ENVIRONMENTAL ASSESSMENT

For

Unexploded Ordnance Removal From Waters Adjacent to the K-2 Impact Area

At

Marine Corps Base Camp Lejeune, NC

June 2020

This page intentionally left blank.

Abstract

Designation:	Environmental Assessment
Title of Proposed Action:	Unexploded Ordnance Removal from Waters Adjacent to the K-2 Impact Area
Project Location:	Marine Corps Base Camp Lejeune, NC
Lead Agency for the EA:	U.S. Marine Corps Installations East – Marine Corps Base Camp Lejeune
Cooperating Agency:	None
Affected Region:	New River, NC
Action Proponent:	Marine Corps Installations East - Marine Corps Base Camp Lejeune
Point of Contact:	Jessi Baker Environmental Planning Program Manager 12 Post Lane Camp Lejeune, NC 28547 Email address: jessi.baker@usmc.mil
Date:	June 2020

The U.S. Marine Corps Installations East – Marine Corps Base Camp Lejeune has prepared this Environmental Assessment in accordance with the National Environmental Policy Act, as implemented by the Council on Environmental Quality Regulations and U.S. Navy regulations for implementing the National Environmental Policy Act. The Proposed Action would reduce the public safety risk associated with historical munitions and explosives of concern located in the waters of the New River adjacent to the K-2 Impact Area at Marine Corps Base Camp Lejeune, North Carolina. The Proposed Action involves intrusive investigation (i.e., locating and removing munitions and explosives of concern) within approximately 800 acres of water within the New River. This Environmental Assessment evaluates the potential environmental impacts associated with the Proposed Action and the No Action Alternative to the following resource areas: water resources, biological resources, noise, public health and safety, recreation, coastal zone, socioeconomics, and environmental justice.

This page intentionally left blank.

EXECUTIVE SUMMARY

ES.1 Proposed Action

The Marine Corps Installations East – Marine Corps Base Camp Lejeune (MCIEAST-MCB Camp Lejeune) proposes to reduce the public safety risk associated with historical potential Unexploded Ordnance (UXO) located in the waters of the New River adjacent to the K-2 Impact Area at Marine Corps Base (MCB) Camp Lejeune, North Carolina. The potentially affected waters of the New River total approximately 800 acres adjacent to the K-2 Impact Area and includes shallow (less than 3 feet) and deep water (3 to 10 feet).

ES.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to reduce the volume of Munitions and Explosives of Concern (MEC) and Material Potentially Presenting an Explosive Hazard (MPPEH) in the New River adjacent to the K-2 Impact Area. The need for the Proposed Action is to reduce the potential risks to public safety, marine species, and the environment.

ES.3 Alternatives Considered

Alternatives were developed for analysis based upon the following reasonable alternative screening factors: protection of human health and the environment; reduction of explosive risk by reducing the MEC/MPPEH volume; anticipated regulatory and private community acceptance of the alternative; and anticipated implementation cost. The USMC evaluated several alternatives and determined to only carry forward one action alternative that would meet the purpose of and need for the Proposed Action. The No Action Alternative is also included.

The Proposed Action (Preferred Alternative) would involve reducing the public safety concern within 800 acres of the New River adjacent to the K-2 Impact Area. The Proposed Action includes identifying and removing MEC/MPPEH from the riverbed and would have an approximate in-water duration of 12 months. The proposed method for identifying and removing MEC/MPPEH is described below.

Anomalies (metallic items on the river bottom) would be identified using surface digital geophysical mapping (in shallow waters, less than 3 feet) and underwater digital geophysical mapping (in deep waters, 3 to 10 feet). The mapping equipment would be towed by an all-terrain vehicle (in shallow water) or a small watercraft (in deep water). The anomalies would be intrusively investigated using hand digging techniques by a qualified diver. All anomalies determined to be MEC/MPPEH would be removed from the project area and taken to the upland K-2 Range for disposal. There may be situations in which the diver cannot safely relocate the MEC to the K-2 Range after exposing it in the riverbed. In those situations, the MEC would have to be detonated in place. The in-water detonation is considered unlikely to occur, however, the possibility exists so it is included in the Proposed Action. A temporary Exclusion Zone would be established around the MEC/MPPEH being investigated to ensure safety of the public and the dive team. The size of the Exclusion Zone would vary depending on the activity taking place and the explosive weight of the item being investigated. The area would be monitored for manatees, marine mammals, and sea turtles during all in-water activities. Work would cease until these animals were clear of the area during activities that may be harmful to these animals.

Under the No Action Alternative, the Proposed Action would not occur. The Marine Corps would not reduce the safety risk associated with MEC/MPPEH within waters adjacent to the K-2 Impact Area. The

area would remain posted with existing warning signs cautioning the public against bottom-disturbing activities due to the potential hazard.

ES.4 Summary of Environmental Resources Evaluated in the EA

Council on Environmental Quality regulations, National Environmental Policy Act, and U.S. Navy regulations for implementing the National Environmental Policy Act, specify that an Environmental Assessment (EA) should address those resource areas potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact.

The following resource areas have been addressed in this EA: water resources, biological resources, noise, public health and safety, recreation, coastal zone, socioeconomics, and environmental justice. Because potential impacts were considered to be negligible or nonexistent, the following resources were not evaluated in this EA: air quality, land use, geology, topography, soils, groundwater, floodplains, wetlands, cultural resources, airspace, infrastructure and transportation, visual resources, and hazardous materials and wastes.

ES.5 Summary of Potential Environmental Consequences of the Action Alternatives and Major Mitigating Actions

Table ES-1 provides a tabular summary of the potential impacts to the resources associated with each of the alternative actions analyzed.

Table ES-1. Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Proposed Action (Preferred Alternative)*
Water Resources	No change to the existing water resources.	Operation of all-terrain vehicles in shallow water areas, operation of watercraft, hand digging to expose MEC, and in-water detonation of MEC would all disturb sediments which would increase turbidity. The turbidity would be short-term and impacts to water quality are expected to be minor.
Biological Resources	No change to the existing biological resources.	In-water activities, to include operation of watercraft, hand digging, and possible in-water detonation, could potentially disturb wildlife and protected species. MCIEAST-MCB Camp Lejeune prepared a Biological Assessment for this action and consulted with U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries Service. The Proposed Action may affect, but is not likely to adversely affect the West Indian manatee, Red knot, Green sea turtle, Loggerhead sea turtle, Leatherback sea turtle, Kemp's Ridley sea turtle, Hawksbill sea turtle, Atlantic sturgeon, and Shortnose sturgeon. If in-water detonation were required, the noise would potentially disturb Atlantic spotted and Bottlenose dolphins. MCIEAST-MCB Camp Lejeune prepared an Incidental Harassment

Table ES-1. Summary of Potential Impacts to Resource Areas		
Resource Area	***No Action Alternative***	***Proposed Action (Preferred Alternative)***
		Authorization and consulted with National Oceanic and Atmospheric Administration Fisheries Service. If in-water detonation were required, the noise could potentially result in injury or mortality to fish species. MCIEAST-MCB Camp Lejeune prepared an Essential Fish Habitat Assessment for this action and consulted with National Oceanic and Atmospheric Administration Fisheries Service.
Noise	No change to the existing noise environment.	MCB Camp Lejeune is an active military installation with active training ranges, as such artillery and explosive noise is common. The airborne noise generated by the all-terrain vehicles and the airborne and underwater noise from small watercraft would be the same as the noise produced by other recreational and commercial watercraft in the area. This noise would be negligible in the current acoustic environment. Similarly, if an in-water detonation were required it would not create an airborne noise disturbance different than what currently occurs on a routine basis. Any necessary detonations would not change the existing noise contours in the project area or expose any new sensitive noise receptors. The detonations, if required, would create a temporary underwater noise disturbance for marine animals.
Public Health and Safety	No change to existing public health and safety. Public safety risks would continue to be serious; especially during bottom-disturbing activities that have the potential to strike a MEC.	All in-water activities would be performed in accordance with required safety plans and standards of procedure. Establishing a temporary Exclusion Zone would prohibit unauthorized persons from entering the project site, ensuring public safety. After completion of the Proposed Action, the current public safety risk associated with historical UXO would be greatly reduced in the project area.
Recreation	No change to existing recreation opportunities. The USMC would continue to encourage the public to not access the area via the warning signs.	The temporary Exclusion Zones would prevent the public from accessing small areas of the New River. It is expected that recreational users could use other areas of the New River during these temporary closures with little to no impact.

Table ES-1. Summary of Potential Impacts to Resource Areas		
Resource Area	***No Action Alternative***	***Proposed Action (Preferred Alternative)***
Coastal Zone	No change to the coastal zone.	The Proposed Action is consistent with the enforceable policies of North Carolina's Coastal Zone Management Plan. The North Carolina Division of Coastal Management provided concurrence on a Federal Consistency Determination for this project .
Socioeconomics	No change to the socioeconomics.	The temporary Exclusion Zones would prevent commercial and recreational fishermen and hunters from accessing the project site. It is expected that other areas of the New River could be used for commercial fishing, however, reducing access to this area could potentially reduce revenues to the commercial fishing industry. This impact would be temporary and short-term (project duration is expected to be 12 months). The Proposed Action is not expected to have a noticeable impact on the revenue associated with recreational hunting or fishing in the area.
Environmental Justice	No environmental justice concerns.	The Proposed Action would not impact minority populations or populations living below poverty in the vicinity of the project site.

ES.6 Public Involvement

MCIEAST-MCB Camp Lejeune hosted a public awareness meeting on January 26, 2016 to inform the public and interested stakeholders about the potential safety risks within the New River adjacent to the K-2 Impact Area. In conjunction with the public meeting, the Marine Corps received comments on the safety risks and considered that input in the development of the proposed action and alternatives.

A NOA of the Final EA and the Finding of No Significant Impact (FONSI) (if applicable) will be published in the Jacksonville Daily News. This notice will inform the public and stakeholders the decision that was made with respect to this action.

Preliminary Final

Environmental Assessment for Unexploded Ordnance Removal From Waters Adjacent to K-2 Impact Area

TABLE OF CONTENTS

List of Figures

List of Tables

Abbreviations and Acronyms

Acronym	Definition
AEC	Areas of Environmental Concern
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
CAA	Clean Air Act
CAMA	Coastal Area Management Act
CCD	Coastal Consistency Determination
CDNL	C-weighted Day-Night Average Sound Level
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	decibel
dBA	A-weighted sound level
DDESB	Department of Defense Explosive Safety Board
DoD	Department of Defense
DON	United States Department of the Navy
DPS	distinct population segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
HAPC	habitat areas of particular concern
HQW	High Quality Waters
Hz	Hertz
IHA	Incident Harassment Authorization
MBTA	Migratory Bird Treaty Act
MCB	Marine Corps Base
MCIEAST-MCB Camp Lejeune	U.S. Marine Corps Installations East – Marine Corps Base Camp Lejeune
MCO	Marine Corps Order
MEC	Munitions and Explosives of Concern
Mm	millimeter
MMPA	Marine Mammal Protection Act
MPPEH	Material Potentially Presenting an Explosive Hazard
NCAC	North Carolina Administrative Code
NCDEQ	North Carolina Department of Environmental Quality
NCDMF	North Carolina Division of Marine Fisheries
NCMFC	North Carolina Marine Fisheries Commission
NCWRC	NC Wildlife Resources Commission
NEPA	National Environmental Policy Act
NEW	Net explosive weight
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	notice of availability
NOAA	National Oceanic and Atmospheric Administration

Acronym	Definition
NOTMARs	Notice to Marines
NSW	Nutrient Sensitive Waters
OPNAVINST	Chief of Naval Operations Instruction
ORC	Operational Range Clearance
OSHA	Occupational Safety and Health Administration
PL	Public Law
RAICUZ	Range Air Installations Compatible Use Zone
RCRA	Resource Conservation and Recovery Act
ROI	Region of Influence
SONAR	Sound Navigation and Ranging
TNT	trinitrotoluene
U.S.	United States
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
UXO	Unexploded ordnance

This page intentionally left blank.

1 Purpose of and Need for the Proposed Action

1.1 Introduction

The U.S. Marine Corps Installations East – Marine Corps Base Camp Lejeune (MCIEAST-MCB Camp Lejeune) proposes to reduce the public safety risk associated with historical potential Unexploded Ordnance (UXO) located in the waters of the New River adjacent to the K-2 Impact Area at Marine Corps Base (MCB) Camp Lejeune, North Carolina.

This Environmental Assessment (EA) has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) (42 United States [U.S.] Code [U.S.C.] section 4321 et seq.); the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508); U.S. Navy regulations implementing NEPA (32 CFR 775); Marine Corps Order (MCO) 5090.2, Volume 12; and all other applicable laws, regulations, Executive Orders (EOs), and instructions.

1.2 Background and Location

1.2.1 K-2 Impact Area

The K-2 Impact Area encompasses multiple firing range fans and surface danger zones from land-based operational ranges on MCB Camp Lejeune that once extended into the New River but are now wholly contained on land. The firing range fans and surface danger zones are the ground and airspace areas designated for the containment of projectiles, fragments, debris and components from the firing, launching, or detonating of weapon systems to include explosives and demolitions. The K-2 Range is currently an operational range that supports a variety of ordnance from 5.56 millimeter (mm) to 84 mm projectiles, MK76 practice bombs, and MK80 series bombs. Historically, the K-2 Impact Area was used to accept a variety of artillery up to 155 mm projectiles. Although the range fans and danger zones have been modified so that they no longer overlap the New River, the K-2 Impact Area once included a buffer area affecting approximately 800 acres of the New River along approximately 5 miles of the west and south banks that is known to include unexploded projectiles, rockets, and grenades from past range operations (**Figure 1.2-1**). The perimeter of the area where UXO are present in the waters adjacent to the K-2 Impact Area in the New River are posted with signs cautioning against bottom-disturbing activities due to the potential hazard; however, the area is currently open to commercial or recreational users.

1.2.2 Underwater Investigations of the New River

During routine activities to clear UXO from the land area of the K-2 Range, UXO was identified along the beach and below the mean high water line, indicating the likely occurrence of UXO in the adjacent waters. In 2014-2015 under the Operational Range Clearance (ORC) program, initial investigation of the water adjacent to the K-2 Range along the New River shoreline located a number of “anomalies” and determined many to be historical UXO.

The former buffer area of the K-2 Impact Area that overlaps the New River was investigated in 2014 through low-altitude magnetic and electromagnetic aerial geophysical surveys (CH2M 2015a). The objective of these surveys was to locate ordnance-related metallic items for subsequent removal. These surveys identified 5,000 metallic anomalies. A follow-on investigation was performed October 2014 through March 2015 that targeted these anomalies to determine if they were munitions and explosives of concern (MEC) or material potentially presenting an explosive hazard (MPPEH).

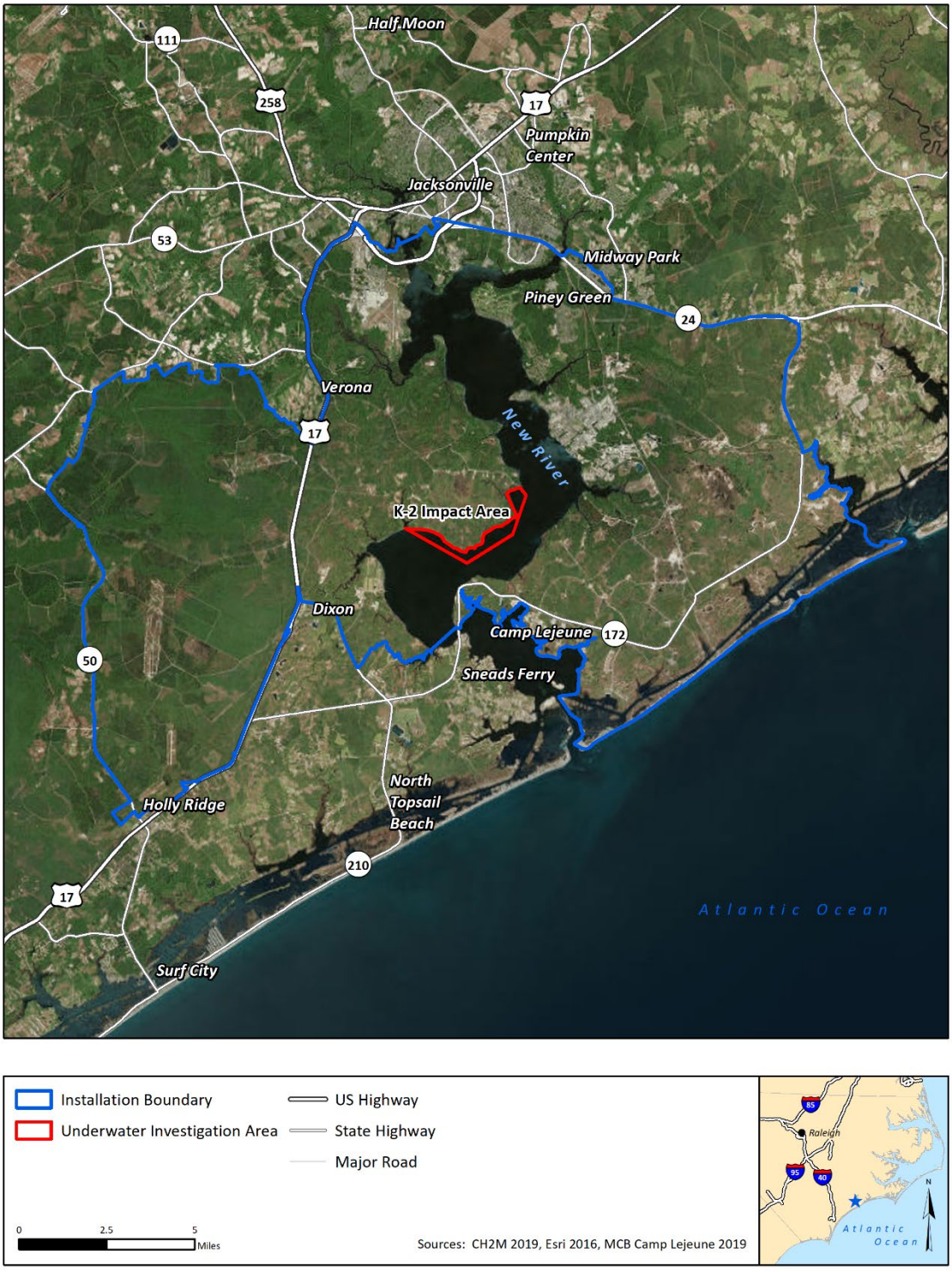


Figure 1.2-1. K-2 Impact Area at MCB Camp Lejeune

That investigation recommended that 622 of the anomalies be further investigated. A total of 572 anomalies were intrusively investigated (i.e., a diver dug up to 1 foot below the riverbed surface to expose the anomaly).The intrusive investigation identified 39 MEC items and 4 MPPEH items that were removed from the riverbed and taken to the land area of the K-2 Impact Area and destroyed through intentional detonations. The remaining anomalies that were intrusively investigated consisted of non-munitions related debris (crab pots, scrap metal, cans, etc.) (CH2M 2015a).

1.2.3 Explosive Hazards Evaluation

As part of the underwater investigations during 2014 to 2015, an explosive hazards evaluation was also performed. For the MEC or MPPEH to result in a human casualty, there must exist the presence of explosive ordnance, a human receptor in contact with, or in the vicinity of, the ordnance, and an event to cause the detonation of the explosive ordnance. Site factors, human factors, and ordnance factors were evaluated to assess the likelihood of an explosive injury occurring (**Table 1.2-1**). The explosive hazard evaluation determined that the situation in the waters adjacent to the K-2 Impact Area was "serious" since a mishap may occur in time and may cause death.

Table 1.2-1. Factors Evaluated to Assess the Likelihood of Explosive Injury

Factor	*Evaluation*
Site Factors	• Accessible for recreational users (kayakers, boaters, duck hunters) • Accessible for commercial fishing (flounder) • Accessible for gathering shellfish (crabs, oysters, clams, shrimp) • Evidence of boaters landing on shoreline • Duck hunting shelters and crab pots within the site
Human Factors	• Humans may make unintentional contact with MEC/MPPEH on river bottom while boating, fishing, clamming, gigging, shell fishing, or wading • Several MEC/MPPEH were on river bottom or just under the sediment
Ordnance Factors	• All MEC items found during 2014/2015 investigation were safe to move, therefore, probability of unintentional detonation by casual contact (i.e. stepping on them) considered low • Anchors and boat propellers striking MEC or use of more sensitive artillery fuzes would increase probability of unintentional detonation • Aggressive contact has a higher probability of detonation (intentional deformation, unintentional aggressive contact)

Legend: MEC - munitions and explosives of concern, MPPEH – material potentially presenting an explosive hazard.

1.3 Purpose and Need for Proposed Action

The purpose of the Proposed Action is to reduce the volume of MEC/MPPEH in the New River adjacent to the K-2 Impact Area. The need for the Proposed Action is to reduce the potential risks to public safety, marine species, and the environment.

1.4 Scope of Environmental Analysis

This EA includes an analysis of potential environmental impacts associated with the Proposed Action and the No Action Alternative. The environmental resource areas analyzed in this EA include: water resources, biological resources, noise, public health and safety, recreation, coastal zone, socioeconomics, and environmental justice. The study area for each resource analyzed may differ due to how the Proposed Action interacts with or impacts the resource.

1.5 Key Documents

Key documents are sources of information incorporated into this EA. Documents are considered to be key because of similar actions, analyses, or impacts that may apply to this Proposed Action. CEQ guidance encourages incorporating documents by reference. Documents incorporated by reference in part or in whole include:

1. Underwater MEC Investigation of the New River within the K-2 Impact Area (CH2M 2015a).
2. K2 Impact Area Underwater MEC Investigation of New River, Work Plan (CH2M 2015b).
3. Alternatives Analysis Report K-2 Range Impact Area of the New River (CH2M 2018).
4. EA MCB Camp Lejeune Range Operations (MCB Camp Lejeune 2009).

1.6 Relevant Laws and Regulations

A variety of laws, regulations, and EOs apply to actions undertaken by Federal agencies and form the basis of the analyses prepared in this EA. These include but are not limited to:

- **NEPA** (42 U.S.C. sections 4321–4370h)
- **CEQ Regulations for Implementing the Procedural Provisions of NEPA** (40 CFR 1500-1508)
- **Navy regulations for implementing NEPA (**32 CFR 775).
- **MCO 5090.2**, Volume 12, Environmental Planning and Review.
- **National Historic Preservation Act** (54 U.S.C. section 306108 et seq.)
- **Endangered Species Act (ESA)** (16 U.S.C. section 1531 et seq.)
- **Migratory Bird Treaty Act (MBTA)** (16 U.S.C. section 703-712)
- **Marine Mammal Protection Act (MMPA)** (16 U.S.C. section 1361 et seq.)
- **Clean Water Act (CWA)** (33 U.S.C. section 1251, et seq.)
- **Coastal Zone Management Act (CZMA)** (16 U.S.C. section 1451 et seq.
- **EO 12898**, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*

1.7 Public and Agency Participation and Intergovernmental Coordination

Regulations from the CEQ direct agencies to involve the public in preparing and implementing their NEPA procedures.

1.7.1 Public and Agency Participation

The Marine Corps hosted a public awareness meeting on January 26, 2016 to inform the public and interested stakeholders about the potential safety risks within the New River adjacent to the K-2 Impact Area. The meeting was held at the Sneads Ferry Community Center and was well attended by recreational and commercial fishermen, local elected officials, media representatives, and other interested persons. In conjunction with the meeting, the Marine Corps established a project specific website that provided information on the safety risk, invited people to the public awareness meeting, and solicited comments on the issue. Twenty-one official comments were received during the open public comment period, most of which were from commercial and recreational fisherman. There was a strong desire for the waters adjacent to the K-2 Impact Area to remain open to fishing.

An NOA of the Final EA and the Finding of No Significant Impact (FONSI) (if applicable) will be published in the Jacksonville Daily News. This notice will inform the public and stakeholders the decision that was made with respect to this action.

1.7.2 Intergovernmental Coordination

MCIEAST-MCB Camp Lejeune will provide a copy of the EA to the North Carolina State Clearinghouse for review. Any correspondence received from the clearinghouse will be provided in **Appendix A** of the Final EA.

MCIEAST-MCB Camp Lejeune submitted an Essential Fish Habitat Assessment to the NOAA Fisheries Service for the Proposed Action on January 9, 2020. NOAA Fisheries Service agreed with the determination and did not provide further conservation recommendations on February 13, 2020. The Essential Fish Habitat Assessment and correspondence with NOAA Fisheries Service is provided in **Appendix B**.

MCIEAST-MCB Camp Lejeune has consulted with the U.S. Fish and Wildlife Service (USFWS) and National Oceanic Atmospheric Administration (NOAA) Fisheries Service in accordance with Section 7 of the ESA for this Proposed Action. An official species list for the waters adjacent to the K-2 Impact Area that may be affected by the Proposed Action was obtained from the USFWS Information for Planning and Consultation system on May 14, 2019. A Biological Assessment and a request for consultation was submitted on November 4, 2019. USFWS provided concurrence with the "may affect, but not likely to adversely affect" determination for species within their jurisdiction on December 13, 2019. Concurrence from NOAA Fisheries Service for the species within their jurisdiction is still pending. All Section 7 consultation correspondence is provided in **Appendix C**.

MCIEAST-MCB Camp Lejeune submitted an Incident Harassment Authorization (IHA) to the NOAA Fisheries Service in accordance with the MMPA on December 4, 2019 for the Proposed Action (**Appendix D**). Response from NOAA Fisheries Service is still pending.

MCIEAST-MCB Camp Lejeune submitted a Federal Coastal Consistency Determination (CCD) for this Proposed Action to the North Carolina Department of Environmental Quality (NCDEQ), Division of Coastal Management on January 6, 2020. The NCDEQ concurred that the Proposed Action is consistent with the enforceable policies of North Carolina's Coastal Management Program on March 6, 2020. The CCD and agency correspondence is provided in **Appendix E.**

This page intentionally left blank.

2 Proposed Action and Alternatives

2.1 Proposed Action

The Proposed Action is to reduce the public safety risk associated with potential UXO located in approximately 800 acres of the New River from historical range operations at MCB Camp Lejeune, North Carolina. The potentially affected waters of the New River adjacent to the K-2 Impact Area includes shallow (less than 3 feet) and deep water areas (up to 10 feet). Three Areas of Concern near the shoreline (65 acres, 17 acres, and 94.6 acres in size [177 acres total]) have been identified where a higher density of MEC/MPPEH were identified during previous surveys (CH2M 2015a) (**Figure 2.2-1**) (CH2M 2018). These high density areas indicate potential historical target areas.

2.2 Screening Factors

NEPA's implementing regulations provide guidance on the consideration of alternatives to a federally Proposed Action and require rigorous exploration and objective evaluation of reasonable alternatives. Only those alternatives determined to be reasonable and to meet the purpose and need require detailed analysis. Potential alternatives that meet the purpose and need were evaluated against the following screening factors:

- Protection of human health and the environment.
- Reduction of explosive risk by reducing the potential MEC/MPPEH volume.
- Anticipated regulatory and private community acceptance of the alternative.
- Anticipated implementation cost.

In addition to the screening factors, the alternatives were ranked in terms of the relative explosive risk that would remain following implementation. Based on the natural and physical conditions of the New River and the information gathered during the extensive investigations of the waters adjacent to the K-2 Impact Area (see **Section 1.2.2**), there is no way to completely eliminate the explosive risk in this area of the New River. Alternatives that investigate areas where the highest density of MEC/MPPEH was found and those that investigate more acreage of the waters adjacent to the K-2 Impact Area were ranked higher. Several alternatives to reduce the public safety risk within the waters adjacent to the K-2 Impact Area were considered and are summarized below.

Alternative 1: Restrict Access to Waters Adjacent to the K-2 Impact Area. Under this alternative, MCIEAST-MCB Camp Lejeune would recommend that the U.S. Army Corps of Engineers (USACE) establish a danger zone, as defined in 33 CFR 334.2, to close access to this part of the New River to the public. There are existing signs within the river along the entire investigation area that warn users of the potential danger in this area. Under this alternative the message on these signs would be changed to restrict the public and unauthorized personnel from entering the area so that no intentional or unintentional bottom-disturbing activities, such as anchoring, clamming or crabbing, would be conducted.

Alternative 2: Restrict Access to Areas of Concern. Similar to the alternative above, under this alternative MCIEAST-MCB Camp Lejeune would recommend that the USACE establish a danger zone, as defined in 33 CFR 334.2, to close access to the Areas of Concern. This alternative would involve installing restriction signs around the three Areas of Concern near the shoreline.

Note*:* MEC locations shown on this figure are from the 2014/2015 survey. These locations may not be exact or represent all of the MEC within the waters adjacent to the K-2 Impact Area.
Legend: MEC - munitions and explosives of concern.

Figure 2.2-1. Areas of Concern within K-2 Impact Area

Alternative 3: Restrict Access to Areas of Concern and Investigate a Portion of the Deep Water. This alternative would restrict access to Areas of Concern (as described above) and investigate a portion of the deep water to better characterize the extent of MEC/MPPEH in the deep water. Underwater digital geophysical mapping would be performed along transects in approximately 10 percent of the deep water areas (48 acres). This mapping involves a boat towing geophysical equipment through the water. The equipment would be mounted on the instrument platform that is either floating on the water surface or beneath the surface at a designated distance/depth above the river bottom. The mapping would identify underwater anomalies that could be potential MEC/MPPEH. The anomalies would then be intrusively investigated. Any MEC or MPPEH identified would be disposed. A temporary exclusion zone would be established around areas of intrusive work to ensure dive team and public safety. Depending on the location of the intrusive work, the exclusion zone could extend into the channel. The in-water work would be expected to last approximately 3 months.

Terminology used in this EA:

Identification involves using geophysical, visual, and sound navigation and ranging (SONAR) technologies to survey the area and identify metallic "anomalies" on the riverbed or just beneath the sediment surface.

Anomalies are metallic items on the riverbed that should not naturally be there and could include scrap metal, old crab pots, and MEC/MPPEH.

Once anomalies are identified, they are ***intrusively investigated*** by a UXO qualified dive team using hand digging techniques to determine if they are MEC/MPPEH or simply scrap metal.

Alternative 4: Investigate Shallow Water Area. This alternative would involve investigating all of the shallow water area (less than 3 feet deep, approximately 320 acres) adjacent to the shoreline using a "mag-and-dig" technique. This technique involves a team of technicians employing magnetometers and/or metal detectors in shallow water in a systematic pattern to identify anomalies. Where there is a "hit", the technician immediately digs (using hand tools such as shovels, airblade, or portable suction) until the anomaly is recovered. Any MEC/MPPEH found would be disposed. Depending on the location of the intrusive work, the temporary exclusion zone could extend into the channel. The in-water work would be expected to last approximately 9 months.

Alternative 5: Investigate Shallow Water Areas and a Portion of the Deep Water. This alternative would involve investigating all of the shallow water area (approximately 320 acres) using surface digital geophysical mapping, and conducting underwater digital geophysical mapping (described above) along transects within approximately 10 percent of the deep water area (48 acres) to evaluate the lateral extent of the metallic anomalies present within the waters adjacent to the K-2 Impact Area. The anomalies in both the shallow and deep water areas would be intrusively investigated. Any MEC/MPPEH found would be disposed. Depending on the location of the intrusive work, the temporary exclusion zone could extend into the channel. The in-water work would be expected to last approximately 15 months.

Alternative 6: Investigate Shallow and Northern Deep Water Area. This alternative would involve investigating all of the shallow water area (approximately 320 acres) using mag-and-dig techniques, and investigating approximately 114 acres of deep water within the northern portion of the impact area where the highest density of MEC was found. The deep water area would be investigated using underwater digital geophysical mapping and subsequent investigation of identified anomalies as

described in alternatives above. Any MEC or MPPEH found would be disposed. Depending on the location of the intrusive work, the temporary exclusion zone could extend into the channel. The in-water work would be expected to last approximately 18 months.

Alternative 7: Investigate Areas of Concern. This alternative would involve investigating all of the Areas of Concern (177 acres) using surface or underwater digital geophysical mapping. The anomalies would be intrusively investigated. Any MEC or MPPEH found would be disposed. Depending on the location of the intrusive work, the temporary exclusion zone could extend into the channel. The in-water work would be expected to last approximately 9 months.

Alternative 8: Investigate Areas of Concern and a Portion of the Deep Water (Preferred Alternative). This alternative would involve investigating all of the Areas of Concern (177 acres). In addition, underwater digital geophysical mapping would be conducted along transects across all of the deep water areas outside of the Areas of Concern (approximately 40 acres). Identified anomalies would be intrusively investigated. Any MEC or MPPEH found would be disposed. Depending on the location of the intrusive work, the temporary exclusion zone could extend into the channel. The in-water work would be expected to last approximately 12 months.

Alternative 9: Investigate Shallow and Deep Water Areas. This alternative would involve investigating 100 percent of the shallow water area (320 acres) using surface digital geophysical mapping and conducting underwater digital geophysical mapping along transects within 100 percent of the deep water area (480 acres). All identified anomalies within both the shallow and deep water areas would be intrusively investigated. Any MEC or MPPEH found would be disposed. Depending on the location of the intrusive work, the temporary exclusion zone could extend into the channel. The in-water work would be expected to last approximately 34 months.

A summary of the alternatives evaluation is provided in **Table 2.2-1**.

Table 2.2-1. Summary of Alternative Evaluation

Alternative	*Acreage Intrusively Investigated*[1]	*Protection of human health and environment*	*Reduction of MEC/MPPEH volume*	*Regulatory and Private Community Acceptance*	*Estimated Cost*	*Relative Risk Ranking* [2]	*Carry Forward?*
Alternative 1	0	Moderate	None	Unlikely	$348,200	7	No
Alternative 2	0	Low	None	Unlikely	$248,400	9	No
Alternative 3	48	Moderate	Moderate	Unlikely	$1,115,200	8	No
Alternative 4	320	Moderate	Moderate	Likely	$2,959,400	6	No
Alternative 5	368	High	Moderate	Likely	$5,011,000	5	No
Alternative 6	434	High	Moderate	Likely	$5,702,900	2	No
Alternative 7	177	Moderate	Moderate	Likely	$3,554,500	4	No
Alternative 8 (Preferred Alternative)	217	High	Moderate	Likely	$4,056,100	3	Yes
Alternative 9	800	High	High	Likely	$14,198,500	1	No

Source: Modified from Alternatives Analysis Report K-2 Range Impact Area of the New River (CH2M 2018).

Notes: [1] Acreage intrusively investigated refers to the total area where MEC/MPPEH would be physically removed, thus reducing the volume of MEC/MPPEH.

[2] 1 is the lowest estimated risk and 9 is the highest estimated risk remaining following implementation of the alternative.

Legend: MEC - munitions and explosives of concern; MPPEH – material potentially presenting an explosive hazard

2.3 Alternatives Considered but Not Carried Forward for Detailed Analysis

Alternatives 1, 2, and 3 would all involve restricting access to all or parts of the waters adjacent to the K-2 Impact Area. Restricting access would not reduce the volume of potential MEC/MPPEH, therefore, these alternatives would have the highest explosive risk after implementation. In addition, restricting access to the area would not be an acceptable alternative to the private community given the current commercial and recreational use of the area. Therefore, these alternatives do not meet the purpose and need and thus were eliminated from further analysis.

Alternatives 4 and 7 would only provide moderate protection of the public and reduction of the potential MEC/MPPEH as these would not address deep water areas outside the Areas of Concern. Alternative 5 would provide high protection of the public, but does not focus on reducing the MEC/MPPEH within the Areas of Concern. The relative explosive risk after implementation of these alternatives would still be too high. These alternatives do not meet the purpose and need and thus were eliminated from further analysis.

Alternative 6 would provide high protection of the public by investigating the shallow water areas and the northern deep water and is likely to be accepted by the public. However, this alternative would not address reduction of the potential MEC and MPPEH volume within all of the deep water nor does it concentrate efforts at the Areas of Concern. This alternative does not meet the purpose and need and thus was eliminated from further analysis.

Alternative 9 provides a high protection of the public and addresses all high density areas of MEC. While this alternative would reduce the highest volume of MEC/MPPEH, it would take much longer to implement (up to three years) and the cost to implement this alternative would be substantially high. Since there is no way to completely eliminate the explosive risk, this alternative was eliminated from further analysis based on cost in favor of another alternative that achieves the same high protection of the public for a much lower cost.

2.4 Alternatives Carried Forward for Analysis

Based on evaluation of the alternatives against the screening factors and whether or not they meet the purpose and need for the Proposed Action, one Action Alternative was identified for detailed analysis within this EA along with the No Action Alternative.

2.4.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. MCIEAST-MCB Camp Lejeune would not restrict access to or reduce the safety risk associated with MEC/MPPEH within waters adjacent to the K-2 Impact Area. The area would remain posted with existing warning signs cautioning the public against bottom-disturbing activities due to the potential hazard. The No Action Alternative would not meet the purpose and need for the Proposed Action; however, as required by NEPA, the No Action Alternative is carried forward for analysis in this EA. The No Action Alternative will be used to analyze the consequences of not undertaking the Proposed Action, not simply conclude no impact, and will serve to establish a comparative baseline for analysis.

2.4.2 Proposed Action (Preferred Alternative)

The Proposed Action (Preferred Alternative) would include investigating the Areas of Concern (177 acres) and approximately 40 acres of deep water outside of the Areas of Concern, described as Alternative 8 in **Section 2.2** (**Figure 2.4-1**).

Notes: MEC locations shown on this figure are from the 2014/2015 survey. These locations may not be exact or represent all of the MEC in waters adjacent to the K-2 Impact Area.

Legend: MEC - munitions and explosives of concern, UDGM - underwater digital geophysical mapping.

Figure 2.4-1. Proposed Action

The Proposed Action would have an approximate in-water duration of 12 months. This alternative focuses on investigation within the Areas of Concern, where a higher density of MEC may be present. In addition, a portion of the deep water area would be investigated to better assess the potential presence of MEC/MPPEH in this area.

2.4.2.1 Investigate Areas of Concern

The Proposed Action includes investigating 100 percent of the Areas of Concern within waters adjacent to the K-2 Impact Area (approximately 177 acres). The Areas of Concern have the highest density of potential MEC/MPPEH and are thought to contain the historical target areas of the K-2 Range. The three Areas of Concern contain both shallow water areas (approximately 94 acres) and deep water areas (approximately 83 acres). This investigation would include the anomalies identified by aerial geophysical surveys, but not selected for investigation during the 2014/2015 investigation (CH2M 2015a). Anomalies would be identified using surface digital geophysical mapping (shallow waters) and underwater digital geophysical mapping (deep waters). The location of the anomaly would be flagged with either polyvinyl chloride (PVC) tubing or a buoy with an attached weight. The digital geophysical mapping would take approximately 2.5 months to complete.

Shallow Water: Surface digital geophysical mapping uses a high sensitivity, high resolution metal detector that can detect both ferrous and non-ferrous metal. The system can be pushed or pulled as a trailer, by a person or vehicle, such as an all-terrain vehicle (See **Figure 2.4-2**).

(Photo credit: 3DGeophysics.com)

Figure 2.4-2. Surface digital geophysical mapping

Deep Water: A small to medium-sized boat is used to perform underwater digital geophysical mapping which uses an underwater magnetometer to map geophysical anomalies. The underwater digital geophysical mapping towed array consists of a 13-foot wide sensor that is designed to operate in 2 to 50 feet of water, and in close proximity to, but have no contact with the bottom (See **Figure 2.4-3**).

(Photo credit: 3DGeophysics.com)

Figure 2.4-3. Underwater digital geophysical mapping

Anomalies within the Areas of Concern would be intrusively investigated. Intrusive investigation would be done by a UXO qualified dive team in accordance with Department of Defense (DoD) Explosives Safety Board (DDESB) Technical Publication 18, *Minimum Qualifications for UXO Technicians and Personnel* (DDESB 2004). Intrusive investigation of the Areas of Concern is expected to take approximately 6.5 months to complete.

Any anomalies determined to be MEC/MPPEH during the intrusive investigation would be removed from the water and taken to the upland area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal in accordance with existing standard operating procedures. Because the items found in the water are associated with historic K-2 Range activities, relocating potential MEC/MPPEH to the upland area of the K-2 Range would be in compliance with the Environmental Protection Agency's Military Munitions Rule, and a Resource Conservation and Recovery Act permit would not be required. Detonation in the upland portion of the range has been evaluated in previous NEPA documentation and will not be addressed in this EA (MCB Camp Lejeune 2009).

2.4.2.2 Investigate Portion of Deep Water Outside the Areas of Concern

The Proposed Action would include investigating a portion of the deep water areas adjacent to the K-2 Impact Area outside of the Areas of Concern to better characterize the extent of potential MEC/MPPEH within these areas. Underwater digital geophysical mapping would be performed along transects to cover approximately 10 percent of the deep water area outside of the Areas of Concern (approximately 40 acres) to evaluate the extent of MEC within the waters adjacent to the K-2 Impact Area. Underwater

digital geophysical mapping would occur in the deep waters along transects using the same methods as described in **Section 2.4.2.1**.

Anomalies identified along the transects would be intrusively investigated as described in **Section 2.4.2.1**. Any anomalies determined to be MEC/MPPEH during the intrusive investigation would be removed from the water and taken to the land area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal. The investigation in the deep water area would take approximately 3 months.

2.4.2.3 In-water Detonation of MEC

There may be situations in which the diver cannot safely relocate the MEC to the K-2 Range after exposing it in the riverbed. In those situations, the MEC would have to be detonated in place. Although in-water detonation was not required during any of the intrusive investigations of previous surveys (CH2M 2015a, 2018) and is considered unlikely to occur, the possibility exists so it is included in the Proposed Action. It is anticipated that no more than five MEC would require in-water detonation throughout the intrusive investigation. The detonations would occur one at a time throughout the duration of intrusive investigations. This represents a conservative estimate of approximately one percent of the anomalies identified during the 2014/2015 investigations. For analysis purposes and to provide the worst-case scenario, it is assumed the most explosive ordnance historically used at the range and previously discovered in waters adjacent to the K-2 Impact Area, the 155 mm projectile, would be detonated in the water (CH2M 2015a).

The 155 mm ordnance that has been identified in previous surveys within the waters adjacent to the K-2 Impact Area was determined to be the M101 and/or the M107 155mm high explosive loaded projectiles fired from a gun or howitzer, respectively. The characteristics of these projectiles will be used for analytical purposes in this EA to represent a worst case scenario. The artillery fuze used on these historical projectiles was the point detonating fuze. This is the most commonly used fuze on high explosive loaded projectiles. These projectiles contain 14.6 pounds of trinitrotoluene (TNT) and have an assumed casualty radius on land of approximately 164 feet and a hazardous fragment distance of 389 feet (CH2M 2015a). The hazardous fragment distance was obtained from DDESB publications and is for surface detonations without engineering controls to reduce the fragmentation (such as burial). The explosive safety quantity distance would be used to establish a temporary exclusion zone for public and non-essential personnel during in-water detonations. This distance would vary depending on the depth of the water where the detonation would occur (**Table 2.4-1**) and would be in compliance with the Naval Sea Systems Command Ordnance Pamphlet 5 Volume 1 Seventh Revision "Ammunition and Explosives Safety Ashore".

Table 2.4-1. Explosive Safety Quantity Distance for In-Water Detonations

Ordnance	*Depth of Water (feet)*	*Explosive Safety Quantity Distance (feet)*
155 mm M107	1	1,635
	5	355
	10	157

Source: CH2M 2015b
Legend: mm – millimeter

Explosives detonated underwater would introduce loud, impulsive, broadband sounds into the marine environment. Three factors influence the sound effect of an explosive: the weight of the explosive material, the type of explosive material, and the detonation depth. The net explosive weight (the weight of the TNT required to produce an equivalent explosive power – net explosive weight [NEW]) accounts for the first two parameters, and in this case is estimated to be 14.6 pounds. The water depth adjacent to the K-2 Impact Area ranges from less than 1 foot near the shoreline to approximately 10 feet. In the event an intentional detonation would need to occur, sandbags or an earthen berm would be established around the MEC to contain the noise and debris. Sandbags would be filled with clean fill sand. Any sandbags or earthen berms would be removed after detonation. The temporary exclusion zone would be surveyed for the presence of marine mammals prior to a detonation and would not occur until the zone was free of marine mammals.

2.4.2.4 Establish Exclusion Zone

A temporary exclusion zone would be established during intrusive investigation activities to ensure the safety of the public as well as UXO technicians/divers. The exclusion zone is an explosive safety quantity distance established to protect personnel and the public from an unintentional detonation during intrusive investigation activities (**Table 2.4-2**). The exclusion zone would be temporary and established as a radius around the area being investigated only when the UXO technicians/divers are working in the area. Since the exclusion zone could be established at an investigation site anywhere within the underwater investigation area, **Figure 2.4-4** illustrates the maximum distance for an exclusion zone of either distance. An exclusion zone would also be established during any intentional in-water detonation and would vary depending on the depth of the water where the detonation would occur. The exclusion zone would be monitored by a chase boat. Access to the exclusion zone by unauthorized personnel would result in ceasing all operations until the zone is cleared.

Table 2.4-2. Exclusion Zones

Activity	*Explosive Safety Quantity Distance*
Intrusive Investigation, Above the Water	613 feet
Intrusive Investigation, Below the Water	2,130 feet
Intentional In-Water Detonation	See **Table 2.4-1**

Source: Adapted from CH2M 2015b

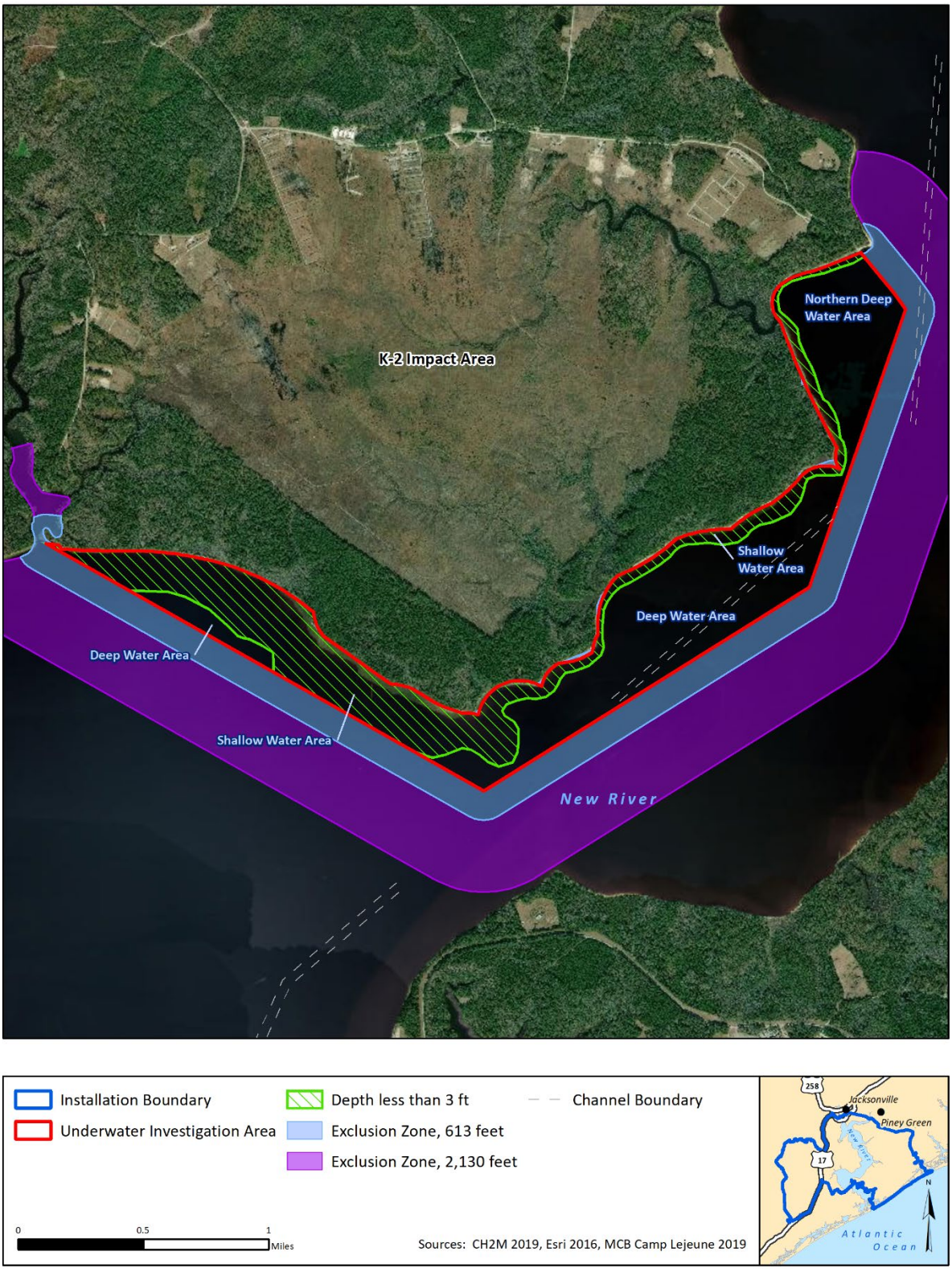


Figure 2.4-4. Exclusion Zones

2.5 Best Management Practices Included in the Proposed Action

This section presents an overview of the best management practices (BMPs) that are incorporated into the Proposed Action in this document. BMPs are existing policies, practices, and measures that the Marine Corps would adopt to reduce the environmental impacts of designated activities, functions, or processes. Although BMPs mitigate potential impacts by avoiding, minimizing or reducing/eliminating impacts, BMPs are distinguished from potential mitigation measures because BMPs are (1) existing requirements for the Proposed Action, (2) ongoing, regularly occurring practices, or (3) not unique to this Proposed Action. In other words, the BMPs identified in this document are inherently part of the Proposed Action and are not potential mitigation measures proposed as a function of the NEPA environmental review process for the Proposed Action. **Table 2.5-1** includes a list of BMPs.

Table 2.5-1. Best Management Practices

BMP	*Description*	*Impacts Reduced/Avoided*
Maintain the existing warning signs.	Existing warning signs that inform the public of the potential danger in this area would continue to be maintained by MCB Camp Lejeune.	Reduce impacts to Public Safety.
Issue Notice to Mariners (NOTMARs).	NOTMARs would be issued to inform commercial and recreational users of the New River of the planned in-water activities associated with the intrusive investigations or the in-water detonations (if necessary).	Reduce impacts to Public Safety.
Work would cease upon discovery of any unmapped cultural or archaeological materials or resources.	Any work within underwater investigation area would cease upon discovery of unknown cultural resources. The MCB Camp Lejeune Cultural Resources Manager would be notified. Work would not continue without approval by MCB Camp Lejeune Cultural Resources Manager.	Reduce impacts to cultural resources.
Visual surveys for unauthorized persons.	Visual surveys of the project site would be performed to monitor for unauthorized persons during in-water activities.	Reduce impacts to public safety.
Small boat visual checks and avoidance of manatee	Base Order 5090.11A requires all personnel conducting waterborne operations to be alert for possible manatee sightings/encounters, and if a manatee is sighted, immediately slow to a no-wake speed and do not approach.	Reduce impacts to manatee.
Small boat visual checks for protected species.	Operators of small boats will be knowledgeable of marine mammals, protected species, and visual clues related to the presence of marine mammals and protected species. All members of small boat crews shall be required to take the Marine Species Awareness Training maintained and promoted by the Department of the Navy.	Reduce impacts to protected species.
Work would cease upon discovery of a marine mammal or sea turtle.	In-water work that involves boats or any equipment in the project site would cease upon discovery of a marine mammal or sea turtle as identified by observers. Work would not continue until the species moves out of the project site.	Reduce impacts to marine mammals and sea turtles.
Employ sandbags and berms around any in-water detonation sites.	In the event an intentional detonation would need to occur, sandbags or an earthen berm would be established around the MEC to contain the noise and debris.	Reduce impacts to protected species.

Legend: MCB – Marine Corps Base; NOTMARs - Notice to Mariners

3 Affected Environment and Environmental Consequences

This chapter presents a description of the environmental resources and baseline conditions that could be affected from implementing the Proposed Action and an analysis of the potential direct and indirect effects.

All potentially relevant environmental resource areas were initially considered for analysis in this EA. In compliance with NEPA, the CEQ, and U.S. Navy and Marine Corps guidelines, the discussion of the affected environment (i.e., existing conditions) focuses only on those resource areas potentially subject to impacts. Additionally, the level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact.

"Significantly," as used in NEPA, requires considerations of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole (e.g., human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of a Proposed Action. For instance, in the case of a site-specific action, significance would usually depend on the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant. Intensity refers to the severity or extent of the potential environmental impact, which can be thought of in terms of the potential amount of the likely change. In general, the more sensitive the context, the less intense a potential impact needs to be in order to be considered significant. Likewise, the less sensitive the context, the more intense a potential impact would be expected to be significant.

The resources analyzed in detail in this section include: water resources (surface water), biological resources, noise, public health and safety, recreation, coastal zone, socioeconomics, and environmental justice.

The potential impacts to the following resource areas are considered to be negligible or nonexistent so they were not analyzed in detail in this EA:

Air Quality: Small to medium-sized motor boats would be used to tow survey equipment and divers. Emissions from the operation of these boats would be minor and similar to the emissions from the myriad other boats operating within the New River. The emissions would be intermittent, short-term, and only occur while the boats were operating in the water.

Land Use: The Proposed Action would be a temporary activity and not change existing land use.

Geology, Topography, and Soils: The Proposed Action would not affect geology, topography, or soils. The intrusive investigation would create a minor disturbance to sediments within the underwater investigation area. This disturbance would be similar or less than the disturbance created from other common bottom-disturbing activities in the New River such as anchoring, clam raking, shellfish harvesting, etc. The sediments would quickly dissipate and settle back to the surface of the New River. The potential disturbance to sediments associated with in-water detonation is discussed in **Section 3.1.3.2** Water Resources, Proposed Action Potential Impacts.

Groundwater and Floodplains: There are no construction or demolition activities proposed that would affect floodplains. The Proposed Action does not include activities that would withdrawal or otherwise impact groundwater.

Wetlands: The intrusive investigations along the shallow water areas and near the shoreline of the K-2 Impact Area could use all-terrain vehicles to pull the geophysical mapping equipment. The investigation

would include a diver digging out the MEC/MPPEH by hand and restoring the elevation of the marsh upon completion of the removal using hand tools. There would not be any fill activities. The disturbance would be temporary and minor.

Cultural Resources: There are no known cultural resources within the project area. Surveying for MEC/MPPEH would not disturb the bottom surface of the river. Intrusive investigations could unearth an unknown or unmapped cultural resource. In an event such as this, all work would cease until approved by the MCB Camp Lejeune Cultural Resources Manager.

Airspace: The Proposed Action does not alter, use, or have the potential to affect airspace at the installation.

Infrastructure and Transportation: The Proposed Action does not alter or affect infrastructure or transportation on land. The Exclusion Zones would be established on a temporary basis during the in-water activities. These zones would be established as a radius around the investigation area and could temporarily extend into the navigation channel of the New River. The zones would not be continuous or create a significant obstacle to other users of the New River. In-water work would cease if an unauthorized person or watercraft entered the zone. The zones would be monitored by a chase boat to ensure public safety.

Visual Resources: The Proposed Action would not create a visual intrusion. The activities associated with the in-water investigation would be similar in nature to other fishing or recreational activities on the water.

Hazardous Materials and Wastes: The Proposed Action would not introduce any new hazardous materials in the environment. Because the items found in the water are associated with historic K-2 Range activities, relocating potential MEC/MPPEH to the upland area of the K-2 Range would be in compliance with the Environmental Protection Agency's Military Munitions Rule, and a Resource Conservation and Recovery Act (RCRA) permit would not be required. In the unlikely event of an in-water detonation, all debris from that event would be removed.

3.1 Water Resources

This discussion of water resources includes surface water and shorelines. Surface water resources generally consist of wetlands, lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. A water body can be deemed impaired if water quality analyses conclude that exceedances of water quality standards occur.

Shorelines can be located along marine (oceans), brackish (estuaries), or fresh (lakes) bodies of water. Physical dynamics of shorelines include tidal influences, channel movement and hydrological systems, flooding or storm surge areas, erosion and sedimentation, water quality and temperature, presence of nutrients and pathogens, and sites with potential for protection or restoration. Shoreline ecosystems are vital habitat for multiple life stages of many fish, birds, reptiles, amphibians, and invertebrates. Different shore zones provide different kinds and levels of habitat, and when aggregated, can significantly influence life. Organic matter that is washed onto the shore, or "wrack," is an important component of shoreline ecosystems, providing habitat for invertebrates, soil and organic matter, and nutrients to both the upland terrestrial communities and aquatic ecosystems.

3.1.1 Regulatory Setting

The Rivers and Harbors Act of 1899 (33 U.S.C. sections 401, 403, and 407) was enacted to ensure that navigable waters are not obstructed or fouled by the placement of material or disposal of refuse in them. Section 10 of the Rivers and Harbors Act requires the issuance of a permit by the USACE prior to commencement of work or placement of structures in or affecting navigable waters of the U.S.

The CWA was enacted to protect surface water quality in the U.S. Section 404 of the CWA authorizes the USACE to issue permits for the discharge of dredged or fill material into "waters of the United States," a term that includes rivers, lakes, and most streams and wetlands. Any action requiring a Section 404 CWA permit also requires a Section 401 Water Quality Certification from the responsible state authority.

Section 402 of the CWA regulates the discharge of pollutants from point sources into waters of the U.S.. The CWA limits any discharge of pollutants to a level sufficient to ensure compliance with state water quality standards.

The state of North Carolina defines estuarine waters (15A North Carolina Administrative Code [NCAC] 07H. 0206) to include the state's oceans, sounds, tidal rivers and their tributaries that link to the other parts of the estuarine system. The state of North Carolina defines Coastal Shorelines (15A NCAC 07H. 0209) to include all land within 75 feet (23 meters) of the normal high water level of estuarine waters, as well as land within 30 feet (9 meters) of the normal high water level of public trust waters located inland of the dividing line between coastal fishing waters and inland fishing waters.

The state of North Carolina has assigned water quality classifications for surface waters based on the existing and contemplated "best usage" for which the waters must be protected. Class SA waters receive the highest rating for tidal waters and are suitable for shell fishing and any of the uses specified for SB and SC classifications. The intermediate rating for tidal waters is Class SB, waters suitable for primary recreation and other uses as specified by the SC classification. Class SC waters are suitable for aquatic life propagation and survival, fishing, wildlife, and secondary recreation (15A NCAC 02B).

NCDEQ has applied supplemental classifications to describe other attributes of the water bodies. The term "nutrient sensitive waters" (NSW) identifies streams, creeks, and rivers that are so designated in order to limit the discharge of nutrients (15A NCAC 02B.0202). "High quality waters" (HQW) are waters rated as excellent based on biological or physical/chemical characteristics (15A NCAC 02B.0101). The New River and most tributary streams of the New River south of the City of Jacksonville have the additional HQW designation.

The North Carolina Marine Fisheries Commission (NCMFC) designated certain estuarine areas as "primary nursery areas" to protect the habitat for juvenile populations of economically important commercial fish species. Primary nursery areas are defined as those areas inhabited by the embryonic, larval or juvenile life stages of marine or estuarine fish or crustacean species due to favorable physical, chemical or biological factors (15A NCAC 10C.0502). Primary nursery areas are located in the upper portions of creeks and bays (NCMFC 2015; NCMFC 2019). "Special secondary nursery areas" are located adjacent to "secondary nursery areas" but closer to the open waters of sounds and the oceans. The state of North Carolina has designated sections of the New River as special secondary nursery areas.

3.1.2 Affected Environment

The following discussions provide a description of the existing conditions for the water resources at MCB Camp Lejeune. In the context of the Proposed Action, the potentially affected surface waters and

marine waters at the K-2 Impact Area total approximately 800 acres of the New River extending from shore to 10 feet deep (see **Figure 2.2 1**). The potentially affected shoreline at the K-2 Impact Area totals approximately 4.8 miles of the New River (see **Figure 2.2 1**). The entire project area is within a special secondary nursery area.

The 50-mile New River and its watershed are located entirely within Onslow County. Numerous second order streams and unnamed tributaries drain into the New River. Just within the MCB Camp Lejeune boundary, the New River is joined by Northeast Creek and Southwest Creek to form a wide, slow moving tidal estuary that empties into the Atlantic Ocean at Onslow Bay. There are 223 stream miles, 22,810 acres of surface water, and 15 miles of Atlantic coastline in the New River subbasin (NCDEQ 2007). Surface waters include estuarine and marine waters because much of the New River is tidally influenced (NCDEQ 2007). Portions of the New River are periodically dredged to support recreational vessels and light commercial vessel traffic (USACE 2010), and vessel operations on the New River are occasionally managed to coordinate with MCB Camp Lejeune training operations (U.S. Coast Guard 2017).

There are 19 active individual National Pollutant Discharge Elimination System wastewater discharge permits owned by various facilities in the New River subbasin, with a total permitted flow of approximately 64 million liters per day (17 million gallons) (NCDEQ 2019a). The largest of these permitted outfalls is held by the U.S. Marine Corps – MCB Camp Lejeune Advanced Wastewater Treatment Plant.

Within the tidal portions of the New River, water quality classifications range from SA to SC. Within the New River Estuary, all waters downstream from Grey Point to the New River Inlet at the Atlantic Ocean are classified as SA (NCDEQ 2019b). All waters draining to the New River north of Grey Point are considered NSW. The New River and most tributary streams of the New River south of the City of Jacksonville have the additional designation of HQW and primary nursery areas.

Water quality meets the NCDEQ standards for shellfish harvest through nearly the entire New River subbasin, and shellfish harvest is open in the vicinity of the K-2 Impact Area. Shellfish harvest is permanently closed for the upper half of the New River beginning approximately 2 miles north of the K-2 impact area. The closure is based on state buffer-zone regulations for shellfish harvest near outfalls and marinas.

3.1.3 Environmental Consequences

3.1.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no reduction of the safety risk associated with historical potential UXO within waters adjacent to the K-2 Impact Area and there would be no change to baseline water resources. Therefore, no significant impacts to water resources would occur with implementation of the No Action Alternative.

3.1.3.2 Proposed Action Potential Impacts

The Proposed Action would be confined to the 800-acre project site adjacent to the K-2 Impact Area. The Proposed Action would not create features that alter river flow, patterns, and currents. Hand digging to expose MEC may cause minor localized changes to river bottom topography that could have negligible impacts on the currents and hydrodynamics in the New River. Risks to surface water resources from chemicals and contaminants associated with the potential UXO would be substantially reduced in

the long term after the completion of the Proposed Action. The approximate duration of in-water activities would be 12 months, likely occurring during working hours, Monday through Friday. Active contact with surface waters and river bottom would occur over a span of several hours each day. The activities associated with the Proposed Action with the potential to increase turbidity and affect surface water quality include:

- Operation of all-terrain vehicles (shallow water areas only).
- Operation of vessels.
- Hand digging to expose MEC.
- In-water detonation of MEC (if necessary).

Temporary exclusion zones would be established around areas of intrusive work to ensure dive team and public safety. The temporary exclusion of recreational or commercial anglers and boaters would temporarily reduce their consequences to surface water quality (e.g., turbidity from transit, anchoring, or fishing) in the vicinity of the exclusion zone.

Under the Proposed Action, the operation of all-terrain vehicles within the shallow water areas would temporarily disturb the river bottom. Use of an all-terrain vehicle would be limited to digital geophysical mapping activities within the very shallow water close to the shoreline. The vehicle would operate at very low speeds while pulling a trailer with the mapping equipment. The disturbance would have minor increases to turbidity and would be short-term. Both the MCB Camp Lejeune Range Operations Plan and the Integrated Natural Resources Management Plan contain measures specifically designed to minimize impact and promote the stabilization of shoreline resources (MCB Camp Lejeune 2009; MCB Camp Lejeune 2015). The following BMPs would be implemented to reduce erosion and protect shorelines:

- Amphibious vehicles use only designated splash points;
- Units must grade or level out all rutted and disturbed areas; and
- Units must respect barricades, fences, gates, and signs at areas posted as off-limits during implementation of land rehabilitation and erosion maintenance/repair projects.

Because the Proposed Action would incorporate these measures to minimize impacts to shorelines, there is negligible risk of long-term or permanent effects to shoreline resources.

The Proposed Action includes the use of vessels within the project site to tow the underwater digital geophysical mapping equipment, transport divers, and to monitor the exclusion zones. Operation of these vessels would have the same minor disturbance to sediments as the existing commercial and recreational vessels within the New River. The increased turbidity would be minor and temporary.

The hand digging activities associated with intrusive investigations and any necessary in-water detonations would disturb the river bottom and re-suspend sediments into the surface waters causing localized increases of turbidity. Disturbance from removal would range from small volumes of sediment associated with hand exposure of MEC to larger volumes associated with in-water detonation. The duration of sediment disturbance would range from minutes to hours for these activities. Turbidity dispersion to background levels is very slow in low-flow or quiescent contexts, often taking many days (USACE 2017). But once settled, a particle is very resistant to re-suspension even in turbulent flow contexts (Reynolds et al. 1990). It is assumed that the entire water column would be affected by turbidity and re-suspended sediment because the project area is too shallow to meaningfully differentiate disturbance at the river bottom from the water surface.

The spatial footprint of disturbance would depend on the size of the UXO being intrusively investigated at any given time. For example, a typical large MK80 series UXO is approximately 30 inches long and personnel completing intrusive investigations would be expected to disturb the entire perimeter of the UXO. Assuming a 6-foot working space around the UXO, the potentially disturbed river bottom would be approximately 42 square feet (4 square meters). The duration of disturbance during intrusive investigations would be temporary and recovery to background conditions would be short-term.

The spatial footprint of disturbance from in-water detonation of MEC would depend on the size of the UXO and NEW of the detonation charge. Sandbags or earthen berms would be placed around and on top of the MEC to contain the noise and debris during in-water detonation. These minimization measures would also reduce disturbance to the river bottom, and would reduce sediment re-suspension and turbidity. Crater depths and widths would vary depending on the depth and NEW of the charge. Size of craters reportedly varies little among different unconsolidated sediment types (O'Keeffe & Young 1984), and crater depressions are generally short-lived (days to weeks). The Atlantic Fleet Training and Testing Environmental Impact Statement (EIS) (Appendix F) calculated crater footprint sizes associated with the detonation of different amounts of NEW. Approximate crater footprints sizes calculated include 12 square feet for 0.5 pounds NEW; 54 square feet for 5 pounds NEW, 85 square feet for 10 pounds NEW, 135 square feet for 20 pounds NEW, and 281 square feet for 60 pounds NEW (Department of Navy [DON] 2018). The maximum NEW detonation anticipated under the Proposed Action would be 27.3 pounds (24.8 pounds NEW from 155 mm round + 2.5 pounds NEW from donator charge). Most disturbed sediment impacts would be temporary because the investigation area is low-flow, and with little energy for sediment transport, most disturbed sediment would settle back into the crater. Turbidity impacts from in-water detonation of MEC would be temporary because dispersion to background levels would likely only take several days (USACE 2017).

Therefore, implementation of the Proposed Action would not result in significant impacts to water resources.

3.2 Biological Resources

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. This section will focus on marine species including including threatened and endangered species and marine mammals that would utilize the project area and vicinity. Additionally, no terrestrial habitats would be affected by the Proposed Action since the region of influence (ROI) is the area from which UXO would be removed and the marine environment surrounding that area. No wetland vegetation would be affected as the proposed project area is unvegetated soft bottom habitat.

3.2.1 Regulatory Setting

Special-status species, for the purposes of this assessment, are those species listed as threatened or endangered under the ESA as well as species afforded Federal protection under the MMPA and Bald and Golden Eagle Protection Act (BGEPA).

The purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend and to conserve and recover listed species. Section 7 of the ESA requires action proponents to consult with the USFWS or NOAA National Marine Fisheries Service (NMFS) to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat. Critical habitat is an area protected by ESA that contains features essential to the conservation of an endangered or

threatened species and that may require special management and protection. Critical habitat cannot be designated on any areas owned, controlled, or designated for use by the DoD where an Integrated Natural Resources Management Plan has been developed that, as determined by the Department of Interior or Department of Commerce Secretary, provides a benefit to the species subject to critical habitat designation. A Biological Assessment (BA) was prepared and submitted to USFWS and NMFS (**Appendix C**).

All marine mammals are protected under the provisions of the MMPA. The MMPA prohibits any person or vessel from "taking" marine mammals in the U.S. or the high seas without authorization. The MMPA defines "take" to mean "to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal."

Bald and golden eagles are protected by the BGEPA. This Act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles, including their parts, nests, or eggs. The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

The Magnuson-Stevens Fishery Conservation and Management Act provides for the conservation and management of the fisheries. Under the Act, essential fish habitat (EFH) consists of the waters and substrate needed by fish to spawn, breed, feed, or grow to maturity.

Species protected by the MBTA are not assessed here in accordance with the Department of Interior Solicitor's Opinion M-37050, Incidental Take Prohibited Under the MBTA, issued December 22, 2017 which concludes that the MBTA's prohibition on take (defined as pursuing, hunting, taking, capturing, killing, or attempting to do the same) applies only to "direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests" and not to the losses incidental to otherwise lawful activities.

3.2.2 Affected Environment

Just within the MCB Camp Lejeune boundary, the New River, which is the largest water feature at MCB Camp Lejeune, is joined by Northeast Creek and Southwest Creek to form a wide, slow moving tidal estuary that empties into the Atlantic Ocean at Onslow Bay. The Intracoastal Waterway and broad expanses of tidal marsh separate the barrier islands from the mainland on the southern side of the base. The following discussions provide a description of the existing conditions for biological resources that may be affected at MCB Camp Lejeune.

3.2.2.1 Threatened and Endangered Species

On May 14, 2019, an official species list was obtained from the USFWS (Consultation Code: 04EN2000-2019-SLI-0879). Based on a review of site conditions and existing records for the investigation area, the species listed in **Table 3.2-1** are considered to have the potential to occur. No critical habitat has been designated for these species within the investigation area or on MCB Camp Lejeune. A review of the biology, status, and management of each of the species potentially affected by the Proposed Action.

Table 3.2-1. Threated and Endangered Species with the Potential to Occur

Species	*Status*	*Potential to Occur*	*Jurisdiction*
		Mammal	
West Indian Manatee (*Trichechus manatus*)	E	Is or may be present in the waters surrounding Camp Lejeune including the investigation area, most likely in June through October.	USFWS

Table 3.2-1. Threated and Endangered Species with the Potential to Occur (cont.)			
Species	**Status**	**Potential to Occur**	**Jurisdiction**
Birds			
Red knot (*Calidris canutus*)	T	Not known to nest in North Carolina but species is observed in small numbers throughout the year. Uses North Carolina coast, including Camp Lejeune during migration and for wintering. Forages on intertidal beach and mudflats. Roosts on beaches during migration. The investigation area provides marginal winter foraging habitat.	USFWS
Reptiles			
Green sea turtle (*Chelonia mydas*)	T	Nests on Onslow Beach. Potential for foraging, transiting through the investigation area, most likely spring through fall.	USFWS and NMFS
Loggerhead sea turtle (*Caretta caretta*)	T	Nests on Onslow Beach. Potential for foraging, transiting through the investigation area, most likely in spring through summer.	USFWS and NMFS
Leatherback sea turtle (*Dermochelys coriacea*)	E	Occurs in the waters off the coast of Camp Lejeune, but are not known to nest aboard the installation. Though they are unlikely to occur in mouths of rivers, there is small potential for foraging or transiting through the investigation area, most likely mid-April through mid-October.	USFWS and NMFS
Reptiles (cont.)			
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	E	Occurs in the waters off the coast of Camp Lejeune, but are not known to nest aboard the installation. Potential for foraging, transiting the investigation area particularly in spring and fall.	USFWS and NMFS
Hawksbill sea turtle (*Eretmochelys imbricata*)	E	Occurs rarely in the waters off the coast of Camp Lejeune, but are not known to nest aboard the installation. Low potential to occur in the investigation area.	USFWS and NMFS
Fish			
Atlantic sturgeon (*Acipenser oxyrinchus*)	E	Unlikely to occur in the investigation area but could be present in the waters surrounding Camp Lejeune.	NMFS
Shortnose sturgeon (*Acipenser brevirostrum*)	E	Unlikely to occur in the investigation area but could be present in the waters surrounding Camp Lejeune.	NMFS

Legend: T – Threatened; E – Endangered; USFWS – U.S. Fish and Wildlife Service; NMFS – National Marine Fisheries Service.

No suitable habitat for red-cockaded woodpecker (*Picoides borealis*), piping plover (*Charadruis melodus*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), Northern right whale (*Balaena glacialis*), Sei whale (*Balaenoptera borealis*), sperm whale (*Physeter catodon*), rough-leaved loosestrife (*Lysimachia asperulaefolia*), seabeach amaranth (*Amaranthus pumilus*), Hirst's panic grass (*Dichanthelium hirstii*), Cooley's meadowrue (*Thalictrum cooleyi*), golden sedge (*Carex lutea*), or pondberry (*Lindera melissifolia*) occurs in the proposed project area. Therefore, these species are not addressed in this EA. The American alligator (*Alligator mississippiensis*) is listed by the USFWS as threatened due to similarity of appearance to the threatened American crocodile (*Crocodylus acutus*). Federal agencies are not responsible for fulfilling the requirements of Section 7 with respect to actions that may affect species protected due to similarity of appearance. Therefore, this species is not analyzed in this EA.

West Indian Manatee

Manatees are large and seal-shaped with paddle-like forelimbs, no hind limbs, and a round, paddle-shaped tail. Adult manatees average nearly 10 feet long and 2,200 pounds. Manatees are herbivorous, feeding opportunistically on a wide variety of submerged, floating, and emergent vegetation in marine, estuarine, and freshwater environments (USFWS 2007). Manatees feed in shallow seagrass beds and are generally found in waters between 2 and 4 meters deep (DON 2008). Many manatees are year-round residents of certain areas and congregate in warm water springs when the water gets colder in winter. The rest of the year, they are generally solitary, except for mothers with calves (USFWS 2001).

In the southeastern U.S., manatees occur primarily in Florida and southeastern Georgia, but individuals can range as far north as Rhode Island on the Atlantic Coast, and probably as far west as Texas on the Gulf coast (USFWS 2001). West Indian manatees have been reported occasionally along the Atlantic Intracoastal Waterway, inside the barrier islands of the North Carolina coast, and on a few occasions off the beaches and nearshore banks. Manatees are occasionally sighted near the New River Inlet, with one sighting occurring within the New River (DON 2008), and a dead manatee was found in the New River in January 2004. Manatees are migratory, and have typically been recorded in North Carolina waters from June to October; however, they may sometimes overwinter (October-April) in warm water discharges from coastal power plants (DON 2003, 2008).

The West Indian Manatee was listed as endangered throughout its range for both the Florida and Antillean subspecies in 1967 under the Endangered Species Preservation Act of 1966 (Public Law 89–669) and received Federal protection with the passage of the ESA in 1973. In 2017, the West Indian Manatee was reclassified as threatened. Manatees are also protected under the MMPA. The two primary threats to manatees are collision with watercraft and loss of warm water springs and currents (USFWS 2001).

Base Order 5090.11A requires all personnel conducting waterborne operations to be alert for possible manatee sightings/encounters, and if a manatee is sighted, immediately slow to a no-wake speed and do not approach. Additionally, marine mammal protection measures employed at MCB Camp Lejeune require that operators of small boats be knowledgeable of marine mammals, protected species, and visual clues related to the presence of marine mammals and protected species. All members of small boat crews are required to take the Marine Species Awareness Training maintained and promoted by the DON. Upon discovery of a marine mammal by marine mammal observers, activities must cease until the marine mammal moves out of the project site.

Red Knot

Though it does not nest in North Carolina, the federally threatened red knot is found along the North Carolina coast during migration and in winter. MCB Camp Lejeune provides intertidal beach and mudflats for foraging habitat and beach for roosting during migration. The shoreline along the proposed project area is potential foraging habitat for red knots during migration.

Red knots make one of the longest distance migrations known in the animal kingdom, traveling up to 19,000 miles annually, and may undertake long flights that span thousands of miles without stopping. During both spring and fall migrations, red knots use key staging and stopover areas to rest and feed and are highly dependent on the habitat at a few key staging areas (USFWS 2013). In the southeastern U.S., red knots forage along sandy beaches, tidal mudflats, and peat banks during spring and fall migration from Maryland through Florida. Major spring stopover areas along the U.S. Atlantic Coast include the Virginia barrier islands and Delaware Bay (USFWS 2013).

The red knot was listed as threatened by the USFWS in December 2014. The primary threats to the red knot are: habitat loss and degradation attributable to sea level rise, shoreline stabilization, and Arctic warming; and reduced food availability and asynchronies in the migration timing relative to food availability and favorable weather conditions. Secondary threats include hunting, predation, human disturbance, algal blooms, oil spills and wind energy development. In summary, as a whole, the rangewide status of the species is declining (USFWS 2013).

MCB Camp Lejeune maintains the portion of Onslow Beach outside the recreational and training beaches in a natural state for the benefit of nesting shorebirds and sea turtles. This area also benefits red knots migrating through, or wintering on MCB Camp Lejeune.

Green Sea Turtle

The green sea turtle is distributed worldwide in tropical and subtropical waters where it inhabits shallow waters near reefs and in bays and inlets, particularly areas with abundant sea grass and algae. Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands, Puerto Rico, Georgia, South Carolina, and North Carolina, and in larger numbers in Florida. Green sea turtles are found in deep sea locations during migration. Nesting typically occurs June through September in the southeastern U.S. Green sea turtles generally nest at 2, 3, or 4-year intervals on open sloping beaches with minimal disturbance. Hatchlings have been observed to seek refuge and food in Sargassum rafts (USFWS 2019).

In 2016, the range of the green sea turtle was divided into eleven distinct population segments (DPS). North Carolina lies within the North Atlantic DPS, which stretches from the boundary of South and Central America north to include the Atlantic Coast of the U.S. and east to Europe and Africa. This DPS is designated as threatened (USFWS 2016). The NMFS and USFWS Five Year Review of the green sea turtle (2007a) reported that most nesting on the Atlantic Coast of the U.S. occurs in Florida, with smaller numbers nesting in Georgia, South Carolina, and North Carolina. Within the Western Atlantic region, population trends at assessed nesting locations appear to be increasing or stable.

Threats include impacts to nesting beaches resulting from coastal development, coastal armoring, beachfront lighting, erosion, sand extraction, and vehicle and pedestrian traffic. Foraging habitat is affected by pollution including oil spills, agricultural and residential runoff, and sewage. Fibropapillomatosis is a chronic, often lethal disease that affects turtles throughout the range of the DPS (USFWS 2016).

Although green sea turtles can be found year-round in North Carolina, they are most abundant from spring through fall. Nearshore estuarine waters are important for the juvenile phase of green sea turtles and adults that are foraging between nesting sessions, and these areas are abundant within the waters surrounding MCB Camp Lejeune. The occurrence of this species in the marine environments of MCB Camp Lejeune is expected to be common (DON 2008). In both 2007 and 2013, 12 green sea turtle nests were identified during surveys.

Loggerhead Sea Turtle

Loggerhead sea turtles inhabit the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. Within the continental U.S., loggerheads nest from Texas to Virginia. Major nesting concentrations in the U.S. are found on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida. Loggerheads typically nest on open beaches or along narrow bays that have suitable sand, typically between the high tide line and dune. Loggerhead sea turtles are widely distributed throughout their range, occurring in areas hundreds of miles out to sea

to inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers (NMFS and USFWS 2008).

The loggerhead sea turtle was listed as threatened throughout its range in 1978 (43 Federal Register 32800) and in 2011 the listing was revised to include nine DPS. The Northwest Atlantic population, which includes North Carolina, is listed as threatened. A recovery plan (NMFS and USFWS 2008) for this population was published in 2008. Threats to the survival and recovery of loggerheads include loss and degradation of nesting habitat as a result of coastal development and beach armoring, hatchling disorientation from beachfront lighting, nest predation by native and non-native predators, degradation of foraging habitat; marine pollution and debris; watercraft strikes; disease; and incidental take from channel dredging and commercial trawling, longline, and gill net fisheries (NMFS and USFWS 2008).

The NMFS and USFWS Five Year Review of the Loggerhead Turtle (2007b) summarizes current status of loggerheads. Data show that from 1989 to 2005, the Northern Nesting Subpopulation (North Carolina south to northwestern Florida) had an average of 5,151 nests per year. From 1983 to 2005, standardized ground surveys of 11 North Carolina, South Carolina, and Georgia beaches showed a significant downward trend in loggerhead nesting of 1.9 percent annually. **Table 3.2-2** contains the number of loggerhead sea turtle nests observed on Onslow Beach during summer surveys from 2010-2019.

Table 3.2-2. Loggerhead Sea Turtle Nests on Onslow Beach

Year	*Loggerhead Nests*
2010	46
2011	66
2012	52
2013	70
2014	50
2015	78
2016	68
2017	47
2018	21
2019	91

Leatherback Sea Turtle

The leatherback turtle is distributed circumglobally in tropical, subtropical, and warm-temperate waters throughout the year and into cooler temperate waters during warmer months. Leatherbacks are essentially oceanic, entering into coastal waters for foraging and reproduction. There is limited information about the habitats utilized by post-hatchling and early juvenile leatherbacks, which are entirely oceanic. Their prey consist of soft-bodied organisms such as jellyfish (NMFS and USFWS 1992).

Leatherbacks were listed as endangered in 1970, and remained listed with the passing of the ESA of 1972. Several documents have been prepared to address concern over this species, including a recovery plan for the U.S. Caribbean, Atlantic, and Gulf of Mexico populations (NMFS and USFWS 1992) and most recently a 5-year review (NMFS and USFWS 2013). Critical habitat was designated in 1979 for this species at a nesting location and surrounding waters in St. Croix, U.S. Virgin Islands. No critical habitat has been designated for the continental east coast of the U.S.

Population status is difficult to determine for leatherbacks; females nest on different beaches rather than returning to the same beach repeatedly. Population trends in the Atlantic (with the exception of the Western Caribbean and West Africa) overall are stable or increasing (NMFS and USFWS 2013). Threats to the species include incidental capture in fishing gear, and in places outside of the U.S., directed harvest.

The Leatherback Sea Turtle is often found in close proximity to North Carolina during the spring and summer, but can be found rarely throughout the year off the coast. Available sighting, stranding, bycatch, tagging, and nesting data demonstrate the pattern of north to south nearshore migration from winter to summer and seasonal occurrence is highly variable (DON 2003). They generally appear close to shore in Onslow Bay during their northward migration in spring. Leatherbacks occur in North Carolina in the highest numbers from mid-April to mid-October (Keinath et al. 1996). No leatherback nesting has been documented at MCB Camp Lejeune or in the vicinity though leatherback nesting in North Carolina has occurred sporadically including 1998, 2000 and 2002 at Cape Lookout and Cape Hatteras (Rabon et al. 2003) and in 2009, 2010, 2012 and 2018 at Cape Hatteras, Cape Lookout, Bald Head Island, Holden Beach, Carolina Beach and Fort Fischer State Recreation Area, all north of the New River Inlet (North Carolina Wildlife Resources Commission [NCWRC] 2019). Leatherbacks infrequently enter inshore waters, and are not expected to occur in the downstream portions and mouths of the major rivers (Epperly et al. 1995).

Kemp's Ridley Sea Turtle

Kemp's ridleys inhabit the Gulf of Mexico and Northwest Atlantic Ocean, as far north as the Grand Banks and Nova Scotia. Kemp's ridley nesting is essentially limited to the beaches of the western Gulf of Mexico, primarily in Tamaulipas, Mexico. In the U.S., nesting occurs primarily in Texas and occasionally in Florida, Alabama, Georgia, South Carolina, and North Carolina. Kemp's ridleys tend to nest in large aggregations, or arribadas, which can be comprised of thousands of individuals (NMFS and USFWS 2015).

Kemp's ridley turtles move from open-ocean and Sargassum habitats of the North Atlantic Ocean as post-hatchlings to benthic, nearshore feeding grounds along the U.S. Atlantic and Gulf coasts as large juveniles and adults where they frequent sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters inhabited by its preferred food, the blue crab (*Callinectes sapidus*). Coastal bays and estuaries along the U.S. Atlantic Coast including the North Carolina sounds are important developmental habitats. Kemp's ridleys utilize Pamlico and Core Sounds, in particular, as summer developmental habitat (DON 2008).

The Kemp's ridley Sea Turtle was listed as endangered in 1978. Population trends reveal a dramatic decrease in arribada size resulting from intensive egg collection, killing of nesting females, and bycatch and drowning in the shrimp fleets of the U.S. and Mexico. With intensive conservation actions, the Kemp's ridley began to slowly rebound during the 1990s (NMFS and USFWS 2015).

Since the Kemp's ridley turtle is often restricted to waters less than 50 meters deep, it is known to occur in the inshore and estuarine waters off North Carolina study area during warm months. During winter months, it is not expected in and around the major river mouths. In spring Kemp's ridleys begin to move into North Carolina's sounds and in summer, they move further north to forage in Chesapeake and Cape Cod Bay and Long Island Sound. In waters further inshore, occurrence is low or unknown in spring and summer. In fall, as water temperatures drop, distribution is similar to spring (DON 2003). In general, Kemp's ridleys account for only 5% of all sea turtle occurrences in Pamlico and Core Sounds in North

Carolina (Epperly et al. 1995). Kemp's ridleys have been known to nest in North Carolina, but such an activity is extremely rare and they are not known to nest at MCB Camp Lejeune. Past fisheries bycatch records for the Bogue Inlet area indicate that only 12 percent of the turtles caught are Kemp's ridleys (Epperly et al., 1995). This species may occur, but with relatively low frequency, in the nearshore waters surrounding MCB Camp Lejeune (DON 2008).

Hawksbill Sea Turtle

Hawksbills are found circumtropically, including the Atlantic, Pacific, and Indian Oceans and associated water bodies. Hawksbills are highly migratory, and females nest on sandy beaches surrounding islands or mainland coasts in the tropics or subtropics. Post-hatchlings are thought to occupy the pelagic environment while adults primarily occur in or near coral reef habitats (NMFS and USFWS 2007c). In U.S. territories, hawksbills are known to nest in Puerto Rico and U.S. Virgin Islands, and the southeast coast of Florida and the Florida Keys are documented areas for small nesting groups.

Hawksbills do not nest in the project area and their occurrence north of Florida is extremely rare, but they may transit North Carolina waters seasonally. This species is not expected to occur with any regularity near MCB Camp Lejeune (NMFS 2019; NMFS and USFWS 2007c). There are rare reports in North Carolina of hawksbills stranded or incidentally captured in fishing gear. In 2015, a single hawksbill laid two nests on southern Hatteras Island NC. These nests were the northernmost reproductive activity documented for hawksbills in the Northern Hemisphere (NCWRC 2015a).

Atlantic sturgeon

The Atlantic sturgeon is a long-lived (approximately 60 years) anadromous fish, spawning in freshwater but spending most of their subadult and adult life in the marine environment (Atlantic Sturgeon Status Review Team 2007; Dadswell 2006; Greene et al. 2009). Sturgeon eggs are adhesive and usually deposited on hard surfaces in freshwater streams (Sulak and Clugston 1998). Juvenile Atlantic sturgeon move downstream into brackish waters, and remain residents of their natal estuaries for two to six years. Subadults emigrate to coastal waters or to other estuaries seasonally (Ingram and Peterson 2016; Waldman et al. 2013). Migratory subadults and adults are normally located in shallow (10-50 meters) nearshore areas dominated by gravel and sand substrate (Stein et al. 2004). Atlantic sturgeon feed on mollusks, polychaeta worms, gastropods, shrimps, pea crabs, decapods, amphipods, isopods, and small fishes in the marine environment (Greene et al. 2009; Guilbard et al. 2007).

Five DPSs of Atlantic sturgeon were listed under the ESA in 2012 (NMFS 2012). The Carolina DPS is listed as endangered based on low population sizes and continuing threats including degraded water quality, habitat impacts from dredging and damming, fisheries bycatch, ship strikes, low dissolved oxygen, and inadequacy of regulatory mechanisms in ameliorating these impacts and threats (Atlantic Sturgeon Status Review Team 2007). The majority of the populations show no signs of recovery (Atlantic Sturgeon Status Review Team 2007). The largest remaining adult Atlantic sturgeon populations are currently found in the Hudson (3,000), Altamaha (1,325), Delaware (1,305), Kennebec (865), Savannah (745), and James Rivers (705) (Fritts et al. 2016; Hale et al. 2016; Peterson et al. 2000; Schueller and Peterson 2010). None of the spawning populations are currently large or stable enough to provide any level of certainty for continued existence of any of the DPSs.

The Carolina DPS includes seven extant populations from the Santee-Cooper River to the Albemarle Sound, and is less than three percent of its historical population size (Atlantic Sturgeon Status Review Team 2007). There is no information, current or historic, of spawning Atlantic sturgeon utilizing the New River in North Carolina. These rivers are short and shallow, coastal plains rivers that most likely do not

contain suitable habitat for Atlantic sturgeon. Telemetry and tagging studies are active in North and South Carolina, providing the ability to detect Atlantic sturgeon transiting waters of MCB Camp Lejeune or the New River (NMFS 2013, 2014; NCWRC 2015b; South Carolina Department of Natural Resources 2015).

Shortnose Sturgeon

The federally endangered shortnose sturgeon is the smallest of three sturgeon species that occur along the east coast of North America. Shortnose sturgeon have been documented overwintering in both freshwater and marine habitats, although occurrence in the marine environment is less common. This species requires free access to upstream river environments for spawning, and an unhindered return to foraging habitat at the interface of fresh tidal water and saline estuaries. Shortnose sturgeon are benthic feeders; juveniles feed on benthic insects and crustaceans and adults feed on large benthic mollusks and crustaceans (Shortnose Sturgeon Status Review Team 2010). Historical distribution of shortnose sturgeon is in major rivers along the Atlantic seaboard, with the northern limit near the St. John River in Canada, and the southern limit near the Indian River in central Florida (NMFS 2015). In the southern portion of its range (south of the Chesapeake), shortnose sturgeon is amphidromous, that is they use upstream portions of rivers for spawning and return to estuarine portions of rivers post-spawning.

The shortnose sturgeon was listed as an endangered species in 1967, and remained listed with the passing of the ESA of 1972. A recovery plan was completed in 1998. Threats include habitat loss, fishing, and incidental fisheries bycatch. Damming of rivers was particularly harmful to this species, as they block access to historic spawning habitat. The major additional threat to the species today is habitat alterations from coastal development (NMFS 1998). Currently, 19 populations of shortnose sturgeon have been identified throughout their known distribution, and the Cape Fear River is the only one in North Carolina. Most viable populations occur north of Cape Hatteras, North Carolina, and the only viable population to the south is in the Altamaha River in Georgia.

The New River is one of several coastal rivers that have no documented captures of shortnose sturgeon, and do not contain suitable habitat features to support spawning. It is possible but highly unlikely that a shortnose sturgeon would occupy or transit the river, estuarine, or nearshore waters of MCB Camp Lejeune or the New River. There is no recent evidence of their occurrence in or near waters of MCB Camp Lejeune or the New River MCB despite longstanding efforts to document the species (Shortnose Sturgeon Status Review Team 2010; DON 2003). The nearest known shortnose sturgeon was the Cape Fear River population, about 50 miles to the south, and has no documented captures since 1997 (NMFS 1998; Shortnose Sturgeon Status Review Team 2010). Telemetry and tagging studies remain active in North and South Carolina, and they provide no evidence that shortnose sturgeon would occupy or transit waters of MCB Camp Lejeune or the New River (NMFS 2013, 2014; NCWRC 2015b; South Carolina Department of Natural Resources 2015).

3.2.2.2 Marine Mammals

Jurisdiction over marine mammals is maintained by NMFS and the USFWS. NMFS maintains jurisdiction over whales, dolphins, porpoises, seals, and sea lions. The USFWS maintains jurisdiction for certain other marine mammal species, including manatees. Of the marine mammal species that have the potential to occur in the waters surrounding the MCB Camp Lejeune, the Atlantic spotted dolphin (*Stenella frontalis*), common bottlenose dolphin (*Tursiops truncates*), and West Indian Manatee have the potential to occur in waters near the proposed project activities. The West Indian Manatee is discussed in **Section 3.2.2.1** above.

Atlantic Spotted Dolphin

The Atlantic spotted dolphin is found in nearshore tropical to warm-temperate waters, predominantly over the continental shelf and upper slope (Waring et al. 2013, 2014). The large, heavily spotted coastal form of the Atlantic spotted dolphin typically occurs over the continental shelf, usually 4.9 to 12.4 mi. offshore (Perrin 2008). Atlantic spotted dolphin sightings have been concentrated in the slope waters north of Cape Hatteras, but in the shelf waters south of Cape Hatteras sightings extend into the deeper slope and offshore waters of the mid-Atlantic (Mullin and Fulling 2003; Waring et al. 2014). Vessel surveys conducted between January 2009 and December 2014 offshore of Cape Hatteras, North Carolina resulted in multiple sightings of Atlantic spotted dolphins annually from 2011 to 2014 (Foley et al. 2015). Aerial and shipboard surveys conducted between 2007 and 2010 in offshore waters of Onslow Bay, North Carolina indicate that spotted dolphins exhibit preference for waters over the continental shelf and do not typically occur beyond the shelf break (Read et al. 2014). Numerous re-sightings of multiple individuals over several years and across seasons suggests a degree of residency for Atlantic spotted dolphins in Onslow Bay (Swaim et al. 2014).

Bottlenose Dolphin

The bottlenose dolphin occurs in tropical to temperate waters of the Atlantic Ocean as well as inshore, nearshore, and offshore waters of the Gulf of Mexico and U.S. East Coast (Waring et al. 2016). They occur in most enclosed or semi-enclosed seas in habitats ranging from shallow, murky, estuarine waters to deep, clear offshore waters in oceanic regions (Jefferson et al. 2008, 2015).

Along the U.S. East Coast and northern Gulf of Mexico, the bottlenose dolphin stock structure is well studied. There are currently 53 management stocks identified by NMFS in the western North Atlantic and Gulf of Mexico, including oceanic, coastal, and estuarine stocks (Waring et al. 2016). Most stocks are designated as Strategic or Depleted under the MMPA. The Northern North Carolina Estuarine Stock and Southern North Carolina Estuarine Stock may be present near the project area in the New River.

3.2.2.3 Essential Fish Habitat

Fish are vital components of the marine ecosystem. They have great ecological and economic importance. To protect this resource, NMFS works with the regional fishery management councils to identify the essential habitat for every life stage of each federally managed species using the best available scientific information. In accordance with the Magnuson-Stevens Fishery Conservation and Management Act of 1976, Federal agencies must consult with the NMFS for activities that may adversely affect EFH that is designated in a Federal Fisheries Management Plan. EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” EFH has been described for approximately 1,000 managed species, or species groups, to date. An EFH assessment was prepared for the proposed project and is included in **Appendix B**.

EFH habitat along the New River at MCB Camp Lejeune includes the New River, as a coastal inlet, and the tributaries that drain into the New River. The North Carolina Division of Marine Fisheries (NCDMF) indicates that the New River within the project area is classified as a special secondary nursery area. **Table 3.2-3** presents the species or species units potentially present in the project area for which EFH and/or Habitat Areas of Particular Concern (HAPC), a subset of EFH that refers to specific locations required by a life stage, exist.

Table 3.2-3. Summary of Essential Fish Habitat Designations for the Proposed Action Area

Species Present	*Lifestages*				*HAPC*
	Eggs	*Larvae*	*Juveniles*	*Adults*	
South Atlantic Fishery Management Council					
Panaeid Shrimp	X	X	X	X	X
Snapper Grouper Management Unit			X		X
Coastal Migratory Pelagic Species			X		
Mid-Atlantic Fishery Management Council					
Bluefish	X	X	X	X	
Summer Flounder	X	X	X	X	
Atlantic Highly Migratory Species NMFS					
Smoothhound Shark (Atlantic Stock)	X	X	X	X	

3.2.2.4 Wildlife

The nearshore habitats in the ROI support numerous bird species, providing important foraging habitat for migratory, wintering, and resident-breeding marine birds, including shorebirds, waterfowl, wading and diving birds, and other waterbirds like gulls. Approximately 156 migratory bird species are known to use the base as breeding grounds, wintering grounds, or stop over habitat during migration. Hawk surveys have identified 13 raptor species that are resident or transient species at the Base (MCB Camp Lejeune 2015). Bald eagle nesting has been documented on MCB Camp Lejeune since 2000. Nests are protected and monitored regularly. There are currently four active bald eagle nests on MCB Camp Lejeune. The proposed project area provides potential foraging habitat for bald eagles (MCB Camp Lejeune 2015). Other wildlife that characterize the aquatic habitat adjacent to the K2 range include those invertebrates typical of intertidal and subtidal soft bottom and shell bottom habitats, such as burrowing crustaceans and marine worms, blue crab, oysters (*Crassostrea virginica*), hard clams (*Merceneria merceneria*), and other shellfish. Several commercially and recreationally important fish species may also occur including spot (*Leiostomus xanthurus*), Atlantic croaker (*Micropogon undulates*), striped bass (*Morone saxatilis*), and American shad (*Alosa sapidissima*).

3.2.3 Environmental Consequences

3.2.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to existing biological resources. Therefore, no significant impacts to biological resources would occur with implementation of the No Action Alternative.

3.2.3.2 Proposed Action

Threatened and Endangered Species

In accordance with Section 7(c) of the ESA, MCIEAST-MCB Camp Lejeune has analyzed the effects of implementing the Proposed Action, the identification and removal of potential UXO in the waters adjacent to the K2 range, on federally listed species within the investigation area. Based on a lack of habitat in the investigation area, a finding of "no effect" is made for the red-cockaded woodpecker, piping plover, fin whale, humpback whale, Northern right whale, Sei whale, sperm whale, rough-leaved loosestrife, seabeach amaranth, Hirst's panic grass, Cooley's meadow rue, golden sedge, and pondberry.

Based on the evaluation presented in the Biological Assessment prepared for the project and summarized below, MCIEAST-MCB Camp Lejeune has made the following determination of effects on listed species and critical habitat from implementation of the Proposed Action (See **Table 3.2-4**). There would be no significant impact on threatened and endangered species. MCIEAST-MCB Camp Lejeune has requested concurrence from USFWS and NOAA Fisheries Service for these determinations. The USFWS provided concurrence on the effects determination for the West Indian Manatee and the Red knot. The concurrence from NOAA Fisheries Service for the reptiles and fish is still pending. Correspondence concerning these consultations is provided in **Appendix C**.

Table 3.2-4. Effects on Listed Species and Critical Habitat

Species	*Status*	*Effects Determination*
Mammal		
West Indian Manatee (*Trichechus manatus*)	E	May affect, not likely to adversely affect
Bird		
Red knot (*Calidris canutus*)	T	May affect, not likely to adversely affect
Reptiles		
Green sea turtle (*Chelonia mydas*)	T	May affect, not likely to adversely affect
Loggerhead sea turtle (*Caretta caretta*)	T	May affect, not likely to adversely affect
Leatherback sea turtle (*Dermochelys coriacea*)	E	May affect, not likely to adversely affect
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	E	May affect, not likely to adversely affect
Hawksbill sea turtle (*Eretmochelys imbricata*)	E	May affect, not likely to adversely affect
Fish		
Atlantic sturgeon (*Acipenser oxyrinchus*)	E	May affect, not likely to adversely affect
Shortnose sturgeon (*Acipenser brevirostrum*)	E	May affect, not likely to adversely affect

West Indian Manatee. Because of its infrequent occurrence in the investigation area, the low probability of an in-water detonation of UXO, the temporary use of a small to medium-sized boats in waters less than 10 feet deep, and the BMPs that would be employed, the activities associated with the Proposed Action may affect, but are not likely to adversely affect, the West Indian Manatee.

Red Knot. Potential disturbances to red knots foraging in the investigation area during winter migration could result from exposure to noise from detonation of UXO or from in-water activities in shallow waters adjacent to mudflats and shorelines where the species could forage. These impacts, however, are unlikely to occur because the investigation area represents marginal foraging habitat, the activities are unlikely to occur during the time of year knots could be present, and because of the low probability of UXO detonation. Therefore, the activities associated with the Proposed Action may affect, but are not likely to adversely affect, the Red Knot.

Sea Turtles. Potential disturbances to sea turtles are similar for the five species that may occur in the investigation area, thus sources of potential impacts are analyzed for all five sea turtle species. The

likelihood of impacts differs with the relative abundance of the species in the area, with loggerhead sea turtles expected to occur most commonly and hawksbill sea turtle occurrence being extremely rare and unlikely to occur in the investigation area. If present in the area during the proposed activities, all species could collide with the boat conducting underwater investigation as it transits to and from the project area or could be disturbed by noise from the boat or from in-water detonation of UXO that could not be safely removed from the area. These impacts however, are unlikely to occur because of the short time the investigations would take place (12 months), the low probability of an in-water detonation of UXO, the BMPs (including the presence of trained observers on the boat) that would be employed and because the project area offers little habitat to these species. Because of these factors, activities associated with the Proposed Action may affect, but are not likely to adversely affect, the green, loggerhead, leatherback, Kemp's ridley and hawksbill sea turtles.

Fish. Neither the Atlantic or shortnose sturgeon are likely to be present in the investigation area as the area does not contain suitable habitat for Atlantic of shortnose sturgeon. The absence of suitable habitat, lack of evidence of the current or historic occurrence of these species, and the low probability of an in-water detonation of UXO, the activities associated with the Proposed Action may affect, but are not likely to adversely affect, the Atlantic and shortnose sturgeon.

Marine Mammals

The effects of underwater noise on marine mammals depend on several factors including: the species; proximity to the source; the depth, intensity, and duration of the sound; the depth of the water column; the substrate; and the sound propagation properties of the environment. The degree of effect is related to the level and duration of the sound exposure, which are influenced by the distance between the animal and the source. In general, sound exposure would be less intense farther away from the source. The substrate and depth of the water affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to more rapid sound attenuation. Substrates that are soft absorb the sound more readily than hard substrates, which may reflect the acoustic wave.

An IHA was prepared in conjunction with this EA to assess the impact of the Proposed Action on marine mammals (**Appendix D**). The analysis identified that in an unlikely situation that a UXO would have to be detonated in place, Atlantic spotted dolphin and common bottlenose dolphin could be exposed to underwater noise. Any dolphins that are exposed may change their normal behavior patterns (i.e., swimming speed, foraging habits, etc.) or be temporarily displaced from the underwater investigation area. Mitigation is expected to minimize the potential for adverse impacts. Mitigations include requiring operators of small boats to be knowledgeable of marine mammal and other protected species and visual clues related to the presence such species. All members of small boat crews would be required to take the Marine Species Awareness Training. Work within the project site would cease upon discovery of a marine mammal and work and would not commence until the marine mammal moves out of the area. Any exposures will likely have only a minor effect on individuals and no effect on the population.

Essential Fish Habitat

The overall potential for adverse impacts to EFH-designated species and EFH in the Proposed Action area would be highly localized. Direct mortality to the benthic resources and certain egg/larval stages of EFH-designated species that occur on the bottom substrate within the proposed project area would result from towed survey equipment in shallow areas, intrusive investigation of anomalies, and from the installation of earthen berms or sand bags used to minimize impacts from the detonation of UXO. The

potential in-water detonation of UXO could result in injury or mortality to individuals within the detonation range. Proposed mitigation measures would reduce the potential for mortality and injury (**Appendix B**).

Wildlife

Potential impacts to bird species could occur in the unlikely event of a detonation while an individual is foraging in the immediate vicinity. Bird species that use the nearshore waters of MCB Camp Lejeune are acclimated to the commonly occurring range activities and operations, such as small boat maneuvers, weapons firing, and explosions and the Proposed Action would not create a new type of exposure. Any impacts that could occur as a result of the Proposed Action would not jeopardize the population or foraging habitat of any of the known bird species that utilize the nearshore areas of MCB Camp Lejeune.

As described for EFH, sessile or slow moving benthic species could be affected by towed survey equipment, removal of anomalies or from in-water detonation. For fish, impacts would primarily be limited to temporary displacement from benthic or water column habitats, which are otherwise abundant within the New River Estuary. The potential in-water detonation of UXO could result in injury or mortality to fish species. The overall potential for adverse impacts to fish would be highly localized. Several mitigation measures are proposed that would reduce the potential for mortality and injury and the number of detonations would be limited to a total of five. Therefore, implementation of the Proposed Action would not result in significant impacts to biological resources.

3.3 Noise

The discussion of noise includes the types or sources of noise and the associated sensitive receptors in the human environment. Noise in relation to biological resources and wildlife species is discussed in Biological Resources **Section 3.2**.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us. The perception and evaluation of sound involves three basic physical characteristics:

- Intensity – the acoustic energy, which is expressed in terms of sound pressure, in decibels (dB)
- Frequency – the number of cycles per second the air vibrates, in Hertz (Hz)
- Duration – the length of time the sound can be detected

Noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although continuous and extended exposure to high noise levels (e.g., through occupational exposure) can cause hearing loss, the principal human response to noise is annoyance. The response of different individuals to similar noise events is diverse and is influenced by the type of noise, perceived importance of the noise, its appropriateness in the setting, time of day, type of activity during which the noise occurs, and sensitivity of the individual.

3.3.1 Basics of Sound

The loudest sounds that can be detected comfortably by the human ear have intensities that are a trillion times higher than those of sounds that can barely be detected. This vast range means that using a linear scale to represent sound intensity is not feasible. The dB is a logarithmic unit used to represent the intensity of a sound, also referred to as the sound level. All sounds have a spectral content, which means their magnitude or level changes with frequency.

To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements are usually on an "A-weighted" scale that filters out very low and very high frequencies in order to replicate human sensitivity. It is common to add the "A" to the measurement unit in order to identify that the measurement has been made with this filtering process. However, "C-weighting" better targets the lower frequencies that are "felt," instead of "heard" and is commonly used for impulsive noise caused by things like explosions that is relevant to this Proposed Action.

3.3.2 Noise Metrics

A metric is a system for measuring or quantifying a particular characteristic of a subject. Since noise is a complex physical phenomenon, different noise metrics help to quantify the noise environment. The metric relevant to this Proposed Action is the C-weighted Day –Night Average Sound Level (CDNL) which is reported in C-weighted decibels (dBC). CDNL is a C-weighted cumulative noise metric, which emphasizes lower frequency sound vibrations, that measures noise based on annual average daily noise events. CDNL is used to measure the effects of artillery fire and explosions at MCB Camp Lejeune.

CDNL has two time periods of interest: daytime and nighttime. Daytime hours are from 7:00 a.m. to 10:00 p.m. local time. Nighttime hours are from 10:00 p.m. to 7:00 a.m. local time. CDNL weights operations occurring during its nighttime period by adding 10 dB to the single event sound to account for humans being typically more annoyed by noise later at night when most people are resting. Note that "daytime" and "nighttime" in calculation of CDNL are sometimes referred to as "acoustic day" and "acoustic night" and always correspond to the times given above.

3.3.3 Regulatory Setting

Under the Noise Control Act of 1972, the Occupational Safety and Health Administration (OSHA) established workplace standards for noise. The minimum requirement states that constant noise exposure must not exceed 90 A-weighted decibels (dBA) over an 8-hour period. The highest allowable sound level to which workers can be constantly exposed is 115 dBA and exposure to this level must not exceed 15 minutes within an 8-hour period. The standards limit instantaneous exposure, such as impact noise, to 140 dBA. If noise levels exceed these standards, employers are required to provide hearing protection equipment that will reduce sound levels to acceptable limits.

The Chief of Naval Operations Instruction (OPNAVINST) 3550.1A/Marine Corps Order 3550.11, *Range Air Installations Compatible Use Zones (RAICUZ) Program,* provides guidance administering the RAICUZ program which recommends land uses that are compatible with Range Compatibility Zones and noise levels associated with military range operations.

3.3.4 Affected Environment

The predominant noise sources at MCB Camp Lejeune and in the vicinity of the K-2 Range consist of aircraft operations used to support ground training maneuvers, military training maneuvers on the ground, and noise generated by artillery fired into the K-2 Impact Area. Along the New River boundary of the K-2 Range, noise from recreational boats, commercial fishing vessels, and amphibious military maneuvers would also be common. Other components such as construction and vehicle traffic produce noise, but such noise generally represents a transitory and negligible contribution to the average noise level environment. The CDNL noise contours (reported in dBC) from artillery blast noise are shown in **Figure 3.3-1**. Noise levels of 70 dBC from the K-2 Impact Area extend across the New River, and most of MCB Camp Lejeune is within the 62 dBC contour.

Figure 3.3-1. Existing CDNL Noise Contours at MCB Camp Lejeune

The U.S. Army Public Health Command has recommended land use guidelines for noise sensitive areas at levels over 62 CDNL. At 62 CDNL or less, noise sensitive land uses are generally acceptable (U.S. Army Center for Health Promotion and Preventative Medicine 2005).

The Federal government supports conditions free from noise that threaten human health and welfare and the environment. Response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and whoever hears it (the receptor), receptor sensitivity, and time of day. A noise sensitive receptor is defined as a land use where people involved in indoor or outdoor activities may be subject to stress or considerable interference from noise. Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, and libraries. Sensitive receptors may also include noise sensitive cultural practices, some domestic animals, or certain wildlife species. The nearest sensitive receptors are approximately 1.5 miles away at Courthouse Bay, which is the nearest cantonment area to the project site. Potentially noise sensitive wildlife species are discussed in **Section 3.2**.

3.3.5 Environmental Consequences

3.3.5.1 No Action Alternative

Under the No Action Alternative, there would be no effort to remove the UXO along the shoreline or within the waters adjacent to the K-2 Impact Area. Under this alternative, there would be no change to the baseline noise conditions at the project site. Therefore, no significant impacts due to the noise environment would occur with implementation of the No Action Alternative.

3.3.5.2 Proposed Action Potential Impacts

Under the Proposed Action, intrusive investigation of anomalies identified during geophysical mapping would be performed in the shallow and deep water areas of the New River. Investigation would require use of boats and other similar equipment that routinely operates within the immediate vicinity of the project area. During intrusive investigation, impacts to the environment from airborne noise would be imperceptible from existing conditions since this area is located within the 70 CDNL contour due to existing range activities.

In the unlikely event that a MEC were discovered during the intrusive investigation that could not be safely removed to be disposed of within the K-2 Range, it would be destroyed in place within the New River. Based on past investigations, it is anticipated this would be a rare occurrence and for analysis purposes this would be limited to no more than five times over the 13-month investigation period. The airborne sound produced from the in-water detonation of the MEC would be very similar to that produced from artillery fire at the K-2 Impact Area that already occurs frequently. The limited in-water detonation would not cumulatively increase airborne noise that would change the current CDNL contour. The in-water detonation would also produce underwater sounds that could affect underwater species, such as marine mammals and fish. Impacts to biological resources from underwater noise are covered in **Section 3.2**.

It is unlikely that the Proposed Action would produce any appreciable or perceptible increase to the airborne noise environment at MCB Camp Lejeune. Therefore, implementation of the Proposed Action would not result in significant impacts to the noise environment.

3.4 Public Health and Safety

This discussion of public health and safety includes consideration for any activities, occurrences, or operations that have the potential to affect the safety, well-being, or health of members of the public. A safe environment is one in which there is no, or optimally reduced, potential for death, serious bodily injury or illness, or property damage. The primary goal is to identify and prevent potential accidents or impacts on the general public. Public health and safety within this EA discusses information pertaining to operational safety. Operational safety in this EA refers to the intrusive investigation activities and potential risks to users of adjacent or nearby land and water areas.

3.4.1 Regulatory Setting

The Defense Explosives Safety Regulation is published through the DDESB under the authority of DoD Directive 6055.09E. The Directive establishes explosives safety standards for the DoD that are designed to manage explosives-related risk associated with DoD operations and installations by providing protection criteria to minimize serious injury, loss of life, and damage to property.

3.4.2 Affected Environment

The Proposed Action would require a Health and Safety Plan, Dive Safety Plan, and other standard operating procedures to ensure the safety of the personnel executing the work and persons that could be near the project site.

Health and Safety Plans are prepared in accordance with the requirements in USACE Safety and Health Requirements Manual EM 385-1-1. These plans detail the project site conditions, safety procedures to be followed, and identify potential hazards that may be encountered during execution of the work.

Dive Safety Plans are prepared in accordance with the requirements in USACE Safety and Health Requirements Manual EM 385-1-1; OSHA 29 CFR 1910 Subpart T; USACE Explosive Safety and Health Requirements Manual EM 385-1-97. The plan is written for the specific site conditions, purposes, dates, and personnel that would execute the project.

MCIEAST-MCB Camp Lejeune installed a series of warning signs along the perimeter of the area associated with the Proposed Action. These signs were installed as a safety precaution to inform the public and commercial users of the New River of the potential dangers in the area. The signs do not prohibit access to the area, but provide a warning that bottom-disturbing activities such as anchoring should be avoided.

3.4.3 Environmental Consequences

3.4.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and the explosive risk within the New River would not be reduced. The explosive hazard evaluation determined that the situation in the waters adjacent to the K-2 Impact Area was “serious” since a mishap may occur in time and may cause death (see **Section 1.2.3**). The No Action Alternative could have a serious impact to public health and safety for anyone using this area of the New River, specifically during bottom-disturbing activities that have the potential to strike an MEC (such as clam raking, anchoring, harvesting oysters, bottom trawling, and crabbing).

3.4.3.2 Proposed Action Potential Impacts

The Proposed Action would involve potentially dangerous activities. Intrusive investigation would be done by a UXO qualified dive team in accordance with DDESB Technical Publication 18, Minimum Qualifications for UXO Technicians and Personnel (DDESB 2004). Positive identification of any potential UXO and consideration of the potential consequences of an intentional or accidental detonation is required before disposition of any recovered munitions. The DoD is responsible for protecting people, property, and the environment from potential explosive hazards associated with DoD owned UXO.

NOTMARs would be issued prior to any in-water activities to alert other users of the New River. This notice would provide the public with the dates and times of the activity and inform them that the public cannot access the area during the planned work.

A temporary exclusion zone would be established around the project site to ensure the safety of the dive team and the public in the surrounding area. The radius of the exclusion zone would be based on an explosive safety quantity distance for the item of concern or the activity that is taking place. For this Proposed Action, the zone could range from 613 feet up to 2,130 feet (see **Figure 2.4-4**). The zone would be monitored by a chase boat while activities are taking place to prohibit access by unauthorized persons. Prohibiting unauthorized persons from the exclusion zone would ensure the public's safety during the in-water activities.

UXO must not be moved unless technically qualified personnel determine that the risk associated with movement are acceptable. During all previous investigations the MEC/MPPEH that was found in the project site was acceptable to move to the upland K-2 Range and dispose in accordance with existing range procedures. It is anticipated that this would be the case for the Proposed Action as well, however, there is the possibility that MEC/MPPEH would have to be detonated in place. The site-specific Health and Safety Plan, Dive Safety Plan, and other project specific standards of procedure would include safety guidelines for in-water detonation. The exclusion zone for this activity would depend on the NEW of the item to be detonated and the depth of the water. In addition, sand bags or earthen berms would be established around the site to reduce the potential for debris and fragments to go beyond the immediate site.

Based on the natural and physical conditions of the New River and the information gathered during the extensive investigations of the waters adjacent to the K-2 Impact Area (see **Section 1.2.2**), there is no way to completely eliminate the explosive risk associated with potential UXO in this area of the New River. However, after completion of the Proposed Action the public safety risk would be greatly reduced, which would result in a long-term positive impact to public health and safety.

Therefore, implementation of the Proposed Action would not result in significant impacts to public health and safety.

3.5 Recreation

Recreation includes indoor and outdoor activities that take place away from the residence of the participant. For this analysis, recreation includes outdoor activities that occur on the portion of the New River affected by the Proposed Action.

3.5.1 Regulatory Setting

There is no regulatory driver for the analysis of impacts to recreation. Recreation is analyzed in this EA because portions of the New River that are utilized by the public would be inaccessible when temporary exclusion zones are in place.

3.5.2 Affected Environment

Common types of recreation that occur along the New River include fishing, shellfish harvesting, hunting, boating, canoeing, and kayaking. Hunting and freshwater fishing in North Carolina are regulated by the NCWRC; saltwater or brackish water fishing are regulated by the NCDMF, which is a division of NCDEQ. The New River is an estuary of the Atlantic Ocean, and permits for fishing or shellfish harvesting in the area are issued by NCDMF.

There are two public boat ramps that allow direct access to the New River. The Jacksonville Landing boat ramp is located north of MCB Camp Lejeune in Jacksonville and is maintained by the City. The Sneads Ferry boat ramp is located south of MCB Camp Lejeune in Sneads Ferry and is maintained by NCWRC (NCWRC 2019). Authorized personnel can also access the New River via one of the 15 boat ramps or three marinas located on MCB Camp Lejeune. Authorized personnel include active duty military, retired military, reservists, and civilian employees of MCB Camp Lejeune. Authorized personnel may also sponsor guests. The MCB Camp Lejeune conservation office issues permits for fishing and hunting on the installation, and the use of boat ramps also requires permitting through the conservation office (MCB Camp Lejeune 2015).

3.5.3 Environmental Consequences

3.5.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no reduction of the safety risk associated with historical potential UXO within waters adjacent to the K-2 Impact Area. There would be no restriction of access to the area for recreation; however, the warning signs that are currently in place would remain. The public is encouraged to avoid bottom-disturbing activities in this area for their own safety. Therefore, no significant impacts to recreation would occur with implementation of the No Action Alternative.

3.5.3.2 Proposed Action Potential Impacts

Under the Proposed Action, the intrusive investigations in the shallow and deep water areas would temporarily restrict recreational activities within the exclusion zone. During the intrusive investigations, exclusion zones would be established and access to the area for fishing, hunting, and boating or any other recreational activity would be prohibited. The restriction would be temporary. Shellfish habitats may be disturbed during the intrusive investigations which could potentially affect future recreational fishing. This disturbance is expected to be minimal and short-term (see **Section 3.2**). Before intrusive investigations would occur, MCB Camp Lejeune would issue NOTMARs to inform recreational users of the New River. This notice would provide the public with the dates and times of the planned activity and inform them that the public cannot access the area during the planned work.

Although the activities associated with the Proposed Action would temporarily restrict access to some areas, there are many similar habitats and locations in the vicinity of the project area and recreational users would likely substitute these nearby areas for the temporarily restricted areas with little impact.

Once the Proposed Action was completed, there would no longer be any restrictions on accessing the area. Additionally, risks to recreational users of the New River associated with the potential UXO would be reduced in the long term after the completion of the Proposed Action.

Therefore, implementation of the Proposed Action would not result in significant impacts to recreation.

3.6 Coastal Zone

The coastal zone is the interface between land and water and is vital to the well-being of our country. It supports half of the nation's population and supports ecologically important habitats and natural resources.

3.6.1 Regulatory Setting

Through the CZMA of 1972, Congress established national policy to preserve, protect, develop, restore, or enhance resources in the coastal zone. This Act encourages coastal states to properly manage use of their coasts and coastal resources, prepare and implement coastal management programs, and provide for public and governmental participation in decisions affecting the coastal zone. To this end, CZMA imparts an obligation upon Federal agencies whose actions or activities affect any land or water use or natural resource of the coastal zone to be carried out in a manner consistent to the maximum extent practicable with the enforceable policies of federally approved state coastal management programs. However, Federal lands, which are "lands the use of which is by law subject solely to the discretion of the Federal Government, its officers, or agents," are statutorily excluded from the State's "coastal uses or resources." If, however, the proposed Federal activity affects coastal uses or resources beyond the boundaries of the Federal property (i.e., has spillover effects), the CZMA Section 307 Federal consistency requirement applies. As a Federal agency, MCIEAST-MCB Camp Lejeune is required to determine whether its proposed activities would affect the coastal zone. This takes the form of a consistency determination, a negative determination, or a determination that no further action is necessary.

The North Carolina General Assembly passed the landmark Coastal Area Management Act (CAMA) in 1974. CAMA established the Coastal Resources Commission, required local land use planning in 20 coastal counties, and provided for a program for regulating development. The North Carolina Coastal Management Program was federally approved in 1978 by NOAA.

The CAMA requires local governments in each of the 20 coastal counties in the state to prepare, implement, and enforce a Land Use Plan and ordinances consistent with established state and Federal policies. Specifically, local policy statements are required on resource protection; resource production and management; economic and community development; continuing public participation; and storm hazard mitigation, post-disaster recovery, and evacuation plans. Upon approval by the North Carolina Coastal Resources Commission, each plan becomes part of the North Carolina Coastal Management Plan.

The Onslow County Comprehensive Plan (CAMA Core Land Use Plan), adopted by the Onslow County Board of Commissioners on October 19, 2009 and certified by the Coastal Resources Commission on January 13, 2010, addresses land use planning in relation to CAMA. According to this Comprehensive Land Use Plan, MCB Camp Lejeune is zoned as a Military Reservation and is limited to activities determined to be appropriate by the military. As the proposed project has been requested by authorities at MCB Camp Lejeune, the Proposed Action on base will be consistent with the operation of the Camp Lejeune Military Reservation, the applicable policies of the North Carolina Coastal

Management Program, and Onslow County's comprehensive plan policies, for the reasons described in the Coastal Consistency Determination (**Appendix E**).

3.6.2 Affected Environment

MCB Camp Lejeune is located in Onslow County within the coastal zone of North Carolina. The North Carolina Division of Coastal Management is the lead agency for coastal management and is responsible for enforcing the State's federally approved coastal management plan.

There are two tiers within the North Carolina coastal boundary. The first tier is comprised of Areas of Environmental Concern (AEC) designated by the state. The second tier includes land uses with the potential to affect coastal waters, even though they are not defined as AECs. The coastal zone extends seaward to the three nautical mile territorial sea.

An AEC is an area of natural importance and its classification protects the area from uncontrolled development. The four categories of AECs are:

1. The Estuarine and Ocean System, which includes public trust areas, estuarine coastal waters, Coastal Shorelines, and coastal wetlands;
2. The Ocean Hazard System, which includes components of barrier island systems;
3. Public Water Supplies, which include certain small surface water supply watersheds and public water supply well fields; and
4. Natural and Cultural Resource Areas, which include coastal complex natural areas; areas providing habitat for Federal or state designated rare, threatened, or endangered species; unique coastal geologic formations; or significant coastal archaeological or historic resources.

In addition to the AECs designated by the state, the Onslow County Land Use Plan contains policies related to protecting the coastal zone and its resources. Those policies include: public access; land use compatibility; agricultural and forestry preservation; conservation; stormwater control; water and sewer, solid waste, transportation; natural hazard areas; water quality; and local AEC (cultural and historic sites).

3.6.3 Environmental Consequences

3.6.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to coastal zone resources. Therefore, no significant impacts to the coastal zone would occur with implementation of the No Action Alternative.

3.6.3.2 Proposed Action Potential Impacts

MCIEAST-MCB Camp Lejeune determined that the Proposed Action is consistent with the enforceable policies of North Carolina's approved Coastal Management Program and has requested concurrence on this determination from the North Carolina Division of Coastal Management **(Appendix E)**. A summary of the determination is provided below.

The Proposed Action would take place along the estuarine and coastal shoreline of the New River. Intrusive investigation activities under the Proposed Action would occur along the shoreline and adjacent to the shoreline within the water of the New River. The only applicable policy for the Proposed

Action is NCAC 07H.0200, *Estuarine and Ocean Systems* which includes coastal wetlands, estuarine waters, and public trust areas.

Coastal Wetlands (15A NCAC 07H.0205). The underwater investigation area slightly overlaps with small areas of coastal wetlands along the shoreline of the New River. The Proposed Action does not include any development or fill activities. The survey equipment would not come into contact with the substrate. There could be contact with the substrate from the survey array being towed as a trailer, by a person, or small ATV; however, any disturbance would be minor and temporary. Should any MEC/MPPEH be identified within coastal wetlands the activities associated with intrusive investigation would include a diver digging out the material by hand and restoring the elevation of the marsh upon completion of removal using only hand tools. In the unlikely event of an in-water detonation within coastal wetlands, bottom sediment would be disturbed. The use of sandbags around the MEC/MPPEH to be detonated would minimize the sediment disturbance, and the elevation of the marsh would be restored to the maximum extent practicable upon completion. Any remaining sandbag material following an in-water detonation would be removed using only hand tools. After MEC/MPPEH has been removed from the New River/coastal wetlands, the public safety for those using this area of the New River would greatly improve. The Proposed Action would be consistent with this policy.

Estuarine Waters (15A NCAC 07H.0206). The Proposed Action does not include any development activities. The activities associated with intrusive investigation and removal of MEC/MPPEH would be short-term, temporary, and create a minimal disturbance to the bottom sediments. The disturbance would be similar to that which occurs during other bottom-disturbing activities such as anchoring or clam raking. In the unlikely event of an in-water detonation, bottom sediment would be disturbed. It is expected that sediment would quickly disperse and settle back to the bottom of the New River. The use of sandbags around the MEC to be detonated would further minimize the sediment disturbance. Any remaining sandbag material following an in-water detonation would be removed. After MEC/MPPEH has been removed from the New River, the public safety for those using this area of the New River would greatly improve. As such, estuarine waters would not be adversely impacted by the Proposed Action and would be consistent with this policy.

Public Trust Areas (15A NCAC 07H.0207). Public rights for navigation and recreation of public trust waters would be protected, as no loss of public trust waters would result from this Proposed Action. In-water activities would necessitate the establishment of temporary Exclusion Zones in order to protect the safety of the public and the workers in the project area. The Exclusion Zones would only be established while the workers were actively working in the project area. The Proposed Action would be consistent with this policy.

The only policies defined in the Onslow County Land Use Plan that are applicable would be public access, conservation, and water quality. The Proposed Action would be consistent with all of these policies.

Therefore, implementation of the Proposed Action would not result in significant impacts to coastal zone resources.

3.7 Socioeconomics

This section discusses commercial fishing, recreational fishing, hunting and boating activities, and related data providing key insights into the socioeconomic conditions that might be affected by the Proposed Action. Access to the potentially impacted areas is limited to the surface water areas due to

the restricted shoreline access at the range, therefore the socioeconomic section is limited to these water focused impacts.

3.7.1 Regulatory Setting

Data shown in this section are presented at the state, county, municipality, and waterbody levels to characterize baseline socioeconomic conditions in the context of regional and statewide trends. Data have been collected from previously published documents issued by Federal, state, and local agencies and from state and national databases.

3.7.2 Affected Environment

An assessment of commercial fishing, recreational fishing, and hunting and boating impacts is included in this EA because the Proposed Action has the potential to affect local spending and income associated with these activities. Discussion in this section is limited in scope to the impacts on the local economy. Further discussions of wildlife and recreation are located in **Section 3.2** Biological Resources and **Section 3.5** Recreation, respectively.

3.7.2.1 Commercial Fishing

Commercial fishing is an important part of Onslow County's economy. Total commercial seafood landings for North Carolina, Onslow County, and the New River in 2017 are listed in **Table 3.7-1**. Landings in the county totaled 2,314,102 pounds and were valued at $5,789,044 in 2017. This represented 4.3 percent of the total landings in North Carolina by weight and 6.0 percent by value. Landings in the New River totaled 585,163 pounds valued at $1,802,020. The New River accounted for 25.3 percent of the commercial fishing landings in Onslow County by weight and 31.1 percent by value.

Table 3.7-1. 2017 Commercial Seafood Landing Totals in the Study Area

Location	*Pounds*	*Value*
North Carolina	54,373,398	$96,513,753
Onslow County	2,314,102	$5,789,044
New River	585,163	$1,802,020

Source: North Carolina Division of Marine Fisheries (NCDMF) 2018

Commercial seafood landings in Onslow County in 2017 are listed in **Table 3.7-2**. The majority of the county's commercial seafood economy is located in Sneads Ferry with other minor activity occurring in Hubert, Jacksonville, and Swansboro.

Table 3.7-2. 2017 Onslow County Commercial Seafood Landing Totals by Dealer City

Location/Dealer City	*Pounds*	*Value*
Onslow County Total	*2,314,102*	*$5,789,044*
Hubert	19,235	$36,155
Jacksonville	64,737	$98,636
Sneads Ferry	1,960,400	$4,792,877
Swansboro	219,104	$755,694
Onslow Other	50,624	$105,682

Source: NCDMF 2018

Commercial fishing activity in the New River is primarily based on shellfish although there are other finfish species taken from the river as well. The top five species by weight taken from the New River in 2017 are listed in **Table 3.7-3**. Blue Crabs were the most harvested species in the New River by weight while clams were the most valuable species harvested. Clams harvested in the New River represent a large percentage of the statewide totals (31.9 percent). The other four of the top five harvested species each represent less than five percent of the statewide total.

Table 3.7-3. Top Five Species in Commercial Landings for the New River in 2017

	New River		*North Carolina Total*	
Species	***Pounds***	***Value***	***Pounds***	***Value***
Total – All Species	*585,163*	*$1,802,020*	*54,373,398*	*$96,513,753*
Blue Crabs, Hard	241,671	$237,752	18,069,170	$17,776,188
Clams, Hard	87,050	$692,657	273,280	$2,174,491
Shrimp, White	77,039	$174,004	9,125,239	$20,610,738
Mullet, Striped	44,632	$33,857	1,363,146	$1,034,044
Oysters	34,272	$228,166	836,960	$5,572,063

Source: NCDMF 2018

Commercial fishing activities within the areas potentially impacted by the Proposed Action include fishing for various finfish and shellfish species using gill nets, crab pots, clam rakes, and hand tongs. Two NCDMF shellfish management areas, Catfish Point and Little Creek, fall within the potentially impacted area which restricts trawling.

3.7.2.2 Recreational Fishing

Recreational fishing is also a significant contributor to the economy of North Carolina and of Onslow County. The NCDMF estimates coastal recreational fishing in North Carolina generated 41,743 jobs, $1.5 billion in income, and $3.9 billion in total output in 2017 (NCDMF 2018). Recreational fishing activities in the area stimulate the local economy as visitors spend money at local businesses such as restaurants, hotels, fuel sales, or other supply stores. Chartered recreation businesses also stimulate the local economy and add employment opportunities.

A total of 469,571 coastal recreational fishing licenses were issued in North Carolina in 2017 (**Table 3.7-4**). Of those, 164,149 licenses were issued to people from outside of North Carolina. Of all the counties in North Carolina, Onslow County had the second highest number of license holders with 17,202.

Table 3.7-4. Top Five Counties Ranked by Number of North Carolina Coastal Recreational Fishing Licenses in 2017

County	***Licenses***
North Carolina Total	*469,571*
State Residents Total	*305,422*
Wake	23,636
Onslow	17,202
New Hanover	15,090
Brunswick	10,791
Carteret	9,943

Source: NCDMF 2018

A mail survey of recreational anglers in North Carolina is used to produce estimates of the recreational harvest. **Table 3.7-5** lists the estimated recreation effort for clams, Blue Crabs, Shrimp, and Mullet.

Table 3.7-5. North Carolina Recreational Landing Estimates for 2017

Species	*Total Effort[1]*	*Catch[2]*	*Release[2]*	*Harvest[2]*
Clams	3,435	93,295	18,124	75,171
Blue Crab	17,381	140,311	67,667	72,645
Shrimp	195,121	62,692	32,134	30,557
Mullet	182,697	568,205	247,543	320,662

Source: NCDMF 2018

Notes: [1] Effort estimates are determined by the number of trips reported for each survey respondent extrapolated to represent the population of license holders.

[2] Catch estimates are determined by the species harvested by each angler extrapolated to represent the population of license holders.

Recreational fishing activities within the areas potentially impacted by the Proposed Action include fishing for various species using hook and line gear, hand harvest, clam rakes, and crab pots.

3.7.2.3 Hunting and Boating Activities

Additional recreation opportunities that would potentially be affected include waterfowl hunting or recreational boating. During scoping meetings comments were received indicating various hunting activities within potentially impacted areas. As with recreational fishing, visitors coming to the local area to participate in hunting and boating stimulate the local economy.

3.7.3 Environmental Consequences

3.7.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no reduction of the safety risk associated with historical potential UXO within waters adjacent to the K-2 Impact Area. There would be no restriction of access to the area; however, the elevated risks would remain. Anglers would likely substitute other nearby accessible areas to replace the areas with elevated risk. Therefore, no significant impacts to socioeconomics would occur with implementation of the No Action Alternative.

3.7.3.2 Proposed Action Potential Impacts

The study area for socioeconomic analyses for the Proposed Action is defined as Onslow County and communities surrounding the New River waterbody.

Under the Proposed Action, intrusive investigations in the shallow and deep water area would temporarily restrict other activities including commercial fishing, recreational fishing, and hunting and boating activities. During the intrusive investigations exclusion zones would be established and access to fishing, hunting, and boating areas would be temporarily reduced. This has the potential to negatively impact the commercial fishing catch and therefore reduce revenues to the commercial fishing industry. The reduced areas available for recreational fishing, and hunting and boating activities during the intrusive investigations may reduce the number of visitors traveling to the area and therefore may impact local businesses catering to these visitors. During intrusive investigations, shellfish habitats may be disturbed which would potentially affect future commercial and recreational fishing. However, it is expected that this potential impact would short-term and minor.

Although the activities associated with the Proposed Action would temporarily restrict access to some areas there are many similar habitats and locations in the vicinity of the area and users including commercial anglers, recreational anglers, hunters, and recreational boaters would likely substitute these nearby areas for the restricted areas with little impact. It is not expected that the Proposed Action would have a noticeable impact on the revenue associated with recreational hunting or fishing in the area.

Therefore, implementation of the Proposed Action would not result in significant impacts to the socioeconomics of the local area or region.

3.8 Environmental Justice

U.S. Environmental Protection Agency (USEPA) defines Environmental Justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (USEPA 2014).

3.8.1 Regulatory Setting

Consistent with EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994), the U.S. Navy and Marine Corps policy is to identify and address any disproportionately high and adverse human health or environmental effects of its actions on minority and low-income populations.

3.8.2 Affected Environment

Table 3.8-1 lists the demographic data for the areas potentially impacted by the Proposed Action. Data are listed for the census tract block groups in the vicinity of the area as well as for North Carolina as a whole, Onslow County, the City of Jacksonville, and the City of Sneads Ferry. Minority populations include anyone of hispanic or latino origin or anyone with a designated race other than white. The population below poverty is designated as the percentage of the population with an income below the poverty level over the last 12 months.

Table 3.8-1. Environmental Justice Communities in Proximity to the Potentially Impacted Area

Location	*Population*	*Minority Population*	*Population Below Poverty*
North Carolina	10,052,564	36.4%	16.1%
Onslow County	192,685	33.2%	14.1%
Jacksonville	73,661	42.1%	14.0%
Sneads Ferry	2,910	12.7%	25.5%
Census Tract 4.02			
Block Group 1	3,832	18.8%	7.2%
Block Group 2	1,794	18.6%	38.7%
Census Tract 5			
Block Group 1	1,659	41.5%	NA
Census Tract 6			
Block Group 1	1,454	38.1%	NA
Block Group 3	4,430	39.0%	NA
Block Group 4	4,822	31.7%	NA

Source: U.S. Census Bureau (USCB), 2017a and 2017b.

Note: NA - Census Tracts 5 and 6 are located on the military installation and poverty rates are not determined.

The waters adjacent to the K-2 Range Impact Area are surrounded by census tract 5, block group 1 within Onslow County. This area includes the bulk of MCB Camp Lejeune. This area has a higher distribution of minorities (41.5 percent) than Onslow County (33.2 percent) or North Carolina (36.4 percent) as a whole. Poverty information was not reported for areas on the military installation. Directly across the New River to the north east of the potential impact area are three block groups (block groups 1, 3, and 4) within census tract 6. These block groups are also within MCB Camp Lejeune and block group 4 has a lower proportion of minorities than the state or county (31.7 percent) while block groups 1 and 3 have higher proportions of minorities (38.1 percent and 39.0 percent respectively) than state and county levels. Two block groups are located to the south of the potential impact area across Stones Bay, census tract 4.02, block group 1 and census tract 4.02, block group 2. Both of these block groups have minority populations that are a smaller percentage of the total population than the state or county levels. Census tract 4.02, block group 1 has a smaller proportion of its population in poverty (7.2 percent) than the state or county level, while census tract 4.02, block group 2 has a larger proportion (38.7 percent).

3.8.3 Environmental Consequences

3.8.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. Currently the communities surrounding the proposed action area are not suffering any disproportionate impacts as the potential harm is related to activities on the water so there would be no affect to Environmental Justice. Therefore, no significant impacts with respect to environmental justice would occur with the implementation of the No Action Alternative.

3.8.3.2 Proposed Action Potential Impacts

The study area for environmental justice analysis for the Proposed Action is defined as the communities in census block groups surrounding the proposed action area and along the New River waterbody across from the area.

Impacts associated with the Proposed Action are related to activities on the water. Although some of the block groups have higher proportions of minority populations than the surrounding region and some have higher proportions of the population living below poverty than the surrounding region, there are not anticipated to be any impacts to the communities living in these block groups.

Implementation of the Proposed Action would not cause disproportionately high and adverse human health or environmental effects on any minority or low-income populations.

3.9 Summary of Potential Impacts to Resources and Impact Avoidance Minimization

A summary of the potential impacts associated with the Proposed Action and the No Action Alternative and impact avoidance and minimization measures are presented in **Tables 3.9-1 and 3.9-2**, respectively.

Table 3.9-1. Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Proposed Action (Preferred Alternative)*
Water Resources	No change to the existing water resources.	Operation of all-terrain vehicles in shallow water areas, operation of watercraft, hand digging to expose MEC, and in-water detonation of MEC would all disturb sediments which would increase turbidity. The turbidity would be short-term and impacts to water quality are expected to be minor.
Biological Resources	No change to the existing biological resources.	In-water activities, to include operation of watercraft, hand digging, and possible in-water detonation, could potentially disturb wildlife and protected species. MCIEAST-MCB Camp Lejeune prepared a Biological Assessment for this action and consulted with U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries Service. The Proposed Action may affect, but is not likely to adversely affect the West Indian manatee, Red knot, Green sea turtle, Loggerhead sea turtle, Leatherback sea turtle, Kemp's Ridley sea turtle, Hawksbill sea turtle, Atlantic sturgeon, and Shortnose sturgeon. If in-water detonation were required, the noise would potentially disturb Atlantic spotted and Bottlenose dolphins. MCIEAST-MCB Camp Lejeune prepared an Incidental Harassment Authorization and consulted with National Oceanic and Atmospheric Administration Fisheries Service. If in-water detonation were required, the noise could potentially result in injury or mortality to

Table 3.9-1. Summary of Potential Impacts to Resource Areas		
Resource Area	***No Action Alternative***	***Proposed Action (Preferred Alternative)***
		fish species. MCIEAST-MCB Camp Lejeune prepared an Essential Fish Habitat Assessment for this action and consulted with National Oceanic and Atmospheric Administration Fisheries Service.
Noise	No change to the existing noise environment.	MCB Camp Lejeune is an active military installation with active training ranges, as such artillery and explosive noise is common. The airborne noise generated by the all-terrain vehicles and the airborne and underwater noise from small watercraft would be the same as the noise produced by other recreational and commercial watercraft in the area. This noise would be negligible in the current acoustic environment. Similarly, if an in-water detonation were required it would not create an airborne noise disturbance different than what currently occurs on a routine basis. Any necessary detonations would not change the existing noise contours in the project area or expose any new sensitive noise receptors. The detonations, if required, would create a temporary underwater noise disturbance for marine animals.
Public Health and Safety	No change to existing public health and safety. Public safety risks would continue to be serious; especially during bottom-disturbing activities that have the potential to strike a MEC.	All in-water activities would be performed in accordance with required safety plans and standards of procedure. Establishing a temporary Exclusion Zone would prohibit unauthorized persons from entering the project site, ensuring public safety. After completion of the Proposed Action, the current public safety risk associated with historical UXO would be greatly reduced in the project area.
Recreation	No change to existing recreation opportunities. The USMC would continue to encourage the public to not access the area via the warning signs.	The temporary Exclusion Zones would prevent the public from accessing small areas of the New River. It is expected that recreational users could use other areas of the New River during these temporary closures with little to no impact.
Coastal Zone	No change to the coastal zone.	The Proposed Action is consistent with the enforceable policies of North Carolina's Coastal Zone Management Plan. A Federal Consistency Determination for this project has been prepared and submitted to North Carolina Division of Coastal Management for concurrence.

Table 3.9-1. Summary of Potential Impacts to Resource Areas		
Resource Area	***No Action Alternative***	***Proposed Action (Preferred Alternative)***
Socioeconomics	No change to the socioeconomics.	The temporary Exclusion Zones would prevent commercial and recreational fishermen and hunters from accessing the project site. It is expected that other areas of the New River could be used for commercial fishing, however, reducing access to this area could potentially reduce revenues to the commercial fishing industry. This impact would be temporary and short-term (project duration is expected to be 12 months). The Proposed Action is not expected to have a noticeable impact on the revenue associated with recreational hunting or fishing in the area.
Environmental Justice	No environmental justice concerns.	The Proposed Action would not impact minority populations or populations living below poverty in the vicinity of the project site.

Table 3.9-2. Avoidance and Minimization Measures		
Activity	***Description***	***Impacts Reduced/Avoided***
Maintain the existing warning signs.	Existing warning signs that inform the public of the potential danger in this area would continue to be maintained by MCB Camp Lejeune.	Reduce impacts to Public Safety.
Issue Notice to Mariners (NOTMARs)	NOTMARs would be issued to inform commercial and recreational users of the New River of the planned in-water activities associated with the intrusive investigations or the in-water detonations (if necessary).	Reduce impacts to Public Safety.
Work would cease upon discovery of any unmapped cultural or archaeological materials or resources.	Any work within underwater investigation area would cease upon discovery of unknown cultural resources. The MCB Camp Lejeune Cultural Resources Manager would be notified. Work would not continue without approval by MCB Camp Lejeune Cultural Resources Manager.	Reduce impacts to cultural resources.
Visual surveys for unauthorized persons.	Visual surveys of the project site would be performed to monitor for unauthorized persons during in-water activities.	Reduce impacts to public safety.
Small boat visual checks and avoidance of manatee	Base Order 5090.11A requires all personnel conducting waterborne operations to be alert for possible manatee sightings/encounters, and if a manatee is sighted, immediately slow to a no-wake speed and do not approach.	Reduce impacts to manatee.

Table 3.9-2. Avoidance and Minimization Measures		
Activity	***Description***	***Impacts Reduced/Avoided***
Small boat visual checks for protected species.	Operators of small boats will be knowledgeable of marine mammals, protected species, and visual clues related to the presence of marine mammals and protected species. All members of small boat crews shall be required to take the Marine Species Awareness Training maintained and promoted by the Department of the Navy.	Reduce impacts to protected species.

Note: This table will be revised as necessary after consultations are complete with NOAA Fisheries Service.

This page intentionally left blank.

4 Cumulative Impacts

This section (1) defines cumulative impacts, (2) describes past, present, and reasonably foreseeable future actions relevant to cumulative impacts, (3) analyzes the incremental interaction the Proposed Action may have with other actions, and (4) evaluates cumulative impacts potentially resulting from these interactions.

4.1 Definition of Cumulative Impacts

The approach taken in the analysis of cumulative impacts follows the objectives of NEPA, CEQ regulations, and CEQ guidance. Cumulative impacts are defined in 40 CFR 1508.7 as "the impact on the environment that results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

To determine the scope of environmental impact analyses, agencies shall consider cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact analysis document.

In addition, CEQ and USEPA have published guidance addressing implementation of cumulative impact analyses—Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ 2005) and Consideration of Cumulative Impacts in USEPA Review of NEPA Documents (USEPA 1999). CEQ guidance entitled *Considering Cumulative Impacts Under NEPA* (1997) states that cumulative impact analyses should

"…determine the magnitude and significance of the environmental consequences of the Proposed Action in the context of the cumulative impacts of other past, present, and future actions...identify significant cumulative impacts…[and]…focus on truly meaningful impacts."

Cumulative impacts are most likely to arise when a relationship or synergism exists between a Proposed Action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in close proximity to the Proposed Action would be expected to have more potential for a relationship than those more geographically separated. Similarly, relatively concurrent actions would tend to offer a higher potential for cumulative impacts. To identify cumulative impacts, the analysis needs to address the following three fundamental questions.

- Does a relationship exist such that affected resource areas of the Proposed Action might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
- If one or more of the affected resource areas of the Proposed Action and another action could be expected to interact, would the Proposed Action affect or be affected by impacts of the other action?
- If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the Proposed Action is considered alone?

4.2 Scope of Cumulative Impacts Analysis

The scope of the cumulative impacts analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this EA, the study area delimits the geographic extent of the cumulative impacts analysis. In general, the study area will include those areas

previously identified in Chapter 3 for the respective resource areas. The time frame for cumulative impacts centers on the timing of the Proposed Action.

Another factor influencing the scope of cumulative impacts analysis involves identifying other actions to consider. Beyond determining that the geographic scope and time frame for the actions interrelate to the Proposed Action, the analysis employs the measure of "reasonably foreseeable" to include or exclude other actions. For the purposes of this analysis, public documents prepared by Federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Documents used to identify other actions include notices of intent for EISs and EAs, management plans, land use plans, and other planning related studies.

4.3 Past, Present, and Reasonably Foreseeable Actions

This section will focus on past, present, and reasonably foreseeable future projects at and near the Proposed Action locale. In determining which projects to include in the cumulative impacts analysis, a preliminary determination was made regarding the past, present, or reasonably foreseeable action. Specifically, using the first fundamental question included in **Section 4.1**, it was determined if a relationship exists such that the affected resource areas of the Proposed Action included in this EA might interact with the affected resource area of a past, present, or reasonably foreseeable action. If no such potential relationship exists, the project was not carried forward into the cumulative impacts analysis. In accordance with CEQ guidance (CEQ 2005), these actions considered but excluded from further cumulative effects analysis are not catalogued here as the intent is to focus the analysis on the meaningful actions relevant to informed decision-making. An exhaustive search was done to identify past, present, and reasonably foreseeable future actions of other government agencies or stakeholders. The Proposed Action would be confined to 12 months of in-water activity and would not create a permanent or long-term disturbance. No other projects were identified that would geographically or temporally overlap with the Proposed Action area. Therefore, projects included in this cumulative impacts analysis are limited to other USMC projects.

4.3.1 Past Actions

Previous Investigations of K2 Impact Area (CH2M 2015a, b). As described in **Section 1.2.2**, there were previous investigations of the project area to identify MEC/MPPEH. The project area was investigated in 2014 through low-altitude magnetic and electromagnetic aerial geophysical surveys (CH2M 2015a). The objective of these surveys was to locate ordnance-related metallic items for subsequent removal. These surveys identified 5,000 metallic anomalies. A follow-on investigation was performed October 2014 through March 2015 that targeted these anomalies to determine if they were MEC or MPPEH. That investigation recommended that 622 of the anomalies be further investigated. A total of 572 anomalies were intrusively investigated. The intrusive investigation identified 39 MEC items and 4 MPPEH items that were removed from the riverbed and taken to the land area of the K-2 Impact Area and destroyed through intentional detonations. The remaining anomalies that were intrusively investigated consisted of non-munitions related debris (crab pots, scrap metal, cans, etc.) (CH2M 2015a).

EA for Range Operations at MCB Camp Lejeune (MCB Camp Lejeune 2009). An EA was completed in January 2009 that analyzed the potential environmental impact of training activities in the MCB Camp Lejeune Range Complex. The Proposed Action was to support and conduct current and emerging training operations at existing land ranges, water ranges, and special use airspace. The action included: an increase in small arms training; an increase in helicopter operations; an increase in training with the MK-19; an increase in training with artillery, mortar, and other large arms; an increase in training with

tank rounds; and an increase in tactical vehicle operations. Operations in the water ranges results in temporary closures of surface water restricted areas in the New River which prevents commercial and recreational fishermen from accessing these areas. While these closures have an impact on commercial and recreational activities, the closures are usually brief (lasting approximately one hour). Small boat and amphibious vehicle training occurs in the nearshore environment at Onslow Beach. These activities disturb underwater sediments. Also, some of the surface danger zones extend over the New River, potentially resulting in munitions accidentally landing in the water.

4.3.2 Reasonably Foreseeable Future Actions

Update to the EA for Range Operations at MCB Camp Lejeune. MCB Camp Lejeune is currently preparing an update to the 2009 Range Operations EA. The EA would address changes to the use of the land ranges, water ranges, and special use airspace since the release of the 2009 EA. This action is in the early stages of development and the changes to range operations are not known at this time. It is expected that similar operations as analyzed in the 2009 EA would continue and impacts could be similar in nature, but vary in the level of impact.

4.4 Cumulative Impact Analysis

The MCB Camp Lejeune Range Complex provides a unique training environment that is of vital importance to the readiness of Marine Forces. As noted in the projects above, training at the land and water ranges has the potential to impact the physical environment, specifically from activities that result in ground disturbance. Current and future operations potentially disturb the shoreline soils and nearshore sediments, but it is expected that these sediments settle to the bottom surface and do not create any long-term turbidity impacts. The Proposed Action would also have temporary, minor disturbance to the bottom sediments during intrusive investigations but on a significantly smaller scale given the small project area and limited duration for the activity. Cumulatively, the Proposed Action would not create a noticeable increase in the ground or sediment disturbance beyond what currently occurs from range operations. These disturbances are not expected to have a significant impact to the sediments or water quality in the New River.

Historical and current use of the munitions ranges has the potential to result in munitions accidentally landing in the adjacent waters since some of the surface danger zones extend over the New River. The previous investigations in the Proposed Action project site identified several UXO in the nearshore environment. Implementing the Proposed Action along with the previous investigations would cumulatively improve the public health and safety in this area. These improvements would have indirect benefits to recreation and commercial fishing in the area by improving the safety in this area. While many of the MEC/MPPEH would be removed under the Proposed Action, it is not possible to completely remove all of the potential historical UXO. The warning signs would remain in place to advise the public of the potential danger in the area.

This page intentionally left blank.

5 Other Considerations Required by NEPA

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

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

Table 5.1-1. Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
NEPA; CEQ NEPA implementing regulations; Navy procedures for Implementing NEPA	EA being prepared to document compliance
CAA	n/a
CWA	Completion of EA will document compliance
Rivers and Harbors Act	Completion of EA will document compliance
CZMA	Consistency Determination submitted to NC Division of Coastal Management
NHPA	n/a
ESA	Biological Assessment submitted to USFWS and NOAA Fisheries. Concurrence received from USFWS. Concurrence from NOAA Fisheries is pending.
Magnuson-Stevens Fishery Conservation and Management Reauthorization Act	EFH Assessment submitted to NOAA Fisheries; concurrence received.
MMPA	Request for Incidental Harassment Authorization submitted to NOAA Fisheries concurrence is pending.
MBTA	n/a
BGEPA	n/a
CERCLA	n/a
Emergency Planning and Community Right-to-Know Act	n/a
Federal Insecticide, Fungicide, and Rodenticide Act	n/a
Resource Conservation and Recovery Act	n/a
Toxic Substances Control Act	n/a
Farmland Protection Policy Act	n/a
EO 11988, Floodplain Management	n/a
EO 12088, Federal Compliance with Pollution Control Standards	n/a
EO 12114, Environmental Effects Abroad of Major Federal Actions (DON implementing regulation 32 CFR 287)	n/a
EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations	Completion of EA will document compliance
EO 13045, Protection of Children from Environmental Health Risks and Safety Risks	Completion of EA will document compliance
EO 13089, Coral Reef Protection	n/a

Table 5.1-1. Principal Federal and State Laws Applicable to the Proposed Action	
Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	***Status of Compliance***
EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management	n/a
EO 13175, Consultation and Coordination with Indian Tribal Governments	n/a
EO 13696, Planning for Federal Sustainability in the Next Decade	n/a

Legend: CAA – Clean Air Act; CEQ – Council on Environmental Quality; CCD – Coastal Consistency Determination; CWA – Clean Water Act; CZMA – Coastal Zone Management Act; DON – Department of Navy; EA – Environmental Assessment; NEPA – National Environmental Policy Act; NHPA – National Historic Preservation Act; ESA – Endangered Species Act; MBTA – Migratory Bird Treaty Act; NC – North Carolina; USFWS – U.S. Fish and Wildlife Service; EFH – Essential Fish Habitat; NOAA – National Oceanic and Atmospheric Administration; MMPA – Marine Mammal Protection Act; CFR – Code of Federal Regulations; BGEPA – Bald and Gold Eagle Protection Act; CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act; EO – Executive Order

5.2 Irreversible or Irretrievable Commitments of Resources

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Implementation of the Proposed Action would involve human labor; and the consumption of fuel, oil, and lubricants for vessels and vehicles. In the unlikely event that in-water detonation of MEC is necessary, the possibility exists that nearby fish or marine mammals could be harassed, harmed, or killed by the underwater noise and sound pressure. The limited number of detonations and use of observers would minimize the likelihood of impact so there would not be a detrimental effect on species populations or their existence. BMP and mitigation measures would minimize this potential to the extent possible. Implementing the Proposed Action would not result in significant irreversible or irretrievable commitment of resources.

5.3 Unavoidable Adverse Impacts

This EA has determined that the Proposed Action would not result in any significant impacts. Implementing the Proposed Action would result in the following unavoidable environmental impacts:

- Short-term degradation of water quality from increased turbidity during intrusive investigations and in-water detonation
- Disturbance, harassment, potential incidental take of marine mammals, fish, and wildlife for in-water detonation

5.4 Relationship between Short-Term Use of the Environment and Long-Term Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development

site reduces future flexibility in pursuing other options, or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

In the short-term, effects to the human environment with implementation of the Proposed Action would primarily relate to the activities associated with the intrusive investigations. Water quality, recreation, and natural resources would be impacted in the short-term. In the long-term, public health and safety would be greatly improved from the removal of UXO from a publically accessible area. The Proposed Action would not result in any impacts that would significantly reduce environmental productivity or permanently narrow the range of beneficial uses of the environment.

This page intentionally left blank.

6 References

Atlantic Sturgeon Status Review Team 2007. Status Review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus). (Vol. Updated with corrections on July 27, 2007, pp. 174). Gloucester, MA: National Marine Fisheries Service, Northeast Regional Office. Available from https://www.greateratlantic.fisheries.noaa.gov/protected/atlsturgeon/docs/AtlSturgeonStatusReviewReport.pdf

CH2M 2015a. Underwater MEC Investigation of the New River within the K-2 Impact Area. November.

CH2M 2015b. K-2 Impact Area Underwater MEC Investigation of New River Work Plan. February.

CH2M 2018. Alternatives Analysis Report K-2 Range Impact Area of the New River. Final. March.

Council on Environmental Quality (CEQ). 2005. Guidance on the Consideration of Past Actions in Cumulative Effects Analysis. Memorandum from James L. Connaughton to Heads of Federal Agencies. 24 June.

CEQ. 1997. *Considering Cumulative Effects Under the National Environmental Policy Act.* Washington, DC.

Dadswell, M. J. 2006. A Review of the Status of Atlantic Sturgeon in Canada, with Comparisons to Populations in the United States and Europe. Fisheries, 31(5), 218-229. 10.1577/1548-8446(2006)31 Retrieved from https://doi.org/10.1577/1548-8446(2006)31[218:AROTSO]2.0.CO;2

Department of Defense Explosive Safety Board (DDESB) 2004. Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel. Department of Defense Explosive Safety Board (DDESB) Technical Bulletin 18. December.

Department of the Navy (DON) 2003. Marine Resource Assessment for the Cherry Point and Southern Virginia Capes (VACAPES) Inshore and Estuarine Areas. Final Report. Naval Facilities Engineering Command, Norfolk, VA.

DON 2008. Marine Resources Assessment for the Cherry Point Operating Area. Final Report. October 2008. Prepared for the Department of the Navy.

DON 2018. Atlantic Fleet Training and Testing Final Environmental Impact Statement. (Vol. IV). Norfolk, VA: Naval Facilities Engineering Command Atlantic. Available from https://www.public.navy.mil/usff/environmental/Pages/aftt.aspx

Epperly, S.P., J. Braun, and Veishlow, A. 1995. Sea turtles in North Carolina waters. *Conservation Biology* 9:384-394.

Foley, H., Z. Swaim, D. Waples, & A. Read. 2015. Deep divers and satellite tagging projects in the Virginia Capes OPAREA - Cape Hatteras, NC: January 2014–December 2014. Virginia Beach, VA: U.S. Fleet Forces Command.

Greene, K. E., Zimmerman, J. L., Laney, R. W. and Thomas-Blate, J. C. 2009. Chapter 8 Atlantic Sturgeon Atlantic States Marine Fisheries Commission Atlantic Coast Diadromous Fish Habitat: A Review of Utilization, Threats, Recommendations for Conservation, and Research Needs (pp. 195-254). Washington, D.C: Atlantic States Marine Fisheries Commission.

Guilbard, F., Munro, J., Dumont, P., Hatin, D. and Fortin, R. 2007. Feeding Ecology of Atlantic Sturgeon and Lake Sturgeon Co-Occurring in the St. Lawrence Estuarine Transition Zone, American Fisheries Society Symposium (Vol. 56, pp. 85-104): American Fisheries Society.

Hale, E. A., Park, I. A., Fisher, M. T., Wong, R. A., Stangl, M. J. and Clark, J. H. 2016. Abundance Estimate for and Habitat Use by Early Juvenile Atlantic Sturgeon within the Delaware River Estuary. Transactions of the American Fisheries Society, 145(6), 1193-1201. 10.1080/00028487.2016.1214177

Ingram, E. C. & Peterson, D. L. 2016. Annual Spawning Migrations of Adult Atlantic Sturgeon in the Altamaha River, Georgia. Marine and Coastal Fisheries, 8(1), 595-606. 10.1080/19425120.2016.1243599 Retrieved from https://doi.org/10.1080/19425120.2016.1243599

Jefferson, T. A., M. A. Webber, & R. L. Pitman 2008. Marine mammals of the world: a comprehensive guide to their identification. London, UK: Elsevier.

Jefferson, T. A., M. A. Webber, & R. L. Pitman 2015. Marine mammals of the world: a comprehensive guide to their identification (2nd ed.): Academic Press

Keinath, J.A., J.A. Musick, and Barnard, D.E. 1996. Abundance and distribution of sea turtles off North Carolina. *OCS Study MMS* 95-0024. Prepared by the Virginia Institute of Marine Science, College of William and Mary. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, Louisiana.

MCB Camp Lejeune 2009. Environmental Assessment for MCB Camp Lejeune Range Operations. January.

MCB Camp Lejeune 2015. 2015-2020 Integrated Natural Resources Management Plan for Marine Corps Base Camp Lejeune. July.

Mullin, K. D., & G. L. Fulling. 2003. Abundance of cetaceans in the southern U.S. North Atlantic Ocean during summer 1998. Fishery Bulletin, 101(3), 603–613.

National Marine Fisheries Service (NMFS) 1998. Final Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). (pp. 104). Silver Spring, MD. Prepared by Shortnose Sturgeon Recovery Team. Prepared for National Marine Fisheries Service

NMFS 2012. Endangered and Threatened Wildlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser* oxyrinchus oxyrinchus) in the Southeast. Federal Register, 77(24), 70. Retrieved from https://www.govinfo.gov/content/pkg/FR-2012-02-06/pdf/2012-1950.pdf

NMFS 2013. Incidental Take Permit to Georgia Department of Natural Resources for Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Federal Register. Retrieved from https://www.fisheries.noaa.gov/action/incidental-take-permit-georgia-department-natural-resources

NMFS 2014. Incidental Take Permit to North Carolina Department of Marine Fisheries (NCDMF) Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Federal Register, 79(44), 43716-43717. Retrieved from https://www.federalregister.gov/d/2014-17645

NMFS 2015. Endangered and Threatened Wildlife; 12-Month Finding on a Petition To Identify and Delist a Saint John River Distinct Population Segment of Shortnose Sturgeon Under the Endangered Species Act. Federal Register, 80(286), 65183-65194. Retrieved from https://www.federalregister.gov/d/2015-27148

NMFS 2019. Programmatic Biological Opinion on the Towing of Inactive U.S. Navy Ships from their Existing Berths to Dismantling Facilities or other Inactive Ship Sites. (pp. 318). Prepared by O. o. P. R. National Marine Fisheries Service, ,. doi.org/10.25923/sw62-zf21. Available from https://repository.library.noaa.gov/view/noaa/19786

NMFS and U. S. Fish and Wildlife Service (USFWS) 1992. Recovery Plan for Leatherback Turtles (*Dermochelys coriacea*) in the U.S. Caribbean, Atlantic, and Gulf of Mexico.

NMFS and USFWS 2007a. Green sea turtle (*Chelonia mydas*) 5-year review: summary and evaluation. NMFS Office of Protected Resources, Silverspring, MD and USFWS Southeast Region.

NMFS and USFWS 2007b. Loggerhead sea turtle (*Caretta caretta*) 5-year review: summary and evaluation. NMFS Office of Protected Resources, Silverspring, MD and USFWS Southeast Region.

NMFS and USFWS 2007c. Hawksbill sea turtle (*Eretmochelys imbricate*) 5-year review: summary and evaluation. NMFS Office of Protected Resources, Silverspring, MD and USFWS Southeast Region. August.

NMFS and USFWS 2008. Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (*Caretta caretta*). December 2008.

NMFS and USFWS 2013. Leatherback Sea Turtle (*Dermochelys coriacea*) 5-year Review Summary and Evaluation. November 2013.

NMFS and USFWS 2015. Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) 5-year review: summary and evaluation. July 2015.

North Carolina Department of Environmental Quality (NCDEQ). 2019a. Division of Water Resources Water Quality Programs. May 2019 Civil Penalty Assessments.

NCDEQ. 2019b. Division of Water Resources White Oak River Basin Surface Water Classifications.

NCDEQ. 2007. White Oak River Basinwide Water Quality Plan. May.

North Carolina Division of Marine Fisheries (NCDMF). 2018. License and Statistics Section 2018 Annual Report. November.

North Carolina Wildlife Resources Commission (NCWRC) 2015a. Hawksbill Sea Turtle Nests Confirmed on North Carolina Beach. Wildlife Diversity Program Quarterly Update, 9(4), 13. Retrieved from https://www.ncwildlife.org/Portals/0/Conserving/documents/2015-WDP-Fourth-Qtr-Report.pdf

NCWRC 2015b. North Carolina Wildlife Action Plan. (pp. 890). Raleigh, NC. Available from https://www.ncwildlife.org/Portals/0/Conserving/documents/2015WildlifeActionPlan/NC-WAP-2015-Ch1-Ch-8.pdf

NCWRC 2019. Sea Turtle Monitoring System. Retrieved from: http://www.seaturtle.org/nestdb/?view=1

O'Keeffe, D. J., and G. A. Young. 1984. Handbook on the Environmental Effects of Underwater Explosions. Silver Spring, MD: U.S. Navy, Naval Surface Weapons Center (Code R14).

Onslow County 2014. Onslow County Comprehensive Plan CAMA Core Land Use Plan. October.

Perrin, W. F. 2008. Atlantic spotted dolphin, Stenella frontalis. In W. F. Perrin, B. Wursig & J. G. M. Thewissen (Eds.), Encyclopedia of Marine Mammals (2nd ed., pp. 54–56). Academic Press.

Peterson, D. L., Bain, M. B. & Haley, N. 2000. Evidence of Declining Recruitment of Atlantic Sturgeon in the Hudson River. North American Journal of Fisheries Management, 20(1), 231-238. 10.1577/1548-8675(2000)020<0231:EODROA>2.0.CO;2 Retrieved from https://doi.org/10.1577/1548-8675(2000)020<0231:EODROA>2.0.CO;2

Rabon, D.R., S.A. Johnson, . Boettcher, M. Dodd, M. Lyons, S. Murtphy, S. Ramsey, S. Roff, and K. Stewart 2003. Confirmed Leatherback Turtle (Dermochelys coriacea) Nests from NorthCarolina, with a Summary of Leatherback Nesting Activities North of Florida. Marine Turtle Newsletter No. 101, 2003

Read, A. J., S. Barco, J. Bell, D. L. Borchers, M. L. Burt, E. W. Cummings, J. Dunn, E. M. Fougeres, L. Hazen, L. E. W. Hodge, A.-M. Laura, R. J. McAlarney, P. Nilsson, D. A. Pabst, C. G. M. Paxton, S. Z. Schneider, K. W. Urian, D. M. Waples, & W. A. McLellan 2014. Occurrence, distribution, and abundance of cetaceans in Onslow Bay, North Carolina, USA. Journal of Cetacean Research and Management, 14, 23–35.

Reynolds, C., White, M., Clarke, R., and Marker, A. 1990. Suspension and settlement of particles in flowing water: camparison of the effects of varying water depth and velocity in circulating channels. *Freshwater Biology*. 24,1. 23-34.

Schueller, P. & Peterson, D. L. 2010 Abundance and Recruitment of Juvenile Atlantic Sturgeon in the Altamaha River, Georgia. Transactions of the American Fisheries Society, 139(5), 1526-1535. 10.1577/T09-127.1 Retrieved from https://doi.org/10.1577/T09-127.1

Shortnose Sturgeon Status Review Team 2010. A Biological Assessment of shortnose sturgeon (*Acipenser brevirostrum*) Report to National Marine Fisheries Service, Northeast Regional Office. (pp. 417).

South Carolina Department of Natural Resources 2015. State Wildlife Action Plan - Main Document State Wildlife Action Plan. Columbia, SC. Available from http://www.dnr.sc.gov/swap/

Stein, A. B., Friedland, K. D. & Sutherland, M. 2004. Atlantic Sturgeon Marine Distribution and Habitat Use along the Northeastern Coast of the United States. Transactions of the American Fisheries Society, 133(3), 527-537. 10.1577/T02-151.1 Retrieved from https://doi.org/10.1577/T02-151.1

Sulak, K. J. & Clugston, J. P. 1998. Early Life History Stages of Gulf Sturgeon in the Suwannee River, Florida. Transactions of the American Fisheries Society, 127(5), 758-771. 10.1577/1548-8659. Retrieved from https://afspubs.onlinelibrary.wiley.com/doi/abs/10.1577/1548-8659%281998%29127%3C0758%3AELHSOG%3E2.0.CO%3B2

Swaim, Z., H. Foley, D. Waples, K. Urian, & A. Read 2014. Protected species monitoring in Navy OPAREAS off the U.S. Atlantic Coast, January 2013 – December 2013. Department of the Navy, Norfolk, Virginia.

U.S. Army Center for Health Promotion and Preventive Medicine. 2005. Operational Noise Manual An Orientation For Department of Defense Facilities. November.

U.S. Army Corps of Engineers (USACE). 2017. PTM Modeling of Dredged Suspended Sediment at Proposed Polaris Point and Ship Repair Facility CVN Berthing Sites – Apra Harbor, Guam. September.

USACE. 2010. Feasibility Report and Environmental Impact Statement on Coastal Storm Damage Reduction.

U.S. Census Bureau (USCB). 2017a. American Community Survey, Ethnicity and Race for Onslow County and North Carolina.

U.S. Census Bureau (USCB). 2017b. American Community Survey, Poverty for Onslow County and North Carolina.

U.S. Coast Guard. 2017. 33 CFR Part 165. Safety Zone; Atlantic Intracoastal Waterway, Camp Lejeune, NC. Temporary Final Rule. October 10.

U.S. Environmental Protection Agency (USEPA). 1999. Consideration of Cumulative Impacts In USEPA Review of NEPA Documents. U.S. Environmental Protection Agency, Office of Federal Activities (2252A).

USEPA. 2014. Plan EJ 2014. Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100DFCQ.PDF?Dockey=P100DFCQ.PDF.

U.S. Fish and Wildlife Service (USFWS) 2001. Florida Manatee Recovery Plan (*Trichechus manatus latirostris*). October 2001.

USFWS 2007. West Indian Manatee (*Trichechus manatus*) 5-Year review: summary and evaluation.

USFWS 2013. Proposed threatened status for the Rufa Red Knot (*Calidris canutus rufa*). Federal Register 78:60023-60098.

USFWS 2016. Endangered and Threatened Wildlife and Plants; Final Rule To List Eleven Distinct Population Segments of the Green Sea Turtle (*Chelonia mydas*) as Endangered or Threatened and Revision of Current Listings Under the Endangered Species Act. 81 Federal Register 20057.

USFWS 2019. Species Profile for Green Sea Turtle (*Chelonia mydas*). https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C00S. Accessed May 9, 2019.

Waldman, J. R., King, T., Savoy, T., Maceda, L., Grunwald, C. & Wirgin, I. 2013. Stock Origins of Subadult and Adult Atlantic Sturgeon, Acipenser oxyrinchus, in a Non-natal Estuary, Long Island Sound. [journal article]. Estuaries and Coasts, 36(2), 257-267. 10.1007/s12237-012-9573-0 Retrieved from https://doi.org/10.1007/s12237-012-9573-0

Waring, G. T., E. Josephson, K. Maze-Foley, & P. E. Rosel 2013. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments–2012. Woods Hole, MA: National Oceanic and Atmospheric Administration. Retrieved from http://www.nmfs.noaa.gov/pr/sars/region.htm.

Waring, G. T., E. Josephson, K. Maze-Foley, & P. E. Rosel, (Eds.) 2014. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments–2013. Woods Hole, MA: U.S. Department of Commerce, National Marine Fisheries Service.

Waring, G. T., E. Josephson, K. Maze-Foley, P. E. Rosel, (Eds.), B. Byrd, T. V. N. Cole, L. Engleby, L. P. Garrison, J. Hatch, A. Henry, S. C. Horstman, J. Litz, M. C. Lyssikatos, K. D. Mullin, C. Orphanides, R. M. Pace, D. L. Palka, M. Soldevilla, & F. W. Wenzel 2016. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments–2015.

7 List of Preparers

This EA was prepared collaboratively between the Navy, USMC, and contractor preparers.

U.S. Department of the Navy

Angela Peyton (Naval Facilities Engineering Command)
B.S. Mechanical Engineering
Years of Experience: 31

U.S. Marine Corps

Jessi Baker (MCB Camp Lejeune)
M.S. Biology
B.S. Biology
Years of Experience: 15

Contractors

Dana Banwart, AICP, Project Manager (Cardno)
B.S. Biology
Years of Experience: 20

Elizabeth Burak, Environmental Analyst (Cardno)
M.S. Biology
Years of Experience: 23

Matthew Lybolt, PhD (Cardno)
PhD Marine Ecology
Years of Experience: 20

Michael Harrison, Environmental Scientist (Cardno)
M.S. Environmental Science
B.S. Biology
Years of Experience: 17

Stephen Anderson, Environmental Scientist (Cardno)
B.A. Environmental Science
Years of Experience: 11

Sharon Simpson, Project Coordinator and Document Production Specialist (Cardno)
A.S. Science
Years of Experience: 16

This page intentionally left blank.

Appendix A
Public and Agency Participation

This page intentionally left blank.

Appendix B
Essential Fish Habitat Assessment

This page intentionally left blank.

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090.12
G-F/BEMD
JAN 09 2020

Mr. Pace Wilber
National Oceanic and Atmospheric Administration (NOAA)
National Marine Fisheries Service (NMFS)
2019 Fort Johnson Road
Charleston, SC 29412

Dear Mr. Wilber:

Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ) proposes to reduce the public safety risk associated with historical potential Unexploded Ordnance (UXO) located in the waters of the New River adjacent to the K-2 Impact Area at MCB CAMLEJ, North Carolina.

Enclosed is our Essential Fish Habitat (EFH) Assessment for the project. The purpose of the Proposed Action is to reduce the volume of munitions and explosives of concern (MEC) in the New River adjacent to the K-2 Impact Area that could potentially be UXO to reduce the potential risks to public safety, marine species, and the environment.

The USMC has determined that the Proposed Action would have no more than minimal, temporary, adverse effects on EFH and would not reduce the quality or quantity of EFH in the long term. The USMC is requesting NMFS concurrence with this effects determination.

We look forward to working with you and your staff to answer any questions about this assessment. Please feel free to contact Ms. Jessi Baker, jessi.baker@usmc.mil, (910)451-4542 with additional questions.

Sincerely,

JOHN R. TOWNSON
Director, Environmental Management
By direction of the
Commanding General

Enclosure: ESSENTIAL FISH HABITAT (EFH) ASSESSMENT FOR MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE CAMP LEJEUNE, UNEXPLODED ORDNANCE REMOVAL FROM WATER ADJACENT TO THE K-2 IMPACT AREA, ONSLOW COUNTY, NORTH CAROLINA

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
https://www.fisheries.noaa.gov/region/southeast

February 13, 2020 F/SER47:TC/pw

(Sent via Electronic Mail)

Major General Julian D. Alford
Commanding General, MCI EAST–MCB CAMLEJ
G-F/EMD/ECON
12 Post Lane
Camp Lejeune, NC 28547

Attention: Jessi Baker

Dear Major General Alford:

NOAA's National Marine Fisheries Service (NMFS) reviewed the Essential Fish Habitat (EFH) Assessment, dated October 2019, the Marine Corps Installations East-Marine Corps Base Camp Lejeune provided by email on January 13, 2020. The United States Marine Corps (USMC) proposes to reduce safety risks to the public by removing historical, potential unexploded ordnance (UXO) located in the waters of the New River adjacent to the K-2 Impact Area at Marine Corps Base Camp Lejeune. The USMC's initial determination is the proposed impacts to EFH within the project area from the removal would be minimal and temporary. As the nation's federal trustee for the conservation and management of marine, estuarine, and anadromous fishery resources, the NMFS provides the following comments and recommendations pursuant to authorities of the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

The USMC proposes to investigate three areas near the shoreline of the New River (65 acres, 17 acres, and 94.6 acres for a total of approximately 177 acres total) identified by a previous study as having a high density of munitions and explosives of concern or material potentially presenting an explosive hazard (MEC/MPPEH). The USMC will also examine an offshore 40-acre area suspected to have UXOs. Surveys in water less than three feet deep would be done using a person or vehicle to tow a sensor, 13 feet wide, above the bottom. In deeper water, a boat would tow the sensor. A diver would investigate anomalies by hand. Any anomalies determined to be MEC/MPPEH would be removed and taken to the upland K-2 Range for detonation or disposal in accordance with existing standard operating procedures.

The EFH Assessment requests the ability to detonate MEC/MPPEH in place when the USMC cannot safely remove the potential UXOs. While the USMC views in-place detonations as very unlikely, for the purpose of the EFH Assessment, the USMC indicates up to five such detonations may occur.

The EFH Assessment focuses upon brown shrimp, white shrimp, snapper-grouper complex, bluefish, and summer flounder, which is appropriate for USMC's location. The EFH Assessment adequately describes EFH within the project area and examines the effects to EFH from project activities.

The USMC does not propose direct impacts to sensitive EFH, such as submerged aquatic vegetation. The EFH Assessment describes best management practices the USMC will employ to minimize impacts to fish habitat and water quality during the investigation and removal activities. Accordingly, the NMFS agrees with the USMC's EFH determination and offers no EFH conservation recommendations for the proposed removal of UXO from the K-2 Impact Area. No further consultation under the Magnuson-Stevens Act for this work is needed unless project plans change or new information becomes available and the USMC believes those changes or new information indicate an adverse impact to EFH may occur from the proposed action.

In accordance with section 7 of the Endangered Species Act of 1973, as amended, it is the responsibility of the USMC to review and identify any proposed activity that may affect endangered or threatened species and their designated critical habitat. Determinations involving species under NMFS jurisdiction should be reported to the NMFS Protected Resources Division at the letterhead address. The Marine Mammal Protection Act of 1972, as amended, prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters. If the proposed action may incidentally take, by harassment, a marine mammal, the USMC should contact the NMFS Office of Protected Resources, Permits Division, at NOAA Headquarters, Silver Spring, Maryland.

Thank you for the opportunity to provide these comments. Please direct related questions or comments to the attention of Ms. Twyla Cheatwood at our Beaufort Field Office, 101 Pivers Island Road, Beaufort, North Carolina 28516-9722, or at (252) 728-8758.

Sincerely,

/ for
Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc: UMMC, Jessi.Baker@usmc.mil
NCDMF, Anne.Deaton@ncdenr.gov
EPA, Bowers.Todd@epa.gov
USFWS, Pete_Benjamin@fws.gov
F/SER47, Twyla.Cheatwood@noaa.gov

ESSENTIAL FISH HABITAT ASSESSMENT

In Support of the

Environmental Assessment for
Unexploded Ordnance Removal from
Waters Adjacent to the K-2 Impact Area

Marine Corps Base Camp Lejeune
North Carolina

OCTOBER 2019

This page intentionally left blank.

TABLE OF CONTENTS

List of Figures

List of Tables

ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
CAMA	Coastal Area Management Act
CFR	Code of Federal Regulations
cm	centimeters
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ELMR	Estuarine Living Marine Resources
°F	Degrees Farenheit
FMP	Fishery Management Plan
ft/sec	feet per second
HAPC	Habitat Area of Particular Concern
MAFMC	Mid-Atlantic Fishery Management Council
MARMAP	Marine Resources Monitoring, Assessment, and Prediction
MCB	Marine Corps Base
MEC	Munitions of Environmental Concern
MPPEH	Munitions Potentially Presenting and Explosive Hazard
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NCAC	North Carolina Administrative Code
NCDMF	North Carolina Division of Marine Fisheries
NEFSC	Northeast Fisheries Science Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PNA	Primary Nursery Area
ppt	parts per thousand
SAFMC	South Atlantic Fishery Management Council
SAV	Submerged Aquatic Vegetation
SNA	Secondary Nursey Area
SSNA	Special secondary nursery area
TNT	trinitrotoluene
TTS	Temporary Threshold Shift
UDGM	Underwater Digital Geophysical Mapping
USMC	United States Marine Corps
UXO	Unexploded ordnance

1.0 BACKGROUND

The United States Marine Corps (USMC) proposes to reduce the public safety risk associated with historical potential Unexploded Ordnance (UXO) located in the waters of the New River adjacent to the K-2 Impact Area at Marine Corps Base (MCB) Camp Lejeune, North Carolina (**Figure 1-1**). The K-2 Impact Area encompasses multiple firing range fans and surface danger zones from land-based operational ranges on MCB Camp Lejeune that once extended into the New River but are now wholly contained on land. The firing range fans and surface danger zones are the ground and airspace areas designated for the containment of projectiles, fragments, debris and components from the firing, launching, or detonating of weapon systems to include explosives and demolitions. The K-2 Range is currently an operational range that supports a variety of ordnance from 5.56 millimeter (mm) to 84 mm projectiles, MK76 practice bombs, and MK80 series bombs. Historically, the K-2 Impact Area was used to accept a variety of artillery up to 155 mm projectiles. Although the range fans and danger zones have been modified so that they no longer overlap the New River, the K-2 Impact Area once included a buffer area affecting approximately 800 acres of the New River along approximately 5 miles of the west and south banks that is known to include unexploded projectiles, rockets, and grenades from past range operations

During routine activities to clear UXO from the land area of the K-2 Range, UXO was identified along the beach and below the high water line, indicating the likely occurrence of UXO in the adjacent waters. In 2014-2015 under the Operational Range Clearance program, initial investigation of the water adjacent to the K-2 Range along the New River shoreline located a number of "anomalies" and determined many to be historical UXO. As part of the underwater investigations during 2014 to 2015, an explosive hazards evaluation was also performed. The explosive hazard evaluation determined that the situation in the waters adjacent to the K-2 Impact Area was "serious".

1.1 REGULATORY ENVIRONMENT

The USMC has prepared this Essential Fish Habitat (EFH) Assessment in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) of 1976, as reauthorized in 2006 and signed into law in January of 2007. EFH, as defined by the MSFCMA, includes "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of EFH: 'waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fishes where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species' full life cycle", see 50 Code of Federal Regulations (CFR) 600.10.

Under the MSFCMA, federal agencies are required to consult with the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service when any of their proposed activities may have an adverse effect on EFH.

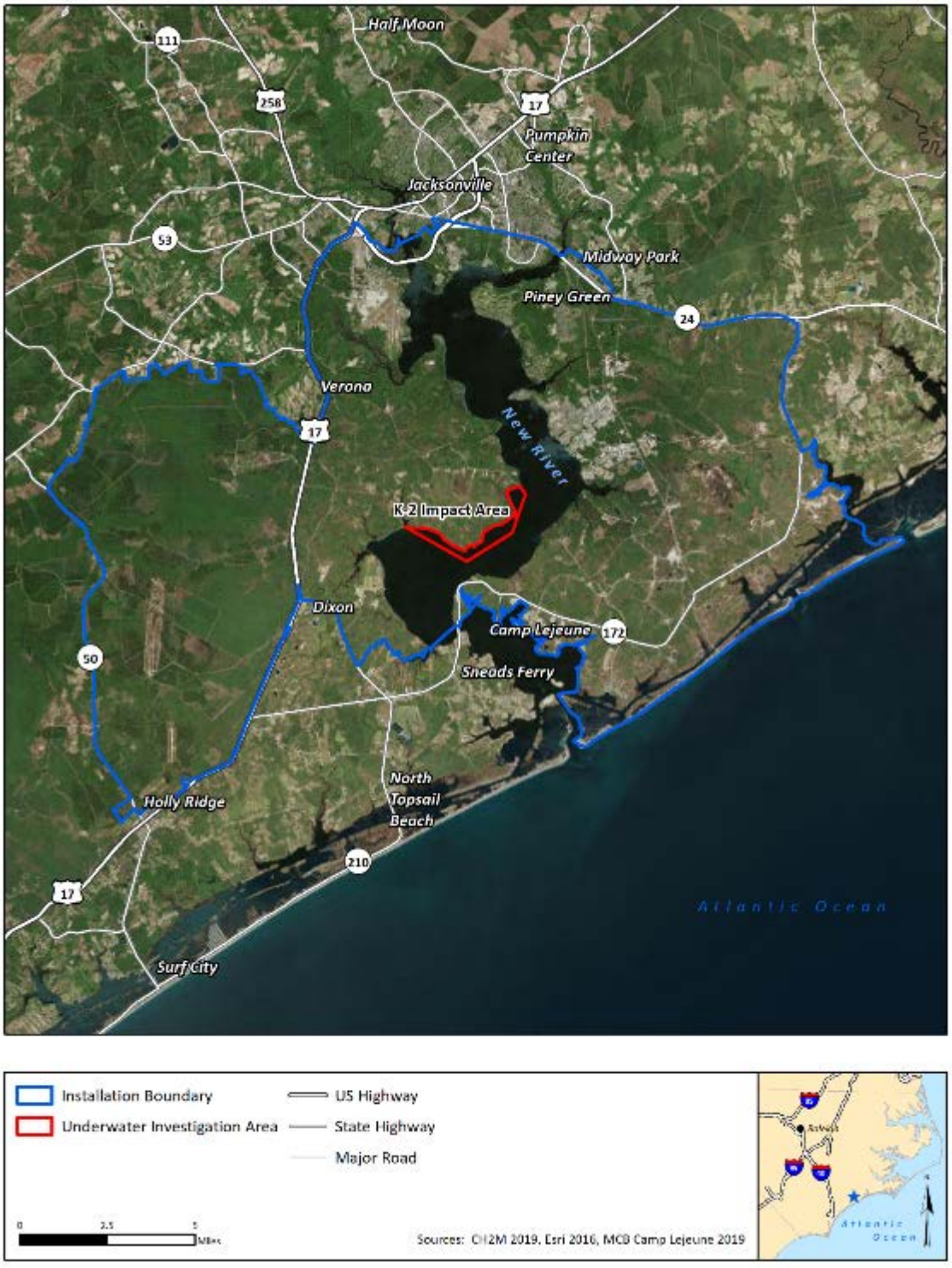


Figure 1-1. K-2 Impact Area at MCB Camp Lejeune

The MSFCMA defines an adverse effect as "any impact which reduces quality and/or quantity of EFH." See 50 CFR 810(a). Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual or synergistic consequences of actions.

This EFH Assessment has been prepared to describe how the Proposed Action may adversely affect EFH and Habitat Areas of Particular Concern (HAPC), pursuant to Section 305(b)(2) of the MSFCMA and includes the following information:

1. a description of the Proposed Action;
2. a description of the affected environment within the action areas;
3. identification of EFH and EFH species;
4. an analysis of the effects of the Proposed Action and proposed mitigation measures; and
5. the USMC's conclusions about the effects of the Proposed Action.

The objective of this EFH Assessment is to describe how the Proposed Action may adversely affect EFH designated within the action area by NOAA Fisheries, South Atlantic Fishery Management Council (SAFMC), the Mid-Atlantic Fishery Management Council (MAFMC), and Atlantic States Marine Fisheries Commission.

This page intentionally left blank.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action is to reduce the volume of potential UXO (referred to as munitions and explosives of concern [MEC] or material potentially presenting an explosive hazard [MPPEH]) in the New River adjacent to the K-2 Impact Area. Reducing the volume of MEC/MPPEH would reduce the risks to public safety, marine species, and the environment.

The potentially affected waters adjacent to the K-2 Impact Area total approximately 800 acres of the New River that includes shallow (less than 3 feet) and deep water areas (up to 10 feet). Three Areas of Concern near the shoreline (65 acres, 17 acres, and 94.6 acres in size [177 acres total]) have been identified where a higher density of MEC/MPPEH were identified during previous surveys (CH2M, 2015a; CH2M, 2018) (**Figure 2-1**). These high density areas indicate potential historical target areas. The Proposed Action would have an approximate in-water duration of 13 months.

2.1 INVESTIGATE AREAS OF CONCERN

The Proposed Action (Preferred Alternative) would include investigating the Areas of Concern (177 acres) and an additional 40 acres of deep water outside of the Areas of Concern (**Figure 2-1**). Investigating the Areas of Concern would involve using surface water digital geophysical mapping (in the shallow water areas) and underwater digital geophysical mapping (UDGM) (in the deep waters) to identify "anomalies". Anomalies are metallic items on the riverbed that should not naturally be there and could include scrap metal, old crab pots, and MEC/MPPEH. Shallow water digital geophysical mapping uses a high sensitivity, high resolution metal detector that can detect both ferrous and non-ferrous metal. The system can be pushed or pulled as a trailer, by a person or vehicle, such as an all-terrain vehicle.

In the deep waters, a small to medium-sized boat would be used to perform UDGM which uses an underwater magnetometer to map geophysical anomalies. The UDGM towed array consists of a 13-foot wide sensor that is designed to operate in 2 to 50 feet of water, and in close proximity to, but have no contact with the bottom. Once anomalies are located, they would be "intrusively investigated" which would involve hand digging by a diver to expose the anomaly. Intrusive investigation would be done by a UXO qualified dive team in accordance with Department of Defense Explosives Safety Board Technical Publication 18, Minimum Qualifications for UXO Technicians and Personnel. Any anomalies determined to be MEC/MPPEH during the intrusive investigation would be removed from the water and taken to the upland area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal in accordance with existing standard operating procedures.

2.2 INVESTIGATE PORTION OF DEEP WATER OUTSIDE THE AREAS OF CONCERN

In addition to the Areas of Concern, the Proposed Action also includes investigating a portion of the deep water areas outside of the Areas of Concern to better characterize the extent of potential MEC/MPPEH within these areas. UDGM would be performed along transects to cover approximately 10 percent of the deep water area outside of the Areas of Concern (approximately 40 acres) to evaluate the extent of MEC within the waters adjacent to the K-2 Impact Area. The UDGM methods and intrusive investigation of any identified anomalies would be the same as described for the Areas of Concern in **Section 2.1**.

Note*:* MEC locations shown on this figure are from the 2014/2015 survey. These locations may not be exact or represent all of the MEC within the waters adjacent to the K-2 Impact Area.

Figure 2-1. Areas of Concern within K-2 Impact Area and Proposed Action

2.3 IN-WATER DETONATION OF MEC

There may be situations in which the diver cannot safely relocate the MEC to the K-2 Range after exposing it in the riverbed. In those situations, the MEC would have to be detonated in place. Although in-water detonation was not required during any of the intrusive investigations of previous surveys (CH2M, 2015b; CH2M, 2018) and is considered unlikely to occur, the possibility exists so it is included in the Proposed Action. For analysis purposes, it is anticipated that no more than five MEC would require in-water detonation throughout the intrusive investigation. The detonations would occur one at a time throughout the duration of intrusive investigations. This represents a conservative estimate of approximately one percent of the anomalies identified during the 2014/2015 investigations. For analysis purposes, it is assumed the most explosive ordnance discovered in waters adjacent to the K-2 Impact Area, the 155 mm projectile, would be detonated in the water.

The 155 mm ordnance that has been identified within the waters adjacent to the K-2 Impact Area was assumed to be the M101 and/or the M107 155 mm high explosive loaded projectiles fired from a gun or howitzer, respectively. The artillery fuze used on these projectiles was the point detonating fuze. This is the most commonly used fuze on high explosive-loaded projectiles. These projectiles contain 14.6 pounds of trinitrotoluene (TNT) and have an assumed casualty radius on land of approximately 164 feet and a hazardous fragment distance of 389 feet (CH2M, 2015b). The hazardous fragment distance was obtained from Department of Defense Explosives Safety Board publications and is for surface detonations without engineering controls to reduce the fragmentation (such as burial). The explosive safety quantity distance would be used to establish an exclusion zone for public and non-essential personnel during in-water detonations. This distance would vary depending on the depth of the water where the detonation would occur (**Table 2-1**).

Table 2-1. Explosive Safety Quantity Distance for In-Water Detonations

Ordnance	Depth of Water (feet)	Explosive Safety Quantity Distance (feet)
155 mm M107	1	1,635
	5	355
	10	157

Source: CH2M, 2015a

Explosives detonated underwater would introduce loud, impulsive, broadband sounds into the marine environment. Three factors influence the sound effect of an explosive: the weight of the explosive material, the type of explosive material, and the detonation depth. The net explosive weight (the weight of the TNT required to produce an equivalent explosive power) accounts for the first two parameters, and in this case is estimated to be 14.6 pounds. The water depth adjacent to the K-2 Impact Area ranges from less than 1 foot near the shoreline to approximately 10 feet. In the event an intentional detonation would need to occur, sandbags or an earthern berm would be established around the MEC to contain the noise and debris.

2.4 ESTABLISH EXCLUSION ZONE

A temporary exclusion zone would be established during intrusive investigation activities to ensure the safety of the public as well as UXO technicians/divers. The exclusion zone is an explosive safety quantity distance established to protect personnel and the public from an unintentional detonation during intrusive investigation activities (**Table 2-2**). The exclusion zone would be temporary and established as a radius

around the area being investigated. Since the exclusion zone could be established at an investigation site anywhere within the underwater investigation area, **Figure 2-2** illustrates the maximum distance for an exclusion zone of either distance. An exclusion zone would also be established during any intentional in-water detonation and would vary depending on the depth of the water where the detonation would occur. The exclusion zone would be monitored by a chase boat. Access to the exclusion zone by unauthorized personnel would result in ceasing all operations until the zone is cleared.

Table 2-2. Exclusion Zones

Activity	Explosive Safety Quantity Distance
Intrusive Investigation, Above the Water	613 feet
Intrusive Investigation, Below the Water	2,130 feet
Intentional In-Water Detonation	See Table 2-1

Source: Adapted from (CH2M, 2015a)

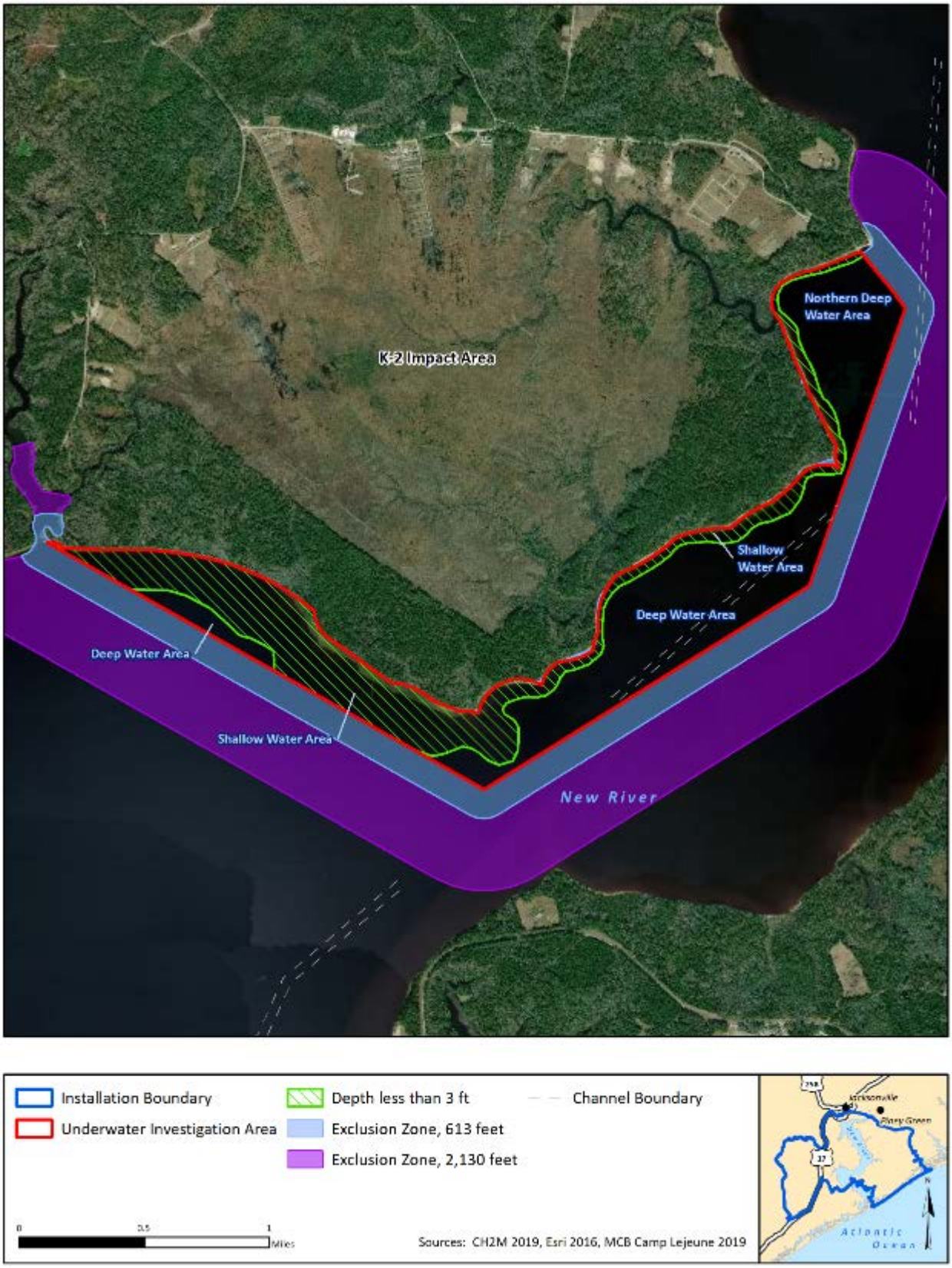


Figure 2-2. Exclusion Zone

This page intentionally left blank.

3.0 AFFECTED ENVIRONMENT

This section presents a description of the EFH resources (species and habitat) and baseline conditions that may potentially be adversely affected by implementing the Proposed Action. The affected environment includes the physical environment and biological resources within the action area.

The proposed project area consists of waters within the New River adjacent to the K-2 Range impact area and is located near the center of MCB Camp Lejeune, approximately 7 miles south of the U.S. Highway 24 bridge in Jacksonville and 4 miles north of the N.C. Highway 172 bridge over the New River in Sneads Ferry, North Carolina. The proposed project area lies along approximately 5 miles of the west bank of the New River, and includes approximately 800 acres within the river (**Figure 1-1**) (CH2M, 2018).

The New River is the largest water feature at Camp Lejeune as it bisects the Mainside along a 17 mile, 16,650 acre reach extending from the Base's northern boundary south of Jacksonville to the southern boundary at the Atlantic Ocean. Just within the Base boundary, the New River is joined by Northeast Creek and Southwest Creek to form a wide, slow-moving tidal estuary that empties into the Atlantic Ocean at Onslow Bay (Naval Facilities Engineering Command Mid-Atlantic, 2015).

According to a publication about the state of the New River Basin produced by the State of North Carolina in cooperation with the North Carolina Department of Environment and Natural Resources and the Office of Environmental Education and Public affairs, the New River is part of the Albemarle-Pamlico estuarine system. This estuary system is made up of six river basins: the Pasquotank, Chowan, Roanoke, Tar-Pamlico, Neuse, and White Oak basins. The New River and New River subbasin are part of the White Oak basin (Partenership, Albermarle-Pamlico National Estuary, no date). The New River subbasin is the largest and most populated of the White Oak River Basin and contains the city of Jacksonville and MCB Camp Lejeune (State of North Carolina, no date).

3.1 HYDROGRAPHY

The water depth within the study area ranges from less than 1 foot near the shoreline to approximately 10 feet in the deepest areas, and is impacted by two tides per day that vary the river's water surface level by approximately 1 foot during each event. Vegetation along the New River is largely composed of trees and shrubs. The river water is murky, with underwater visibility ranging from approximately 1 foot to 4 feet (CH2M, 2018).

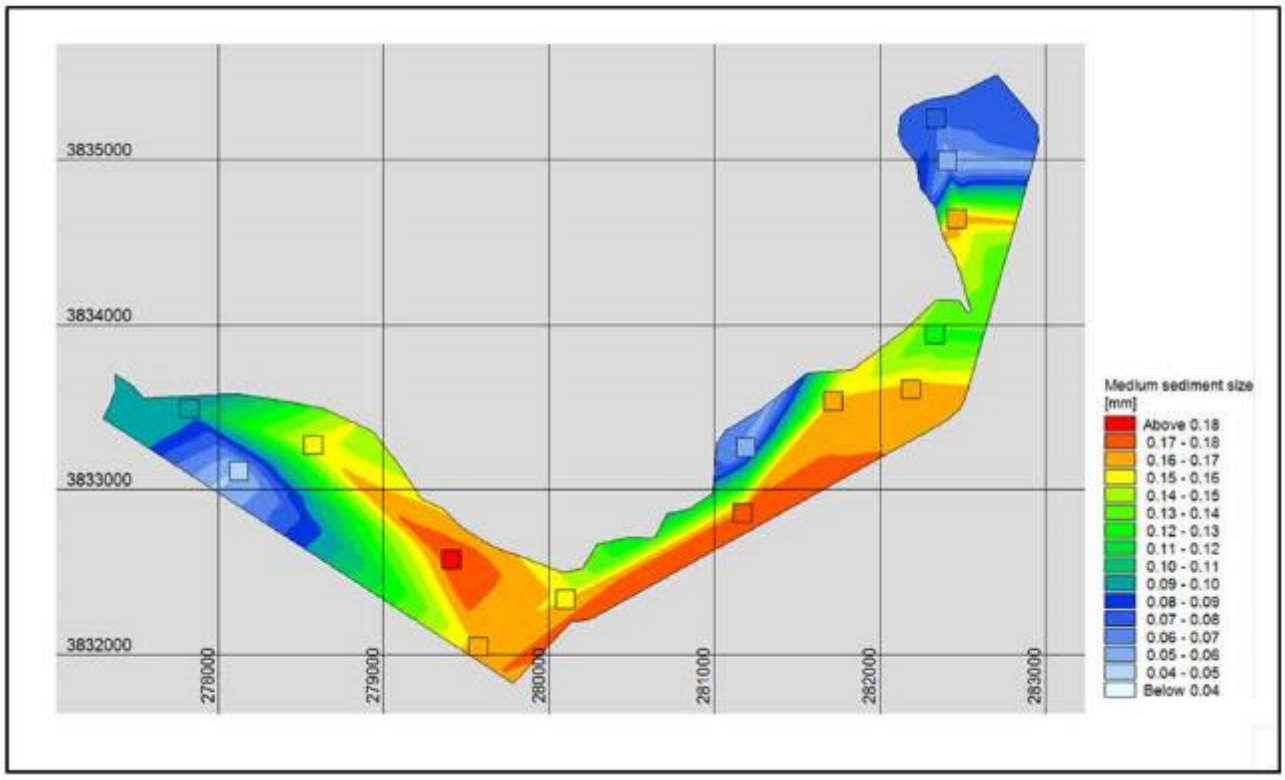
An evaluation of the daily tidal fluctuations in the New River was performed in support of the proposed project using an In-Situ Level Troll Transducer that was attached to an existing support beam in the river near Mill Creek Landing (southern portion of the site). The transducer recorded temperature and water level values from the river every 30 minutes for a duration of 10 days. The results demonstrated that the water-surface level of the New River varies by approximately 0.6 to 0.8 foot per day, with two fluctuations in elevation per day. The temperature of the river water varied from 26 to 31 degrees Celsius (^{o}C) during the 10-day recording period, and occasionally fluctuated within this range during a single day (CH2M, 2018).

River flow velocity measurements were collected on September 13, 2016 using a digital water flow probe at two locations in the river within the southern portion of the proposed project area. Measurements were collected from three vertical depth intervals in the river (20, 60, and 80 percent depth) at each location, with flow velocities decreasing 45 to 60 percent with depth at each location. The average current velocity of the

river was approximately 0.5 feet per second (ft/sec), and the average velocity near the bottom of the river was approximately 0.3 ft/sec (CH2M, 2018).

3.2 SEDIMENT CHARACTERIZATION

Sediment sampling in the proposed project area has determined that project area sediments are generally silty in the shallow embayments/coves of the river areas where there is low water velocity. Sediments outside of the shallow embayments and coves consists predominantly of medium- to fine-grained sand. **Figure 3-1** depicts the interpolated sediment distribution within the study area based on the 2016 sediment sampling results. The figure shows that finer-grained silt-sized sediment (blue color) is present within the northern, central, and southern portions of the area. Sand-size sediment comprises the majority of the remainder of the project area, with the coarsest sediment (red color) present within the deeper water areas (greater than 3 foot depth) (CH2M, 2018).



Source: CH2M, 2018

Figure 3-1. Interpolated Distribution of Sediment in the Proposed Project Area

3.3 WATER QUALITY

According to a publication about the state of the New River Basin produced by the State of North Carolina in cooperation with the North Carolina Department of Environment and Natural Resources and the Office of Environmental Education and Public affairs, due to persistent overgrowth of algae in the New River in 1991, the state classified the headwaters of the New River, Southwest Creek, and Northeast Creek as nutrient sensitive waters and placed restrictions on nutrients in wastewater treatment plant discharges. Since

that time, dramatic changes in wastewater treatment have occurred. The city of Jacksonville stopped discharging waste into the river, and MCB Camp Lejeune consolidated its seven separate facilities into one large, modern treatment plant. These changes have greatly improved the water quality of the New River (State of North Carolina, no date).

The waters of the New River in the proposed project area are classified as SC: Tidal Salt Water. Class SC is defined as, "all tidal salt waters protected for secondary recreation such as fishing, boating, and other activities involving minimal skin contact; fish and noncommercial shellfish consumption; aquatic life propagation and survival; and wildlife". Waters in the proposed project area are also classified as "High Quality Waters". This supplemental classification is intended to protect waters that are rated excellent based on biological and physical/chemical characteristics through monitoring or special studies, primary nursery areas designated by the Marine Fisheries Commission, and other functional nursery areas designated by the Marine Fisheries Commission. The New River, in the proposed project area, is classified as a Special Secondary Nursery Area (SSNA) (North Carolina Department of Environmental Quality, 2019) (refer to Section 3.4.4.).

3.4 HABITATS

Habitat designated by the SAFMC can be classified by habitat type into several broad categories. The following sections describe the habitat types designated by the SAFMC that occur in the proposed project area.

3.4.1 Estuarine Water Column

Water column habitat is defined as "the water covering a submerged surface and its physical, chemical, and biological characteristics". The water column extends from the surface to the substrate, including physical, chemical, and biological characteristics (North Carolina Department of Environmental Quality, 2016). Estuarine Water Column habitat traditionally comprises four salinity categories: oligohaline (< 8 parts per thousand [ppt]), mesohaline (8 -18 ppt), and polyhaline waters (18 - 30 ppt) with some euhaline water (>30 ppt) around inlets. Alternatively, a three-tier salinity classification is presented by Schreiber and Gill (1995 in (South Atlantic Fishery Management Council, 2019)) in their prototype document developing approaches for identifying and assessing important fish habitats: tidal fresh (0-0.5 ppt), mixing (0.5-25 ppt), and seawater (>25 ppt). Saline environments have moving boundaries, but are generally maintained by sea water transported through inlets by tide and wind mixing with fresh water supplied by land runoff. Particulate materials settle from these mixing waters and accumulate as bottom sediments. Coarser-grained sediments, saline waters, and migrating organisms are introduced from the ocean, while finer grained sediments, nutrients, organic matter, and fresh water are input from rivers and tidal creeks. The sea water component stabilizes the system, with its abundant supply of inorganic chemicals and its relatively conservative temperatures. Closer to the sea, rapid changes in variables such as temperature are moderate compared to shallow upstream waters. Without periodic additions of sea water, seasonal thermal extremes would reduce the biological capacity of the water column, as well as reduce the recruitment of fauna from the ocean. While nearby wetlands contain some assimilative capacity abating nutrient enrichment, fresh water inflow and tidal flushing are primarily important for circulation and removal of nutrients and wastes from the estuary (South Atlantic Fishery Management Council, 2019).

3.4.2 Intertidal and Subtidal Soft Bottom Habitat

The majority of the proposed project area contains soft bottom habitat. Soft bottom habitat occurs wherever there is uncovered, unvegetated sediment in freshwater, estuarine, and marine systems and includes subtidal bottom and shallow intertidal flats (North Carolina Department of Environmental Quality, 2016; 2019). Soft bottom is utilized by nearly every native fish species in North Carolina and is a critical habitat to species of fish that dig or bury themselves in substrate. Soft bottom habitats include places such as mud flats, beaches, shoals, holes, and sand bars. Although soft bottom habitat is defined as "unvegetated" and lacks visible structural habitat, the surface sediments support an abundance of microscopic plants called benthic microalage and numerous burrowing animals are hidden below the surface (North Carolina Department of Environmental Quality, 2019).

3.4.3 Shell Bottom Habitat

Small areas in the proposed project area are characterized by shell bottom habitat. Shell bottom is defined as "estuarine intertidal or subtidal bottom composed of surface shell concentrations of living or dead oysters (*Crassostrea virginica*), hard clams (Merceneria merceneria), and other shellfish." In North Carolina, this definition is limited to inshore bodies of water like bays, estuaries, and rivers (North Carolina Department of Environmental Quality, 2016). Shell bottom habitats are commonly referred to as "oyster beds, rocks, reefs, bars, and shell hash." While most of these terms describe concentrations of living and dead oysters, shell hash refers to an accumulation of unconsolidated shell (oyster, clam, bay scallop and/or other shellfish). Shell bottom habitat provides structure, shelter, and food for many fish and invertebrate species. Living shellfish on shell bottom habitat filter algae and bacteria from the water column, improving water quality. Water filtration by oysters, clams, and other shellfish clears the water column for growth of submerged aquatic vegetation (SAV). Additionally, shell bottom habitat protects shorelines from erosion by reducing wave energy (North Carolina Department of Environmental Quality, 2019).

3.4.4 Nursery Areas

The North Carolina Marine Fisheries Commission adopted regulations in August 1977 to protect estuarine areas, known as nursery areas. Nursery areas are defined in rule 15 North Carolina Administrative Code (NCAC) 3I.0101(b)(20)(E) as: "…Those areas in which for reasons such as food, cover, bottom type, salinity, temperature, and other factors, young finfish and crustaceans spend the major portion of their initial growing season." In the original 1977 rule (3B .1404) that described the Scope and Purpose of Nursery areas, the following language was included: "Nursery areas are necessary for the early growth and development of virtually all of North Carolina's important seafood species."

"Nursery areas need to be maintained, as much as possible, in their natural state, and the populations within them must be permitted to develop in a normal manner with as little interference from man as possible." The North Carolina Division of Marine Fisheries (NCDMF) recognizes two types of nursery areas: Primary Nursery Areas (PNAs) and Secondary Nursery Areas (SNAs):

- PNAs are defined by rule 15 NCAC 3I .0101(b)(20)(E) as: "…. those areas in the estuarine system where initial post-larval development takes place. These areas are usually located in the uppermost sections of a system where populations are uniformly very early juveniles." Populations of economically important species in these areas are composed almost uniformly of early juveniles during the spring recruitment period from March to June. Rules protecting PNAs were created with the establishment of the Coastal Area Management Act (CAMA).

CAMA provided rules for coastal development, such as prohibiting new dredging of channels, canals, and boat basins in PNAs, and extending the area of rule application from 75 feet landward from the shoreline to 575 feet landward of the shoreline. Construction of marinas that require dredging is also prohibited in PNAs.

- SNAs are defined by rule 15 NCAC 3N .0102(c) as: "…those areas in the estuarine system where later juvenile development takes place. Populations are usually composed of developing sub –adults of similar size that have migrated from an upstream primary nursery area to the secondary nursery area located in the middle portion of the estuarine system." These areas are located adjacent to PNAs, are generally deeper and contain mixed populations of large juveniles, sub-adults, and adults. Areas delineated as SSNAs may be opened to shrimp and crab trawling at designated times of the year.

The location of the proposed project on the New River is classified as SSNA. The adjacent Whitehurst Creek and Mill Creek are classified as PNAs.

3.4.5 Estuarine and Marine Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil. Jurisdictional and planning level wetland delineations have identified over 55,000 acres of wetland at MCB Camp Lejeune (excluding the New River), which comprises approximately 44 percent of the Base's land area (Naval Facilities Engineering Command Mid-Atlantic, 2015).

The subtidal and intertidal areas within the proposed project area, as well as the adjacent upland areas, contain palustrine and estuarine wetlands.

3.4.5.1 Palustrine Wetlands

The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 ppt. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 20 acres; (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 8.2 feet at low water; and (4) salinity due to ocean-derived salts less than 0.5 ppt. The proposed project area contains both forested and scrub-shrub palustrine wetlands (Federal Geographic Data Committee, 2013).

Forested

Two types of forested wetlands occur in the proposed project area, broad-leaved deciduous (PFO1) and broad-leaved evergreen (PFO3). Broad-leaved deciduous trees include woody trees or shrubs with relatively wide, flat leaves that are shed during the cold or dry season; e.g., black ash (*Fraxinus nigra*).

Broad-leaved evergreens included woody trees or shrubs with relatively wide, flat leaves that generally remain green and are usually persistent for a year or more; e.g. loblolly pine (*Pinus taeda)* (Federal Geographic Data Committee, 2013).

Scrub-Shrub

Scrub-Shrub wetlands include areas dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions (Federal Geographic Data Committee, 2013).

3.4.5.2 Estuarine Wetlands

The Estuarine System consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines, there is appreciable dilution of sea water. Offshore areas with typical estuarine plants and animals, such as Smooth Cordgrass (*Spartina alterniflora*) and eastern oysters (*Crassostrea virginica*), are also included in the Estuarine System. The proposed project area contains three kinds of estuarine wetlands: emergent, unconsolidated shore, and unconsolidated bottom (Federal Geographic Data Committee, 2013).

Emergent

Emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants (Federal Geographic Data Committee, 2013). All of the emergent wetlands in the proposed project area are intertidal.

Unconsolidated Shore

Emergenet wetlands with unconsolidated shore includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders, or bedrock and; (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class (Federal Geographic Data Committee, 2013).

Unconsolidated Bottom

Emergent wetlands with unconsolidated bottom includes all wetlands and deepwater habitats with at least 25 percent cover of particles smaller than stones (less than 6-7 centimeters [cm]), and a vegetative cover less than 30 percent (Federal Geographic Data Committee, 2013). This is the only subtidal wetland class in the proposed project area.

3.5 BIOLOGICAL FEATURES

According to a publication about the state of the New River Basin produced by the State of North Carolina in cooperation with the North Carolina Department of Environment and Natural Resources and the Office of Environmental Education and Public affairs, forest and wetlands—both privately and publicly owned—cover almost half the White Oak River basin. More than 80,000 acres of the Croatan National Forest lie within the White Oak River Basin. It hosts the largest population of carnivorous plants of any national forest and is the second largest habitat for the endangered red-cockaded woodpecker (State of North Carolina, no date).

The White Oak River Basin includes an area known as the Onslow Bight that stretches from the lower Northeast Cape Fear River to the Pamlico River. The bight is characterized by its unique landforms of barrier islands, marshes, riverine wetlands, pocosins, longleaf pine savannas, and other coastal ecosystems.

Camp Lejeune, which is located within the Onslow Bight, harbors some of the highest quality longleaf pine and pocosin habitats (raised bogs with a thick layer of peat) remaining in North Carolina (State of North Carolina, no date).

Several rare and endangered animals are found in the White Oak River Basin, including the leatherback, sea turtle, West Indian manatee, shortnose sturgeon, red-cockaded woodpecker, and roseate tern (State of North Carolina, No date).

The New River estuary supports areas that have been identified by NCDMF as important for shellfish production (Naval Facilities Engineering Command Mid-Atlantic, 2015). Many of the basin's shellfish beds are closed to harvest due to contaminated runoff from construction sites, developed areas, streets and yards, farmland, and forestry operations (State of North Carolina, no date). Several oyster cultch planting sites are located in and adjacent to the proposed project area and nearby areas in the New River (**Figure 3-2**). Several commercially and recreationally important fish species are known to occur in the rivers and estuaries of the White Oak River Basin, as summarized in **Table 3-1**.

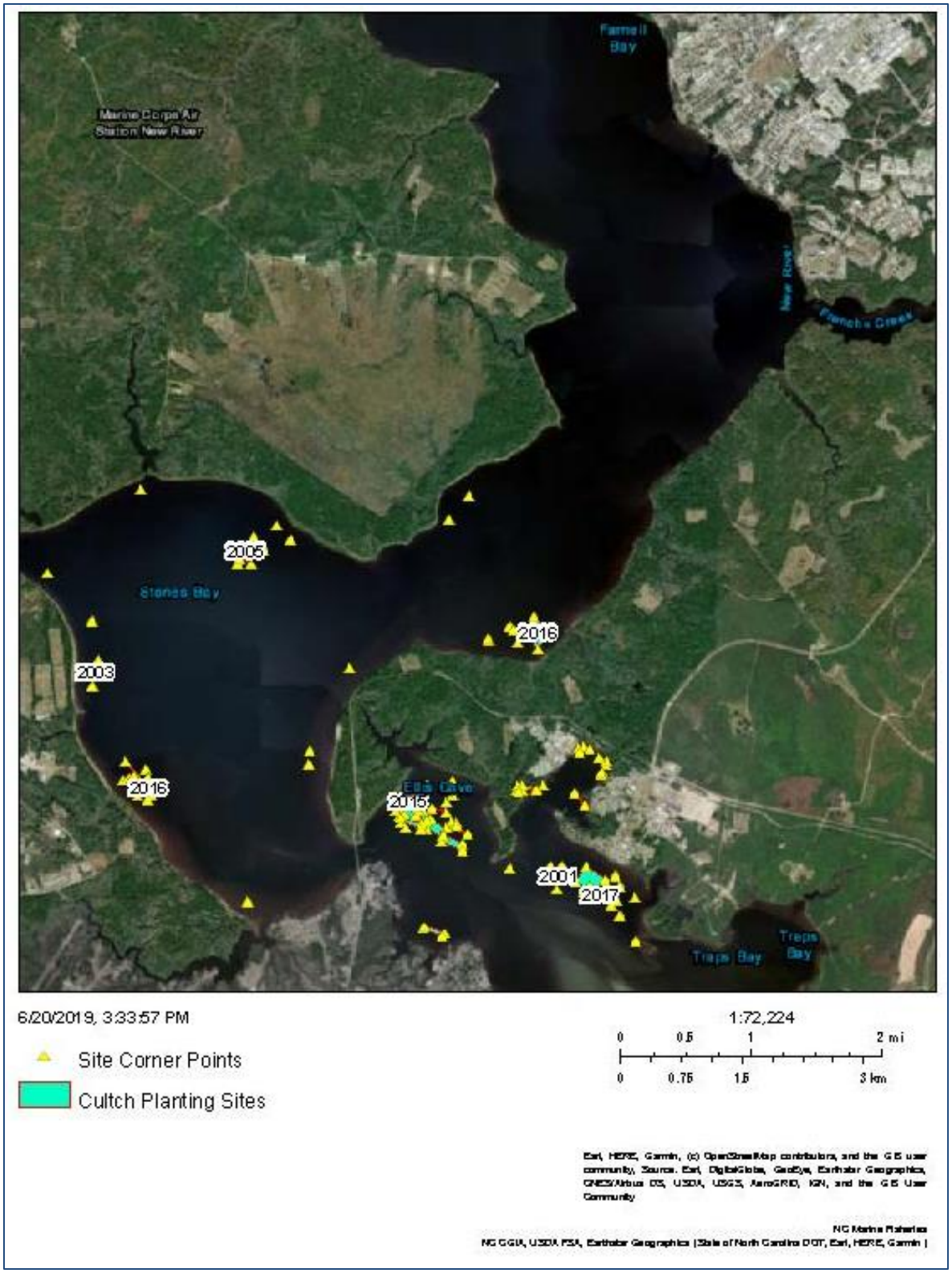


Figure 3-2. Shellfish Cultch Planting Sites in the New River (1981-2018)

Table 3-1. Common Fish Species in the White Oak River Basin	
Common Name	**Scientific Name**
Freshwater Game Species	
Redfin pickerel	*Esox americanus americanus*
Chain pickerel	*Esox niger*
Warmouth	*Chaenobryttus gulo9jus*
Bluegill	*Lepomis macrochirus*
Pumpkinseed	*Lepomis gibbosus*
Redbreast sunfish	*Lepomis cyanellus*
Largemouth bass	*Micropterus salmoides*
Mud sunfish	*Acantharchus pomotis*
Banded sunfish	*Enneacanthus obesus*
Pirate perch	*AphredoderLIS sayanus*
Bluespotted sunfish	*Enneacanthus gloriosus.*
Golden shiner	*Notemigonus crysoleucas*
Ironcolor shiner	*Notropis chalybaeus*
Marine Species	
American shad	*Alosa sapidissima*
Atlantic menhaden	*Brevoortia tyrannus*
Bluefish	*Pomatomus saltaltrix*
Spotted seatrout	*Cynoscion nebulosus*
Spot	*Leiostomus xanthurus*
Atlantic croaker	*Micropogon undulatus*
Black drum	*Pogonias cromis*
Red drum	*Sciaenops ocellata-*
Striped mullet	*Mugil cephalus*
Summer flounder	*Paralichtys dentatus*
Southern flounder	*Paralichtys lethostigma*
Anadromous Species	
Striped bass	*Morone saxatilis*
American shad	*Alosa sapidissima*
Hickory shad	*Alosa mediocris*
Blueback herring	*Alosa aestivalis*
Alewife	*Alosa pseudoharengus*
Atlantic sturgeon	*Acipenser oxyrhynchus*

Source: (National Oceanic and Atmospheric Administration, 1981)

4.0 EFH AND SPECIES DESCRIPTIONS

The SAFMC is responsible for the conservation and management of fish stocks within the federal 200-mile limit of the Atlantic Ocean off the coasts of North Carolina, South Carolina, Georgia, and east Florida to Key West. The MAFMC manages fisheries from 3 to 200 miles off the coasts of New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. Both councils share jurisdiction across several different fishery management plans (FMPs) whose species range overlaps the Proposed Action area. The fishery management councils classify EFH for federally managed species in terms of five basic life stages: eggs, larvae, juveniles, adult, and spawning adult.

NOAA Fisheries categorizes the life stages of managed highly migratory species somewhat differently, resulting in three categories based on common habitat usage by all life stages in each group: 1) spawning adult, egg, and larvae; 2) juvenile and subadult; and 3) adult. Additionally, NOAA Fisheries classifies EFH for sharks in terms of three life stages, based on the most current research and the general habitat shifts that accompany each developmental stage: 1) neonate (primarily includes newborns and only small young-of-the-year); 2) juvenile (includes all immature sharks from young to older/late juveniles); and 3) adult (sexually mature sharks; largest size class). NOAA Fisheries jurisdiction includes all federally managed waters of the United States where highly migratory species occur, which is generally in pelagic waters of the open-ocean and nearshore waters.

EFH is separated into estuarine and marine components. The estuarine component is generally defined as all estuarine waters and substrates including the subtidal vegetation and adjacent intertidal vegetation. Specific habitats included in this definition include, but are not limited to, emergent wetlands, estuarine scrub/shrub wetlands, SAV, reefs and shell banks, intertidal flats, aquatic beds, and the estuarine water column. The marine component is generally defined as all waters and substrates from the shoreline to the seaward limit of the Exclusive Economic Zone (EEZ). Specific habitats included in this definition are live/hard bottom, coral and coral reefs, artificial and manmade reefs, Sargassum, and the marine water column.

NOAA Fisheries designates EFH for most species in association with a grid of 10 x 10 minute squares, which cover all marine habitats along the United States coastline. NOAA Fisheries also designates EFH for estuarine waters (including estuaries, bays, and rivers). The proposed project area is located within the 10 x 10 minute EFH block with the following boundaries summarized in **Table 4-1** and depicted in **Figure 4-1**.

Table 4-1. Coordinates for the EFH 10’ x 10’ Square Quadrant Inclusive of the Proposed Project Area

Boundary	North	East	South	West
Coordinate	34° 40.0’ N	77° 20.0’ W	34° 30.0’ N	77° 30.0’ W

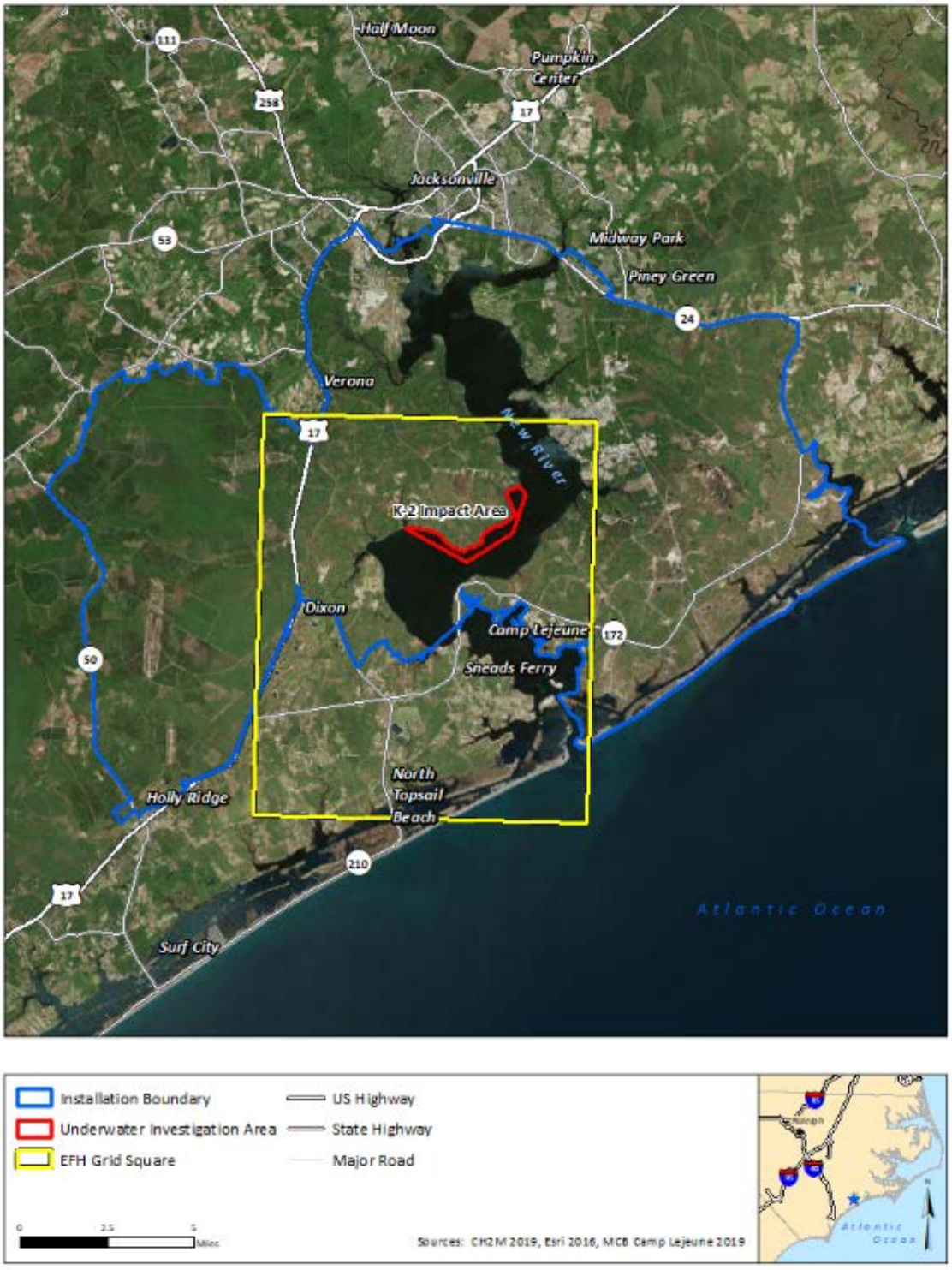


Figure 4-1. 10x10 Minute EFH Block Encompassing the Proposed Action Area

EFH habitat along the New River at Camp Lejeune includes the New River, as a coastal inlet, and the tributaries that drain into the New River. NCDMF indicates that the New River within the project area is classified as a SSNA. In addition, the tributaries of the New River in proximity to the project area are classified as PNAs (North Carolina Division of Marine Fisheries, 2011). These waters also provide nursery and foraging habitat for other species that are prey for fish managed by the SAFMC, such as a variety of mackerels, snappers, and groupers and migratory species such as a variety of billfish and shark managed by the National Marine Fisheries Service (NMFS).

SAFMC have developed FMPs for several species, or species units, although not all of these species are found in the project area. Highly migratory species' FMPs were developed by the Highly Migratory Species Management Unit, Office of Sustainable Fisheries, NMFS. As part of each FMP, the council designates not only EFH, but also HAPC, a subset of EFH that refers to specific locations required by a life stage(s) of that managed species. **Table 4-2** presents the species or species units potentially present in the project area for which EFH and/or HAPC exist.

Table 4-2. Summary of EFH Designations for the Proposed Action Area

Species	Lifestage				HAPC
	Eggs	Larvae	Juveniles	Adults	
South Atlantic Fishery Management Council					
Penaeid Shrimp	X	X	X	X	X
Snapper Grouper Management Unit			X		X
Coastal Migratory Pelagic Species			X		
Mid-Atlantic Fishery Management Council					
Bluefish	X	X	X	X	
Summer flounder	X	X	X	X	
Atlantic Highly Migratory Species NMFS					
Smoothhound shark (Atlantic Stock)	X	X	X	X	

Source: Rohde, 2019
Notes: X = Lifestage or HAPC present in the 10x10 EFH block that encompasses the proposed action area.

The following subsections provide designated EFH descriptions and general habitat parameters for each EFH species or species units and lifestages applicable to the Proposed Action area. This information was compiled primarily from EFH source documents, FMPs, and other technical reports/primary literature sources.

4.1 PENAEID SHRIMP

4.1.1 Species Description

This group includes members of the shrimp family, Penaeidae, a large group that also contains a few smaller species common in this geographic area (South Carolina Department of Natural Resources, 2015). There are three species of penaeid shrimp in North Carolina, including brown shrimp (*Farfantepenaeus aztecus*), white shrimp (*Litopenaeus setiferus*), and pink shrimp (*Litopenaeus duorarum*). These species are very similar in appearance and have similar life cycles. In general, spawning occurs along the beaches and nearshore waters, with brown shrimp spawning in October and November and white shrimp spawning in

spring to early summer. The preferred nursery habitat includes the tidal marshes and creeks with a salinity range of 25-65 percent seawater. White and brown shrimp prefer muddy bottoms, while pink shrimp prefer sand/shell substrate. They inhabit the nursery areas for two to three months before migrating towards the ocean. They often stage in the lower reaches of the rivers and bays and eventually move into the ocean waters in late summer/early fall (South Carolina Department of Natural Resources, 2015).

4.1.2 Essential Fish Habitat

For penaeid shrimp, EFH includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine SAV (e.g., seagrass); and subtidal and intertidal non-vegetated flats. EFH extends from North Carolina through the Florida Keys (South Atlantic Fishery Management Council, 2016).

4.1.3 Habitat Area of Particular Concern

Areas which meet the criteria for EFH-HAPC for penaeid shrimp include all coastal inlets, all state-designated nursery habitats of particular importance to shrimp (for example, in North Carolina this would include all PNAs and all SNAs), and state-identified overwintering areas (Figure 4.1-1) (South Atlantic Fishery Management Council, 2016).

4.2 SNAPPER GROUPER

4.2.1 Species Description

The snapper grouper plan includes 55 species from 10 families of fish, including: sea bass and grouper (*Serranidae*), wreckfish (*Polyproionidae*), snapper (*Lutjanidae*), porgies (*Sparidae*), grunt (*Haemulidae*), jack (*Carangidae*), tilefish (*Malacanthidae*), triggerfish (*Balistidae*), wrasses (*Labridae*), and spadefish (*Eppiphidae*) families. Although species from eight of these families use estuaries opportunistically, there are only five species that are estuarine-dependent. These species include gag grouper (*Mycteroperca microlepis*), goliath grouper (*Epinephelus itajara*), cubera snapper (*Lutjanus cyanopterus*), gray snapper (*L. griseus*), and dog snapper (*L. jocu*). The lifecycles of these estuarine-dependent species differ, but during at least one stage they are restricted to estuarine habitats. Therefore, the SAFMC FMP documents near shore EFH to include estuarine emergent wetlands, tidal creeks, oyster reefs/shell banks, and unconsolidated bottom (South Atlantic Fishery Management Council, 1983).

4.2.2 Essential Fish Habitat

SAFMC's EFH designation for snapper-grouper species applies to all waters from the EEZ to the landward most influence of the tide, from the Virginia/North Carolina border to the Dry Tortugas in the Florida Keys (South Atlantic Fishery Management Council, 2016). The specific habitats and locations that are EFH are listed below.

EFH for snapper-grouper species includes coral reefs, live/hard bottom, SAV, artificial reefs, and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet (but to at least 2000 feet for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including Sargassum, required for

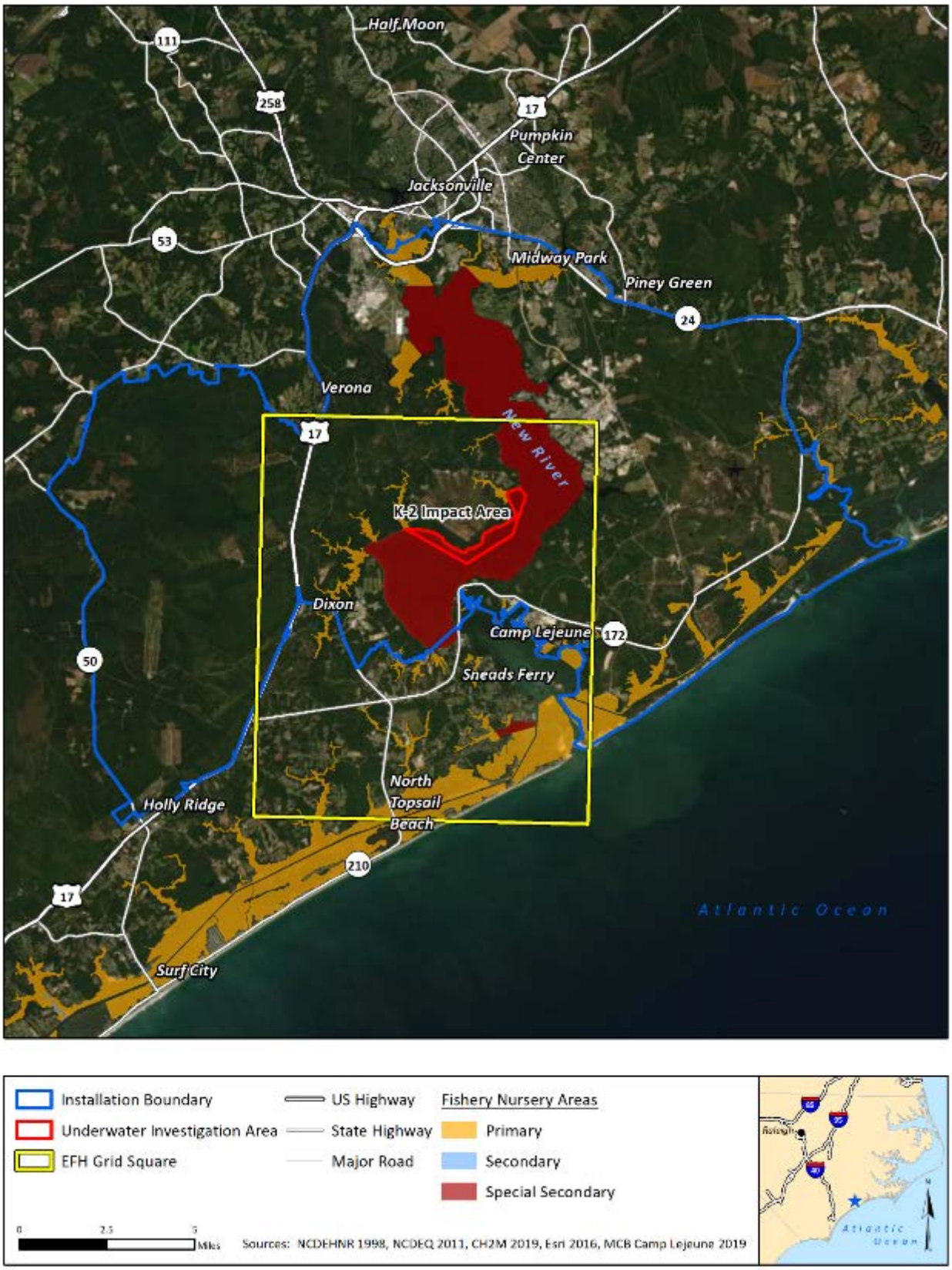


Figure 4-2. EFH for Panaeid Shrimp Species

larval survival and growth up to and including settlement. In addition, the Gulf Stream is EFH because it provides a mechanism to disperse snapper-grouper larvae (South Atlantic Fishery Management Council, 2016).

For specific life stages of estuarine-dependent and nearshore snapper-grouper species, EFH includes areas inshore of the 100-foot contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom (**Figure 4-3**) (South Atlantic Fishery Management Council, 2016).

4.2.3 Habitat Areas of Particular Concern

Areas which meet the criteria for EFH-HAPCs for species in the snapper-grouper management unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; nearshore hard bottom areas; The Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper-grouper (e.g., PNAs and SNAs designated in North Carolina); pelagic and benthic Sargassum; Hoyt Hills for wreckfish; the Oculina Bank HAPC; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (South Atlantic Fishery Management Council, 2016).

4.3 COASTAL MIGRATORY PELAGIC

4.3.1 Species Description

The Coastal Migratory Pelagic (Mackerel) FMP for the Gulf of Mexico and South Atlantic regions is a joint management plan between the Gulf of Mexico Fishery Management Council and SAFMC. Beginning in January 2012, in addition to managing separate migratory groups of king mackerel and Spanish mackerel, the two fishery management councils have added separate migratory groups of cobia to the FMP (South Atlantic Fishery Management Council, 2016).

4.3.2 Essential Fish Habitat

SAFMC's EFH designation for coastal migratory pelagic species applies to all waters from the EEZ to the landward most influence of the tide, from the Virginia/North Carolina border to the Dry Tortugas in the Florida Keys. The specific habitats and locations that are EFH are listed below (South Atlantic Fishery Management Council, 2016).

EFH for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including Sargassum. In addition, EFH includes all coastal inlets, all state-designated nursery habitats of particular importance to coastal migratory pelagics (for example, in North Carolina this would include all PNAs and SNAs). Coastal inlets include the throat of the inlet, as well as shoal complexes associated with the inlets. Shoals formed by waters moving landward through the inlet are referred to as flood tidal shoals, and shoals formed by waters moving waterward through the inlet are referred to as ebb tidal shoals (**Figure 4-4**) (South Atlantic Fishery Management Council, 2016).

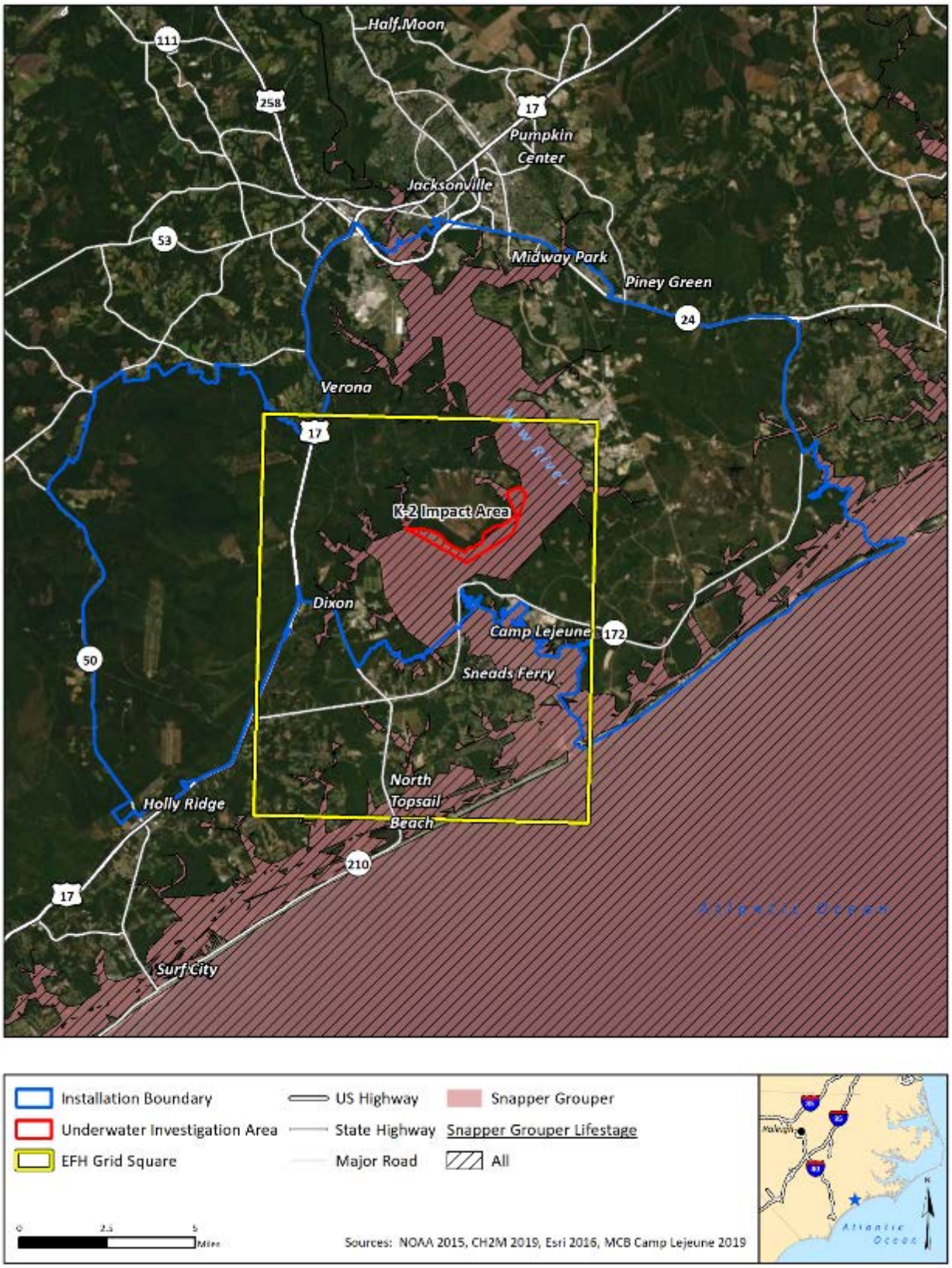


Figure 4-3. EFH for Snapper Grouper Species

Figure 4-4. EFH for Coastal Migratory Pelagic Species

4.3.3 Habitat Areas of Particular Concern

Areas which meet the criteria for HAPC include sandy shoals of Cape Lookout, Cape Fear, and Cape Hatteras from shore to the ends of the respective shoals, but shoreward of the Gulf stream; The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and Hurl Rocks (South Carolina); The Point off Jupiter Inlet (Florida); Phragmatopoma (worm reefs) reefs off the central east coast of Florida; nearshore hard bottom south of Cape Canaveral; The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The "Wall" off of the Florida Keys; Pelagic Sargassum; and Atlantic coast estuaries with high numbers of Spanish mackerel and cobia based on abundance data from the Estuarine Living Marine Resources Program (South Atlantic Fishery Management Council, 2016).

Estuaries meeting the EFH-HAPC criteria for Spanish mackerel include Bogue Sound and New River, North Carolina; Bogue Sound, North Carolina (Adults May-September salinity >30 ppt); and New River, North Carolina (Adults May-October salinity >30 ppt) (South Atlantic Fishery Management Council, 2016).

4.4 BLUEFISH

4.4.1 Species Description

The bluefish (Pomatomus saltatrix) is a fast-swimming, fast growing, schooling, pelagic species. Bluefish are widely distributed in the northwest Atlantic from Nova Scotia and Bermuda south to Argentina, though rare between southern Florida and northern South America. It is expected that there are several spawning groups; however, these mix throughout their entire range during their lives. Therefore, bluefish in the United States are managed as a single stock. Bluefish travel in schools with individuals of similar size and make seasonal migrations. Bluefish are managed under the Bluefish FMP administered by the MAFMC. According to NOAA Fisheries, the stock is not considered overfished, and overfishing is not occurring (National Oceanic and Atmospheric Administration Fisheries, 2018).

4.4.2 Essential Fish Habitat

All life stages of bluefish have EFH within the proposed project area (**Figure 4-5**).EFH for all life stages of Atlantic bluefish are described below.

Eggs: 1) North of Cape Hatteras, pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) at mid-shelf depths, from Montauk Point, New York south to Cape Hatteras in the highest 90 percent of the area where bluefish eggs were collected in the Marine Resources Monitoring, Assessment, and Prediction (MARMAP) program surveys; and 2) South of Cape Hatteras, 100 percent of the pelagic waters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida at mid-shelf depths. Bluefish eggs are generally not collected in estuarine waters and thus there is no EFH designation inshore. Generally, bluefish eggs are collected between April through August in temperatures greater than 64°Fahrenhiet (F) and normal shelf salinities (> 31 ppt) (Mid-Atlantic Fishery Management Council, 1998a).

Larvae: 1) North of Cape Hatteras, pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) most commonly above 49 feet, from Montauk Point, New York south to Cape Hatteras, in the highest 90 percent of the area where bluefish larvae were collected during the MARMAP surveys; 2) South of Cape Hatteras, 100 percent of the pelagic waters greater than 15 meters over the

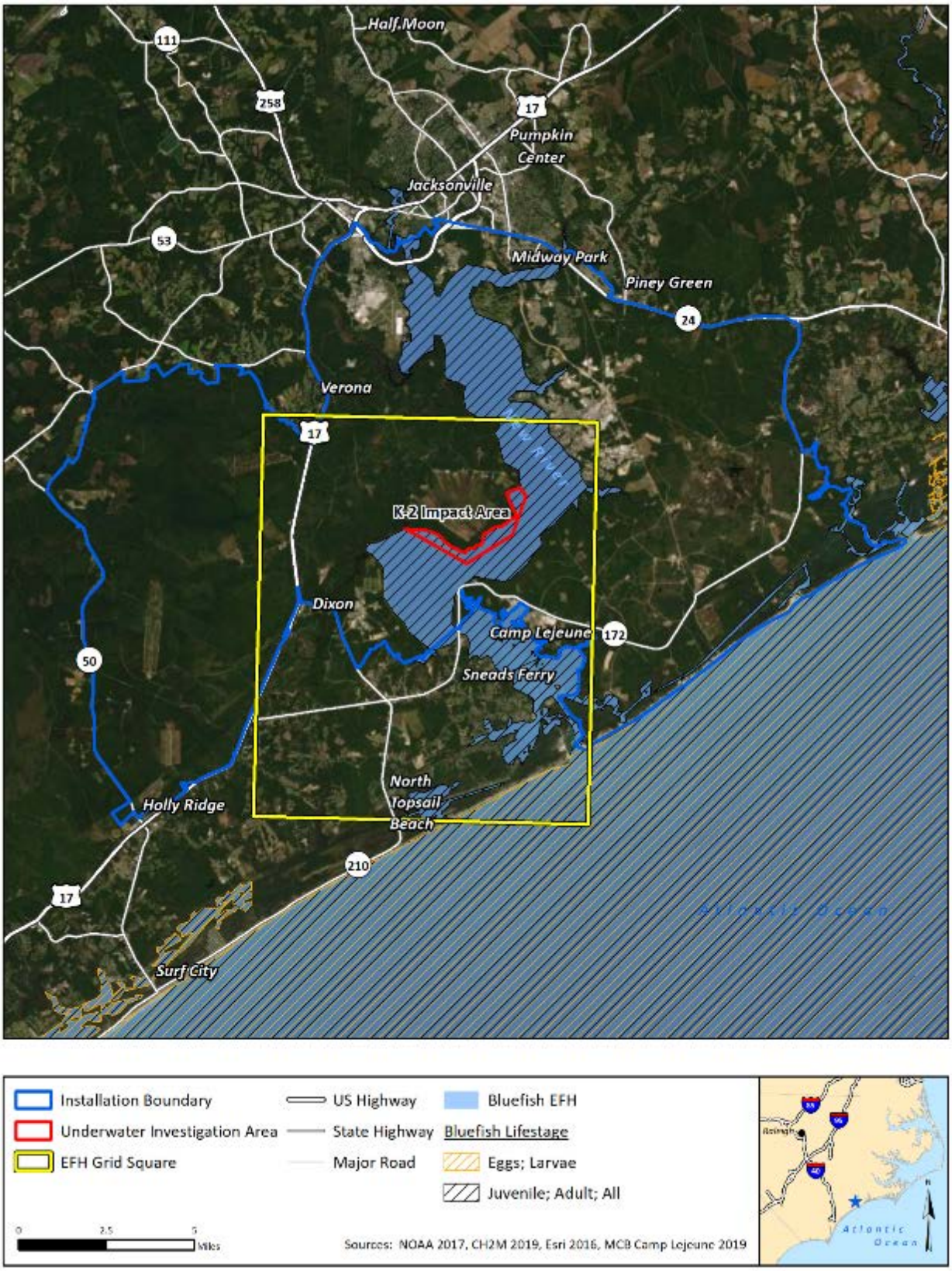


Figure 4-5. EFH for Bluefish

continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; and 3) the "slope sea" and Gulf Stream between latitudes 29° 00 North and 40° 00 North. Bluefish larvae are not generally collected inshore, so there is no EFH designation inshore for larvae. Generally, bluefish larvae are collected April through September in temperatures greater than 64 degrees Fahrenheit (°F) in normal shelf salinities (> 30 ppt) (Mid-Atlantic Fishery Management Council, 1998a).

Juveniles (<35 cm total length): 1) North of Cape Hatteras, pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) from Nantucket Island, Massachusetts south to Cape Hatteras, in the highest 90 percent of the area where juvenile bluefish are collected in the Northeast Fisheries Science Center (NEFSC) trawl survey; 2) South of Cape Hatteras, 100 percent of the pelagic waters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; 3) the "slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N; and 4) all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Generally, juvenile bluefish occur in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from May through October, and South Atlantic estuaries March through December, within the "mixing" and "seawater" zones. Distribution of juveniles by temperature, salinity, and depth over the continental shelf is undescribed (Mid-Atlantic Fishery Management Council, 1998a).

Adults (≥35 cm total length): 1) North of Cape Hatteras, over the continental shelf (from the coast out to the limits of the EEZ), from Cape Cod Bay, Massachusetts south to Cape Hatteras, in the highest 90 percent of the area where adult bluefish were collected in the NEFSC trawl survey; 2) South of Cape Hatteras, 100 percent of the pelagic waters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream) through Key West, Florida; and 3) all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Adult bluefish are found in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from April through October, and in South Atlantic estuaries from May through January in the "mixing" and "seawater" zones. Bluefish adults are highly migratory and distribution varies seasonally and according to the size of the individuals comprising the schools. Bluefish are generally found in normal shelf salinities (> 25 ppt) (Mid-Atlantic Fishery Management Council, 1998a).

4.4.3 Habitat Areas of Particular Concern

No HAPC has been designated for bluefish (Mid-Atlantic Fishery Management Council, 1998a).

4.5 SUMMER FLOUNDER

4.5.1 Species Description

Summer flounder is one of the most sought after commercial and recreational fish along the Atlantic coast. Summer flounder (*Paralichthys dentatus*) are found in inshore and offshore waters from Nova Scotia, Canada to the east coast of Florida (National Oceanic and Atmospheric Administration Fisheries, no date). In the United States, they are most abundant in the Mid-Atlantic region from Cape Cod, Massachusetts to Cape Fear, North Carolina (Atlantic States Fishery Management Council, 2019).

Summer flounder usually begin to spawn at age two or three, at lengths of about 10 inches. Spawning occurs in the fall while the fish are moving offshore. Spawning migration is linked to sexual maturity, with the oldest and largest fish migrating first. As in their seasonal migrations, spawning summer flounder in the northern portion of the geographic range spawn and move offshore (depths of 120 to 600 feet) earlier than those in the southern part of the range. Larvae migrate to inshore coastal and estuarine areas from October

to May. The larvae, or fry, move to bottom waters upon reaching the coast and spend their first year in bays and other inshore areas. At the end of their first year, some juveniles join the adult offshore migration (Atlantic States Fishery Management Council, 2019).

Adults spend most of their life on or near the sea bottom burrowing in the sandy substrate. Flounder lie in ambush and wait for their prey. They are quick and efficient predators with well-developed teeth allowing them to capture small fish, squid, sea worms, shrimp, and other crustaceans (Atlantic States Fishery Management Council, 2019).

4.5.2 Essential Fish Habitat

All life stages of summer flounder have EFH within the proposed project area (**Figure 4-6**). EFH for all life stages of summer flounder are described below.

Eggs: 1) North of Cape Hatteras, EFH is the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of the all the ranked ten-minute squares for the area where summer flounder eggs are collected in the MARMAP survey; and 2) South of Cape Hatteras, EFH is the waters over the continental shelf (from the coast out to the limits of the EEZ), from Cape Hatteras, North Carolina to Cape Canaveral, Florida, to depths of 360 feet. In general, summer flounder eggs are found between October and May, being most abundant between Cape Cod and Cape Hatteras, with the heaviest concentrations within 9 miles of shore off New Jersey and New York. Eggs are most commonly collected at depths of 30 to 360 feet (Mid-Atlantic Fishery Management Council, 1998b).

Larvae: 1) North of Cape Hatteras, EFH is the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked ten-minute squares for the area where summer flounder larvae are collected in the MARMAP survey; 2) South of Cape Hatteras, EFH is the nearshore waters of the continental shelf (from the coast out to the limits of the EEZ), from Cape Hatteras, North Carolina to Cape Canaveral Florida, in nearshore waters out to 50 miles from shore; and 3) Inshore, EFH is all the estuaries where summer flounder were identified as being present (rare, common, abundant, or highly abundant) in the Estuarine Living Marine Resources (ELMR) database, in the "mixing" (defined in ELMR as 0.5 to 25.0 ppt) and "seawater" (defined in ELMR as greater than 25 ppt) salinity zones. In general, summer flounder larvae are most abundant nearshore (12-50 miles from shore) at depths between 30 to 230 feet. They are most frequently found in the northern part of the Mid-Atlantic Bight from September to February, and in the southern part from November to May (Mid-Atlantic Fishery Management Council, 1998b).

Juveniles (<28 cm total length): 1) North of Cape Hatteras, EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked ten-minute squares for the area where juvenile summer flounder are collected in the NEFSC trawl survey; 2) South of Cape Hatteras, EFH is the waters over the continental shelf (from the coast out to the limits of the EEZ) to depths of 500 feet, from Cape Hatteras, North Carolina to Cape Canaveral, Florida; and 3) Inshore, EFH is all of the estuaries where summer flounder were identified as being present (rare, common, abundant, or highly abundant) in the ELMR database for the "mixing" and "seawater" salinity zones. In general, juveniles use several estuarine habitats as nursery areas, including salt marsh creeks, seagrass beds, mudflats, and open bay areas in water temperatures greater than 37 °F and salinities from 10 to 30 ppt range (Mid-Atlantic Fishery Management Council, 1998b).

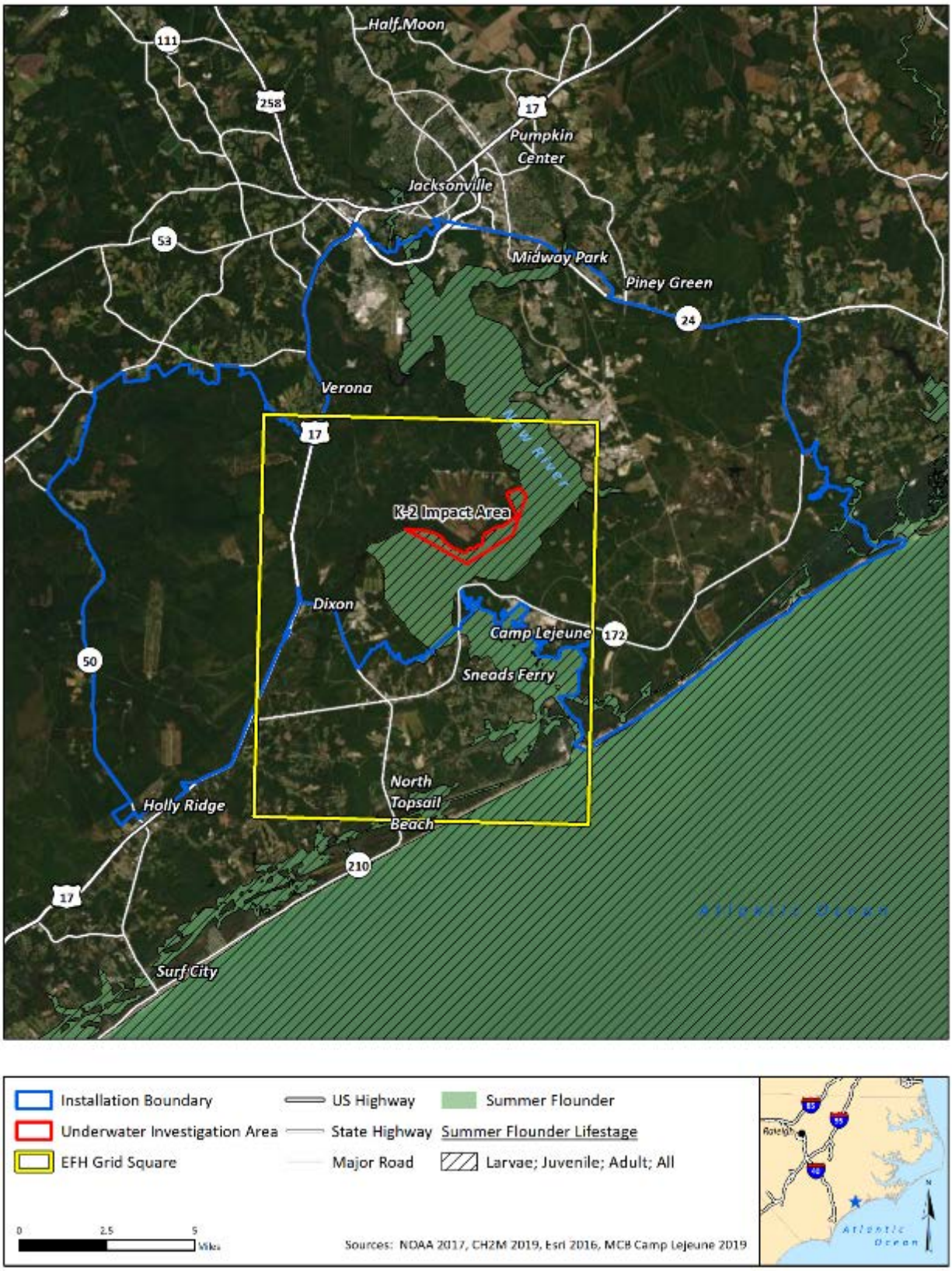


Figure 4-6. EFH for Summer Flounder

Adults (≥28 cm total length): 1) North of Cape Hatteras, EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked ten-minute squares for the area where adult summer flounder are collected in the NEFSC trawl survey; 2) South of Cape Hatteras, EFH is the waters over the continental shelf (from the coast out to the limits of the EEZ) to depths of 500 feet, from Cape Hatteras, North Carolina to Cape Canaveral, Florida; and 3) Inshore, EFH is the estuaries where summer flounder were identified as being common, abundant, or highly abundant in the ELMR database for the "mixing" and "seawater" salinity zones. Generally, summer flounder inhabit shallow coastal and estuarine waters during warmer months and move offshore on the outer continental shelf at depths of 500 feet in colder months (Mid-Atlantic Fishery Management Council, 1998b).

4.5.3 Habitat Areas of Particular Concern

Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. The proposed project area does not contain summer flounder HAPC (Mid-Atlantic Fishery Management Council, 1998b).

4.6 SMOOTHHOUND SHARK COMPLEX

4.6.1 Species Description

The smoothhound shark complex consists of three species, Smooth Dogfish Shark (*Mustelus canis*); Florida Smoothhound Shark (*Mustelus norrisi*); and Gulf of Mexico Smoothhound Shark (*Mustelus sinusmexicanus*). These three species are difficult to differentiate, complicating separate EFH determination for each species. The smooth dogfish is the only smoothhound shark complex species found in the Atlantic, so all EFH identified in the Atlantic is exclusively for smooth dogfish (National Oceanic and Atmospheric Administration Fisheries, 2017).

Smooth dogfish is a common coastal shark species found in the Atlantic Ocean from Massachusetts to northern Argentina. They are primarily demersal sharks that inhabit continental shelves and are typically found in inshore waters down to 200 meters depth. Smooth dogfish is a migratory species that responds to changes in water temperature. They primarily congregate between southern North Carolina and the Chesapeake Bay in the winter. In the spring, smooth dogfish move along the coast when bottom water warms up to at least 6 to 7 °C. As temperatures get colder, smooth dogfish move offshore to their wintering areas. Smooth dogfish can tolerate a range of temperatures from 6 to 27 °C. Smooth dogfish have diets that are dominated by invertebrates. They primarily feed on large crustaceans, consisting mostly of crabs, but also rely heavily on American lobsters (National Oceanic and Atmospheric Administration Fisheries, 2017).

4.6.2 Essential Fish Habitat

Neonate/Young of year, Juvenile, and Adult: At this time, available information is insufficient for the identification of EFH for this life stage; therefore, all life stages are combined in the EFH designation. EFH in Atlantic coastal areas ranges from Cape Cod Bay, Massachusetts to South Carolina, inclusive of inshore bays and estuaries (e.g., Pamlico Sound, Core Sound, Delaware Bay, Long Island Sound, Narragansett Bay, etc.). EFH also includes continental shelf habitats between southern New Jersey and Cape Hatteras, North Carolina (**Figure 4-7**) (National Oceanic and Atmospheric Administration Fisheries, 2017).

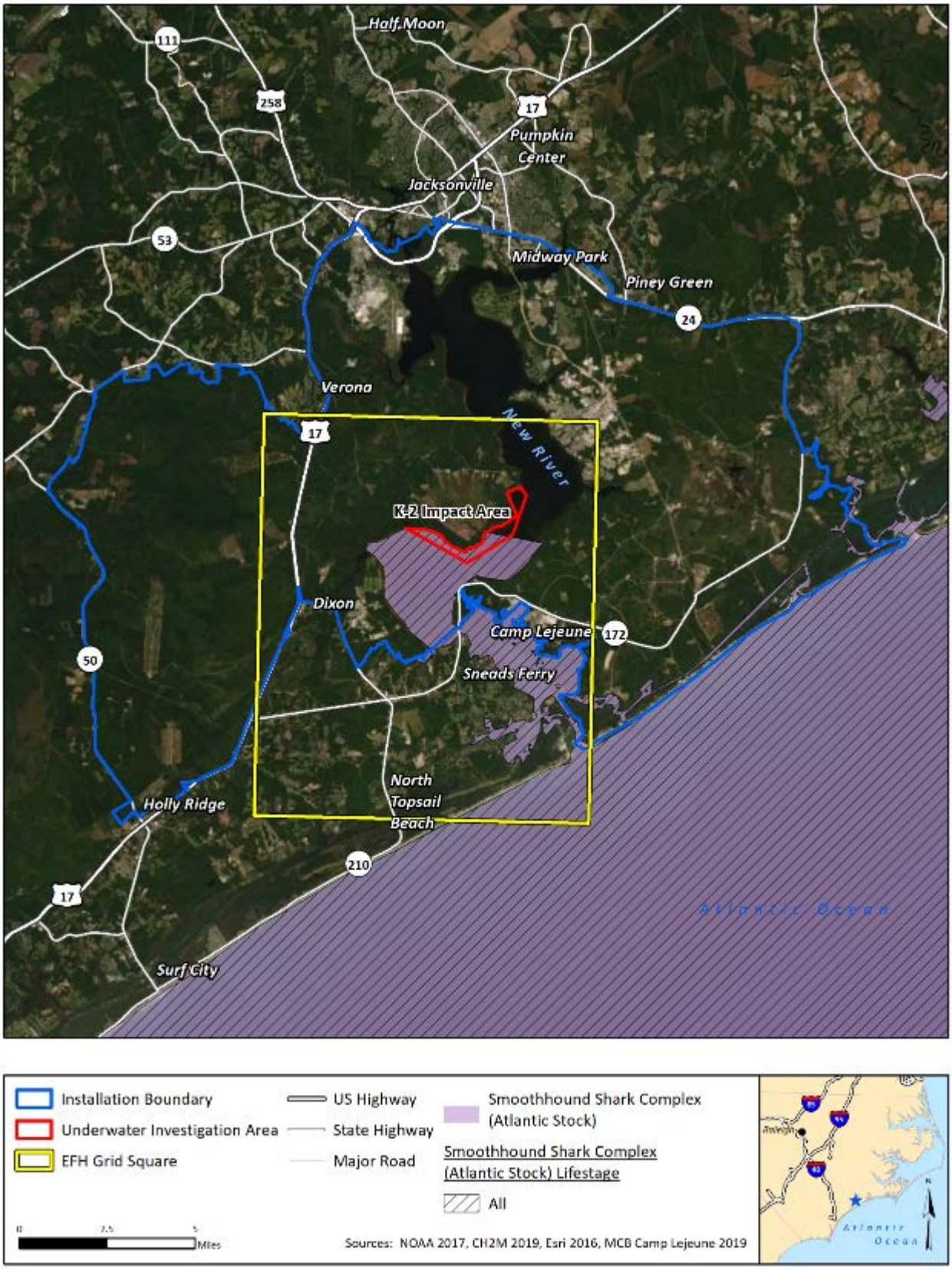


Figure 4-7. EFH for Smoothhound Shark Complex (Atlantic Stock)

4.6.3 Habitat Areas of Particular Concern

No HAPC has been designated for smoothhound shark complex (Atlantic Stock).

4.7 OTHER

The waters of New River and the surrounding area also serve as nursery and forage habitat for other species including black drum (*Pogonia cromis*), red drum (*Sciaenops ocellatus*), striped bass (*Morone saxitalis*), Atlantic menhaden (*Brevoortia tyrannus*), Atlantic croaker (*Micropogonias undulates*), spot (*Leiostomus xanthurus*), bay anchovy (*Anchoa mitchilli*), striped mullet (*Mugil cephalus*), weakfish (*Cynoscion regalis*), Eastern oyster *(Crassostrea virginica*), and blue crab (*Callinectes sapidus*) that serve as prey for other species (e.g., mackerels, snappers, and groupers, billfishes and sharks). Blue crab and many finfish prey upon penaeid shrimp. Commercially important larval fishes move through the estuarine waters in mid-winter to feed on plankton (South Atlantic Fishery Management Council, 2009).

Anadromous fishes within the New River include American shad, hickory shad, blueback herring, striped bass, Atlantic sturgeon, and shortnose sturgeon. The Endangered Species Act protects these sturgeon species, and NMFS and others have focused considerable resources on restoring the migration corridors used by anadromous fish in the region. The waters of the New River north of U.S. Route 17 are classified as inland anadromous fish spawning areas and are regulated by NCDMF (15A NCAC 10C.0603).

5.0 ASSESSMENT OF IMPACTS AND MITGATION

This section identifies the potential for the Proposed Action to reduce the quantity or quality of EFH in the proposed project area. This section also describes the context, intensity, and duration of potential direct and indirect impacts of the Proposed Action on the relevant life history stages of EFH-designated species, their habitats, and their prey species. **Table 5-1** describes the activities associated with the Proposed Action that may be a potential source for adverse impacts to EFH and EFH-designated species. There would be temporary and highly localized direct impacts within the footprint of the Proposed Action area on the habitat and associated prey species for the duration of the proposed project. However, as clam raking and fishing activities occur regularly in this area, the temporary and localized disturbances associated with investigating anomalies are considered to be consistent with the background conditions of the area. Therefore, potential in-water detonations would have the greatest impacts to EFH. As previously noted, in-water detonations were not required during any of the intrusive investigations of previous surveys (CH2M 2015a, 2017) and is considered unlikely to occur as part of the Proposed Action. As a contingency, the USMC is proposing a maximum of five in-water detonations. Because the proposed action area represents only a small portion of this type of available benthic and water column EFH in the New River, only a commensurately small portion of available EFH is potentially exposed to adverse impacts. **Table 5-1** summarizes all potential sources of EFH impacts within the Proposed Action area.

Table 5-1. Potential for Adverse Impacts to EFH for each Activity

Description of Activities	Area of Effect	Potential for Adverse Impacts to EFH
Investigate Areas of Concern	94 acres (shallow) 83 acres (deep water)	• YES • Shallow water - Temporary benthic and water column habitat disturbance by towed survey equipment and from intrusive investigation of anomalies. • Deep water - Temporary water column habitat disturbance from towed survey equipment. Temporary benthic habitat disturbance from intrusive investigation of anomalies.
Investigate Deep Water Outside of Areas of Concern	40 acres (deep water)	• YES • Temporary water column habitat disturbance from towed survey equipment. Temporary benthic habitat disturbance from intrusive investigation of anomalies.
In-water detonation of MEC	Incidental. Up to 5 detonations anticipated (155 mm/ 14.6 pounds TNT)	• YES • Temporary benthic and water column habitat disturbance from the placement of sandbags or earthen berms to contain noise and debris. • Temporary benthic and water column habitat disturbance from detonation of MEC. • Potential for injury and mortality to managed species

The Proposed Action has the potential to adversely affect EFH within the Proposed Action area and surrounding waters but would have no permanent or long-term adverse effects to EFH. All potential impacts would be temporary in nature. As noted in 50 CFR 600.910(a), an "adverse effect" on EFH includes any impact that reduces the quantity and/or quality of EFH. Potential effects on EFH within the proposed project area would be associated with temporary disturbance to bottom sediments and vegetation during the intrusive investigation and noise impacts on EFH species during in-water detonation of MEC. Long-term beneficial effects to EFH would result from the removal of MEC and MPPEH from the area. The effects of

these activities are assessed to determine their potential to adversely affect EFH, including associated fish and invertebrate species.

No intrusive investigation would be conducted in the tributaries to the New River. There would be no effect on juvenile snapper/grouper EFH in these areas. There would be temporary disturbance to the bottom sediments and vegetation during the underwater intrusive investigation. This disturbance would be temporary and localized to specific sites where anomalies are detected. Because the individual areas of potential disturbance would be small relative to the total area of the inlet of the New River, the bottom sediments would be expected to return to pre-disturbance conditions after work is complete through natural sediment transport of the river. There would be no loss of EFH as a result of the intrusive investigation, as no areas designated as EFH would be filled or removed. There would be no net change in the acreage of coastal inlet areas.

5.1 WATER COLUMN HABITAT

The primary potential effects on the water column would be from the temporary re-suspension of bottom sediments during surveys of shallow areas and intrusive investigations in shallow and deep water. Re-suspended sediments would have temporary impacts on the water column resulting from increased turbidity and decreases in the dissolved oxygen concentration. There would be no change in salinity regime, tidal height, or water temperature. The potential detonation of MEC would result in short-term, intermittent increases in underwater noise levels, which could cause injury, stress, and behavioral changes in aquatic organisms. These temporary impacts on EFH are discussed further below.

Impacts on the water column would be localized to the areas in and immediately surrounding the project area. Shallow water surveys and intrusive investigations in shallow and deep water are expected to result in localized increases in suspended sediments and levels of turbidity within the project area that would settle out after the completions of activities. The detonation of MEC would be at least partially confined by sand bags or earthen berms. These mitigation measures would shrink the area exposed to severe turbidity and noise stressors.

Turbidity associated with the Proposed Action would likely be of short duration and involve minimal spreading due to the dynamic nature of the estuarine environment and the grain size of the material being removed. The turbidity generated by proposed project activities would be expected to cover a small area relative to the total open water habitat area available to managed species. Many of the managed fish species that may be present in the Proposed Action area are visual predators. Increased turbidity in the water column could affect their ability to forage efficiently. However, most of the potentially impacted organisms are highly mobile and would escape or avoid the impacted area of the water column during periods of increased turbidity, and would return quickly following the completion of proposed project activities.

Sediment in the action areas primarily consists of silty mud and fine to medium-grained sand (see Section 3.2). The coarser grain sizes would be expected to settle out of the water column quickly and would do so close to the area of disturbance (U.S. Environmental Protection Agency, 1999). Also, riverine flushing and tidal action, combined with the rapid settling of sediment, are expected to quickly return concentrations of suspended sediment to background levels (Reynolds, 1990). As a result of rapid settling and mixing, nearby seagrass beds are not anticipated to be adversely affected by turbidity generated by the proposed project. Turbidity can also decrease the dissolved oxygen concentration in the water column (U.S. Environmental Protection Agency, 2015); however, the dynamic nature of the estuary results in mixing of the water

column, which would dilute and disperse any areas of depressed dissolved oxygen levels. In summary, there would be a temporary, minor, and localized adverse effect on water quality during proposed project activities as a result of turbidity. Within a short time after activities are completed, water quality would return to pre-disturbance conditions, and EFH species would return to the affected areas.

5.2 BENTHIC HABITAT

The benthic habitat within and adjacent to the Proposed Action area has been characterized as fine to medium-grained sand with areas of soft silt in coves and embayments where water velocities are low (see Section 3.2). Direct impacts on benthic habitat and organisms would occur in shallow areas from towed survey equipment and in shallow and deep water areas from the intrusive investigation of anomalies. Additional impacts would occur from the installation of sand bags or earthen berms in the event of an in-water detonation and from the detonation itself, should it occur. As a result, the proposed project area and adjacent areas would temporarily have higher levels of turbidity than the surrounding area during proposed activities; however, finer sediments would be suspended in the water column and would settle on the benthic community in adjacent, undisturbed areas. Suspension feeders (i.e., bivalves) and surface deposit feeders (i.e., polychaetes) would be the most susceptible to burial. However, it is expected that these impacts would be minor and temporary. Benthic communities are very resilient to habitat disturbance and would likely recover to pre-disturbance levels within two years or less (Brooks, Purdy, Bell, & Sulak, no date; Diaz, Cutter, & Hobbs, 2004).

5.3 MARINE VEGETATION

SAV is a marine fish habitat dominated by one or more species of underwater vascular plants such as eelgrass (*Zostera marina*), shoalgrass (*Halodule wrightii*), and widgeon grass (*Ruppia maritima*). These vegetation beds cover extensive areas. Seagrasses do not occur in the proposed project area but occur in small isolated adjacent areas (**Figure 5-1**), therefore no direct impacts to eelgrass are expected (North Carolina Department of Environmental Quality, 2007). Potential indirect impacts from turbidity were discussed in **Section 5.1**. Fish utilize habitat created by aquatic vegetation for foraging and refuge. The proposed in-water activities would temporarily disturb substrate within portions of the action area but would not remove or disturb marine vegetation beyond localized impacts. Marine vegetation would be expected to rapidly return to the area following the completion of activities.

While the proposed activities may result in the mortality of marine vegetation within the proposed project area footprint, the species of marine vegetation recorded in the action area is not sensitive to anthropogenic disturbance and are abundant throughout the New River estuary.

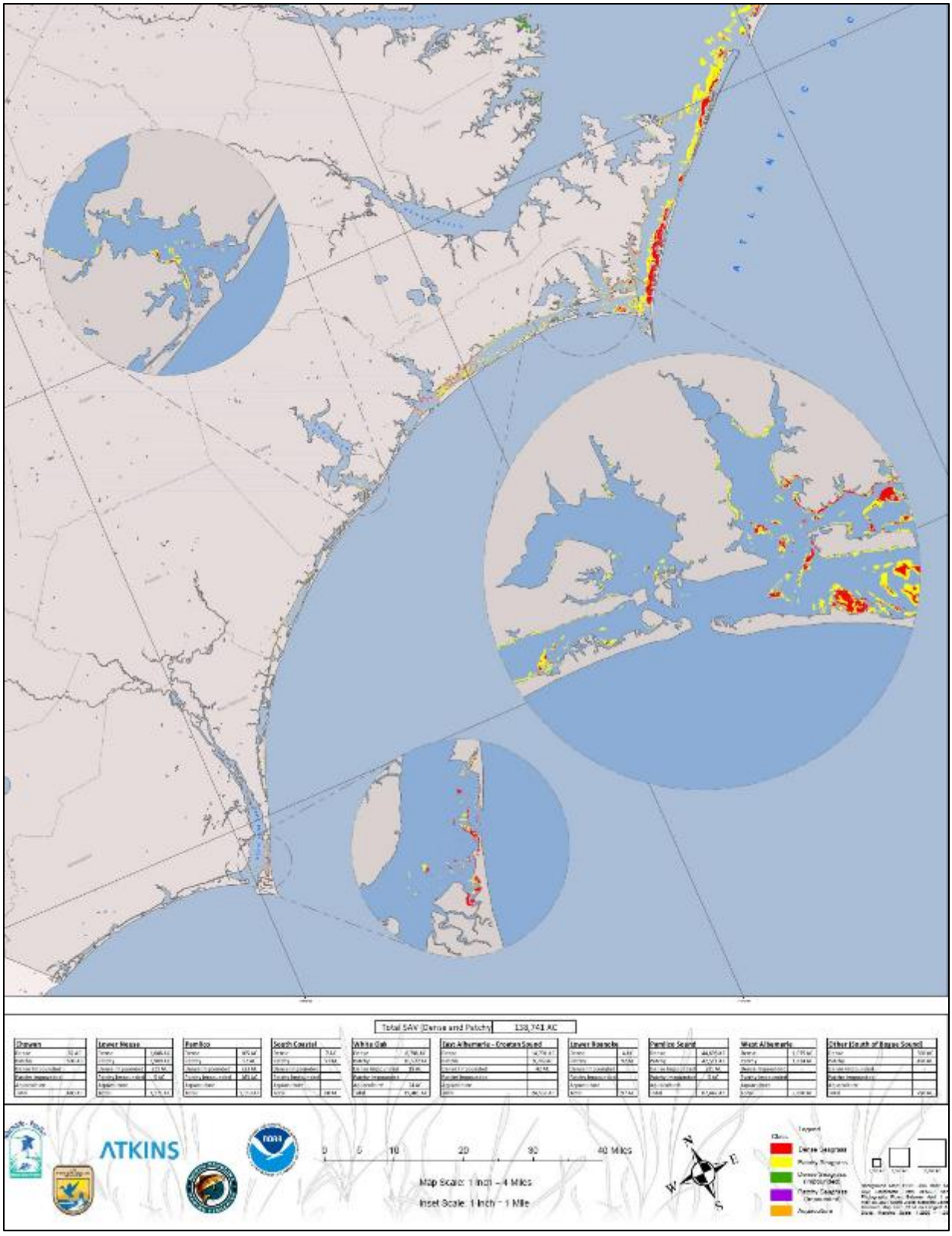


Figure 5-1. Mapped SAV Beds in the Vicinity of the Proposed Project Area

5.4 MANAGED SPECIES

Species that are present in the action areas would be temporarily displaced from the area of activity. Direct mortality or temporary displacement of egg and larval life stages could result from burial in fluidized sediments or by the placement of sandbags or earthen berms (in the event an in-water detonation was necessary). Juvenile and adult species potentially present in the action areas are mobile and would be expected to avoid areas of in-water activity and use other nearby habitats.

During proposed in-water activities, sediment disturbance would temporarily increase turbidity within the water column as described in **Section 5.1**. Increased turbidity may impair the ability of sight-feeding fishes to forage in the area immediately surrounding in-water action areas. Long-term exposure to increased suspended solids and turbidity in the water column may alter the gill structure or impact the ability of some fishes to uptake oxygen through their gills. However, most juvenile and adult fish species are capable of avoiding or moving away from discrete areas of increased turbidity and those same individuals would likely move away from the disturbance before any resulting increases in turbidity from in-water activities. Turbidity can also decrease the dissolved oxygen concentration in the water column, which could adversely affect egg and larval life stages of managed species. These life stages are unable to avoid areas where turbidity may be increased, and therefore, may be directly affected by reduced dissolved oxygen levels.

Turbidity and in-water noise associated with in-water detonation of MEC would be wholly or partly contained within temporary earthen berms or sandbags that would reduce the extent and intensity of these stressors. These mitigation measures would shrink the area exposed to severe turbidity and noise stressors. Most noise-related injury would be constrained to within the immediate area of the detonation.

Underwater detonations generate intense sound pressure waves that may adversely affect fishes through direct mortality or behavioral changes (California Department of Transportation, 2001; Stoltz & Colby, 2001). Generally, fishes that possess swim bladders are more susceptible to impacts from underwater detonations than those without (Keevin, Hempen, & Schaffer, 1997). In addition, smaller fish are more likely to be impacted by underwater detonations than larger fish; however, fish larvae tend to be less sensitive as swim bladders are not yet developed at this stage (Keevin, Hempen, & Schaffer, 1997; Wright, no date). EFH species with swim bladders (e.g., bluefish, snapper-grouper, coastal migratory pelagics) in the immediate vicinity of the detonation would be unable to adjust to the abrupt change in pressure propagated by the detonation, which may result in injury or mortality. EFH species without swim bladders (e.g., summer flounder, shrimp, sharks) are less likely to be injured, unless they are within the immediate vicinity of the detonation.

In addition to mortality, underwater detonations at close range may cause barotrauma injury in some fishes. However, small fishes, even those with swim bladders, are generally less susceptible to death or injury from barotrauma compared to larger fishes (Edds-Walton & Finneran, 2006). Fishes near the bottom (i.e., summer flounder) typically exhibit fewer signs of barotrauma injury when exposed to peak pressure exposures of 80 to 140 pounds per square inch, whereas fish near the surface exhibit injuries around peak pressure exposures of 40 to 70 pounds per square inch (Teleki & Chamberlain, 1978; Wiley, Gaspin, & Goertner, 1981).

In-water detonation of MEC would temporarily increase underwater noise and induce changes in water pressure that could injure the inner ears of fishes or cause a temporary loss of swim bladder and buoyancy control (Illingworth and Rodkin, 2009). Study of underwater noise impacts on fishes using impulsive

sounds (seismic air guns) have showed temporary hearing loss in some species but not in others, and recovery in those species showing temporary threshold shifts (TTS) varied by species with no apparent damage to the sensory hair cells of the ear. While further study is needed with regards to underwater noise impacts on fish hearing, particularly with species that have different morphological relationships between a gas-filled structure and the inner ear, current research suggest that any limits on impulsive sounds based on onset of effects to non-auditory tissues (i.e. swim bladders) will be protective of any damage to the inner ear and to hearing (Casper, et al., 2013). In addition, underwater noise can induce a startle response and behavioral changes, particularly avoidance of active noise producing areas (Illingworth and Rodkin, 2009). The extent to which managed species would react varies depending on species and life stage, but mobile juveniles and adults would be expected to avoid detonation activity. The detonation of MEC would be at least partially confined by sand bags or earthen berms that would be removed once detonations were complete. Less mobile egg and larval life stages would be directly impacted by burial or crushing by earthen berms or sand bags during in-water detonations, but would be less susceptible to impacts from underwater sound generated by the detonation.

The guidelines for effects of explosions on fish are provided in **Table 5-2**. It is anticipated that the sound pressure levels created by the detonation of MEC (14.6 pounds TNT) would be louder than the guidelines presented for fish mortality and potential fish mortal injury in **Table 5-2**. Therefore, it is likely that unmitigated blasting activities would result in fish mortality. Mitigations measures would be implemented to minimize potential impacts and are discussed in **Section 5.5**.

Table 5-2. Guidelines for Effects of Explosions on Fish

Type of Animal	Mortality and potential mortal injury	Impairment		Behavior
		Recoverable injury	TTS	
Fish: no swim bladder (particle motion detection)	229 - 234 decibel peak	(N) High (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) High (I) Moderate (F) Low
Fish where swim bladder *is not* involved in hearing (particle motion detection)	229 – 234 decibel peak	(N) High (I) High (F) Low	(N) High (I) Moderate (F) Low	(N) High (I) High (F) Low
Fish where swim bladder *is* involved in hearing (primarily pressure detection)	229 – 234 decibel peak	(N) High (I) High (F) Low	(N) High (I) High (F) Low	(N) High (I) High (F) Low
Fish eggs and Larvae	> 13mm s^{-1} peak velocity	(N) High (I) Low (F) Low	(N) High (I) Low (F) Low	(N) High (I) Low (F) Low

Notes: peak sound pressure levels in dB re 1 µPa; All criteria are presented as sound pressure even for fish without swim bladders since no data for particle motion exist. Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N), intermediate (I), and far (F).

Source: Popper, et al., 2014.

Prey for managed species may also be displaced or lost as a result of towing survey equipment, intrusive investigations, and in-water detonation activities. The temporary disturbance of benthic species would primarily be limited to the proposed project area as described in Section 5.2. Mobile prey organisms (e.g., fishes and crabs) are expected to avoid areas of activity. Less mobile prey organisms (e.g., benthic macroinvertebrates and bivalves) may be lost during project activities. However, given that the proposed project would have limited and localized impacts on the benthos and water column habitat, the proposed

project activities are not expected to result in population-level impacts on benthic or marine vegetation species or in reduced prey availability for managed species.

5.5 PROPOSED MEASURES TO AVOID AND MINIMIZE IMPACTS

The USMC has designed proposed in-water activities to minimize their impacts on EFH and managed species to the extent practicable, and the USMC will further develop and implement measures to avoid and minimize effects based on consultation with federal agencies. Mitigation measures that have been integrated into the design of the project to date to avoid and minimize impacts are listed in **Table 5-3**.

Table 5-3. Mitigation Measures to Minimize Impacts on EFH and Managed Species

Measure	Description	Impacts Reduced/Avoided
Monitoring zone	A 1,000 yard monitoring zone would be established around each point of in-water detonation*. Prior to the start of activity this area would be monitored for floating vegetation that would be relocated or detonation would be delayed until the monitoring zone is clear.	Minimizes impacts to managed fish species
Noise reducing measures	Noise reducing measures such as the use of earthen berms or sand bags would be employed to reduce and contain noise generated by the in-water detonation of MEC, as appropriate. The number of in-water detonations would be limited to a maximum of five.	Minimizes impacts to managed fish species and water column EFH.
Scare charges for blasting	Prior to detonation of MEC and as appropriate, a very small charge would be detonated in the water to allow fish to move away from the disturbance prior to full detonation.	Minimizes impacts to managed fish species.
Post detonation monitoring	After completion of a detonation, the monitoring zone would be observed for 30 minutes. If any injured or dead fish are observed, they would be collected and identified for reporting purposes, as appropriate. Mitigation measures may be further refined if fish mortality is deemed excessive.	Minimizes impacts to managed fish species.

* The provided mitigation distance is the NOAA agreed-upon mitigation zone for large-caliber projectiles for all ocean training in the entire northern Atlantic as documented in the AFTT EIS (Navy, 2018)

In order to minimize impacts to fish, several measures will be implemented prior to and during detonation activities. A 1,000-yard monitoring zone would be established around each detonation site. The monitoring zone would be a radius around the MEC to be detonated and could occur anywhere within the proposed project area. **Figure 5-2** shows the maximum distance from the outer boundary of the underwater investigation area should a detonation occur at the outer limits of the project area. The monitoring zone would be observed before, during, and after detonations. Thirty minutes prior to detonations, the monitoring zone would be observed for floating vegetation. This vegetation would be relocated or allowed to move beyond the monitoring zone, as appropriate. After detonation, the monitoring zone would be observed for dead or injured fish for 30 minutes. If any injured or dead fish are observed, they would be collected and identified for reporting purposes, as appropriate. If fish mortality is deemed excessive, additional mitigation measure would be designed and implemented. The detonation of MEC would be limited to five detonations and each detonation would only have a total duration of a fraction of a second. Because the detonation would occur behind or underneath sand bags or earthen berms, impacts from the detonation are anticipated to be muffled and contained. Lastly, small scare charges would be detonated prior to detonation activities to allow fish to move away from the area before detonations begin. As a result, with mitigation, impacts to fish from the in-water detonation of MEC would not be significant.

Figure 5-2. 1,000 Yard Monitoring Zone

6.0 SUMMARY OF ESSENTIAL FISH HABITAT IMPACTS

The EFH impact evaluation process for the proposed project area is summarized in **Table 6-1**. Impacts are listed by type and nature (i.e., significance of effects). Impacts are considered direct, indirect, temporary, short-term, long-term, or permanent. Most of the effects are temporary and would be offset by best management practices, environmental protection guidelines, mitigation measures, or are negligible considering the localized effect of the actions compared to the area of the New River Estuary that would be unaffected.

Table 6-1. Summary of Anticipated Impacts to EFH within the Proposed Action Area

Type of Impact	Eggs	Larvae	Juvenile	Adult
Elevated Turbidity	Direct and indirect temporary impacts would be minor.			
Underwater detonation	Direct and indirect temporary impacts would be minor. Potential mortality for individuals directly within the detonation range.			
Open Water habitat disturbance	Direct and indirect temporary impacts to fish species within the proposed project area would be minor.			
Benthic Habitat disturbance	Direct and indirect permanent impacts to benthic species within the proposed project area would be minor.			
Marine Vegetation Loss	No direct impacts to SAV within the proposed project area. Negligible temporary indirect impacts to down river SAV beds			

For most EFH species impacted by the Proposed Action, those impacts would be limited to temporary displacement from benthic or water column habitats, which are otherwise abundant within the New River Estuary. The egg or larval stages of some species may potentially be subjected to direct mortality by burial in sediment or crushing by earthen berms or sand bags. Potential impacts to EFH species are summarized in **Table 6-2**.

The overall potential for adverse impacts to EFH-designated species and EFH in the Proposed Action area would be highly localized. Direct mortality to the benthic resources and certain egg/larval stages of EFH-designated species that occur on the bottom substrate within the proposed project area would result from towed survey equipment in shallow areas, intrusive investigation of anomalies, and from the installation of earthen berms or sand bags used to minimize impacts from the detonation of MEC.

The potential in-water detonation of MEC could result in injury or mortality to managed species. Several mitigation measures are proposed that would reduce the potential for mortality and injury (refer to **Section 5.5**) and the number of detonations would be limited to a total of five. As a result, impacts would not be significant.

Most EFH-designated species within the Proposed Action area feed on motile epifaunal organisms or small forage fishes. Since the impacts to these prey resources would be limited to temporary displacement, the impact to the feeding abilities of EFH-designated species is expected to be minimal. For bottom-feeding EFH species, the proposed activities would temporarily disturb feeding habitat. While those benthic prey resources would be temporarily lost, a substantial amount of undisturbed equivalent benthic prey resources of similar quality exist nearby.

Table 6-2. Summary of EFH Designations for the Proposed Action Area						
	Lifestage					
Species Present	**Eggs**	**Larvae**	**Juveniles**	**Adults**	**HAPC**	**Impact Summary**
South Atlantic Fishery Management Council						
Penaeid Shrimp	X	X	X	X	X	Eggs and larvae may be lost by burial in sediment from intrusive investigation or crushing by towed survey equipment, and earthen berms or sandbags. Adults and juveniles would be displaced during project activities. Disturbance of HAPC would be temporary.
Snapper Grouper Management Unit			X		X	Juveniles would be displaced during project activities. Disturbance of HAPC would be temporary. Potential for direct mortality from in-water detonations.
Coastal Migratory Pelagic Species			X			Juveniles would be displaced during project activities. Potential for direct mortality from in-water detonations.
Mid-Atlantic Fishery Management Council						
Bluefish	X	X	X	X		Eggs and larvae may be lost by burial in sediment from intrusive investigation or crushing by towed survey equipment and earthen berms or sandbags. Impacts to eggs and larvae would be unlikely since this lifestage is not likely to occur within the proposed project area. Adults and juveniles would be displaced during project activities. Potential for direct mortality from in-water detonations.
Summer flounder	X	X	X	X		Eggs and larvae may be lost by burial in sediment from intrusive investigation or crushing by towed survey equipment, and earthen berms or sandbags Adults and juveniles would be displaced during project activities.
Atlantic Highly Migratory Species NMFS						
Smoothhound shark (Atlantic Stock)	X	X	X	X		Eggs and larvae may be lost by burial in sediment from intrusive investigation or crushing by towed survey equipment, and earthen berms or sandbags. Adults and juveniles would be displaced during project activities. Potential for direct mortality from in-water detonations.

In addition to the mitigation measures discussed in **Section 5.5**, best management practices would be implemented to further minimize potential impacts to the New River (**Table 6-3**). These best management practices are specifically designed to be protective of aquatic resources.

Table 6-3. Best Management Practices		
Best Management Practice	**Description**	**Impacts Reduced/Avoided**
Sedimentation and Erosion Controls	Erosion control measures would be installed prior to any soil disturbing activity, and a Soil and Erosion Control Plan would be implemented to guide appropriate placement of control measures on the site. Investigative activities would comply with the North Carolina Sedimentation Control Law.	Prevent direct and indirect adverse impacts to water quality.
Spill prevention and control measures	Proper housekeeping, maintenance of equipment, and containment of fuels and other potentially hazardous materials would be implemented. Spill control kits would be provided at the work site to facilitate spill response.	Minimize the potential for accidental releases of fuels and other potentially hazardous materials.
General best management practices for equipment	Water-based equipment would be cleaned and cleared of polluting substances prior to use. Equipment would be subject to daily inspections for cleanliness and leaks. If a leak is detected, the equipment would not be used until the leak is repaired and equipment cleaned. Hydraulic fluids would be vegetable based. Refueling of equipment would only be permitted at approved fueling facilities. All trash would be secured to ensure it does not enter adjacent surface waters. Any floating debris generated would be retrieved. Retrieved debris would be disposed of at an upland disposal site. No petroleum products, chemicals, or other toxic or harmful materials shall be allowed to enter surface waters. Wash water resulting from washdown of equipment or work areas shall be contained for proper disposal and shall not be discharged unless authorized. Equipment that enters surface waters shall be maintained to prevent any visible sheen from petroleum products. No oil, fuels, or chemicals shall be discharged to surface waters or onto land where there is a potential for re-entry into surface waters to occur. Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. shall be checked regularly for leaks. Materials would be maintained and stored properly to prevent spills. No cleaning solvents or chemicals used for tools or equipment cleaning shall be discharged to ground or surface waters.	Minimize degradation of water quality and impacts to fish and marine resources. Minimize the potential for accidental releases of fuels and other potentially hazardous materials that may pollute soil, groundwater, and/or surface water.

7.0 REFERENCES

ASFMC. (2019). Summer Flounder. Retrieved from www.asfmc.org/species/summer-flounder

Brooks, R. A., Purdy, C. N., Bell, S. S., & Sulak, K. J. (n.d.). The Benthic Community of the Eastern U.S. Continental Shelf: A Literature Synopsis of Benthic Faunal Resources. *Continental Shelf Research 26:804-818*.

CALTRANS. (2001). San Francisco-Oakland Bay Bridge East Span seismic safety project, pile installation demonstration project, fisheries impact assessment.

Casper, B. M., Smith, M. E., Michele, H. B., Huifang, S., Thomas, C. J., & Arthur, P. N. (2013). Effects of exposure to pile driving sounds on fish inner ear tissues. *Comparative Biochemistry and Physiology, Part A*, 352-360.

CH2M. (2015a, November). Underwater MEC Investigation of the New River within the K-2 Impact Area.

CH2M. (2015b, February). K-2 Impact Area Underwater MEC Investigation of New River Work Plan.

CH2M. (2018, March). Alternatives Analysis Report K-2 Range Impact Area of the New River. Final.

CH2M. (2018, March). Alternatives Analysis Report K-2 Range Impact Area of the New River. Final. .

Diaz, R. J., Cutter, G. R., & Hobbs, C. H. (2004). Potential Impacts of Sand Mining offshore of Maryland and Delaware: Part 2 - Bilogical Considerations. *Journal of Coastal Research 20(1):61-69*.

Edds-Walton, P. L., & Finneran, J. J. (2006). Evaluation of Evidence for Altered Behavior and Auditory Deficits in Fishes Due to Human-Generated Noise Sources. (Technical Report 1939).

Federal Geographic Data Committee. (2013). Classification of Wetlands and Deepwater Habitats of the United States.

Illingworth and Rodkin. (2009). *Final Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish.*

Keevin, T. M., Hempen, G. L., & Schaffer, D. J. (1997). . Use of a bubble curtain to reduce fish mortality during explosive demolition of Locks and Dam 26, Mississippi River. Pp. 197-206. In: Proceedings of the Twenty-third Annual Conference on Explosives and Blasting Technique, Las Vegas, Nevada. Internationa.

MAFMC. (1998). Amendment 1 to the Bluefish Fishery Management Plan.

MAFMS. (1998b). Amendment 12 to the SUmmer FLounder, Scup, and Blask Sea Bass Fishery Management Plan.

National Oceanic and Atmospheric Administration. (1981). White Oak River System Study: Final Report. A Plan of Action for the White Oak River.

National Oceanic and Atmospheric Administration Fisheries. (2018). Bluefish (potatomus saltatrix). Retrieved from website: https://www.fishwatch.gov/profiles/bluefish

Naval Facilities Engineering Command Mid-Atlantic. (2015, July). 2015-2020 Integrated Natural Resources Management Plan.

NCDEQ. (2007a). Map of North Carolina Submerged Aquatic Vegetation.

NOAA Fisheries. (2017, September 1). Amendment 10 to the 2006 Atlantic Highly Migratory Species Fishery Management Plan: Essential Fish Habitat and Environmental Assessment.

NOAA FIsheries. (No Date). Summer Flounder. Retrieved from Website: https://www.fishwatch.gov/profiles/summer-flounder

North Carolina Department of Environmental Quality. (2016). 2016 Coastal Habitat Protection Plan Source Document.

North Carolina Department of Environmental Quality. (2019). Habitat.

North Carolina Division of Marine Fisheries. (2011). Map of Fishery Nursery Areas.

Partenership, Albermarle-Pamlico National Estuary. (no date). Albermarle-Pamlico Region. Albermarle-Pamlico National Estuary Partenership.

Reynolds, C. S. (1990, August). Suspension and settlement of particles in flowing water: comparison of the effects of varying water depth and velocity in circulating channels. *Freshwater Biology Vol. 4, Issue 1*.

Rohde, F. (2019). Fishery Biologist, NOAA Fisheries Southeast Regional Office. (E. Fuery, Interviewer)

SAFMC. (2009, April). Fishery Ecosystem Plan of the Southeast Atlantic Region. Volume II: South Atlantic Habitats and Species.

SAFMC. (2016, November). Users Guide to Essential Fish Habitat Designations by the South Atlantic Fishery Management Council.

South Atlantic Fishery Management Council. (1983). Fishery Management Plan, Regulatory Impact Review, and Final Environmental Impact Statement for the Snapper-Grouper Fishery of the South Atlantic Region.

South Atlantic Fishery Management Council. (2016). Users Guide to Essential Fish Habitat Designations by the South Atlantic Fishery Management Council.

South Atlantic Fishery Management Council. (2019). Marine and Estuarine Water Column Habitat.

South Carolina Department of Natural Resources. (2015). State Wildlife Action Plan: Supplemental Volume Species of Conservation Concern. *Penaeid Shrimp Guild*. Retrieved from website: http://www.dnr.sc.gov/swap/species2015.html#freshwatershrimp

State of North Carolina. (no date). White Oak River Basin.

Stoltz, T., & Colby, J. (2001). January 2001 dive report for Mukilteo wingwall replacement project. Washington State Ferries Memorandum.

Teleki, G. C., & Chamberlain, A. J. (1978). Acute Effects of underwater construction blasting on fishes in Long Point Bay, Lake Erie. *Journal of the Fisheried Research Board of Canada 35:1191-8*.

USEPA. (1999, April). EPA Guidance Manual, Turbidity Provisions. Chapter 8: Particles Contributing to Turbidity.

USEPA. (2015). Data from the National Aquatic Resource Surveys. Retrieved from website: http://www2.epa.gov/national-aquatic-resource-surveys/data-national-aquatic-resource-surveys

Wiley, M. L., Gaspin, J. B., & Goertner, J. F. (1981). Effects of underwater explosions on fish with a dynamical model to predict fishkill. . *Ocean Science and Engineering, 6(2), 223-284*.

Wright, D. (n.d.). A discussion paper on the effects of explosives on fish and marine mammals in the waters of the Northwest Territories. Winnipeg (Manitoba): Western Region, Department of Fisheries and Oceans. *Canadian Technical Report of Fisheries and Aquatic Sciences*.

This page intentionally left blank.

Appendix C
Section 7 Consultation Correspondence

This page intentionally left blank.

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090.11
G-F/BEMD
NOV 0 4 2019

Mr. Pete Benjamin, Fish and Wildlife Biologist
US Fish and Wildlife Service
Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726

Subject: BIOLOGICAL ASSESSMENT FOR UNEXPLODED ORDNANCE REMOVAL FROM WATER ADJACENT TO THE K-2 IMPACT AREA AT MARINE CORPS BASE CAMP LEJEUNE, ONSLOW COUNTY, NORTH CAROLINA

Dear Mr. Benjamin:

The U.S. Marine Corps (USMC) is preparing an Environmental Assessment for its proposal to reduce the risk to public safety by identifying and removing potential historical Unexploded Ordnance in the New River adjacent to the K-2 Impact Area at Marine Corps Base Camp Lejeune, North Carolina.

Attached is the Biological Assessment for the subject project. The USMC requests your concurrence with its effects determinations.

Please contact Mr. Craig Ten Brink, (910)451-7228 or craig.tenbrink@usmc.mil, with any questions about this application. We look forward to working with you and your staff.

Sincerely,

JOHN R. TOWNSON
Director, Environmental Management
By direction of the
Commanding General

Enclosure: Biological Assessment

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090.11
G-F/BEMD
NOV 0 4 2019

Dr. Roy Crabtree, Regional Administrator
NOAA National Marine Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL, 33701

Subject: BIOLOGICAL ASSESSMENT FOR UNEXPLODED ORDNANCE REMOVAL FROM WATER ADJACENT TO THE K-2 IMPACT AREA AT MARINE CORPS BASE CAMP LEJEUNE, ONSLOW COUNTY, NORTH CAROLINA

Dear Dr. Crabtree:

The U.S. Marine Corps (USMC) is preparing an Environmental Assessment for its proposal to reduce the risk to public safety by identifying and removing potential historical Unexploded Ordnance in the New River adjacent to the K-2 Impact Area at Marine Corps Base Camp Lejeune, North Carolina.

Attached is the Biological Assessment for the subject project. The USMC requests your concurrence with its effects determinations.

Please contact Mr. Craig Ten Brink, (910)451-7228 or craig.tenbrink@usmc.mil, with any questions about this application. We look forward to working with you and your staff.

Sincerely,

JOHN R. TOWNSON
Director, Environmental Management
By direction of the
Commanding General

Enclosure: Biological Assessment

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh ES Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

December 13, 2019

Mr. John R. Townson
Director, Environmental Management Division
Marine Corps Base
PSC 20004
Camp Lejeune, North Carolina 28542-0004

Dear Mr. Townson:

The Fish and Wildlife Service (Service) has reviewed your November 4, 2019 letter and Biological Assessment (BA) titled "Biological Assessment for Unexploded Ordnance Removal from Water Adjacent to the K-2 Impact Area at Marine Corps Base Camp Lejeune, Onslow County, North Carolina" (BA). The U.S. Marine Corps (USMC) proposes to reduce the volume of unexploded ordnance (UXO) in waters of the New River adjacent to the K-2 Impact Area. The proposed action would decrease the potential risks of UXO to public safety, marine species, and the environment. UXO removal may take place in suitable habitat for a variety of federally protected species known to occur in Onslow County. Our comments are provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 USC 1531 et seq.).

The proposed action involves identifying, investigating and removing potential UXO from 177 acres designated as "Areas of Concern" based on a concentration of magnetic anomalies identified in previous studies. The project also includes investigation of an additional 40 acres of deep water (depths greater than three feet) outside of the Areas of Concern to detect and remove UXO in these areas. All identified UXO would be removed to the upland area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal in accordance with existing standard operating procedures. In the event that some identified UXO is not stable enough for safe removal, in-water detonation would be required. The project would have an approximate duration of 13 months.

Anomalies will be identified using surface water (three feet and under) geophysical mapping in shallow waters and underwater geophysical mapping in deep water (+ three to 10 feet). Shallow water digital geophysical mapping uses a high sensitivity, high resolution metal detector that can detect both ferrous and non-ferrous metal. The system can be pushed or pulled as a trailer, by a person or vehicle, such as an all-terrain vehicle. A small to medium sized boat would be used to perform underwater digital geophysical mapping which uses an underwater magnetometer to map geophysical anomalies. The underwater digital geophysical mapping towed array consists of a 13-foot wide sensor that is designed to operate in two to 50 feet of water, and in close proximity to, but have no contact with the bottom. Anomalies within the Areas of Concern would be intrusively investigated by a UXO qualified dive team.

As noted in the BA, it is possible some undetonated munitions/ explosives may not be safely relocated to the K-2 Range after being exposed in the river bed. These items would have to be detonated in place. It is anticipated that no more than five would require in-water detonation throughout the intrusive investigation. The detonations would occur one at a time throughout the duration of intrusive investigations (estimated 6.5-month period).

The BA identifies nine federally endangered or threatened species that may be affected by the proposed action. Two of these, the West Indian manatee (manatee) and rufa red knot, fall under Fish and Wildlife Service jurisdiction. As noted in the BA, the project area contains marginal foraging habitat for the red knot. Due to the low probability that red knots might be in or near the project area during the course of the proposed action, the USMC has determined that the proposed action may affect but is not likely to adversely affect the red knot.

Of the two species addressed in the BA that fall under Fish and Wildlife Service jurisdiction, the manatee is the most sensitive to the outlined activities. The BA indicates that impacts to manatees could result from contact with the vessel conducting underwater digital geophysical mapping and transiting to and from the survey areas; and noise disturbance from any required in-water detonations of UXO. The BA cites Best Management Practices (BMPs; see section 2.2 of the BA), currently in place, which include visual checks for small craft operators and steps for reducing potential impacts to marine mammals, including manatees. These are incorporated into the proposed action.

For in-water operations, temporary exclusion zones would be established during intrusive investigation activities and any in-water detonations. The purpose of these exclusion zones is to ensure the safety of the public, as well as UXO technicians and divers. The dimensions of these exclusion zones will depend on the proposed activity (investigation or intentional in-water detonation) and safety parameters based on UXO quantity and position of the activity out of water or in the water column. Exclusion zones established for intentional in-water detonations would be surveyed for the presence of marine mammals and sea turtles prior to a detonation; a detonation would not occur until the zone was free of protected species.

Based on the information provided in your November 4, 2019 letter and biological assessment, the Service concurs with your determination that the proposed unexploded ordnance removal from waters adjacent to the K-2 Range Impact Area may affect but is not likely to adversely affect the West Indian manatee or red knot and will have no effect on the red-cockaded woodpecker, piping plover, rough-leaved loosestrife, seabeach amaranth, Hirst's panic grass, Cooley's meadowrue, golden sedge, pondberry, or any other federally listed threatened or endangered species under Fish and Wildlife Service juristiction. We believe that the requirements of section 7(a)(2) of the Act have been satisfied. We remind you that obligations under section 7 consultation must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered; (2) this action is subsequently modified in a manner that was not considered in this review; or, (3) a new species is listed or critical habitat determined that may be affected by the identified action.

The Service recognizes the vital tasks Marine Corps Base, Camp Lejeune carries out to meet the needs of military training and to sustain natural resources and the facilities where Marines, Sailors and citizens work and live. If you have any questions regarding this matter, please contact Mr. John Hammond at 919-856-4520 (Ext. 28). Thank you for your continued cooperation with our agency.

Sincerely,

John S. Hammond for

Pete Benjamin
Field Supervisor

FINAL

Biological Assessment

For

Removal of Unexploded Ordnance from Waters Adjacent to the K-2 Range Impact Area

At

Marine Corps Base Camp Lejeune, N.C.

October 2019

This page intentionally left blank.

Biological Assessment for Removal of Unexploded Ordnance from Waters Adjacent to the K-2 Range Impact Area

Marine Corps Base Camp Lejeune, N.C.

TABLE OF CONTENTS

List of Figures

List of Tables

Abbreviations and Acronyms

Acronym	Definition
BA	Biological Assessment
BMP	best management practice
DDESB	Department of Defense Explosives Safety Board
DON	Department of Navy
DPS	Distinct Population Segment
ESA	Endangered Species Act
MCB	Marine Corps Bases
MEC	Munitions and Explosives of Concern
mm	millimeters
MPPEH	Material Potentially Presenting an Explosive Hazard
NCDEQ	North Carolina Department of Environmental Quality
NEPA	National Environmental Policy Act
NOTAMAR	Notice to Marines
NMFS	National Marine Fisheries Service
TNT	Trinitrotoluene
U.S.	United States
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
UXO	Unexploded Ordnance

1 Introduction

1.1 Introduction

The United States (U.S.) Marine Corps (USMC) proposes to reduce the public safety risk associated with historical Unexploded Ordnance (UXO) located in the waters of the New River adjacent to the K-2 Range Impact Area at Marine Corps Base (MCB) Camp Lejeune, in Onslow County, North Carolina. The Proposed Action is to identify and remove UXO.

This Biological Assessment (BA) has been prepared to evaluate the potential impacts to species listed or proposed for listing as Threatened and Endangered by the Endangered Species Act (ESA [Public Law 93-205; 16 U.S. Code § 1531 et seq.]) associated with the Proposed Action as compared to the current situation. Details of the Proposed Action are described in **Section 2.0**. Best Management Practices (BMP) designed to avoid or minimize potential effects associated with the proposed activities are presented in **Section 2.2**. Implementation of the Proposed Action would begin once Section 7 consultation and other permitting requirements are complete and would last approximately 13 months.

Section 7(a)(2) of the ESA requires Federal agencies to ensure that any action authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat.

This BA is intended to support the formal consultation of the USMC with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) as required by 50 Code of Federal Regulations 402.14(c) and Section 7 of the ESA regarding the likelihood of an adverse effect ("take") of any listed or proposed species and/or designated or proposed critical habitat. It provides the best available scientific and commercial data for the ESA-listed threatened or endangered species in the Action Area.

This BA describes the potential effects on ESA-listed species known to occur in the Action Area and any potential impacts to critical habitat from the implementation of the Proposed Action. Direct, indirect, and cumulative effects are analyzed.

1.2 Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to reduce the volume of UXO in waters of New River adjacent to the K-2 Range Impact Area. The need for the Proposed Action is to reduce the potential risks to public safety, marine species, and the environment.

1.3 Background and Location

MCB Camp Lejeune is located along the southern coast of eastern North Carolina adjacent to the City of Jacksonville (**Figure 1.3-1**). Located entirely within Onslow County, North Carolina, MCB Camp Lejeune lies approximately 400 miles south of Washington, DC, and 47 miles north of Wilmington, North Carolina.

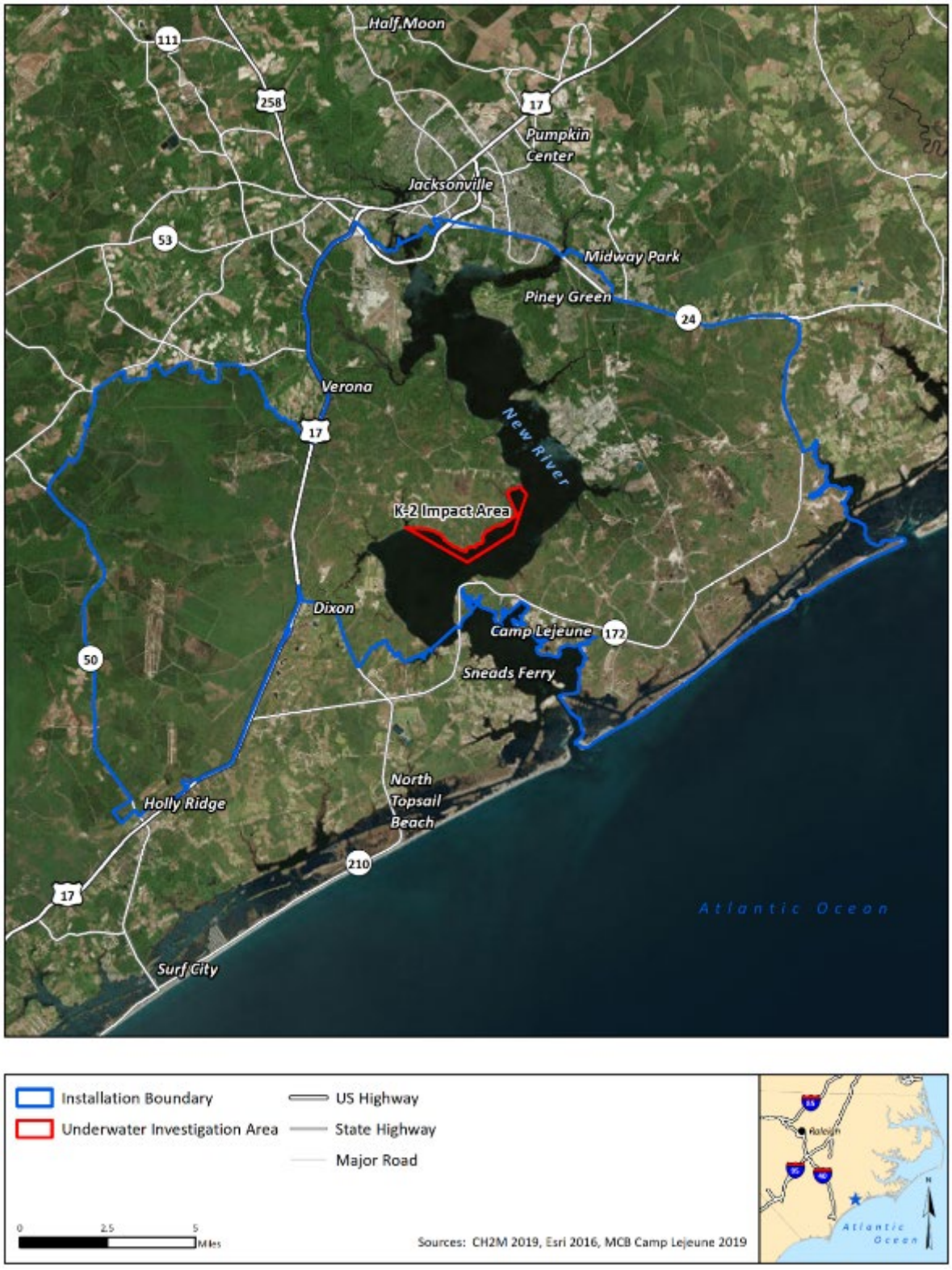


Figure 1.3-1. Waters Adjacent to the K-2 Impact Area at MCB Camp Lejeune

1.3.1 K-2 Range Impact Area

The K-2 Range Impact Area encompasses multiple firing range fans and surface danger zones from land-based operational ranges on MCB Camp Lejeune that once extended into the New River but are now wholly contained on land. The firing range fans and surface danger zones are the ground and airspace areas designated for the containment of projectiles, fragments, debris and components from the firing, launching, or detonating of weapon systems including explosives and demolitions. The K-2 Range is currently an operational range that supports a variety of ordnance. Historically, the K-2 Impact Area was used to accept a variety of artillery up to 155 millimeters (mm) projectiles. Although the range fans and danger zones have been modified so that they no longer overlap the New River, the K-2 Impact Area once included a buffer area affecting approximately 800 acres of the New River along approximately 5 miles of the west and south banks that is known to include unexploded projectiles, rockets, and grenades from past range operations (**Figure 1.3-1**). Currently, the perimeter of the area where UXO are present in the waters adjacent to the K-2 Impact Area in the New River are posted with signs cautioning against bottom disturbing activities due to the potential hazard; however, the area is open to commercial and recreational users.

1.3.2 Explosive Hazards Evaluation

As part of the underwater investigations during 2014 to 2015, an explosive hazards evaluation was performed. For the Munitions and Explosives of Concerns (MEC) or Material Potentially Presenting an Explosive Hazard (MPPEH) to result in a human casualty, there must be an explosive ordnance, a human receptor in contact with or in the vicinity of the ordnance, and an event to cause the detonation of the explosive ordnance. Site factors, human factors, and ordnance factors were evaluated to assess the likelihood of an explosive injury occurring (**Table 1.3-1**). The explosive hazard evaluation determined that the situation in the waters adjacent to the K-2 Impact Area was “serious” since a mishap may occur in time and may cause death.

Table 1.3-1. Factors Evaluated to Assess the Likelihood of Explosive Injury

Factor	Evaluation
Site Factors	• Accessible for recreational users (kayakers, boaters, duck hunters) • Accessible for commercial fishing (flounder) • Accessible for gathering shellfish (crabs, oysters, clams, shrimp) • Evidence of boaters landing on shoreline • Duck hunting shelters and crab pots within the site
Human Factors	• Humans may make unintentional contact with MEC/MPPEH on river bottom while boating, fishing, clamming, gigging, shell fishing, or wading • Several MEC/MPPEH were on river bottom or just under the sediment
Ordnance Factors	• All MEC items found during 2014/2015 investigation were safe to move, therefore, probability of unintentional detonation by casual contact (i.e. stepping on them) considered low • Anchors and boat propellers striking MEC or use of more sensitive artillery fuzes would increase probability of unintentional detonation • Aggressive contact has a higher probability of detonation (intentional deformation, unintentional aggressive contact)

This page intentionally left blank.

2 Proposed Action

2.1 Overview

The Proposed Action would include identifying, investigating and removing potential UXO from 177 acres designated as "Areas of Concern" based on a concentration of magnetic anomalies identified in previous studies. An additional 40 acres of deep water (depths greater than 3 feet) outside of the Areas of Concern would also be investigated to identify potential UXO, which would be investigated and removed (**Figure 2.1-1**). All identified UXO would be removed to the upland area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal in accordance with existing standard operating procedures. It is possible that UXO could be identified, which are not stable enough for safe removal. In these cases, in-water detonation would be required. The Proposed Action would have an approximate duration of 13 months.

2.1.1 Investigation of Areas of Concern

The Proposed Action includes investigating 177 acres identified in earlier studies as Areas of Concern, those thought to contain the historical target areas of the K-2 Range and those with the highest density of potential MEC/MPPEH. The three Areas of Concern contain both shallow water areas (approximately 94 acres) and deep water areas (approximately 83 acres). The investigation would include the anomalies identified by aerial geophysical surveys that were not selected for investigation during the 2014/2015 investigation (CH2M 2015a). Anomalies would be identified using surface water digital geophysical mapping in shallow waters (less than approximately 3 feet) and underwater digital geophysical mapping in deep waters (approximately 3 to 10 feet). The location of each anomaly would be flagged with either polyvinyl chloride tubing or a buoy with an attached weight. The digital geophysical mapping would take approximately 2.5 months to complete.

Figure 2.1-1. Proposed Action

Shallow Water: Shallow water digital geophysical mapping uses a high sensitivity, high resolution metal detector that can detect both ferrous and non-ferrous metal. The system can be pushed or pulled as a trailer, by a person or vehicle, such as an all-terrain vehicle (See **Figure 2.1-2**).

Photo Credit: 3DGeophysics.com

Figure 2.1-2. Shallow Water Digital Geophysical Mapping

Deep Water: A small to medium sized boat is used to perform underwater digital geophysical mapping which uses an underwater magnetometer to map geophysical anomalies. The underwater digital geophysical mapping towed array consists of a 13-foot wide sensor that is designed to operate in 2 to 50 feet of water, and in close proximity to, but have no contact with the bottom (See **Figure 2.1-3**).

Photo Credit: 3DGeophysics.com

Figure 2.1-3. Underwater Digital Geophysical Mapping

Anomalies within the Areas of Concern would be intrusively investigated by a UXO qualified dive team in accordance with Department of Defense Explosives Safety Board Technical Publication 18, *Minimum Qualifications for UXO Technicians and Personnel* (Department of Defense Explosives Safety Board [DDESB] 2004) using hand digging techniques. Intrusive investigation of the Areas of Concern is expected to take approximately 6.5 months to complete.

Any anomalies determined to be MEC/MPPEH during the intrusive investigation would be removed from the water and taken to the upland area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal in accordance with existing standard operating procedures.

2.1.2 Investigate Portion of Deep Water Outside the Areas of Concern

The Proposed Action would include investigating a portion of the deep water areas adjacent to the K-2 Impact Area outside of the Areas of Concern to better characterize the extent of potential MEC/MPPEH within these areas. Underwater digital geophysical mapping would be performed along transects to cover approximately 10% of the deep water area outside of the Areas of Concern (approximately 40 acres) to evaluate the extent of MEC within the waters adjacent to the K-2 Impact Area. Underwater digital geophysical mapping would occur in the deep waters along transects using the same methods as described in **Section 2.1.1**.

Anomalies identified along the transects would be intrusively investigated using hand digging techniques as described above. Any anomalies determined to be MEC/MPPEH during the intrusive investigation would be removed from the water and taken to the land area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal. The investigation in the deep water area would take approximately 3 months.

2.1.3 In-Water Detonation

There may be situations in which the diver cannot safely relocate the MEC/MPPEH to the K-2 Range after exposing it in the riverbed. In those situations, the items would have to be detonated in place. Although in-water detonation was not required during any of the intrusive investigations of previous surveys (CH2M 2015a, 2018) and is considered unlikely to occur, the possibility exists so it is included in the Proposed Action. It is anticipated that no more than five would require in-water detonation throughout the intrusive investigation. This represents a conservative estimate of approximately one percent of the anomalies identified during the 2014/2015 investigations. The detonations would occur one at a time throughout the duration of intrusive investigations. For analysis purposes, it is assumed the most explosive ordnance discovered in waters adjacent to the K-2 Impact Area, the 155 mm projectile, would be detonated in the water.

The 155 mm ordnance that has been identified within the waters adjacent to the K-2 Impact Area was assumed to be the M101 and/or the M107 155 mm high explosive loaded projectiles fired from a gun or howitzer, respectively. The artillery fuze used on these projectiles was the point detonating fuze, the most commonly used fuze on high explosive loaded projectiles. These projectiles contain 14.6 pounds of trinitrotoluene (TNT) and have an assumed casualty radius on land of approximately 164 feet and a hazardous fragment distance of 389 feet (CH2M 2015a). The hazardous fragment distance was obtained from DDESB publications and is for surface detonations without engineering controls to reduce the fragmentation (such as burial). The explosive safety quantity distance would be used to establish an exclusion zone for public and non-essential personnel during in-water detonations. This

distance would vary depending on the depth of the water where the detonation would occur (**Table 2.1-1**).

Table 2.1-1. Explosive Safety Quantity Distance for In-Water Detonations

Ordnance	Depth of Water (feet)	Explosive Safety Quantity Distance (feet)
155 mm M107	1	1,635
	5	355
	10	157

Source: CH2M 2015b

Explosives detonated underwater would introduce loud, impulsive, broadband sounds into the marine environment. Three factors influence the sound effect of an explosive: the weight of the explosive material, the type of explosive material, and the detonation depth. The net explosive weight (the weight of the TNT required to produce an equivalent explosive power) accounts for the first two parameters, and in this case is estimated to be 14.6 pounds. The water depth adjacent to the K-2 Impact Area ranges from less than 1 foot near the shoreline to approximately 10 feet. In the event an intentional detonation would need to occur, sandbags or an earthen berm would be established around the MEC to contain the noise and debris. The exclusion zone would be surveyed for the presence of marine mammals and sea turtles prior to a detonation and would not occur until the zone was free of these protected species.

2.1.4 Establish Exclusion Zone

A temporary exclusion zone would be established during intrusive investigation activities to ensure the safety of the public as well as UXO technicians/divers. The exclusion zone is an explosive safety quantity distance established to protect personnel and the public from an unintentional detonation during intrusive investigation activities (**Table 2.1-2**). The exclusion zone would be temporary and established as a radius around the area being investigated. Since the exclusion zone could be established at an investigation site anywhere within the underwater investigation area, **Figure 2.1-4** illustrates the maximum distance for an exclusion zone of either distance. An exclusion zone would also be established during any intentional in-water detonation and would vary depending on the depth of the water where the detonation would occur. The exclusion zone would be monitored by a chase boat. Access to the exclusion zone by unauthorized personnel would result in ceasing all operations until the zone is cleared.

Table 2.1-2. Exclusion Zones

Activity	Explosive Safety Quantity Distance
Intrusive Investigation, Above the Water	613 feet
Intrusive Investigation, Below the Water	2,130 feet
Intentional In-Water Detonation	See Table 2.1-1

Source: Adapted from CH2M 2015b

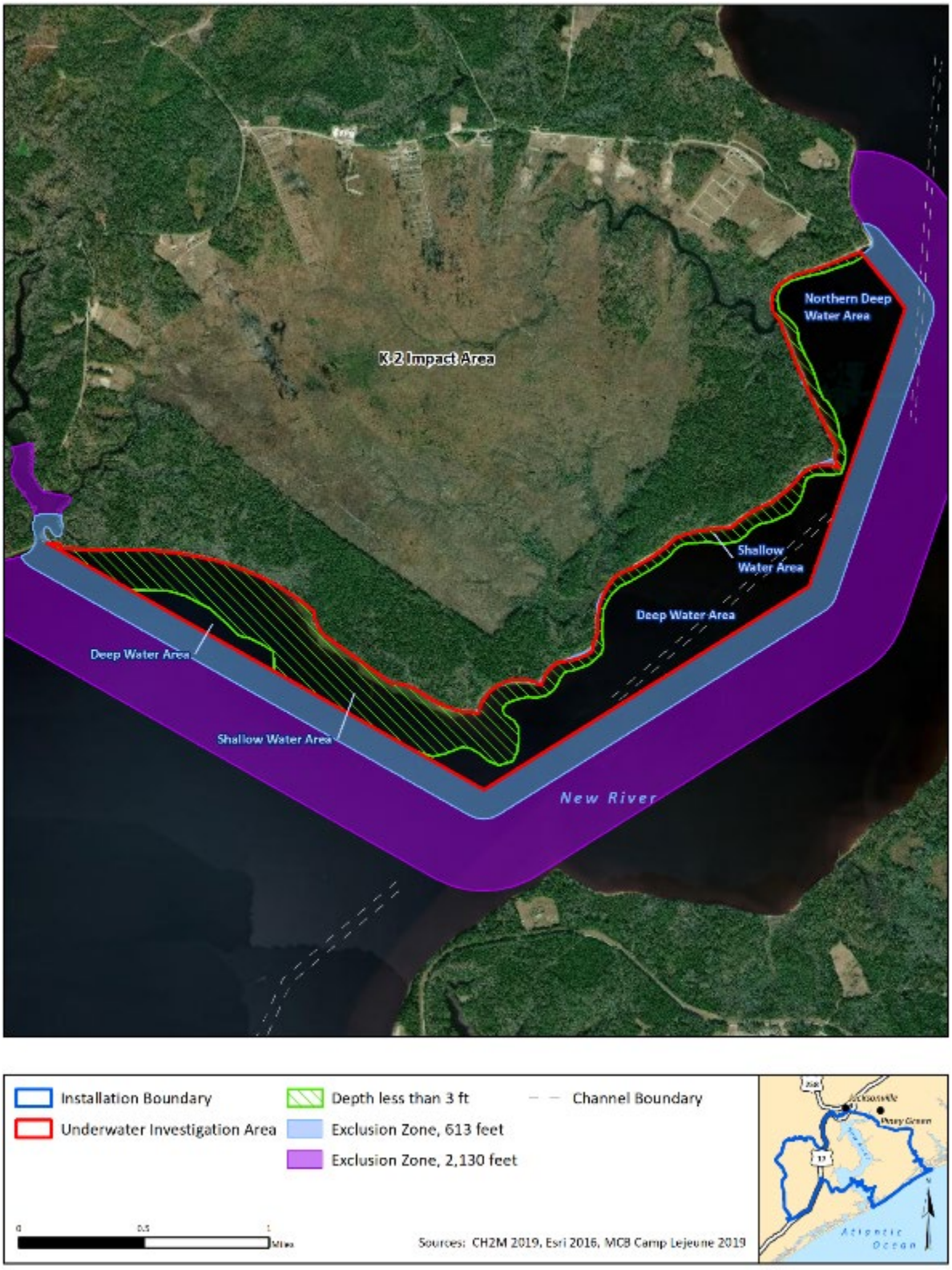


Figure 2.1-4. Exclusion Zones

2.2 Best Management Practices Included in the Proposed Action

This Section presents an overview of the BMPs that are incorporated into the Proposed Action in this document. BMPs are existing policies, practices, and measures that the Marine Corps would adopt to reduce the environmental impacts of designated activities, functions, or processes. Although BMPs mitigate potential impacts by avoiding, minimizing or reducing/eliminating impacts, BMPs are distinguished from potential mitigation measures because BMPs are (1) existing requirements for the Proposed Action, (2) ongoing, regularly occurring practices, or (3) not unique to this Proposed Action. In other words, the BMPs identified in this document are inherently part of the Proposed Action and are not potential mitigation measures proposed as a function of the National Environmental Policy Act (NEPA) environmental review process for the Proposed Action. **Table 2.1-1** includes a list of BMPs.

Table 2.2-1. Best Management Practices

BMP	Description	Impacts Reduced/Avoided
Maintain the existing warning signs.	Existing warning signs that inform the public of the potential danger in this area would continue to be maintained by MCB Camp Lejeune.	Reduce impacts to Public Safety.
Issue Notice to Mariners (NOTMARs)	NOTMARs would be issued to inform commercial and recreational users of the New River of the planned in-water activities associated with the intrusive investigations or the in-water detonations (if necessary).	Reduce impacts to Public Safety.
Work would cease upon discovery of any unmapped cultural or archaeological materials or resources.	Any work within underwater investigation area would cease upon discovery of unknown cultural resources. The MCB Camp Lejeune Cultural Resources Manager would be notified. Work would not continue without approval by MCB Camp Lejeune Cultural Resources Manager.	Reduce impacts to cultural resources.
Visual surveys for unauthorized persons.	Visual surveys of the project site would be performed to monitor for unauthorized persons during in-water activities.	Reduce impacts to public safety.
Small boat visual checks and avoidance of manatee	Base Order 5090.11A requires all personnel conducting waterborne operations to be alert for possible manatee sightings/encounters, and if a manatee is sighted, immediately slow to a no-wake speed and do not approach.	Reduce impacts to manatee.
Small boat visual checks for protected species.	Operators of small boats will be knowledgeable of marine mammals, protected species, and visual clues related to the presence of marine mammals and protected species. All members of small boat crews shall be required to take the Marine Species Awareness Training maintained and promoted by the Department of the Navy.	Reduce impacts to protected species.

Table 2.2-1. Best Management Practices (cont.)		
BMP	**Description**	**Impacts Reduced/Avoided**
Work would cease upon discovery of a marine mammal or sea turtle.	Work within the project site would cease upon discovery of a marine mammal or sea turtle as identified by observers. Work would not continue until the species moves out of the project site.	Reduce impacts to marine mammals and sea turtles
Employ sandbags and berms around any in-water detonation sites	In the event an intentional detonation would need to occur, sandbags or an earthen berm would be established around the MEC to contain the noise and debris.	Reduce impacts to protected species.

3 Action Area and Existing Conditions

The proposed project area consists of waters within the New River adjacent to the K-2 Range Impact Area and is located near the center of MCB Camp Lejeune, approximate 7 miles south of the U.S. Highway 24 bridge in Jacksonville and 4 miles north of the N.C. Highway 172 bridge over the New River in Sneads Ferry, North Carolina. The proposed project area lies along approximately 5 miles of the west bank of the New River.

The Action Area refers to the area directly or indirectly affected by the Proposed Action and within which project effects could be experienced by listed species. The Action Area for this Proposed Action encompasses the Areas of Concern and deep water areas being investigated and from which UXO could be removed as well as the surrounding exclusion zones.

The Action Area includes the 217 acre area that would be investigated for MEC/MPPEH and from which identified materials would be removed as well as a buffer area that corresponds to the various activities that are part of the proposed project (See **Figure 2.1-4** and **Tables 2.1-1 and 2.1-2**). For example, for below water investigation, the buffer area would be 2,130 feet, if in place detonation were required in one foot of water, the exclusion zone would be 1,635 corresponding to the explosive safety quantity distance for the largest munition anticipated to be encountered.

The New River is part of the Albemarle-Pamlico estuarine system. The New River is the largest water feature at MCB Camp Lejeune as it bisects the main base from its northern boundary south of Jacksonville to the southern boundary at the Atlantic Ocean. Just within the base boundary, the New River is joined by Northeast Creek and Southwest Creek to form a wide, slow-moving tidal estuary that empties into the Atlantic Ocean at Onslow Bay (Marine Corps Base Camp Lejeune [MCBCL] 2015).

The water depth within the study area ranges from less than 1 foot near the shoreline to approximately 10 feet in the deepest areas, and is impacted by two approximately 1-foot tides per day. Vegetation along the New River is largely composed of trees and shrubs. The river water is murky, with underwater visibility ranging from approximately 1 to 4 feet. Sediments in the proposed project area are generally silty in the shallow embayments/coves of the river areas where there is low water velocity. Sediments outside of the shallow embayments and coves consists predominantly of medium- to fine-grained sand (CH2M 2018).

The waters of the New River in the proposed project area are classified as Tidal Salt Water (Class SC), defined as, “all tidal salt waters protected for secondary recreation such as fishing, boating, and other activities involving minimal skin contact; fish and noncommercial shellfish consumption; aquatic life propagation and survival; and wildlife”. Waters in the proposed project area are also classified as “High Quality Water”. This supplemental classification is intended to protect waters that are rated excellent based on biological and physical/chemical characteristics. The majority of the proposed project area contains soft bottom habitat - uncovered, unvegetated sediment such as mud flats, beaches, shoals, holes and sand bars. Small areas in the proposed project areas are characterized by shell bottom habitat. The subtidal and intertidal areas within the proposed project area as well as the adjacent upland areas contain palustrine and estuarine wetlands (North Carolina Department of Environmental Quality [NCDEQ] 2019).

This page intentionally left blank.

4 Description of the Listed Species that May Be Affected by the Proposed Action

On May 14, 2019, an official species list was obtained from the USFWS (Consultation Code: 04EN2000-2019-SLI-0879). Based on a review of site conditions and existing records for the Action Area, the species listed in **Table 4.1-1** are considered to have the potential to occur. No critical habitat has been designated for these species within the Action Area or on MCB Camp Lejeune. A review of the biology, status, and management of each of the species potentially affected by the Proposed Action, is presented below.

Table 4.1-1. Threated and Endangered Species with the Potential to Occur in the Action Area

Species	Status	Potential to Occur	Jurisdiction
Mammal			
West Indian Manatee (*Trichechus manatus*)	E	Is or may be present in the waters surrounding Camp Lejeune including the Action Area, most likely in June through October.	USFWS
Birds			
Red knot (*Calidris canutus*)	T	Not known to nest in North Carolina but species is observed in small numbers throughout the year. Uses North Carolina coast, including Camp Lejeune during migration and for wintering. Forages on intertidal beach and mudflats. Roosts on beaches during migration. The Action Area provides marginal winter foraging habitat.	USFWS
Reptiles			
Green sea turtle (*Chelonia mydas*)	T	Nests on Onslow Beach. Potential for foraging, transiting through the Action Area, most likely spring through fall.	USFWS and NMFS
Loggerhead sea turtle (*Caretta caretta*)	T	Nests on Onslow Beach. Potential for foraging, transiting through the Action Area, most likely in spring through summer.	USFWS and NMFS
Leatherback sea turtle (*Dermochelys coriacea*)	E	Occurs in the waters off the coast of Camp Lejeune, but are not known to nest aboard the installation. Though they are unlikely to occur in mouths of rivers, there is small potential for foraging or transiting through the Action Area, most likely mid-April through mid-October.	USFWS and NMFS
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	E	Occurs in the waters off the coast of Camp Lejeune, but are not known to nest aboard the installation. Potential for foraging, transiting the Action Area particularly in spring and fall.	USFWS and NMFS
Hawksbill sea turtle (*Eretmochelys imbricata*)	E	Occurs rarely in the waters off the coast of Camp Lejeune, but are not known to nest aboard the installation. Low potential to occur in the Action Area.	USFWS and NMFS

Table 4.1-1. Threated and Endangered Species with the Potential to Occur in the Action Area (cont.)			
Species	**Status**	**Potential to Occur**	**Jurisdiction**
Fish			
Atlantic sturgeon (*Acipenser oxyrinchus*)	E	Unlikely to occur in the Action Area but could be present in the waters surrounding Camp Lejeune.	NMFS
Shortnose sturgeon (*Acipenser brevirostrum*)	E	Unlikely to occur in the Action Area but could be present in the waters surrounding Camp Lejeune.	NMFS

Legend: T – Threatened; E – Endangered; USFWS – US Fish and Wildlife Service; NMFS – National Marine Fisheries Service.

The American alligator (*Alligator mississippiensis*) is listed by the USFWS as threatened due to similarity of appearance to the threatened American crocodile (*Crocodylus acutus*). Federal agencies are not responsible for fulfilling the requirements of Section 7 with respect to actions that may affect species protected due to similarity of appearance. Therefore, this species is not analyzed in this BA.

No suitable habitat for red-cockaded woodpecker (*Picoides borealis*), piping plover (*Charadruis melodus*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), Northern right whale (*Balaena glacialis*), Sei whale (*Balaenoptera borealis*), sperm whale (*Physeter catodon*), rough-leaved loosestrife (*Lysimachia asperulaefolia*), seabeach amaranth (*Amaranthus pumilus*), Hirst's panic grass (*Dichanthelium hirstii*), Cooley's meadowrue (*Thalictrum cooleyi*), golden sedge (*Carex lutea*), or pondberry (*Lindera melissifolia*) occurs in the proposed project area. Therefore, these species are not analyzed in this BA.

4.1 West Indian Manatee (*Trichechus manatus*)

4.1.1 Biology

Manatees are found in marine, estuarine, and freshwater environments. The West Indian Manatee includes two distinct subspecies, the Florida manatee (*Trichechus manatus latirostris*) and the Antillean manatee (*Trichechus manatus manatus*) (USFWS 2007). Manatees have large, seal-shaped bodies with paddle-like forelimbs, no hind limbs, and a round, paddle-shaped tail. Adult manatees average nearly 10 feet long and 2,200 pounds. Manatees are herbivorous, feeding opportunistically on a wide variety of submerged, floating, and emergent vegetation. In general, manatees favor shallow grass beds immediately adjacent to deep channels, including warm freshwater areas, estuarine waters, rivers and streams, canals, bays, and lagoons. Many manatees are year-round residents of certain areas and simply congregate in warm water springs when the water gets colder in winter. The rest of the year, they are generally solitary, except for mothers with calves (USFWS 2001). Manatees feed in shallow seagrass beds and are generally found in waters between 2 and 4 meters deep (Department of Navy [DON] 2008).

In the southeastern United States, manatees occur primarily in Florida and southeastern Georgia, but individuals can range as far north as Rhode Island on the Atlantic coast, and probably as far west as Texas on the Gulf coast (USFWS 2001). West Indian manatees have been reported occasionally along the Atlantic Intracoastal Waterway, inside the barrier islands of the North Carolina coast, and on a few occasions off the beaches and nearshore banks. Manatees are occasionally sighted near the New River Inlet, with six sightings occurring in the New River and Intracoastal Waterway ,since 2008. A dead manatee was found in the New River in January 2004. They are migratory, and have typically been

recorded in North Carolina waters from June to October; however, they may sometimes overwinter (October-April) in warm water discharges from coastal power plants (DON 2003, 2008).

4.1.2 Status

The West Indian Manatee was listed as endangered throughout its range for both the Florida and Antillean subspecies in 1967 under the Endangered Species Preservation Act of 1966 (Public Law 89–669) and received federal protection with the passage of the ESA in 1973. In 2017, the West Indian Manatee was reclassified as threatened. Manatees are also protected under the Marine Mammal Protection Act.

The two primary threats to manatees are collision with watercraft and loss of warm water springs and currents. Between 1976 and 2000, collisions with watercraft accounted for an average of 24% of known manatee deaths in Florida annually; a much smaller number of deaths (4%) are attributed to water control structures and navigational locks (USFWS 2001).

4.1.3 Management

Base Order 5090.11A requires all personnel conducting waterborne operations to be alert for possible manatee sightings/encounters, and if a manatee is sighted, immediately slow to a no-wake speed and do not approach. Additionally, marine mammal protection measures employed at MCB Camp Lejeune require that operators of small boats be knowledgeable of marine mammals, protected species, and visual clues related to the presence of marine mammals and protected species. All members of small boat crews shall be required to take the Marine Species Awareness Training maintained and promoted by the DON. Upon discovery of a marine mammal by marine mammal observers, activities must cease until the marine mammal moves out of the project site.

4.2 Red Knot (*Calidris canutus*)

4.2.1 Biology

Red knots make one of the longest distance migrations known in the animal kingdom, traveling up to 19,000 miles annually, and may undertake long flights that span thousands of miles without stopping. There are six recognized subspecies of red knots, each believed to occupy separate breeding areas, in addition to having distinctive morphological traits (i.e., body size and plumage characteristics), migration routes, and annual cycles. The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States (Southeast), the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the northbound (spring) and southbound (fall) migrations, red knots use key staging and stopover areas to rest and feed and are highly dependent on the continued existence of quality habitat at a few key staging areas. In many stopover areas, quality high tide roosting habitat (i.e., close to feeding areas, protected from predators, with sufficient space during the highest tides, free from excessive human disturbance) is limited. The supratidal (above the high tide) sandy habitats of inlets provide important areas for roosting, especially at higher tides when intertidal habitats are inundated. These areas serve as stepping stones between wintering and breeding areas. Habitats used by red knots in migration and wintering areas are generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments (USFWS 2013).

In the southeastern U.S., red knots forage along sandy beaches, tidal mudflats, and peat banks during spring and fall migration from Maryland through Florida. Major spring stopover areas along the U.S. Atlantic coast include the Virginia barrier islands and Delaware Bay. The red knot eats hard-shelled mollusks, sometimes supplemented with easily accessed softer invertebrate prey. A prominent departure from typical prey items occurs each spring when red knots feed on the eggs of horseshoe crabs and *Donax* spp. clams (USFWS 2013).

4.2.2 Status

The red knot was listed as threatened by the USFWS in December 2014. The primary threats to the red knot are: habitat loss and degradation attributable to sea level rise, shoreline stabilization, and Arctic warming; and reduced food availability and asynchronies in the migration timing relative to food availability and favorable weather conditions. Secondary threats include hunting, predation, human disturbance, algal blooms, oil spills and wind energy development. In summary, as a whole, the rangewide status of the species is declining (USFWS 2013).

Current population estimates for the mid-Atlantic red knot migratory population are 44,680 stopping in Delaware Bay in 2012, and 12,611 to 14,688 stopping annually in Virginia from 2007 to 2010 (USFWS 2013). The wintering population in the southeast (Virginia, North Carolina, South Carolina, Georgia, Florida, Louisiana, Alabama, and Mississippi) from 1999 to 2002 was estimated to be approximately 11,700, with the greatest numbers occurring in Florida and Georgia. Overall, it is estimated that red knot numbers declined in the 2000's and have stabilized at a relatively low level. However, data indicate that the southeast wintering population did not decline over the same time period, likely as a result of geographic shifting of red knots from year to year within the region. Though the shoreline adjacent to the K2 range is not surveyed, red knots have been observed on Onslow Beach.

4.2.3 Management

MCB Camp Lejeune maintains the portion of Onslow Beach outside the recreational and training beaches in a natural state for the benefit of nesting shorebirds and sea turtles. This area also benefits red knots migrating through, or wintering on MCB Camp Lejeune.

4.3 Green Sea Turtle (*Chelonia mydas*)

4.3.1 Biology

The green sea turtle is distributed worldwide in tropical and subtropical waters. They generally inhabit shallow waters near reefs and in bays and inlets, and are attracted to areas with abundant sea grass and algae. Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands, Puerto Rico, Georgia, South Carolina, and North Carolina, and in larger numbers in Florida. Green sea turtles are found in deep sea locations during migration. Nesting typically occurs June through September in the southeastern U.S. Green sea turtles nest at 2, 3, or 4-year intervals; occasionally, successive year clutches may be produced. Open beaches with a sloping platform and minimal disturbance are required for nesting. Green turtles apparently have a strong nesting site fidelity and often make long distance migrations between feeding grounds and nesting beaches. Hatchlings have been observed to seek refuge and food in Sargassum rafts (USFWS 2019a).

4.3.2 Status

The majority of green sea turtles were listed as threatened in 1978 with the exception of breeding colony populations in Florida and on the Pacific Coast of Mexico that were listed as endangered (43 Code of Federal Regulation 32800). In 2016, the range of the green sea turtle was divided into eleven distinct population segments (DPS). North Carolina lies within the North Atlantic DPS, which stretches from the boundary of South and Central America north to include the Atlantic coast of the U.S. and east to Europe and Africa where it extends from 19 to 48° N latitude. This DPS is designated as threatened (USFWS 2016).

Threats include impacts to nesting beaches resulting from coastal development, coastal armoring, beachfront lighting, erosion, sand extraction, and vehicle and pedestrian traffic. Foraging habitat is affected by pollution including oil spills, agricultural and residential runoff, and sewage. Fibropapillomatosis is a chronic, often lethal disease that affects turtles throughout the range of the DPS (USFWS 2016).

The NMFS and USFWS Five Year Review of the green sea turtle (2007a) reported that most nesting on the Atlantic Coast of the U.S. occurs in Florida, with smaller numbers nesting in Georgia, South Carolina, and North Carolina. Within the Western Atlantic region, population trends at assessed nesting locations appear to be increasing or stable.

Although green sea turtles can be found year-round in North Carolina, they are most abundant from spring through fall. Nearshore estuarine waters are important for the juvenile phase of green sea turtles and adults who are foraging between nesting sessions, and these areas are abundant within the waters surrounding MCB Camp Lejeune. The occurrence of this species in the marine environments of MCB Camp Lejeune is expected to be common (DON 2008). Green sea turtles rarely nest on Onslow Beach. Since 2009, there have been 4 green sea turtle nests found on Onslow Beach, two in 2013, and one each in 2015 and 2019.

4.3.3 Management

MCB Camp Lejeune monitors approximately 7 miles of Onslow Beach each year from mid-May through August. Daily surveys are conducted for sea turtle crawls and the number and location of crawls are documented. If individual turtles are located, personnel document tag information and record size data. Night surveys are undertaken if night training is scheduled to occur during the nesting season to provide immediate protection of nests. If nests are found within the amphibious training beach they are relocated. As the nests near the end of incubation, they are checked each morning for signs of hatching, hatchling emergence, or predation. In addition, nests that are below the mean high tide line are eligible for relocation. After hatching, hatchling tracks are counted to estimate a measure of success before the completion of nest inventory. Driving on Onslow Beach is restricted to training areas only from April 1 to August 31 to coincide with the shorebird and sea turtle nesting season. Recreational driving is permitted on the beach to the inlet outside of the nesting season.

4.4 Loggerhead Sea Turtle (*Caretta caretta*)

4.4.1 Biology

Loggerheads were named for their large heads, which support powerful jaws and enable them to feed on hard-shelled prey, such as whelks and conch. In adults, the carapace (top shell) is slightly heart-

shaped and reddish-brown with a mean length of 3 feet. Adults average 250 pounds (USFWS 2019b). Loggerhead sea turtles inhabit the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. Within the continental U.S., loggerheads nest from Texas to Virginia. Major nesting concentrations in the U.S. are found on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida. Loggerheads typically nest on open beaches or along narrow bays that have suitable sand, typically between the high tide line and dune. Loggerhead sea turtles are widely distributed throughout their range, occurring in areas hundreds of miles out to sea to inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers (NMFS and USFWS 2008).

4.4.2 Status

The loggerhead sea turtle was listed as threatened throughout its range in 1978 (43 Federal Register 32800) and in 2011 the listing was revised to include nine DPS. The Northwest Atlantic population, which includes North Carolina, is listed as threatened. A recovery plan (NMFS and USFWS 2008) for this population was published in 2008, before the DPSs were established. There are many threats to the survival and recovery of loggerheads, these include loss and degradation of nesting habitat as a result of coastal development and beach armoring, hatchling disorientation from beachfront lighting, nest predation by native and non-native predators, degradation of foraging habitat; marine pollution and debris; watercraft strikes; disease; and incidental take from channel dredging and commercial trawling, longline, and gill net fisheries (NMFS and USFWS 2008).

The NMFS and USFWS Five Year Review of the Loggerhead Turtle (2007b) summarizes current status of loggerheads from peer reviewed scientific publications; unpublished field observations by the USFWS, State, and other experienced biologists; unpublished survey reports; and notes and communications form other qualified biologists. Data show that from 1989 to 2005, the Northern Nesting Subpopulation (North Carolina south to northwestern Florida) had an average of 5,151 nests per year. From 1983 to 2005, standardized ground surveys of 11 North Carolina, South Carolina, and Georgia beaches showed a significant downward trend in loggerhead nesting of 1.9% annually.

The loggerhead turtle is the most abundant sea turtle occurring in the Action Area. In Pamlico and Core Sounds loggerheads accounted for 80% of all sea turtles incidentally captured by commercial fisherman between 1988 and 1992 (Epperly et al. 1995). Loggerheads occur in inshore waters in spring and fall including estuaries and river mouths in the mid and southern Atlantic Coasts. Nesting activity along the North Carolina coast begins in the spring, peaking in June-July (DON 2003). **Table 4.4-1** contains the number of loggerhead sea turtle nests observed on Onslow Beach during summer surveys from 2010-2019.

Table 4.4-1. Loggerhead Sea Turtle Nests on Onslow Beach

Year	Loggerhead Nests
2010	46
2011	66
2012	52
2013	70
2014	50
2015	78
2016	68
2017	47
2018	21
2019	91

4.4.3 Management

MCB Camp Lejeune monitors approximately 7 miles of Onslow Beach each year from mid-May through August. Daily surveys are conducted for sea turtle crawls and the number and location of crawls are documented. If individual turtles are located, personnel document tag information and record size data. Night surveys are undertaken if night training is scheduled to occur during the nesting season to provide immediate protection of nests. If nests are found within the amphibious training beach they are relocated. As the nests near the end of incubation, they are checked each morning for signs of hatching, hatchling emergence, or predation. In addition, nests that are below the mean high tide line are eligible for relocation. After hatching, hatchling tracks are counted to estimate a measure of success before the completion of nest inventory. Driving on Onslow Beach is restricted to training areas only from April 1 to August 31 to coincide with the shorebird and sea turtle nesting season. Recreational driving is permitted on the beach to the inlet outside of the nesting season.

4.5 Leatherback Sea Turtle (*Dermochelys coriacea*)

4.5.1 Biology

The leatherback is the largest, deepest diving, and most migratory and wide ranging of all sea turtles. The adult leatherback can reach 4 to 8 feet in length and 500 to 2,000 pounds in weight. Its shell is composed of a mosaic of small bones covered by firm, rubbery skin with seven longitudinal ridges or keels (USFWS 2019c). The leatherback turtle is distributed circumglobally in tropical, subtropical, and warm-temperate waters throughout the year and into cooler temperate waters during warmer months. Leatherbacks are essentially oceanic, entering into coastal waters for foraging and reproduction. There is limited information available regarding the habitats utilized by post-hatchling and early juvenile leatherbacks as those age classes are entirely oceanic. Their prey items consist of soft-bodied organisms such as jellyfish, as they lack the strong jaws necessary to process hard-shelled prey (NMFS and USFWS 1992).

4.5.2 Status

Leatherbacks were listed as endangered in 1970, and remained listed with the passing of the ESA of 1972. Several documents have been prepared to address concern over this species, including a recovery plan for the U.S. Caribbean, Atlantic, and Gulf of Mexico populations (NMFS and USFWS 1992) and most recently a 5-year review (NMFS and USFWS 2013). Critical habitat was designated in 1979 for this species at a nesting location and surrounding waters in St. Croix, U.S. Virgin Islands. No critical habitat has been designated for the continental East Coast of the U.S.

Population status is difficult to determine for leatherbacks; many females nest on different beaches rather than returning to the same beach repeatedly. Population trends in the Atlantic (with the exception of the Western Caribbean and West Africa) overall are stable or increasing as indicated by nesting data (NMFS and USFWS 2013). Threats to the marine phase of this species include incidental capture in fishing gear, and in many places outside of the U.S., directed harvest.

The Leatherback Sea Turtle is often found in close proximity to North Carolina during the spring and summer, but can be found rarely throughout the year off the coast. Available sighting, stranding, bycatch, tagging, and nesting data demonstrate the pattern of north to south nearshore migration from winter to summer and seasonal occurrence is highly variable (DON 2003). They generally appear close to shore in Onslow Bay during their northward migration in spring. Leatherbacks occur in North Carolina in the highest numbers from mid-April to mid-October (Keinath et al., 1996). No leatherback nesting has been documented at MCB Camp Lejeune or in the vicinity though leatherback nesting in North Carolina has occurred sporadically including 1998, 2000 and 2002 at Cape Lookout and Cape Hatteras (Rabon et al., 2003) and in 2009, 2010, 2012 and 2018 at Cape Hatteras, Cape Lookout, Bald Head Island, Holden Beach, Carolina Beach and Fort Fischer State Recreation Area, all north of the New River Inlet (NCWRC 2019). Leatherbacks infrequently enter inshore waters, and are not expected to occur in the downstream portions and mouths of the major rivers (Epperly et al. 1995).

4.5.3 Management

Though the species has not nested on MCB Camp Lejeune since monitoring began in 1979, management actions in place to protect other species of nesting sea turtles as well as shorebirds (see **Sections 4.1.3** and **4.2.3**) would provide protection were nesting to occur in the future.

4.6 Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

4.6.1 Biology

The Kemp's ridley turtle is the smallest of the sea turtles, with adults reaching about 2 feet in length and weighing up to 100 pounds. The adult Kemp's ridley has an oval carapace that is almost as wide as it is long and is usually olive-gray in color. This turtle is a shallow water benthic feeder with a diet consisting primarily of crabs (USFWS 2019d).

Kemp's ridleys inhabit the Gulf of Mexico and Northwest Atlantic Ocean, as far north as the Grand Banks and Nova Scotia. Kemp's ridley nesting is essentially limited to the beaches of the western Gulf of Mexico, primarily in Tamaulipas, Mexico. In the United States, nesting occurs primarily in Texas and occasionally in Florida, Alabama, Georgia, South Carolina, and North Carolina. Kemp's ridleys tend to nest in large aggregations, or arribadas, which can be comprised of thousands of individuals (NMFS and USFWS 2015).

Kemp's ridley turtles move from open-ocean and Sargassum habitats of the North Atlantic Ocean as post-hatchlings to benthic, nearshore feeding grounds along the U.S. Atlantic and Gulf coasts as large juveniles and adults where they frequent sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters where its preferred food, the blue crab (*Callinectes sapidus*), is known to exist. Coastal bays and estuaries along the U.S. Atlantic Coast including the North Carolina sounds are important developmental habitats. Kemp's ridleys utilize Pamlico and Core Sounds, in particular, as summer developmental habitat (DON 2008).

4.6.2 Status

The Kemp's Ridley Sea Turtle was listed as endangered in 1978. Several documents have been prepared to address concern over this species, including a recovery plan and update in 1992 and one in development beginning in 2010 and status reviews most recently in 2007 and 2015. Virtually all nesting activity takes place in Mexico. Population trends reveal a dramatic decrease in arribada size, indicating lower nesting activity. In 1947 an arribada with 40,000 Kemp's ridleys was documented. The Kemp's ridley population experienced a rapid and significant decline between the late 1940s and the mid-1980s. The largest arribadas recorded from 1966 to 1968 ranged from approximately 1,500 to 5,000 turtles. This dramatic decline resulted from intensive egg collection, killing of nesting females, and bycatch and drowning in the shrimp fleets of the U.S. and Mexico. With intensive conservation actions, the Kemp's ridley began to slowly rebound during the 1990s. The number of nests at the nesting beach at Rancho Nuevo increased to 1,430 in 1995, 6,947 in 2005, and in excess of 16,000 in 2011 and 2012 (NMFS and USFWS 2015).

Since the Kemp's ridley turtle is often restricted to waters less than 50 m deep, it is known to occur in the inshore and estuarine waters off North Carolina study area during warm months. During winter months, it is not expected in and around the major river mouths. In spring Kemp's ridleys begin to move into North Carolina's sounds and in summer, they move further north to forage in Chesapeake and Cape Cod Bay and Long Island Sound. In waters further inshore, occurrence is low or unknown in spring and summer. In fall, as water temperatures drop, distribution is similar to spring (DON 2003). In general, Kemp's ridleys account for only 5% of all sea turtle occurrences in Pamlico and Core Sounds in North Carolina (Epperly et al. 1995). Kemp's ridleys have been known to nest in North Carolina, but such an activity is extremely rare and they are not known to nest at MCB Camp Lejeune. Past fisheries bycatch records for the Bogue Inlet area indicate that only 12% of the turtles caught are Kemp's ridleys (Epperly et al., 1995). This species may occur, but with relatively low frequency, in the nearshore waters surrounding MCB Camp Lejeune (DON 2008).

4.6.3 Management

Though the species has not nested on MCB Camp Lejeune since monitoring began in 1979, management actions in place to protect other species of nesting sea turtles as well as shorebirds (see **Sections 4.1.3** and **4.2.3**) would provide protection were nesting to occur in the future.

4.7 Hawksbill Sea Turtle (*Eretmochelys imbricata*)

4.7.1 Biology

The federally endangered hawksbill sea turtle is named for its elongated head that tapers to a point. The head shape is well-suited for feeding on prey that is found in tight spaces; hawksbills are known to reach into crevices of coral reefs to retrieve sponges and other invertebrate prey organisms. Similar to other

sea turtles, this species uses different habitats throughout its ontogeny. Post-hatchlings are thought to occupy the pelagic environment, and some drift in mats of algae in the genus Sargassum. Recruitment to coastal areas occurs after several years, where feeding takes place in the benthic environment. Adults are known to reside primarily in or near coral reef habitats. Hawksbills are found circumtropically, including the Atlantic, Pacific, and Indian Oceans and associated water bodies. Hawksbills are highly migratory, and females nest on sandy beaches surrounding islands or mainland coasts in the tropics or subtropics. Females display high site fidelity for nesting with a return to breed at or near their natal beaches (NMFS and USFWS 2007c). In U.S. territories, hawksbills are known to nest in Puerto Rico and U.S. Virgin Islands, and the southeast coast of Florida and the Florida Keys are documented areas for small nesting groups. Worldwide, the largest known nesting populations occur along the northwest coast of Australia.

4.7.2 Status

Hawksbills were listed as endangered in 1970, and remained listed with the passing of the ESA of 1972. Critical habitat was designated in 1998 for this species in coastal waters surrounding two islands in Puerto Rico. Similar to other sea turtle species, population trends are evaluated based on nesting data. As hawksbills only nest in the tropics and subtropics, abundance estimates for central and northern U.S. Atlantic coastal states are limited, and sightings in these areas are rare. Overall population trends based on nesting data indicate decreasing populations for the majority of nesting populations for which data are available (NMFS and USFWS 2007c). Threats include the loss of coral reef habitat, incidental capture in fishing gear, and in many places outside of the U.S., directed harvest. Legal and illegal directed harvest is common for this species over a large part of its geographic range.

Hawksbills do not nest in the Action Area and their occurrence north of Florida is extremely rare, but they may transit North Carolina waters seasonally. This species is not expected to occur with any regularity near MCB Camp Lejeune (NMFS 2019; NMFS and USFWS 2007c). There are rare reports in North Carolina of hawksbills stranded or incidentally captured in fishing gear. In 2015, a single hawksbill laid two nests on southern Hatteras Island N.C. These nests were the furthest north reproductive activity ever documented for hawksbills in the Northern Hemisphere (North Carolina Wildlife Resources Commission 2015a). The occurrence of hawksbill turtles in the nearshore waters of the mid-Atlantic is low or unknown for all seasons. Hawksbill turtles are not expected to occur in the inshore waters of North Carolina during any season, as their preferred habitats (coral reefs and mangroves) are not at all present in these areas (DON 2003).

4.7.3 Management

Though the species has not nested on MCB Camp Lejeune since monitoring began in 1979, management actions in place to protect other species of nesting sea turtles as well as shorebirds (see **Sections 4.1.3** and **4.2.3**) would provide protection were nesting to occur in the future.

4.8 Atlantic Sturgeon (*Acipenser oxyrinchus*)

The New River is one of several coastal rivers that were excluded from Atlantic sturgeon critical habitat designation (NMFS 2017b). There is no information, current or historic, of spawning Atlantic sturgeon utilizing the Chowan and New Rivers in North Carolina (NMFS 2017b). These rivers are short, coastal plains rivers that most likely do not contain suitable habitat for Atlantic sturgeon. Nevertheless, adult Atlantic sturgeon may transit the area.

4.8.1 Biology

The Atlantic sturgeon is a long-lived (approximately 60 years) anadromous fish, spawning in freshwater but spending most of their subadult and adult life in the marine environment (Atlantic Sturgeon Status Review Team 2007; Dadswell 2006; Greene et al. 2009). Atlantic sturgeon are bluish-black or olive brown dorsally (on their back) with paler sides, a white belly, and have five major rows of "scutes" (bony plates in the skin) and can grow to approximately 14 feet long and can weigh up to 800 pounds. Spawning intervals range from one to five years for male Atlantic sturgeon (Collins et al. 2000; Sulak and Clugston 1998) and three to five years for females (Schueller and Peterson 2010; Stevenson and Secor 2000). Spawning timing is variable among DPS and among particular locations, occurring from spring to early autumn (Balazik et al. 2012; Hager et al. 2014). Sturgeon eggs are adhesive and usually deposited on hard surfaces in freshwater streams (Sulak and Clugston 1998). Juvenile Atlantic sturgeon move downstream into brackish waters, and remain residents of their natal estuaries for two to six years. Subadults emigrate to coastal waters or to other estuaries seasonally (Ingram and Peterson 2016; Waldman et al. 2013). Tagging and genetic data indicate that adult Atlantic sturgeon undertake long marine migrations and utilize habitats up and down the East Coast for rearing, feeding, and migrating (Bain 1997; Watterson 2015; Wirgin et al. 2015). Migratory subadults and adults are normally located in shallow (10-50 meters) nearshore areas dominated by gravel and sand substrate (Stein et al. 2004). Atlantic sturgeon feed on mollusks, polychaeta worms, gastropods, shrimps, pea crabs, decapods, amphipods, isopods, and small fishes in the marine environment (Greene et al. 2009; Guilbard et al. 2007). Despite extensive mixing in coastal waters, Atlantic sturgeon display high site fidelity to their natal streams.

4.8.2 Status

Five DPSs of Atlantic sturgeon were listed under the ESA in 2012 (NMFS 2012). The Gulf of Maine DPS is listed as threatened while the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs are listed as endangered. The listings are based on low population sizes and the level of continuing threats such as degraded water quality, habitat impacts from dredging and damming, fisheries bycatch, ship strikes, low dissolved oxygen, and inadequacy of regulatory mechanisms in ameliorating these impacts and threats (Atlantic Sturgeon Status Review Team 2007). The sturgeon fishery collapsed in 1901 but a two generation moratorium on the fishery was only placed in 1998 (Atlantic States Marine Fisheries Commission 1998). The majority of the populations show no signs of recovery (Atlantic Sturgeon Status Review Team 2007). The largest remaining adult Atlantic sturgeon populations are currently found in the Hudson (3,000), Altamaha (1,325), Delaware (1,305), Kennebec (865), Savannah (745), and James Rivers (705) (Hale et al. 2016; NMFS 2017a; Peterson et al. 2000; Schueller and Peterson 2010). There is a relatively high probability that abundance of the Carolina DPS has increased since the implementation of the 1998 fishing moratorium (Atlantic States Marine Fisheries Commission 2017). None of the spawning populations are currently large or stable enough to provide any level of certainty for continued existence of any of the DPSs.

The Carolina DPS includes seven extant populations from the Santee-Cooper River to the Albemarle Sound, and is less than three percent of its historical population size (Atlantic Sturgeon Status Review Team 2007). There is no information, current or historic, of spawning Atlantic sturgeon utilizing the Chowan and New Rivers in North Carolina. These rivers are short, coastal plains rivers that most likely do not contain suitable habitat for Atlantic sturgeon. Telemetry and tagging studies remain active in North and South Carolina, providing a relatively robust capacity to detect Atlantic sturgeon transiting waters of

MCB Camp Lejeune or the New River (NMFS 2013, 2014; North Carolina Wildlife Resources Commission 2015b; South Carolina Department of Natural Resources 2015).

4.8.3 Management

Though the species has never been recorded in waters of MCB Camp Lejeune or the New River, any incidental sightings would be reported through the installation's Threatened & Endangered species monitoring programs (MCBCL 2015). Management actions in place to protect other estuarine species could incidentally benefit Atlantic sturgeon if they were to occur in the future.

4.9 Shortnose Sturgeon (*Acipenser brevirostrum*)

The New River is one of several coastal Carolina rivers that have no documented captures of shortnose sturgeon, and do not contain suitable habitat features to support spawning. The Neuse River, nearest to the north of New River, also has no documented captures of shortnose sturgeon. The Cape Fear River, nearest to the south of New River, has no documented captures since 1997 and rare captures in prior decades (Shortnose Sturgeon Status Review Team 2010). Telemetry and tagging studies remain active in North and South Carolina, and they provide no evidence that shortnose sturgeon would occupy or transit waters of MCB Camp Lejeune or the New River (NMFS 2013, 2014; North Carolina Wildlife Resources Commission 2015b; South Carolina Department of Natural Resources 2015).

4.9.1 Biology

The federally endangered shortnose sturgeon is the smallest of three sturgeon species that occur along the East Coast of North America, with a maximum recorded total length of 4.7 feet and a maximum recorded age of 67 years. Shortnose sturgeon have been documented overwintering in both freshwater and marine habitats, although occurrence in the marine environment is less common. This species requires free access to upstream river environments for spawning, and an unhindered return to foraging habitat, which is located at the interface of fresh tidal water and saline estuaries. Eutrophic rivers (nutrient pollution) seem unsuitable for shortnose sturgeon; and the Neuse, New, and Cape Fear rivers all are classified as eutrophic (Shortnose Sturgeon Status Review Team 2010). Shortnose sturgeon are benthic feeders; juveniles feed on benthic insects and crustaceans and adults feed on large benthic mollusks and crustaceans (Shortnose Sturgeon Status Review Team 2010). Historical distribution of shortnose sturgeon is in major rivers along the Atlantic seaboard, with the northern limit near the St. John River in Canada, and the southern limit near the Indian River in central Florida (National Marine Fisheries Service 2015).

In the southern portion of its range (south of the Chesapeake), shortnose sturgeon is amphidromous because their life history includes migration to upstream portions of rivers for spawning and return to estuarine portions of rivers post-spawning. Tagging studies indicate that shortnose sturgeon remain in their natal river or the natal river estuary (NMFS 1998), and there is no evidence that populations in adjacent river systems interbreed (Shortnose Sturgeon Status Review Team 2010). Therefore, there is no reason to assume that adult shortnose sturgeon would enter or transit the New River.

4.9.2 Status

The shortnose sturgeon was listed as an endangered species in 1967, and remained listed with the passing of the ESA of 1972. A recovery plan was completed for shortnose sturgeon in hopes to delist and recover populations depleted by habitat loss, fishing, and incidental fisheries bycatch (NMFS 1998).

Currently, 19 populations of shortnose sturgeon have been identified throughout their known distribution, and the Cape Fear River is the only one in North Carolina. Most viable populations occur north of Cape Hatteras, North Carolina, and the only viable population to the south is in the Altamaha River in Georgia. Population dynamics information is scant due to the small numbers of individuals (National Marine Fisheries Service 1998; Shortnose Sturgeon Status Review Team 2010). Damming of rivers was particularly harmful to this species, because dams blocked access to historic spawning habitat, and dams remain an impediment to recovery. The major additional threat to the species today is habitat alterations from coastal development.

It is possible but highly unlikely that a shortnose sturgeon would occupy or transit the river, estuarine, or nearshore waters of MCB Camp Lejeune or the New River. There is no recent evidence of their occurrence in or near waters of MCB Camp Lejeune or the New River despite longstanding efforts to document the species (Shortnose Sturgeon Status Review Team 2010; U.S. Department of the Navy 2003). The nearest known shortnose sturgeon was the Cape Fear River population, about 50 miles to the south, and has no documented captures since 1997 (National Marine Fisheries Service 1998; Shortnose Sturgeon Status Review Team 2010). Telemetry and tagging studies remain active in North and South Carolina, and they provide no evidence that shortnose sturgeon would occupy or transit waters of MCB Camp Lejeune or the New River (NMFS 2013, 2014; North Carolina Wildlife Resources Commission 2015b; South Carolina Department of Natural Resources 2015).

4.9.3 Management

Though the species has never been recorded in waters of MCB Camp Lejeune or the New River, they are included in the installation's Threatened & Endangered species monitoring programs (MCBCL 2015); and management actions in place to protect other estuarine species could incidentally benefit shortnose sturgeon if they were to occur in the future.

This page intentionally left blank.

5 Analysis of Effects

5.1 Manatee

West Indian manatees are occasionally observed in MCB Camp Lejeune's water ranges, particularly near the New River Inlet and off nearby beaches. Sightings in North Carolina have increased over the years, although they remain uncommon. Manatees have been reported occasionally along the Atlantic Intracoastal Waterway, inside the barrier islands of the North Carolina coast and, on a few occasions, off the beaches and nearshore banks (DON 2003). Yet, sightings are so infrequent that there are no published density estimates for the North Carolina coast.

It is possible that impacts to manatees could result from:

- impacts with the boat conducting underwater digital geophysical mapping and transiting to and from the survey areas; and
- noise disturbance from any required in-water detonations of UXO.

The Proposed Action would utilize a one to three small to medium sized boat to map and identify anomalies in approximately 120 acres of deep water (generally between 3 and 10 feet). Manatees are slow swimmers and collisions with boats and propeller injuries have been documented as a primary cause for mortality. However, manatees are commonly found in high boat traffic areas (Laist and Shaw, 2006). Commercial and recreational boating are common in the Action Area so the addition of boats in relatively shallow nearshore waters in the Action Area is not expected to add appreciably to the likelihood of collision.

It is possible that UXO could be discovered that cannot safely be removed to the land range to be destroyed and, in such cases, in-water detonation would be required. Though in previous investigative work, which included the removal of UXO, no in-water detonation was required, if manatees were to occur in the vicinity of a detonation, they may be disturbed and temporarily leave the area.

BMPs listed in **Section 2.2** would further reduce the likelihood of impacts resulting from the proposed activities to marine mammals including the manatee:

- Base Order 5090.11A requires all personnel conducting waterborne operations to be alert for possible manatee sightings/encounters, and if a manatee is sighted, immediately slow to a no-wake speed and do not approach.
- Operators of small boats will be knowledgeable of marine mammals, protected species, and visual clues related to the presence of marine mammals and protected species. All members of small boat crews shall be required to take the Marine Species Awareness Training maintained and promoted by the DON. An exclusion zone would be established around any activities. See **Tables 2.1-1 and 2.1-2** for the sizes of exclusion zones for each activity.
- Work within the project site would cease upon discovery of a marine mammal as identified by marine mammal observers. Work would not continue until the marine mammal moves out of the project site.

Because of its infrequent occurrence in the Action Area, the low probability of an in-water detonation of UXO, the temporary use of a small to medium sized boats in waters less than 10 feet deep, and the

BMPs that would be employed, the activities associated with the Proposed Action **may affect, but are not likely to adversely affect**, the West Indian Manatee.

5.2 Red Knot

Potential disturbances to red knots foraging in the Action Area during winter migration could result from exposure to noise from detonation of UXO or from in-water activities in shallow waters adjacent to mudflats and shorelines where the species could forage. These impacts, however, are unlikely to occur because the Action Area represents marginal foraging habitat, the activities are unlikely to occur during the time of year knots could be present, and because of the low probability of UXO detonation. Therefore, the proposed action **may affect, but is not likely to adversely affect**, the red knot.

5.3 Sea Turtles

Potential disturbances to sea turtles are similar for the five species that may occur in the Action Area, thus sources of potential impacts are analyzed for all five sea turtle species. The likelihood of impacts differs with the relative abundance of the species in the area, with loggerhead sea turtles expected to occur most commonly and hawksbill sea turtle occurrence being extremely rare and unlikely to occur in the Action Area. If present in the area during the proposed activities, all species could collide with the boat conducting underwater investigation as it transits to and from the project area or could be disturbed by noise from the boat or from in-water detonation of UXO that could not be safely removed from the area. These impacts however, are unlikely to occur because of the short time the investigations would take place (13 months), the low probability of an in-water detonation of UXO, the BMPs (including the presence of trained observers on the boat) that would be employed and because the project area offers little habitat to these species. Because of these factors, activities associated with the Proposed Action **may affect, but are not likely to adversely affect**, the green, loggerhead, leatherback, Kemp's ridley and hawksbill sea turtles.

5.4 Fish

Neither the Atlantic or shortnose sturgeon are likely to be present in the Action Area. Because of lack of evidence of occurrence of these species and the low probability of an in-water detonation of UXO, the activities associated with the Proposed Action **may affect, but are not likely to adversely affect**, the Atlantic and shortnose sturgeon.

6 Determination

In accordance with Section 7(c) of the ESA, MCB Camp Lejeune has analyzed the effects of implementing the Proposed Action, the identification and removal of UXO in the waters adjacent to the K2 Range, on federally listed species within the Action Area (See **Table 6.1-1**).

Based on a lack of habitat in the Action Area, a finding of "no effect" is made for the red-cockaded woodpecker, piping plover, fin whale, humpback whale, Northern right whale, Sei whale, sperm whale, rough-leaved loosestrife, seabeach amaranth, Hirst's panic grass, Cooley's meadowrue, golden sedge, and pondberry.

Based on the evaluation presented above, the Marine Corps has made the following determination of effects on listed species and critical habitat from implementation of the Proposed Action within the Action Area.

Table 6.1-1. Effects on Listed Species and Critical Habitat

Species	Status	Effects Determination
Mammal		
West Indian Manatee (*Trichechus manatus*)	E	May affect, not likely to adversely affect
Bird		
Red knot (*Calidris canutus*)	T	May affect, not likely to adversely affect
Reptiles		
Green sea turtle (*Chelonia mydas*)	T	May affect, not likely to adversely affect
Loggerhead sea turtle (*Caretta caretta*)	T	May affect, not likely to adversely affect
Leatherback sea turtle (*Dermochelys coriacea*)	E	May affect, not likely to adversely affect
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	E	May affect, not likely to adversely affect
Hawksbill sea turtle (*Eretmochelys imbricata*)	E	May affect, not likely to adversely affect
Fish		
Atlantic sturgeon (*Acipenser oxyrinchus*)	E	May affect, not likely to adversely affect
Shortnose sturgeon (*Acipenser brevirostrum*)	E	May affect, not likely to adversely affect

This page intentionally left blank.

7 References

Atlantic States Marine Fisheries Commission (ASMFC) 1998. Amendment 1 to the Interstate Fishery Management Plan for Atlantic Sturgeon. (pp. 59).

Atlantic Sturgeon Status Review Team 2017. Atlantic Sturgeon Benchmark Stock Assessment and Peer Review Report. (pp. 456) Atlantic Sturgeon Management Board.

Atlantic Sturgeon Status Review Team 2007. Status Review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus). (Vol. Updated with corrections on July 27, 2007, pp. 174). Gloucester, MA: National Marine Fisheries Service, Northeast Regional Office. Available from https://www.greateratlantic.fisheries.noaa.gov/protected/atlsturgeon/docs/AtlSturgeonStatusReviewReport.pdf

Bain, M. B. 1997. Atlantic and shortnose sturgeons of the Hudson River: common and divergent life history attributes Environmental Biology of Fishes, 48, 347-358. Springer. Retrieved from https://doi.org/10.1023/A:1007325814893.

Balazik, M. T., Garman, G. C., Van Eenennaam, J. P., Mohler, J. & Woods, L. C. 2012. Empirical Evidence of Fall Spawning by Atlantic Sturgeon in the James River, Virginia. Transactions of the American Fisheries Society, 141(6), 1465-1471. 10.1080/00028487.2012.703157

CH2M 2015a. Underwater MEC Investigation of the New River within the K-2 Impact Area. November.

CH2M 2015b. K-2 Impact Area Underwater MEC Investigation of New River Work Plan. February.

CH2M 2018. Alternatives Analysis Report K-2 Range Impact Area of the New River. Final. March.

Collins, M. R., Rogers, S. G., Smith, T. I. J. & Moser, M. L. 2000. Primary factors affecting sturgeon populations in the southeastern United States: fishing mortality and degradation of essential habitats. Bulletin of Marine Science, 66(3), 917-928. Retrieved from https://www.ingentaconnect.com/content/umrsmas/bullmar/2000/00000066/00000003/art00028

Dadswell, M. J. 2006. A Review of the Status of Atlantic Sturgeon in Canada, with Comparisons to Populations in the United States and Europe. Fisheries, 31(5), 218-229. 10.1577/1548-8446(2006)31 Retrieved from https://doi.org/10.1577/1548-8446(2006)31[218:AROTSO]2.0.CO;2

Department of Defense Explosives Safety Board 2004. Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel. Department of Defense Explosive Safety Board (DDESB) Technical Bulletin 18. December.

Department of the Navy (DON) 2003. Marine Resource Assessment for the Cherry Point and Southern Virginia Capes (VACAPES) Inshore and Estuarine Areas. Final Report. Naval Facilities Engineering Command, Norfolk, VA.

DON 2008. Marine Resources Assessment for the Cherry Point Operating Area. Final Report. October 2008. Prepared for the Department of the Navy.

Epperly, S.P., J. Braun, and Veishlow, A. 1995. Sea turtles in North Carolina waters. *Conservation Biology* 9:384-394.

Greene, K. E., Zimmerman, J. L., Laney, R. W. and Thomas-Blate, J. C. 2009. Chapter 8 Atlantic Sturgeon Atlantic States Marine Fisheries Commission Atlantic Coast Diadromous Fish Habitat: A Review of Utilization, Threats, Recommendations for Conservation, and Research Needs (pp. 195-254). Washington, D.C: Atlantic States Marine Fisheries Commission.

Guilbard, F., Munro, J., Dumont, P., Hatin, D. and Fortin, R. 2007. Feeding Ecology of Atlantic Sturgeon and Lake Sturgeon Co-Occurring in the St. Lawrence Estuarine Transition Zone, American Fisheries Society Symposium (Vol. 56, pp. 85-104): American Fisheries Society.

Hager, C., Kahn, J., Watterson, C., Russo, J. and Hartman, K. 2014. Evidence of Atlantic Sturgeon Spawning in the York River System. Transactions of the American Fisheries Society, 143(5), 1217-1219. 10.1080/00028487.2014.925971 Retrieved from https://doi.org/10.1080/00028487.2014.925971

Hale, E. A., Park, I. A., Fisher, M. T., Wong, R. A., Stangl, M. J. and Clark, J. H. 2016. Abundance Estimate for and Habitat Use by Early Juvenile Atlantic Sturgeon within the Delaware River Estuary. Transactions of the American Fisheries Society, 145(6), 1193-1201. 10.1080/00028487.2016.1214177

Ingram, E. C. & Peterson, D. L. 2016. Annual Spawning Migrations of Adult Atlantic Sturgeon in the Altamaha River, Georgia. Marine and Coastal Fisheries, 8(1), 595-606. 10.1080/19425120.2016.1243599 Retrieved from https://doi.org/10.1080/19425120.2016.1243599

Keinath, J.A., J.A. Musick, and Barnard, D.E. 1996. Abundance and distribution of sea turtles off North Carolina. *OCS Study MMS* 95-0024. Prepared by the Virginia Institute of Marine Science, College of William and Mary. US Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, Louisiana.

D.W. Laist and C. Shaw. 2006. Preliminary evidence that boat speed restrictions reduce deaths of Florida manatees. Marine Mammal Science 22(2): 472–479.l

Marine Corps Base Camp Lejeune (MCBCL). 2015. 2015-2020 Integrated Natural Resources Management Plan Marine Corps Base Camp Lejeune, North Carolina. Prepared for Mid-Atlantic Division, Naval Facilities Engineering Command. July 2015.

National Marine Fisheries Service (NMFS) 1998. Final Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). (pp. 104). Silver Spring, MD. Prepared by Shortnose Sturgeon Recovery Team. Prepared for National Marine Fisheries Service

NMFS 2012. Endangered and Threatened Wildlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser* oxyrinchus oxyrinchus) in the Southeast. Federal Register, 77(24), 70. Retrieved from https://www.govinfo.gov/content/pkg/FR-2012-02-06/pdf/2012-1950.pdf

NMFS 2013. Incidental Take Permit to Georgia Department of Natural Resources for Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Federal Register. Retrieved from https://www.fisheries.noaa.gov/action/incidental-take-permit-georgia-department-natural-resources

NMFS 2014. Incidental Take Permit to North Carolina Department of Marine Fisheries (NCDMF) Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Federal Register, 79(44), 43716-43717. Retrieved from https://www.federalregister.gov/d/2014-17645

NMFS 2015. Endangered and Threatened Wildlife; 12-Month Finding on a Petition To Identify and Delist a Saint John River Distinct Population Segment of Shortnose Sturgeon Under the Endangered Species Act. Federal Register, 80(286), 65183-65194. Retrieved from https://www.federalregister.gov/d/2015-27148

NMFS 2017a. Designation of Critical Habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay Distinct Population Segments of Atlantic Sturgeon. (pp. 244) Greater Atlantic Regional Fisheries Office. Available from https://www.greateratlantic.fisheries.noaa.gov/regs/2017/August/17criticalhabitatdpssatlanticsturgeonfria.pdf

NMFS 2017b. Endangered and Threatened Species; Designation of Critical Habitat for the Endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments of Atlantic Sturgeon and the Threatened Gulf of Maine Distinct Population Segment of Atlantic Sturgeon. Federal Register, 82(158), 39160-39274. Retrieved from https://www.federalregister.gov/d/2017-17207

NMFS 2019. Programmatic Biological Opinion on the Towing of Inactive U.S. Navy Ships from their Existing Berths to Dismantling Facilities or other Inactive Ship Sites. (pp. 318). Prepared by O. o. P. R. National Marine Fisheries Service, ,. doi.org/10.25923/sw62-zf21. Available from https://repository.library.noaa.gov/view/noaa/19786

NMFS and U. S. Fish and Wildlife Service (USFWS) 1992. Recovery Plan for Leatherback Turtles (*Dermochelys coriacea*) in the US Caribbean, Atlantic, and Gulf of Mexico.

NMFS and USFWS 2007a. Green sea turtle (*Chelonia mydas*) 5-year review: summary and evaluation. NMFS Office of Protected Resources, Silverspring, MD and USFWS Southeast Region.

NMFS and USFWS 2007b. Loggerhead sea turtle (*Caretta caretta*) 5-year review: summary and evaluation. NMFS Office of Protected Resources, Silverspring, MD and USFWS Southeast Region.

NMFS and USFWS. August 2007c. Hawksbill sea turtle (*Eretmochelys imbricate*) 5-year review: summary and evaluation. NMFS Office of Protected Resources, Silverspring, MD and USFWS Southeast Region.

NMFS and USFWS 2008. Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (*Caretta caretta*). December 2008.

NMFs and USFWS 2013. Leatherback Sea Turtle (*Dermochelys coriacea*) 5-year Review Summary and Evaluation. November 2013.

NMFS and USFWS 2015. Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) 5-year review: summary and evaluation. July 2015.

North Carolina Department of Environmental Quality 2019. Division of Marine Fisheries Habitat Descriptions. Retrieved from http://portal.ncdenr.org/web/mf/home

North Carolina Wildlife Resources Commission (NCWRC) 2015a. Hawksbill Sea Turtle Nests Confirmed on North Carolina Beach. Wildlife Diversity Program Quarterly Update, 9(4), 13. Retrieved from https://www.ncwildlife.org/Portals/0/Conserving/documents/2015-WDP-Fourth-Qtr-Report..pdf

NCWRC 2015b. North Carolina Wildlife Action Plan. (pp. 890). Raleigh, NC. Available from https://www.ncwildlife.org/Portals/0/Conserving/documents/2015WildlifeActionPlan/NC-WAP-2015-Ch1-Ch-8.pdf

NCWRC 2019. Sea Turtle Monitoring System. Retrieved from: http://www.seaturtle.org/nestdb/?view=1

Peterson, D. L., Bain, M. B. & Haley, N. 2000. Evidence of Declining Recruitment of Atlantic Sturgeon in the Hudson River. North American Journal of Fisheries Management, 20(1), 231-238. 10.1577/1548-8675(2000)020<0231:EODROA>2.0.CO;2 Retrieved from https://doi.org/10.1577/1548-8675(2000)020<0231:EODROA>2.0.CO;2

Rabon, D.R., S.A. Johnson, . Boettcher, M. Dodd, M. Lyons, S. Murtphy, S. Ramsey, S. Roff, and K. Stewart. Confirmed Leatherback Turtle (Dermochelys coriacea) Nests from NorthCarolina, with a Summary of Leatherback Nesting Activities North of Florida. Marine Turtle Newsletter No. 101, 2003

Schueller, P. & Peterson, D. L. 2010 Abundance and Recruitment of Juvenile Atlantic Sturgeon in the Altamaha River, Georgia. Transactions of the American Fisheries Society, 139(5), 1526-1535. 10.1577/T09-127.1 Retrieved from https://doi.org/10.1577/T09-127.1

Shortnose Sturgeon Status Review Team 2010. A Biological Assessment of shortnose sturgeon (*Acipenser brevirostrum*) Report to National Marine Fisheries Service, Northeast Regional Office. (pp. 417).

South Carolina Department of Natural Resources 2015. State Wildlife Action Plan - Main Document State Wildlife Action Plan. Columbia, SC. Available from http://www.dnr.sc.gov/swap/

Stein, A. B., Friedland, K. D. & Sutherland, M. 2004. Atlantic Sturgeon Marine Distribution and Habitat Use along the Northeastern Coast of the United States. Transactions of the American Fisheries Society, 133(3), 527-537. 10.1577/T02-151.1 Retrieved from https://doi.org/10.1577/T02-151.1

Stevenson, J. T. & Secor, D. H. 2000. Age determination and growth of Hudson River Atlantic sturgeon, Acipenser oxyrinchus. Fishery Bulletin, 98(1), 153-166. Retrieved from https://spo.nmfs.noaa.gov/content/age-determination-and-growth-hudson-river-atlantic-sturgeon-acipenser-oxyrinchus

Sulak, K. J. & Clugston, J. P. 1998. Early Life History Stages of Gulf Sturgeon in the Suwannee River, Florida. Transactions of the American Fisheries Society, 127(5), 758-771. 10.1577/1548-8659. Retrieved from https://afspubs.onlinelibrary.wiley.com/doi/abs/10.1577/1548-8659%281998%29127%3C0758%3AELHSOG%3E2.0.CO%3B2

USFWS 2001. Florida Manatee Recovery Plan (*Trichechus manatus latirostris*). October 2001.

USFWS 2007. West Indian Manatee (*Trichechus manatus*) 5-Year review: summary and evaluation.

USFWS 2013. Proposed threatened status for the Rufa Red Knot (*Calidris canutus rufa*). Federal Register 78:60023-60098.

USFWS 2016. Endangered and Threatened Wildlife and Plants; Final Rule To List Eleven Distinct Population Segments of the Green Sea Turtle (*Chelonia mydas*) as Endangered or Threatened and Revision of Current Listings Under the Endangered Species Act. 81 Federal Register 20057.

USFWS 2019a. Species Profile for Green Sea Turtle (*Chelonia mydas*). https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C00S. Accessed May 9, 2019.

USFWS 2019b. Species Profile for Loggerhead Sea Turtle (*Caretta caretta*). https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=1110. Accessed May 9, 2019.

USFWS 2019c. Species Profile for Leatherback Sea Turtle (*Dermochels coriacea*). https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C00F. Accessed May 9, 2019.

USFWS 2019d. Species Profile for Kemp's Ridley Sea Turtle (*Lepidochelys kempii*). https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C00O. Accessed May 9, 2019.

Waldman, J. R., King, T., Savoy, T., Maceda, L., Grunwald, C. & Wirgin, I. 2013. Stock Origins of Subadult and Adult Atlantic Sturgeon, Acipenser oxyrinchus, in a Non-natal Estuary, Long Island Sound. [journal article]. Estuaries and Coasts, 36(2), 257-267. 10.1007/s12237-012-9573-0 Retrieved from https://doi.org/10.1007/s12237-012-9573-0

Watterson, C. J. 2015. Navy Sponsored Research Uncovers the Mystery of Atlantic Sturgeon. Endangered Species Bulletin(Fall), 2. Retrieved from www.fws.gov/endangered/news/bulletin.html

Wirgin, I., Maceda, L., Grunwald, C. & King, T. L. 2015. Population origin of Atlantic sturgeon Acipenser oxyrinchus oxyrinchus bycatch in U.S. Atlantic coast fisheries. Journal of fish biology, 86(4), 1251-1270. 10.1111/jfb.12631 Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/25727098

This page intentionally left blank.

8 List of Preparers

Stephen Anderson
B.A., Environmental Science
Years of Experience: 11

Dana Banwart, AICP
B.S. Biology
Years of Experience: 21

Elizabeth Burak
M.S. Biology
Year of Experience: 22

Matthew Lybolt, PhD
PhD Marine Ecology
Years of Experience: 20

Michael Harrison
M.S. Environmental Science
B.S. Biology
Years of Experience: 19

Sharon Simpson
A.S., Science
Years of Experience: 16

This page intentionally left blank.

Appendix D
Incidental Harassment Authorization

This page intentionally left blank.

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090.11.1
G-F/BEMD
DEC 0 4 2019

Jolie Harrison, Division Chief
Permits and Conservation Division,
Office of Protected Resources,
1315 East-West Highway, F/PR1 Room 13805,
Silver Spring, MD 20910

SUBJECT: REQUEST FOR INCIDENTAL TAKE AUTHORIZATION FOR UNEXPLODED ORDNANCE REMOVAL FROM WATER ADJACENT TO THE K-2 IMPACT AREA AT MARINE CORPS BASE CAMP LEJEUNE, ONSLOW COUNTY, NORTH CAROLINA

Dear Ms. Harrison:

Please find enclosed the subject request for an incidental take authorization under section 101(a)(5) of the Marine Mammal Protection Act of 1972, as amended, for the take of marine mammals incidental to reducing the risk of unexploded ordnance located in the waters of the New River adjacent to the K-2 Impact Area at Marine Corps Base Camp Lejeune, North Carolina by the United States Marine Corps (USMC).

The USMC plans to reduce the volume of known munitions and explosives of concern/material potentially presenting an explosive hazard in the New River. These USMC activities have the potential to cause Level B harassment of marine mammals; therefore, we are submitting enclosure (1) for your review and consideration.

We look forward to working with you and your staff. Please direct any questions you may have to Mr. Craig Ten Brink at (910)451-7228 or craig.tenbrink@usmc.mil.

Sincerely,

JOHN R. TOWNSON
Director, Environmental Management
By direction of the
Commanding General

Enclosure: Request for Incidental Harassment Authorization

Request for Incidental Harassment Authorization for Marine Mammals Resulting from Unexploded Ordnance Removal from Waters Adjacent to the K-2 Impact Area Marine Corps Base Camp Lejeune, North Carolina

Submitted to:

Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, Maryland 20910-3226

November 2019

This page intentionally left blank.

EXECUTIVE SUMMARY

The United States Marine Corps has prepared this Incidental Harassment Authorization application for the potential incidental take of marine mammals from reducing the risk of unexploded ordnance located in the waters of the New River adjacent to the K-2 Impact Area at Marine Corps Base Camp Lejeune, North Carolina.

Noise disturbances associated with the proposed activities have the potential to affect marine mammals within the waterways adjacent to the Proposed Action, which could result in harassment under the Marine Mammal Protection Act of 1972, as amended.

The following seven marine mammal species, under the jurisdiction of the National Marine Fisheries Service, have a reasonable potential to occur within the waters surrounding Marine Corps Base Camp Lejeune and the Proposed Action activities: North Atlantic right whale (*Eubalaena glacialis*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), Sei whale (*Balaenoptera borealis*), sperm whale (*Physeter macrocephalus*), Atlantic spotted dolphin (*Stenella frontalis*), and common bottlenose dolphin (*Tursiops truncates*). These species are included in the analysis of this application based on the potential for exposure to Level B behavioral harassment from noise associated with the explosive mine neutralization activities.

In addition, the West Indian manatee (*Trichechus manatus*) has a reasonable potential to occur and is addressed separately through consultation with the U.S. Fish and Wildlife Service.

The purpose of the Proposed Action is to reduce the volume of munitions and explosives of concern/material potentially presenting an explosive hazard in the New River adjacent to the K-2 Impact Area that could potentially be unexploded ordnance. The need for the Proposed Action is to reduce the potential risks to public safety, marine species, and the environment. The Proposed Action would include investigating the Areas of Concern (177 acres) and an additional 40 acres of deep water outside of the Areas of Concern. The Proposed Action would have an approximate duration of 13 months.

The United States Marine Corps used the thresholds and criteria for assessing potential exposures to marine mammals resulting from acoustic and explosive stressors described in the United States Department of the Navy's *Request for Regulations and Letters of Authorization for the Incidental Taking of Marine Mammals Resulting from the United States Navy Training and Testing Activities in the Atlantic Fleet Training and Testing Study Area* (U.S. Department of the Navy, 2017a). Additional information on the quantitative analysis used in this document is provided in the technical report titled *Quantitative Analysis for Estimating Acoustic and Explosive Impacts to Marine Mammals and Sea Turtles* (U.S. Department of the Navy, 2017b). Potential exposures are described in Section 6 and summarized in Table ES-1.

Level A harassments associated with potential in-water detonation of no more than 5 unexploded ordnance will be avoided for all marine mammals by implementing mitigation measures described in Section 11. Mitigation measures will include: operators of small boats during underwater investigations will be knowledgeable of marine mammals, protected species, and visual clues related to the presence of marine mammals and protected species. All members of small boat crews will be required to take the Marine Species Awareness Training maintained and promoted by the United States Department of the Navy, and work within the underwater investigation area would cease upon discovery of a marine mammal as identified by marine mammal observers. Work would not continue until the marine

mammal moves out of the mitigation zones. Conservative assumptions (including marine mammal group size) used to estimate the exposures are likely to overestimate the potential number of exposures.

Pursuant to Marine Mammal Protection Act Section 101(a)(5)(A), the United States Marine Corps submits this application to National Marine Fisheries Service for the authorization of incidental, but not intentional, taking of individuals of two marine mammal species during project activities. All taking is expected to have a negligible impact on populations of these species. In addition, the taking will not have an adverse impact on the availability of these species for subsistence use.

Regulations governing the issuance of incidental take under certain circumstances are codified at 50 Code of Federal Regulations Part 216, Subpart I (Sections 216.101–216.108). Section 216.104 sets forth 14 specific items that must be addressed in requests for take pursuant to Section 101 (a)(5)(A) of the Marine Mammal Protection Act. These 14 items are addressed in Sections 1 through 14 of this Incidental Harassment Authorization application.

Table ES-1. Potential Exposures to Marine Mammals Resulting from the Project's Acoustic and Explosive Stressors

Species	***Stock***	***Level B Harassment***	***Level A Harassment***
North Atlantic right whale	*Western*	0	0
Fin whale	*Western North Atlantic*	0	0
Humpback whale	*Gulf of Maine*	0	0
Sei whale	*Nova Scotia*	0	0
Sperm whale	*North Atlantic*	0	0
Atlantic spotted dolphin	*Western North Atlantic*	25	0
Bottlenose dolphin	*Northern North Carolina Estuarine System*	40	0
	Southern North Carolina Estuarine System		

TABLE OF CONTENTS

List of Tables

List of Figures

Abbreviations and Acronyms

Acronym	Definition
BA	Biological Assessment
BMP	best management practice
CFR	Code of Federal Regulations
dB	decibel
dB re 1 µPa	decibels referenced at 1 micropascal
DDESB	Department of Defense Explosives Safety Board
DPS	Distinct Population Segment
EA	Environmental Assessment
ESCA	Endangered Species Conservation Act
ESA	Endangered Species Act
FR	Federal Register
IHA	Incidental Harassment Authorization
MCB	Marine Corps Base
MEC	munitions and explosives of concern
MPPEH	material potentially presenting an explosive hazard
USMC	United States Marine Corps
Navy	U.S. Department of the Navy
NMFS	National Marine Fisheries Service
PTS	permanent threshold shift
SEL	sound exposure level
SPL	sound pressure level
TNT	trinitrotoluene
TTS	temporary threshold shift
U.S.C.	United States Code
UXO	unexploded ordnance

1 INTRODUCTION AND DESCRIPTION OF ACTIVITIES

A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.

1.1 Introduction

The United States Marine Corps (USMC) has prepared this incidental harassment authorization (IHA) of marine mammals during activities for reducing the public safety risk of historical potential unexploded ordnance (UXO) located in the waters of the New River adjacent to the K-2 Impact Area at Marine Corps Base (MCB) Camp Lejeune (Figure 1-1).

Under the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 United States Code [U.S.C.] Section 1371(a)(5)(D)), the USMC is requesting an Incidental Harassment Authorization (IHA) for project activities that are expected to result in the unintentional take of marine mammals. Sections 1 through 14 of this application cover the 14 specific items required for this application, as set out by 50 Code of Federal Regulations (CFR) 216.104 Submission of Requests.

In-water activities of the Proposed Action would potentially begin on November 1, 2020 and would require 13 months to complete. The USMC will notifiy NMFS of any changes to project dates. Dates and durations are described in Section 2.

The USMC used the thresholds and criteria for assessing potential exposures to marine mammals resulting from acoustic and explosive stressors described in the U.S. Department of the Navy (Navy) *Request for Regulations and Letters of Authorization for the Incidental Taking of Marine Mammals Resulting from the United States Navy Training and Testing Activities in the Atlantic Fleet Training and Testing Study Area* (U.S. Department of the Navy, 2017a). Additional information on the quantitative analysis used in this document is provided in the technical report titled *Quantitative Analysis for Estimating Acoustic and Explosive Impacts to Marine Mammals and Sea Turtles* (U.S. Department of the Navy, 2017b). Sound exposure criteria and thresholds are described in Section 6.5.

This IHA was developed concurrently with a National Environmental Policy Act Environmental Assessment (EA) (U.S. Marine Corps Base Camp Lejeune, 2019a) and Endangered Species Act (ESA) Biological Assessment (BA) (U.S. Marine Corps Base Camp Lejeune, 2019b), which provide additional detail on the project. Standard operating procedures, best management practices (BMPs), avoidance and minimization measures, mitigation and conservation measures, and environmental commitments that protect marine mammals in the EA and BA are also incorporated by reference in the IHA. Mitigation measures are described in Section 11.

1.2 Description of Activities

The Proposed Action is to reduce the public safety risk associated with UXO in approximately 750 acres of the New River from historical range operations at MCB Camp Lejeune, North Carolina. The potentially affected waters adjacent to the K-2 Impact Area total approximately 750 acres of the New River that includes shallow (less than 3 feet) and deep water areas (up to 10 feet). Three Areas of Concern near the shoreline (65 acres, 17 acres, and 94.6 acres in size [177 acres total]) have been identified where a higher density of munitions and explosives of concern (MEC) and material potentially presenting an explosive hazard (MPPEH) were identified during previous surveys (CH2M, 2015a; 2015b; 2018) (Figure 1-2). These high density areas indicate potential historical target areas.

The project would include investigating the Areas of Concern (177 acres) and an additional 40 acres of deep water outside of the Areas of Concern (Figure 1-2). The Proposed Action would have an approximate duration of 13 months.

The project would meet the purpose and need using the following screening factors:

- Protection of human health and the environment
- Reduction of explosive risk by reducing the potential MEC/MPPEH volume
- Anticipated state and community acceptance of the alternative
- Anticipated implementation cost

In addition to the screening factors, the Proposed Action was proposed in terms of the relative explosive risk that would remain following implementation. Based on the natural and physical conditions of the New River and the information gathered during the extensive investigations of the waters adjacent to the K-2 Impact Area, there is no way to completely eliminate the explosive risk associated with potential UXO in this area of the New River.

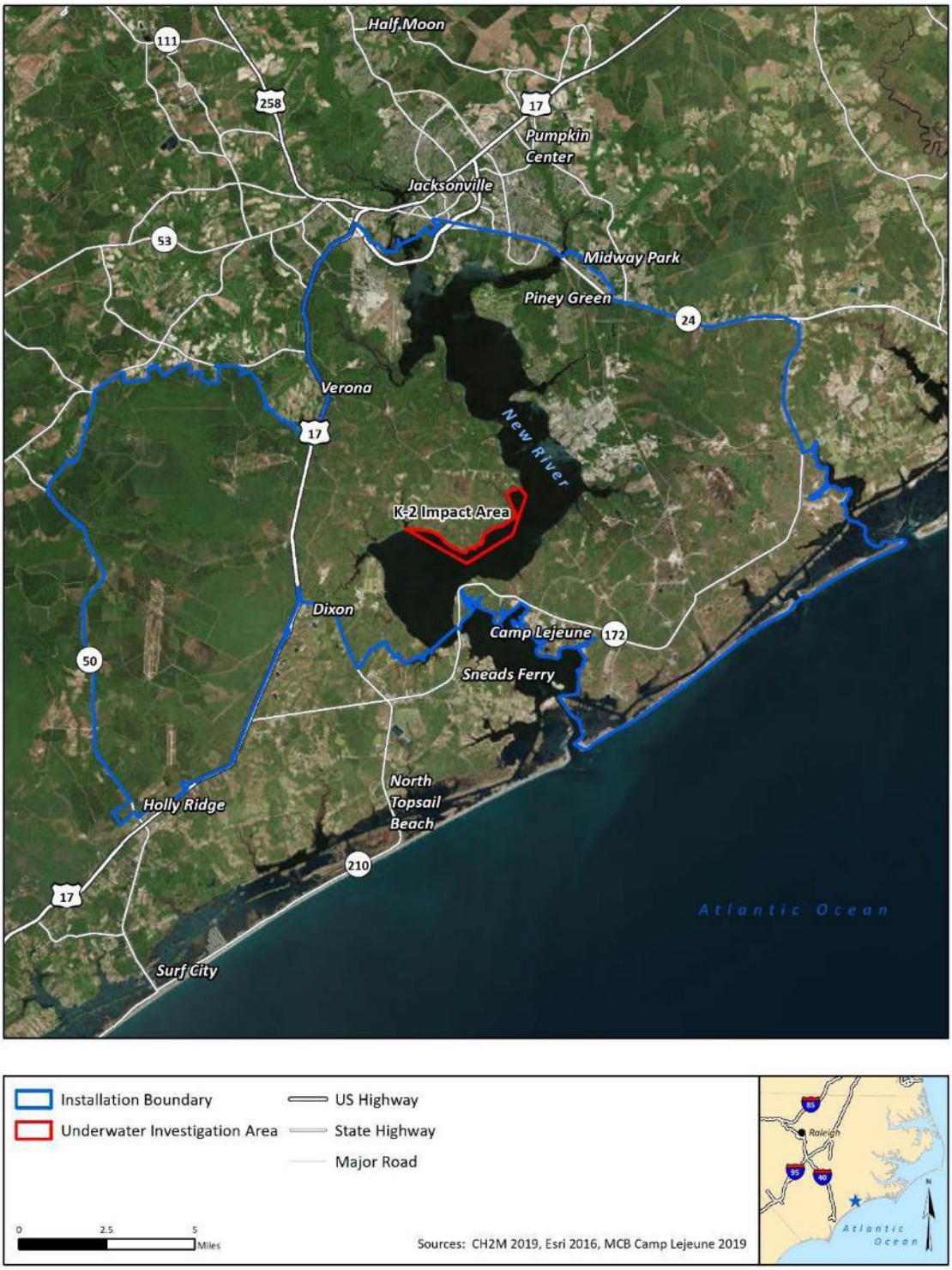


Figure 1-1. K-2 Impact Area at MCB Camp Lejeune

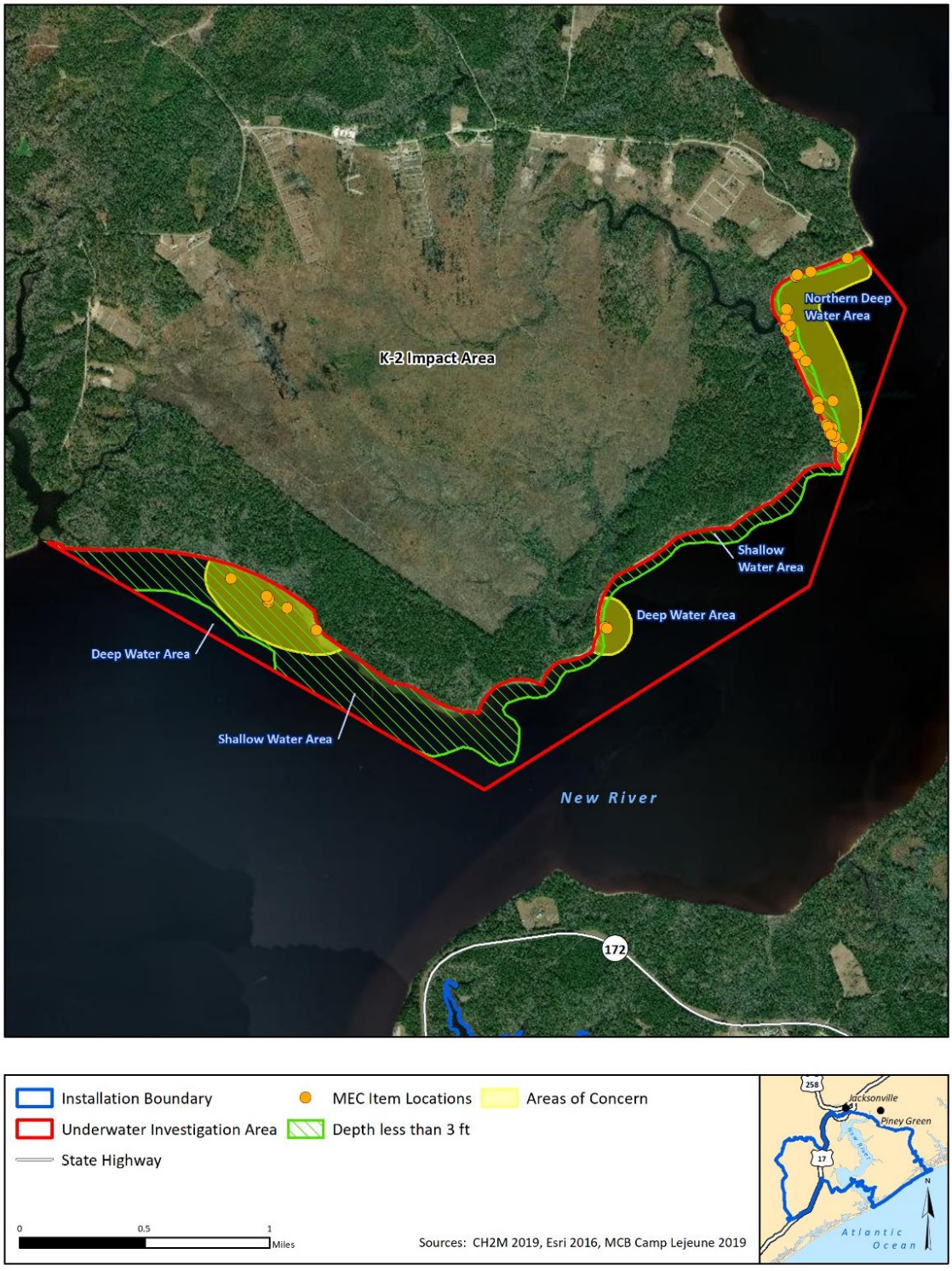


Figure 1-2. Areas of Concern within K-2 Impact Area

1.2.1 Investigate Areas of Concern

The Proposed Action includes investigating 100 percent of the Areas of Concern within waters adjacent to the K-2 Impact Area (approximately 177 acres). The Areas of Concern have the highest density of potential MEC/MPPEH and are thought to contain the historical target areas of the K-2 Range. The three Areas of Concern contain both shallow water areas (approximately 94 acres) and deep water areas (approximately 83 acres). This investigation would include the anomalies identified by aerial geophysical surveys but not selected for investigation during the 2014/2015 investigation (CH2M, 2015a). Anomalies would be identified using surface water digital geophysical mapping (shallow waters) and underwater digital geophysical mapping (deep waters). The location of the anomaly would be flagged with either polyvinyl chloride tubing or a buoy with an attached weight. The digital geophysical mapping would take approximately 2.5 months to complete.

Shallow Water: Shallow water digital geophysical mapping uses a high-sensitivity, high-resolution metal detector that can detect both ferrous and non-ferrous metal. The system can be pushed or pulled as a trailer, by a person or vehicle, such as an all-terrain vehicle (Figure 1-3).

Figure 1-3. Shallow Water Digital Geophysical Mapping (Photo credit: 3DGeophysics.com)

Deep Water: A small to medium-sized boat using an underwater magnetometer to map geophysical anomalies is used to perform underwater digital geophysical mapping. The towed underwater digital geophysical mapping array consists of a 13-foot-wide sensor that is designed to operate in 2 to 50 feet of water and in proximity to, but without contacting, the bottom (Figure 1-4).

Figure 1-4. Deep Water Digital Geophysical Mapping (Photo credit: 3DGeophysics.com)

Anomalies within the Areas of Concern would be intrusively investigated using reacquisition and hand-digging techniques. Intrusive investigation would be done by a UXO-qualified dive team in accordance with Department of Defense Explosives Safety Board Technical Publication 18, *Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel* (Department of Defense Explosives Safety Board [DDESB], 2004). Intrusive investigation of the Areas of Concern is expected to take approximately 6.5 months to complete.

Any anomalies determined to be MEC/MPPEH during the intrusive investigation would be removed from the water and taken to the upland area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal in accordance with existing standard operating procedures. Because the items found in the water are associated with historical K-2 Range activities, relocating potential MEC/MPPEH to the upland area of the K-2 Range would be in compliance with the Environmental Protection Agency's Military Munitions Rule, and a Resource Conservation and Recovery Act permit would not be required. Detonation in the upland portion of the range has been evaluated in previous National Environmental Policy Act analyses and will not be addressed in this EA (U.S. Marine Corps Base Camp Lejeune, 2009).

1.2.2 Investigate Portion of Deep Water Outside the Areas of Concern

The Proposed Action would include investigating a portion of the deep water areas adjacent to the K-2 Impact Area outside of the Areas of Concern to better characterize the extent of potential MEC/MPPEH within these areas. A combination of underwater digital geophysical mapping, side-scan sonar, and bathymetric surveys would be performed along transects to cover approximately 10 percent of the deep water area outside of the Areas of Concern (approximately 40 acres) to evaluate the extent of MEC within the waters adjacent to the K-2 Impact Area. Underwater digital geophysical mapping would occur in the deep waters along transects. In conjunction with mapping, side-scan sonar surveys would be employed to produce a high-resolution image of the sea floor.

Anomalies identified along the transects would be intrusively investigated using reacquisition and hand-digging techniques. Any anomalies determined to be MEC/MPPEH during the intrusive investigation would be removed from the water and taken to the land area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal. The investigation in the deep water area would take approximately 3 months.

1.2.3 In-Water Detonation of MEC

There may be situations in which the diver cannot safely relocate the MEC to the K-2 Range after exposing it in the riverbed. In those situations, the MEC would have to be detonated in place. Although in-water detonation was not required during any of the intrusive investigations of previous surveys (CH2M, 2015a; 2015b) and is considered unlikely to occur, the possibility exists so it is included in the Proposed Action. It is anticipated that no more than five MEC would require in-water detonation throughout the intrusive investigation. The detonations would occur one at a time throughout the duration of intrusive investigations. This represents a conservative estimate of approximately 1 percent of the anomalies identified during the 2014/2015 investigations. For analysis purposes, it is assumed the most explosive ordnance discovered in waters adjacent to the K-2 Impact Area, the 155-millimeter projectile, would be detonated in the water.

The 155-millimeter ordnance identified within the waters adjacent to the K-2 Impact Area is assumed to be the M101 and/or the M107 155-millimeter high explosive-loaded projectiles, fired from a gun or howitzer, respectively. The artillery fuse used on these projectiles was the point-detonating fuse. This is the most commonly used fuse on high explosive-loaded projectiles. These projectiles contain 14.6 pounds of trinitrotoluene (TNT) and have an assumed casualty radius on land of approximately 164 feet and a hazardous fragment distance of 389 feet (CH2M, 2015a). The hazardous fragment distance was obtained from DDESB publications and is for surface detonations without engineering controls to reduce the fragmentation (such as burial). The explosive safety quantity distance would be used to establish an exclusion zone for public and non-essential personnel during in-water detonations. This distance would vary depending on the depth of the water where the detonation would occur (Table 1-1).

Table 1-1. Explosive Safety Quantity Distance for In-Water Detonations

Ordnance	*Depth of Water (feet)*	*Explosive Safety Quantity Distance (feet)*
155=millimeter M107	1	1,635
	5	355
	10	157

Source: CH2M, 2015b

Explosives detonated underwater would introduce loud, impulsive, broadband sounds into the marine environment. Three factors influence the sound effect of an explosive: the weight of the explosive material, the type of explosive material, and the detonation depth. The net explosive weight (the weight of the TNT required to produce an equivalent explosive power) accounts for the first two parameters and, in this case, is estimated to be 14.6 pounds. The water depth adjacent to the K-2 Impact Area ranges from less than 1 foot near the shoreline to approximately 10 feet. In the event an intentional detonation would need to occur, sandbags or an earthen berm would be established around the MEC to

contain the noise and debris. The exclusion zone would be surveyed for the presence of marine mammals prior to a detonation and would not occur until the zone was free of marine mammals.

1.2.4 Establish Exclusion Zone

A temporary exclusion zone would be established during intrusive investigation activities to ensure the safety of the public as well as UXO technicians/divers. The exclusion zone is an explosive safety quantity distance established to protect personnel and the public from an unintentional detonation during intrusive investigation activities (Table 1-2). The exclusion zone would be temporary and established as a radius around the area being investigated. Because the exclusion zone could be established at an investigation site anywhere within the underwater investigation area, Figure 1-5 illustrates the maximum distance for an exclusion zone of either distance. An exclusion zone would also be established during the unlikely need for an intentional in-water detonation and would vary depending on the depth of the water where the detonation would occur. The exclusion zone would be monitored by a chase boat. Access to the exclusion zone by unauthorized personnel would result in ceasing all operations until the zone is cleared.

Table 1-2. Exclusion Zones

Activity	*Explosive Safety Quantity Distance*
Intrusive Investigation, Above the Water	613 feet
Intrusive Investigation, Below the Water	2,130 feet
Intentional In-Water Detonation	See Table 2.4-1

Source: Adapted from CH2M, 2015b

1.3 Best Management Practices, Mitigation, and Minimization Measures

Section 11 describes the general BMPs, mitigation, and minimization measures that may be implemented for marine mammal protection. BMPs are routinely used by the USMC and Navy during training and testing activities to avoid and minimize potential environmental impacts. Additional minimization measures have been added to protect marine mammals, ESA-listed species, and designated critical habitats. These measures include marine mammal monitoring mitigation zones set at 1,500 feet and 3,000 feet, respectively, as described in Section 11 (Figure 1-6). These mitigation zones extend beyond the injury ranges for marine mammals potentially present near the activity area.

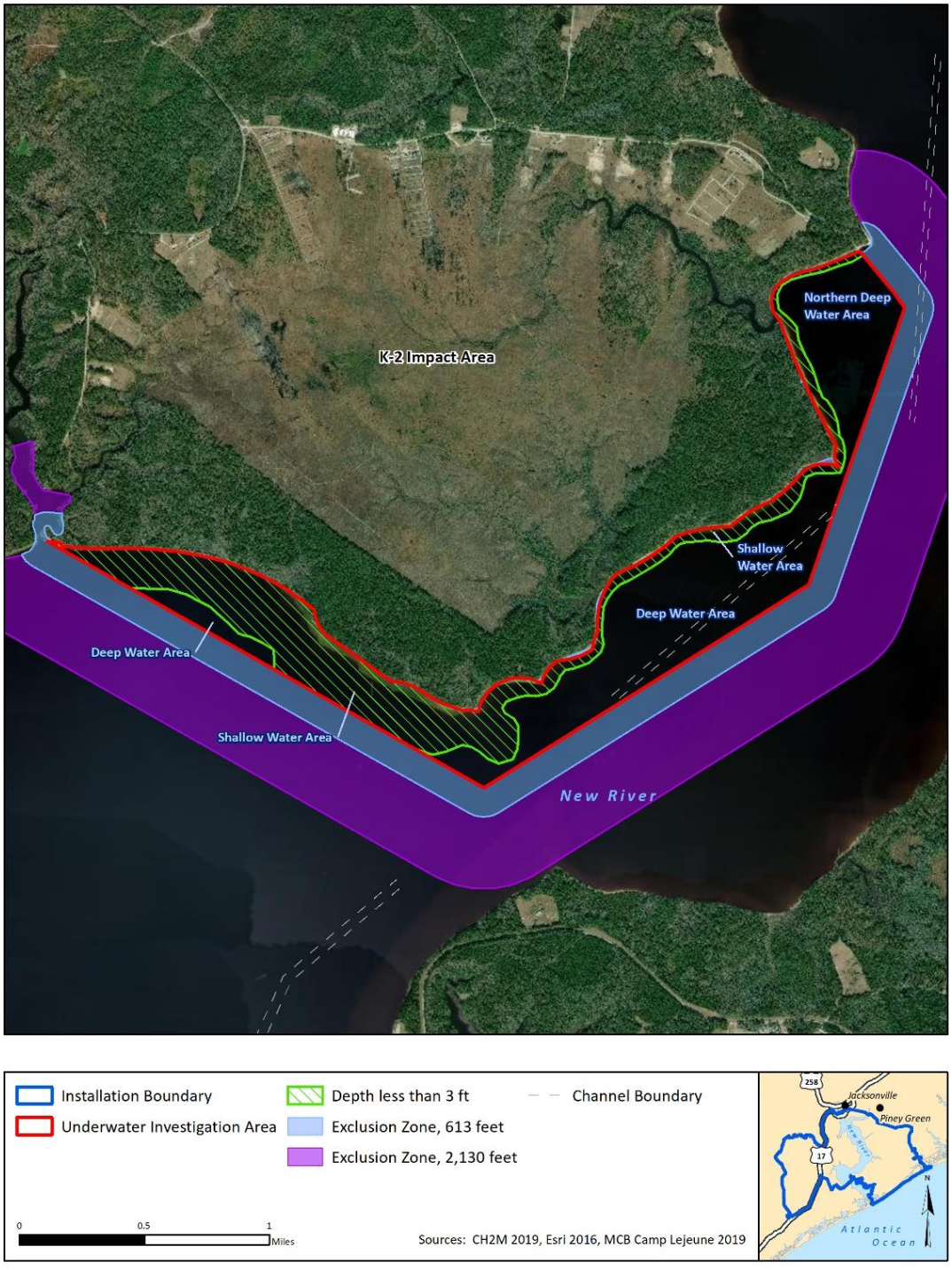


Figure 1-5. Proposed Exclusion Zones

Figure 1-6. Proposed Mitigation Zones

2 DATES, DURATION, AND LOCATION OF ACTIVITIES

The dates and duration of such activity and the specific geographical region where it will occur.

2.1 Dates and Duration of Activities

No in-water work would begin until the USMC has received all required permits and approvals. In-water work is tentatively planned for November 1, 2020 to October 31, 2021. The USMC will update NMFS immediately of any changes to the dates or duration of activities.

2.2 Geographic Region of Activities

The project is located outside the installation boundary of MCB Camp Lejeune in waters adjacent to the K-2 Range Impact Area within the New River (see Figure 1-1 and Figure 2-1). The New River is a tidal estuary that flows out to through the Atlantic Intracoastal Waterway and into Onslow Bay and the Atlantic Ocean.

2.3 Project Location

MCB Camp Lejeune is the largest MCB on the east coast. Its ranges, training areas, and airspace provide a safe and realistic training environment to ensure military personnel are ready to defend the nation. In addition to the Marine Corps and Navy, many other services and agencies train at the MCB Camp Lejeune Range Complex: Army, Air Force, Coast Guard, foreign military services, state wildlife resource officers, and law enforcement personnel from federal, state, and local agencies.

The perimeter of the underwater investigation area is currently where UXO are potentially present in the waters adjacent to the K-2 Impact Area in the New River. The perimeter is posted with signs cautioning against bottom-disturbing activities due to the potential hazard; however, the area is currently open to commercial or recreational users.

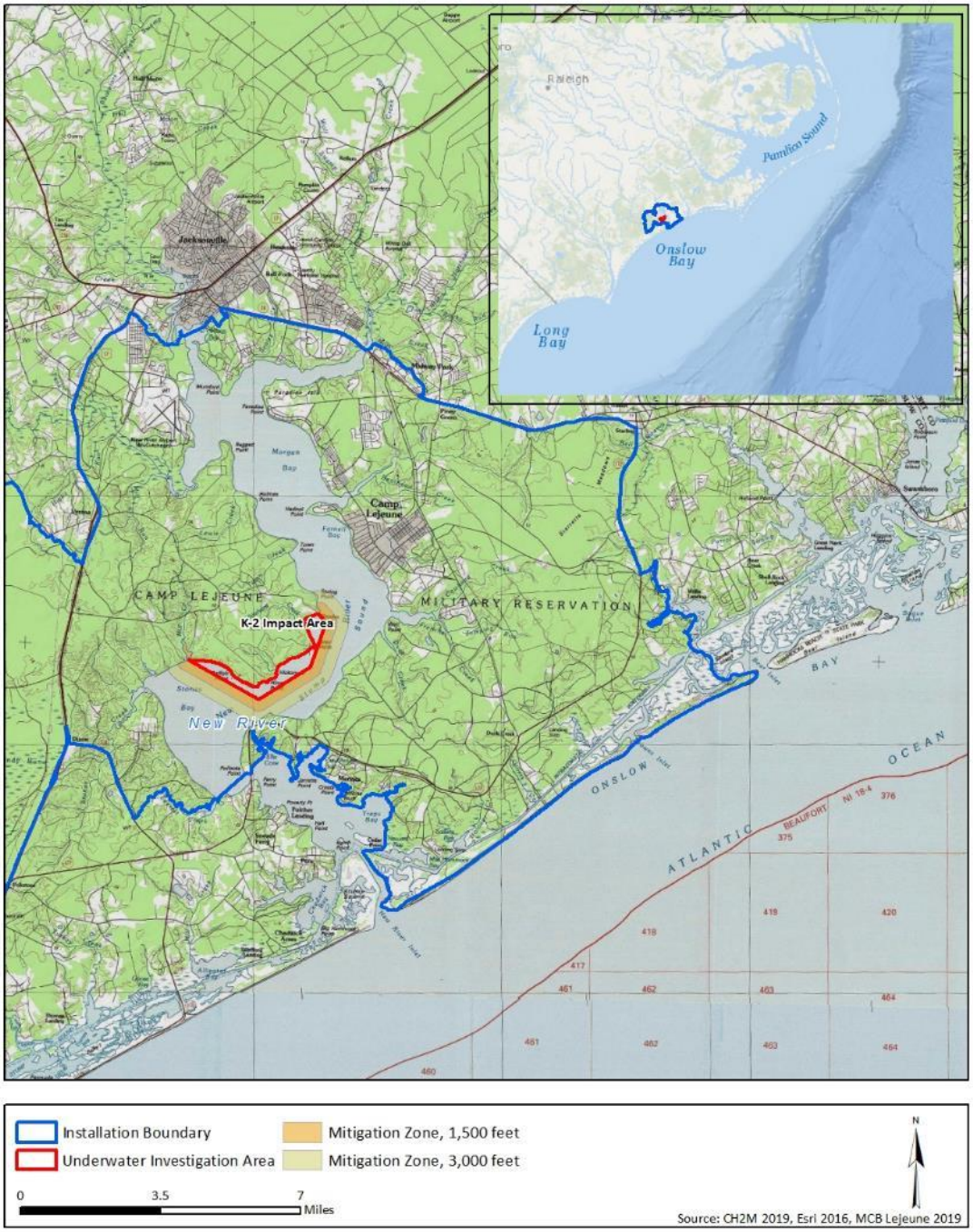


Figure 2-1. Geographic Region of Activities

3 MARINE MAMMAL SPECIES AND NUMBERS

The species and numbers of marine mammals likely to be found within the activity area.

The USMC reviewed marine mammal species occurring in waters off the Atlantic coast of North Carolina and inland waters of New River and determined that those listed in Table 3-1 may occur near the Proposed Action. Marine species' densities were derived from the Navy's Marine Species Density Database and Technical Report (U.S. Department of the Navy, 2017c). Consultation for the West Indian manatee (*Trichechus manatus*) will be completed separately with the U.S. Fish and Wildlife Service; take is not anticipated. Table 3-1 summarizes the stock abundance and ESA/MMPA status of these marine mammal species. Section 4 describes life history information for each species. Several marine mammal species have been detected off the coast of North Carolina on occasion but are not carried forward in this application.

Table 3-1. Marine Mammals Potential Occuring in Waters near the Activity Area

Species	*Stock*	*ESA and MMPA Status*	*Stock Abundance Best (CV) / Minimum Population*	*Density in Activity Area*
Order Cetacea				
Suborder Mysticeti (baleen whales)				
Family Balaenidae (right whales and bowhead whales)				
North Atlantic right whale (*Eubalaena glacialis*)	Western	Endangered, strategic, depleted	440 (0) / 440	0.000033
Family Balaenopteridae (rorquals)				
Fin whale (*Balaenoptera physalus*)	Western North Atlantic	Endangered, strategic, depleted	1,618 (0.33) / 1,234	0.00 – 0.0001
Humpback whale (*Megaptera novaeangliae*)	Gulf of Maine	Not listed, strategic	896 (0) / 896	0.00009
Sei whale (*Balaenoptera borealis*)	Nova Scotia	Endangered, strategic, depleted	357 (0.52) / 236	0.000101
Suborder Odontoceti (toothed whales)				
Family Physeteridae (sperm whales)				
Sperm whale (*Physeter macrocephalus*)	North Atlantic	Endangered, strategic, depleted	2,288 (0.28) / 1,815	0.00 – 0.0001
Family Delphinidae (dolphins)				
Atlantic spotted dolphin (*Stenella frontalis)*	Western North Atlantic	Not listed, non-strategic	44,715 (0.43) / 31,610	0.153
Bottlenose dolphin (*Tursiops truncatus)*	Northern North Carolina Estuarine	Not listed, strategic	823 (0.06) / 782	0.169871
	Southern North Carolina Estuarine	Not listed, strategic	Unknown	

Source: National Marine Fisheries Service marine mammal stock assessment reports at: http://www.nmfs.noaa.gov/pr/sars/species.htm

Key: CV = coefficient of variation; ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act

This page intentionally left blank.

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

A description of the status and distribution, including seasonal distribution (when applicable), of the affected species or stocks of marine mammals likely to be affected by such activities

Four main types of marine mammals are generally recognized: cetaceans (whales, dolphins, and porpoises), pinnipeds (seals, sea lions, and walruses), sirenians (manatees, dugongs, and sea cows), and other marine carnivores (sea otters and polar bears) (Jefferson et al., 2008; Rice, 1998). The order Cetacea is divided into two suborders: Mysticeti and Odontoceti.

The baleen whales (suborder Mysticeti) are universally large (more than 15 feet [5 meters] as adults). They are called baleen whales because, instead of teeth, they have a fibrous structure made of keratin, a type of protein like that found in human fingernails, in their mouths that enables them to filter or extract food from the water for feeding. They are batch feeders that use this baleen instead of teeth to engulf, suck, or skim large numbers of prey, such small schooling fish, shrimp, or microscopic sea animals (i.e., plankton) from the water or out of ocean floor sediments (Heithaus & Dill, 2008). The baleen whales are further divided into four families, two of which may be present in the vicinity of the activity area: right whales and rorquals. Right whales have a stocky black body, with no dorsal fin. Their tail is broad, deeply notched, and all black with a smooth trailing edge. The stomach and chest may be all black or have irregular-shaped white patches. Pectoral flippers are relatively short, broad, and paddle-shaped. Their characteristic feature is raised patches of rough skin, called callosities, on their heads that appear white because of whale lice (cyamids).

Rorquals have a series of longitudinal folds of skin, often referred to as throat grooves, running from below the mouth back towards the navel. Rorquals are slender and streamlined in shape, compared with their relatives the right whales, and most have narrow, elongated flippers.

The toothed whales, dolphins, and porpoises (suborder Odontoceti) range in size from slightly longer than 3.3 feet (1 meter) to more than 60 feet (18 meters) and have teeth, which they use to capture and consume individual prey. Detailed reviews of the different groups of cetaceans can be found in Perrin et al. (2009).

Most pinnipeds can be divided into two families: phocids (true seals) and the otariids (fur seals and sea lions); neither occurs in the activity area.

Of the sirenians, only West Indian manatee has the potential to occur in the activity area and is addressed separately in consultation with the U.S. Fish and Wildlife Service.

4.1 Mysticetes (Baleen Whales)

4.1.1 Balaenidae (Right Whales and Bowhead Whales)

4.1.1.1 North Atlantic Right Whale (*Eubalaena glacialis*)

Status and Management

North Atlantic right whale population is considered one of the most critically endangered populations of large whales in the world (Clapham et al., 1999). The size of this stock is considered extremely low relative to the Optimum Sustainable Population in the U.S. Atlantic Exclusive Economic Zone, and this species is listed as endangered under the ESA. A recovery plan for the North Atlantic right whale is in

effect (National Marine Fisheries Service, 2005). The North Atlantic right whale has been protected from commercial whaling since 1949 by the International Convention for the Regulation of Whaling (62 Stat. 1716; 161 UNTS 72). A National Marine Fisheries Service (NMFS) ESA status review in 2008 concluded that the western North Atlantic stock remains endangered (73 Federal Register [FR] 12024 [March 6, 2008]). This conclusion was reinforced by the International Whaling Commission (Best et al., 2003), which expressed grave concern regarding the status of this stock. Relative to populations of southern right whales, there are also concerns about growth rate, percentage of reproductive females, and calving intervals in the North Atlantic right whale population. The total level of human-caused mortality and serious injury is unknown, but reported human-caused mortality was a minimum of three right whales per year from 2006 through 2010 (Waring et al, 2016). Any mortality or serious injury to individuals within this stock should be considered significant. This is a strategic stock because the average annual human-related mortality and serious injury rates exceed potential biological removal and because the North Atlantic right whale is an endangered species.

Two ESA-designated critical habitats for North Atlantic right whales have been designated by NMFS to encompass physical and biological features essential to conservation of the species (81 FR 4838-4874 [January 27, 2016]). The northern unit includes the Gulf of Maine and Georges Bank region, which are key areas essential for right whale foraging. The southern unit includes the coast of North Carolina, South Carolina, Georgia, and Florida, which are key areas essential for calving. These two ESA-designated critical habitats were established in January 2016 to replace three smaller previously ESA-designated critical habitats (Cape Cod Bay/Massachusetts Bay/Stellwagen Bank, Great South Channel, and the coastal waters of Georgia and Florida in the southeastern United States) that had been designated by NMFS in 1994 (59 FR 28805 [June 3, 1994]).

Habitat and Geographic Range

The western North Atlantic right whale population ranges primarily from calving grounds in coastal waters of the southeastern United States to feeding grounds in New England waters and the Canadian Bay of Fundy, Scotian Shelf, and Gulf of St. Lawrence. Based on limited satellite tag, sighting, and historical whaling data, right whales generally associate with the Labrador Current, North Atlantic Gyre, and Gulf Stream open ocean areas.

Research suggests there are seven major habitats or congregation areas for western North Atlantic right whales. These include winter breeding grounds in the coastal waters of the southeastern United States, and summer feeding grounds in more northerly areas including the Great South Channel, Jordan Basin, the northeastern edge of Georges Bank, Cape Cod and Massachusetts Bays, the Bay of Fundy, and the Roseway Basin on the Scotian Shelf. Movements within and between habitats are extensive, evidenced by one whale making the round-trip migration from Cape Cod, Massachusetts, to Georgia and back at least twice during the winter months (Brown & Marx, 2000). Satellite tag data clearly indicates that intermittent sightings separated by perhaps 2 weeks should not necessarily be assumed to indicate a stationary or resident animal. Instead, the data show rather lengthy and somewhat distant excursions, including into deep waters beyond the continental shelf (Baumgartner & Mate, 2005; Mate et al., 1997).

The winter range for North Atlantic right whales includes the Southeast United States Continental Shelf Large Marine Ecosystem. LaBrecque et al. (2015a) used habitat analyses of sea surface temperatures and water depths and aerial sightings data to delineate a calving area in the southeast Atlantic,

extending from Cape Lookout, North Carolina, to Cape Canaveral, Florida. This area, identified as biologically important, encompasses waters from the shoreline to the 25-meter isobath from mid-November through late April. Passive acoustic monitoring conducted offshore of Cape Hatteras and in Onslow Bay, North Carolina, in 2011 and 2007, respectively, confirmed winter occurrence of North Atlantic right whales in these areas (McLellan et al., 2014).

Population Trends

The annual population growth rate reported for 1986–1992 by Knowlton et al. (1994) was 2.5 percent (coefficient of variation=0.12), suggesting that the stock was showing signs of slow recovery. However, subsequent work suggested that survival probability of an individual (averaged at the population level) declined from 0.99 per year in 1980 to 0.94 per year in 1994 (Best et al., 2001; Caswell et al., 1999). Historical patterns of mortalities, including those in the first half of 2005, suggest an increase in the annual mortality rate (Kraus et al., 2005). Examination of the minimum number alive population index calculated from the individual sightings database (as it existed on October 27, 2015) for 1990–2012 suggests a declining trend in numbers (Waring et al., 2016).

4.1.2 Balaenopteridae (Roquals)

4.1.2.1 Fin Whale (*Balaenoptera physalus*)

Status and Management

The fin whale is listed as endangered under the ESA and is considered a depleted and strategic stock under the MMPA. A final recovery plan was published in July 2010 for fin whales in U.S. waters (NMFS, 2010a). The International Whaling Commission recognizes seven management stocks of fin whales in the North Atlantic Ocean: (1) Nova Scotia, (2) Newfoundland-Labrador, (3) West Greenland, (4) East Greenland-Iceland, (5) North Norway, (6) West Norway-Faroe Islands, and (7) British Isles-Spain-Portugal. NMFS assumes management of the western North Atlantic stock, which is likely equivalent to the Nova Scotia management stock. The stock identity of North Atlantic fin whales has received relatively little attention, and whether the current stock boundaries define biologically isolated units has long been uncertain (Waring et al., 2016). Fin whales in the Gulf of St. Lawrence may be a separate stock (Ramp et al., 2014).

Habitat and Geographic Range

Fin whales prefer temperate and polar waters and are rarely seen in warm tropical waters (Reeves et al., 2002). They typically congregate in areas of high productivity and spend most of their time in coastal and shelf waters but can often be found in waters approximately 2,000 meters deep (Aissi et al., 2008; Reeves et al., 2002). Fin whales are often seen closer to shore after periodic patterns of upwelling (wind-driven upward movement of nutrient-rich deep ocean water) and the resultant increased surface water productivity and krill density (Azzellino et al., 2008). This species is highly adaptable, following prey, typically off the continental shelf (Azzellino et al., 2008; Panigada et al., 2008). Fin whales are likely associated with the Labrador Current, North Atlantic Gyre, and Gulf Stream open ocean areas while undergoing seasonal migrations. However, in contrast to the more common seasonal migrations of other mysticetes, such as blue whales and humpback whales, some fin whales exhibit a reverse pattern, remaining in higher latitudes during colder months and in lower latitudes during warmer months (Edwards et al., 2015).

Fin whales are common off the Atlantic coast of the United States from coastal waters to seaward of the continental shelf (at about the 1,000-fathom contour). In the mid-Atlantic region, they tend to occur north of Cape Hatteras, where they accounted for about 46 percent of the large whales observed in surveys conducted between 1978 and 1982 (National Marine Fisheries Service, 2010). During the summer, fin whales in this region tend to congregate in feeding areas between 41°20' N and 51°00' N, from the shore seaward to the 1,000-fathom contour. These whales winter from the edge of sea ice (near the Gulf of St. Lawrence) south to the Gulf of Mexico and the West Indies (National Marine Fisheries Service, 2010).

Fin whales have been detected frequently throughout the winter months by passive acoustic monitoring conducted from 2007 through 2015 within the continental shelf break and slope waters off Onslow Bay, North Carolina (Hodge et al., 2015; Hodge et al., 2014; U.S. Department of the Navy, 2013). Monthly aerial surveys conducted offshore of Cape Hatteras since May 2011 have resulted in seven sightings of fin whales, primarily during the fall and spring (McLellan et al., 2014). Three individuals were sighted during small vessel fieldwork conducted off the coast of Cape Hatteras (July 2009–December 2014), with one individual seen in 2012 and two individuals seen in 2013 (Foley et al., 2015). More recent work, including visual surveys, acoustic and satellite tagging, passive acoustic monitoring, biopsy, and photo-identification conducted from January 2014 to December 2014 resulted a new photo-identification catalogue in 2014 for a fin whale that was previously observed offshore of Cape Hatteras in 2013 (Foley et al., 2015).

Visual surveys and passive acoustic monitoring conducted from 2007 to 2011 in Onslow Bay, North Carolina, indicate fin whale occurrence in this area between late fall and early spring (Hodge, 2011). Monthly aerial surveys conducted between June 2007 and April 2011 only resulted in one sighting of fin whales in March 2010. However, high-frequency recording packages deployed between November 2007 and April 2010 in Onslow Bay detected low-frequency 20-hertz pulses from fin whales primarily in the winter months, starting in November and continuing through mid-April, suggesting that fin whales are migrating past Onslow Bay during this time (Hodge, 2011).

Population Trends

A population trend analysis has not been conducted for this stock (Waring et al., 2016).

4.1.2.2 Humpback Whale (*Megaptera novaeangliae*)

Status and Management

In June 1970, humpback whales were designated as endangered under the Endangered Species Conservation Act (ESCA). In 1973, the ESA replaced the ESCA and continued to list humpback whales as endangered.

In April 2015, NMFS proposed to revise the ESA listing of the humpback whale by identifying 14 Distinct Population Segments (DPSs) and listing 2 DPSs as threatened and 2 as endangered (80 FR 22304 [April 21, 2015]). The other 10 identified DPSs were not proposed for listing.

In September 2016, NMFS revised the ESA listing for the humpback whale to identify 14 DPSs, list 1 as threatened and 4 as endangered, and identify 9 others as not warranted for listing (81 FR 62260-62320 [September 8, 2016]).

The West Indies DPS that occurs offshore of the activity area does not warrant listing under the ESA because it is neither in danger of extinction nor likely to become so in the foreseeable future.

All humpback whales that forage in the western North Atlantic are considered part of the West Indies DPS (Bettridge et al., 2015), including the Gulf of Maine stock. The West Indies DPS feeding range primarily includes the Gulf of Maine, eastern Canada, and western Greenland (80 FR 22304-22345 [April 21, 2015]), and breeding grounds include waters of the Dominican Republic and Puerto Rico (81 FR 62260-62320 [September 8, 2016]).

For management purposes in U.S. waters, NMFS identified stocks that are based on feeding areas. Although the western North Atlantic population was once treated as a single management stock, the Gulf of Maine stock has been identified as a discrete subpopulation based on the strong site fidelity exhibited in that region (Waring et al., 2016). This is the only stock of humpback whales in the Atlantic managed under NMFS jurisdiction. However, it should be noted that several other discrete humpback whale subpopulations, based on feeding grounds, are found in the western North Atlantic, including the Gulf of St. Lawrence, Newfoundland/Labrador, and western Greenland (Waring et al., 2016).

Habitat and Geographic Range

Humpback whales are distributed worldwide in all major oceans and most seas. Most humpback whale sightings are in nearshore and continental shelf waters; however, humpback whales frequently travel through deep oceanic waters during the annual migrations (Calambokidis et al., 2001; Clapham & Mattila, 1990). In the western North Atlantic, humpback whales are typically associated with the Labrador Current, North Atlantic Gyre, and Gulf Stream open ocean areas during seasonal migrations from higher latitude summer feeding grounds to the lower latitude winter calving and breeding grounds (Waring et al., 2016).

Humpback feeding habitats are typically shallow banks or ledges with high seafloor relief (Hamazaki, 2002; Payne et al., 1990). In the western North Atlantic, humpback whales feed during spring, summer, and fall over a geographic range encompassing the eastern coast of the United States (including the Gulf of Maine), the Gulf of St. Lawrence, Newfoundland/Labrador, and western Greenland (Katona & Beard 1990).

On the breeding grounds, humpback whales segregate by breeding status, with females with calves using shallower waters and breeding adults using deeper more offshore waters (Ersts & Rosenbaum, 2003; Smultea, 1994). The habitat requirements of wintering humpbacks appears to be controlled by the conditions necessary for calving, such as warm water and relatively shallow, low-relief ocean bottom in protected areas, created by islands or reefs (Clapham, 2000; Craig & Herman, 2000; Smultea, 1994).

Individual variability in the timing of migrations may result in the presence of individuals in high-latitude areas throughout the year (Straley, 1990). Records of humpback whales off the United States mid-Atlantic coast (New Jersey to North Carolina) from January through March suggest these waters may represent a supplemental winter feeding ground used by juvenile and mature humpback whales of United States and Canadian North Atlantic stocks (LaBrecque et al., 2015a).

Aerial and vessel monitoring conducted offshore of Cape Hatteras, North Carolina, in Onslow Bay, North Carolina, and offshore of Jacksonville, Florida, confirmed winter occurrence of humpback whales in

these three areas of the Atlantic, as well as spring occurrence in Onslow Bay (U.S. Department of the Navy, 2013a).

Population Trends

Current data suggest that the Gulf of Maine humpback whale stock is steadily increasing in numbers (Waring et al., 2016). This is consistent with an estimated average growth trend of 3.1 percent (standard error =0.005) in the North Atlantic population overall for the period 1979–1993 (Stevick et al., 2003).

4.1.2.3 Sei Whale (*Balaenoptera borealis*)

Status and Management

The sei whale is listed as endangered under the ESA and is considered a depleted and strategic stock under the MMPA. Critical habitat is not designated for sei whales. A recovery plan for the sei whale was finalized in 2011 (National Marine Fisheries Service, 2011). There are two stocks for the sei whale in the North Atlantic: the Nova Scotia stock and the Labrador Sea stock (Waring et al., 2013; Waring et al., 2016). The Nova Scotia stock is considered in the management unit under NMFS jurisdiction; it includes the continental shelf waters of the northeastern United States and extends northeastward to south of Newfoundland. The Labrador Sea stock is outside of NMFS jurisdiction but occurs within the activity area.

Habitat and Geographic Range

Sei whales have a worldwide distribution and are found primarily in cold temperate to subpolar latitudes. Sei whales are typically found in the open ocean and are rarely observed near the coast (Horwood, 2009; Jefferson et al., 2015). They are generally found between 10° N and 70° N latitudes. Satellite tagging data indicate sei whales feed and migrate east to west across large sections of the North Atlantic (Olsen et al., 2009); they typically do not occur in equatorial or Arctic waters. In the activity area, the open ocean range includes the Labrador Current, North Atlantic Gyre, and Gulf Stream open ocean areas.

Sei whales are found from 20° N to 23° N during the winter and from 35° N to 50° N during the summer (Horwood, 2009; Masaki, 1976, 1977; Smultea et al., 2010). Sei whales spend the summer feeding in subpolar high latitudes and return to lower latitudes to calve in winter. However, no migratory corridor for sei whales has been identified in U.S. Atlantic waters (LaBrecque et al., 2015a). There are also no known sei whale mating or calving grounds in U.S. Atlantic waters (LaBrecque et al., 2015a). Whaling data provide some evidence of varied migration patterns, based on reproductive class, with females arriving at and departing from feeding areas earlier than males (Horwood, 1987; Perry et al., 1999). Sei whales are known to swim at speeds greater than 25 kilometers per hour and may be one of the fastest cetaceans, after the fin whale (Horwood, 1987; Jefferson et al., 2015).

The range of the Nova Scotia stock includes the continental shelf waters of the northeastern United States and extends northeastward to south of Newfoundland. During the feeding season, a large portion of the Nova Scotia sei whale stock is centered in northerly waters of the Scotian Shelf (Waring et al., 2013). The range of the Labrador Sea stock likely includes continental shelf waters near Labrador and Newfoundland, although satellite tag data indicate that most of that stock may use the deeper water areas between Greenland and Labrador (Prieto et al., 2014). Using data from vessel-based surveys,

LaBrecque et al. (2015a) delineated a feeding area for sei whales in the northeast Atlantic between the 25-meter contour off coastal Maine and Massachusetts to the 200-meter contour in central Gulf of Maine, including the northern shelf break area of Georges Bank. The feeding area also includes the southern shelf break area of Georges Bank from 100 meters to 2,000 meters and the Great South Channel. Feeding activity in the U.S. Atlantic waters is concentrated from May through November with a peak in July and August.

The southern portion of the species' range during spring and summer includes the northern portions of the U.S. Exclusive Economic Zone in the Atlantic Ocean, including the Gulf of Maine and Georges Bank. During spring and summer, sei whales occur in waters from the Bay of Fundy to northern Narragansett Bay. Large concentrations are often observed along the northern flank, eastern tip, and southern shelf break of Georges Bank. During the fall, sei whales may be found in limited shelf areas of the Northeast Channel and in the western Gulf of Maine (Cetacean and Turtle Assessment Program, 1982; Simpert et al., 2003). Spring is the period of greatest abundance in Georges Bank and into the Northeast Channel area, along the Hydrographer Canyon (Cetacean and Turtle Assessment Program, 1982; Waring et al., 2010). Although this species is uncommon near the coastline, two strandings of sei whales have been reported on the Virginia coast in 2003 and 2011 (King, 2011; Swingle et al., 2014).

Passive acoustic monitoring conducted offshore of Cape Hatteras, North Carolina, since 2011 resulted in the detections of low-frequency sounds from sei whales on bottom-mounted high-frequency acoustic recording packages that were not observed during visual surveys (McLellan et al., 2014). Passive acoustic monitoring conducted offshore of Jacksonville, Florida, from 2009 to 2012 also included detections of sei whales on marine acoustic recording units during the winter of 2009-2010 (Oswald et al., 2016) and possible detections on high-frequency acoustic recording packages during the winter of 2010 and 2011 (Hodge & Read, 2013).

Population Trends

Commercial whaling in the nineteenth and twentieth centuries depleted populations in all areas throughout the species' range. While they appear to be recovering in the northern hemisphere as a result of legal protection, a trend analysis has not been conducted for this stock (Waring et al., 2016).

4.2 Odontocetes (Toothed Whales)

4.2.1 Physeteridae (Sperm Whale)

4.2.1.1 Sperm Whale (*Physeter macrocephalus*)

Status and Management

The sperm whale has been listed as an endangered species since 1970 under the precursor to the ESA (National Marine Fisheries Service, 2009) and is listed as depleted and strategic under the MMPA. Whether the northwestern Atlantic population is discrete from northeastern Atlantic is currently unresolved. The International Whaling Commission recognizes one stock for the North Atlantic, based on reviews of many types of stock studies (e.g., tagging, genetics, catch data, mark and recapture, biochemical markers). A recovery plan is in place for the sperm whale in U.S. waters (National Marine Fisheries Service, 2010b). There are currently two stocks of sperm whales recognized within the activity area managed under NMFS jurisdiction: the western North Atlantic and the Gulf of Mexico stocks. In

2013, NMFS determined that a petition to list the Gulf of Mexico stock as a DPS was not warranted based on a review of best available information on physical, physiological, ecological, and behavioral factors (78 FR 68032-68037 [November 13, 2013]). A 5-year review for sperm whales was finalized in 2015 (National Marine Fisheries Service, 2015).

Habitat and Geographic Range

Sperm whales are found throughout the world's oceans in deep waters to the edge of the ice at both poles (Rice, 1989). Sperm whales show a strong preference for deep waters (Rice, 1989). Their distribution is typically associated with waters over the continental shelf break, over the continental slope, and into deeper waters and mid-ocean regions. However, in some areas, adult males are reported to consistently frequent waters with bottom depths less than 100 meters and as shallow as 40 meters (Jefferson et al., 2008; Jefferson et al., 2015). Typically, sperm whale concentrations correlate with areas of high productivity. These areas are generally near drop-offs and areas with strong currents and steep topography (Jefferson et al., 2015).

Sperm whales form large matrilineal social groups consisting of adult females and their offspring, which generally inhabit waters greater than 1,000 meters deep at latitudes less than 40° N. Young males stay with the matrilineal group for 4 to 21 years, then leave to join bachelor schools consisting of young males. As males age, they are found in progressively smaller groups and at progressively higher latitudes. Sperm whale migration or distributional shifts are not well understood and are not as seasonally based as observed with mysticete whales.

Passive acoustic monitoring conducted in Onslow Bay, North Carolina, between 2007 and 2013 confirmed year-round occurrence of sperm whales, along with a nocturnal increase in click detection and greater vocal activity on recorders located in deeper waters of the monitoring area (U.S. Department of the Navy, 2013). Researchers confirmed occurrence of sperm whale vocalizations in Onslow Bay on recorders deployed at water depths of 230 meters and 366 meters, along with regular nocturnal occurrence of sperm whale clicks near the shelf break, suggesting that foraging activities were occurring at that time (Hodge & Read, 2013). This diel pattern is in contrast to what was recorded offshore of Cape Hatteras (Stanistreet et al., 2013). Habitat models also support findings of sperm whale occurrence in the U.S. Economic Exclusion Zone waters offshore of Onslow Bay (Best et al., 2012). Visual surveys in Onslow Bay and analysis of remotely sensed oceanographic data were used to determine the effects of dynamic oceanography.

Population Trends

There has been considerable variation in point estimates of northern Gulf of Mexico sperm whale abundance based on data collected in 1991–2009. Differences in temporal abundance are difficult to interpret without a Gulf of Mexico-wide (including waters belonging to Mexico and Cuba) understanding of sperm whale abundance. Studies based on abundance and distribution surveys restricted to U.S. waters are unable to detect temporal shifts in distribution beyond U.S. waters that might account for changes in abundance (Waring et al., 2016). As a result, a trend analysis for the North Atlantic stock of sperm whales has not been conducted (Waring et al., 2016).

4.2.2 Delphinidae (Dolphins)

4.2.2.1 Atlantic Spotted Dolphin (*Stenella frontalis*)

Status and Management

The Atlantic spotted dolphin occurs in two forms that may be distinct subspecies (Rice, 1998): the large, heavily spotted form, which inhabits the continental shelf and is usually found inside or near the 200-meter isobath; and the smaller, less spotted island and offshore form, which occurs in the Atlantic Ocean but is not known to occur in the Gulf of Mexico (Fulling et al., 2003; Mullin & Fulling, 2003, 2004). The western North Atlantic population is provisionally being considered a separate stock from the Gulf of Mexico stock(s) for management purposes based on genetic analysis (Waring et al., 2014; Waring et al., 2016). The U.S. Virgin Islands population is provisionally being considered a separate stock, although there is currently no information to differentiate this stock from the Atlantic Ocean and Gulf of Mexico stocks.

Habitat and Geographic Range

The Atlantic spotted dolphin is found in nearshore tropical to warm-temperate waters, predominantly over the continental shelf and upper slope (Waring et al., 2013, 2014). In the eastern Gulf of Mexico, for instance, the species often occurs over the mid-shelf (Griffin & Griffin, 2003). In the western Atlantic, this species is distributed from New England to Brazil and is found in the Gulf of Mexico as well as the Caribbean Sea (Perrin, 2008). Atlantic spotted dolphins may occur in the Gulf Stream open ocean area.

The large, heavily spotted coastal form of the Atlantic spotted dolphin typically occurs over the continental shelf but usually at least 4.9 to 12.4 miles offshore (Perrin, 2008). Atlantic spotted dolphin sightings have been concentrated in the slope waters north of Cape Hatteras, but in the shelf waters south of Cape Hatteras, sightings extend into the deeper slope and offshore waters of the mid-Atlantic (Mullin & Fulling, 2003; Waring et al., 2014). Vessel surveys conducted between January 2009 and December 2014 offshore of Cape Hatteras, North Carolina, resulted in multiple sightings of Atlantic spotted dolphins annually from 2011 to 2014 (Foley et al., 2015). Aerial and shipboard surveys conducted between 2007 and 2010 in offshore waters of Onslow Bay, North Carolina, indicate that spotted dolphins have a strong preference for waters over the continental shelf and do not typically occur beyond the shelf break (Read et al., 2014). Numerous re-sightings of multiple individuals over several years and across seasons supports the existence of considerable fine-scale population structure and a degree of residency for Atlantic spotted dolphins in Onslow Bay.

Photo-identification catalogs of Atlantic spotted dolphins from Cape Hatteras, Onslow Bay, and Jacksonville survey areas have been compared, but no matches have been identified (Foley et al., 2015; Swaim et al., 2014) suggesting a high degree of residency to these areas. Atlantic spotted dolphins were one of the dominant species sighted during vessel surveys conducted along the continental shelf break and pelagic waters offshore of Jacksonville, Florida, from July 2009 through December 2013 (Swaim et al., 2014). Sightings were restricted to the relatively shallow shelf waters of the survey area.

Population Trends

Due to imprecise abundance estimates and long periods of time between surveys, a trend analysis has not been conducted for the western North Atlantic stock of Atlantic spotted dolphins (Waring et al., 2014).

4.2.2.2 Bottlenose Dolphin (*Tursiops truncatus*)

Status and Management

Along the U.S. East Coast and northern Gulf of Mexico, the bottlenose dolphin stock structure is well studied. There are currently 53 management stocks identified by NMFS in the western North Atlantic and Gulf of Mexico, including oceanic, coastal, and estuarine stocks (Waring et al., 2016). Most stocks are designated as strategic or depleted under the MMPA. Two stocks may be present in the activity area (Northern North Carolina Estuarine Stock and Southern North Carolina Estuarine Stock) and there may be mixing in the New River area.

Habitat and Geographic Range

The bottlenose dolphin occurs in tropical to temperate waters of the Atlantic Ocean as well as inshore, nearshore, and offshore waters of the Gulf of Mexico and U.S. East Coast (Waring et al., 2016). They occur in in habitats ranging from shallow, murky, estuarine waters to deep, clear offshore waters in oceanic regions (Jefferson et al., 2008; Jefferson et al., 2015).

There are two morphologically and genetically distinct bottlenose dolphin morphotypes (distinguished by physical differences) (Duffield et al., 1983) described as coastal and offshore forms. Both inhabit waters in the western North Atlantic Ocean and Gulf of Mexico (Curry & Smith, 1997; Hersh & Duffield, 1990; Mead & Potter, 1995) along the U.S. Atlantic coast. The coastal morphotype of bottlenose dolphin is continuously distributed along the Atlantic coast south from Long Island, New York, to around the Florida peninsula, and along the Gulf of Mexico coast. The range of the offshore bottlenose dolphin includes waters beyond the continental slope (Kenney, 1990), and offshore bottlenose dolphins may move between the Gulf of Mexico and the western Atlantic (Wells et al., 1999). Dolphins with characteristics of the offshore type have stranded as far south as the Florida Keys.

Aerial surveys flown during 1979–1981 indicated a concentration of bottlenose dolphins in waters less than 25 meters deep corresponding to the coastal morphotype and an area of high abundance along the shelf break corresponding to the offshore stock (Cetacean and Turtle Assessment Program, 1982; Kenney, 1990). During winter months and south of Cape Hatteras, North Carolina, the ranges of the coastal and offshore morphotypes overlap to some degree. Bottlenose dolphins have been sighted regularly during surveys conducted offshore of Cape Hatteras from 2009 through 2014 (Foley et al., 2015). Monthly aerial and vessel surveys conducted between June 2007 and June 2010 offshore of Onslow Bay, North Carolina, showed the fauna was also dominated strongly by bottlenose dolphins, with year-round occurrence. Most bottlenose dolphin encounters occurred just off the shelf break (Read et al., 2014).

Similar to other U.S. Atlantic coast areas, bottlenose dolphins were among the most frequently observed cetacean species during vessel surveys conducted along the continental shelf break and pelagic waters offshore of Jacksonville, Florida, from July 2009 through December 2013. Bottlenose dolphins were encountered throughout the area, including within deeper pelagic waters (Swaim et al., 2014). Genetic analyses of biopsy samples confirmed that all sampled bottlenose dolphins were of the offshore morphotype, suggesting there is limited overlap between coastal and offshore populations in this area of the Atlantic Ocean (Swaim et al., 2014). Photo-identification catalogs of bottlenose dolphins from Cape Hatteras, Onslow Bay, and Jacksonville survey areas have been compared, but no matches have

been identified (Foley et al., 2015; Swaim et al., 2014) suggesting a high degree of residency to these areas.

Several lines of evidence support a distinction between coastal stock dolphins and those present primarily in the inshore waters of the bays, sounds, and estuaries (LaBrecque et al., 2015b). Photo-identification and genetic studies support the existence of more than 40 stock populations in bays, sounds, and estuaries. These populations inhabit estuaries and bays from North Carolina to the Gulf of Mexico coast (Gubbins, 2002; Gubbins et al., 2003).

LaBrecque et al. (2015a) identified nine small and resident bottlenose dolphin population areas within estuarine areas along the U.S. East Coast. Two of the populations, Northern North Carolina and Southern North Carolina stocks were present in nearshore portions of the Navy Cherry Point Range Complex and MCB Camp Lejeune near the activity area.

Population Trends

There are insufficient data to determine the population trends for Northern North Carolina Estuarine System Stock or Southern North Carolina Estuarine System Stock of bottlenose dolphins (Waring et al., 2012; Waring et al., 2015).

This page intentionally left blank.

5 TAKE AUTHORIZATION REQUESTED

The type of incidental taking authorization that is being requested (i.e., takes by harassment only, takes by harassment, injury, and/or death), and the method of incidental taking.

5.1 Take Authorization Request

Under Section 101 (a)(5)(A) of the MMPA, the USMC requests an IHA for the incidental take of marine mammals described in this application resulting from reducing the risk of UXO located in the waters of the New River adjacent to the K-2 Impact Area at MCB Camp Lejeune, North Carolina. The USMC requests an IHA from November 1, 2020.

The term "take," as defined in Section 3 (16 U.S.C. Section 1362(13)) of the MMPA, 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).

Acoustic and explosive sources have the potential to result in incidental takes of marine mammals by harassment, injury, or mortality. The USMC used the thresholds and criteria for assessing potential exposures to marine mammals resulting from acoustic and explosive described in the in the Navy *Request for Regulations and Letters of Authorization for the Incidental Taking of Marine Mammals Resulting from U.S. Navy Training and Testing Activities in the Atlantic Fleet Training and Testing Study Area* (U.S. Department of the Navy, 2017a) and developed in the technical report titled *Quantitative Analysis for Estimating Acoustic and Explosive Impacts to Marine Mammals and Sea Turtles* (U.S. Department of the Navy, 2017b).

The Navy Acoustic Effects Model estimates acoustic and explosive effects without taking mitigation into account; therefore, the model overestimates predicted impacts on marine mammals within mitigation zones. For additional information on the quantitative analysis process and mitigation measures, refer to Chapter 6 (Numbers and Species Exposed) and Chapter 11 (Mitigation Measures).

5.2 Method of Incidental Taking

This authorization request considers noise from explosive shock wave and sound that has the potential to disturb or displace marine mammals or produce a temporary shift in their hearing ability (temporary threshold shift [TTS]) resulting in Level B harassment. The Proposed Action is not anticipated to affect the prey base or significantly affect other habitat features of marine mammals that would meet the definition of take.

Table 5.1 summarizes the USMC's take request (exposures that may lead to Level B harassment) in the unlikely situation a MEC would have to be detonated in place. As stated in Section 1.2.3, it is anticipated that no more than five MEC would require in-water detonation throughout the intrusive investigation. It is assumed that in-water detonation of MEC (if necessary) would take place on five different days over the course of the 6.5-month investigation of the Area of Concern and the 3-month investigation of the deep water area.

Table 5-1. Potential Exposures to Marine Mammals Resulting from the Project's Acoustic and Explosive Stressors

Species	*Stock*	*Level B Harassment*	*Level A Harassment*
North Atlantic right whale	*Western*	0	0
Fin whale	*Western North Atlantic*	0	0
Humpback whale	*Gulf of Maine*	0	0
Sei whale	*Nova Scotia*	0	0
Sperm whale	*North Atlantic*	0	0
Atlantic spotted dolphin	*Western North Atlantic*	25	0
Bottlenose dolphin	*Northern North Carolina Estuarine System*	40	0
	Southern North Carolina Estuarine System		

6 NUMBERS AND SPECIES EXPOSED

By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking, and the number of times such takings by each type of taking are likely to occur.

6.1 Estimated Take of Marine Mammals by Acoustic and Explosive Sources

The USMC estimated take of marine mammals by acoustic and explosive sources by following methods used in the Navy's *Quantitative Analysis for Estimating Acoustic and Explosive Impacts to Marine Mammals and Sea Turtles* (U.S. Department of the Navy, 2017b). There are seven marine mammal species managed by NMFS that have a reasonable potential to occur within the waters surrounding MCB Camp Lejeune (Table 3-1).

Long recognized by the scientific community (Payne & Webb, 1971), and summarized by the National Academies of Science, is the fact that human-generated sound could possibly harm marine mammals or significantly interfere with their normal activities (National Research Council, 2005). Assessing whether a sound may disturb or injure a marine mammal involves understanding the characteristics of the acoustic sources, the marine mammals that may be present in the vicinity of the sound, and the effects that sound may have on the physiology and behavior of those marine mammals. Although it is known that sound is important for marine mammal communication, navigation, and foraging (National Research Council, 2003, 2005), there are many unknowns in assessing impacts, such as the potential interaction of different effects and the significance of responses by marine mammals to sound exposures (Nowacek et al., 2007; Southall et al., 2007). Furthermore, many other factors besides just the received level of sound may affect an animal's reaction, such as the animal's physical condition, prior experience with the sound, and proximity to the source of the sound. Although it is clear that sound can disturb marine mammals and alter their behaviors temporarily, there is currently an absence of observations or measurements that demonstrate that disturbance due to intermittent sound in the water will have long-term consequences for the animal or significantly altered behaviors over longer periods (i.e., greater than a few hours to a few days dependent upon the species and stressor).

6.2 Conceptual Framework for Assessing Effects from Acoustic and Explosive Activities

A detailed discussion of the conceptual framework describing the potential effects from exposure to acoustic and explosive activities and the accompanying short-term costs to the animal (e.g., expended energy or missed feeding opportunity) can be found in Section 6.2 of the *Request for Regulations and Letters of Authorization for the Incidental Taking of Marine Mammals Resulting from the United States Navy Training and Testing Activities in the Atlantic Fleet Training and Testing Study Area* (U.S. Department of the Navy, 2017a. It outlines the conditions that may lead to long-term consequences for the individual if the animal cannot fully recover from the short-term costs and how these in turn may affect the population.

The methods for estimating the number and types of exposure are described in the sections below, followed by the method for quantifying exposures of marine mammals to sources of energy exceeding those threshold values. Exposure of each was determined by the potential of each species to be impacted by the acoustic sources as determined by acoustic criteria for marine mammals. Potential

exposures were calculated by multiplying the average group size by the potential number of days of in-water detonation of MEC.

6.3 Description of Noise Sources

Ambient sound is a composite of sounds from multiple sources, including environmental events, biological sources, and anthropogenic activities. Physical noise sources include waves at the surface, precipitation, earthquakes, ice, and atmospheric noise, among other events. Biological sources include marine mammals, fish, and invertebrates. Anthropogenic sounds are produced by vessels (small and large), dredging, aircraft overflights, construction activities, geophysical explorations, commercial and military sonars, and other activities.

Impulsive sounds (e.g., explosions), which are referred to as pulsed sounds by Southall et al. (2007), are brief, broadband, atonal transients (Harris, 1998) and occur either as isolated events or are repeated in some succession (Southall et al., 2007). Impulsive sounds are characterized by a relatively rapid rise from ambient pressure to a maximal pressure value, followed by a decay period that may include a period of diminishing, oscillating maximal and minimal pressures (Southall et al., 2007). Impulsive sounds generally have a greater capacity to induce physical injury compared with sounds that lack these features (Southall et al., 2007).

6.4 Vocalization and Hearing of Marine Mammals

All marine mammals that have been studied can produce sounds and use sounds to forage, orient, detect, and respond to predators and to facilitate social interactions (Richardson et al., 1995). Measurements of marine mammal sound production and hearing capabilities provide some basis for assessing whether exposure to a particular sound source may affect a marine mammal behaviorally or physiologically. Marine mammal hearing abilities are quantified using live animals either via behavioral audiometry or electrophysiology (Au, 1993). Behavioral audiograms, which are plots of an animal's exhibited hearing threshold versus frequency, are obtained from captive, trained live animals using standard testing procedures with appropriate controls. These audiograms are considered to be a more accurate representation of a subject's hearing abilities. However, behavioral audiograms of marine mammals are difficult to obtain because many species are too large, too rare, and too difficult to acquire and maintain for experiments in captivity. Consequently, our understanding of a species' hearing ability may be based on the behavioral audiogram of a single individual or a small group of animals. In addition, captive animals may be exposed to local ambient sounds and other environmental factors that may impact their hearing abilities and may not accurately reflect the hearing abilities of free-swimming animals.

For animals that are not available in captive or stranded settings (including large whales and rare species), estimates of hearing capabilities are made based on anatomical and physiological structures, the frequency range of the species' vocalizations, and extrapolations from related species.

Electrophysiological audiometry measures small electrical voltages produced by neural activity when the auditory system is stimulated by sound. The technique is relatively fast, does not require a conscious response, and is routinely used to assess the hearing of newborn humans. It has recently been adapted for use on non-humans, including marine mammals (Dolphin, 2000). For both methods of evaluating hearing ability, hearing response in relation to frequency is a generalized U-shaped curve or audiogram

showing the frequency range of best sensitivity (lowest hearing threshold) and frequencies above and below with higher threshold values.

NMFS reviewed studies of the hearing sensitivity of marine mammals and developed thresholds for use as guidance when assessing the effects of anthropogenic sound on marine mammals based on measured or estimated hearing ranges (National Marine Fisheries Service, 2018). The guidance places marine mammals into the following functional hearing groups based on their generalized hearing sensitivities: high-frequency cetaceans, mid-frequency cetaceans, low-frequency cetaceans (mysticetes), phocid pinnipeds (true seals), and otariid pinnipeds (sea lions and fur seals). Of these groups, only low-frequency cetaceans and mid-frequency cetaceans may be present in the activity area. Table 6-1 provides a summary of the sound production and hearing capabilities of the marine mammal species assessed in this application.

Table 6-1. Hearing and Vocalization Ranges for Marine Mammal Functional Hearing Groups and Species Potentially within the Activity Area

Functional Hearing Group	*Species*	*Functional Hearing Range*
Low-frequency cetaceans	North Atlantic right whale, humpback whale, sei whale, fin whale	7 Hz to 35 kHz
Mid-frequency cetaceans	Sperm whale, bottlenose dolphin, Atlantic spotted dolphin,	150 Hz to 160 kHz

Key: Hz = Hertz; kHz = kilohertz

Source: National Marine Fisheries Service, 2018

6.5 Sound Exposure Criteria and Thresholds

Marine mammals could be exposed to energy, sound, and fragments from underwater explosions associated with the proposed activities. Energy from an explosion is capable of causing mortality, injury, hearing loss, a behavioral response, masking, or physiological stress, depending on the level and duration of exposure.

The death of an animal would eliminate future reproductive potential, which is considered in the analysis of potential long-term consequences to the population. Exposures that result in non-auditory injuries or permanent threshold shift (PTS) may limit an animal's ability to find food, communicate with other animals, or interpret the surrounding environment. Impairment of these abilities can decrease an individual's chance of survival or impact its ability to successfully reproduce and potentially increase the risk of predation or other injury (e.g., vessel strike). TTS can also impair an animal's abilities, but the individual is likely to recover quickly with little significant effect.

Explosions in the ocean or near the water surface can introduce loud, impulsive, broadband sounds into the marine environment. These sounds, which are within the audible range of most marine mammals, could cause behavioral reactions, masking, and elevated physiological stress. Behavioral responses can include shorter surfacing time, shorter dives, fewer blows (breaths) per surfacing, longer intervals between blows, ceasing or increasing vocalizations, shortening or lengthening vocalizations, and changing frequency or intensity of vocalizations (National Research Council, 2005). Sounds from explosives could also mask biologically important sounds; however, the duration of individual sounds is very short, reducing the likelihood of substantial auditory masking.

The USMC applied Navy studies that performed a quantitative analysis to estimate the number times that marine mammals could be impacted by explosives used during Navy training and testing activities. The Navy Acoustic Effects Model is used to produce initial estimates of the number of instances that animals that may experience these effects; these estimates are further refined by considering animal avoidance of sound-producing activities and implementation of mitigation. A detailed explanation of this analysis is provided in the technical report *Quantitative Analysis for Estimating Acoustic and Explosive Impacts to Marine Mammals and Sea Turtles* (U.S. Department of the Navy, 2017b).

Two metrics have been identified as predictive of injury: impulse and peak pressure. Peak pressure contributes to the "crack" or "stinging" sensation of a blast wave, compared to the "thump" associated with received impulse. Older military reports documenting exposure of human divers to blast exposure generally describe peak pressure exposures around 100 pounds per square inch (237 decibels referenced at 1 micropascal [dB re 1 µPa] sound pressure level [SPL] peak) to feel like slight pressure or stinging sensation on skin, with no enduring effects (Christian & Gaspin, 1974).

Because data on explosive injury do not indicate a set threshold for injury, rather a range of risk for explosive exposures, two sets of criteria are provided for use in non-auditory injury assessment. The first set provides thresholds to estimate the number of animals that may be affected during mine neutralization using divers (Table 6-2). The second set (Table 6-3) provides thresholds for the onset of the effect to estimate farthest range for potential occurrence of an effect. Both sets of criteria are useful for assessing potential effects to marine mammals and the range at which mitigation could be effective. Increasing animal mass and increasing animal depth both increase the impulse thresholds (i.e., decrease susceptibility), whereas smaller mass and decreased animal depth reduce the impulse thresholds (i.e., increase susceptibility). For impact assessment, marine mammal populations are assumed to be 70 percent adult and 30 percent calf/pup. Sub-adult masses are used to determine onset of effect, in order to estimate the farthest range at which an effect may first be observable. The derivation of these injury criteria and the species mass estimates are provided in the technical report *Criteria and Thresholds for U.S. Navy Acoustic and Explosive Impacts to Marine Mammals and Sea Turtles* (U.S. Department of the Navy, 2017c).

Table 6-2. Criteria to Quantitatively Assess Non-Auditory Injury Due to Underwater Explosions

Impact Assessment Criterion	*Threshold*
50% Mortality (Impulse)	$144\ M^{\frac{1}{3}}(1+\frac{D}{10.1})^{\frac{1}{6}}Pa-\mathrm{s}$
50% Injury (Impulse)	$65.8\ M^{\frac{1}{3}}(1+\frac{D}{10.1})^{\frac{1}{6}}Pa-\mathrm{s}$

Impact Assessment Criterion	*Threshold*
Injury (Peak Pressure)	243 dB re 1 µPa SPL peak

Key: dB re 1 µPa: decibels referenced to 1 micropascal; Pa-s: pascal second; SPL: sound pressure level; D = depth of animal (m); M = mass of animal (kg)

Source: U.S. Department of the Navy, 2017a; 2017b

Table 6-3. Criteria for Estimating Ranges to Potential Effect for Mitigation Purposes

Impact Assessment Criterion	*Threshold*
Onset Mortality (Impulse)	$103\ M^{\frac{1}{3}}(1+\frac{D}{10.1})^{\frac{1}{6}}Pa-\mathrm{s}$
Onset Injury (Impulse)	$47.5\ M^{\frac{1}{3}}(1+\frac{D}{10.1})^{\frac{1}{6}}Pa-\mathrm{s}$
Onset Injury (Peak Pressure)	237 dB re 1 µPa SPL peak

Key: dB re 1 µPa: decibels referenced to 1 micropascal; Pa-s: pascal second; SPL: sound pressure level; D = depth of animal (m); M = mass of animal (kg)

Source: U.S. Department of the Navy, 2017a; 2017b

When explosive ordnance (e.g., bomb or missile) detonates, fragments of the weapon are thrown at high-velocity from the detonation point, which can injure or kill marine mammals if they are struck. Risk of fragment injury reduces exponentially with distance as the fragment density is reduced. Fragments underwater tend to be larger than fragments produced by in-air explosions (Swisdak & Montaro, 1992). Underwater, the friction of the water would quickly slow these fragments to a point where they no longer pose a threat. On the other hand, the blast wave from an explosive detonation moves efficiently through the seawater. Because the ranges to mortality and injury due to exposure to the blast wave are likely to far exceed the zone where fragments could injure or kill an animal, the above thresholds are assumed to encompass risk due to fragmentation.

6.6 Auditory Weighting Functions

Animals are not equally sensitive to noise at all frequencies. To capture the frequency-dependent nature of the effects of noise, auditory weighting functions are used. Auditory weighting functions are mathematical functions based on a generic band-pass filter and incorporate species-specific hearing

abilities to calculate a weighted received sound level in units SPL or sound exposure level (SEL). Due to the band pass nature, the auditory weighting functions resemble an inverted "U" shape, with amplitude plotted as a function of frequency. The flatter portion of the plotted function, where the amplitude is closest to zero, is the emphasized frequency range (i.e., the pass-band), while the frequencies below and above this range (where amplitude declines) are de-emphasized.

Criteria used to define threshold shifts from explosions is derived from the two known studies designed to induce TTS in marine mammals from impulsive sources. Finneran et al. (2002) reported behaviorally measured TTS of 6 and 7 decibels (dB) in a beluga exposed to single impulses from a seismic water gun. Lucke et al. (2009) reported auditory-evoked, potential-measured TTS of 7 to 20 dB in a harbor porpoise exposed to single impulses from a seismic air gun. Because marine mammal PTS data from impulsive noise exposures do not exist, onset-PTS levels for all groups were estimated by adding 15 dB to the threshold for non-impulsive sources. This relationship was derived by Southall et al. (2007) from impulsive noise TTS growth rates in chinchillas. These frequency-dependent thresholds are depicted by the exposure functions for each group's range of best hearing (Table 6-4).

Table 6-4. Weighted Sound Exposure Thresholds for Underwater Explosive Sounds for Marine Mammal Functional Hearing Groups and Species Potentially within the Activity Area

Functional Hearing Group	*Behavior (SEL) weighted (dB)*	*TTS (SEL) weighted (dB)*	*TTS (Peak SPL) unweighted (dB)*	*PTS (SEL) weighted (dB)*	*PTS (Peak SPL) unweighted (dB)*
Low-frequency cetaceans	163	168	213	183	219
Mid-frequency cetaceans	165	170	224	185	230

Notes: dB: decibels; PTS: permanent threshold shift; SEL: sound exposure level; SPL: sound pressure level; TTS: temporary threshold shift

Sources: U.S. Department of the Navy, 2017a; Finneran et al., 2002; Lucke et al., 2009; Southall et al., 2007

6.7 Impact Range for Explosives

The following section provides the range (distance) over which specific physiological or behavioral effects are expected to occur based on the explosive and the explosive propagation calculations from the Navy Acoustic Effects Model. For this project, the net explosive weight is estimated to be 14.6 pounds and places the explosive source in Bin E6 (>10-20 net explosive weight), as described in *Request for Regulations and Letters of Authorization for the Incidental Taking of Marine Mammals Resulting from U.S. Navy Training and Testing Activities in the Atlantic Fleet Training and Testing Study Area* (U.S. Department of the Navy, 2017a).

For ranges to 50 percent non-auditory injury risk from the in-water detonation of MEC for all marine mammal groups, the average distance is 318 feet (97 meters) (U.S. Department of the Navy, 2017a). Table 6-5 summarizes ranges to 50 percent mortality risk for all marine mammal hearing groups as a function of animal mass.

Table 6-5. Ranges to 50 Percent Mortality Risk for All Marine Mammal Hearing Groups as a Function of Animal Mass

Bin	*10 kg*	*250 kg*	*1,000 kg*	*5,000 kg*	*25,000 kg*	*72,000 kg*
E6	85.3 feet (26 meters)	45.9 feet (14 meters)	23.0 feet (7 meters)	13.1 feet (4 meters)	6.6 feet (2 meters)	3.3 feet (1 meter)

Source: U.S. Department of the Navy, 2017a

Table 6-6 provides average ranges for auditory and behavioral effects for low- and mid-frequency cetaceans. For additional information on how ranges to impacts from explosions were estimated, see the technical report *Quantifying Acoustic Impacts on Marine Mammals and Sea Turtles: Methods and Analytical Approach for Phase III Training and Testing* (U.S. Department of the Navy, 2017b).

Table 6-6. SEL-Based Average Ranges to Onset PTS, Onset TTS, and Behavioral Reaction for Low- and Mid-Frequency Cetaceans

Functional Hearing Group	*PTS*	*TTS*	*Behavioral*
Low-frequency cetaceans	919 feet (280 meters)	3,339 feet (1,018 meters)	1,972 feet (601 meters)
Mid-frequency cetaceans	381 feet (116 meters)	1,758 feet (536 meters)	2,434 feet (742 meets)

Notes: PTS: permanent threshold shift; TTS: temporary threshold shift

Source: U.S. Department of the Navy, 2017a

6.8 Exposure Estimates

Exposure estimates generally do not differentiate age, sex, or reproductive condition. However, some inferences can be made based on what is known about the life stages of the animals that visit or inhabit the New River and adjacent waters. The lack of available habitat and feeding areas and limited access through the New River inlet inhibits and deters use by the North Atlantic right whale, fin whale, humpback whale, sei whale, and sperm whales. These marine mammals have not been sighted in New River. In addition, marine mammal monitoring of mitigation zones would ensure these marine mammals would not be exposed to areas within range of in-water detonation of MEC. In addition, the mitigation zone will be 3,000 feet (914 meters), which is beyond all ranges except for TTS for low-frequency cetaceans. Low-frequency cetaceans are not expected in inland waters of the New River and the activity area. Therefore, exposure would be avoided, and behavioral harassment would not occur (Table 5-1). The Atlantic spotted dolphin and bottlenose dolphin may be present year-round in the inland waters of the New River and exposure estimates are provided in the following sections.

6.8.1 Atlantic Spotted Dolphin

Atlantic spotted dolphins may be present in the New River. In coastal waters, average group size usually consists of five individuals. The Level B exposure estimate is factored using an average group size of five multiplied by 5 days of in-water detonation of MEC.

Level B Exposure = (Average Group Size) x (Potential Number of Days of In Water Detonation)

Therefore, the USMC requests takes for Level B exposure of up to 25 Atlantic spotted dolphins for the project (Table 5-1). Animals of any age, sex, or reproductive status could be exposed to underwater sounds.

To protect Atlantic spotted dolphins from noise impacts, the USMC will implement a shutdown if dolphins are seen by marine mammal monitors in mitigation zones (see the mitigation measures in Section 11). A monitor will be stationed at locations from which the mitigation zones are visible and will implement a shutdown if a dolphin enters the zones. Because in-water detonation of MEC will not occur if dolphins enter the mitigation zones, no Level A take is requested. Any exposure of dolphins to explosive noise will be minimized to short-term behavioral harassment.

6.8.2 Bottlenose Dolphin

Bottlenose dolphins may be present in the New River, with observed groups ranging from 1 to 40 dolphins and an average group size of 7.4. The Level B exposure estimate is factored using an average group size of 8 multiplied by 5 days of in-water detonation of MEC.

Level B Exposure = (Average Group Size) x (Potential Number of Days of In Water Detonation)

Therefore, the USMC requests takes for Level B exposure of up to 40 common bottlenose dolphins for the project (Table 5-1). Animals of any age, sex, or reproductive status could be exposed to underwater sounds.

To protect common bottlenose dolphins from noise impacts, the USMC will implement a shutdown if dolphins are seen by marine mammal monitors in mitigation zones (see the mitigation measures in Section 11). A monitor will be stationed at locations from which the mitigation zones are visible and will implement a shutdown if a dolphin enters the zones. Because in-water detonation of MEC will not occur if dolphins enter the mitigation zones, no Level A take is requested. Any exposure of dolphins to explosive noise will be minimized to short-term behavioral harassment.

7 IMPACTS TO MARINE MAMMAL SPECIES OR STOCKS

The anticipated impact of the activity upon the species or stock of marine mammals

7.1 Potential Effects of Clearance of Unexploded Ordnance on Marine Mammals

7.1.1 Potential Effects Resulting from Underwater Noise

The effects of underwater noise on marine mammals depends on several factors, including the species, size of the animal, and proximity to the source; the depth, intensity, and duration of the sound; the depth of the water column; the substrate; the distance between the source and the animal; and the sound propagation properties of the environment.

As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. In general, sound exposure should be less intense farther away from the source. The substrate and depth of the habitat affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to more rapid sound attenuation. In addition, substrates that are soft (e.g., sand) will absorb the sound more readily than hard substrates (rock), which may reflect the acoustic wave.

Potential impacts to marine species can be caused by physiological responses to both the type and strength of the acoustic signature (Viada et al., 2008). Behavioral impacts may also occur, although the type and severity of these effects are more difficult to define because studies addressing the behavioral effects of impulsive sounds on marine mammals are limited. Potential effects from impulsive sound sources can range from Level B effects, such as brief behavioral disturbance, tactile perception, and physical discomfort, to Level A impacts, which may include injury to the internal organs and the auditory system and possible death of the animal (Yelverton et al., 1973; O'Keeffe & Young, 1984). Based on the mitigation measures outlined in Section 11 and the conservative modeling assumptions discussed in Section 6, Level A harassment is not expected to any individuals.

7.1.1.1 Physiological Responses

Direct tissue responses to impact/impulsive sound stimulation may range from mechanical vibration or compression with no resulting injury to tissue trauma (injury). Because the ears are the most sensitive organ to pressure, they are the organs most sensitive to injury (Ketten, 2000). Sound-related trauma can be lethal or sublethal. Lethal impacts are those that result in immediate death or serious debilitation in or near an intense source and are often related to lung injury (Ketten et al., 1993). Sublethal damage to the ear from a pressure wave can rupture the tympanum, fracture the ossicles, and damage the cochlea and can cause hemorrhage as well as leakage of cerebrospinal fluid into the middle ear (Ketten, 2000). Sublethal impacts also include hearing loss, which is caused by exposure to perceptible sounds.

Moderate injury implies partial hearing loss. Permanent hearing loss (also called PTS) can occur when the hair cells of the ear are damaged by a very loud event as well as by prolonged exposure to noise. Instances of TTSs and/or auditory fatigue are well documented in marine mammal literature as being one of the primary avenues of acoustic impact. Temporary loss of hearing sensitivity has been documented in controlled settings using captive marine mammals exposed to strong sound exposure levels at various frequencies (Mooney et al. 2009).

7.1.1.2 Behavioral Responses

Behavioral responses to sound can be highly variable. For each potential behavioral change, the magnitude of the change ultimately determines the severity of the response. A number of factors may influence an animal's response to noise, including its previous experience, its auditory sensitivity, its biological and social status (including age and sex), and its behavioral state and activity at the time of exposure. Habituation occurs when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok et al., 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. The opposite process is sensitization—when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure.

Behavioral state or differences in individual tolerance levels may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing noise levels than animals that are highly motivated to remain in an area for feeding (Richardson et al., 1995; National Research Council, 2003; Wartzok et al., 2004; Southall et al., 2007). Indicators of disturbance may include sudden changes in the animal's behavior or avoidance of the affected area. A marine mammal may show signs that it is startled by the noise and/or it may swim away from the sound source and avoid the area. Increased swimming speed, increased surfacing time, and cessation of foraging in the affected area would indicate disturbance or discomfort.

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway et al., 1997; Finneran et al., 2003) and an increase in the respiration rate of harbor porpoises (Kastelein et al., 2013). Observed responses of wild marine mammals to loud pulsed sound sources (typically including seismic guns or acoustic harassment devices and pile driving) have been varied, but these responses often consist of avoidance behavior or other behavioral changes that suggest discomfort (Wartzok et al., 2004; Nowacek et al., 2007).

A comprehensive review of acoustic and behavioral responses to noise exposure by Nowacek et al. (2007) concluded that one of the most common behavioral responses is displacement. To assess the significance of displacements, it is necessary to know the areas to which the animals relocate, the quality of that habitat, and the duration of the displacement in the event that they return to the pre-disturbance area. Short-term displacement may not be of great concern unless the disturbance happens repeatedly. Similarly, long-term displacement may not be of concern if adequate replacement habitat is available. Effects of activities will be experienced by individual marine mammals but will not cause population-level impacts or affect the continued survival of the species.

7.2 Conclusions Regarding Impacts to Species or Stocks

Individual marine mammals may be exposed to underwater noise, which may result in Level B behavioral harassment. Any marine mammals that are exposed (harassed) may change their normal behavior patterns (e.g., swimming speed, foraging habits) or be temporarily displaced from the underwater investigation area. Any exposures to Level B harassment will likely have only a minor effect on individuals and no effect on the population. Mitigation is expected to avoid most potential adverse underwater impacts to marine mammals from in-water detonation of MEC. Nevertheless, some exposure may be unavoidable. Section 6 presents the expected level of unavoidable exposure (defined as acoustic harassment).

8 IMPACTS TO SUBSISTENCE USE

The anticipated impact of the activity on the availability of the species or stock of marine mammals for subsistence uses.

8.1 Subsistence Harvests by Northwest Treaty Indian Tribes

There are no relevant subsistence uses of marine mammals implicated by this action. Potential impacts resulting from the Proposed Action will be limited to individuals of marine mammal species located in the marine waters near the project and will be primarily limited to Level B harassment. For all species, no population impacts will result from the Proposed Action. Therefore, no impacts to the availability of species or stocks for subsistence use are expected.

This page intentionally left blank.

9 IMPACTS TO THE MARINE MAMMAL HABITAT AND THE LIKELIHOOD OF RESTORATION

The anticipated impact of the activity upon the habitat of the marine mammal populations, and the likelihood of restoration of the affected habitat.

Impacts to habitat will be temporary. They include increased human activity and noise levels; localized, minor impacts to water quality; and changes in prey availability near the individual underwater investigation sites. Impacts will not result in permanent impacts to habitats used directly by marine mammals.

9.1 Effects from Human Activity and Noise

Exiting human activity and underwater noise levels could increase temporarily during underwater investigations. Marine mammals in and near the activity area likely encounter vessel traffic associated with both USMC and non-USMC activities.

Several studies have linked vessel traffic with behavioral changes in marine mammals, although it is not well understood whether the presence and activity of the vessels, the vessel noise produced, or a combination of these factors produces the changes (Kruse, 1991). The probability and significance of vessel and marine mammal interactions are dependent upon several factors, including numbers, types, and speeds of vessels; the regularity, duration, and spatial extent of activities; and the presence/absence and density of marine mammals. During investigation activity, additional vessels may operate in the underwater investigation area but will operate at low speeds. Therefore, effects are expected to be limited to short-term behavioral changes and are not expected to rise to the level of take or harassment as defined under the MMPA.

9.2 Impacts on Water Quality

Temporary and localized reduction in water quality will occur as a result of underwater investigation activities. Most of this effect will occur during intrusive investigation using hand-digging techniques when bottom sediments are disturbed. Effects to turbidity and sedimentation are expected to be short-term, minor, and localized. Turbidity will return to normal levels within minutes to hours after intrusive investigation. Turbidity and sedimentation levels are not anticipated to result in increases that are significant for marine mammals or their forage base.

9.3 Impacts on Prey Base (Fish)

The greatest impact to prey species would occur in the unlikely situation of in-water detonation of MEC and result from behavioral disturbances. Secondary impacts include benthic habitat displacement and resuspension of sediments. It is possible that prey species may alter their normal behaviors, and these alterations could include startle response and avoidance of the immediate activity area. Thus, prey availability for marine mammal predators within an undetermined portion of the areas near the project could be reduced temporarily in localized areas during investigation. However, with the minimization measures that will be implemented, the effect to the overall marine mammal fish forage base will be minimized. Therefore, adverse effects to the marine mammal prey base will be insignificant and will not rise to the level of MMPA take.

9.4 Likelihood of Habitat Restoration

In-water activities associated with the Proposed Action are not likely to have a permanent adverse effect on any marine habitat or population of prey species.

10 IMPACTS TO MARINE MAMMALS FROM LOSS OR MODIFICATION OF HABITAT

The anticipated impact of the loss or modification of the habitat on the marine mammal population involved.

The proposed activities are not expected to have any habitat-related effects that could cause significant or long-term consequences for populations of marine mammals because all activities will be temporary. In-water detonation of MEC will affect marine mammal habitats indirectly through temporary, localized impacts on prey abundance and availability. The most important impacts on marine fish species consumed by marine mammals will result from potential injury and behavioral disturbance to fish species during detonation in the water. Information provided in Section 9 indicates there may be temporary impacts, but those impacts will be minimized through avoidance and mitigation measures and limited to the immediate area surrounding the MEC.

This page intentionally left blank.

11 MITIGATION MEASURES

The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance

The USMC will employ BMPs and minimization measures and implement procedural mitigation listed in this section to avoid and minimize impacts to marine mammals, their habitats, and forage species.

11.1 Minimization Measures for Marine Mammals

The following mitigation measures will be implemented to avoid marine mammal exposure to Level A injurious noise levels generated from in-water detonation of MEC and to reduce to the lowest extent practicable exposure to Level B disturbance noise levels. The USMC or approved contractor will conduct briefings between investigation of the Area of Concern and deep water areas with supervisors and crews, the marine mammal monitoring team, and USMC staff prior to the start of all activities and when new personnel join the work, to explain responsibilities, communication procedures, and marine mammal procedural mitigation.

11.2 Procedural Mitigation

Procedural mitigation generally involves (1) the use of one or more trained Lookouts to diligently observe for specific biological resources within a mitigation zone, (2) requirements for Lookouts to immediately communicate sightings of specific biological resources to the appropriate watch station for information dissemination, and (3) requirements for the watch station to implement mitigation (e.g., halt an activity) until certain recommencement conditions have been met. Procedural mitigation for explosive mine neutralization activities involving Navy divers is outlined in Table 11-1, and similar procedures will be employed for this activity.

11.3 Small Boat Vessel and Underwater Investigation Operating Procedures

While in transit, vessel will be alert at all times, use caution, and proceed at a “safe speed” so that the vessel can take proper and effective action to avoid a collision with any marine mammal and can be stopped within a safe distance appropriate to the prevailing circumstances and conditions. When whales have been sighted in the area, vessels will increase vigilance and take reasonable and practicable actions to avoid collisions and activities that may result in close interaction with marine mammals.

Operators of small boats during underwater investigations will be knowledgeable of marine mammals, protected species, and visual clues related to the presence of marine mammals and protected species. All members of small boat crews will be required to take the Marine Species Awareness Training maintained and promoted by the Navy, and work within the underwater investigation area would cease upon discovery of a marine mammal as identified by marine mammal observers. Work would not continue until the marine mammal moves out of the mitigation zones.

Table 11-1. Procedural Mitigation for Explosive Mine Neutralization Activities Involving Divers

Procedural Mitigation Description
Stressor or Activity Mine neutralization activities involving divers
Number of Lookouts and Observation Platform • 2 Lookouts (two small boats with one Lookout each, or one Lookout on a small boat when implementing the smaller mitigation zone) • 4 Lookouts (two small boats with two Lookouts each) when implementing the larger mitigation zone
Mitigation Zone Size and Mitigation Requirements • The USMC will not set time-delay firing devices (0.1–20 pound [lb.] net explosive weight) to exceed 10 minutes. • 500 yards around the detonation site during activities under positive control using 0.1–20 lb. net explosive weight, or • 1,000 yards around the detonation site during all activities using time-delay fuses (0.1–20 lb. net explosive weight) and during activities under positive control using 21–60 lb. net explosive weight charges: o Prior to the start of the activity (e.g., when maneuvering on station for activities under positive control; 30 minutes for activities using time-delay firing devices), observe for floating vegetation and marine mammals; if resource is observed, do not commence detonations or fuse initiation. o During the activity, observe for marine mammals; if resource is observed, cease detonations or fuse initiation. o All divers placing the charges on mines will support the Lookouts while performing their regular duties and will report all marine mammal sightings to their supporting small boat or Range Safety Officer. o To the maximum extent practicable depending on mission requirements, safety, and environmental conditions, boats will position themselves near the mid-point of the mitigation zone radius (but outside of the detonation plume and human safety zone), will position themselves on opposite sides of the detonation location (when two boats are used), and will travel in a circular pattern around the detonation location with one Lookout observing inward toward the detonation site and the other observing outward toward the perimeter of the mitigation zone. o To allow a sighted marine mammal to leave the mitigation zone, the Navy will not recommence detonations or fuse initiation until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the detonation site; or (3) the mitigation zone has been clear from any additional sightings for 10 minutes during activities under positive control with aircraft that have fuel constraints, or 30 minutes during activities under positive control with aircraft that are not typically fuel constrained and during activities using time-delay firing devices. • After completion of an activity using time-delay firing devices, observe for marine mammals for 30 minutes; if any injured or dead resources are observed, follow established incident reporting procedures.

Source: U.S. Department of the Navy, 2017a

12 EFFECTS ON ARCTIC SUBSISTENCE HUNTING AND PLAN OF COOPERATION

Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, the applicant must submit either a plan of cooperation or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses. A plan must include the following:

(i) A statement that the applicant has notified and provided the affected subsistence community with a draft plan of cooperation

(ii) A schedule for meeting with the affected subsistence communities to discuss proposed activities and to resolve potential conflicts regarding any aspects of either the operation or the plan of cooperation

(iii) A description of what measures the applicant has taken and/or will take to ensure that proposed activities will not interfere with subsistence whaling or sealing

(iv) What plans the applicant has to continue to meet with the affected communities, both prior to and while conducting activity, to resolve conflicts and to notify the communities of any changes in the operation

Not applicable. The Proposed Action will take place within the New River, North Carolina, and no activities will take place in or near a traditional Arctic subsistence hunting area. Therefore, there are no relevant subsistence uses of marine mammals implicated by this project.

This page intentionally left blank

13 MONITORING AND REPORTING EFFORTS

The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking, or impacts on populations of marine mammals that are expected to be present while conducting activities and the suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that will be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding.

The USMC is committed to demonstrating environmental stewardship while executing its National Defense Mission and complying with the suite of federal environmental laws and regulations. As a complement to the USMC's commitment to avoiding and reducing impacts of the Proposed Action through mitigation (Section 11, Mitigation Measures), the USMC will undertake reporting efforts to track compliance with take authorizations and help investigate the effectiveness of implemented mitigation measures.

13.1 Coordination

The USMC will conduct briefings with the construction supervisors, the crew, and marine mammal observer(s) prior to the start of underwater investigations to discuss marine mammal monitoring protocol and requirement to halt work. The USMC will coordinate monitoring efforts with the Navy's Integrated Comprehensive Monitoring Program (U.S. Department of the Navy, 2010). With this level of coordination in the region of activity, the USMC will be able to get real-time information on the presence or absence of marine mammals before starting any underwater investigations in the New River.

13.2 Integrated Comprehensive Monitoring Program

The Integrated Comprehensive Monitoring Program provides the overarching framework for coordination of the Navy's marine species monitoring efforts and serves as a planning tool to focus Navy monitoring priorities pursuant to ESA and MMPA requirements. The purpose of the Integrated Comprehensive Monitoring Program is to coordinate monitoring efforts across all regions and to allocate the most appropriate level and type of monitoring effort for each study area based on a set of standardized objectives, regional expertise, and resource availability. Although the Integrated Comprehensive Monitoring Program does not identify specific field work or individual projects, it is designed to provide a flexible, scalable, and adaptable framework using adaptive management and strategic planning processes that periodically assess progress and reevaluate objectives.

13.3 Reporting Plan

The USMC will provide NMFS with a draft monitoring report within 90 days of the conclusion of monitoring. This report will detail the monitoring protocol, summarize the data recorded during monitoring, and estimate the number of marine mammals that may have been harassed. If comments are received from the Regional Administrator on the draft report, a final report will be submitted to NMFS within 30 days thereafter. If no comments are received from NMFS, the draft report will be considered to be the final report.

This page intentionally left blank.

14 RESEARCH EFFORTS

Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

In-water noise generated by detonation of MEC at the project site is the primary issue of concern relative to local marine mammals. Explosive noise will be monitored during the project, in order to collect data.

As described in Section 13, the USMC will coordinate with the Navy's Integrated Comprehensive Monitoring Program to gather information on the location of marine mammals prior to initiating underwater investigations. Marine mammal monitoring will be conducted to collect information on presence of marine mammals within the mitigation zones for this project.

This page intentionally left blank.

15 REFERENCES

Aissi, M., A. Celona, G. Comparetto, R. Mangano, M. Wurtz, & A. Moulins. (2008). Large-scale seasonal distribution of fin whales (*Balaenoptera physalus*) in the central Mediterranean Sea. *Journal of the Marine Biological Association of the United Kingdom, 88*, 1253–1261.

Au, W. W. L. (1993). *The Sonar of Dolphins* (pp. 277). New York, NY: Springer-Verlag.

Azzellino, A., S. Gaspari, S. Airoldi, & B. Nani. (2008). Habitat use and preferences of cetaceans along the continental slope and the adjacent pelagic waters in the western Ligurian Sea. *Deep Sea Research Part I: Oceanographic Research Papers, 55*(3), 296–323.

Baumgartner, M. F., & B. R. Mate. (2005). Summer and fall habitat of North Atlantic right whales (*Eubalaena glacialis*) inferred from satellite telemetry. *Canadian Journal of Fisheries and Aquatic Sciences, 62,* 527–543.

Best, P. B., J. L. Bannister, R. L. Brownell, & G. P. Donovan. (2001). Right whales: Worldwide status. *Journal of Cetacean Research and Management, 2*(309).

Best, P. B., R. A. Rademeyer, C. Burton, D. Ljungblad, K. Sekiguchi, H. Shimada, D. Thiele, D. Reeb, & D. S. Butterworth. (2003). The abundance of blue whales on the Madagascar Plateau, December 1996. *Journal of Cetacean Research and Management, 5*(3), 253–260.

Best, B. D., P. N. Halpin, A. J. Read, E. Fujioka, C. P. Good, E. A. LaBrecque, R. S. Schick, J. J. Roberts, L. J. Hazen, S. S. Qian, D. L. Palka, L. P. Garrison, & W. A. McLellan. (2012). Online cetacean habitat modeling system for the U.S. east coast and Gulf of Mexico. *Endangered Species Research, 18*, 1–15.

Bettridge, S., C. S. Baker, J. Barlow, P. J. Clapham, M. Ford, D. Gouveia, D. K. Mattila, R. M. Pace, P. E. Rosel, G. K. Silber, & P. R. Wade. (2015). *Status review of the humpback whale (Megaptera novaeangliae) under the Endangered Species Act* (NOAA Technical Memorandum NMFS-SWFSC-540). La Jolla, CA: Southwest Fisheries Science Center.

Brown, M. W., & M. K. Marx. (2000). *Surveillance, monitoring and management of North Atlantic right whales, Eubalaena glacialis, in Cape Cod Bay, Massachusetts: January to mid-May, 2000*. Division of Marine Fisheries, Commonwealth of Massachusetts.

Calambokidis, J., G. H. Steiger, J. M. Straley, L. M. Herman, S. Cerchio, D. R. Salden, J. Urban R., J. K. Jacobsen, O. von Ziegesar, K. C. Balcomb, C. M. Gabriele, M. E. Dahlheim, S. Uchida, G. Ellis, Y. Miyamura, P. Ladron De Guevara, M. Yamaguchi, F. Sato, S. A. Mizroch, L. Schlender, K. Rasmussen, J. Barlow, & T. J. Quinn, II. (2001). Movements and population structure of humpback whales in the North Pacific. *Marine Mammal Science, 17*(4), 769–794.

Caswell, H., S. Brault, & M. Fujiwara. (1999). Declining survival probability threatens the North Atlantic right whale. *Proceedings of the National Academy of Sciences, 96*, 3308–3313.

Cetacean and Turtle Assessment Program. (1982). *A characterization of marine mammals and turtles in the Mid and North Atlantic areas of the U.S. Outer Continental Shelf*. (Contract Number AA551-CT8-48). Kingston, RI: University of Rhode Island, Graduate School of Oceanography.

CH2M. (2015a). Underwater MEC Investigation of the New River within the K-2 Impact Area. November.

CH2M. (2015b). K-2 Impact Area Underwater MEC Investigation of New River Work Plan. February.

CH2M. (2018). Alternatives Analysis Report K-2 Range Impact Area of the New River. Final. March.

Christian, E. A., & J. B. Gaspin. (1974). *Swimmer safe standards from underwater explosions. Navy Science Assistance Program Project No. PHP-11-73*. White Oak, MD: Naval Ordnance Laboratory.

Clapham, P. J., & D. K. Mattila. (1990). Humpback whale songs as indicators of migration routes. *Marine Mammal Science, 6*(2), 155–160.

Clapham, P. J., S. B. Young, & R. L. Brownell, Jr. (1999). Baleen whales: Conservation issues and the status of the most endangered populations. *Mammal Review, 29*, 35–60.

Clapham, P. J. (2000). The humpback whale: seasonal feeding and breeding in a baleen whale. In J. Mann, R. C. Connor, P. L. Tyack & H. Whitehead (Eds.), *Cetacean Societies: field studies of dolphins and whales* (pp. 173–196). University of Chicago Press.

Craig, A. S., & L. M. Herman. (2000). Habitat preferences of female humpback whales, *Megaptera novaeangliae,* in the Hawaiian Islands are associated with reproductive status. *Marine Ecology Progress Series, 193*, 209–216.

Curry, B. E., & J. Smith. (1997). Phylogeographic structure of the bottlenose dolphin (*Tursiops truncatus*): Stock identification and implications for management. In A. E. Dizon, S. J. Chivers & W. F. Perrin (Eds.), *Molecular Genetics of Marine Mammals* (pp. 227–247). Lawrence, KS: Society for Marine Mammalogy.

Department of Defense Explosive Safety Board (DDESB). (2004). *Minimum qualifications for unexploded ordnance (UXO) technicians and personnel*. Department of Defense Explosive Safety Board (DDESB) Technical Bulletin 18. December.

Dolphin, W. F. (2000). Electrophysiological measures of auditory processing in odontocetes. In: W.W.L. Au, A.N. Popper, & R.R. Fay (Eds.). *Hearing by Whales and Dolphins*. Springer Handbook of Auditory Research series, New York: Springer-Verlag.

Duffield, D. A., S. H. Ridgway, & L. H. Cornell. (1983). Hematology distinguishes coastal and offshore forms of dolphins (Tursiops). *Canadian Journal of Zoology, 61,* 930–933.

Edwards, E. F., C. Hall, T. J. Moore, C. Sheredy, & J. V. Redfern. (2015). Global distribution of fin whales (*Balaenoptera physalus*) in the post-whaling era (1980–2012). *Mammal Review, 45*, 197–214.

Ersts, P. J., & H. C. Rosenbaum. (2003). Habitat preference reflects social organization of humpback whales (*Megaptera novaeangliae*) on a wintering ground. *Journal of Zoology, 260*(4), 337–345.

Finneran, J. J., C. E. Schlundt, R. Dear, D. A. Carder, & S. H. Ridgway. (2002). Temporary shift in masked hearing thresholds in odontocetes after exposure to single underwater impulses from a seismic watergun. *The Journal of Acoustical Society of America, 111*(6), 2929–2940.

Finneran, J. J., R. Dear, D. A. Carder, & S. H. Ridgway. (2003). Auditory and behavioral responses of California sea lions (*Zalophus californianus*) to single underwater impulses from an arc-gap transducer. *The Journal of Acoustical Society of America, 114*(3), 1667–1677.

Foley, H., Z. Swaim, D. Waples, & A. Read. (2015). *Deep divers and satellite tagging projects in the Virginia Capes OPAREA - Cape Hatteras, NC: January 2014–December 2014*. Virginia Beach, VA: U.S. Fleet Forces Command.

Fulling, G. L., K. D. Mullin, & C. W. Hubard. (2003). Abundance and distribution of cetaceans in outer continental shelf waters of the U.S. Gulf of Mexico. *Fishery Bulletin, 101*, 923–932.

Griffin, R. B., & N. J. Griffin. (2003). Distribution, habitat partitioning, and abundance of Atlantic spotted dolphins, bottlenose dolphins, and loggerhead sea turtles on the eastern Gulf of Mexico continental shelf. *Gulf of Mexico Science, 1,* 23–34.

Gubbins, C. (2002). Association patterns of resident bottlenose dolphins (*Tursiops truncatus*) in a South Carolina estuary. *Aquatic Mammals, 28*(24–31).

Gubbins, C., M. Caldwell, S. G. Barco, K. Rittmaster, N. Bowles, & V. Thayer. (2003). Abundance and sighting patterns of bottlenose dolphins (*Tursiops truncatus*) at four northwest Atlantic coastal sites. *Journal of Cetacean Research and Management, 5*(2), 141–147.

Hamazaki, T. (2002). Spatiotemporal prediction models of cetacean habitats in the mid-western North Atlantic Ocean (from Cape Hatteras, North Carolina, U.S.A. to Nova Scotia, Canada). *Marine Mammal Science, 18*(4), 920–939.

Harris, C. (1998). Handbook of acoustical measurements and noise control. (3rd ed.). TX: McGraw Hill.

Heithaus, M. R., & L. M. Dill. (2008). Feeding strategies and tactics. In W. F. Perrin, B. Wursig, & J. G. M. Thewissen (Eds.), *Encyclopedia of Marine Mammals* (2nd ed., pp. 1100–1103). Academic Press.

Hersh, S. L., & D. A. Duffield. (1990). Distinction between northwest Atlantic offshore and coastal bottlenose dolphins based on hemoglobin profile and morphometry. In S. Leatherwood & R. R. Reeves (Eds.), *The Bottlenose Dolphin* (pp. 129–139). San Diego, CA: Academic Press.

Hodge, L. E. W. (2011). *Monitoring Marine Mammals in Onslow Bay, North Carolina, Using Passive Acoustics*. (Doctor of Philosophy Disseration). Duke University.

Hodge, K. B., C. A. Muirhead, J. L. Morano, C. W. Clark, & A. N. Rice. (2015). North Atlantic right whale occurrence near wind energy areas along the mid-Atlantic US coast: implications for management. *Endangered Species Research, 28*, 225–234.

Hodge, L., & A. Read. (2013). *Passive acoustic monitoring for marine mammals at site A in Jacksonville, FL, August 2010 – January 2011*. Norfolk, VA: Marine Physical Laboratory Scripps Institution of Oceanography and Duke University Marine Laboratory.

Hodge, L., & A. Read. (2015). *Passive acoustic monitoring for marine mammals at Site E in Onslow Bay, October 2012 – June 2013*. Norfolk, Virginia: Prepared by Duke University Marine Laboratory, Beaufort, North Carolina.

Hodge, L., J. Stanistreet, & A. Read. (2014). *Passive acoustic monitoring for cetaceans in Navy OPAREAS off the U.S. Atlantic Coast, January 2013 – December 2013*. Norfolk, VA: Duke University Marine Laboratory.

Horwood, J. (1987). *The sei whale: population biology, ecology, and management*. New York, NY: Croom Helm.

Horwood, J. (2009). Sei whale, *Balaenoptera borealis*. In W. F. Perrin, B. Wursig & J. G. M. Thewissen (Eds.), *Encyclopedia of Marine Mammals* (2nd ed., pp. 1001–1003). San Diego, CA: Academic Press.

Jefferson, T. A., M. A. Webber, & R. L. Pitman. (2008). *Marine mammals of the world: a comprehensive guide to their identification*. London, UK: Elsevier.

Jefferson, T. A., M. A. Webber, & R. L. Pitman. (2015). *Marine mammals of the world: a comprehensive guide to their identification* (2nd ed.): Academic Press.

Kastelein, R. A., D. van Heerden, R. Gransier, & L. Hoek. (2013). Behavioral responses of a harbor porpoise (*Phoceoena phocoena*) to playbacks of broadband pile driving sounds. *Marine Environmental Research, 92*, 206–214.

Katona, S. K., and J. A. Beard. 1990. Population size, migrations, and feeding aggregations of the humpback whale (*Megaptera novaeangliae*) in the western North Atlantic Ocean. Rep. int. Whal. Commn. Special Issue 12: 295-306.

Kenney, R. D. (1990). Bottlenose dolphins off the Northeastern United States. In S. Leatherwood & R. R. Reeves (Eds.), *The Bottlenose Dolphin* (pp. 369–386). San Diego, CA: Academic Press.

Ketten, D. R. (2000). Cetacean Ears. In W. Au, A. N. Popper & R. R. Fay (Eds.), *Hearing by whales and dolphins* (1st ed., pp. 43–108). New York, NY: Springer-Verlag.

Ketten, D. R., J. Lien, & S. Todd. (1993). Blast injury in humpback whale ears: Evidence and implications *The Journal of Acoustical Society of America, 94*(3), 1849–1850.

King, L. (2011). Sei whale found stranded in Virginia Beach. *The Virginian-Pilot*. Retrieved from http://pilotonline.com/news/sei-whale-found-stranded-in-virginia-beach/article_2a66b71b-ff9c-506d-a621-9291983a3c7c.html

Knowlton, A. R., S. D. Kraus, & R. D. Kenney. (1994). Reproduction in North Atlantic right whales (*Eubalaena glacialis*). *Canadian Journal of Zoology, 72*, 1297–1305.

Kraus, S. D., M. W. Brown, H. Caswell, C. W. Clark, M. Fujiwara, P. K. Hamilton, R. D. Kenney, A. R. Knowlton, S. Landry, C. A. Mayo, W. C. McLellan, M. J. Moore, D. P. Nowacek, D. A. Pabst, A. J. Read, & R. M. Rolland. (2005). North Atlantic right whales in crisis. *Science, 309*(5734), 561–562.

Kruse, S. (1991). The interactions between killer whales and boats in Johnstone Strait, B.C. In K. Pryor & K. S. Norris (Eds.), *Dolphin Societies: Discoveries and Puzzles* (pp. 149–159). Berkeley and Los Angeles, CA: University of California Press.

LaBrecque, E., C. Curtice, J. Harrison, S. M. Van Parijs, & P. N. Halpin. (2015a). Biologically important areas for cetaceans within U.S. waters—East Coast region. *Aquatic Mammals, 41*(1), 17–29.

LaBrecque, E., C. Curtice, J. Harrison, S. M. Van Parijs, & P. N. Halpin. (2015b). Biologically important areas for cetaceans within U.S. waters—Gulf of Mexico region. *Aquatic Mammals, 41*(1), 30–38.

Lucke, K., U. Siebert, P. A. Lepper, & M. A. Blanchet. (2009). Temporary shift in masked hearing thresholds in a harbor porpoise (*Phocoena phocoena*) after exposure to seismic airgun stimuli. *Journal of Acoustical Society of America, 125*(6), 4060–4070.

Masaki, Y. (1976). Biological studies on the North Pacific sei whale. *Bulletin of the Far Seas Fisheries Research Laboratory, 14*, 1–104.

Masaki, Y. (1977). The separation of the stock units of sei whales in the North Pacific. *Reports of the International Whaling Commission, Special Issue 1*, 71–79.

Mate, B. R., S. L. Nieukirk, & S. D. Kraus. (1997). Satellite-monitored movements of the northern right whale. *The Journal of Wildlife Management, 61*(4), 1393–1405.

McLellan, W., H. Foley, R. McAlarney, E. Cummings, Z. Swaim, L. Hodge, J. Stanistreet, K. Urian, D. Waples, C. Paxton, D. Pabst, J. Bell, & A. Read. (2014). *Patterns of cetacean species occurrence, distribution and density at three sites along the continental shelf break of the U.S. Atlantic coast*. Paper presented at the Southeast and Mid-Atlantic Marine Mammal Symposium, University of North Carolina Wilmington.

Mead, J. G., & C. W. Potter. (1995). Recognizing two populations of the bottlenose dolphin (*Tursiops truncatus*) off the Atlantic Coast of North America: Morphologic and ecologic considerations. *IBI Reports, 5*, 31–44.

Mooney, T. A., P. E. Nachtigall, & S. Vlachos. (2009). Sonar-induced temporary hearing loss in dolphins. *Biology Letters, 5*(4), 565–567.

Mullin, K. D., & G. L. Fulling. (2003). Abundance of cetaceans in the southern U.S. North Atlantic Ocean during summer 1998. *Fishery Bulletin, 101*(3), 603–613.

Mullin, K. D., & G. L. Fulling. (2004). Abundance of cetaceans in the oceanic northern Gulf of Mexico, 1996–2001. *Marine Mammal Science, 20*(4), 787–807.

National Marine Fisheries Service. (1998). *Recovery plan for the blue whale (Balaenoptera musculus)*. Silver Spring, MD: National Marine Fisheries Service, Office of Protected Resources.

National Marine Fisheries Service. (2005). Recovery Plan for the North Atlantic Right Whale (Eubalaena glacialis). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service. (2009). *Sperm whale (Physeter macrocephalus): 5-Year Review: Summary and Evaluation*. Silver Spring, MD: National Marine Fisheries Service, Office of Protected Resources.

National Marine Fisheries Service. (2010a). *Recovery plan for the fin whale (Balaenoptera physalus)*. National Marine Fisheries Service, Silver Spring, MD. 121 pp.

National Marine Fisheries Service. (2010b*). Recovery plan for the sperm whale (Physeter macrocephalus)*. National Marine Fisheries Service, Silver Spring, MD. 165pp

National Marine Fisheries Service. (2011). *Final recovery plan for the sei whale (Balaenoptera borealis)*. Silver Spring, MD: National Marine Fisheries Service, Office of Protected Resources.

National Marine Fisheries Service. (2015). *Sperm whale (Physeter macrocephalus) 5-year review: summary and evaluation, June 2015*. Silver Spring, MD.

National Marine Fisheries Service. (2018). *2018 Revisions to: Technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing (Version 2.0): Underwater thresholds for onset of permanent and temporary threshold shifts*. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 pp.

National Research Council. (2003). *Ocean Noise and Marine Mammals*. Washington, DC: National Academies Press

National Research Council. (2005). *Marine mammal populations and ocean noise*. Washington, DC: National Academies Press.

Nowacek, D. P., L. H. Thorne, D. W. Johnston, & P. L. Tyack. (2007). Responses of cetaceans to anthropogenic noise. *Mammal Review, 37*(2), 81–115.

O'Keeffe, D. J., & G. A. Young. (1984). *Handbook on the environmental effects of underwater explosions*. Silver Spring, MD: U.S. Navy, Naval Surface Weapons Center (Code R14).

Olsen, E., W. P. Budgell, E. Head, L. Kleivane, L. Nøttestad, P. Prieto, M. A. Silva, H. Skov, G. A. Víkingsson, G. Waring, & N. Øien. (2009). First satellite-tracked long-distance movement of a sei whale (*Balaenoptera borealis*) in the North Atlantic. *Aquatic Mammals, 35*(3), 313–318.

Oswald, J. N., T. F. Norris, T. M. Yack, E. L. Ferguson, A. Kumar, J. Nissen, & J. Bell. (2016). Patterns of occurrence and marine mammal acoustic behavior in relation to navy sonar activity off Jacksonville, Florida. *Adv Exp Med Biol, 875*, 791–799.

Panigada, S., M. Zanardelli, M. Mackenzie, C. Donovan, F. Melin, & P. S. Hammond. (2008). Modelling habitat preferences for fin whales and striped dolphins in the Pelagos Sanctuary (Western Mediterranean Sea) with physiographic and remote sensing variables. *Remote Sensing of Environment, 112*(8), 3400–3412.

Payne, P. M., D. W. Heinemann, & L. A. Selzer. (1990). *A distributional assessment of cetaceans in shelf/shelf-edge and adjacent slope waters of the Northeastern United States based on aerial and shipboard surveys, 1978–1988*. Woods Hole, MA: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center.

Payne, R., & D. Webb. (1971). Orientation by means of long range signaling in baleen whales. *Annals New York Academy of Sciences, 188*, 110–141.

Perrin, W. F. (2008). Atlantic spotted dolphin, *Stenella frontalis*. In W. F. Perrin, B. Wursig & J. G. M. Thewissen (Eds.), *Encyclopedia of Marine Mammals* (2nd ed., pp. 54–56). Academic Press.

Perrin, W. F., B. Würsig, & J. G. M. E. Thewissen. (2009). *Encyclopedia of marine mammals* (2nd ed.). San Diego, CA: Academic Press.

Perry, S. L., D. P. DeMaster, & G. K. Silber. (1999). The great whales: History and status of six species listed as Endangered under the U.S. Endangered Species Act of 1973. *Marine Fisheries Review, 61*(1), 1–74.

Prieto, R., M. A. Silva, G. T. Waring, & J. M. A. Goncalves. (2014). Sei whale movements and behaviour in the North Atlantic inferred from satellite telemetry. *Endangered Species Research, 26*, 103-113.

Ramp, C., J. Delarue, M. Berube, P. S. Hammond, & R. Sears. (2014). Fin whale survival and abundance in the Gulf of St. Lawrence, Canada. *Endangered Species Research, 23*, 125-132.

Read, A. J., S. Barco, J. Bell, D. L. Borchers, M. L. Burt, E. W. Cummings, J. Dunn, E. M. Fougeres, L. Hazen, L. E. W. Hodge, A.-M. Laura, R. J. McAlarney, P. Nilsson, D. A. Pabst, C. G. M. Paxton, S. Z. Schneider, K. W. Urian, D. M. Waples, & W. A. McLellan. (2014). Occurrence, distribution, and abundance of cetaceans in Onslow Bay, North Carolina, USA. *Journal of Cetacean Research and Management, 14,* 23–35.

Reeves, R. R., T. D. Smith, R. L. Webb, J. Robbins, & P. J. Clapham. (2002). Humpback and fin whaling in the Gulf of Maine from 1800 to 1918. *Marine Fisheries Review, 64*(1), 1–12.

Rice, D. W. (1989). Sperm whale, *Physeter macrocephalus* Linnaeus, 1758. In S. H. Ridgway & R. Harrison (Eds.), *Handbook of Marine Mammals, Volume 4: River dolphins and the larger toothed whales* (Vol. 4, pp. 177–234). San Diego, CA: Academic Press

Rice, D. W. (1998). *Marine mammals of the world: Systematics and distribution* (Society for Marine Mammalogy Special Publication). Lawrence, KS: Society for Marine Mammalogy.

Richardson, W. J., C. R. Greene, Jr., C. I. Malme, & D. H. Thomson. (1995). *Marine Mammals and Noise*. San Diego, CA: Academic Press.

Ridgway, S. H., D. A. Carder, R. R. Smith, T. Kamolnick, C. E. Schlundt, & W. R. Elsberry. (1997). *Behavioral responses and temporary shift in masked hearing threshold of bottlenose dolphins, Tursiops truncatus, to 1-second tones of 141 to 201 dB re 1 µPa*. (Technical Report 1751, Revision 1). San Diego, CA: U.S. Department of Navy, Naval Command, Control and Ocean Surveillance Center, RDT&E Division.

Simpert, A. K., T. V. N. Cole, R. M. Pace, & P. J. Clapham. (2003). *Distributions of four baleen whale species in the northwest Atlantic Ocean based on large-scale aerial survey data*. Paper presented at the Fifteenth Biennial Conference on the Biology of Marine Mammals, Greensboro, NC. Presentation.

Smultea, M. A. (1994). Segregation by humpback whale (*Megaptera novaeangliae*) cows with a calf in coastal habitat near the island of Hawaii. *Canadian Journal of Zoology, 72*, 805–811.

Smultea, M. A., T. A. Jefferson, & A. M. Zoidis. (2010). Rare sightings of a Bryde's whale (*Balaenoptera edeni*) and Sei whales (*B. borealis*) (Cetacea: Balaenopteridae) northeast of Oahu, Hawaii. Pacific Science, 64(3), 449–457

Southall, B. L., A. E. Bowles, W. T. Ellison, J. J. Finneran, R. L. Gentry, C. R. Greene, Jr., D. Kastak, D. R. Ketten, J. H. Miller, P. E. Nachtigall, W. J. Richardson, J. A. Thomas, & P. L. Tyack. (2007). *Marine mammal noise exposure criteria: Initial scientific recommendations*. Aquatic Mammals, 33(4), 411–521.

Stanistreet, J. E., L. E. W. Hodge, D. P. Nowacek, J. T. Bell, J. A. Hildebrand, S. M. Wiggins, & A. J. Read. (2013, December 9 - 13, 2012). *Passive acoustic monitoring of beaked whales and other cetaceans off Cape Hatteras, North Carolina.* Paper presented at the 20th Biennial Conference on the Biology of Marine Mammals, Dunedin, New Zealand.

Stevick, P. T., J. Allen, P. J. Clapham, N. Friday, S. K. Katona, F. Larsen, J. Lien, D. K. Mattila, P. J. Palsboll, J. Sigurjonsson, T. D. Smith, N. Oien, & P. S. Hammond. (2003). North Atlantic humpback whale abundance and rate of increase four decades after protection from whaling. *Marine Ecology Progress Series, 258*, 263–273.

Straley, J. M. (1990). Fall and winter occurrence of humpback whales (*Megaptera novaeangliae*) in southeastern Alaska. *Reports of the International Whaling Commission, Special Issue 12*, 319–323.

Swaim, Z., H. Foley, D. Waples, K. Urian, & A. Read. (2014). *Protected species monitoring in Navy OPAREAS off the U.S. Atlantic coast, January 2013 – December 2013*. Department of the Navy, Norfolk, Virginia.

Swingle, W. M., M. C. Lynott, E. B. Bates, L. R. D'Eri, G. G. Lockhart, K. M. Phillips, & M. D. Thomas. (2014). *Virginia sea turtle and marine mammal stranding network 2013 grant report* (Final Report to the Virginia Coastal Zone Management Program, NOAA CZM Grant #NA12NOS4190122, Task #49). Virginia Beach, VA: Virginia Aquarium Foundation Stranding Response Program.

Swisdak, M. M., Jr., & P. E. Montaro. (1992). *Airblast and fragmentation hazards produced by underwater explosions*. Silver Springs, MD: Naval Surface Warfare Center.

U.S. Marine Corps Base Camp Lejeune. (2009). Environmental Assessment MCB Camp Lejeune Range Operations. January.

U.S. Marine Corps Base Camp Lejeune. (2019a). Environmental Assessment Unexploded Ordnance Removal from Waters Adjacent to K-2 Impact Area. In Progress.

U.S. Marine Corps Base Camp Lejeune. (2019b). Biological Assessment Unexploded Ordnance Removal from Waters Adjacent to K-2 Impact Area. In Progress.

U.S. Department of the Navy. (2010). *Navy Integrated Comprehensive Monitoring Plan*.

U.S. Department of the Navy. (2013). *Comprehensive exercise and marine species monitoring report for the U.S. Navy's Atlantic Fleet Active Sonar Training (AFAST) and Virginia Capes, Cherry Point, Jacksonville, and Gulf of Mexico Range Complexes 2009–2012*. Department of the Navy, United States Fleet Forces Command, Norfolk, Virginia.

U.S. Department of the Navy. (2017a). *Request for regulations and letters of authorization for the incidental taking of marine mammals resulting from U.S. Navy Training and Testing Activities in the Atlantic Fleet Training and Testing Study Area*. United States Fleet Forces Command, Norfolk, VA. Submitted to NMFS on August 4, 2017.

U.S. Department of the Navy. (2017b). *Quantitative analysis for estimating acoustic and explosive impacts to marine mammals and sea turtles*. Space and Naval Warfare System Command, Pacific and Naval Undersea Warfare Center, Newport.

U.S. Department of the Navy. (2017c). *U.S. Navy marine species density database Phase III for the Atlantic Fleet Training and Testing Study Area* (NAVFAC Atlantic Technical Report). Norfolk, VA.

Viada, S. T., Hammer, R. M., Racca, R., Hannay, D., Thompson, M. J., Balcom, B. J., & Phillips, N.W. (2008). Review of potential impacts to sea turtles from underwater explosive removal of offshore structures. *Environmental Impact Assessment Review, 28*(4), 267–285.

Waring, G. T., E. Josephson, K. Maze-Foley, & P. E. Rosel. (2010). *U.S. Atlantic and Gulf of Mexico marine mammal stock assessments–2010*. Woods Hole, MA: National Oceanic and Atmospheric Administration.

Waring, G. T., E. Josephson, K. Maze-Foley, & P. E. Rosel. (2013). *U.S. Atlantic and Gulf of Mexico marine mammal stock assessments–2012*. Woods Hole, MA: National Oceanic and Atmospheric Administration. Retrieved from http://www.nmfs.noaa.gov/pr/sars/region.htm.

Waring, G. T., E. Josephson, K. Maze-Foley, & P. E. Rosel, (Eds.). (2014). *U.S. Atlantic and Gulf of Mexico marine mammal stock assessments–2013*. Woods Hole, MA: US Department of Commerce, National Marine Fisheries Service.

Waring, G. T., K. Maze-Foley, & P. E. Rosel, (Eds.). (2015). *U.S. Atlantic and Gulf of Mexico marine mammal stock assessments–2014*.

Waring, G. T., E. Josephson, K. Maze-Foley, P. E. Rosel, (Eds.), B. Byrd, T. V. N. Cole, L. Engleby, L. P. Garrison, J. Hatch, A. Henry, S. C. Horstman, J. Litz, M. C. Lyssikatos, K. D. Mullin, C. Orphanides, R.

M. Pace, D. L. Palka, M. Soldevilla, & F. W. Wenzel. (2016). *U.S. Atlantic and Gulf of Mexico marine mammal stock assessments–2015*.

Wells, R. S., H. L. Rhinehart, P. Cunningham, J. Whaley, M. Baran, C. Koberna, & D. P. Costa. (1999). Long distance offshore movements of bottlenose dolphins. *Marine Mammal Science, 15*(4), 1098–1114.

Yelverton, J. T., D. R. Richmond, E. R. Fletcher, & R. K. Jones. (1973). *Safe distances from underwater explosions for mammals and birds*. Albuquerque, NM: Lovelace Foundation for Medical Education and Research.

This page intentionally left blank.

Appendix E
Coastal Consistency Determination

This page intentionally left blank.

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090.12
G-F/BEMD
JAN 0 6 2020

Mr. Daniel Govoni
Federal Consistency Coordinator
North Carolina Department of Environmental Quality
Division of Coastal Management
400 Commerce Avenue
Morehead City, NC 28557-3421

Dear Mr. Govoni:

Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ) proposes reduce the public safety risk associated with historical potential Unexploded Ordnance (UXO) located in the waters of the New River adjacent to the K-2 Impact Area at MCB CAMLEJ, North Carolina.

Enclosed is our consistency determination for the proposed project. In accordance with Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 as amended, MCIEAST-MCB CAMLEJ has determined that these activities are consistent with North Carolina's Coastal Management Program. This determination is based on the review of the enforceable policies of the State's coastal program, found in Chapter 7 of Title 15A of the North Carolina Administrative Code. MCIEAST-MCB CAMLEJ requests that the Division of Coastal Management concur with this consistency determination.

The point of contact for this project is Ms. Jessi Baker, Environmental Conservation Branch, G-F, at (910)451-4542 or email jessi.baker@usmc.mil.

Sincerely,

JOHN R. TOWNSON
Director, Environmental Management
By direction of the
Commanding General

Enclosure: CONSISTENCY DETERMINATION FOR MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE CAMP LEJEUNE, UNEXPLODED ORDNANCE REMOVAL FROM WATER ADJACENT TO THE K-2 IMPACT AREA, ONSLOW COUNTY, NORTH CAROLINA

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
BRAXTON C. DAVIS
Director

NORTH CAROLINA
Environmental Quality

March 6, 2020

Courtney Spears
Environmental Assessment Specialist
12 Post Lane
Camp Lejeune, NC 28547

SUBJECT: **CD20-010** Consistency Concurrence Concerning the U.S. Marine Corps Base (USMC) Camp Lejeune Proposed Unexploded Ordnance Removal (DCM#20200010)

Dear Mrs. Spears:

We received your consistency submission on January 16, 2020, concerning USMC proposal to remove unexploded ordnance from waters adjacent to the K-2 Impact area at Marine Corps Base Camp Lejeune, Onslow County, North Carolina.

North Carolina's coastal zone management program consists of, but is not limited to, the Coastal Area Management Act, the State's Dredge and Fill Law, Chapter 7 of Title 15A of North Carolina's Administrative Code, and the land use plan of the County and/or local municipality in which the proposed project is located. It is the objective of the Division of Coastal Management (DCM) to manage the State's coastal resources to ensure that proposed federal activities would be compatible with safeguarding and perpetuating the biological, social, economic, and aesthetic values of the State's coastal waters.

DCM has reviewed the submitted information pursuant to the management objectives and enforceable policies of Subchapters 7H and 7M of Chapter 7 in Title 15A of the North Carolina Administrative Code and concurs that the proposed activity is consistent with North Carolina's approved coastal management program. DCM recommends that all substrates be returned to original grade and contour after unexploded ordnances has been removed with no filling or excavation of Coastal Wetlands or Estuarine Waters.

Prior to the initiation of the activities described, the applicant should obtain any required State approvals or authorizations, including any authorizations required by the N.C. Division of Water Resources. Should the proposed action be modified further, a revised consistency determination could be necessary. This might take the form of either a supplemental consistency determination pursuant to 15 CFR 930.46, or a new consistency determination pursuant to 15 CFR 930.36. Likewise, if further project assessments reveal environmental effects not previously considered, a supplemental consistency certification may be

required. If you have any questions, please contact me at (252) 808-2808. Thank you for your consideration of the North Carolina Coastal Management Program.

Sincerely,

Daniel Govoni
Policy Analyst
Federal Consistency Coordinator

North Carolina Department of Environmental Quality | Division of Coastal Management
Morehead City Office | 400 Commerce Avenue | Morehead City, North Carolina 28557
252.808.2808

FEDERAL CONSISTENCY DETERMINATION FOR UNEXPLODED ORDNANCE REMOVAL FROM WATER ADJACENT TO K-2 IMPACT AREA AT MARINE CORPS BASE CAMP LEJEUNE, ONSLOW COUNTY NORTH CAROLINA

December 2019

The United States (U.S.) Marine Corps has determined that the proposed activity is consistent with the enforceable policies of North Carolina's approved Coastal Management Program. Marine Corps Base (MCB) Camp Lejeune is located in Onslow County, North Carolina.

1.0 FEDERAL AGENCY PURPOSE AND ACTION

The Marine Corps is proposing to reduce the public safety risk associated with historical potential unexploded ordnance (UXO) located in the waters of the New River adjacent to the K-2 Impact Area at MCB Camp Lejeune. The K-2 Impact Area encompasses multiple firing range fans and surface danger zones from land-based operational ranges on MCB Camp Lejeune that once extended into the New River but are now wholly contained on land. The firing range fans and surface danger zones are the ground and airspace areas designated for the containment of projectiles, fragments, debris and components from the firing, launching, or detonating of weapon systems to include explosives and demolitions. The K-2 Range is currently an operational range that supports a variety of ordnance from 5.56 millimeter (mm) to 84 mm projectiles, MK76 practice bombs, and MK80 series bombs. Historically, the K-2 Impact Area was used to accept a variety of artillery up to 155 mm projectiles. Although the range fans and danger zones have been modified so that they no longer overlap the New River, the K-2 Impact Area once included a buffer area affecting approximately 800 acres of the New River along approximately 5 miles of the west and south banks that is known to include unexploded projectiles, rockets, and grenades from past range operations (**Figure 1**).

During routine activities to clear UXO from the land area of the K-2 Range, UXO was identified along the beach and below the high water line, indicating the likely occurrence of UXO in the adjacent waters. In 2014-2015 under the Operational Range Clearance program, initial investigation of the water adjacent to the K-2 Range along the New River shoreline located a number of "anomalies" and determined many to be historical UXO. As part of the underwater investigations during 2014 to 2015, an explosive hazards evaluation was also performed. The explosive hazard evaluation determined that the situation in the waters adjacent to the K-2 Impact Area was "serious". The purpose of the Proposed Action is to reduce the volume of potential UXO (referred to as munitions and explosives of concern [MEC] or material potentially presenting an explosive hazard [MPPEH]) in the New River adjacent to the K-2 Impact Area. The need for the Proposed Action is to reduce the potential risks to public safety, marine species, and the environment.

The Proposed Action would include investigating three Areas of Concern (177 acres total) and an additional 40 acres of deep water outside of the Areas of Concern (**Figure 2**). The Areas of Concern have been identified where a higher density of MEC/MPPEH were identified during the 2014 to 2015 surveys. These high density areas indicate potential historical target areas. The Proposed Action would have an approximate in-water duration of 13 months, with work occurring during daylight hours.

Investigating the Areas of Concern would involve using surface water digital geophysical mapping (in the shallow water areas) and underwater digital geophysical mapping (UDGM) (in the deep waters) to identify "anomalies". Anomalies are metallic items on the riverbed that should not naturally be there and could include scrap metal, old crab pots, and MEC/MPPEH. Shallow water digital geophysical mapping uses a high sensitivity, high resolution metal detector that can detect both ferrous and non-ferrous metal. The system can be pushed or pulled as a trailer, by a person or vehicle, such as an all-terrain vehicle.

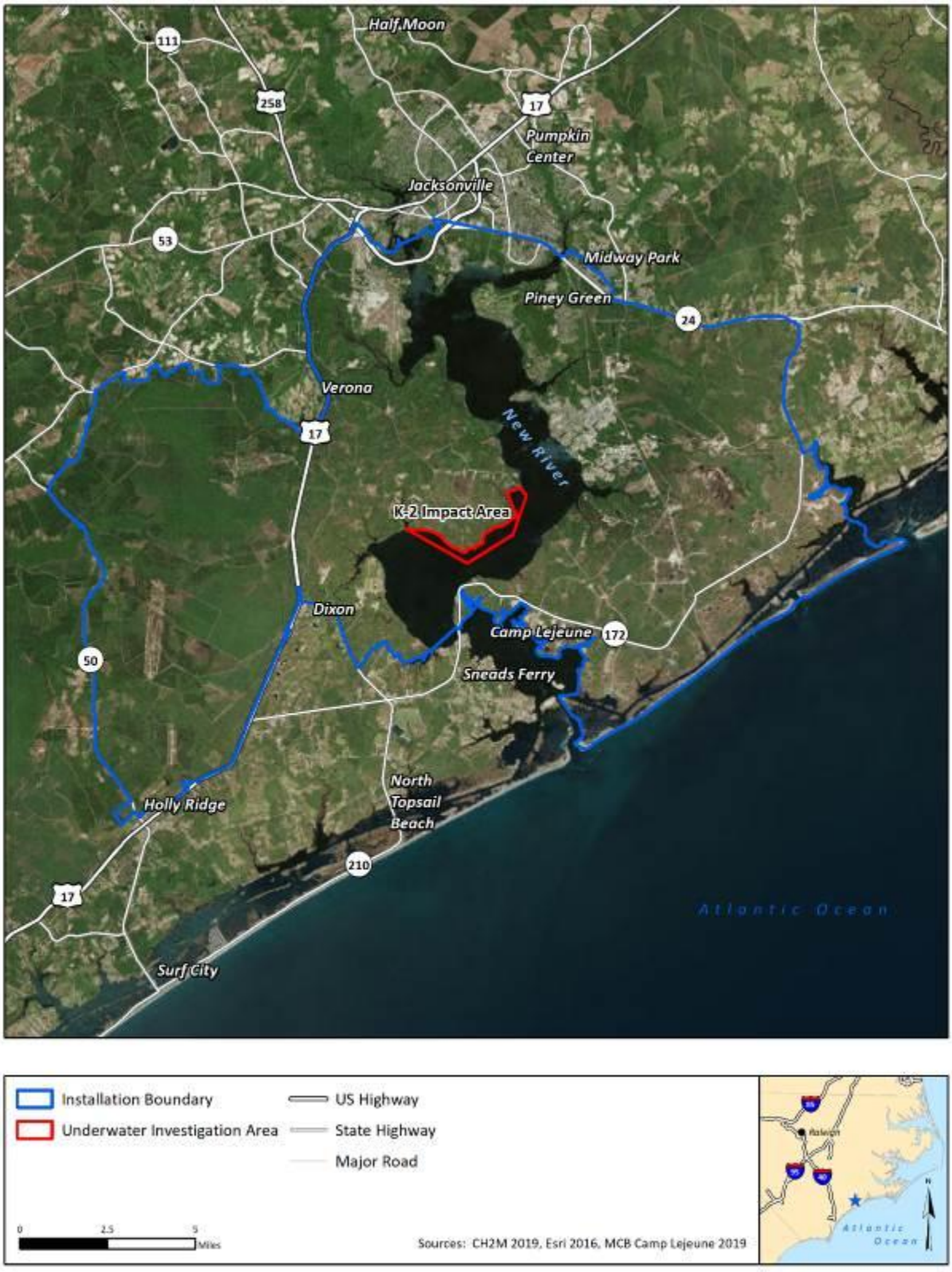


Figure 1. K-2 Impact Area at MCB Camp Lejeune

Figure 2. Proposed Action

In the deep waters, a small to medium-sized boat would be used to perform UDGM which uses an underwater magnetometer to map geophysical anomalies. The UDGM towed array consists of a 13-foot wide sensor that is designed to operate in 2 to 50 feet of water, and in close proximity to, but have no contact with the bottom. Once anomalies are located, they would be "intrusively investigated" which would involve hand digging by a diver to expose the anomaly. Intrusive investigation would be done by a UXO qualified dive team in accordance with Department of Defense Explosives Safety Board Technical Publication 18, Minimum Qualifications for UXO Technicians and Personnel. Any anomalies determined to be MEC/MPPEH during the intrusive investigation would be removed from the water and taken to the upland area of the K-2 Range on MCB Camp Lejeune for detonation and/or disposal in accordance with existing standard operating procedures.

In addition to the Areas of Concern, the Proposed Action also includes investigating a portion of the deep water areas outside of the Areas of Concern to better characterize the extent of potential MEC/MPPEH within these areas. UDGM would be performed along transects to cover approximately 10 percent of the deep water area outside of the Areas of Concern (approximately 40 acres) to evaluate the extent of MEC within the waters adjacent to the K-2 Impact Area. The UDGM methods and intrusive investigation of any identified anomalies would be the same as described for the Areas of Concern.

There may be situations in which the diver cannot safely relocate the MEC/MPPEH to the K-2 Range after exposing it in the riverbed. In those situations, the MEC/MPPEH would have to be detonated in place. In the event an intentional detonation would need to occur, sandbags would be established around the MEC to contain the noise and debris. Sandbags would be filled with clean fill sand. Any sandbags would be removed after detonation. Although in-water detonation was not required during any of the intrusive investigations of previous surveys, and is considered unlikely to occur, the possibility exists so it is included in the Proposed Action. For analytical purposes, it is assumed no more than five in-water detonations would occur.

A temporary exclusion zone would be established during intrusive investigation activities to ensure the safety of the public as well as UXO technicians/divers. The exclusion zone is an explosive safety quantity distance established to protect personnel and the public from an unintentional detonation during intrusive investigation activities and varies depending on the activity (up to 2,130 feet). The exclusion zone would be temporary and established as a radius around the area being investigated. An exclusion zone would also be established during any intentional in-water detonation and would vary depending on the depth of the water where the detonation would occur (ranging from 157 to 1,635 feet). The exclusion zone would be monitored by a chase boat. Access to the exclusion zone by unauthorized personnel would result in ceasing all operations until the zone is cleared.

2.0 NORTH CAROLINA COASTAL AREA MANAGEMENT ACT

In 1972, Congress passed the Coastal Zone Management Act, which encouraged states to keep the coasts healthy by establishing programs to manage, protect, and promote the country's fragile coastal resources. Two years later, the North Carolina General Assembly passed the landmark Coastal Area Management Act (CAMA). CAMA established the Coastal Resources Commission, required local land use planning in 20 coastal counties, and provided for a program for regulating development. The North Carolina Coastal Management Program was federally approved in 1978 by the National Oceanic and Atmospheric Administration.

2.1 AREAS OF ENVIRONMENTAL CONCERN

North Carolina's coastal zone includes the 20 counties that are adjacent to, adjoining, intersected by, or bounded by the Atlantic Ocean or any coastal sound, including Onslow County. There are two tiers within this boundary. The first tier is comprised of Areas of Environmental Concern (AEC) designated by the state. The second tier includes land uses with the potential to affect coastal waters, even though they are not defined as AECs. The coastal zone extends seaward to the three nautical mile territorial sea.

An AEC is an area of natural importance and its classification protects the area from uncontrolled development. The four categories of AECs are:

1. The Estuarine and Ocean System, which includes public trust areas, estuarine coastal waters, coastal shorelines, and coastal wetlands;
2. The Ocean Hazard System, which includes components of barrier island systems;
3. Public Water Supplies, which include certain small surface water supply watersheds and public water supply well fields; and
4. Natural and Cultural Resource Areas, which include coastal complex natural areas; areas providing habitat for federal or state designated rare, threatened, or endangered species; unique coastal geologic formations; or significant coastal archaeological or historic resources.

The Proposed Action would take place along the estuarine and coastal shoreline of the New River (**Figure 3**). The entire shoreline is estuarine shoreline but is not labeled on the figure since it overlaps with the Underwater Investigation Area. Intrusive investigation activities under the Proposed Action would occur along the shoreline and adjacent to the shoreline within the water of the New River. There are Coastal Wetlands along the shoreline, and areas of Coastal Wetlands located below normal high water would be surveyed according to the methods described above. The following is a brief analysis of only the policies of the CAMA AEC applicable to the Proposed Action.

***Note*:** The "Areas of Concern" on this figure are those areas within the Underwater Investigation Area that have a higher likelihood of containing potential UXO. These areas are not to be confused with the Areas of Environmental Concern (AEC) for coastal zone.

Figure 3. Areas of Environmental Concern

15A North Carolina Administrative Code (NCAC) 07H.0200 (Estuarine and Ocean Systems)

Estuarine and ocean systems include coastal wetlands, estuarine waters, and public trust areas.

15A NCAC 07H .0205 (Coastal Wetlands) defines and establishes management objectives for coastal wetlands. The management objective of this policy is to conserve and manage these resources as an interrelated group so as to safeguard and perpetuate their biological, social, economic, and aesthetic values and to make certain that development occurring within AECs is compatible with natural characteristics so as to minimize the likelihood of substantial loss of private property and public resources. An additional objective is to protect present common-law and statutory public rights of access to the lands and waters of the coastal area.

The underwater investigation area slightly overlaps with small areas of coastal wetlands along the shoreline of the New River. The Proposed Action does not include any development or fill activities. The survey equipment would not come into contact with the substrate. There could be contact with the substrate from the survey array being towed as a trailer, by a person or small ATV, however, any disturbance would be minor and temporary. Should any MEC/MPPEH be identified within Coastal Wetlands the activities associated with intrusive investigation would include a diver digging out the material by hand and restoring the elevation of the marsh upon completion of removal using only hand tools. In the unlikely event of an in-water detonation within Coastal Wetlands, bottom sediment would be disturbed. The use of sandbags around the MEC/MPPEH to be detonated would minimize the sediment disturbance, and the elevation of the marsh would be restored to the maximum extent practicable upon completion. Any remaining sandbag material following an in-water detonation would be removed using only hand tools. After MEC/MPPEH has been removed from the New River/Coastal Wetlands, the public safety for those using this area of the New River would greatly improve. The Proposed Action would be consistent with this policy.

15A NCAC 07H .0206 (Estuarine Waters) defines and establishes management objectives for estuarine waters in order "to conserve and manage the important features of estuarine waters so as to safeguard and perpetuate their biological, social, aesthetic, and economic values; to coordinate and establish a management system capable of conserving and utilizing estuarine waters so as to maximize their benefits to man and the estuarine and ocean system."

The Proposed Action does not include any development activities. The activities associated with intrusive investigation and removal of MEC/MPPEH would be short-term, temporary, and create a minimal disturbance to the bottom sediments. The disturbance would be similar to that which occurs during other bottom-disturbing activities such as anchoring or clam raking. In the unlikely event of an in-water detonation, bottom sediment would be disturbed. It is expected that sediment would quickly disperse and settle back to the bottom of the New River. The use of sandbags around the MEC to be detonated would further minimize the sediment disturbance. Any remaining sandbag material following an in-water detonation would be removed. After MEC/MPPEH has been removed from the New River, the public safety for those using this area of the New River would greatly improve. As such, estuarine waters would not be adversely impacted by the Proposed Action and would be consistent with this policy.

15A NCAC 07H .0207 (Public Trust Areas) defines and establishes management objectives for public trust areas, in order "to protect public rights for navigation, recreation, and to conserve and manage public trust areas in a manner that safeguards and perpetuates their biological, economic, and aesthetic values."

Public rights for navigation and recreation of public trust waters would be protected, as no loss of public trust waters would result from this Proposed Action. In-water activities would necessitate the establishment of temporary Exclusion Zones in order to protect the safety of the public and the workers in the project area. The Exclusion Zones would only be established during intrusive investigation while

divers are in the water or during in-water detonation activities. This phase of the project is expected to take approximately nine (9) months with work, and associated exclusion zones, only established during daylight hours. The radius of the exclusion zone would be determined based on the type of MEC/MPPEH being investigated/detonated. Once divers are out of the water, or the detonation is complete and post-detonation surveys/work are complete, the exclusion zones would be removed. The Proposed Action would be consistent with this policy.

15A NCAC 07H.0300 (Ocean Hazard Areas)
Ocean hazard areas are those areas along the Atlantic Ocean shoreline where, because of their special vulnerability to erosion or other adverse effects of sand, wind, and water, uncontrolled or incompatible development could unreasonably endanger life or property. Ocean hazard areas include beaches, frontal dunes, inlet lands, and other areas in which geologic, vegetative, and soil conditions indicate a substantial possibility of excessive erosion or flood damage. No aspect of the Proposed Action would impact Ocean Hazard Areas. No activities would occur on dunes or ocean coastlines. Therefore, the Proposed Action would be consistent with this policy.

15A NCAC 07H.0400 (Public Water Supplies)
This policy addresses valuable small surface water supply watersheds and public water supply well fields. These vulnerable, critical water supplies, if degraded, could adversely affect public health or require substantial monetary outlays by affected communities for alternative water source development. The management objective for this policy is to regulate development within critical water supply areas to protect and preserve public water supply well fields and surface water sources. The Proposed Action does not include any development activities; therefore, the Proposed Action would be consistent with this policy.

15A NCAC 07H.0500 (Natural and Cultural Resource Areas)
15A NCAC 07H .0501 (General) defines fragile coastal natural and cultural resource areas as "areas containing environmental, natural, or cultural resources of more than local significance in which uncontrolled or incompatible development could result in major or irreversible damage to natural systems or cultural resources, scientific, educational, or associative values, or aesthetic qualities." The AECs within this category are coastal complex natural areas, coastal areas that sustain remnant species, unique coastal geologic formations, significant coastal architectural resources, and significant coastal historic architectural resources. There are two significant natural heritage areas near the New River shoreline in the vicinity of the project site (Mill Stone Creek Swamp and French's Creek Coastal Goldenrod Site), however, these areas would not be in the project site or be affected by the proposed in-water activities. Therefore, the Proposed Action would be consistent with this policy.

2.2 GENERAL POLICY GUIDELINES

The North Carolina CAMA sets forth 11 General Policy Guidelines, addressing:

Shoreline erosion policies;
Shorefront access policies;
Coastal energy policies;
Post-disaster policies;
Floating structure policies;
Mitigation policies;
Coastal water quality policies;
Policies on use of coastal airspace;
Policies on water- and wetland-based target areas for military training areas;

Policies on beneficial use and availability of materials resulting from the excavation or maintenance of navigational channels; and
Policies on ocean mining.

The purpose of these rules is to establish generally applicable objectives and policies to be followed in the public and private use of land and water areas within the coastal area of North Carolina. None of the general policies are applicable for the activities associated with intrusive investigation and removal of MEC/MPPEH from approximately 800 acres of the New River.

3.0 ONSLOW COUNTY COASTAL MANAGEMENT POLICIES

CAMA required local governments in each of the 20 coastal counties in North Carolina to prepare and implement a land use plan and ordinances for its enforcement that are consistent with established federal and state policies. Specifically, policy statements are required on resource protection, resource production and management, economic and community development, continuing public participation, and storm hazard mitigation, post-disaster recovery, and evacuation plans. Upon approval by the North Carolina Coastal Resources Commission, the plan becomes part of the *North Carolina Coastal Management Plan.*

The Onslow County Comprehensive Plan (CAMA Core Land Use Plan), adopted by the Onslow County Board of Commissioners on October 19, 2009 and certified by the Coastal Resource Commission on January 13, 2010, addresses land use planning in relation to CAMA. According to this Comprehensive Land Use Plan, Camp Lejeune is zoned as a Military Reservation (MR) and is limited to activities determined to be appropriate by the military. As the proposed project has been requested by authorities at Camp Lejeune, the Proposed Action on Base will be consistent with the operation of the Camp Lejeune Military Reservation, the applicable policies of the North Carolina Coastal Management Program, and Onslow County's comprehensive plan policies, for the reasons described throughout this Coastal Consistency Determination.

4.0 CONCLUSION

In conclusion, after careful consideration of the investigation and removal of MEC/MPPEH under the Proposed Action, the Marine Corps has determined that this action would not adversely affect North Carolina’s coastal zone and would be consistent with all enforceable policies.