hubner@noaa.gov]
Sent: Monday, November 24, 2014 4:58 PM
To: Campora, Cory E CIV NAVFAC HI
Cc: Richard Hall - NOAA Federal; Aaron Nadig; Patrick Opay; Danielle Jayewardene - NOAA Affiliate; Huang, Andy D CIV NAVFAC HI, OPHE2; David Nichols
Subject: Re: ESA/EFH informal consultation for a project (SSRNM) near Barber's Point lighthouse

Hi Corey and All,

I received, and am reviewing, the ESA BA and EFHA for the installation and operation of proposed Fixed Surface Ship Radiated Noise Measurement (SSRNM) System off southwest Oahu. I've only just started and have not gotten through your effects assessment yet. My comments are currently limited to the action area and the ESA-species that may be affected, and the description of the proposed action. I leave for the mainland tomorrow, and will be back in the office on Wed, December 3rd, and will continue then.

Page 1-1: I disagree with the Determination Summary in that humpback whales and false killer whales have been determined "no effect", and sperm whales should be included on the list. I don't know enough yet if they would NLAA. I have concerns about potential entanglement, particularly for humpback whales, and have questions about the acoustics of the "tracking nodes" or "acoustic modems" and of planned shipboard operations during noise measurements.

Page 2-1: From our perspective, the action area would include all in-water areas where our trust resources could be exposed to stressors from this action. That would include the area off Barbers Point where in-water work would be done to install the cables, the route of the cable, the site of the array installation, and the area around the area where our trust resources may be affected by the calibration of the system (active transducers) as well as by the planned shipboard operations during the intended acoustic measuring in the FORACS Range. Will this range be used to measure shipboard active sonars, or will it be limited to shipboard mechanical and propulsion systems?

Page 2-2: Please provide a description of how the cabled array would be installed. Lowered into place, dropped, some combination, ROVS making connections, etc. We would also like a better description of the materials that would be used to help understand their tensile strength, flexibility, and likelihood to entangle or hang up on a marine mammal that may encounter a cable. At 2.2.1 the hydrophones are described but I'm not sure what is meant by "directly affixed". Are the hydrophones dangling, attached top and bottom along the side of the cable, or are they integral with the cable and encapsulated within the polyethylene sheathing?

Also confirm the relative buoyancies of the anchors and buoys. Assuming that the array anchor is steel and maintains all of its "dry weight" of 13,600 lb, and that the combined buoyancy of the 3 buoys is 13,414 lb (from the table), how can that anchor stay in place with only 214 lb of negative buoyancy?

Please confirm where the line would part for the break-away buoy at 65 feet, and how many pounds of pressure. I assume it would be just under that buoy. How will the Navy know when the break-away has been released? I need to talk with some whale experts first, but it seems to me that a heavy anchor that would prevent a whale from lifting/dragging the array, combined with strong cables that would be held rigid, with streamlined hydrophones and buoys (especially the top buoy) would increase the likelihood that the lines would pass along, vice snag or encircle any marine mammal that may encounter it. Has the Navy considered an elongate and tapered (trumpet horn shape) for the attached end of the upper buoy, such that the buoy would be unlikely to snag on a whale's mouth, flippers, or flukes. Alternatively, what about another large buoy with lots of buoyancy to keep the upper section tight?

Nice job describing the HDD.

Page 2-3: Please confirm the SPL is at 1m from the source (i.e. = source level), at some distance from the source, and provide frequency information if it is unclassified.

Page 2-4: The description of the cable lay to shore makes it sound like articulated steel armor would be installed over the cable before it is sent ashore. I've never seen that done before. Almost always, the cable is floated and pulled ashore "naked", then divers sequentially remove the floats and guide the cable into the conduit to be pulled ashore and secured, and to lay on the bottom along the desired route. After that, the articulated armor is attached and secured to the substrate or buried in sand. Please confirm the planned method of cable landing.

Second Page 2-1&2 (should be 2-7&8) at 2.2.5: Please describe/confirm the types of shipboard noises that would be measured, and give at least close estimates of the source levels, frequencies, and quality of the significant noise sources (impulsive, non-impulsive, broadband, discrete, etc.). Will gunnery noise or sonars be measured? If so, they should be described also.

Until next week, I hope that you all have a very happy Thanksgiving !

Don

--
Donald M. Hubner
Endangered Species Biologist
NMFS/PIRO/Protected Resources Division
1845 Wasp Blvd., Building 176
Honolulu, HI 96818
(808) 725-5145
On 11/10/2014 5:00 PM, Campora, Cory E CIV NAVFAC HI wrote:

From:	Campora, Cory E CIV NAVFAC HI <Cory.Campora@navy.mil>
Sent:	Wednesday, January 28, 2015 4:35 PM
To:	Donald Hubner
Cc:	Leonillo, Marcom C CIV NAVSEA KPWA-PRLH; Crandall, Natalie J CIV NAVSEA KPWA, 70; D'Angelo, Fabio G CIV NAVSEA KPWA; Huang, Andy D CIV NAVFAC HI, OPHE2
Subject:	Revised BA for the Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System
Signed By:	cory.campora@navy.mil

Mr. Don Hubner,

Based on the analyses presented in the revised Biological Assessment for the Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System, that will be provided separately by the end of this week, the proposed action would have insignificant impacts, or the likelihood of impacts would be discountable, for the marine species and proposed revised critical habitat considered in this assessment. Therefore, the Navy has determined that the proposed action is not likely to adversely affect endangered or threatened species under NMFS jurisdiction or to destroy or adversely modify critical habitat, and requests written concurrence from NMFS under section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §1531 et seq.), with that determination.

Please address correspondence containing written concurrence to: CAPT D. A. Tufts, Regional Engineer (N4), Commander Navy Region Hawaii, 850 Ticonderoga Street, Suite 110, Joint Base Pearl Harbor-Hickam, Hawaii 96860-5101.

We ask that you direct any immediate questions regarding the revised Biological Assessment and/or this request to Natalie Crandall, natalie.crandall@navy.mil (808) 472-1706.

Very respectfully,
Cory Campora

Cory Campora, PhD
Natural Resources Specialist
NAVFAC Hawaii, Environmental Planning (EV2)
400 Marshall Road, Bldg X-11
Joint Base Pearl Harbor-Hickam, HI 96860-3134
cory.campora@navy.mil
808-471-1170 x244

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

In Reply Refer To:
2015-TA-0058

DEC 16 2014

Mr. Cory Campora, PhD
Natural Resource Specialist
NAVFAC Hawai'i, Environmental Planning (EV2)
400 Marshall Road, Bldg X-11
Joint Base Pearl Harbor-Hickam, Hawai'i 96860-3134

Subject: Technical Assistance for the Fixed Surface Ship Radiated Noise Measurement System, Barbers Point, O'ahu

Dear Mr. Campora:

The U.S. Fish and Wildlife Service received your letter on November 17, 2014, requesting our comments on the ESA Biological Assessment and Essential Fish Habitat Assessment for the Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System at the Fleet Test and Evaluation Center, Barbers Point, O'ahu. The Commanding Officer, Naval Undersea Warfare Center, Division Keyport, proposes to install and operate a fixed SSRNM system hydrophone array to support ongoing Fleet SSRNM Mid Pacific operations. The proposed work includes the installation and operation of a SSRNM hydrophone array in the ocean off Nānākuli, undersea data transmission cable (trunk cable), and shore station upgrades at Fleet Technical Evaluation Center (FTEC), Barbers Point. The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site. The hydrophones receive noise (i.e. propulsion, ship machinery and flow noise) coming from vessels as they operate under normal conditions. The data from the hydrophones are transmitted to shore through a trunk cable to shore facilities for analysis. The cable would be installed into a shore bypass conduit under the shoreline, intertidal and near-shore zones. Operating the SSRNM would be entirely electronic without the need for support vessels. The approximate overall timeline for the installation portion of the Action would occur over three weeks during the summer of 2015, beginning no earlier than May 2015. The project would be complete no later than October 2015.

We have reviewed the information you provided and pertinent information in our files, including data compiled by the Hawai'i Biodiversity and Mapping Program as it pertains to listed species and designated critical habitat in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*). Our data indicate that the federally endangered Hawksbill sea turtle (*Eretmochelys imbricata*) and threatened green sea turtle

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(*Chelonia mydas*) (collectively referred to as sea turtles) may occur within the vicinity of the proposed project site. The Federally and State listed endangered plant, *Achyranthes splendens* var. *rotundata* and a federally designated critical habitat unit (O'ahu-Coastal Unit 14) occur within the proposed project site. We offer the following comments and recommendations to assist you in preparation for your proposed project.

Sea Turtles

The U.S. Fish and Wildlife Service consults only on nesting sea turtles and their use of nesting habitats (terrestrial portion of the proposed project). The National Marine Fisheries Service (NMFS) consults on sea turtles and their use of off-shore and open ocean habitats. We understand you have consulted with NMFS regarding the potential impacts from the proposed project to sea turtles and their use off-shore and open ocean habitats.

Sea turtles have been documented in and around the Barbers Point adjacent to the FTEC. Sea turtles may be affected by components of your project. We recommend you survey and monitor for basking or nesting sea turtles while using Horizontal Directional Drilling (HDD) to ensure no adverse effects to these protected species above and around the drilling site. If you determine the project may affect sea turtles in the water, we recommend that you contact the NMFS as this would be their jurisdiction. If you determine the project may affect nesting or hauled out sea turtles, please contact us so we may assist you with Endangered Species Act compliance.

Achyranthes splendens var. *rotundata* and O'ahu Coastal Unit 14

Herbaceous plant species, such as *Achyranthes splendens* var. *rotundata*, may have seedlings that appear along the proposed project area at any time. The federally designated critical habitat unit, O'ahu-Coastal Unit 14, occurs within the proposed project site. This critical habitat unit is occupied by the *Achyranthes splendens* var. *rotundata* and is designated unoccupied critical habitat for 6 additional federally endangered plants (*Bidens amplectens*, *Centaurium sebaeoides*, *Chamaesyce celastroides* var. *kaenana*, *Schiedea kealiae*, *Sesbania tomentosa*, and *Vigna o-wahuensis*. All 7 of these plant species face a plethora of threats, including but not limited to, fire, non-native plants, and loss of habitat.

Critical habitat is the scientifically calculated land area within the range of one or more species that is essential to the conservation of the species by providing the physical and biological features necessary for the expansion of the existing wild population. Although the proposed project would be located in an area that is mostly cleared of vegetation and previously used for construction access in the past, it is still possible for any of the above mentioned plants to occur, when given optimal conditions, within the proposed HDD construction site. We recommend a qualified botanist survey for listed plants prior to any detrimental construction activities resulting from your proposed project.

Anchialine Pools

Since there are numerous anchialine pools in the vicinity of the proposed project area, the Service also recommends incorporating an anchialine pool biologist into your proposed project plan to ensure that the integrity of any existing anchialine pools and listed species within them are not compromised (e.g., filled in, crushed, etc.) by the proposed activities.

We appreciate your efforts to conserve Hawai'i's listed species. If you have questions regarding information contained in this letter please contact Jiny Kim, Fish and Wildlife Biologist (phone: 808-792-9400, email: Jiny_Kim@fws.gov).

Sincerely,

Jay Bruning, Acting

for Aaron Nadig
Island Team Manager
O'ahu, Kaua'i, North Western Hawaiian Islands,
and American Samoa

Naval Undersea Warfare Center Division, Keyport

ESA Biological Assessment and Essential fish Habitat Assessment

For The

Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System

At the Fleet Test and Evaluation Center
Barbers Point O'ahu, Hawai'i and Surrounding Ocean

Naval Undersea Warfare Center Division, Keyport

Pacific Detachment

Mr. Marcom C. Leonillo, NUWC Keyport, Pacific Detachment

1894 Wasp Blvd

JBPHH, HI 96860-5809

Phone Number: (808) 472-1702

V2 RevC-4

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ABBREVIATIONS, ACRONYMS, & SYMBOLS

Term	Definition
§	Section
µ	micro (e.g. 1 µm = 0.000001 m)
ac	acre = 43560 sq ft or 0.404 ha
ACHP	Advisory Council on Historic Preservation
AMA	Achyranthes Management Area
BE	Biological Evaluation
CFR	Code of Federal Regulations
CWA	Clean Water Act
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DBEDT-OP	State of Hawai'i Department of Business, Economic Development and Tourism, Office of Planning
DOH-CWB	State of Hawai'i Department of Health, Clean Water Branch
DPS	distinct population segment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FMP	Fishery Management Plan
FORACS	Fleet Operational Readiness Accuracy Check Site
ft	foot
FTEC	Fleet Technical Evaluation Center
ftm	fathom = 1.8288 m = 6 ft
FTSF	Fleet Test Support Facility
GPS	Global Positioning System
GHG	Greenhouse gasses
ha	hectare = 10000 sq m
HAPC	Habitat Area of Particular Concern
HAR	Hawai'i Administrative Rules
hr	hour
ICPC	International Cable Protection Committee
in	inch
km	kilometer = 0.621 mi = 0.540 NM
kt	nautical miles per hour
MCB	Kaneohe Bay Marine Corps Base
MHI	Main Hawai'ian Islands
mi	statute mile = 1.609 km
mm	millimeter
MMPA	Marine Mammal Protection Act
MPA	Marine Protected Area
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MUS	Management Unit Species
NAAQS	National Ambient Air Quality Standards
NHPA	National Historic Preservation Act
nm	nautical mile = 6076 ft
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSF	National Science Foundation
NUWC Keyport	Naval Undersea Warfare Center Division, Keyport
NUWCPACDET	Naval Undersea Warfare Center Pacific Detachment, Pearl Harbor
NWHI	Northwest Hawai'ian Islands
°C	degrees Celsius
°F	degrees Fahrenheit
psu	practical salinity units
RF	Radio Frequency
SESEF	Shipboard Electronics Systems Evaluation Facility

Term	Definition
SHPO	State Historic Preservation Officer
SPCC	Spill Prevention, Control and Countermeasures
sq ft	square feet
SSRNM	Surface Ship Radiated Noise Measurement
T	Tesla, an SI derived unit of magnetic field strength
U.S.C.	United States Code
UNEP	United Nations Environment Programme
USACE	The US Army Corps of Engineers, Honolulu District
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VHF	Very High Frequency
WETS	Kaneohe Bay Wave Energy Test System
WPRFMC	Western Pacific Regional Fishery Management Council
WQC	Water Quality Certification
yd	yard

1 SUMMARY

The Commanding Officer, Naval Undersea Warfare Center, Division Keyport (NUWC Keyport), proposes to install and operate a fixed Surface Ship Radiated Noise Measurement (SSRNM) system hydrophone array to support ongoing Fleet SSRNM Mid Pacific (MIDPAC) operations.

This proposal includes the installation and operation of an SSRNM hydrophone array (array) in the ocean off Nānākuli, O'ahu, Hawai'i, undersea data transmission cable (trunk cable), and shore station upgrades at Fleet Technical Evaluation Center (FTEC), Barbers Point (Figure 1). The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site (FORACS). The hydrophones would receive noise (i.e. propulsion, ship machinery and flow noise) coming from vessels as they operate under normal conditions. The data from the hydrophones would be transmitted to shore through a trunk cable to shore facilities for analysis. The cable would be installed into a shore bypass conduit under the shoreline, intertidal and nearshore zones. Operating the SSRNM would be entirely electronic without the need for support vessels.

Based on the assessment provided below, the Action **May Affect, but is Not Likely to Adversely Affect (NLAA) ESA-listed species** or **critical habitat** as summarized in Table 1, and would have no effect on any other marine species under NMFS jurisdiction. In addition, the project **may adversely affect Essential Fish Habitat, but the effects on Essential Fish Habitat are likely to be negligible and insignificant.**

Table 1. Summary Determination of Effects on ESA Species Likely Occurring Within the Action Area

Common name	Status / Critical Habitat	Taxon	Determination of Effect
Humpback whale	E	*Megaptera novaeangliae*	NLAA
False killer whale (Insular Hawaiian DPS)	E	*Pseudorca crassidens*	NLAA
Hawaiian monk seal	E / Proposed Critical Habitat	*Monachus schauinslandi*	NLAA species NLAA critical habitat
Green sea turtle	T	*Chelonia mydas*	NLAA
Hawksbill sea turtle	E	*Eretmochelys imbricata*	NLAA
Round-leaved chaff-flower ('Ewa hinahina)	E / Critical Habitat	*Achyranthes splendens* var. *rotundata*	No Effect species NLAA critical habitat
Hawaiian hoary bat (Ōpe'ape'a)	E	*Lasiurus cinereus semotus*	NLAA

2 DESCRIPTION OF THE ACTION AREA AND ACTION

2.1 Action Area

The Action Area for this analysis is the leeward coast of O'ahu, Hawai'i and includes ocean and land areas. The ocean portion of the Action Area lies between Barbers Point and Mā'ili Point, and seaward approximately 5 nm (9.3 km). The upland site is the FTEC Barbers Point and contiguous properties (Figure 1).

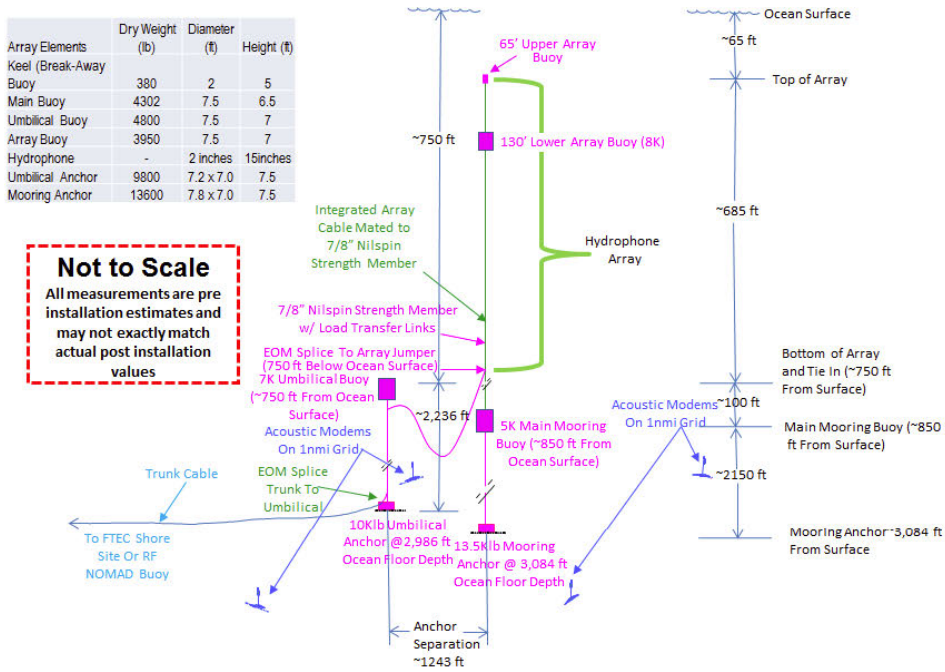
The Navy used information about the Action Area directly from the recently-completed HSTT EIS/OEIS (DON 2013). Descriptions of the Action Area in the HSTT documentation are summarized here where relevant to the Action. The HSTT EIS/OEIS is available online at: http://hsttei s.com/default.aspx. This baseline information has been augmented with additional information from the literature to provide additional relevant detail.

Figure 1. Action – Fixed/Cabled Array

2.2 Action

2.2.1 Overview

The Action involves installing a vertically suspended hydrophone array anchored within the FORACS about 3.5 mi (5.6 km) offshore and approximately 6.3 mi (10.2 km) from FTEC. Data communications would be through a trunk cable installed between the array and FTEC shore station. The trunk cable would be laid on the ocean floor from the hydrophone array to the reef ledge, where divers would hand lay the cable in shallow areas to avoid live corals. The cable would then be routed through a shore bypass conduit to the FTEC shore station. The shore bypass conduit would be installed using horizontal directional drilling (HDD) techniques. See Figure 2 for details.



Array Elements	Dry Weight (lb)	Diameter (ft)	Height (ft)
Keel (Break-Away Buoy	380	2	5
Main Buoy	4302	7.5	6.5
Umbilical Buoy	4800	7.5	7
Array Buoy	3950	7.5	7
Hydrophone	-	2 inches	15inches
Umbilical Anchor	9800	7.2 x 7.0	7.5
Mooring Anchor	13600	7.8 x 7.0	7.5

Figure 2. SSRNM Hydrophone Array Configuration

2.2.2 Hydrophone Array

The proposed array would be anchored within the FORACS (21°20'33.85"N, 158°11'8.18"W) at a depth of about 3,084 ft (940 m). The top of the array would be suspended approximately 65 ft (19.8 m) below the ocean surface (Figure 3).

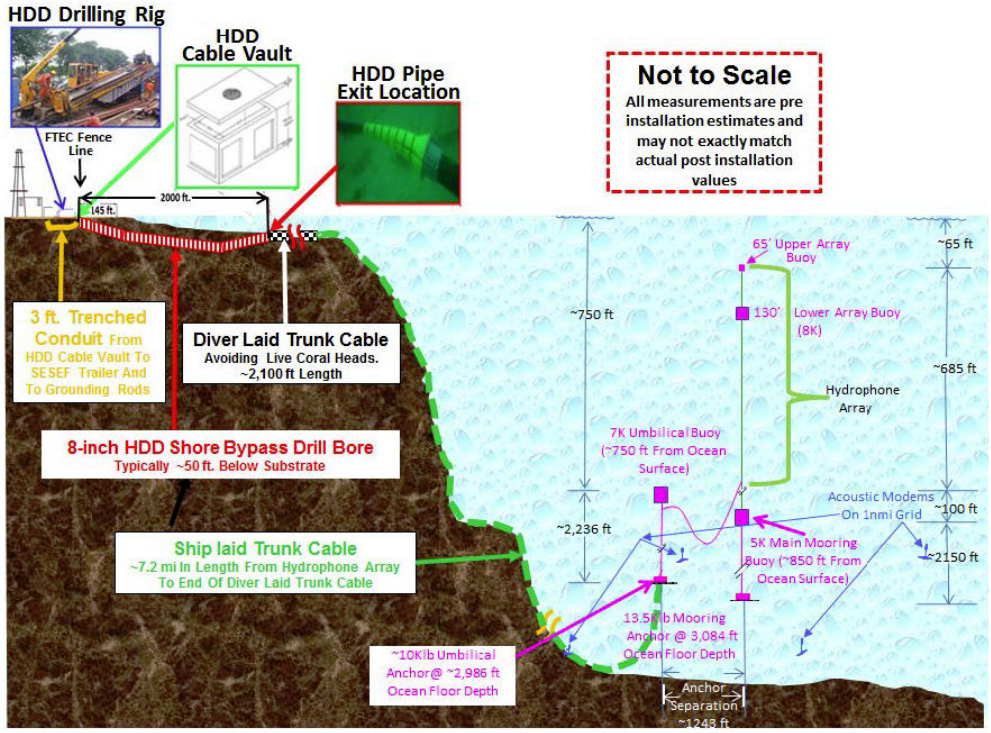


Figure 3. Action – Fixed/Cabled Array Concept Cross-section

2-3

The cable array would consist of two moorings. The main mooring would have about 3,020 ft of 7/8 in thick, plastic coated, wire rope (Nilspin) that would be anchored with a 13,500 lb steel anchor, and be suspended up to 65 ft below the ocean surface by three submarine buoys. The buoys would each be about 7.5 ft (2.3 m) in diameter and 7 ft (2.1 m) tall.

Hydrophone cable would be bound to the top 750 ft (229 m) of the Nilspin, with ten passive hydrophones mounted at intervals along this length. The hydrophones considered for use with the Action are cylindrical in shape, 2 in diameter x 15 in long, and would be affixed to the array cable by brackets that would hold them less than 2 ft from the cable.

Data from the hydrophones would be transmitted to shore via an umbilical cable suspended above the seafloor and anchored with a separate dead-weight anchor. The umbilical assembly supports the trunk cable under varying stress loads from the larger hydrophone array as it shifts in ocean currents. At 750 ft, the hydrophone cable would be spliced to about 2,236 ft of cable called the "array jumper". The array jumper would drape from the main mooring, to a secondary mooring, anchored about 1,243 ft to the south. The secondary mooring would be constructed and anchored similarly to the main mooring, but having only one submarine buoy, and rising only to 750 ft below the surface, where the array jumper would be spliced to the umbilical cable that would be bound to the secondary mooring's Nilspin and run down to the seafloor. There, the umbilical cable would be spliced to the trunk cable that would extend to the shore landing.

The hydrophone array would be designed to meet a 15-year service life.

2.2.3 Construction

Installation would include on-land and in-water work. The project would include excavation and backfill work to conduct Horizontal Directional Drilling (HDD) to install the Shore Bypass Conduit and a beach manhole, and work done to connect the trunk cable to the Fleet Technical Evaluation Center (FTEC). Other work would include submarine cable laying and installation of moorings to support acoustic arrays. In-water construction and installation would include the use of a medium-displacement Cable Laying Vessel (CLV) (200 – 400 ft [61 – 122 m] long), a small Anchor Handling Vessel (AHV) (100 – 200 ft [30 – 61 m] long) a small Dive Support Vessel (DSV) (30 – 60 ft [9 – 18 m] long), and a small Support Vessel (SV) (20 – 40 ft [6 – 12 m] long). The relative timing of on-land and in-water work is not certain and some degree of overlap is certain to occur. The order it is presented below does not necessarily indicate the order in which it would be completed.

2.2.4 Shore Bypass Conduit

Horizontal Directional Drilling (HDD) would be used to install a shore bypass conduit from the FTEC shore station, beneath the shoreline, intertidal and near-shore shallows to an exit location approximately 2,000 ft (610 m) offshore at a depth of 20 ft (6 m) (Figure 4). The HDD system would bore an 8 in (20.3 cm) diameter tunnel, using 6 in (15.2 cm) outside-diameter steel pipe (4 in [10.2 cm] inside diameter), which would be left in place to be used as the bypass conduit. Some type of wire or other line would be installed inside the pipe, behind the cutting head, and pulled along its length. This line would later be used to pull the trunk cable on shore through the conduit. The depth of the HDD drill bore underground is estimated to be 50 ft (15 m) below the seafloor.

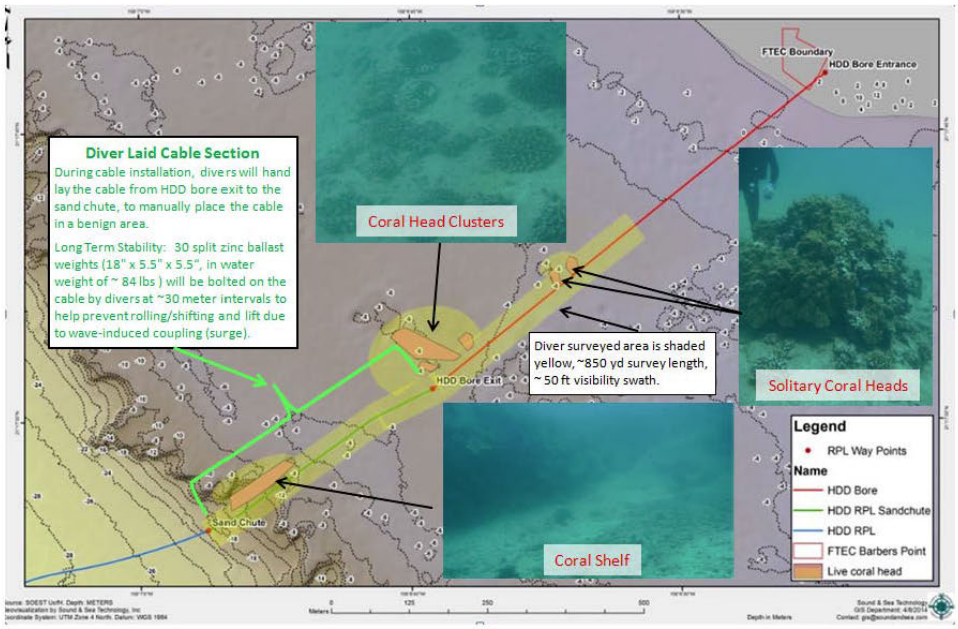


Figure 4. Coral Avoidance along the SSRNM Trunk Cable Route

HDD drilling uses drilling fluid containing non-toxic bentonite (sodium montmorillonite) and fresh water. The drilling fluid lubricates the cutting head, seals the bore annulus and removes cuttings from the bore. The drilling fluid is managed with a closed-cycle reclamation system that pumps drilling fluid containing drill cuttings from a 10 ft-square (3 x 3 x 3 m) drill entry pit, mechanically separates the cuttings from the used drill fluid, and then recycles cleared drill fluid through the drill pipe string to the cutting head. The HDD drill operation would produce cuttings mixed with bentonite drill fluid which would be contained on site and disposed of at the Waimanalo Gulch Sanitary Landfill, Kapolei. The fluid then flows back to the entry pit through the bore outside of the drill pipe string to be recycled.

HDD operators monitor drill fluid pressure to maximize the efficient use of the drilling fluid. The drilling fluid lubricates the cutting head, removes cuttings from the bore and seeps into the surrounding media, sealing the bore and containing the drill fluid under pressure[1]. If bentonite seeps excessively into the surrounding earth, a drop in pressure is observed by the operator. If this occurs, the drill operation is shut down while the bentonite fluid forms a better seal, allowing a gradual drilling fluid pressure increase and reactivating the drill head.

The HDD contractor would be required to prepare a drill fluid management plan for review and approval by Navy before work could begin. The objective of the plan is to manage the volume of

[1] The pressures used for HDD should not be confused with the pressures used in natural gas mining in a process sometimes known as "fracking." Pressures used in HDD drilling are much less than that required to break (fracture) the surrounding geologic formation. Fracturing is undesirable in this drilling operation.

drilling fluid released at the drill bore exit; to detect unintentional release; and to provide an organized, timely and minimum impact response to unintentional release. Navy would require the contractor's plan to be consistent with industry best management practices and standards promulgated by the North American Society for Trenchless Technology (NASTT 2008) and the American Society of Testing and Materials (ASTM 2011). These practices and standards identify HDD design; material selection; site investigations; utility surveys; worker and public safety; site layout; unintentional release; drilling fluid pressure management; and HDD drilling operations. During construction, adherence to the contractor's management plan would minimize the potential of inadvertent release of drill fluid. If inadvertent release of bentonite should occur, the plan would specify actions to be taken and those responsible. Adherence to these procedures insures that there would be no significant impact due to drill fluid management during onshore construction.

During the final stage of drilling, bentonite addition to the drilling fluid would be discontinued, and only water would be used to avoid the release of bentonite when the bore exits the seabed. After the conduit is installed, a precast concrete vault placed into the entry pit receives the conduit, protects and distributes trunk cabling, and provides access to electrical connections.

After breaking out through the seafloor, divers would remove the cutting head. The pipe would be left in-place to serve as the cable conduit, and the annulus around the pipe would be sealed with an environmentally safe polyurethane bend-strain relief (BSR).

2.2.5 Trunk Cable

About 7.6 mi (12.2 km) of 1.5 in (40 mm) diameter, polyethylene-sheathed, trunk cable would be installed to transmit data between the array and FTEC shore station. The entire trunk cable is constructed with outer armoring for protection from disturbance, seismic and storm surge hazards.

During cable installation, the CLV would use dynamic positioning to hold offshore while deploying the float-supported trunk cable that would be pulled by a small support boat to a position above the shore bypass conduit exit on the seafloor, about 2,000 ft (610 m) from the shoreline at the FTEC. Divers would sequentially remove the floats and take the trunk cable to the conduit, where it would be attached to the pull line. An on-shore winch would pull the line, through the conduit with the cable attached, until the cable reaches the man hole vault, where it would be connected to the shore site system. Meanwhile divers would continue to remove floats from the cable and manually place it on the sea floor to avoid live coral, between the conduit exit and a sand chute on the reef crest (Figure 4). The near-shore proposed cable route was previously diver surveyed (Hatke 2012). Once on the bottom, divers would install split galvanized steel weights (5.5 in diameter x 18 in long) around the cable about every 50 ft (15 m), out to a depth of 82 ft (25 m) and anchor them to the substrate to prevent wave-induced movement of the cable. This weighting construct is consistent with recommendations provided in reference (Sound & Sea Technology 2014).

Once the cable is secured to the reef, the CLV would slowly (between 0.5 and 1 kt) proceed southwest across the ledge of the fringing reef (reef crest) and out to a depth of about 1,640 ft (500 m), and then proceed along a northwesterly course until it reaches the planned array site.

2.2.6 Hydrophone array

Prior to installing the hydrophone array, the Anchor Handling Vessel (AHV) would install four independent acoustic modems, with one at each corner in a 1 nm-square grid by using a davit to

deploy the modems over the side. Upon their release from the davit, they free fall to the ocean floor and the procedure would be repeated until the grid is complete (Figure 3). Each of these four acoustic modems is spherical, approximately 24 in (0.6 m) diameter, weighing approximately 80 pounds. Each modem is attached by 3/8 in nylon line to a 125 lb (56.7 kg) pyramid mooring anchor. A fifth modem would be installed at the top of the hydrophone array. The acoustic positioning modems would be operated (pinged) during the installation of the array, to ensure precise placement of the array anchors. They would also be operated to determine the position of the array in the water column during ship noise tests. The array position needs to be known only once per test. However, a position may have to be requested more than once if it is not read properly. The signal frequency of the modems is between 9.66 and 14.5 kHz, and the source level is 160 dB re. 1 µPa. (Table 2). Please see the HSTT EIS/OEIS, Volume I, Section 3.0.4, Acoustic and Explosives Primer (DON 2013), to learn more about basic acoustic principles and terminology describing how sound travels (propagates) in air and water.

During hydrophone array and acoustic modem grid installation, one vessel would be present in the affected area offshore for a period of about three days.

Table 2. Acoustic Modem Source Parameters (Teledyne Benthos modem)

Activity	Sound Pressure Level (dB re 1 µPa)	Frequency (kHz)	Pulse Length (seconds)	Duty Cycle (%)	Beam (angles)
Modem Transmit	160	9.66 to 14.5	1.25	31.2	omni-directional
Modem Response	160	9.66 to 14.5	0.2	20	omni-directional

2.2.7 Shore Station

The FTEC shore station would include conduits, cabling, electronics and vault facilities designed to conduct and process hydrophone array data. The shore bypass conduit terminates 145 ft (44 m) landward in an underground concrete vault. The trunk cable would then be routed via an underground conduit to system computers inside an existing building. Electrical grounding rods would be installed inside the FTEC shore station fenced area. Excavations would be backfilled; the surface returned to grade and landscaped compatible with the USCG restoration plan (USCG 2013).

The HDD construction site would be located at an area that is mostly cleared and has been used for construction access in the past. The construction site located outside the FTEC fence-line is estimated to be 9,200 sq ft (0.09 ha). Of this area, approximately 2,615 sq ft (0.02 ha) of native and non-native vegetation east of the FTEC fence-line would be removed during construction (Figure 5).

The SSRNM system components to be installed underground or within existing facilities at FTEC would include:

- Data processing – Electronic equipment that collects and transmits data.
- Cable housing – Trunk cable linking the array to the shore station would pass via an underground precast concrete cable vault 8 ft x 7 ft x 8 ft high (2.4 m x 2.1 m x 2.4 m) and trenched conduit 3 ft (0.9 m) deep.
- Grounding rods – Three to five copper grounding rods would be installed down to 30 ft (9.1 m) below ground. The rods would be connected to the facility's electrical system with entrenched cables.

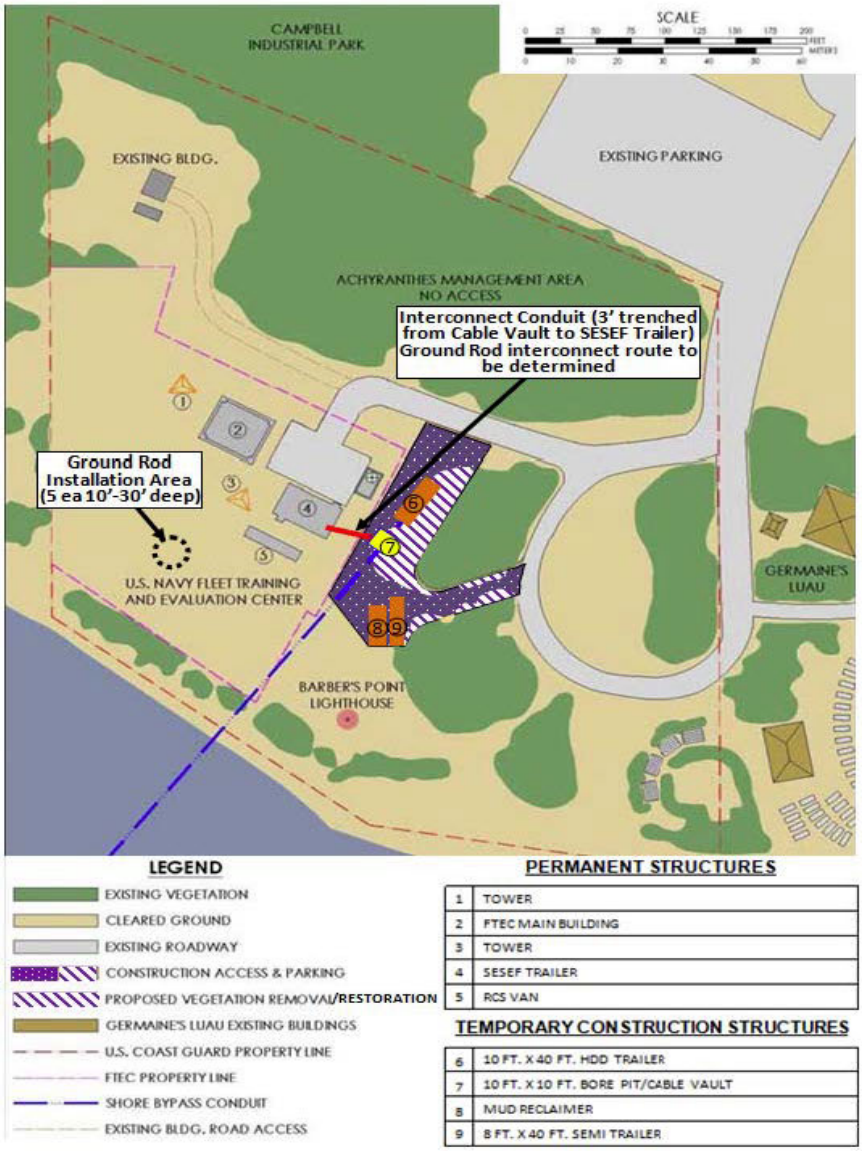


Figure 5. FTEC Shore Station Landing HDD Construction Site Layout

2.2.8 Construction/Installation Timeline

HDD and FTEC shore site construction would occur over about two weeks, beginning no earlier than April 2015. Cable and array installation would occur over three weeks during the summer of

2015, beginning no earlier than May 2015. The project would be complete no later than October 2015.

2.2.9 Operations and Maintenance

SSRNM testing is conducted on Navy ships to evaluate their waterborne acoustic characteristics while underway. All classes of naval vessel may be tested at the range, including tactical vessels such as aircraft carriers, cruisers, destroyers, and submarines. Support vessels would also undergo acoustic testing. The use of tactical sonars would not occur as part of these tests, but fathometers are likely to be used. However, shipboard operations on the range are covered under the HSTT EIS/OEIS and therefore are not considered part of this assessment.

Prior to conducting tests, the range would briefly operate the acoustic positioning modem system (about 7 seconds) to determine the position of the hydrophone array. Otherwise, testing would involve only the passive collection of in-water sounds. During a test, a single ship would perform a planned set of maneuvers under various operational modes and speeds, passing by the array several times. Specialists would be embarked onboard the ship to monitor systems, direct propulsion configurations, and collect and record data. No support vessels would be involved with acoustic testing.

The hydrophone array would measure ambient sea noise as well as the tested ship's waterborne acoustic signature, which would be transmitted through the trunk cable to the FTEC shore station. Personnel at the FTEC shore station would operate computer systems and other equipment to record, process, and analyze the vessel's acoustic signature. The total time to mobilize personnel and equipment, conduct a test, and demobilize is about five days. Actual testing would likely require several hours of vessel operations on the range, over one or two days. Up to ten acoustic tests would be conducted annually. Operational maintenance would be limited to annual servicing of batteries in each of the four acoustic modems that make up the grid. Approximately every 12 months, a small support vessel would approach the known location of each of the acoustic modems and acoustically initiate their release from the pyramid mooring anchor. Modems are recovered and taken to a shore based lab, where they are cleaned and batteries are replaced. Modems are then deployed again in the same way they were initially installed. This total evolution requires approximately 3 days for completion.

2.3 Best Management Practices

A. Constant vigilance shall be kept for the presence of ESA-listed marine species during all aspects of the proposed action, particularly in-water activities such as boat operations, diving, and deployment of anchors and mooring lines.

1. The project manager shall designate an appropriate number of competent lookouts to survey the areas adjacent to the proposed action for ESA-listed marine species.
2. Surveys shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one half hour. Periodic additional surveys throughout the work day are strongly recommended.
3. All work shall be postponed or halted when ESA-listed marine species are within 50 yards of the proposed work, and shall only begin/resume after the animals have voluntarily departed the area. If ESA-listed marine species are noticed within 50 yards after work has already begun, that work may continue only if, in the best judgment of the project supervisor, that there is no way for the activity to adversely affect the animal(s). For

example; divers performing surveys or underwater work would likely be permissible, whereas operation of heavy equipment is likely not.

4. Acoustic releases will not be operated when marine mammals are spotted within 380 yards (347 m) from the vessel.
5. Special attention will be given to verify that no ESA-listed marine animals are in the area where equipment or material is expected to contact the substrate before that equipment/material may enter the water. This includes the requirement to limit anchoring to sandy areas well away from coral.
6. Array mooring anchors and cable will be lowered to the bottom (or installed) in a controlled manner. This can include the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent.
7. In-water tethers, as well as mooring lines for vessels and marker buoys shall be kept to the minimum lengths necessary, and shall remain deployed only as long as needed to properly accomplish the required task.
8. For all vessels other than the cable laying ship, vessel operators shall alter course to remain at least 100 yards (91 m) from whales, and at least 50 yards (46 m) from other marine mammals and sea turtles. The cable laying vessel is unable to adjust course, but will adjust speed as necessary to maintain a safe distance apart.
9. Reduce vessel speed to 10 kt or less when piloting vessels at or within the ranges described above from marine mammals and sea turtles. Operators shall be particularly vigilant to watch for turtles at or near the surface in areas of known or suspected turtle activity, and if practicable, reduce vessel speed to 5 kt or less.
10. If despite efforts to maintain the distances and speeds described above, a marine mammal or turtle approaches the vessel, put the engine in neutral until the animal is at least 50 ft (15 m) away, and then slowly move away to the prescribed distance.
11. Marine mammals and sea turtles shall not be encircled or trapped between multiple vessels or between vessels and the shore.
12. Do not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA-listed marine species.

B. No contamination of the marine environment shall result from project-related activities.

1. A contingency plan to control toxic materials is required.
2. Appropriate materials to contain and clean potential spills shall be stored at the work site, and be readily available.
3. All project-related materials and equipment placed in the water shall be free of pollutants.
4. The project manager and heavy equipment operators shall perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected, and shall not proceed until the leak is repaired and equipment cleaned.
5. Fueling of land-based vehicles and equipment shall take place at least 50 ft (15 m) away from the water, preferably over an impervious surface. Fueling of vessels shall be done at approved fueling facilities.
6. Turbidity and siltation from project-related work shall be minimized and contained through the appropriate use of erosion control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions.

7. A plan shall be developed to prevent debris and other wastes from entering or remaining in the marine environment during the project and reduce the potential for surface/ground water contamination.
8. The Achyranthes Management Area (AMA) would be marked as "no access" on plan drawings and contractor personnel would be instructed to avoid this area.
9. Project operations would be postponed or halted under unusual conditions, such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage.

3 SPECIES AND HABITATS PRESENT

3.1 ESA Listed Species and Critical Habitat

All ESA-listed species that might occur within the Action Area are listed in Table 3. Based on the given timeframe and habitat preferences of the ESA-listed marine species off the south and west coast of Oahu, North Pacific right whales, sei whales, fin whales, blue whales, sperm whales, leatherback sea turtles, loggerhead sea turtles and olive ridley sea turtles are not expected to occur in the proposed test area and therefore, there would be no effect to them. Short Tailed Albatross, Newell's Shearwaters, and Hawaiian Petrels are also very rare in near-shore and coastal areas of Oahu and these species would also not be expected to occur within the project area.

Based on survey records and available data for the Action Area, of the species, only the Humpback Whale, False Killer Whale, Hawaiian Monk Seal, Green Sea Turtle, Hawksbill Sea Turtle, 'Ewa hinahina and the Ōpe'ape'a have been actually observed within or are likely to occur within or adjacent to the Action Area. Critical habitat for the 'Ewa hinahina exists within the Action Area and critical habitat for the Hawaiian monk seal has been proposed within the project area.

Table 3. ESA-Listed Species within the Action Area and Likelihood of Occurrence

Common name	Status / Critical Habitat	Taxon	Likelihood of Presence in the Action Area
Mammals			
Hawaiian monk seal	E / Proposed Critical Habitat	*Monachus schauinslandi*	Individuals likely present and critical habitat proposed in the area
Humpback whale	E	*Megaptera novaeangliae*	Humpback whales seasonally present November through April. The system installation would occur outside of humpback season, but humpback whales could interact with the system after it is installed.
False killer whale (Insular Hawaiian DPS)	E	*Pseudorca crassidens*	Likely present
North Pacific right whale	E	*Eubalaena japonica*	Rarely occurs in nearshore waters of the MHI
Sei whale	E	*Balaenoptera borealis*	Rarely occurs in nearshore waters of the MHI
Fin whale	E	*Balaenoptera physalus*	Uncommon in nearshore waters of the MHI
Blue whale	E	*Balaenoptera musculus*	Rarely occurs in nearshore waters of the MHI
Sperm whale	E	*Physeter macrocephalus*	Rarely occurs in nearshore waters of the MHI
Hawaiian hoary bat (Ope'ape'a)	E	*Lasiurus cinereus semotus*	Possibly but unlikely; might migrate to shore from Waianae range
Reptiles			
Green sea turtle	T	*Chelonia mydas*	Likely present
Hawksbill sea turtle	E	*Eretmochelys imbricata*	Likely present
Loggerhead sea turtle	E	*Caretta caretta*	Prefers open ocean water; rarely seen in waters near Hawaiian Islands
Olive ridley sea turtle	T	*Lepidochelys olivacea*	Prefers open ocean water; rarely seen in waters near Hawaiian Islands
Leatherback sea turtle	E	*Dermochelys coriacea*	Prefers open ocean water; not commonly seen in waters off Oahu
Birds			

Common name	Status / Critical Habitat	Taxon	Likelihood of Presence in the Action Area
Short-tailed albatross	E	*Phoebastria albatrus*	Very rare in the MHI
Hawaiian petrel	E	*Pterodroma sandwichensis*	Very rare on Oahu
Newell's shearwater	T	*Puffinus auricularis newelli*	Very rare on Oahu
Plants			
Round-leaved chaff-flower ('Ewa hinahina)	E / Critical Habitat	*Achyranthes splendens* var. *rotundata*	Individual plants not present, critical habitat present

3.2 Marine Species

3.2.1 Humpback Whale

Humpback whales are designated as depleted under the MMPA and listed as endangered under the ESA. Based on evidence of population recovery in many areas, the species is being considered by NMFS for removal or downlisting from the United States Endangered Species List. Humpback whales in the affected area are of the Central North Pacific stock, consisting of winter and spring populations of the Hawaiian Islands that migrate to northern British Columbia and Alaska, the Gulf of Alaska, the Bering Sea, and Aleutian Islands (DON 2013).

The Central North Pacific stock of humpback whales occurs throughout known breeding grounds in the Hawaiian Islands during winter and spring (November through April). Peak occurrence is from late February through early April, with a peak in acoustic detections in March. During this time period, primary occurrence is expected from the coast to 50 nm offshore. The greatest densities of humpback whales (including calves) are in the four-island region consisting of Maui, Molokai, Kahoolawe, and Lanai, as well as Penguin Bank and around Kauai. Sightings of humpback whales are relatively low in the Action Area as reported by the Hawaiian Islands Humpback Whale National Marine Sanctuary (Figure 6).

Entanglement in fishing gear poses a threat to individual humpback whales throughout the Pacific, including Hawai'i. Humpback whales, especially calves and juveniles, are vulnerable to ship strikes. Younger whales spend more time at the surface, are less visible, and are found closer to shore, thereby making them more susceptible to collisions. No reports of ship collisions with humpback whales have been attributed to Navy vessels. Humpback whales are potentially affected by loss of habitat, loss of prey (for a variety of reasons including climate variability), underwater noise, and pollutants.

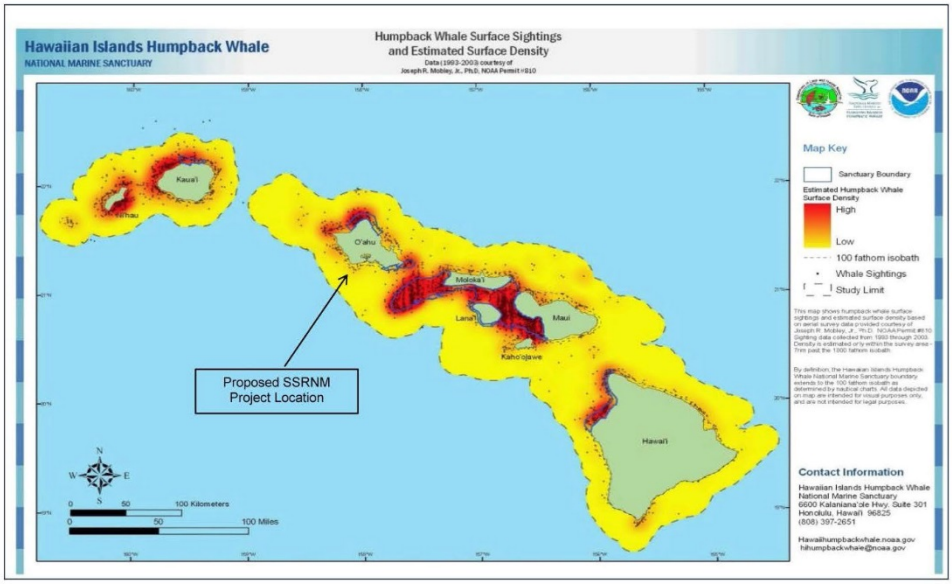


Figure 6. Humpback Whale Surface Sightings 1993-2003. Retrieved from http://hawaiihumpbackwhale.noaa.gov/documents/images/whaledensityl.jpg 2/12/2013

3.2.2 False Killer Whale

The NMFS currently recognizes three stocks of false killer whale in Hawaiian waters: the Hawaii pelagic stock, the Northwestern Hawaiian Islands stock, and the Main Hawaiian Islands insular stock. The Main Hawaiian Islands insular stock, which might be present in the affected area was listed as endangered under the ESA in 2012.

A documented historic decline has been the result of various non-Navy factors that include the small population size of this stock, evidence of decline of the local Hawaii stock, and incidental take by commercial fisheries. Based on recent estimates, approximately eight false killer whales from the Main Hawaiian Islands insular and Hawaii Pelagic stocks are killed or seriously injured by commercial longline fisheries each year (DON 2013).

False killer whales feed primarily on deep-sea cephalopods and fish (Odell and McClune 1999). They prefer larger fish species, such as mahi mahi and tunas. This species is believed to be preyed on by large sharks and killer whales. In Hawaiian waters, false killer whales are particularly susceptible to fishery interactions and entanglements (DON 2013).

3.2.3 Hawaiian Monk Seal

The Hawaiian monk seal is a pinniped endemic to the Hawaiian Islands, listed as an endangered species under the ESA in 1976 (NOAA 2013b). They are a member of the "true seal" Family (Phocidae), with silvery-grey-colored backs and lighter creamy coloration on their underside;

newborns are black. Approximately 1,100 Hawaiian monk seals remain, but the population is declining.

Monk seals primarily occur around the Northwest Hawaiian Islands (NWHI), with the population's six main reproductive sites occurring on Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island and French Frigate Shoals. Smaller breeding sub-populations occur on Necker Island and Nihoa Island. Designated critical habitat for the Hawaiian monk seal includes all beach areas, lagoon waters, and ocean waters out to a depth of 20 ftm (36.5 m, 119.8 ft) around Kure Atoll, Midway Islands (except Sand Island), Pearl and Hermes Reef, Lisianski Island, Laysan Island, Gardner Pinnacles, French Frigate Shoals, Necker Island, Nihoa Island, and Maro Reef (NOAA 2013b).

In 2010 only about 153 individuals were present in and around the Main Hawaiian Islands (MHI), with 30 to 40 individuals identified on O'ahu annually (NOAA 2010a). Monk seals are generally solitary and do not appear to be territorial on land. They are generalist benthic feeders; prey includes fish, cephalopods and crustaceans. NOAA has proposed extending the critical habitat around the MHI, including the ocean and terrestrial areas around O'ahu (NOAA 2013b). Additional detail about the species and its distribution can be found in the HSTT EIS/OEIS (DON 2013).

3.2.4 Hawaiian Monk Seal Proposed Revised Critical Habitat

With the exception of the Kalaeloa Commercial Harbor, the Barbers Point area and the western shoreline along Nānākuli is proposed for designation as revised critical habitat (PRCH) for Hawaiian monk seals. PRCH would include a 16 ft (5 m) shoreline zone and ocean waters out to the 1,640 ft (500 m) contour (Figure 7). The proposed cable landing at the FTEC shore station at Barbers Point is the only part of the action area that is within PRCH. In the recently-proposed critical habitat revision, NOAA notes that the ocean areas off Barbers Point, extending into the FORACS are "utilized frequently" by Hawaiian monk seals (NOAA 2013b), and the area is a known haul out site. The area is thought to provide three of the six habitat features identified as essential in the proposed rule to designate PRCH (76 FR 32026): (3) Marine areas from 0 to 500 meters in depth preferred by juvenile and adult monk seals for foraging; (5) Marine areas with adequate prey quantity and quality; and (6) Significant areas used by monk seals for hauling out, resting, or molting. The other three features (1) Areas characteristics preferred by monk seals for pupping and nursing; (2) Shallow sheltered aquatic areas adjacent to locations preferred by monk seals for pupping and nursing; and (4) Areas with low levels of anthropogenic disturbance are not found within the action area. No pupping is known to occur in the area, the nearshore waters are inconsistent with preferred weaning habitat as described in the proposed rulemaking, and the Campbell Industrial Park, Kalaeloa Air Field, and the Ko'olina resort complex occupy the majority of the Barbers Point area.

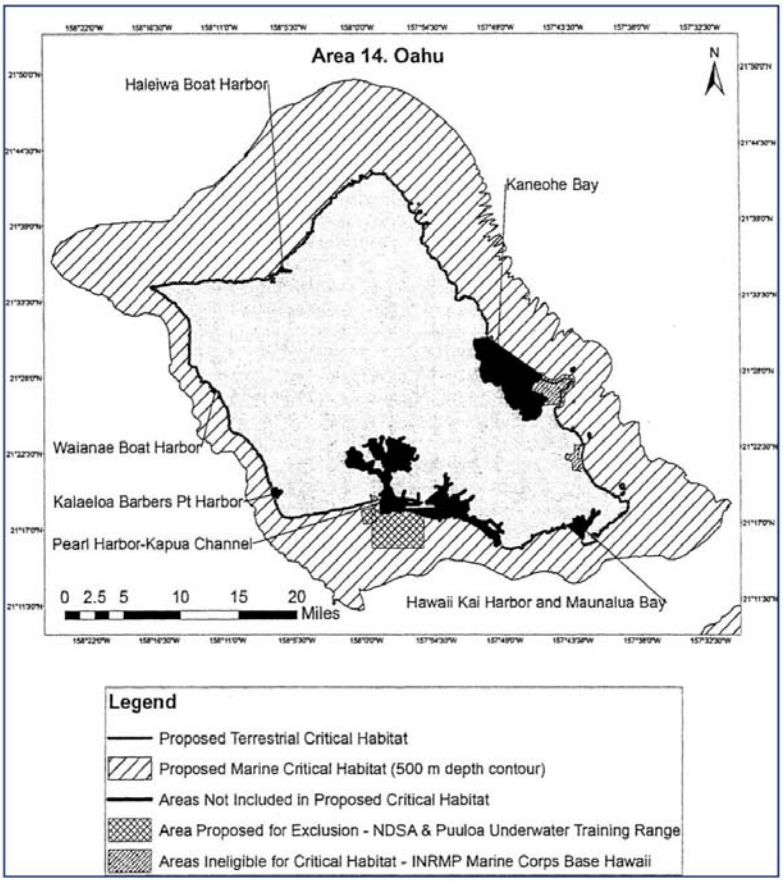


Figure 7. Hawaiian Monk Seal Proposed Critical Habitat around O'ahu (NOAA 2011)

3.2.5 Green Sea Turtle

The green sea turtle is found in tropical and subtropical coastal and open ocean waters, between the 30 degrees of latitude, both north and south. Major nesting beaches are found throughout the western and eastern Atlantic, Indian, and western Pacific Oceans, and are found in more than 80 countries worldwide (DON 2013).

The green sea turtle is the most common sea turtle species in Hawai'i, occurring in the coastal waters of the main Hawaiian Islands throughout the year and commonly migrating seasonally to the NWHI to reproduce. The first recorded green sea turtle nest on the Island of Hawaii occurred in 2011. Green sea turtles are found in inshore waters around all of the main Hawaiian Islands and Nihoa Island, where reefs, their preferred habitats for feeding and resting, are most abundant. They are also common in an oceanic zone surrounding the Hawaiian Islands. This area is frequently

inhabited by adults migrating to the Northwestern Hawaiian Islands to reproduce during the summer and by ocean-dwelling individuals that have yet to settle into coastal feeding grounds of the main Hawaiian Islands. Farther offshore, green sea turtles occur in much lower numbers and densities (DON 2013).

The green sea turtle was listed as threatened in Hawaii under the ESA in 1978 (NOAA 2014). The green sea turtle is the largest of the hard-shelled sea turtles, growing to a maximum length of approximately 4 ft (1.2 m) and weighing up to 440 lb (200 kg). Adults are herbivorous, feeding on sea-grasses, sea lettuce, and algae (DON 2013). The Hawaiian green sea turtle is genetically distinct from other green sea turtle populations, nesting primarily in French Frigate Shoals of the NWHI and feeding in the coastal areas of the MHI. The Hawaiian green sea turtle population has been recognized by NOAA as a distinct population segment that has increased in abundance and that delisting might be appropriate (NOAA 2012; NOAA 2014). No critical habitat is designated around Hawai'i (NOAA 2014).

Green turtles are known to occur in the Action Area and are known to bask at Paradise Cove, northwest of Barbers Point. No nesting sites have been identified in the Action Area (Parker and Balazs 2010).

Threats can include:

- Harvest of eggs and adults
- Incidental capture in fishing gear
- Fibropapillomatosis disease
- General threats to marine turtles: debris and pollution

3.2.6 Hawksbill Sea Turtle

The hawksbill sea turtle has been listed as endangered under the ESA since 1973. The hawksbill sea turtle grows to a length of 25 to 35 in (63.5 to 89 cm), with a corresponding weight of 100 to 150 lb (45 to 60 kg). The carapace has "tortoiseshell" coloration, ranging from dark to golden brown, with streaks of orange, red, or black. The head of the hawksbill sea turtle is elongated and tapers to a beak-like mouth, from which the species gets its name. The shape of the mouth allows it to reach into holes and crevasses of coral reefs to find sponges, which are the primary food source for adults (NOAA 2013a). Hawksbill sea turtles are solitary nesters, making the development of a population estimate or trend from nesting beaches difficult.

Hawksbills are the second-most-common species in the offshore waters of the Hawaiian Islands, yet they are far less abundant than green sea turtles (DON 2013), but are likely present in the Action Area. The lack of hawksbill sightings during aerial and shipboard surveys likely reflects the species' small size and difficulty in identifying them from a distance. Hawksbill turtles are migratory, returning to their natal beaches every two to three years to lay eggs along the beach. Only a few hawksbill turtles were nesting in the MHI as of 1998 (NOAA and USFWS 1998) and no hawksbill nests have been documented on the leeward shore of O'ahu (Parker and Balazs 2010). They are known to nest on only beaches of the main islands, primarily along the south coast of Hawaii and the east end of Molokai. There is no critical habitat in Hawaii.

In O'ahu waters, the following threats exist (NOAA and USFWS 1998):

- Directed take for shell value
- Natural disasters such as hurricanes and tsunamis

- Algae/seagrass/reef degradation due to coastal construction, sedimentation and non-point source pollution
- Environmental contaminants near developed shorelines
- Debris (entangle/ingest) such as discarded fishing gear, plastic bags, "6-pack" rings, Styrofoam, etc.
- Boat collisions
- Marina/dock development

3.3 Terrestrial Species

3.3.1 'Ewa Hinahina

'Ewa hinahina (*Achyranthes splendens* var. *rotundata*) is an endemic shrub listed as endangered in 2012. It occurs naturally at low elevations, generally from sea level to 100 ft, in open, dry areas. Achyranthes splendens is well adapted to low rainfall areas and requires very little moisture, if any, once it has become established (Duvauchelle 2010).

The 'Ewa hinahina has been identified near the FTEC in the past, although no individuals of this plant have been observed in the affected area since the mid 1990's. The USCG and Navy have established a fenced, 1.5 ac (0.6 ha) Achyranthes Management Area (AMA) just north of the FTEC access road to preserve the 'Ewa hinahina and its habitat. The HDD construction activity would be located ≥60 ft (≥18 m) to the south of the AMA and separated from the AMA by the FTEC access road. The AMA would not be affected by this Proposed Action.

The Coast Guard has prepared a Restoration and Management Plan for the Barbers Point Lighthouse Site that covers USCG lands, including the FTEC compound and the construction site for this Action (USCG 2013). Although the 'Ewa hinahina is not now found in the affected area for this Proposed Action – neither in the AMA nor in the FTEC or adjacent property – the Management Plan was prepared for Navy and other users to follow in restoring the 'Ewa hinahina to critical habitat within the Coast Guard's jurisdiction.

A confirming field survey of the FTEC site conducted by Navy biologists in 2014 found no 'Ewa hinahina plants within the proposed limits of construction for the Action. There are no threatened or endangered animals or habitat reported for the FTEC.

The 4 ac (2 ha) O'ahu critical habitat Coastal Unit 14 has been designated as critical habitat for the 'Ewa hinahina and several other threatened or endangered species (USFWS 2012). As described in the 2012 listing, Coastal Unit 14 contains a proper mixture of vegetation associations and moisture regime to support listed species. It also contains "unoccupied habitat that is essential to the conservation of this species by providing the [resources] necessary for the expansion of the existing wild populations" (USFWS 2012). The USCG has prepared a Restoration and Management Plan for the Barbers Point Lighthouse Site which considers habitat restoration for all the listed species by focusing on elimination of non-native plants and restoration of native plant associations (USCG 2013).

3.3.2 Ōpe'ape'a

The Hawaiian hoary bat, or Ōpe'ape'a (*Lasiurus cinereus semotus*) was listed as endangered in 1970. It is a nocturnal mammal historically observed throughout the MHI, but now only regularly observed on Hawai'i, Kaua'i and Maui. The Ōpe'ape'a forages on insects in open areas near

forests and over open water. It roosts during the day in native and non-native tree foliage. The Ōpe'ape'a pups during late summer and early fall, typically producing a pair of twins.

Decline in the population on O'ahu is thought to be related to the loss of native tree cover during the late 1800's. This is especially relevant for the Barbers Point – Campbell Industrial Park area that has been disturbed with agriculture, urbanization and industrialization activities throughout the past century. Threats to species recovery include loss of habitat, particularly roosting sites, possibly pesticides, introduced insects and disease (USFWS 1998).

Observations of the Ōpe'ape'a have been reported in the on the eastern side of O'ahu in the Ko'olau mountain range and, to a lesser extent the Wai'anae mountain range. Department of the Army natural resource studies indicate this species is observed more often in August and September and might forage in coastal areas near the forested mountain areas (USFWS 1998; USFWS 2011; DOA 2012). Recent observations reported in these studies indicate a wider distribution on O'ahu than do historical observations. There are no recorded observations of the Ōpe'ape'a at or near the FTEC. There are some trees in the area, however, that might serve as roosting sites, especially in the AMA to the north. There are no trees in the FTEC. The distance between the Waianae range and the Action Area crosses the heavily industrialized Campbell Industrial Park and urbanized 'Ewa plain area to reach the Barbers Point area. Based on available information, it is possible, but unlikely the Ōpe'ape'a occurs in the Action Area.

4 EFFECTS ANALYSIS

4.1 Effect Sources

4.1.1 Hydrophone Array

Under the Action, installation of the hydrophone array could affect air, water, marine life, and certain protected marine species and ecosystems. The hydrophone array and its components would be installed from a support vessel by lowering the anchor, floats, cables and electronic equipment into the ocean. Dead-weight anchors would be set on the surface of the sea floor. The hydrophone array, umbilical and positioning modem nodes would be suspended from these anchors. Because the equipment is all suspended, there are no anchor chains or cables to drag across the bottom.

4.1.1.1 Configuration

The top of the array would be suspended approximately 65 ft (19.8 m) below the ocean surface. The upper array buoy, lower array buoy, and main mooring buoy keep the entire hydrophone array vertically aligned. Each buoy is approximately 7.5 ft (2.3 m) in diameter and 7 ft (2.1 m) tall. The installed array would be suspended in the water column, consisting of one primary cable and attached electronic communications cable. These cables would be attached to one another to form a single assembly suspended from the buoys. No equipment would drag across, or scour the bottom.

The hydrophone array assembly has no hooks, netting or loosely hanging ropes or cables. It would sway slowly as a unit with shifting surface ocean currents. The array assembly, steel anchor assemblies, cables and onboard electronic system exteriors are ruggedly constructed of steel, stainless steel or polyethylene for a long service life. Because the purpose of these equipment assemblies is to function for 15 years, they would be designed not to corrode or fail in the marine environment. The electronic components would be covered with inert surfaces that do not leak and do not have toxic properties that might leach into the water and adversely affect marine ecosystems.

At the upper reaches of the array in the water column (< 200 m), the array would offer a minor potential to attract and/or divert fish because of its physical presence. It would be visible to fish and marine mammals in the relatively clear water at these depths. The upper reaches of the array assembly would become covered with microscopic and macroscopic marine growth in time.

4.1.1.2 Anchors

The dead-weight anchors for the hydrophone array and buoys would disturb a relatively small bottom area no larger than the anchors themselves. Array installation would cover and disturb a total of 144 sq ft (less than one-one hundredth of an acre) of existing benthic habitat at the array installation site:

- Array mooring anchor (1, each 64 sq ft [8 ft x 8 ft / 2.4 m x 2.4 m])
- Umbilical anchor (1, each 64 sq ft [8 ft x 8 ft / 2.4 m x 2.4 m])
- Positioning modem node anchors (4, each 4 sq ft [2 ft x 2 ft / 0.6 m x 0.6 m])

4.1.1.3 Positioning Modem

The SSRNM is a passive acoustic array used to measure the radiated noise emitted from surface ships. To improve measurement accuracy, active positioning modems are used to determine the position of the array during operation. After the hydrophone array and positioning modems are installed, but before the first operational use, each positioning modem would be located by surveying activity consisting of a single ping transmitted from the surface to a modem followed by measuring the response time of that ping, repeated four to five hundred times to obtain the necessary statistical tolerance to precisely locate the position of the modem on the seafloor. The surveying process would be repeated for all four modems. In operation during each test trial, three positioning fixes are taken. Each location fix requires a total of four transmissions, one from the tracking transducer on the array and one each simultaneously from the four nodes on the bottom. The array position needs to be known only once per trial. However, a position may have to be requested more than once if it is not read properly.

The following assessment is applicable to both the Action and the Alternative Action and the potential impacts and effects on marine mammals. Other species could potentially be affected, but from a criteria perspective marine mammals are considered more sensitive to the effects of underwater acoustic pings. While this assessment is primarily qualitative the quantitative technical parameters of the acoustic modems are given in in the Action description, Table 2.

For Navy NEPA documentation, the criteria for assessing potential effects of underwater acoustics on marine mammals are focused on the hearing of the marine mammals as the most likely physiological effect. The following assessment considers both Cetacean and Phocinae (monk seal) criteria for temporary hearing loss, which is technically identified as temporary threshold shift (TTS). The Phocinae are the most sensitive seals from a hearing perspective.

The energy content of the emitted acoustic signals during installation and during a single operation is compared against the physiological criteria used for Phase II Navy acoustic analyses.[2] Behavioral disturbance is also considered, but this is only assessed with respect to the range to minimal peak levels instead of just the energy content. In Phase II some acoustic sources are defined as "de minimis" when either the source is too quiet to have any real potential for effect, or if the source frequency range is outside of the range of hearing for marine mammals or if region of emitted sound is confined to a small underwater volume. Although the SSRNM positioning modems would not qualify as de minimis under the Phase II criteria because of the frequency and omni-directional beam pattern, the source level is so low that it would affect a small underwater volume and be near a de minimis level.

Because the array is installed in fairly deep water, our analysis of energy accumulation at distance from the source is based on a spherical spreading concept along with the small amount of absorption. Using spherical propagation and accounting for acoustic absorption, the largest radius for potential TTS is less than 20 ft (6 m) during SSRNM operation. This is a very small radius in the ocean water column of about 3,000 ft (914 m). Given this estimate, we conclude that a single operation of the array positioning modem is negligible because the probability of physiological effect to marine mammals is essentially zero.

[2] The current Navy NEPA analyses to assess fleet impacts in all oceans are collectively called Phase II. The HSTT EIS/OEIS is part of preceding NEPA analyses, Phase I, to assess Testing and Training operations in major fleet areas.

Using a peak sound-pressure-level of 120 dB (re 1 μPa) to indicate a probability of zero for individual behavioral response, we estimate a peak pressure level of any ping from the modems would be below this threshold at approximately 525 ft (160 m). At the top of the hydrophone array (65 ft deep [20 m]), individual behavioral response is more likely to be caused by the presence of a surface vessel rather than the array's sounds. The remaining positioning modems are located on the seafloor, 3,000 ft (914 m) below the water surface. Assessment of fleet vessel operations is outside the scope of this EA, and considered in the HSTT EIS/OEIS.

Therefore, the probability of a marine mammal experiencing physiological effects during operation of the positioning modem is very low due to the low source level. When considering individual behavioral response, the radius to the threshold for a zero probability of behavioral response is somewhat larger: about 525 ft (160 m). Near the ocean surface there is a greater probability of individual behavioral response to the presence of vessels.

The foregoing discusses SSRNM array operations that generate four positional modem "fixes." This operation has essentially a zero probability of causing any physiological effect to a marine mammal because the effective range for the most sensitive marine mammals is less than 20 ft (6 m). The probability of behavioral disturbance is very low because of the relatively small range (525 ft [160 m]) of a zero probability of behavioral harassment.

The surveying activity during the installation process is of greater concern, however. We estimate that the modem surveying activity could accumulate sound energy enough to cause physiological effect to a marine mammal, but only if that marine mammal remained within an approximate 328 ft (100 m) radius of the modem throughout the entire installation process. Because the modem source level is low, there would be an unlikely probability of harm (Level A Harassment) or behavioral pattern disturbance to a point where such behavioral patterns are abandoned or significantly altered (Level B Harassment). Similar to operational effects, the possibility of individual behavioral response caused by the underwater sound emitted during surveying would be equally likely to the possibility of individual behavioral response to the surface vessels.

4.1.2 Shore Bypass Conduit

Installation of the shore bypass conduit could affect air, water, earth, marine life and terrestrial life, certain protected marine and terrestrial species and ecosystems, land and water use, archeology and cultural resources, recreation, noise and socioeconomics. The shore bypass conduit and its components would be installed using the HDD method which involves work at the HDD bore entry at the FTEC ashore, and at the HDD bore exit about 2,000 ft (610 m)seaward.

The HDD method would be used to install a shore bypass conduit from the FTEC shore station, beneath the shoreline, intertidal and near-shore shallows to an exit location approximately 2,000 ft (610 m) offshore at a depth of 20 ft (6 m) (**Error! Reference source not found.**). This method effectively bypasses and causes no direct effects to sensitive nearshore tidal and subtidal habitats between the HDD bore entry at 145 ft (44 m) ashore and the HDD bore exit at 2,000 ft (610 m) offshore. There would be no direct surface effects from the HDD conduit installation to shore, intertidal and near-shore subtidal resources between the HDD entry and the HDD bore exit.

During HDD drilling, the proper management of the bentonite drilling fluid seals the bore annulus to avoid pressure fracturing, release of drilling fluid and/or potential aquifer cross-contamination. HDD operators monitor drill fluid pressure to maximize the efficient use of the drilling fluid and avoid release of the drill fluid. The HDD contractor's drill fluid management plan, required by

the Navy, would specify these procedures. Adherence to the management plan insures that there would be no significant impact due to drill fluid management during onshore construction.

During the final stage of the HDD process, operators would replace the use of bentonite with fresh water about 150 ft before exit, and only fresh or sea water would be used in the drilling system for the remainder of the operation. This method avoids discharge of bentonite materials into the ocean when the bore exits the seafloor.

The HDD drilling technique proposed here is equivalent in size to the one described in the MCB Kaneohe Bay Wave Energy Test Site (WETS) EA (DON 2014). As stated in that EA, it is unexpected that the acoustic noise emanated from drilling through the substrate below the sea floor would have much impact on the marine mammals, sea turtles, birds and fish of the area. The acoustic bathymetry for both areas is similar (flat shelf with similar depths for the first two thousand feet), and the noise levels from the drill itself would be expected to be similar as well. Consequently, the analysis given in the Kaneohe Bay EA should be equally applicable to this Action with respect to the acoustic impact in the marine environment. As concluded in the WETS EA, not much impact is expected as the sound level of the drilling noise as the drill head nears the underwater surface at the end of the bore is less than the noise levels of vessels used during construction.

4.1.3 Trunk Cable

Under the Action, installation of the trunk cable could affect air, water, marine life, certain protected marine species and ecosystems, archeology and cultural resources. The trunk cable would be installed from sea from work vessels as required. It is pulled into and through the completed shore bypass conduit and into the cable vault where it is connected to the shore station electronic components. After construction, the trunk cable requires no preventive maintenance work.

Construction activities on the ocean during cable installation would involve three vessels in the affected area offshore for a period of about three weeks. These vessels would be on station, sometimes anchored, to install the trunk cable at the HDD bore exit, the diver-laid and vessel-laid cable route, and hydrophone installation sites. During this work, these vessels would be expected to emit combustion products from engines. These mobile source air emissions are one-time and temporary during the installation work.

Installation of the trunk cable would cause some environmental effect along the seafloor, but precautions would be taken to minimize and avoid adverse environmental impacts in shallower zones. The 7.6 mi, polyethylene sheathed trunk cable would cover 5,016 sq ft over a narrow, 1.5 in strip of bottom, likely damaging the less mobile marine life found in the sediments along this path. There is a possibility precious coral could exist along the cable route, but it is unlikely the cable would directly contact the coral colonies. When considered along with the damage caused by two, 8 ft x 8 ft (2.4 m x 2.4 m) dead-weight anchors of the hydrophone array installation, a total affected seafloor rises to 5,144 sq ft (0.04 ha). This area is an insignificant footprint in comparison to the seafloor over the entire affected environment, about 28,000 ac (11,331 ha).

Damage would occur to smaller, less mobile invertebrates such as segmented worms, small crustaceans and mollusks. Larger, more mobile organisms, including demersal bottomfish and crustaceans, would avoid the cable as it is positioned by divers in shallow water, and the cable ship in deeper waters.

Between the shore bypass conduit and reef crest, the cable would be manually positioned to avoid live coral. The cable would be designed to be stable; it would be weighted with split galvanized ballast weights to prevent rolling, shifting, and lift due to wave-induced surge. After installation, exposed portions of the trunk cable would present a suitable hard substrate habitat; attracting attaching organisms such as anemones and barnacles.

These benthic effects would occur over a very thin strip of the seafloor along its length. The cable passes from well-lit, warm shallow waters down to poorly-lit, cold deep zones. These ecosystems are fairly distinct, marked by dramatically different light and temperatures. Along the cable route, descending in depth, habitats change from high diversity and density to low diversity and density of organisms. Because of the thin width of effects to the ecosystem at any one depth, the effect of the trunk cable on that area would not change the character of the ecosystem relative to the depth zone. At shallow depths, this effect would damage a few invertebrates in and on the sand between live coral heads of the patch reef. As the cable is installed down the sloping seafloor, the number of affected benthic invertebrates and demersal organisms would decrease to a negligible level.

Under the Action, two vessels would be used during the diver assisted cable laying out to the reef crest: Small Support Vessel and Small Dive Support vessels. These vessels would operate on site for no more than five, ten-hour days.

Under the Action, support vessels might anchor near the HDD bore exit and diver-assisted cable lay. These anchoring events would occur over a short timeframe, less than one week. This anchoring would be necessary to conduct cable laying operations. Small vessel anchors are typically fluke or plough anchors that dig into the sediments to hold the vessel against currents and winds.

The cable laying ship will lay trunk cable at slow speeds to maximize contact with the bottom. It is important to pay out cable at a slow speed, between 0.5 and 2 kt so as to maintain the cable angle as near vertical as practicable. This technique allows the cable to conform to the bottom contours and avoids suspending the cable between two seafloor hills. A suspended submarine cable is at risk of damage. The slower laying speed allows the cable to conform to the seafloor, maximizing its service life.

4.1.4 Shore Station

Under the Action, excavation and construction could affect air, water, earth, terrestrial life, certain protected terrestrial species and ecosystems, land use, archeology and cultural resources, recreation, noise and socioeconomics. The shore station and its components would be installed with excavating equipment, an HDD drill rig and supporting equipment over a three-week construction timeframe.

The FTEC shore station would include conduits, cabling, electronics and vault facilities designed to conduct and process hydrophone array data. The shore bypass conduit terminates 145 ft (44 m) landward in an underground concrete vault. The trunk cable would then be routed via an underground conduit to system computers inside an existing building. Electrical grounding rods would be installed inside the FTEC shore station fenced area. Excavations would be backfilled; the surface returned to grade and landscaped compatible with the USCG restoration plan (USCG 2013).

The HDD construction site would be located at an area that is mostly cleared and has been used for construction access in the past. The construction site located outside the FTEC fence-line is

estimated to be 9,200 sq ft (0.09 ha). Of this area, approximately 2,615 sq ft (0.02 ha) of native and non-native vegetation east of the FTEC fence-line would be removed during construction (Figure 5).

The Coast Guard has prepared a Restoration and Management Plan for the Barbers Point Lighthouse Site that includes the FTEC compound and the construction site for this Action (USCG 2013). Although the 'Ewa hinahina is not now found in the affected area for this Proposed Action – neither in the AMA nor in the FTEC or adjacent property – the Management Plan was prepared for Navy and other users to follow in restoring the 'Ewa hinahina to critical habitat within the Coast Guard's jurisdiction.

Shore Station construction would clear, excavate and compact soils in the 9,200 sq ft area (0.09 ha) outside the FTEC. Most of this area has been previously disturbed by construction. The Action calls for clearing the construction site, excavating the HDD entry pit, installing the bypass conduit and excavating and installing the connecting cables and grounding rods at the FTEC. This work requires a drill rig, earth moving equipment and support vehicles. The HDD construction includes the HDD drill rig and drill entry pit, drilling fluid reclamation system, drill pipe storage, bentonite storage and parking. Support vehicles and materials are stored on existing roadways and cleared areas. This equipment would operate at the FTEC for about three weeks. The HDD drill bore entry is located within the entry pit that functions as a holding area for drilling fluid returning through the bore annulus (See Figure 4). Upon completion of the underground submarine cable conduit, the cable vault is installed at the drill entry site. Operating communications cable and electrical grounding rods and wiring are entrenched (3 ft x 3 ft / 1 m x 1 m) between the vault and the existing SESEF operations trailer. The HDD drilling rig and supporting vehicles described in Section 2.1.4 and Figure 4 would produce construction noise and combustion emissions during the three week construction duration. On completion of the trunk cable landing and connection to the operating equipment in the FTEC, the excavations are all returned to pre-existing grade and the area landscaped consistent with the USCG management plan.

This work would clear vegetation and disturb existing soils and the underlying calcareous rock formation, but in a limited 9,200 sq ft (0.09 ha) area. No clearing would occur in excess of that shown in Figure 4. Existing roadways would be used to transport equipment and store materials. The disturbance would be one-time during the three-week construction period. Post construction vegetation would support the sustainability objectives of the USCG.

4.1.5 Operations and Maintenance

Under the Action, no preventive maintenance routines would be needed at the array site, trunk cable or shore bypass conduit. Indeed, one of the objectives of the Action is to reduce time and cost of the SSRNM evolution by not using small craft to conduct the measurement. Operations would include the use of five active acoustic positioning modems that would cause some acoustic effect in the ocean. There are four located on the bottom around the array anchor and one affixed to the top of the array. During operations, these devices operate infrequently, determining the position of the array in the water column during tests. During each test trial, three positioning fixes are taken. Each location fix requires a total of four transmissions, one from the tracking transducer on the array and one each simultaneously from the four nodes on the bottom. The array position needs to be known only once per trial. However, a position may have to be requested more than once if it is not read properly.

As discussed in Section 4.1.1, multiple pings during the installation surveying operation would be unlikely to adversely affect marine life. During operation of the SSRNM array, the positioning modems would operate much less with five or fewer pings during any one test, not accumulating enough energy to affect marine life.

Electromagnetic fields (EMF) are generated by electrical currents passing through cables, but such fields are less than natural EMF of the earth's geomagnetic field. The earth's geomagnetic field varies with latitude between 30 and 70 microTesla (μT); higher near the poles and lower near the equator. In the Hawai'i region of the Pacific Ocean, the geomagnetic field is about 35 μT (Normandeau/Exponent et al. 2011). While it is possible to shield underwater cables from emitting electrical currents into the environment, it is not possible to shield EMF from these cables. The magnetic flux density or EMF of a long thin cable is directly proportional to the amount of current passing through the cable. Additionally, the EMF that is generated by underwater cables decreases rapidly away from the cable. Researchers from the Monterrey Bay Aquarium Research Institute and the Monterey Bay National Marine Sanctuary conducted an impact study of a 95 km submarine cable that had been in place for 8 years off the California coast (Kogan et al. 2006). This cable supports a hydrophone array roughly similar to the Action. The study found few changes in benthic fauna abundance or distribution. Exposed portions of the cable provided new habitat for anemones. Also, some fishes were more abundant near the cable, presumably due to the greater habitat complexity introduced by the cable. Surface-laid cable in the nearshore areas that were subject to frequent wave activity can be undercut by wave surge and currents. Where the cable was suspended in this way, it was subject to strumming that caused abrasion to both to the cable itself and to rocky bottom features.

United Nations Environment Programme (UNEP) and the International Cable Protection Committee (ICPC) collaborated on a review of the environmental impacts of submarine telecommunications cabling (Carter et al. 2009). These authors report none or minimal impacts on benthos, fish and marine mammals based on review of several studies, including the California study discussed above. One of the most extensive field studies on the effects of EMF on marine life was done by the Collaborative Offshore Wind Research into the Environment (COWRIE) from 2002 through 2009 (Gill et al. 2009). The results of this effort failed to demonstrate that EMF produced by a submarine cable would change fish swimming patterns or feeding behavior.

Typical underwater or submarine power cables typically carry a maximum of 1600 Amperes (A) of alternating current (A/C). Using the values of a submarine power cable with 1600A A/C, the magnetic flux density or magnetic field produced by this cable would be 3.2 milliTesla (mT) within 10 cm of the cable, but fall to 0.050 mT, within the range of the earth's natural geomagnetic field, just six meters from the cable. Simple tank-based experiments demonstrated that almost no marine animals would make an attempt to leave an area with a magnetic field of 2.8 mT, the strength of a magnetic field that might exist very near (within 30 cm) of this cable. Other measurements and predictions of submarine cable EMF have confirmed that the EMF is relatively small. EMF measurements on the order of 35 to 50 μT (50 A^{ms} at 11 kV and 60 A^{ms} at 33 KV respectively) were measured at the surface of three-phase submarine power cables (CMACS 2003).

The current flowing in the SSRNM array cable is much less than power cables: 1.15 A maximum, at < 200 V. The expected EMF levels from the SSRNM cabling would be 0.0767 μT at 30 cm, much less than the typical submarine cable (i.e. 2.8 μT), which is also a fraction of the earth's geomagnetic field. Because of this and lack of conclusive EMF-caused biological effects, SSRNM trunk cable EMF would have negligible effects on marine life.

Carter et al. (2009) also report that many cables would self-bury in shifting sand "waves" where the cable is stable and sand waves move across the cable, alternately burying and exposing the cable over time. Under the Action, the trunk cable would be weighted in the diver-laid portion of its route to ensure stability on the seafloor during storm events (Sound & Sea Technology 2014).

4.2 Effects on Threatened and Endangered Marine Mammals and Sea Turtles

The primary impacts to marine mammals from construction of the Action would include the physical presence of support vessels, construction equipment and divers. Because of the short duration of construction, this would constitute a temporary, low potential for effect to marine mammals and sea turtles that might be present.

Proposed monk seal critical habitat intersects with the Action Area. Within the proposed critical habitat at the shore bypass conduit exit and seaward there would be no long-term changes affecting the ability of the habitat to support the species. There is no preferred pupping or nursing area near the construction and the project would not deplete prey. Although individuals might come near the construction site, they would avoid contact with divers and continue normal activity. Under these conditions, the monk seal might be affected, but not adversely so.

Other ESA-listed marine mammals and sea turtles would likely avoid but continue normal activity in the immediate vicinity of construction due to the increased human activity. Further, there are no known marine mammal or turtle strikes resulting from vessel traffic associated with SSRNM testing. Because construction vessels would operate at low speeds within the relatively small construction zone and access routes during the short, three-week in-water construction period, no strikes are anticipated. The likelihood of a vessel strike to these species or behavioral changes is negligible and would be discountable.

During operation, sea turtles and marine mammals are at potential risk of collision, entrapment or entanglement with the hydrophone array in the water column, or with the anchoring system on the seafloor. Although Hawaiian monk seals have one of the highest documented entanglement rates of any pinniped species (NOAA 2010b; NOAA Fisheries Service 2010), the incidents are most often associated with derelict fishing gear including gillnets, fish line, and fishhooks. During operation there would be negligible effects due to EMF as discussed in the previous section.

There is less risk that smaller species such as ESA-listed turtles and monk seal could become entangled in hydrophone cables compared to the large whales, such as the humpback whale. Because of the small size of the hydrophone array, the lack of hooks and nets, and the small size of the supporting cable relative to the ocean habitat, the array is not expected to pose a risk of entrapment, or pose a physical barrier or collision potential that would adversely affect foraging sea turtles, monk seals, or transiting whales.

During installation of the SSRNM array, the surveying of the modems may accumulate enough energy to cause physiological effects to a marine mammal, but that marine mammal would have to stay within an approximately 656 ft (200 m) radius of the array throughout the entire installation process to experience those effects. After completion of surveying, and during the routine operation of the SSRNM, there would be no significant changes in marine mammal behavior because of the low energy output of these devices. The possibility of harm (Level A Harassment) or behavioral pattern disturbance to a point where such behavioral patterns are abandoned or significantly altered (Level B Harassment) caused by the underwater sound emitted by the active

positioning modems would be unlikely because the source levels are low and a duration of effect is short.

4.2.1 Marine Mammals

Installation of the hydrophone array, trunk cable and positioning modems might affect marine mammals. During installation surveying of the positioning modems, multiple pings might accumulate enough energy within 328 ft (100 m) of the modem to affect a marine mammal if the marine mammal remained in the area during the entire survey time frame. Operation of the positioning modems requires fewer pings resulting in a negligible risk of an effect to marine mammals. During operation there would be negligible effects due to EMF. These effects might cause marine mammals to react and avoid the area, but because of the short duration of construction and operation, these responses would not affect the population behavior patterns.

During construction of the Proposed Action elevated noise associated with construction-vessel traffic and short-term changes in prey availability could occur. Surface vessel noise is expected to be typical of vessel traffic in the area and occur only once during the short installation timeframe.

Because of the flexibility of the hydrophone cable, the relatively and small size of the hydrophone array and trunk cable relative to the ocean depth zone habitat, it is not expected to pose any substantial physical barrier, entrapment or collision potential to foraging marine mammals in the area. Those few marine mammals that might be exposed to installation activity would avoid the activity and installation equipment, not colliding with or becoming entangled or trapped in the hydrophone array. Smaller species such as dolphins are even less likely to become entangled or trapped.

Rarely observed marine mammals would not be likely to be encountered during the short three-week construction timeframe. Migratory whales are unlikely to be encountered under the Proposed Action because they are typically in the area during fall, winter or spring months, not during the anticipated summer construction timeframe. Other marine mammals are unlikely to be present due to habitat preferences. Blainville's beaked whale, pygmy killer whale, and pantropical spotted dolphin are typically rare from shore to the shelf break; they might occur in deepwater during installation of the hydrophone array.

Therefore, because of the low power and location of the positioning modems, the short duration of installation activity during the summer months and the benign nature of the hydrophone, the Action might affect, but is not likely to adversely affect marine mammals.

4.2.2 Sea Turtles

During construction of the Proposed Action elevated noise associated with construction-vessel traffic and short-term changes in prey availability could occur. Sea turtles are unlikely to collide or become entangled with the hydrophone array, as are marine mammals. The probability of exposure of a sea turtle to the single hydrophone array is very low. Because of the flexibility of the hydrophone cable, the relatively and small size of the hydrophone array and trunk cable relative to the ocean depth zone habitat, it is not expected to pose any substantial physical barrier or collision potential to foraging sea turtles in the area. During operation there would be negligible effects due to EMF.

Rarely observed sea turtles would not be likely to be encountered during the relatively short, three-week construction timeframe under the Proposed Action. Sea turtles likely to be encountered

under the Proposed Action would include those noted by the Navy as being commonly observed (DON 2013). Common sea turtles expected to occur in the affected environment include the green sea turtle and hawksbill sea turtle.

Sea turtles possess an overall hearing range of approximately 100 Hz to 1 kHz, with an upper limit of 2 kHz (DON 2013). The frequency range of the positioning modems (about 9-14 kHz) is well above the upper limit of sea turtle hearing. Even if some acoustic energy from the modem signal was out-of-band (at reduced levels) the sea turtle would not hear it. Therefore, installation and operation of the hydrophone array and positioning modems are unlikely to affect sea turtles.

The hydrophones are acoustically passive, detecting radiated noise (i.e. propulsion, ship machinery and flow noise) from vessels, not producing noise. The positioning modems are active sound sources, but because of the high frequency (9.66-14.5 kHz) of the modems which is beyond the hearing range of sea turtles; the location of the positioning modems; and the relatively low source levels during operation, no adverse effects would occur to sea turtles.

Vessel movement would occur only during project installation of the hydrophone array and trunk cable, a one-time temporary event. Shore bypass conduit support vessels, diver-assisted trunk cable support vessels and hydrophone array installation support vessels would maintain position on site regardless of changes in the wind, waves and currents. These vessels would not move appreciably; they would either set anchor or maintain position using dynamic positioning.

Because construction vessels would operate at low speeds within the relatively small construction zone and access routes during the three-week in-water construction period, the likelihood of a vessel strike to sea turtles is negligible. During the operation of the Proposed Action there would be no vessel activity to affect sea turtle behavior.

Installation of the deep portions of the trunk cable would occur at relatively slow speeds, between 0.5 and 1 kt. Because of these slow speeds during cable laying and the temporary nature of this event, the probability a construction vessel striking a sea turtle is low.

During transit to and from offshore work sites, vessel speeds would be higher, between 5 and 15 kt, increasing the probability of a construction vessel striking a sea turtle. Visually detecting and avoiding sea turtles can reduce the probability of vessel strike under these circumstances. Therefore, Navy would include a lookout on each construction vessel to detect and take action to avoid direct strike of sea turtles.

In summary, the Proposed Action might cause sea turtles to avoid human activity during the temporary construction period; but because of the short installation timeframe, startle reactions and/or avoidance of the activity would not change population behavior. There is a low probability of a construction vessel striking a sea turtle while on station or moving to and from installation sites. Onboard lookouts could identify and avoid sea turtles at the surface so that appropriate action could be taken to avoid strikes during movement. Therefore, the Action might affect, but is not likely to adversely affect sea turtles.

4.2.3 Summary of Effects by Stressor

This section summarizes the potential effects to protected species based on the stressors that would be associated with the action. Based on the action area, the protected resources involved, the expected timing and methodology to install the hydrophone array, and on the expected operation and maintenance of the equipment, the proposed action is expected to have the following stressors:

1) Collision with vessels; 2) Direct physical impact; 3) Entanglement; 4) Disturbance from human activity and equipment operation; 5) Exposure to elevated noise levels; 6) Exposure to elevated turbidity and sedimentation; 7) Exposure to wastes and discharges; and 8) Impacts on proposed critical habitat.

4.2.3.1 Collision with Vessels

The installation and operation of the SSRNM System involves the use of vessels in nearshore marine waters. Vessels would include small support craft and a cable laying vessel during construction, and during periodic maintenance.

Sea turtles and marine mammals must surface to breathe, and they are known to rest or bask at the surface. Therefore, when at or near the surface, these animals are at risk of being struck by vessels or their propellers as the vessels transit to and from as well as in and around the range. Potential injuries and their severity would depend on the speed and size of the vessel, the part of the vessel that strikes the animal, and the body part impacted. Injuries from vessel strikes may include bruising, broken bones or carapaces, and lacerations. In the case of sea turtles and seals, collisions with even small vessels can result in death. Being much larger, whales are less likely to be killed by a collision with a small boat, but they can be seriously injured by propellers, and collisions with large, fast moving oceangoing vessels is often fatal for even the largest whales.

Existing information about sea turtle sensory biology suggests that sea turtles rely more heavily on visual cues, rather than auditory, to initiate threat avoidance. Research also suggests that sea turtles cannot be expected to consistently notice and avoid vessels that are traveling faster than 2 knots (kt) (Hazel et al. 2007). Vanderlaan and Taggart (2007) report that the severity of injury to large whales is directly related to vessel speed. They found that the probability of lethal injury increased from 21%, for vessels traveling at 8.6 kt, to over 79% for vessels moving at 15 kt or more. Additionally, collisions with whales have been reported for both slow and fast moving craft. Therefore, it appears in at least some situations, that whales may either be unaware of a vessel's presence or unable to resolve the vessel's proximity and/or vector of approach based on available acoustic cues. Consequently, vessel operators must be responsible to actively watch for and avoid sea turtles and marine mammals, and to adjust their speed based on expected animal density and on lighting and turbidity conditions to allow adequate reaction time to avoid marine animals.

The planned installation would involve three weeks of relatively slow-speed vessel operations in water depths of about 20 ft to over 3,400 ft, where those vessels could encounter green and hawksbill sea turtles, Hawaiian monk seals, and false killer whales. Because the work would be done during the summer, humpback whales are not expected to be present. During installation, the vessel operators are expected to operate their craft in accordance with the BMP, which require them to remain vigilant to watch for and avoid protected marine animals. Based on the short duration of the planned work, on the low number of trips that are expected, and on the expectation that construction-related vessels would be operated in accordance with the BMP, we consider the risk of collisions between construction-related vessels and protected species to be discountable.

4.2.3.2 Direct Physical Impact (other than collision)

The planned installation work involves the placement of heavy materials on the sea floor, such as the array and cable anchors. This has the potential to directly strike sea turtles and marine mammals should those animals be present when the material strikes the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of

the strike, and the body part impacted, but may include cuts, bruises, broken bones, cracked or crushed carapaces, and amputations, any of which could result in the animal's death. Animals could also be pinned to the bottom and drowned.

Given that marine animals will likely avoid project areas on their own due to installation activities, that the BMP require that the project manager ensures the area is free of ESA-listed marine animals, and that all materials and equipment will lowered in a controlled manner, we have determined that the potential for impact is extremely remote and the risk of an ESA-listed animal being impacted by material sent to the bottom is discountable.

4.2.3.3 Entanglement

The proposed action involves the permanent deployment of about 7 mi (11.2 km) of submarine cable and the installation of two moorings that would rise above the seafloor. Additionally, construction activities could involve the discharge of waste materials and debris into the marine environment. Whales, sea turtles, and seals often become entangled with marine debris such as fishing nets, fishing lines, and mooring lines. As such these activities have the potential to result in the entanglement of ESA-listed marine animals. Drowning is the most serious potential effect of entanglement for air breathing marine animals that are unable to surface to breathe. Slow amputation of an appendage may occur if an entanglement becomes tighter over time, and animals may drag entangled material for the rest of their lives. This burden may require more exertion for movement, reduce foraging efficiency, and it may interfere with reproduction.

Near shore, the trunk cable would be carefully lowered to the seafloor by divers, where it would be anchored firmly to the substrate to prevent it becoming loose and moving. From there it would be carefully laid across the seafloor in increasingly deeper water until it would be well below the diving range of the animals considered here. The cable is relatively stiff, and is expected to remain taught along the seafloor where it would incapable of forming tight loops. At the array, two moorings that consist of 7/8 in diameter, stiff plastic coated, wire rope, would rise from the sea floor in about 3,000 ft (914 m) of water. The first would rise to 750 ft (229 m) below the surface, suspended by one large subsurface buoy. The second would rise to 65 ft (20 m) below the surface, suspended by three large buoys. The trunk cable would be anchored to the first mooring anchor and bound to the wire rope up to 750 ft (229 m), from there, the cable would be suspended mid-water across about 1,243 ft (379 m), over to the other mooring, where it would be bound and connected to the hydrophone cable that would be bound to the wire rope, up to 65 ft (20 m) below the surface. Once installed, these mooring and cable are expected to be held stiff by the tension on the system, and by the materials physical characteristics. No significant slack or loops would possible. In the unlikely event where a whale encounters either mooring, the lines would be too stiff to be moved or to wrap around any part of the whale's body. The smaller turtles and monk seals would be even less cable of creating any slack in the system. Additionally, the vertical moorings, and as much of the cabling as practicable, will be removed as part of decommissioning at the end of system's life. Therefore, we have determined that the risk of entanglement with the cable and moorings is discountable for the sea turtles and marine mammals considered in this biological assessment.

4.2.3.4 Disturbance from human activity and equipment operation

This project involves work and vessel operations in marine waters where ESA-listed marine species may be exposed to project-related activity. Marine species may experience a startle reaction and resulting stress should they encounter construction activities and vessels during

acoustic testing. The reaction to this interaction could range from one extreme where an animal calmly approaches and investigates the activity, to an opposite reaction of panicked flight, where an animal injures itself in an attempt to flee. However, the most frequent result of this type of interaction is a low to moderate energy avoidance behavior leading to the animal leaving a project area without injury. The BMP for this action would reduce the likelihood of this interaction by watching for and avoiding protected marine life before commencing work and by postponing or halting operations when protected species are within 50 yards (46 m) of project activities. Based on that expectation, we have determined that disturbances related to this action would be infrequent and non-injurious, resulting in insignificant effects on the ESA-listed marine species discussed in this biological assessment.

4.2.3.5 Exposure to elevated noise levels

The proposed action includes the operation of acoustic positioning modems that would emit brief acoustic signals (pings) in the frequency range of 9.66 to 14.5 kHz, with a source level of 160 dB re1 μPa (all further reference to sound levels assumes re1 μPa unless specified differently). The project also includes the use of acoustic release devices that would be used to release the mooring anchors from the surface winch cable that would lower them to the seafloor, and for the acoustic modems. The acoustic release system operates by the surface vessel (and sometimes the release) emitting a series of short-duration 198 dB pings in the frequency range of about 17.4 to 19.7 kHz.

Effects vary with the frequency, intensity, and duration of the sound source, and the hearing characteristics of the affected animal. Effects may include: (1) physical injury and/or permanent hearing damage, also referred to as permanent threshold shift (PTS); and (2) behavioral impacts through temporarily reduced sensitivity also referred to as temporary threshold shifts (TTS), temporarily masked communications or acoustic environmental cues, and modified behaviors.

The acoustic effects thresholds currently used by NMFS are marine mammal specific and based on levels of harassment as defined by the Marine Mammal Protection Act (MMPA). For exposure to sounds in water, ≥ 180 dB and ≥ 190 dB are the thresholds for Level A harassment (i.e. injury and/or PTS) for cetaceans and pinnipeds, respectively. The thresholds for the onset of Level B harassment for all marine mammals, in the form of TTS and behavioral disturbance, are ≥ 160 dB for impulsive noises and ≥ 120 dB for continuous noises. Currently, no acoustic thresholds have been established for sea turtles. Consequently, the ≥ 160 dB threshold will be used for sea turtles for the onset of adverse effects, under the assumption that it is likely conservative for sea turtles.

The frequency ranges of the acoustic positioning modems and the acoustic release system are above the hearing range of green and hawksbill sea turtles. They cannot hear or react to the signals. Therefore, operation of these systems would have no effect on them. Although the whales and monk seals under consideration here can hear the modems, the source level is at the bottom of the threshold limit of 160 dB, and the received levels would be immediately below the threshold at more than 1 meter from the modem. Therefore, any exposure to the modem signal would have insignificant effects on marine mammals. Conservatively assuming an attenuation rate based on the practical spreading loss equation $RL = SL - 15\log(R)$ (RL = received level, SL = source level, R = range in meters), 198 dB would attenuate to 160 dB at 371 yd (339 meters). The BMP require that operation of the acoustic release be postponed or halted when marine mammals are within 380 yd (347 m). Based on this, no marine mammals would be exposed to acoustic signals at or above the threshold for the onset of behavior disturbance and TTS. Therefore, based on the best available

information, the Navy has determined that project related acoustic exposures would have insignificant effects for marine mammals.

4.2.3.6 Exposure to elevated turbidity and sedimentation

When the bore head breaks through the seafloor, in about 20 ft (6 m) deep water, a brief pulse of a relatively small amount of drilling-created fine sediments (that may include residual bentonite) would be released into the water column. The project description includes the plan to drill the final stage with water alone (no bentonite). The exact extent and duration of the sediment plume are unknown, but it is expected to be measured in yards and minutes. The breakthrough would occur above the upper reef slope where wave action and longshore currents prevail. Therefore, mobilized fines are expected to be quickly diluted and carried away from the site. Any detectable plume would be limited to the immediate area a short distance (< 50 yards / < 46 m) down current from the breakout point and be quickly (< 30 minutes) indistinguishable in the normally turbid shallow nearshore waters in the area.

Since sea turtles and marine mammals breathe air instead of water, exposure to increased turbidity should not affect their respiration or other biological functions, and would have no discernible impacts on the fitness of the exposed individuals. Although it is impossible to predict exactly how individual animals might react to a plume, sea turtles and marine mammals may temporarily avoid a plume in favor of clearer water. Therefore, some low level of temporary avoidance would be the most serious effect of this exposure. Based on the available information, the Navy has determined that exposure to project-related turbidity would have insignificant effects on the sea turtles and marine mammals considered in this assessment.

4.2.3.7 Exposure to wastes and discharges

Construction and shipboard wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle marine life. Equipment spills, discharges, and run-off from the project area could contain hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids and other toxicants, which could expose protected species to toxic chemicals. Depending on the chemicals and their concentration, the effects of exposure may range between animals temporarily avoiding an area, to death of the exposed animals. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. Additionally, the proposed action includes BMP that include measures intended to prevent the introduction of wastes and toxicants into the marine environment. Based on the information above, the Navy expects that construction-related discharges and spills would be infrequent, small, and quickly cleaned if they do occur. Therefore, the Navy has determined that exposure to construction-related wastes and discharges would result in insignificant effects for the sea turtles and marine mammals considered in this assessment.

4.2.3.8 Impacts on proposed revised critical habitat

As stated above in Section 3.2.4, the Barbers Point area is thought to provide three of the six habitat features identified as essential in the proposed rule to designate PRCH (76 FR 32026): (3) Marine areas from 0 to 500 meters in depth preferred by juvenile and adult monk seals for foraging; (5) Marine areas with adequate prey quantity and quality; and (6) Significant areas used by monk seals for hauling out, resting, or molting.

4.2.3.8.1 Marine areas from 0 to 500 meters in depth preferred by juvenile and adult monk seals for foraging & Marine areas with adequate prey quantity and quality:

The use of HDD would avoid impacting the shoreline and marine substrate within 2,000 ft of the shoreline. The potential impacts on accessibility and habitat resources beyond 2,000 ft from shore, such as changes to water quality and the quality and availability of prey that may result from the proposed installation of the trunk cables would be temporary and virtually undetectable. Based on the nature of the planned work along with expected compliance with project BMP, in-water substrate disturbance would be limited to the 2 to 3 days of construction work when the HDD cutter head would break out of the reef, and the trunk cable would be landed and secured. As described above, this work would be small in scale; resulting in small amounts of temporarily mobilized sediments that would not extend beyond a few yards of the site and would settle out of the water column within a few minutes of the work ending. The Navy further expects that toxic discharges and spills are unlikely to occur, but would be infrequent, small, and quickly cleaned if they do occur. Therefore, the Navy has determined that the action would have insignificant effects on water quality.

The planned installation would result in one 6 in (15.2 cm) diameter steel pipe conduit protruding slightly beyond the seafloor, and one 1.5 in (3.8 cm) diameter cable being laid across the substrate from the conduit and out past the limits of PRCH. The cable may be encased in articulated steel armor and anchored to the seafloor out to a depth of about 100 ft (30.4 m), which effectively increase its diameter to about 5.5 in (14 cm). No other installations would occur within PRCH. Given that the total amount of affected benthos would be a tiny fraction of the total available, and that the cable would likely become colonized by organisms occupying the adjacent substrate, the Navy has determined that the proposed installation would have insignificant effects on the availability of monk seal prey resources. The work to install the cable may temporarily discourage monk seals from entering area immediately around the work site, and only while that work is being done. Once installed, the cable would have no effect on monk seal access to or through the area. Therefore, based on the best available information, the Navy has determined that the proposed action would have temporary and insignificant effects on these essential features of PRCH.

4.2.3.8.2 Significant areas used by monk seals for hauling out, resting or molting:

The Proposed Action would include about 2 weeks of HDD work near the shoreline, which may temporarily discourage monk seal haul out in the immediate area for the duration of that work. However, because the work would be set back from the shoreline, and because monk seals frequently haul out near active airports and other noisy busy places, the Navy considers it doubtful this work would discourage monk seals from hauling out. Additionally, the use of HDD would avoid impacting shoreline vegetation, the beach, and marine substrate within 2,000 ft (610 m) of the shoreline. HDD operations are not expected to hinder monk seal access to preferred haul out resources, or to alter those resources. Therefore, the Navy has determined that the proposed action would have temporary and insignificant effects on this essential feature of PRCH.

Based on the best available information, the Navy has determined that the proposed action would result in insignificant impacts on the essential features of proposed monk seal critical habitat, and as such is not likely to adversely affect that habitat. Given that the action is not expected to adversely affect proposed critical habitat for the reasons described above, the proposed action is not likely to result in the destruction or adverse modification of proposed critical habitat.

4.2.4 Conclusion

Based on the analyses presented above, the proposed action would have insignificant impacts, or the likelihood of impacts would be discountable, for the marine species and proposed revised critical habitat considered in this assessment. Therefore, the Navy has determined that the proposed action is not likely to adversely affect endangered or threatened species under NMFS jurisdiction or to destroy or adversely modify critical habitat.

4.3 Effects on Threatened and Endangered Terrestrial Species

4.3.1 'Ewa hinahina

The HDD construction site would be located at an area that is mostly cleared of vegetation and has been used for construction access in the past. A negligible amount of additional vegetation would be cleared for the Action. Approximately 2,615 sq ft (0.02 ha) of native and non-native vegetation east of the FTEC fenceline (Figure 5) would be cleared. Re-vegetation and soil compaction issue from the construction activities would be addressed in conjunction with the USCG 'Ewa hinahina restoration effort. The local wildlife has habituated to an industrial setting and would temporally avoid the area during active construction work but would resume utilization of the site when the work crew is not present

The USCG management plan calls for restoring native vegetation at the site to rectify the effects of competition from non-native species (USCG 2013). The existing vegetation is not conducive to recovery of 'Ewa hinahina such that its removal would not necessarily damage critical habitat. Clearing the existing vegetation might offer a positive effect because the existing vegetation is degrading the habitat by outcompeting 'Ewa hinahina. Soil compaction by construction equipment might damage the habitat and hinder species recovery. Restorative landscaping after construction in accordance with the Coast Guard's Management Plan (USCG 2013) could rectify the potential damage from construction work. Thus, the Action might affect but is not likely to adversely affect the critical habitat.

4.3.2 Ōpe'ape'a

The Ōpe'ape'a has not been observed in the affected environment but it has been observed in the Waianae range, about seven miles to the north (DOA 2012). Its presence here is possible but unlikely because of the distance between the Action Area and mountainous observations. Trees suitable for roosting are present near the FTEC, but not within the FTEC or area of vegetation clearing. No trees would be removed during construction; only herbaceous vegetation would be removed. Also, no pesticides would be used in conjunction with construction or operation of the Action. Because of the questionable presence of the hoary bat at the FTEC and the lack of impact to roosting trees, the Proposed Action, both installation and operation, would have no effect on this species.

5 ESSENTIAL FISH HABITAT EFFECTS ASSESSMENT

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), for any Federal action that may adversely affect Essential Fish Habitat (EFH) as defined under the MSA, federal agencies must provide NMFS with a written assessment of the effects of that action on EFH (50 CFR 600.920(e)). An EFH assessment is warranted here because the Action includes components that might affect the physical, chemical or biological properties of designated EFH. This section discusses the relationship between the Action Area of the Action and the EFH, identifying which fishery management units and species are potentially affected.

In compliance with the MSA, the Western Pacific Regional Fishery Management Council (WPRFMC) has developed a Fishery Ecosystem Plan (FEP) describing EFH, including habitats or habitat types determined to be EFH for each life stage of managed fishery species for the Hawaiian Archipelago. The FMP also explains the physical, biological, and chemical characteristics of EFH and, if known, how these characteristics influence the use of EFH by the species/life stage. The FMP identifies the specific geographic location or extent of habitats described as EFH for each managed fishery species and life stage (50 CFR 600.815(a)).

The FMP also identifies specific types or areas of habitat within EFH as habitat areas of particular concern (HAPC) based on one or more of the following considerations:

- The importance of the ecological function provided by the habitat.
- The extent to which the habitat is sensitive to human-induced environmental degradation.
- Whether, and to what extent, development activities are, or would be, stressing the habitat type.
- The rarity of the habitat type (50 CFR 600.815(a)(8))

5.1 Essential Fish Habitat (EFH) Designation in the Action area

Following an ecosystem approach, the WPRFMC has designated EFH for five fishery management units (FMU) in the Hawaiian Islands:

- Pelagics
- Bottomfish
- Crustaceans
- Deep Sea and Precious Corals
- Coral Reef Ecosystems

The Hawaiian Islands FEP (Western Pacific Regional Fishery Management Council 2009b) defines the EFH for bottomfish, crustacean and precious coral management unit species (MUS). These include only species that are known to be present within EEZ waters around the Hawai'i Archipelago. The Pelagic FEP defines the EFH for pelagic species as all areas of pelagic fishing operations in the EEZ or high seas, for any domestic fishing vessels that ship or land Pacific MUS. Although, some pelagic MUS are known to occur within the boundary of the Hawaiian Islands FEP, they are managed under the separate Pelagic FEP (Western Pacific Regional Fishery Management Council 2009a).

The Action might affect the EFH for all five FMUs (Table 4). Further, as defined by the Hawai'i Archipelago FEP, the Action might affect a bottomfish Habitat Area of Particular Concern (HAPC) on the seafloor bottom as it slopes from the reef crest to 918 ft (280 m). Table 4 presents

the definitions of the EFH and HAPC for each management unit. No pelagic, crustacean or precious coral HAPCs coincide with the affected area. Because the Action covers a long distance, extending below the epipelagic and into the mesopelagic zone, different action components would affect different EFHs. Because the FEP treats seamounts separately, it is important to recognize that there are no seamounts within the Action Area, so they are not included in the discussion here. Table 4 also presents postulated association between certain Action components and EFH and HAPC.

The conduit exit, diver-laid trunk cable section and vessel-laid trunk cable section might affect EFH for pelagic, bottomfish, crustacean (spiny lobster), and coral reef ecosystems. The vessel-laid trunk cable section might affect crustacean (deepwater shrimp) FMUs. The Action would not affect deep sea and precious coral EFH. The following sections briefly describe each of the potentially affected management units.

Table 4. Essential Fish Habitat (EFH) and Habitats of Particular Concern (HAPC) Intersecting the Action Area

Management Unit	EFH	EFH Intersects Action Area	HAPC	HAPC Intersects Action Area	Action Component Potentially Affecting EFH
Pelagic	Eggs and Larvae: the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 656 ft (200 m)	Yes	Water column down to 3,280 ft (1,000 m) that lies above seamounts and banks	No	Conduit exit Diver-assist trunk cable Vessel-laid trunk cable
Bottomfish	Eggs and larvae: the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 1,310 ft (400 m) Juvenile/adults: the water column and all bottom habitat extending from the shoreline to a depth of 1,310 ft (400 m)	Yes	All slopes and escarpments between 130 and 920 ft (40 and 280 m)	Yes	Conduit exit Diver-assist trunk cable Vessel-laid trunk cable
Crustaceans	Spiny Lobster: Eggs and larvae: the water column from the shoreline to the outer limit of the EEZ down to a depth of 490 ft (150 m) Juvenile/adults: all of the bottom habitat from the shoreline to a depth of 330 ft (100 m)	Yes	All banks in the Northwest Hawaiian Islands with summits less than or equal to 100 ft (30 m) from the surface	No	Conduit exit Diver-assist trunk cable Vessel-laid trunk cable
	Deepwater shrimp: Eggs and larvae: the water column and associated outer reef slopes between 1,805 and 2,295 ft (550 and 700 m) Juvenile/adults: the outer reef slopes at depths between 985 and 2,295 ft (300 and 700 m)	Yes	No HAPC designated for deepwater shrimp.	Not applicable	Vessel-laid trunk cable
Precious Corals	Shallow-water precious corals 60 – 300 ft (45 – 91 m): EFH has also been designated for three beds known for black corals in the Main Hawaiian Islands between Milolii and South Point on the Big Island, the Auau Channel, and the southern border of Kauai Deep-water precious corals 450 – 4,500 ft (150 to 750 fm): EFH for Precious Corals is confined to six known precious coral beds located off Keahole Point, Makapuu, Kaena Point, Wespac bed, Brooks Bank, and 180 Fathom Bank	Yes	The Auau Channel is a HAPC for shallow water black corals The Makapuu bed, Wespac bed, Brooks Banks bed are HAPCs for deep water precious corals	No	Hydrophone array and umbilical anchors Vessel-laid trunk cable
Coral Reef Ecosystems (CRE)	EFH for the Coral Reef Ecosystem MUS includes the water column and all benthic substrate to a depth of 330 ft (100 m) from the shoreline to the outer limit of the EEZ	Yes	Includes all no-take Marine Protected Areas identified in the CRE-FMP, all Pacific remote islands, as well as numerous existing Marine Protected Areas, research sites, and coral reef habitats throughout the western Pacific	Yes	Conduit exit Diver-assist trunk cable Vessel-laid trunk cable

5.1.1 Pelagic EFH

The western Pacific pelagic fishery management area is broad, including fishing operations in the EEZ or on the high seas for any U.S. persons or vessels fishing, landing or transporting Pelagic MUS (50 CFR 665.798). The Action conduit exit, diver-laid trunk cable section and vessel-laid trunk cable section might affect EFH for the Pelagic EFH (Table 4). Pelagic MUS include tuna, billfish, sharks, squid and other pelagic fish (Table 5). The pelagic or open ocean ecosystem is very large compared with any other marine ecosystem; however, other oceanic communities are vitally important to pelagic species in part because of the food-poor nature of much of the pelagic environment. Research has shown a clear link between the nearshore and oceanic ecosystems in the Hawaiian Islands, which in turn affects the presence and abundance of the pelagic predator species (Benoit-Bird et al. 2001). For example, warm waters closer to shore are convergence zones which bring up nutrient rich waters and create high productivity areas resulting in high densities of predator species, such as tuna, foraging.

Table 5. Western Pacific pelagic management unit species (MUS) (50 CFR 665.800)

English common name	Scientific name
Tunas:	
Albacore	*Thunnus alalunga*
Bigeye tuna	*Thunnus obesus*
Pacific bluefin tuna	*Thunnus orientalis*
Yellowfin tuna	*Thunnus albacares*
Skipjack tuna	*Katsuwonus pelamis*
Kawakawa	*Euthynnus affinis*
Other tuna relatives	*Auxis* spp., *Scomber* spp., *Allothunnus* spp.
Billfishes:	
Black marlin	*Istiompax indica*
Striped marlin	*Kajikia audax*
Pacific blue marlin	*Makaira nigricans*
Shortbill spearfish	*Tetrapturus angustirostris*
Swordfish	*Xiphias gladius*
Sailfish	*Istiophorus platypterus*
Sharks:	
Pelagic thresher shark	*Alopias pelagicus*
Bigeye thresher shark	*Alopias superciliosus*
Common thresher shark	*Alopias vulpinus*
Silky shark	*Carcharhinus falciformis*
Oceanic whitetip shark	*Carcharhinus longimanus*
Blue shark	*Prionace glauca*
Shortfin mako shark	*Isurus oxyrinchus*
Longfin mako shark	*Isurus paucus*
Salmon shark	*Lamna ditropis*
Other pelagic fishes:	
Mahimahi (dolphinfish)	*Coryphaena* spp.
Wahoo	*Acanthocybium solandri*
Moonfish	*Lampris* spp.
Oilfish	Gempylidae
Pomfret	Bramidae
Squid:	
Diamondback squid	*Thysanoteuthis rhombus*
Neon flying squid	*Ommastrephes bartramii*
Purpleback flying squid	*Sthenoteuthis oualaniensis*

The pelagic fishery is one of the most dominant fisheries in the Hawaii Islands, where 32 species are managed as part of the Pelagic MUS (Western Pacific Regional Fishery Management Council 2009a). Because of the relative close proximity to the islands (i.e., within several miles), fish including tuna and swordfish species, along with other billfish and pelagic sharks, are targeted by both commercial and recreational/subsistence fishers. Migration of pelagic species is not well known, although it is understood that most pelagic species make daily migrations, inhabiting shallow surface waters during the night and deepwater during the day (Western Pacific Regional Fishery Management Council 2009a).

5.1.2 Bottomfish EFH

The conduit exit, diver-laid trunk cable section and vessel-laid trunk cable section might affect the bottomfish EFH (Table 4). The bottomfish MUS includes commercially and subsistence/recreationally important species (Table 6). Except for several of the major commercial species, very little is known about the life histories, habitat utilization patterns, food habits, or spawning behavior of most adult bottomfish. However, the distribution of adult bottomfish is closely linked to suitable physical habitat. As the Hawaiian Islands have steep drop offs and narrow shelf ecosystem, as such the 100 ftm isobath (600 ft / 183 m) is commonly used as an index of bottomfish habitat. Adult bottomfish are usually found in habitats characterized by a hard substrate of high structural complexity, like those found in coral reefs. The diver-laid portion of the trunk cable and the vessel-laid trunk cable would pass through areas where these fish are found and through bottomfish HAPC between 130 and 920 ft (40 and 280 m).

Table 6. Hawaii bottomfish management unit species (MUS) (50 CFR 665.201)

English common name	Scientific name	Local name
Silver jaw jobfish	*Aphareus rutilans.*	Lehi
Gray jobfish	*Aprion virescens.*	Uku white papio, ulua au
Giant trevally	*Caranx ignobilis.*	kea
Black jack	*Caranx lugubris.*	ulua la`uli
Sea bass	*Epinephalus quernus.*	hpu`upu`u
Red snapper	*Etelis carbunculus.*	Ehuonaga, `ula`ula
Longtail snapper	*Etelis coruscans.*	koa`e
Blue stripe snapper	*Lutjanus kasmira.*	ta`ape
Yellowtail snapper	*Pristipomoides auricilla.*	kalekale
Pink snapper	*Pristipomoides filamentosus.*	`pakapaka
Pink snapper	*Pristipomoides seiboldii.*	kalekale
Snapper	*Pristipomoides zonatus.*	gindai
Thicklip trevally	*Pseudocaranx dentex.*	pig ulua, butaguchi
Amberjack	*Seriola dumerili.*	kahala

Many of these species are also likely to be associated with the coral reefs in the Action Area. The MUS from this FMU can be found with Crustaceans MUS and the Coral Reef Ecosystems in, and around the deeper coral reefs, on the fringing reef slope between about 100 and 500 ft (30 and 152 m). Bottomfish are typically territorial and, because of their bright coloring, conspicuous during the day. Bottomfish are not evenly distributed within their natural habitat; instead, they are found dispersed in a non-random, patchy fashion depending on available resources (e.g., prey and cover).

5.1.3 Crustacean EFH

The conduit exit, diver-laid trunk cable section and vessel-laid trunk cable section might affect the bottomfish EFH for the spiny lobster MUS (Table 4). Five species and one genus are currently

managed as Crustacean MUS by the WPRFMC. There are four Crustacean MUS (Table 7) that might be found in the Action Area. Only the vessel-laid trunk cable section might affect bottomfish EFH for the deepwater shrimp MUS. Adults of the Crustacean MUS favor sheltered areas with rocky or sandy bottom. The spiny lobster is restricted mainly to windward surf zones of oceanic reefs (e.g., NWHI) (Pitcher 1993). Ten management areas have been established to manage harvesting of the spiny lobster in the NWHI; none of these areas are located in the Action Area. Adult spiny lobsters are typically found on rocky substrate in well-protected areas, such as in crevices and under rocks (Holthuis 1991; Pitcher 1993). Adult and small juvenile spiny lobsters prefer depths less than 33 ft (10m), but can be found at depths of around 360 ft (110m) (Western Pacific Regional Fishery Management Council 2001). The ridgeback spiny lobster likely occurs on rocky bottoms; it is known from depths between 32 and 442 ft (10 and 135 m). The Chinese slipper lobster prefers to live in coral or stone reefs with a sandy bottom (Holthuis 1991). Fishery takes of the Chinese slipper lobster are at depths of 65 to 230 ft (20 to 70 m). The Kona crab is found in a number of environments, from sheltered bays and lagoons to surf zones, but prefers sandy habitat in depths of 78 to 377 ft (24 to 115 m) (Smith 1993; Poupin 1998; Western Pacific Regional Fishery Management Council 1998). Each species can be found along the reef crest coral reef ecosystem in the Action Area.

Table 7. Hawaii Crustacean Management Unit Species (MUS) (50 CFR 665.241)

English common name	Scientific name	Local name
spiny lobster	*Panulirus marginatus, Panulirus penicillatus.*	Ula
slipper lobster	Scyllaridae.	ula papapa
Kona crab	*Ranina ranina.*	papa'i kua loa
deepwater shrimp	*Heterocarpus* spp.	-

5.1.4 Precious Coral EFH

The hydrophone array and umbilical anchors and the trunk cable (vessel-laid) would be installed on the bottom at the depths identified as EFH for both shallow and deep water precious corals. Although the area is recognized as habitat to precious coral, precious coral beds have not been noted in the Action Area (Table 4). Hawaii precious coral management unit species are any coral of the genus Corallium. Management targets precious coral species of the genus Corallium within the EEZ around Hawai'i (Table 8). There are no fishing permit areas: established beds, conditional beds or refugia of precious coral within the Action Area. These are located east, north and northwest of O'ahu. However, the Action Area does intersect with the remainder of the EFH, managed as a fishing permit "exploratory area" (50 CFR 665.261).

Table 8. Hawaiian precious coral management unit species (MUS) (50 CFR 665.261)

English common name	Scientific name
Pink coral (also known as red coral)	*Corallium secundum, Corallium regale, Corallium laauense.*
Gold coral	*Gerardia* spp., *Callogorgia gilberti, Narella* spp., *Calyptrophora* spp.
Bamboo coral	*Lepidisis olapa, Acanella* spp.
Black coral	*Antipathes griggi, Antipathes grandis, Antipathes ulex.*

5.1.5 Coral Reef Ecosystem EFH

The conduit exit, diver-laid trunk cable section and vessel-laid trunk cable section might affect the coral reef ecosystems EFH (Table 4). Coral are the primary living structural component of

Hawaii's subtidal zone, with an average of about 20.3 percent coral coverage in the MHI (Friedlander et al. 2005). Approximately 250 species of corals are found within the MHI, and six species of coral dominate the waters of O'ahu: lobe coral (*Porites lobata*), finger coral (*Porites compressa*), rice coral (*Montipora capitata*), sandpaper rice coral (*Montipora patula*), cauliflower coral (*Pocillopora meandrina*), and blue rice coral (*Montipora flabellata*) (Friedlander et al. 2005).

Hawaii coral reef ecosystem MUS include both "currently harvested" and "potentially harvested" coral reef species. The listed MUS spend the majority of their life within waters less than or equal to 300 ft deep (50 CFR 665.221). Eighty-three species including surgeonfish, triggerfish, jacks, sharks, squirrelfish, flagtail, rudderfish, wrasse, goatfish, mullet, eel, octopus, parrotfish, barracuda, butterflyfish, and featherduster worms are listed as currently harvested and an additional 57 species are listed as potentially harvested, including plants, invertebrates and mollusks. These MUS – too numerous to tabulate here – receive special protections under fishing rules and permitting. Because essentially all coral reefs are classified as HAPC, the Action Area includes coral reef ecosystem HAPC.

The coral reefs of the Action Area appear to be resistant to wave and sediment damage and are described as a patch reef; a reef that is mostly limestone with live corals growing in patches, frequently separated by areas of sediment or sand channels. Jokiel *et al.* (2011) described the area as an exposed limestone reef with low coral cover and evidence of hurricane damage. Kolinski et al. (2005) measured regrowth during storm intervals in the area and pointed out that coral species assemblages found here (*Porites* spp. and *Montipora* spp.) are hearty species of coral that can survive in high energy environments such as breaking waves and can temporarily survival burial under sediments. *Pocillopora meandrina*, also found in the area, is a relatively fast-growing species that can colonize other areas through fragmenting.

Coral cover is low in the Action Area, and has fluctuated in recent years, because of disturbances and recovery processes from storm such as Hurricane Iniki in 1992 (Coles 1998) (Coles 1998). In 2002, coral cover at Kahe Point was approximately 15 percent (Jokiel 1998). Kolinski et al. (2005) estimated a coral cover of less than 20 percent, with *Porites lobata* and *Pocillopora meandrina* being the most common species. Photographs of the area taken along the Action shore bypass conduit route support descriptions provided by Kolinski et al. (2005) and the Coral Reef Assessment & Monitoring Program (Jokiel et al. 2011) of the relative low density of live coral in the area and relative low visibility (typical sediment suspension). Study results on the growth rates of corals in this area indicate that the Action Area is well suited to support coral growth and can quickly recover following disruptive events such as major hurricanes (Jokiel et al. 2011).

5.2 EFH Effects Conclusion of Effect

Trunk cable laying would generate minor bottom disturbances and localized increases in turbidity, affecting pelagic, bottomfish, crustacean, precious coral and coral reef ecosystem EFH. Cable laying would be a one-time event of short duration. The trunk cable would also pass through deeper slope HAPC for bottomfish, such as slopes and escarpments between 131 and 918 ft (40 and 280 m) deep. Installation of the shore bypass conduit and diver-assisted cable laying would similarly generate bottom disturbance, affecting pelagic, bottomfish, crustacean (spiny lobster) and coral reef ecosystem EFH. Installation of the hydrophone array anchors would cover portions of the bottom, potentially affecting precious coral EFH.

Direct effects to habitat generated by laying the trunk cable would be temporary, limited to the three-week construction period. Actual coverage of bottom habitat by the cable (footprint) would be insignificant. Less mobile benthic organisms and their habitat would be covered by the cable. Also, the installed cable can form a habitat substrate for attaching organisms. This habitat effect would not be adverse because of the limited duration and footprint.

The cable routing would at about 20 ft (6 m) and would continue off the reef crest via a sand chute at 50 ft (15 m) to deeper waters, passing out of coral reef ecosystem EFH at 330 ft (100 m) (Table 4). The diver-assisted portion of cable laying occurs through the patch reef above the reef crest. The cable would be positioned along sandy bottom in between coral heads and weighted; avoiding direct effects to the live coral colonies and minimizing direct effects to benthic substrate. Benthic populations, including bottomfish disturbed during conduit installation and cable laying at these shallower depths would populate the cable and disturbed areas around the cable soon after construction is complete.

The coral reef ecosystem at 100-300 ft (30-91 m), also called the "mesosphotic zone" and "twilight zone," supports a diverse assemblage of bottomfish, including a high percentage of Hawaiian endemic species. The bottomfish EFH includes HAPC along slopes and escarpments between 130 and 920 ft (40 and 280 m) A recent study conducted in the NWHI illustrates the high diversity that can occur in clear waters at these depths (Kane et al. 2014). Vessel cable laying – not diver-assisted cable laying – would be conducted within EFH for bottomfish and coral reef ecosystems. At these depths; diver access is limited to complex, mixed-gas technical diving techniques. However, because of the relatively small footprint of the cable and the patchiness of the reef structure in the affected environment (a limitation to general abundance levels), the effects from vessel-laid cable on bottomfish EFH and coral reef ecosystems EFH would be negligible and not adverse.

The remainder of the vessel-laid trunk cable and hydrophone array is not expected to have an adverse effect on pelagic, bottomfish, crustacean and precious coral EFHs because of the small footprint and the stability of the trunk cable. Pelagic EFH might be affected by the array itself during installation and while in place. However, the array is unlikely to create an entrapment or entanglement risk to pelagic fish because of its benign structure. Because to the deep seafloor depth (3,084 ft / 940 m) at which the array would be located, bottomfish EFH or HAPC and crustacean EFH and coral reef ecosystem EFH would not be affected.

In summary, the Proposed Action would not adversely affect EFH because of the limited duration of the installation, limited footprint, location and placement of the trunk cable, and trunk cable stability. Installation and operation of the hydrophone array, anchors, buoys and trunk cable on the ocean bottom would involve inert materials that would cause no measureable water quality impact to EFH. Therefore, no adverse effects to EFH would result from construction of the Proposed Action.

6 Conservation Measures

The Action is not expected to result in adverse effects to ESA-listed species or their habitat. However, to insure a low potential for adverse effect during construction, the following measures would be employed as practicable:

6.1 Installation of Hydrophone Array, Trunk Cable and Shore Bypass Conduit

1. Constant vigilance would be kept for the presence of ESA-listed marine species during in-water activities such as boat operations, diving, and deployment of anchors and mooring lines.
2. Competent observers would survey the adjacent areas being worked for ESA-listed marine species. Surveys would be made prior to the start of work each day, and prior to resumption of work following any break of more than one half hour.
3. Lookouts would be stationed aboard support vessels to detect marine mammals or sea turtles at the surface so that they could adjust course and speed as necessary to maintain a safe distance consistent with prudent seamanship.
4. Vessel speed would be reduced to10 kt or less when marine mammals or sea turtles have been observed.
5. If, despite efforts to maintain a safe distance, a marine mammal or sea turtle approaches the vessel, then the vessel would disengage propulsion (neutral gearing) until the animal is at least 50 ft (15 m) away, then slowly resume course and speed.
6. Installation activities would not be initiated if a marine mammal is sighted within 656 ft (200 m) of the vessel. In-water installation and maintenance work would only begin/resume after the animals have voluntarily departed the area. If ESA-listed marine species are noticed within 50 yd (46 m) after work has already begun, that work may continue only if, in the best judgment of the project supervisor, that the activity would not affect the animal(s).
7. Divers and vessel crew would avoid interaction with ESA-listed marine species.
8. Support vessels would be anchored on sandy bottoms or calcareous rock devoid of live corals.
9. All equipment such as submarine cables, anchors and the hydrophone array would be lowered to the bottom (installed) in a controlled manner.
10. In-water tethers, as well as mooring lines for vessels and marker buoys would be kept to the minimum lengths necessary, and would remain deployed only as long as needed to properly accomplish the required task.

6.2 Installation of Shore Station and Shore Bypass Conduit

1. A contingency plan to control and clean spilled petroleum products and other toxic materials is required.
2. The Achyranthes Management Area (AMA) would be marked as "no access" on plan drawings and contractor personnel would be instructed to avoid this area.
3. Appropriate materials to contain and clean potential spills would be stored at the work site, and be readily available.
4. Project operations would be postponed or halted under unusual conditions, such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage.

5. The project manager and heavy equipment operators would perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations would be postponed or halted should a leak be detected, and would not proceed until the leak is repaired and equipment cleaned.
6. Fueling of land-based vehicles and equipment would take place at least 50 ft (15 m) away from the water, preferably over an impervious surface. Fueling of vessels would be done at approved fueling facilities.

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1845 Wasp Blvd., Bldg 176
Honolulu, Hawaii 96818
(808) 725-5000 • Fax: (808) 725-5215

FEB 23 2015

Captain D. A. Tufts
Regional Engineer (N4)
Commander Navy Region Hawaii
850 Ticonderoga Street, Suite 110
Joint Base Pearl Harbor-Hickam, Hawaii 96860-5101.

Dear Captain Tufts:

This letter responds to the January 28, 2015 electronic mail (e-mail) to request consultation for the Commander Navy Region Hawaii's proposal to install and operate a fixed surface ship radiated noise measurement (SSRNM) system off the southwest coast of Oahu, Hawaii. In the final draft of the biological assessment for the proposed action, the Navy determined that the proposed action is not likely to adversely affect green and hawksbill sea turtles; false killer whales, Main Hawaiian Insular DPS; humpback whales; Hawaiian monk seals; and proposed revised critical habitat for the Hawaiian monk seal, and requested our concurrence under section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §1531 *et seq.*), with that determination.

Proposed Action/Action Area: The proposed action is described in detail in your biological assessment (BA) (Navy 2015). In summary, the proposed action consists of the installation, operation, and periodic maintenance of certain components of a passive hydrophone array, in about 3,000-foot deep water, about 3.5 miles offshore, within the existing Fleet Operational Readiness Accuracy Check Site (FORACS) at Nanakuli, Oahu. Work may begin as soon as May 2015, and will be completed by October 2015. In-water construction would require about 3 days of work. The project includes a comprehensive list of NMFS-recommended best management practices (BMP), as described in the BA. Vessel testing on the range, is considered part of the action covered under the Navy's Hawaii-Southern California Testing and Training (HSTT) EIS/OEIS, and will considered in a separate consultation for that action.

Onshore at the Fleet Technical Evaluation Center (FTEC) at Barbers Point, the Navy's contractors would operate land-based horizontal directional drilling (HDD) and other construction equipment for about 3 weeks to drill an 8-inch diameter tunnel that would proceed about 50 feet underground, and break through the sea floor about 2,000 feet off shore, in 20-foot deep water. A bentonite-based drilling fluid would be used for much of the drilling, but the project plan includes drilling the final stage with water alone (no bentonite). The HDD cutter

head would be driven by a hollow 6-diameter steel pipe that would be left in-place to serve as a conduit for landing a trunk cable that would connect the FTEC to the array.

After HDD work is done, a cable laying vessel (CLV) would hold offshore with dynamic positioning while 1.5-inch diameter cable, would be paid out, lowered to the conduit by divers, pulled ashore, and secured to the shore station. The divers would manually place the cable on the sea floor to avoid live coral, and to secure the cable to the substrate between the conduit exit and a sand channel at about 100-foot depth. At about the same time as the cable laying starts, another vessel would drop 4 anchored tracking modems to the seafloor; one in each corner of a 1-mile square box around the planned array site within the FORACS. Each modem would be connected to a 125-lb pyramid anchor, and include an acoustic release.

Once the trunk cable is secured at the FTEC, and the modem grid is installed, the CLV would head offshore, in a southwesterly direction for about 2 miles before turning northwest toward the FORACS. The CLV would move at 2 nautical miles per hour (kts) or slower while laying cable. As the CLV approaches the mooring site, the anchor for the umbilical mooring would be slowly lowered to the bottom by a crane as the CLV continues moving forward, paying out cable. The acoustic modems would be pinged (160 dB re 1 μPa) during the installation of the array to ensure its accurate placement. After the umbilical mooring anchor reaches the bottom, an acoustic release system (short series of pings at 198 dB re 1 μPa) would uncouple the crane from the anchor, leaving the umbilical mooring in place. Using the same deployment method, the CLV would install the hydrophone array about 1,200 feet past the umbilical mooring, completing the installation.

The SSRNM system has an expected service life of 15 years. In-water operational maintenance would be limited to annual battery replacement for the four acoustic modems. Acoustic modems would be freed from their anchors by activation of acoustic release devices. When close to the modem, the service craft would ping the release and the modem would float to the surface to be recovered. The crew would replace the battery and perform any needed maintenance, including attaching a new pyramid anchor and acoustic release, then drop it back to the bottom at its previous location.

The action area for this project is estimated to be the marine waters of the FORACS Range, the area within 100 yards (92 m) either side of a line along the HDD and trunk cable route and around any work-related vessels as they transit to and from the site. It also includes the down-current extent of any plumes that may result from mobilized sediments or discharges of wastes or toxic chemicals such as fuels and/or lubricants associated with any project-related machinery.

Listed Species/Critical Habitat: The Navy has determined that the following ESA-listed species under NMFS jurisdiction may be affected by the proposed action: green sea turtles (*Chelonia mydas*), hawksbill sea turtles (*Eretmochelys imbricata*), false killer whales, Main Hawaiian Insular DPS (*Pseudorca crassidens*), humpback whales, and Hawaiian monk seals (*Monachus schauinslandi*). Detailed information about the biology, habitat, and conservation status for sea turtles, and marine mammals can be found in the recovery plans and other sources at http://www.nmfs.noaa.gov/pr/species/turtles/, and http://www.nmfs.noaa.gov/pr/species/mammals/, respectively.

Critical Habitat: The action area for this project is entirely within an area proposed for designation as revised critical habitat (PRCH) for Hawaiian monk seals (76 FR 32026). Therefore, the Navy has determined that the proposed action may affect proposed critical habitat.

Analysis of Effects: In order to determine that a proposed action is not likely to adversely affect listed species, NMFS must find that the effects of the proposed action are expected to be insignificant, discountable, or beneficial as defined in the joint USFWS-NMFS Endangered Species Consultation Handbook: (1) insignificant effects relate to the size of the impact and should never reach the scale where take occurs; (2) discountable effects are those that are extremely unlikely to occur; or (3) beneficial effects are positive effects without any adverse effects (USFWS & NMFS 1998). This standard, as well as consideration of the probable duration, frequency, and severity of potential interactions, was applied during the detailed analysis of effects of the proposed action on ESA-listed marine species and proposed critical habitat, as is described in the Navy BA.

In the BA, the Navy determined that the risk of: collision with vessels, direct physical impact, and entanglement would be discountable for ESA-listed sea turtles and marine mammals; and that project-related disturbance from human activity and equipment operation, as well as exposure to elevated noise levels, turbidity and sedimentation, and wastes and discharges would result in insignificant effects on those species. The Navy further determined that that the project would have temporary and insignificant effects on three essential features of PRCH: (3) Marine areas from 0 to 500 meters in depth preferred by juvenile and adult monk seals for foraging; (5) Marine areas with adequate prey quantity and quality; and (6) Significant areas used by monk seals for hauling out, resting, or molting. The proposed action would have no effect on the remaining three essential features because they are not present within the action area.

NMFS agrees that the proposed action would expose green and hawksbill sea turtles; Main Hawaiian Insular false killer whales, humpback whales; Hawaiian monk seals and their PRCH to the suite of stressors identified in the Navy's BA. Based on the description of the proposed action and the action area, on the best information available about the biology and expected behaviors of the ESA-listed marine species considered in this consultation, the best information available about the essential features of PRCH, and having no information that would refute any of the Navy's individual effects assessments, NMFS expects sea turtles, whales, and seals and their PRCH would be unlikely to respond to their exposure to these stressors, and if perchance a response were to occur it would be temporary in nature and never reach the scale that would affect the individual's health or result in lasting or meaningful changes to PRCH. Therefore. NMFS agrees with the Navy's determination. That the proposed action would have both insignificant and discountable effects on ESA-listed marine resources.

Conclusion: NMFS concurs with your determination that the proposed installation, operation, and maintenance of a fixed surface ship radiated noise measurement system off the southwest coast of Oahu is not likely to adversely affect ESA-listed marine species or proposed revised critical habitat for Hawaiian monk seals. Our concurrence is based on the finding that the effects of the proposed action are expected to be both insignificant and discountable. This concludes ESA Section 7 consultation for species under NMFS's jurisdiction. If necessary, consultation

pursuant to Essential Fish Habitat would be completed by NMFS' Habitat Conservation Division in separate communication.

ESA Consultation must be reinitiated if: 1) a take occurs; 2) new information reveals effects of the action that may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the identified action is subsequently modified in a manner causing effects to listed species or designated critical habitat not previously considered; or 4) a new species is listed or critical habitat designated that may be affected by the identified action.

If you have further questions please contact Donald Hubner on my staff at (808) 725-5145. Thank you for working with NMFS to protect our nation's living marine resources.

Sincerely,

Michael D. Tosatto
Regional Administrator

cc: Dan Polhemus, Aquatic Ecosystems Conservation, USFWS, Honolulu

NMFS File No. (PCTS): PIR-2014-9574
PIRO Reference No.: I-PI-14-1227-AG

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U.S. Navy (Navy). 2015. ESA Biological Assessment and Essential Fish Habitat Assessment – Installation and Operation a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System at the Fleet and Evaluation Center, Barbers Point Oahu, Hawaii and Surrounding Ocean. Naval Undersea Warfare Center Division, Keyport Pacific Detachment. Undated. Received via e-mail on January 30, 2015. 55 pp.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

In Reply Refer To:
2015-I-0176

MAR 1 3 2015

Mr. Cory Campora, PhD
Natural Resource Specialist
NAVFAC Hawai'i, Environmental Planning (EV2)
400 Marshall Road, Bldg X-11
Joint Base Pearl Harbor-Hickam, Hawai'i 96860-3134

Subject: Informal Consultation for the Fixed Surface Ship Radiated Noise Measurement System, Barbers Point, O'ahu

Dear Mr. Campora:

The U.S. Fish and Wildlife Service received your email on February 23, 2015, requesting our concurrence with your determination that the proposed Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System at the Fleet Test and Evaluation Center, Barbers Point, O'ahu, may affect, but is not likely to adversely affect the federally endangered Hawaiian hoary bat or 'ōpe'ape'a (*Lasiurus cinereus semotus*) and is not likely to adversely modify the federally designated critical habitat, O'ahu – Coastal Unit 14. The findings and recommendations in this consultation are based on (1) your email; (2) previous correspondence; and (3) other information available to us. A complete administrative record is on file in our office. This response is in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*).

Project Description
The Commanding Officer, Naval Undersea Warfare Center, Division Keyport, proposes to install and operate a fixed SSRNM system hydrophone array to support ongoing Fleet SSRNM Mid Pacific operations. The proposed work includes the installation and operation of a SSRNM hydrophone array in the ocean off Nānākuli, undersea data transmission cable, and shore station upgrades at Fleet Technical Evaluation Center (FTEC), Barbers Point. The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site. The hydrophones would receive noise (i.e. propulsion, ship machinery, and flow noise) coming from vessels as they operate under normal conditions. The data from the hydrophones are transmitted to shore through a trunk cable to shore facilities for analysis. The cable would be installed into a shore bypass conduit under the shoreline, intertidal, and near-shore zones. Operating the SSRNM would be entirely electronic without the need for support vessels. The Horizontal Directional Drilling (HDD) and

TAKE PRIDE IN AMERICA

FTEC shore construction would occur over about two weeks, beginning no earlier than April 2015. Cable and array installation would occur over three weeks during the summer of 2015, beginning no earlier than May 2015. The project would be complete no later than October 2015.

The HDD construction site would be located in an area that is mostly cleared of vegetation and has been used for construction access in the past. No 'Ewa hinahina individuals are currently have been observed in the proposed project area. The HDD construction activity would be located more than or equal to 60 ft. (18 m) to the south of the AMA and separated from the AMA by the FTEC access road. The AMA would not be affected by this proposed project. A negligible amount of additional vegetation would be cleared from the proposed project. Approximately 2,615 square feet (0.02 ha) of native and non-native vegetation east of the FTEC fence line would be cleared. Re-vegetation and soil compaction issue form the construction activities would be addressed in conjunction with the U.S. Coast Guard Restoration and Management Plan for the Barbers Point Coast Guard Lighthouse Site.

Conservation Measures
The following measures identified in your letter will be implemented at the project site to avoid and minimize adverse effects to the O'ahu critical habitat – Coastal Unit 14. These conservation measures are considered part of the project description. Any changes to, modifications of, or failure to implement these conservation measures may result in the need to reinitiate this consultation.

- A contingency plan to control toxic materials is required.
- Appropriate materials to contain and clean potential spills shall be stored at the work site, and be readily available.
- All project-related materials and equipment placed in the water shall be free of pollutants.
- The project manager and heavy equipment operators shall perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected, and shall not proceed until the leak is repaired and equipment cleaned.
- Fueling of land-based vehicles and equipment shall take place at least 50 ft (15 m) away from the water, preferably over an impervious surface. Fueling of vessels shall be done at approved fueling facilities.
- Turbidity and siltation from project-related work shall be minimized and contained through the appropriate use of erosion control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions.
- A plan shall be developed to prevent debris and other wastes from entering or remaining in the marine environment during the project and reduce the potential for surface/ground water contamination.
- The Achyranthes Management Area (AMA) would be marked as "no access" on plan drawings and contractor personnel would be instructed to avoid this area.
- Re-vegetation and soil compaction issue form the construction activities would be addressed in conjunction with the U.S. Coast Guard 'Ewa hinahina restoration effort in accordance to the Restoration and Management Plan for the Barbers Point Coast Guard Lighthouse Site.

Achyranthes splendens var. *rotundata* and O'ahu Coastal Unit 14
Herbaceous plant species, such as *Achyranthes splendens* var. *rotundata*, may have seedlings that appear along the proposed project area at any time. The federally designated O'ahu critical habitat – Coastal Unit 14, occurs within the proposed project site. This critical habitat unit is designated for 7 federally endangered plants: *Achyranthes splendens* var. *rotundata*, *Bidens amplectens*, *Centaurium sebaeoides*, *Chamaesyce celastroides* var. *kaenana*, *Schiedea kealiae*, *Sesbania tomentosa*, and *Vigna o-wahuensis*.

Summary
We concur that the proposed project may affect, but is not likely to adversely modify the O'ahu critical habitat – Coastal Unit 14. Unless the project description changes, or new information reveals that the proposed project may affect listed species or adversely modify critical habitat in a manner or to an extent not considered, or a new species or critical habitat is designated that may be affected by the proposed action, no further action pursuant to section 7 of the Act is necessary.

We appreciate your efforts to conserve Hawai'i's listed species. If you have questions regarding information contained in this letter please contact Jiny Kim, Fish and Wildlife Biologist (phone: 808-792-9400, email: Jiny_Kim@fws.gov).

Sincerely,

Aaron Nadig
Island Team Manager
O'ahu, Kaua'i, North Western Hawaiian Islands, and American Samoa

9.3 Appendix C – CZMA federal consistency

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND, HAWAII
400 MARSHALL ROAD
JBPHH, HAWAII 96860-3139

5750
Ser N45/2004
NOV 13 2014

Mr. John Nakagawa
Hawaii Coastal Zone Management Program
Department of Land and Natural resources
Office of Planning
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Nakagawa:

SUBJECT: HAWAII COASTAL ZONE MANAGEMENT PROGRAM FEDERAL CONSISTENCY REVIEW FOR SURFACE SHIP RADIATED NOISE MEASUREMENT (SSRNM), O'ahu, Hawai'i

The Naval Undersea Warfare Center Division (NUWC), Keyport is requesting a Coastal Zone Management Federal Consistency Review for the proposed Surface Ship Radiated Noise Measurement (SSRNM) project. Our office has been designated as NUWC's agent to coordinate submittal of the review application. Please find enclosed the evaluation of consistency with the State's Coastal Zone Management Program. The Coastal Zone Management (CZM) Application Form is provided as Enclosure 1. The CZM Assessment Form is provided as Enclosure 2. Additional information including a complete description of the project, maps and diagrams, is presented in Enclosure 3.

Should you have any questions, please contact Mr. Andy Huang at (808) 471-1021 or email at andy.huang@navy.mil.

Sincerely,

A. Y. POENTIS
Environmental
Business Line Coordinator
By direction of the
Commanding Officer

Enclosure: 1. CZM Application Form
2. CZM Assessment Form
3. SSRNM Project Description

Hawaii CZM Program
Coastal Zone Management

HAWAII CZM PROGRAM

APPLICATION FOR CZM FEDERAL CONSISTENCY REVIEW

Project/Activity Title or Description: Installation and Operation of a Fixed SSRNM System

Location: Fleet Test and Evaluation Center Barbers Point and Pacific Ocean

Island: Oahu

Tax Map Key: 91026002

Applicant and Agent Information

1.		2.	
Commanding Officer, NUWC Keyport		NAVFAC Hawaii EV2	
Name of Applicant		Name of Agent	
1894 Wasp Blvd		400 Marshall Road, Building 55	
Address		Address	
JBPHH, HI	96860-5809	Pearl Harbor	96860
City & State	Zip Code	City & State	Zip Code
808-472-1702	808-472-0212	808-471-1021	
Daytime Phone	Fax Number	Daytime Phone	Fax Number
marcom.leonillo@navy.mil		andy.huang@navy.mil	
E-mail Address		E-mail Address	

CZM Consistency Determination or Certification

x Check the type of application below and sign.

☒ I. Federal Agency Activity

CZM Consistency Determination: "The proposed activity will be undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of the Hawaii Coastal Zone Management Program."

Signature Andy Huang Date 9/26/2014
(Applicant or responsible party)

☐ II. Federal Permit or License (Please sign below)

CZM Consistency Certification: "The proposed activity complies with the enforceable policies of Hawaii's approved management program and will be conducted in a manner consistent with such program."

Signature _____ Date _____
(Applicant or responsible party)

☐ III. Federal Grants and Assistance (Please sign below)

CZM Consistency Certification: "The proposed activity complies with the enforceable policies of Hawaii's approved management program and will be conducted in a manner consistent with such program."

Signature _____ Date _____
(Applicant or responsible party)

Send To: Office of Planning, P.O. Box 2359, Honolulu, Hawaii 96804

Print Form

HAWAII CZM PROGRAM
FEDERAL CONSISTENCY ASSESSMENT FORM

RECREATIONAL RESOURCES

Objective: Provide coastal recreational opportunities accessible to the public.

Policies:

1) Improve coordination and funding of coastal recreation planning and management.

2) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

   a) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

   b) Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites and sandy beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;

   c) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

   d) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

   e) Encouraging expanded public recreational use of county, State, and Federally owned or controlled shoreline lands and waters having recreational value;

   f) Adopting water quality standards and regulating point and non-point sources of pollution to protect and where feasible, restore the recreational value of coastal waters;

   g) Developing new shoreline recreational opportunities, where appropriate, such as artificial reefs for surfing and fishing; and

   h) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, County planning commissions; and crediting such dedication against the requirements of section 46-6.

RECREATIONAL RESOURCES (continued)

Check either "Yes" or "No" for each of the following questions:		Yes	No
1.	Will the proposed action involve or be near a dedicated public right-of-way?	☐	☒
2.	Does the project site abut the shoreline?	☒	☐
3.	Is the project site near a State or County park?	☒	☐
4.	Is the project site near a perennial stream?	☐	☒
5.	Will the proposed action occur in or affect a surf site?	☐	☒
6.	Will the proposed action occur in or affect a popular fishing area?	☐	☒
7.	Will the proposed action occur in or affect a recreational or boating area?	☐	☒
8.	Is the project site near a sandy beach?	☐	☒
9.	Are there swimming or other recreational uses in the area?	☐	☒

Discussion:

This proposal is for the installation and operation of a fixed Surface Ship Radiated Noise Measurement (SSRNM) Mid Pacific (MIDPAC) hydrophone array in the ocean off Nānākuli, O'ahu, Hawai'i, undersea data transmission cable (trunk cable), and shore equipment upgrades at Fleet Technical Evaluation Center (FTEC), Barbers Point. A complete description of the project, including maps and diagrams, is presented in Enclosure 1.

The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site (FORACS). The hydrophones receive noise (i.e. propulsion, ship machinery and flow noise) coming from vessels as they operate. Data from the hydrophones are transmitted to shore through a trunk cable for analysis. The cable would be installed into a shore bypass conduit beneath the shoreline, intertidal and near shore zones.

The project is located on land owned by the US Coast Guard (USCG) adjacent to the ocean. The project is water-dependent, requiring a secure coastal site located no nearer than 140 feet from the ocean. The distance accommodates the use of horizontal directional drilling (HDD) techniques to install a cable conduit.

The property is adjacent to, but would not interfere with recreational opportunities at the Germaine's Luau and the Barbers Point Beach Park. Project construction would be visible, but not obtrusive because it would be seen against the industrial view-shed of the Campbell Industrial Park. The area outside existing secure fenced Navy facilities is accessible and the project would not affect accessibility to the shoreline. The shoreline is a coral rock beach and not conducive to

HISTORIC RESOURCES

Objective: Protect, preserve, and where desirable, restore those natural and man-made historic and pre-historic resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

1) Identify and analyze significant archaeological resources;

2) Maximize information retention through preservation of remains and artifacts or salvage operations; and

3) Support State goals for protection, restoration, interpretation, and display of historic resources.

Check either "Yes" or "No" for each of the following questions:	Yes	No
1. Is the project site within a historic/cultural district?	☐	☒
2. Is the project site listed on or nominated to the Hawaii or National register of historic places?	☐	☒
3. Does the project site include undeveloped land which has not been surveyed by an archaeologist?	☒	☐
4. Has a site survey revealed any information on historic or archaeological resources?	☐	☒
5. Is the project site within or near a Hawaiian fishpond or historic settlement area?	☐	☒

Discussion:

The project site is near the USCG Barbers Point Lighthouse, an active navigation aid. Accessibility to the lighthouse, views of the lighthouse and the lighthouse itself would not be affected by the project.

With regards to archaeological surveys, the land portion of the project site was previously surveyed during planning for the FTEC compound. The area around FTEC consists of coralline limestone (caprock) with a thin veneer of sand. In 1998, the Navy concluded and the Hawai'i State Historic Preservation Officer concurred, that the probability of encountering significant archeological resources at this site is low. The water portion of the project site has not been surveyed by an archaeologist. Although there are several known wrecks located off the leeward coast, none of these wrecks are located near the proposed trunk cable route. However, in the event cultural

SCENIC AND OPEN SPACE RESOURCES

Objective: Protect, preserve and where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

1) Identify valued scenic resources in the coastal zone management area;

2) Insure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

3) Preserve, maintain and where desirable, improve and restore shoreline open space and scenic resources; and

4) Encourage those developments that are not coastal dependent to locate in inland areas.

Check either "Yes" or "No" for each of the following questions:	Yes	No
1. Does the project site abut a scenic landmark?	☐	☒
2. Does the proposed action involve the construction of a multi-story structure or structures?	☐	☒
3. Is the project site adjacent to undeveloped parcels?	☒	☐
4. Does the proposed action involve the construction of structures visible between the nearest coastal roadway and the shoreline?	☐	☒
5. Will the proposed action involve construction in or on waters seaward of the shoreline? On or near a beach?	☒	☐

Discussion:

With regards to undeveloped parcels, the project site is near an undeveloped area known as the Achyranthes Management Area (AMA), established by the USCG. The AMA was established to protect individuals of the protected Ewa hinahina and its habitat. The AMA is off limits to construction and would not be affected by this project.

With regards to in water work, see Enclosure 1 for additional detail regarding the relationship between project construction ashore and construction in the ocean. The HDD method of installation allows the project to bypass the shore, intertidal and nearshore zones without effect. The HDD drilling entry point is located about 145 feet back from the shoreline.

COASTAL ECOSYSTEMS

Objective: Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

1) Improve the technical basis for natural resources management;
2) Preserve valuable coastal ecosystems of significant biological or economic importance;
3) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land water uses, recognizing competing water needs; and
4) Promote water quantity and quality planning and management practices, which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses, which violate State, water quality standards.

Check either "Yes" or "No" for each of the following questions:	Yes	No
1. Does the proposed action involve dredge or fill activities?	☐	☒
2. Is the project site within the Shoreline Setback Area (20 to 40 feet inland of the shoreline)?	☒	☐
3. Will the proposed action require some form of effluent discharge into a body of water?	☐	☒
4. Will the proposed action require earthwork beyond clearing and grubbing?	☒	☐
5. Will the proposed action include the construction of special waste treatment facilities, such as injection wells, discharge pipes, or cesspools?	☐	☒
6. Is an intermittent or perennial stream located on or near the project site?	☐	☒
7. Does the project site provide habitat for endangered species of plants, birds, or mammals?	☒	☐
8. Is any such habitat located nearby?	☒	☐
9. Is there a wetland on the project site?	☐	☒
10. Is the project site situated in or abutting a Natural Area Reserve?	☐	☒
11. Is the project site situated in or abutting a Marine Life Conservation District?	☐	☒
12. Is the project site situated in or abutting an estuary?	☐	☒

Discussion:

The project would be within the Shoreline Setback Area. However, this portion of the project would only include the shore bypass conduit which would be approximately 50 feet below the surface.

With regards to earthwork, the project involves excavation for the HDD drilling, underground electrical vault and conduits. The project site would be returned to its original grade after construction and the disturbed area planted with restorative landscaping consistent with a USCG management plan. Please see Enclosure 1 for additional information.

ECONOMIC USES

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

1) Concentrate in appropriate areas the location of coastal dependent development necessary to the State's economy;

2) Insure that coastal dependent development such as harbors and ports, visitor industry facilities, and energy generating facilities are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

3) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such development and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

   a) Utilization of presently designated locations is not feasible;

   b) Adverse environmental effects are minimized; and

   c) Important to the State's economy.

Check either "Yes" or "No" for each of the following questions:	Yes	No
1. Does the project involve a harbor or port?	☐	☒
2. Is the project site within a designated tourist destination area?	☐	☒
3. Does the project site include agricultural lands or lands designated for such use?	☐	☒
4. Does the proposed activity relate to commercial fishing or seafood production?	☐	☒
5. Does the proposed activity related to energy production?	☐	☒
6. Does the proposed activity relate to seabed mining?	☐	☒

Discussion:

The proposed shore station site at the FTEC is an existing military site located within an industrial land use area. Although visible to visitors to Germaine's Luau, the FTEC is not open to the public. The project would use existing shore power provided to the FTEC.

The ocean portions of the project would not be located in favored fishing areas or marine protected areas. It is near, but would not interfere with petroleum offload anchorages.

COASTAL HAZARDS

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, and subsidence.

Policies:

1) Develop and communicate adequate information on storm wave, tsunami, flood erosion, and subsidence hazard;

2) Control development in areas subject to storm wave, tsunami, flood, erosion, and subsidence hazard;

3) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

4) Prevent coastal flooding from inland projects.

Check either "Yes" or "No" for each of the following questions:	Yes	No
1. Is the project site on or abutting a sandy beach?	☒	☐
2. Is the project site within a potential tsunami inundation area as depicted on the National Flood Insurance Program flood hazard map?	☒	☐
3. Is the project site within a potential flood inundation area according to a flood hazard map?	☒	☐
4. Is the project site within a potential subsidence hazard areas according to a subsidence hazard map?	☐	☒
5. Has the project site or nearby shoreline areas experienced shoreline erosion?	☐	☒

Discussion:

The shore bypass conduit would run under a sandy beach (approximately 50 feet below the surface).

The shore station would be located within a flood inundation area at the FTEC approximately 145 feet from the coastline at an elevation of about ten feet above mean sea level. The project would not include the construction of permanent above ground structures or residential facilities.

MANAGING DEVELOPMENT

Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

1) Effectively utilize and implement existing law to the maximum extent possible in managing present and future coastal zone development;

2) Facilitate timely processing of application for development permits and resolve overlapping or conflicting permit requirements; and

3) Communicate the potential short- and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the general public to facilitate public participation in the planning and review process.

Check either "Yes" or "No" for each of the following questions:	Yes	No
1. Will the proposed activity require more than two (2) permits or approval? (Provide the status of each.)	☐	☒
2. Does the proposed activity conform with the State and County land use designations for the site?	☒	☐
3. Has or will the public be notified of the proposed activity?	☒	☐
4. Has a draft or final environmental impact statement or an environmental assessment been prepared?	☒	☐

Discussion:

The proposed project would require completion of the following environmental procedures:
- National Environmental Policy Act (NEPA) Environmental Assessment (EA). The draft EA will be available for public review concurrently with environmental consultations.
  -Potential effects on threatened and endangered species, essential fish habitat, and historic and cultural resources will be analyzed in the EA. Consultations with the appropriate regulatory agencies (i.e., NMFS, SHPO) will be completed as applicable.
- US Army Corps of Engineers (USACE) authorization under Section 10 of the Rivers and Harbors Act.

PUBLIC PARTICIPATION

Objective: Stimulate public awareness, education, and participation in coastal management.

Policies:

1) Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;

2) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities; and

3) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Discussion. Please provide information about the proposal relevant to the Objective and Policies No. 2 and No. 3 above:

The draft EA for this project will be made available for public comment. If a Finding of No Significant Impact (FONSI) is made, a Notice of Availability of the final EA and the FONSI would be published in the Honolulu Star-Advertiser and the Office of Environmental Quality Environmental Notice. Informal contact has been made with local citizen groups and Germaine's Luau; no concerns have been raised.

BEACH PROTECTION

Objective: Protect beaches for public use and recreation.

Policies:

1) Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;

2) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and

3) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Discussion. Please provide information about the proposal relevant to the Objective and Policies above:

Construction for this project would be located inland from the shoreline setback. The installed electrical conduits would be underground at the FTEC and seaward 2000 feet, bypassing sensitive shoreline features. Excavation during construction would only occur beyond 145 feet landward of the shore and would be returned to grade after construction.

Post construction features would be underground and not require erosion protection structures seaward of the shoreline.

MARINE RESOURCES

Objective: Implement the State's ocean resources management plan.

Policies:

1) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

2) Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

3) Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;

4) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

5) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

6) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Discussion. Please provide information about the proposal relevant to the Objective and Policies above:

Effects on coastal resources due to the proposed action are not anticipated to be significant. The proposed array would be located in an existing Navy operating area; shore equipment would be located in an existing US Coast Guard compound; installation of the proposed trunk cable would bypass and/or avoid sensitive shoreline resources/features.

Print Form

Enclosure 1

Detailed Project Description

Naval Undersea Warfare Center Division, Keyport

Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System

At the Fleet Test and Evaluation Center

Barbers Point, O‘ahu, Hawai‘i, and Surrounding Ocean

Naval Undersea Warfare Center Division, Keyport

Pacific Detachment

1.0 PURPOSE OF, AND NEED FOR THE PROPOSED ACTION

1.1 Summary

The Commanding Officer, Naval Undersea Warfare Center Division, Keyport (NUWC Keyport), proposes to install and operate a fixed Surface Ship Radiated Noise Measurement (SSRNM) system.

The Proposed Action includes the installation and operation of a permanently fixed SSRNM system, consisting of a hydrophone array, an undersea data transmission cable (trunk cable) in the ocean off Nānākuli, O'ahu, Hawai'i, and a shore station cable landing at the Fleet Technical Evaluation Center (FTEC), Barbers Point, O'ahu, Hawai'i (Figure 1). The U.S. Coast Guard (USCG) is the landowner of the FTEC property where the SSRNM Cable landing would terminate.

The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site (FORACS). The hydrophones would receive noise (i.e., propulsion, ship machinery and flow noise) coming from vessels as they operate. Data from the hydrophones would be transmitted to shore through a trunk cable for analysis. The cable would be installed into a shore bypass conduit under the shoreline, intertidal and near shore zones.

An Environmental Assessment (EA) is currently being prepared to analyze the potential environmental impacts associated with the proposed SSRNM system. The Navy is the lead agency for the EA. In accordance with 40 CFR 1501.6, the USCG is a cooperating agency for the EA.

1.2 Background

SSRNM testing is conducted on Navy ships to evaluate their waterborne acoustic characteristics while underway. In order to maintain readiness certification, U.S. Navy ships are required to undergo SSRNM testing every 18 months according to the Navy Surface Force Readiness Manual. These tests provide information to determine corrective actions to reduce a ship's acoustic noise, thus reducing vulnerability to undersea warfare threats. NUWC Keyport has been conducting SSRNM testing at the FORACS for over 35 years. Currently SSRNM testing is performed using portable systems either a hydrophone array deployed over the side of a small support vessel (20-40 ft), or sonobuoys deployed from the fleet vessel being tested to take noise measurements.

During a typical test, a ship follows a planned set of maneuvers past the portable array or deployed sonobuoys. During each pass the array receives the ship's radiated noise and transmits it to computer equipment for analysis. Personnel operate computer systems at a shore station while additional personnel are onboard the ship to monitor systems, operate shipboard components and record data. Communication from the ship to the shore station is conducted via Very High Frequency (VHF) radio. On average up to ten SSRNM tests are conducted in the FORACS per year.

Figure 1. Proposed Action - Fixed/Cabled Array – FTEC Shore Station Landing

1.3 Purpose and Need

The purpose of the Proposed Action is to provide a permanently fixed safe, reliable, low-maintenance, high-fidelity SSRNM system to serve the Middle Pacific (MIDPAC) Surface Group and visiting vessels in close proximity to Joint Base Pearl Harbor-Hickam (JBPHH). The need for the Proposed Action is to upgrade and modernize existing MIDPAC Surface Group SSRNM testing and operations. Upgrades are needed to improve SSRNM testing efficiency, effectiveness, safety, and to minimize fleet fuel consumption related to SSRNM testing. The proposed location of the fixed SSRNM array is within a well-established range (FORACS), providing close proximity to JBPHH without encroaching on commercial marine activities or having the acoustic noise measurement fouled by other shipping noise.

A fixed shore-based system (Proposed Action) would provide several advantages over the portable systems that are currently used. For fixed systems, data quality is better, availability and safety are improved, and logistics are far simpler. Portable systems are normally used at remote locations or for temporary purposes. These systems have comparatively limited bandwidth and data fidelity, and they depend on the availability and operation of a small support vessel, which restricts their use to favorable weather conditions. Fixed systems can be operated in poor small craft weather conditions; may be operated by fewer personnel; and do not require the deployment and recovery of an array over the side of a support vessel, improving safety and logistics.

2.0 PROPOSED ACTION

The Proposed Action involves a vertically suspended hydrophone array anchored within the FORACS about 3.5 mi (5.6 km) offshore and approximately 6.3 mi (10.2 km) from FTEC. Data communications would be through a trunk cable between the array and the FTEC shore station. The trunk cable would be laid on the ocean floor from the hydrophone array to the reef ledge, where divers would hand lay the cable in shallow areas to avoid live corals. The cable would then be routed through a shore bypass conduit to the FTEC shore station. The shore bypass conduit would be installed using horizontal directional drilling (HDD) techniques. See Figure 2 for details.

The proposed Fixed/Cabled Array system would provide the following benefits:

- Increased availability as dictated by ship schedules without weather delays
- Improved data quality and fidelity
- Improved operator safety, by eliminating the need for support craft and crew
- Consistency with technological advancements in vessel silencing and detection technologies

Hydrophone Array

The proposed array is a 750-ft (229-m) cable with ten hydrophones mounted at intervals, all suspended from the seafloor (Figure 3). Hydrophones are passive (listen only) marine acoustic devices. The hydrophone models considered for use with the Proposed Action are cylindrical in shape and approximately 2 inches in diameter and 15 inches long and would be directly affixed to the array cable. The array would be anchored within the FORACS (21°20'33.85"N, 158°11'8.18"W) at a depth of about 3,084 ft (940 m). The top of the array would be suspended approximately 65 ft (19.8m.) below the ocean surface. A Break-Away Buoy, Array Buoy, and Main Mooring Buoy keep the entire hydrophone array aligned and linear. Each buoy is approximately 7.5 ft (2.3 m) in diameter and 7 ft (2.1 m) tall. The hydrophone array would be designed to meet a 15-year service life.

Construction activities on the ocean during hydrophone array installation would involve one vessel in the affected area offshore for a period of about three days:

- Small Anchor Handling vessel (100- 200 ft)

The installation includes the use of five active acoustic positioning modems: four located on the bottom around the array anchor and one affixed to the top of the array (Figure 3). These devices operate during installation to identify their location on the seafloor and infrequently during operation to determine the position of the array in the water column during tests. The array position needs to be known only once per test. However, a position may have to be requested more than once if it is not read properly.

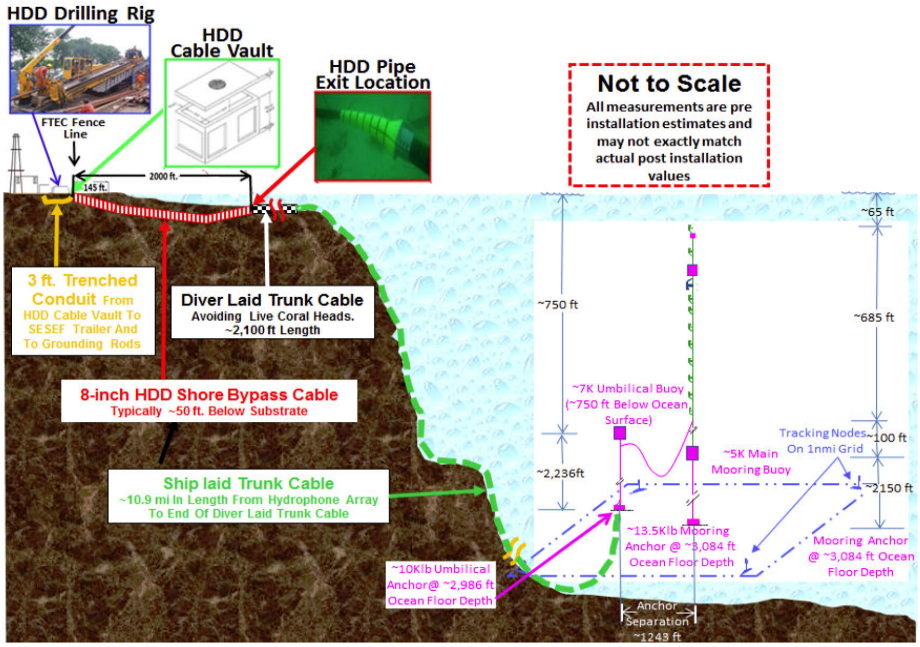
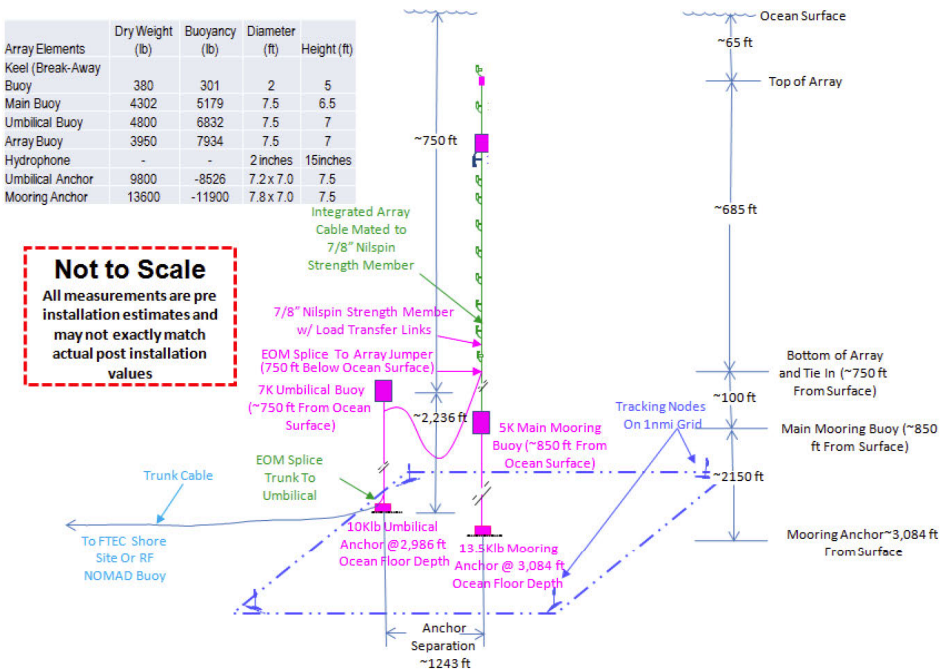


Figure 2. Proposed Action – Fixed/Cabled Array – FTEC Shore Station Landing and Hydrophone Array Concept

Data from the hydrophones and positioning modems would be transmitted to shore via an umbilical cable suspended above the seafloor and anchored with a separate dead-weight anchor. The umbilical assembly supports the trunk cable (see Section below) under varying stress loads from the larger hydrophone array as it shifts in ocean currents.



Array Elements	Dry Weight (lb)	Buoyancy (lb)	Diameter (ft)	Height (ft)
Keel (Break-Away Buoy	380	301	2	5
Main Buoy	4302	5179	7.5	6.5
Umbilical Buoy	4800	6832	7.5	7
Array Buoy	3950	7934	7.5	7
Hydrophone	-	-	2 inches	15inches
Umbilical Anchor	9800	-8526	7.2 x 7.0	7.5
Mooring Anchor	13600	-11900	7.8 x 7.0	7.5

Figure 3. Proposed Action Array Configuration

Shore Bypass Conduit

Using Horizontal Directional Drilling (HDD), a shore bypass conduit would be installed from the FTEC shore station, beneath the shoreline, intertidal and near-shore shallows to an exit location approximately 2,000 ft (610 m) offshore at a depth of 20 ft (6 m) (Figure 2). The HDD system for this project would use 6-inch (15.2 cm) outside-diameter steel pipe (4 in [10.2 cm] inside diameter) which would be left in place to be used as the bypass conduit. The depth of the 8-inch (20.3 cm) HDD drill bore underground is estimated to be 50 ft (15 m) below the seafloor.

Trunk Cable

Data communications would be through a polyethylene-sheathed, 7.6-mi (12.2-km) long, approximately 1.5-inch (40 mm) diameter trunk cable between the array and FTEC shore station. The trunk cable would be routed from the array across the seafloor and up, crossing the ledge of

the fringing reef (reef crest) and on to the shore bypass conduit exit on the seafloor, about 2000 ft (610 m) from the shoreline at the FTEC.

The proposed cable route was previously diver surveyed. During cable installation, weighted cable would be deployed from the ship on floats and divers would then manually place it on the sea floor to avoid live coral, between the conduit exit and a sand chute on the reef crest (Figure 4). Split galvanized ballast weights would be attached to the cable approximately every 100 ft (30 m) to prevent rolling, shifting, and lift due to wave-induced surge. The entire trunk cable is constructed with outer armoring for protection from disturbance, seismic and storm surge hazards.

Construction activities on the ocean during trunk cable installation would involve three vessels in the affected area offshore for a period of about three weeks:

- Small Dive Support Vessel (30 – 60 ft)
- Small Support Vessel (20 – 40 ft)
- Medium displacement Cable Layer (200 – 400 ft), e.g. CS INTREPID, 1,700 ton displacement

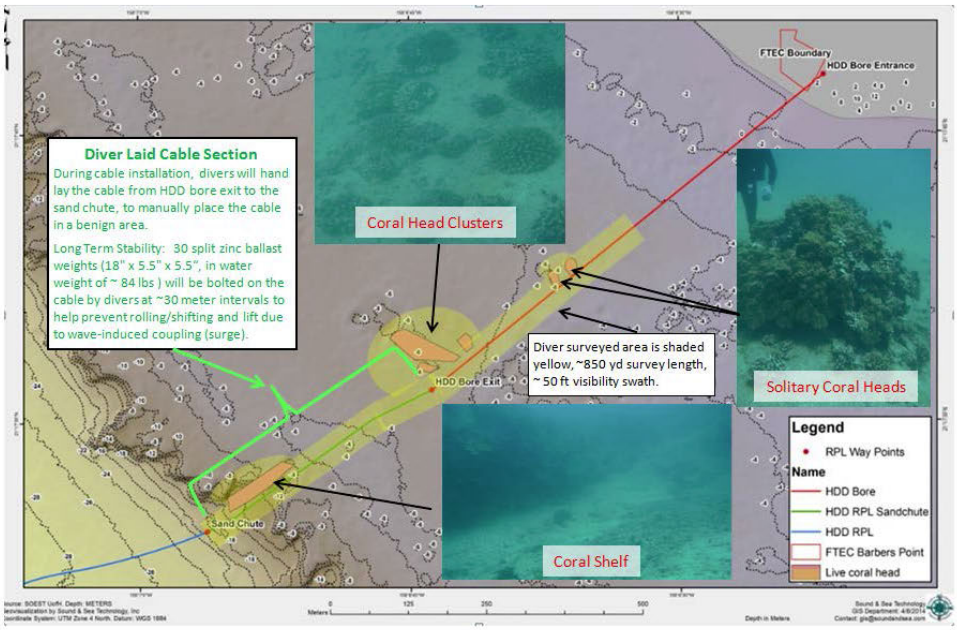


Figure 2. Coral Avoidance along the SSRNM Trunk Cable Route

Shore Station

The FTEC shore station would include conduits, cabling, electronics and vault facilities designed to conduct and process the hydrophone array data. The shore bypass conduit would terminate approximately 145 ft (44 m) landward in an underground concrete vault. The trunk cable would then be routed via an underground conduit to computers inside an existing building. Electrical grounding rods would be installed inside the FTEC shore station fenced area. Excavations would be backfilled; the surface returned to grade and landscaped compatible with a USCG restoration plan.

The HDD construction site would be located outside the FTEC fence-line at an area that is mostly cleared and has been used for construction access in the past. The site is estimated to be 9,200 sq. ft (0.21 ac = 0.09 ha). Of this area, approximately 2,615 sq. ft (0.06 ac or 0.02 ha) of native and non-native vegetation east of the FTEC fence-line would be removed during construction (Figure 5).

The SSRNM system components to be installed underground or within existing facilities at FTEC would include:

- Data processing – Electronic equipment that collects and transmits data.
- Cable housing – Trunk cable linking the array to the shore station would pass via an underground precast concrete cable vault 8 ft x 7 ft x 8 ft high (2.4 m x 2.1 m x 2.4 m) and trenched conduit 3 ft (0.9 m) deep.
- Grounding rods – Three to five copper grounding rods would be installed down to 30 ft (9.1 m) below ground. The rods would be connected to the facility's electrical system with entrenched cables.

Operations and Maintenance

SSRNM testing is conducted on Navy ships to evaluate their waterborne acoustic characteristics while underway. Under the Proposed Action approximately ten such tests would be conducted annually. During each test the ship would follow a planned set of maneuvers passing by the array several times. The hydrophone array would receive the ship's waterborne acoustics and transmit this information through the trunk cable for analysis at the FTEC shore station. During a typical test, personnel would operate computer systems at the shore station, while additional personnel would be onboard the ship to monitor systems, direct propulsion configurations, and collect and record data. No support vessels would be required to conduct SSRNM tests under the Proposed Action. The total time planned to mobilize personnel and equipment, conduct a test and demobilize would be about five days. The actual testing would consist of several vessel runs to measure both ambient sea noise and ships' noise. Because of the long, 15-year service life of the system, there would be no planned preventive maintenance events.

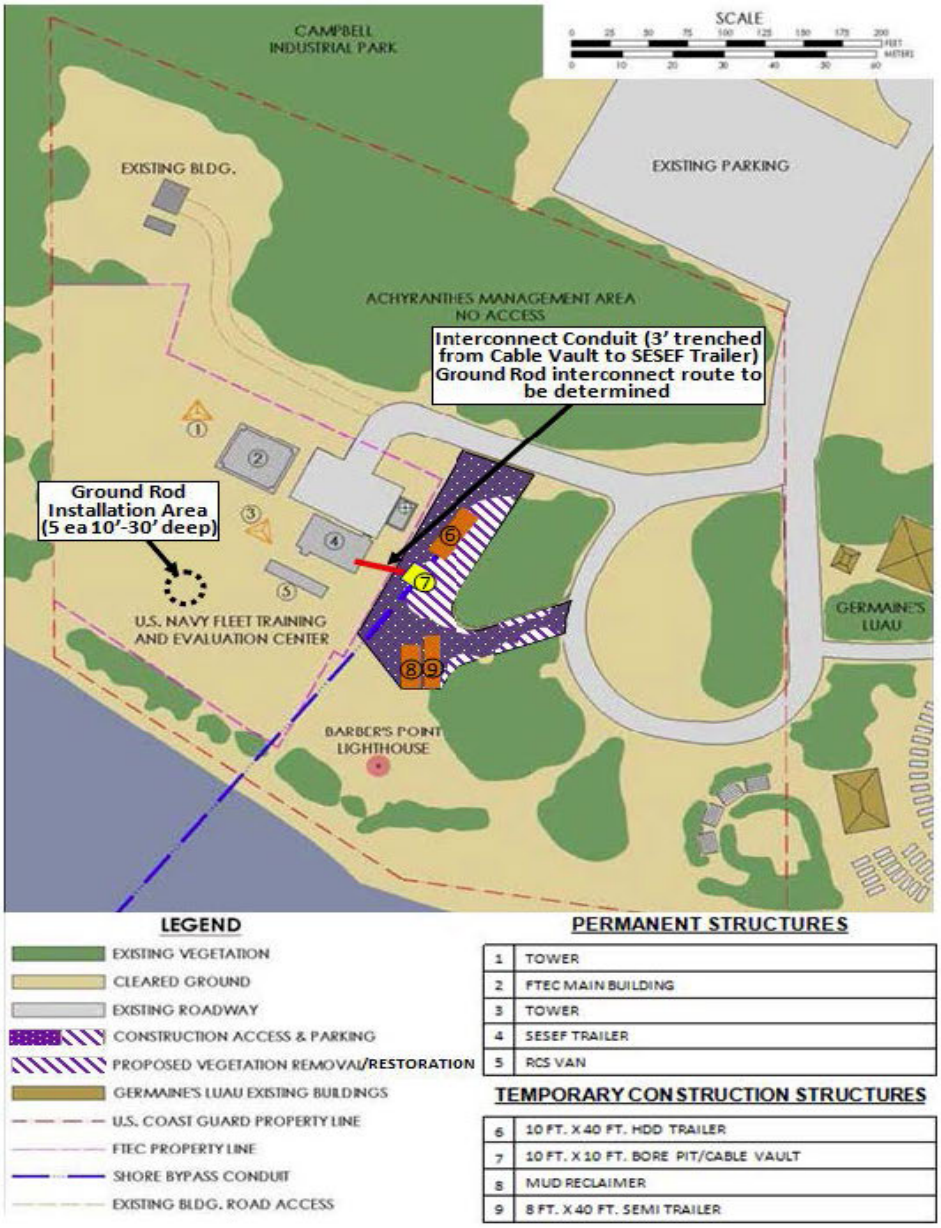


Figure 5. Fixed/Cabled Array – FTEC Shore Station Landing HDD Construction Site Layout

Page 10 of 10

COASTAL ZONE MANAGEMENT NOTICES

Federal Consistency Review

The Hawai'i Coastal Zone Management (CZM) Program has received the following federal actions to review for consistency with the CZM objectives and policies in Chapter 205A, Hawai'i Revised Statutes. This public notice is being provided in accordance with section 306(d) (14) of the National Coastal Zone Management Act of 1972, as amended. For general information about CZM federal consistency please call John Nakagawa with the Hawai'i CZM Program at 587-2878. For neighboring islands use the following toll free numbers: Lanai & Moloka'i: 468-4644 x72878, Kaua'i: 274-3141 x72878, Maui: 984-2400 x72878 or Hawai'i: 974-4000 x72878. For specific information or questions about an action listed below please contact the CZM staff person identified for each action. Federally mandated deadlines require that comments be received by the date specified for each CZM consistency review. Comments may be submitted by mail, electronic mail or fax, as indicated below.

Mail: Office of Planning
Department of Business, Economic Development and Tourism
P.O. Box 2359
Honolulu, Hawai'i 96804
Email: jnakagaw@dbedt.hawaii.gov
Fax: (808) 587-2899

1. Installation & Operation of Fixed Surface Ship Radiated Noise Measurement (SSRNM) System, Barbers Point & Pacific Ocean, O'ahu

Location:	Fleet Test and Evaluation Center, Barbers Point and surrounding ocean, O'ahu
TMK:	(1) 9-1-026:002
Federal Action:	Federal Agency Activity
Federal Agency:	Naval Undersea Warfare Center Division, Keyport
Contact:	Any Huang, NAVFAC Hawai'i, (808) 471-1021
CZM Contact:	John Nakagawa, 587-2878, jnakagaw@dbedt.hawaii.gov
Comments Due:	November 6, 2014
Proposed Action:	Install and operate a Fixed Surface Ship Radiated Noise Measurement (SSRNM) system, consisting of a hydrophone array, an undersea data transmission cable (trunk cable) in the ocean off Nanakuli, O'ahu, and a shore station cable landing at the Fleet Test and Evaluation Center, Barbers Point, O'ahu. The hydrophone array would be located about 3.5 miles offshore within an existing Navy operating area. The hydrophones would receive noise (i.e., propulsion, ship machinery and flow noise) coming from vessels as they operate. Data from hydrophones would be transmitted to shore through a trunk cable for analysis. The cable would be installed into a shore bypass conduit under the shoreline, intertidal and near shore zones using horizontal directional drilling. The purpose of the proposed action is to provide a permanently fixed safe, reliable, low-maintenance, high-fidelity SSRNM system to serve the Middle Pacific Surface Group and visiting vessels in close proximity to Joint Base Pearl Harbor-Hickam. The proposed action would be an upgrade of existing SSRNM testing and operations.

OFFICE OF PLANNING
STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

NEIL ABERCROMBIE
GOVERNOR

LEO R. ASUNCION
ACTING DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

Ref. No. P-14564

November 10, 2014

Mr. Marcom Leonillo
NUWC Keyport Fleet System Program Manager
1894 Wasp Blvd.
Joint Base Pearl Harbor-Hickam, Hawaii 96860-5809

Dear Mr. Leonillo:

Subject: Hawaii Coastal Zone Management (CZM) Program Federal Consistency Review for Installation and Operation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System at the Fleet Test and Evaluation Center, Barbers Point, Oahu

The proposal to install and operate a fixed SSRNM system at the Fleet Test and Evaluation Center and adjacent ocean areas, Barbers Point, Oahu, has been reviewed for consistency with the Hawaii CZM Program. We concur with your determination that the activity is consistent to the maximum extent practicable with the enforceable policies of the Hawaii CZM Program, based on the representations in the supporting document "Enclosure 1 - Detailed Project Description," which includes mitigating measures such as hand laying of the trunk cable by divers in shallow areas to avoid live corals and installing a shore bypass conduit using horizontal directional drilling.

CZM consistency concurrence does not represent an endorsement of the project nor does it convey approval with any other regulations administered by any State or County agency. Thank you for your cooperation in complying with the Hawaii CZM Program. If you have any questions, please call John Nakagawa of our CZM Program at 587-2878.

Sincerely,

Leo R. Asuncion
Acting Director

c: Mr. Andy Huang, NAVFAC Hawaii EV2
U.S. Army Corps of Engineers, Regulatory Branch
Department of Planning and Permitting, City & County of Honolulu

RECEIVED NOV 12 REC'D

14-064

9.4 Appendix D – NHPA archeological and historic property consultation

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION HAWAII
850 TICONDEROGA ST STE 110
JBPHH, HAWAII 96860-5101

5750
Ser N45/ 962
November 24, 2014

CERTIFIED NO: 7011 0110 0002 1803 8292

Mr. William Aila, Jr.
State Historic Preservation Officer
Department of Land and Natural Resources
State Historic Preservation Division
Kakuhihewa Building
601 Kamokila Blvd., Suite 555
Honolulu, HI 96707

Dear Mr. Aila:

SUBJECT: SECTION 106 CONSULTATION FOR INSTALLATION OF A FIXED SURFACE SHIP RADIATED NOISE MEASUREMENT (SSRNM) SYSTEM AT THE FLEET TEST AND EVALUATION CENTER (FTEC), U.S. COAST GUARD, BARBERS POINT, HONOULIULI AHUPUA'A, EWA DISTRICT, O'AHU ISLAND

In accordance with the implementing regulations for Section 106 of the National Historic Preservation Act, the Navy, as the lead agency and consulting on behalf of the U.S. Coast Guard, the landowner, has evaluated this project and determined that it is an undertaking as defined in 36 CFR 800.16(y). The Navy requests your review of the Fixed Surface Ship Radiated Noise Measurement (SSRNM) System project.

The project area is located along the southern shore and waters of Barbers Point, Tax Map Key (9-1-26:002), Honouliuli *Ahupua`a*, 'Ewa District, O`ahu Island, Hawai`i. (Enclosure 1).

PROJECT DESCRIPTION

The Navy proposes to install and operate a fixed Surface Ship Radiated Noise Measurement (SSRNM) system consisting of a hydrophone array and an undersea data transmission cable (trunk cable) in the ocean off Nānākuli, O'ahu, connecting to a shore station cable landing at the Fleet Technical Evaluation Center (FTEC), Barbers Point, O'ahu (Enclosures 2-3). The hydrophone array would be located about 3.5 mi (5.6 km) offshore within an existing Navy operating area named the Fleet Operational Readiness Accuracy Check Site (FORACS). The hydrophones would receive noise (i.e., propulsion, ship machinery and flow noise) coming from vessels as they operate. Data from the hydrophones would be transmitted to shore through a trunk cable for analysis. The cable would be installed into a shore bypass conduit under the shoreline, intertidal, and near shore zones. FTEC is located on US Coast Guard property. The Navy is the lead agency and is consulting on behalf of the USCG. The USCG is a cooperating agency for this Proposed Action.

The purpose of the current project is to provide a permanently fixed, safe, reliable, low-maintenance, and high-fidelity SSRNM system to better serve the Middle Pacific Surface Group (MIDPAC) and visiting vessels in close proximity to Joint Base Pearl Harbor-Hickam (JBPHH). Upgrades are needed to improve SSRNM testing efficiency, effectiveness, and safety, and to minimize fleet fuel consumption regarding SSRNM testing requirements.

INSTALLATION

A shore bypass conduit will be installed from the FTEC shore station using Horizontal Directional Drilling (HDD), beneath the shoreline, intertidal and near-shore shallows to an exit location approximately 2,000 ft. (610 m) offshore at a depth of 20 ft. (6 m). The HDD drill system will use 6-inch (15.2 cm) exterior-diameter steel pipe that will be left in place to be used as the bypass conduit. The depth of the 8-inch (20.3 cm) HDD drill bore underground is estimated to be 50 ft. (15 m) below the seafloor.

The FTEC shore station will include conduits, cabling, electronics and vault facilities designed to conduct and process hydrophone array data. The shore bypass conduit terminates 145 ft. (44 m) landward in an underground concrete vault. The trunk cable will then be routed via an underground conduit to system computers inside an existing building. Electrical grounding rods will be installed inside the FTEC shore station fenced area. All excavations will be backfilled, the surface returned to grade and landscaped as appropriate.

Offshore, the vertically suspended hydrophone array will be anchored within the FORACS range about 3.5 mi (5.6 km) offshore and approximately 6.3 mi [10.2 km] from FTEC. Data communications will be through a trunk cable between the array ocean floor from the hydrophone array to the reef ledge, where divers will hand lay the cable in shallow areas to avoid live corals. The cable will then be routed through a shore bypass conduit to the FTEC shore station. The shore bypass conduit will be installed using HDD techniques.

The array is a 750-ft (229-m) cable with ten hydrophones mounted at intervals, all suspended from the seafloor. It will be anchored within the FORACS range at a depth of about 2,910 ft. (887 m). The top of the array will be suspended at least 65 ft. (19.8 m) below the ocean surface.

OPERATION

Operation of the SSRNM system involves ships passing near the hydrophone arrays and data being collected at the FTEC site for analysis. Operations would not impact cultural resources.

AREA OF POTENTIAL EFFECT (APE)

The area of potential effect is defined and shown in Enclosure 2.

IDENTIFICATION OF HISTORIC PROPERTIES

No archaeological resources are located in the project area. Previous archaeological investigations in the project area included an archaeological inventory survey for the *Shipboard Electronic Systems Evaluation Facility (SESEF) Shorebased Site (OGDEN 1996)*. No cultural remains were identified. Subsurface testing revealed a thin layer of aeolian sand and/or silt overlying calcareous bedrock.

After World War II, three Japanese submarines were scuttled in an area about 5 nautical miles (9.3 km) south-southwest of Barbers Point. The closest charted wreck to Barbers Point is about 4 nautical miles (nm) (7.4 km) along the shore toward Ewa Beach, lying about 0.8 nm (1.4 km) offshore. Several wrecks, charted and uncharted, are located off the leeward coast, but none of these wrecks are near the proposed trunk cable route.

The SSRNM project area is located approximately 30 meters (100 feet) west of the Barbers Point Lighthouse. The original 40-foot high coral tower, with an associated light keeper's house and water cistern, were built in 1888. The light keeper's house was rebuilt in 1915 and located west of the tower. In 1933, funds were allocated to reconstruct a newly reinforced concrete tower, which stands today, adjacent to the coral tower. The old tower was demolished soon after the new tower was built.

In 1964, the Barbers Point lighthouse ceased manual operation and became automated, eliminating the need for a light keeper. The light keeper's house was demolished, and in the 1980s a chain link fence was constructed to enclose the tower.

DETERMINATION OF EFFECT

In consideration of the information previously listed, the Navy has determined the proposed SSRNM system would result in a no affect determination to archeological, historic or cultural resources in accordance with Section 106 implementing regulations under (36 CFR 800.4(d)(1)):

a) The proposed undertaking is located outside the Pearl Harbor National Historic Landmark, and not within any Historic Management Zones identified in the 2008 Integrated Cultural Resource Management Plan (ICRMP).

5750
Ser N45/962
November 24, 2014

b) The proposed construction would not alter the visual character of the Barbers Point Lighthouse or its setting.

c) There are no known archaeological resources within the current APE. However, in the event cultural remains are exposed during construction-related activities, all work in the immediate area shall be halted and the State Historic Preservation Division shall be notified.

Should you have any questions regarding this undertaking, please contact Mr. Jeff Pantaleo, Naval Facilities Engineering Command, Hawaii, at (808)471-1171, extension 368, or jeff.pantaleo@navy.mil.

Sincerely,

D. A. TUFTS
Captain, CEC, U.S. Navy
Regional Engineer
By direction of the
Commander

Enclosures:
1. Project Area on U.S.G.S. Ewa Quadrangle
2. Area of Potential Effect
3. FTEC Shore Station Landing and Hydrophone Array Conceptual Plan

Copy to: Office of Hawaiian Affairs
Kapolei Hawaiian Civic Club

DAVID Y. IGE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ESTHER KIA'AINA
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

601 Kamokila Boulevard, Suite 555
Kapolei, HI 96806

December 26, 2014

D.A. Tufts, Captain, CEC
U.S. Navy Regional Engineer
Department of the Navy, Commander
Navy Region Hawaii
850 Ticonderoga St., Suite 110
Joint Base Pearl Harbor-Hickam, Hawaii 96860-5101

LOG NO: 2014.05358
DOC NO: 1412GC18
Archaeology

Dear Captain Tufts:

SUBJECT: **National Historic Preservation Act (NHPA) Section 106 Consultation– Request for Concurrence of "No Historic Properties Affected" Installation of a Fixed Surface Ship Radiated Noise Measurement (SSRNM) System At the Fleet Test and Evaluation Center (FTEC), USCG, Barbers Point Hono'uli'uli Ahupua'a, 'Ewa District, Island of O'ahu TMK: (1) 9-1-026:002**

Thank you for the opportunity to review this request from the U. S. Navy (Navy), Joint Base Pearl Harbor-Hickam (JBPHH), for consultation and concurrence with their determination of "no effect" for the proposed undertaking to install and operate a fixed Surface Ship Radiated Noise Measurement (SSRNM) System undersea transmission cable in the ocean off Nānākuli, O'ahu connecting to a shore station cable landing at the Fleet Technical Evaluation Center (FTEC), Barbers Point. In accordance with the implementing regulations for Section 106 of the NHPA, the Navy has determined that the project is an undertaking as defined in 36 CFR 800.16(y). We received this submittal on November 26, 2014. The purpose for this project is to provide a permanently fixed, safe, reliable, low-maintenance, and high-fidelity SSRNM system to better serve the Middle Pacific Surface Group (MIDPAC) and visiting vessels in close proximity to Joint Base Pearl Harbor-Hickam (JBPHH).

Your letter indicates that the proposed project includes a shore bypass conduit installed from the FTEC shore station (U.S. Coast Guard Facility, Barbers Point), using Horizontal Directional Drilling (HDD) beneath the shoreline, intertidal and near-shore shallows to an exit location approximately 2,000-feet offshore at a depth of 20-feet. A 6-inch exterior-diameter steel pipe will be used as the bypass conduit. The depth of the 8-inch HDD drill bore underground is estimated to be 50-feet below the seafloor. Installation activities onshore will include conduits, cabling, electronics and vault facilities. The shore bypass conduit terminates 145-feet landward in an underground concrete vault. The cable will then be routed via an underground conduit to system computers inside an existing building. In addition, all onshore trenching will be backfilled and the surface returned to grade and landscaped as appropriate. Offshore installation activities include laying of approximately 9.2 miles of trunk cable from the shore bypass conduit (Barbers Point) to a preselected Hydrophone Array location approximately 3.6 miles offshore within the Fleet Operational Readiness Accuracy Check Site (FORACS) in Nānākuli. Divers will hand lay the trunk cable from the shore bypass conduit (Barbers Point) exit to avoid live coral heads the remainder of the trunk cable will be laid by cable ship. The array is a 750-feet cable with ten hydrophones mounted at intervals. The array will be anchored within the FORACS range at a depth of about 2,910-feet. The top of the array will be suspended at least 65-feet below the ocean surface. The area of potential effect (APE) is defined and shown in Enclosure 2.

The Navy's identification of historic properties indicate that (1) no archaeological resources were identified within the APE; (2) identified chartered and unchartered wrecks are outside the APE including three Japanese submarines located approximately 9.3 kilometers south-southwest of Barbers point, a wreck 7.4 kilometers located along the shore toward Ewa Beach, and several off the leeward coast; (3) the SSRNM project is located approximately 30 meters (100 feet) west of the Barbers Point Lighthouse. The original lighthouse with an associated light keeper's

house and water cistern was built in 1888. In 1933, a new reinforced concrete tower was reconstructed and the old tower was demolished. In 1964, the Barbers Point lighthouse ceased manual operations and became automated. The light keeper's house was demolished, and in the 1980s a chain link fence was constructed to enclose the tower.

Based on the above the Navy determined that the proposed undertaking will result in a no effect on historic properties because (1) the APE is located outside the Pearl Harbor National Historic Landmark, and not within any Historic Management Zones identified in its' 2008 ICRIMP; (2) the proposed construction would not alter the visual character of the Barbers Point Lighthouse or its setting; and (3) there are no known archaeological resources within the current APE. Based on the information provided, the State Historic Preservation Division (SHPD) concurs with the determination of **no historic properties affected** in accordance with 36 CFR 800.4(d)(1).

Please contact Susan Lebo at (808) 692-8029 or at Susan.A.Lebo@hawaii.gov if you have any questions regarding archaeological resources or this letter.

Aloha,

Theresa K. Donham
Archaeology Branch Chief

cc: Jeff Pantaleo, Naval Facilities Engineering Command (jeff.pantaleo@navy.mil)