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United States Fleet Forces Command
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Pursuant to:
National Environmental
Policy Act Section 102(2)(c)

Draft Environmental Assessment
for
Joint Logistics Over-the-Shore Training
at
Joint Expeditionary Base Little Creek-Fort Story
Virginia Beach, Virginia
and
Marine Corps Base Camp Lejeune
Jacksonville, North Carolina

6 January 2015

Abstract

This Environmental Assessment (EA) identifies and evaluates the potential impacts on the environment of conducting joint logistics over-the-shore (JLOTS) training and associated unit-level field training exercises (FTXs) at east coast locations. The purpose of JLOTS training is to ensure that Navy, Marine Corps, and Army personnel develop and maintain competence in conducting joint ship-to-shore movement of cargo and personnel. Conducting JLOTS training is needed to support the Navy's requirements to organize, train, and equip forces for prompt and sustained combat and to coordinate with other military branches, consistent with Title 10 U.S.C. §5062. The EA assesses the impacts of the No Action Alternative and the Action Alternative. Under the Action Alternative, the proposed JLOTS training would be conducted at the Little Creek site of Joint Expeditionary Base (JEB) Little Creek-Fort Story in Virginia Beach, Virginia, the Fort Story site of JEB Little Creek-Fort Story, and at Marine Corps Base Camp Lejeune in Jacksonville, North Carolina. The Proposed Action would not have significant impacts on the environment. Preparation of an environmental impact statement is not required.

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Executive Summary

ES.1 Introduction

The United States (U.S.) Department of the Navy (Navy) has prepared this Environmental Assessment (EA) to evaluate the impacts of conducting joint logistics over-the-shore (JLOTS) training and associated Navy unit-level field training exercises (FTXs) on the east coast. Logistics over-the-shore is the process of transporting cargo and personnel from ships to shore in areas that do not have existing deep-draft fixed port facilities. A JLOTS operation occurs when multiple branches of the military – including various combinations of Navy, U.S. Marine Corps (Marine Corps), and Department of the Army (Army) personnel – conduct logistics over-the-shore activities together under a joint force commander.

Two installations are being considered as potential locations on which to conduct the required training: Joint Expeditionary Base (JEB) Little Creek-Fort Story in Virginia Beach, Virginia and Marine Corps Base Camp Lejeune (Camp Lejeune) in Jacksonville, North Carolina. JEB Little Creek-Fort Story consists of two non-contiguous sites approximately eight miles (13 kilometers) apart: the 2,380-acre (963-hectare) Little Creek site (Little Creek) and the 1,458-acre (590-hectare) Fort Story site (Fort Story). Camp Lejeune comprises approximately 143,000 acres (57,870 hectares) of land used primarily for training.

The EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] §§ 4321-4370h); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [C.F.R.] Parts 1500-1508); and Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1D. The Navy is the lead agency for the proposed action.

ES.2 Purpose and Need

The purpose of JLOTS training is to ensure that Navy, Marine Corps, and Army personnel develop and maintain competence in conducting joint ship-to-shore movement of cargo and personnel. JLOTS training is needed to support the Navy's requirements to organize, train, and equip forces for prompt and sustained combat and to coordinate with other military branches, consistent with Title 10 U.S.C. § 5062. Joint Publication 4.01-6, *Joint Logistics Over-the-Shore (JLOTS)*, requires that Navy units, along with their Marine Corps and Army counterparts, conduct realistic and routine JLOTS exercises to ensure continued readiness for combat and humanitarian relief missions.

ES.3 Proposed Action and Alternatives

ES.3.1 Joint Logistics Over-the-Shore Exercises

Joint logistics over-the-shore training consists of several, coordinated FTXs. An FTX is any exercise conducted under the conditions in which the activity would normally occur (i.e., in the field as opposed to classroom or simulated training). The Proposed Action consists of a combination of FTXs into a full scale integrated JLOTS exercise lasting up to 60 days and smaller sets of unit-level FTXs that would be conducted separately and independently from the full JLOTS exercise. The FTXs that would be conducted include the following:

- **Use of the Improved Navy Lighterage System.** The Improved Navy Lighterage System moves personnel, cargo containers, and rolling stock directly from ships anchored offshore to land. The Improved Navy Lighterage System has four modular components: causeway ferry, roll-on/roll-off discharge facility, floating causeway, and warping tug.
- **Construction and Use of the Elevated Causeway System (ELCAS Modular).** The ELCAS Modular (ELCAS [M]) is a temporary pier constructed from the beach into the water past the surf zone. It consists of a series of 8- by 40-foot (2.4- by 12.2-meter) pontoon sections joined together and supported by piles driven into the sea floor.
- **Use of Water Purification Systems.** The Tactical Water Purification System is an onshore unit that uses reverse osmosis to desalinate water extracted from the ocean offshore to make it potable. The desalinated water is stored in bladders on the beach.
- **Use of Liquid Transfer Systems.** The Amphibious Bulk Liquid Transfer System and Inland Petroleum Discharge System use floating hoses anchored to a beach interface unit and extending to ships to mimic the transfer of fuel ashore.
- **Cargo Marshalling and Movement.** Rolling stock and containerized cargo (equipment and supplies) are moved to shore to certify that the expeditionary piers were built correctly. Vehicles and equipment that have been dismantled for transport are reassembled in a marshalling or staging area for transfer to inland locations.
- **Tent Encampment.** Tent encampments consist of personnel billeting tents; command, communications and operations tents; maintenance facilities; medical tents; portable galley facilities; portable latrine and shower facilities; and laundry facilities.

ES.3.2 Proposed Action and Alternatives

This EA analyzes one Action Alternative and a No Action Alternative. The No Action Alternative represents the current ongoing JLOTS training at the two installations. The Action Alternative includes one full 60-day JLOTS training exercise with ELCAS (M) per year at each installation (described in ES 3.1). Under both alternatives, unit-level JLOTS training would take place only at JEB Little Creek-Fort Story. The training locations at each installation would be the same under both alternatives.

- No Action Alternative – The No Action Alternative is to continue conducting JLOTS training exercises at JEB Little Creek-Fort Story and Camp Lejeune at the current level and intensity (Table ES-1).

- Action Alternative – The Action Alternative consists of the training exercises in the No Action Alternative plus the addition of ELCAS (M) once per year at each installation and the addition of two floating causeways at the Little Creek site (Table ES-1).

Currently, the ELCAS (M) FTX is not being conducted as part of JLOTS training. The requirement for Sailors to achieve and maintain proficiency in the construction of the ELCAS (M) is the primary differentiating factor between the No Action and Action Alternatives. Due to the joint nature of JLOTS exercises and the requirement to utilize east coast training locations within close geographic proximity to Naval Beach Group TWO's operational headquarters at JEB Little Creek-Fort Story in Virginia Beach, Virginia, authorizing training at both a naval installation (JEB Little Creek-Fort Story) and a Marine Corps installation (MCB Camp Lejeune) is necessary. For this reason, the ability to train at both of these installations is incorporated into a single Action Alternative for analysis in this EA.

Table ES-1: Frequency of JLOTS Exercises at All Locations for Both Alternatives

FTX	No Action Alternative								Action Alternative							
	# Annual Occurrence as Part of a Full JLOTS Exercise		# Annual Occurrences as Part of Quarterly Unit-Level Exercises		# Annual Occurrences as Part of Routine Unit-Level Exercises			Total # of Annual Occurrences	# Annual Occurrence as Part of a Full JLOTS Exercise		# Annual Occurrences as Part of Quarterly Unit-Level Exercises		# Annual Occurrences as Part of Routine Unit-Level Exercises			Total # of Annual Occurrences
	JEB LC-FS	CL	JEB LC-FS	CL	LC	FS	CL		JEB LC-FS	CL	JEB LC-FS	CL	LC	FS	CL	
Improved Navy Lighterage System	1	1	4	0	152	0	0	158	1	1	4	0	152	0	0	158
Floating Causeway	2[1]	2	0	0	0	0	0	4	4	2	0	0	0	0	0	6
Liquid Transfer Systems	1	1	4	0	6	0	0	12	1	1	4	0	6	0	0	12
Tactical Water Purification System	1	1	4	0	0	0	0	6	1	1	4	0	0	0	0	6
Cargo Marshalling and Movement	1	1	4	0	152	0	0	158	1	1	4	0	152	0	0	158
Tent Encampment	1	1	4	0	6	0	0	12	1	1	4	0	6	0	0	12
ELCAS (M)	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2

Note:

1. Under the No Action Alternative, floating causeways would only be constructed on the Fort Story portion of JEB Little Creek-Fort Story.

JEB LC-FS = JEB Little Creek-Fort Story
CL = Camp Lejeune
LC = Little Creek
FS = Fort Story

ES.4 Environmental Impacts

The EA evaluates the impacts of the alternatives on air quality; ambient noise; public health and safety; socioeconomics; water resources; bathymetry, sediments, topography, and soils; cultural resources; terrestrial and aquatic vegetation; terrestrial wildlife and birds; fish and marine invertebrates; sea turtles; and marine mammals. Consistent with 40 C.F.R. § 1501.7(a)(3), the following resources are not considered in detail because the Proposed Action has no potential to affect them: land use; visual resources; infrastructure; land transportation; and Environmental Justice.

Because the No Action Alternative represents a continuation of the current levels of JLOTS training at the two installations, its impacts are ongoing (such as use of the beach areas for access by amphibious vehicles and use of nearshore areas by small craft). Therefore, in general, the impacts of the Action Alternative are to the same as the impacts of the No Action Alternative plus the impacts specifically associated with those FTXs not included in the No Action Alternative: the floating causeways and ELCAS (M) at Little Creek and the ELCAS (M) at Fort Story and Camp Lejeune.

ES.4.1 Air Quality

ES.4.1.1 No Action Alternative

The No Action Alternative represents a continuation of the existing level and intensity of JLOTS training at both installations; therefore, impacts on air quality are ongoing and already factored into existing conditions. A quantitative estimate of these emissions showed that they represent a minute amount relative to current or projected emissions in the Hampton Roads region (JEB Little Creek-Fort Story) and in Onslow County (Camp Lejeune). Emissions of criteria pollutants would also be well below the Prevention of Significant Deterioration threshold of 250 tons per year (this threshold does not apply to the Proposed Action but provides a useful point of comparison) and below the General Conformity Rule *de minimis* levels applicable to the Hampton Roads region, a maintenance area for ozone (Camp Lejeune is in a region in attainment for all Clean Air Act criteria pollutants). The No Action Alternative would have no significant impact on air quality at either of the two installations.

ES.4.1.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of ELCAS (M) once a year at each installation and the addition of two floating causeways annually at Little Creek. Under this alternative, annual air emissions would be slightly greater than under the No Action Alternative because of the additional construction and removal activities associated with these structures, but would remain well below the Prevention of Significant Deterioration threshold as well as below the applicable General Conformity Rule *de minimis* levels. Thus, the Action Alternative would have no significant impacts on air quality.

The analysis showed the net difference in emissions of criteria pollutants between the Action Alternative and the No Action Alternative to be well below the *de minimis* levels. Therefore, the Action Alternative does not require a formal General Conformity analysis.

ES.4.2 Ambient Noise

ES.4.2.1 No Action Alternative

Under the No Action Alternative, airborne noise would result from the operation of watercraft; land vehicles and equipment, such as bulldozers, forklifts, and trucks, and generators used during the different training exercises. Overall ambient noise levels at and around each location would remain similar to current conditions. The No Action Alternative would not result in significant noise impacts either during the annual full JLOTS training events or during the smaller, quarterly and routine unit-level training exercises at either location.

ES.4.2.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of ELCAS (M) once a year at both installations and the addition of two floating causeways annually at Little Creek. The additional airborne noise generated by the construction and removal of the floating causeways would be negligible. The pile driving and removal associated with ELCAS (M) would generate greater airborne noise levels than under the No Action Alternative for up to 20 days (construction) and 10 days (removal) once per year. Based on the limited intensity and short duration of the additional airborne noise associated with the ELCAS (M), the Action Alternative would have no significant airborne noise impacts.

ES.4.3 Public Health and Safety

ES.4.3.1 No Action Alternative

The No Action Alternative represents a continuation of current annual training activities at both installations and would introduce no new or unusual risks to public health and safety. All offshore activities would continue to be conducted within existing restricted areas (defined at 33 C.F.R. § 334.310 for Little Creek; 33 C.F.R. § 334.320 for Fort Story; and 33 C.F.R. § 334.440 for Camp Lejeune) and Notices to Mariners would be issued to inform commercial and recreational boaters of impending full JLOTS training exercises. Operators would remain vigilant in monitoring civilian traffic to ensure that training activities and civilian uses of the waterway do not conflict. Training activities would be conducted in accordance with the Navy's safety procedures. Therefore, there would be no significant impacts on public health and safety under the No Action Alternative.

ES.4.3.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of ELCAS (M) once per year and the addition of two floating causeways annually at Little Creek. These additional exercises would not affect the conditions under which training would be conducted with respect to public health and safety. All offshore activities would take place within restricted areas as defined in 33 C.F.R. § 334.310 and 334.320 (at JEB Little Creek-Fort Story) and 33 C.F.R. § 334.440 (at Camp Lejeune). Notices to Mariners would be issued before each full JLOTS training exercise. Training exercises would be conducted in accordance with the Navy's safety procedures. Therefore, there would be no significant impacts on public health and safety under the Action Alternative.

ES.4.4 Socioeconomics

ES.4.4.1 No Action Alternative

All offshore training activities would take place within existing restricted areas at the two installations. Consistent with the regulations applying to these areas, access restrictions would be enforced during the training events. The restrictions would be published in advance of full JLOTS exercises through Notices to Mariners. Additionally, the affected areas would be of moderate size (a few square miles just offshore of the host installations) and the majority of activities would take place close to shore. No commercial shipping lanes or important commercial fisheries would be affected and recreational boaters would have many alternatives to using the training areas while JLOTS exercises are ongoing. The No Action Alternative represents a continuation of current annual training activities at both installations and would introduce no new or unusual restrictions on socioeconomic activities. Thus, the No Action Alternative would have no significant socioeconomic impacts.

ES.4.4.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of ELCAS (M) once a year at both installations and the addition of two floating causeways per year at Little Creek. The addition of these exercises would not affect how offshore activities are conducted within restricted areas as defined in 33 C.F.R. § 334.310 and 334.320 relative to the No Action Alternative at JEB Little Creek-Fort Story or as defined in 33 C.F.R. § 334.440 at Camp Lejeune. Therefore, like the No Action Alternative and for the same reasons, the Action Alternative would have no significant socioeconomic impacts.

ES.4.5 Water Resources

ES.4.5.1 No Action Alternative

The No Action Alternative represents a continuation of the existing level and intensity of annual JLOTS training at both installations. The impacts on water resources are ongoing and reflected in existing conditions within the study area. Current water quality would remain unchanged as a result of the No Action Alternative. Wetlands and floodplains would not be impacted. Prior to the construction of floating causeways and their associated duck ponds, permits pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act would be obtained along with Section 401 water quality certifications, ensuring that water quality standards are maintained. Thus, the No Action Alternative would have no significant impacts on water resources.

ES.4.5.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of ELCAS (M) once per year and the addition of two floating causeways per year at Little Creek. The construction and removal of these structures would cause additional sediment disturbance and water turbidity relative to the No Action Alternative, especially during the construction and removal of the ELCAS (M). The amount of displaced sediment would be limited by the use of hollow piles and this additional impact would be limited in duration, extent, and intensity. Additional excavations needed to secure both structures to the beach would contribute to increased water turbidity but it would be minimal, localized, and short-lived. The Action Alternative would have no significant impacts on water resources.

ES.4.6 Bathymetry, Sediments, Topography, and Soils

ES.4.6.1 No Action Alternative

The No Action Alternative represents a continuation of the existing level and intensity of JLOTS training at the two installations. The impacts on bathymetry, sediments, topography, and soils are ongoing and reflected in existing conditions within the study area. These impacts would occur throughout the year, but each time they would be temporary, localized, and the dynamic marine and shoreline environment would quickly recover. Localized and temporary alterations of the nearshore and shoreline bathymetry may occur in places; however, the natural processes of waves and tides would quickly return the seafloor and beaches to conditions similar to those found prior to training.

Training beaches at both installations are designated and routinely used for activities associated with the No Action Alternative. Vehicle and personnel movements from the beach to inland areas would be through existing paths and dune breaks; therefore, dunes would not be affected. Inland, all movements would be on existing roads with no impacts on soils. Thus, the No Action Alternative would have no significant impact on bathymetry, sediments, topography, and soils.

ES.4.6.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of ELCAS (M) once per year at both installations and the addition of two floating causeways at Little Creek annually. The impacts of the Action Alternative on bathymetry, sediments, topography, and soils would be similar to those of the No Action Alternative and would be localized and temporary. Disturbance from the ELCAS (M) would only occur during construction (20 days) and removal (10 days). Disturbance from the anchoring of the floating causeways would be localized and negligible. The slight increase in their intensity from the additional exercises (ELCAS [M] and floating causeways) would not be such as to compromise the ability of the affected environment to recover from them. The affected resources would return to conditions similar to pre-training conditions between exercises. Thus, the Action Alternative would have no significant impacts on bathymetry, sediments, topography, and soils.

ES.4.7 Cultural Resources

ES.4.7.1 No Action Alternative

The No Action Alternative represents a continuation of the existing level and intensity of JLOTS training at the two installations. No previously identified National Register-eligible or -listed submerged historic properties are present within the study areas at either installation. Under Section 106 of the National Historic Preservation Act, the continuing conduct of the No Action Alternative would have no effect on National Register-eligible or -listed archaeological resources at either installation and no effect on National Register-eligible or -listed architectural resources at Little Creek or Camp Lejeune. Under Section 106 of the National Historic Preservation Act, the continuing conduct of the No Action Alternative activities at Fort Story would have no adverse effect on National Register-eligible or -listed architectural resources. The No Action Alternative would not have a significant impact on cultural resources.

ES.4.7.2 Action Alternative

ES.4.7.2.1 JEB Little Creek-Fort Story

The Action Alternative includes the same activities as the No Action Alternative at JEB Little Creek-Fort Story plus the addition of ELCAS (M) once per year and the addition of two floating causeways annually at Little Creek. The installation of the ELCAS (M) and the floating causeways would not cause any additional impacts due to the lack of presence of National Register-eligible or -listed submerged cultural resources and would not change the character of the Fort Story site's use for conduct of military operations. Under Section 106 of the National Historic Preservation Act, Action Alternative activities at JEB Little Creek-Fort Story would have no effect on National Register-eligible or -listed archaeological resources; no adverse effect on National Register-eligible or -listed architectural resources at Fort Story; and no effect on National Register-eligible or -listed architectural resources at Little Creek. No significant impact on cultural resources at JEB Little Creek-Fort Story would occur under the Action Alternative.

ES.4.7.2.2 Camp Lejeune

The Action Alternative includes the same activities as the No Action Alternative at Camp Lejeune plus the addition of ELCAS (M) once per year. The installation of the ELCAS (M) would not cause any additional impacts on cultural resources due to the lack of presence of National Register-eligible or -listed submerged cultural resources, the lack of presence of terrestrial archaeological sites within the footprint of the proposed activities, and the lack of presence of training activities within the viewshed of the terrestrial architectural sites. Under Section 106 of the National Historic Preservation Act, the Action Alternative activities at Camp Lejeune would have no effect on National Register-listed or -eligible archaeological or architectural resources. No significant impact on cultural resources at Camp Lejeune would occur under the Action Alternative.

ES.4.8 Terrestrial and Aquatic Vegetation

ES.4.8.1 No Action Alternative

At both installations, the areas where in-water training activities would take place consist of sandy bottoms with no submerged aquatic vegetation. Nearby vegetation is not anticipated to be affected by vessel wakes or increased turbidity. At both installations, terrestrial vegetation is minimal or the areas are devoid of vegetation where training would occur. Impacts on terrestrial vegetative communities would be minimal. No federally-listed plants occur in the study areas at JEB Little Creek-Fort Story, and the federally threatened seabeach amaranth occurs at Camp Lejeune. Protective measures currently in place would minimize impacts on seabeach amaranth plants. Under the ESA, the No Action Alternative may affect, but is not likely to adversely affect the seabeach amaranth.

The No Action Alternative represents a continuation of the existing levels and intensity of annual JLOTS training at both installations. Impacts on existing plant communities are ongoing and reflected in existing conditions within the study areas. These impacts would not increase under the No Action Alternative. They would remain temporary and localized. Thus, there would be no significant impact on terrestrial or aquatic vegetation under the No Action Alternative.

ES.4.8.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of the ELCAS (M) once per year at both installations and the addition of two floating causeways annually at Little Creek. The construction of floating causeways and the ELCAS (M) would occur in areas that have little or no vegetation. The impacts associated with the Action Alternative at would remain temporary and localized with no permanent loss of habitat. No community-level consequences to terrestrial or aquatic vegetation would be expected. Protective measures and procedures described in Chapter 4 would minimize the likelihood of impacts on seabeach amaranth. Under the ESA, the Action Alternative may affect, but is not likely to adversely affect, the seabeach amaranth. There would be no significant impacts on terrestrial or aquatic vegetation under the Action Alternative.

ES.4.9 Terrestrial Wildlife and Birds

ES.4.9.1 No Action Alternative

The No Action Alternative represents a continuation of the existing level and intensity of annual JLOTS training at both installations. Federally protected birds could occur at each of the installations including: piping plover, roseate tern, red knot, and the bald eagle. Training associated with the No Action Alternative could produce temporary and localized impacts from artificial light from vehicles and equipment, entanglement in hoses, the temporary loss of habitat from beach activities and tent encampments, temporary impacts on water quality, vessel/vehicle strikes, and noise from vessels, vehicles and equipment. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. Under the ESA, the No Action Alternative would have no effect on the roseate tern or red knot, and may affect, but is not likely to adversely affect, the piping plover. Under the Migratory Bird Treaty Act, the No Action Alternative would not result in a significant adverse effect on migratory bird populations. Pursuant to the Bald and Golden Eagle Protection Act, the No Action Alternative would not be expected to result in any incidental takes of bald eagles. Thus, there would be no significant impacts on terrestrial wildlife and birds under the No Action Alternative.

ES.4.9.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of the ELCAS (M) once a year at both installations and the addition of two floating causeways annually at Little Creek. Construction of the ELCAS (M) and the floating causeways could produce minor additional impacts from artificial light from vehicles and equipment, the temporary loss of habitat, temporary impacts on water quality, vessel/vehicle strikes, and noise from vessels, vehicles, and equipment. Birds could experience behavioral disturbance from pile driving noise, but it would be limited in duration, continuity, and range, and would not cause population-level impacts or affect the continued survival of the species. Under the ESA, the Action Alternative at JEB Little Creek-Fort Story may affect, but is not likely to adversely affect, the piping plover; and would have no effect on the roseate tern or the red knot. Under the ESA, the Action Alternative at Camp Lejeune may affect, but is not likely to adversely affect, the piping plover and the red knot and would have no effect on the roseate tern. The Action Alternative would have no effect on piping plover critical habitat. Under the Migratory Bird Treaty Act, the Action Alternative would not result in a significant adverse effect on migratory bird populations. Pursuant to the Bald and Golden Eagle Protection Act, the Action Alternative would not be expected to result in any incidental takes of bald eagles. Thus, there would be no significant impacts on terrestrial wildlife and birds under the Action Alternative.

ES.4.10 Fish and Marine Invertebrates

ES.4.10.1 No Action Alternative

The federally protected Atlantic and shortnose sturgeon can be found at both installations. Essential fish habitat is designated at each of the installations where training could occur. Exercises under the No Action Alternative could produce temporary and localized impacts on fish and invertebrates from artificial light from vehicles and equipment, entanglement in hoses, the temporary loss of habitat from beach activities, temporary impacts on water quality, vessel/vehicle strikes, and noise from vessels, vehicles, and equipment. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. Sedentary or surf zone-burying invertebrates may be killed, but no population-level consequences would be expected. Under the ESA, activities associated with the No Action Alternative may affect, but are not likely to adversely affect, the Atlantic sturgeon and shortnose sturgeon. Pursuant to the essential fish habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the No Action Alternative would not adversely affect essential fish habitat or Habitat Areas of Particular Concern, as the effects would not appreciably reduce the quantity or quality of habitat in the area. Thus, there would be no significant impacts on fish and marine invertebrates under the No Action Alternative.

ES.4.10.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of the ELCAS (M) once per year at both installations and the addition of two floating causeways annually at Little Creek. Construction of the ELCAS (M) and the floating causeways would produce minor additional impacts from temporary loss of habitat, temporary impacts on water quality, vessel/vehicle strikes, and noise from vessels, vehicles and equipment. The intermittent occurrence of pile driving for a maximum of 1.5 net hours per day on no more than 20 days (impact driving) and 10 days (vibratory extraction) in any given year, suggests that while physiological or behavioral impacts may occur, they would be limited in duration, intensity, and continuity. No population level impacts on fish or marine invertebrates would be anticipated, and the continued survival of all species would be unaffected. Adverse effects on Atlantic and shortnose sturgeon would be unlikely.

Under the ESA, the Action Alternative at JEB Little Creek-Fort Story may affect, but is not likely to adversely affect, the Atlantic sturgeon and would have no effect on the shortnose sturgeon. Under the ESA, the Action Alternative at Camp Lejeune may affect, but is not likely to adversely affect, the Atlantic sturgeon and the shortnose sturgeon. Pursuant to the essential fish habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the Action Alternative may have adverse impacts on water column essential fish habitat and Habitat Areas of Particular Concern from pile driving activities. An essential fish habitat consultation over these effects was completed with the National Marine Fisheries Service as part of the Navy's Atlantic Fleet Training and Testing essential fish habitat consultation. The Action Alternative would have no significant impact on fish and marine invertebrates.

ES.4.11 Sea Turtles

ES.4.11.1 No Action Alternative

Federally protected sea turtles that could occur at either of the installations include: green sea turtles, Kemp's ridley sea turtles, leatherback sea turtles, and loggerhead sea turtles. The hawksbill sea turtle could occur at either installation, but it is unlikely. No Action Alternative activities could produce temporary and localized impacts on sea turtles from artificial light from vehicles and equipment, entanglement in hoses, the temporary loss of habitat on beaches, temporary impacts on water quality, vessel/vehicle strikes, and noise from vessels, vehicles and equipment. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. There would be no permanent loss of habitat. Under the ESA, exercises associated with the No Action Alternative may affect, but are not likely to adversely affect, green, Kemp's ridley, leatherback, or loggerhead sea turtles and would have no effect on hawksbill sea turtles. The No Action Alternative would have no effect on proposed loggerhead sea turtle critical habitat. Thus, there would be no significant impacts on sea turtles under the No Action Alternative.

ES.4.11.2 Action Alternative

The Action Alternative includes the same activities as the No Action Alternative plus the addition of the ELCAS (M) once a year at both installations and the addition of two floating causeways annually at Little Creek. Construction of the ELCAS (M) and the floating causeways would produce minor additional impacts from artificial light from vehicles and equipment, the temporary loss of habitat, temporary impacts on water quality, vessel/vehicle strikes, and noise from vessels, vehicles and equipment. The intermittent occurrence of pile driving for a maximum of 1.5 net hours per day on no more than 20 days (impact driving) and 10 days (vibratory extraction) in any given year, suggests that while physiological or behavioral impacts may occur, they would be limited in duration, intensity, and continuity. No population level impacts would occur, and the continued survival of any sea turtle species would not be affected. Mitigation measures (as discussed in Chapter 4) would be employed. Under the ESA, the Action Alternative may affect, but is not likely to adversely affect, green, Kemp's ridley, leatherback, or loggerhead sea turtles and would have no effect on hawksbill sea turtles. The Action Alternative at Camp Lejeune would have no effect on proposed loggerhead sea turtle critical habitat. Thus, there would be no significant impacts on sea turtles under the Action Alternative.

ES.4.12 Marine Mammals

ES.4.12.1 No Action Alternative

Federally protected marine mammals that could occur at either of the installations include: fin whales, humpback whales, North Atlantic right whales, sei whales, Atlantic spotted dolphins, bottlenose dolphins, and West Indian manatees. Training associated with the No Action Alternative could produce impacts from entanglement in hoses, temporary impacts on water quality, vessel/vehicle strikes, and noise from vessels, vehicles and equipment. Impacts would remain temporary and localized. There would be no permanent loss of habitat and all impacts would cease entirely between training events. Under the ESA, activities associated with the No Action Alternative may affect, but are not likely to adversely affect, the fin whale, humpback whale, the North Atlantic right whale, and West Indian manatee and would have no effect on the sei whale. Pursuant to the MMPA, the No Action Alternative would not be expected to result in any Level A or Level B incidental takes. There would be no significant impacts on marine mammals under the No Action Alternative.

ES.4.12.2 Action Alternative

ES.4.12.2.1 JEB Little Creek-Fort Story

The Action Alternative includes the same annual training activities as the No Action Alternative at JEB Little Creek-Fort Story plus the addition of two floating causeways annually at Little Creek and the addition of ELCAS (M) once per year. Construction of the ELCAS (M) and the floating causeways would produce minor additional impacts from temporary loss of habitat, temporary impacts on water quality, vessel/vehicle strikes, and noise from vessels, vehicles and equipment. The intermittent occurrence of pile driving for a maximum of 1.5 net hours per day on no more than 20 days (impact driving) and 10 days (vibratory extraction) in any given year, suggests that while physiological or behavioral impacts may occur, they would be limited in duration, intensity, and continuity. No population level impacts would occur, and the continued survival of any marine mammal species would not be affected. Additionally, mitigation measures (as discussed in Chapter 4) would be employed.

Under the ESA, activities associated with the Action Alternative at JEB Little Creek-Fort Story may affect, but are not likely to adversely affect, the fin whale, humpback whale, and the North Atlantic right whale, and would have no effect on the sei whale and West Indian manatee. Pursuant to the MMPA, the Action Alternative at JEB Little Creek-Fort Story would not result in Level A incidental takes of marine mammals and may result in up to 250 Level B incidental takes for bottlenose dolphins. Thus, there would be no significant impacts on marine mammals under the Action Alternative at JEB Little Creek-Fort Story.

ES.4.12.2.2 Camp Lejeune

The Action Alternative would include the same annual training activities as the No Action Alternative at Camp Lejeune plus the addition of ELCAS (M) once per year. Impacts would be the same as described in the Action Alternative for JEB Little Creek-Fort Story.

Under the ESA, activities associated with the Action Alternative at Camp Lejeune may affect, but are not likely to adversely affect, the fin whale, humpback whale, the North Atlantic right whale, and West Indian manatee, and would have no effect on the sei whale. Pursuant to the MMPA, the Action Alternative at Camp Lejeune would not result in Level A incidental takes of marine mammals, may result in up to 300 Level B incidental takes for bottlenose dolphins, and may result in up to 250 Level B incidental takes for Atlantic spotted dolphins. Thus, there would be no significant impacts on marine mammals under the Action Alternative at Camp Lejeune.

ES.5 Mitigation

Chapter 4 discusses mitigation measures for JEB Little Creek-Fort Story and Camp Lejeune as they apply to plants, terrestrial wildlife and birds, fish and marine invertebrates, sea turtles, and marine mammals.

ES.6 Conclusion

Based on the analyses in the EA, the Proposed Action under either alternative considered would have no significant impacts on the environment. Preparation of an environmental impact statement is not required.

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Tables

List of Acronyms

C	Celsius
C.F.R.	Code of Federal Regulations
CNO	Chief of Naval Operations
dB	decibel(s)
dBA	A-weighted sound level
EA	Environmental Assessment
ELCAS (M)	Elevated Causeway System (Modular)
EO	Executive Order
ESA	Endangered Species Act
F	Fahrenheit
FONSI	Finding of No Significant Impact
FR	Federal Register
FTX	field training exercise
Hz	Hertz
JEB	Joint Expeditionary Base
JLOTS	Joint Logistics Over-the-Shore
kHz	kilohertz
kW	kilowatt(s)
LARC	Lighter, Amphibious, Resupply, Cargo
μPa	micropascal(s)
MCB	Marine Corps Base
NAAQS	National Ambient Air Quality Standard

NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OPNAV	Office of the Chief of Naval Operations
OPNAVINST	Office of the Chief of Naval Operations Instruction
Pa	Pascal(s)
PTS	permanent threshold shift
SHPO	State Historic Preservation Office(r)
SPL	sound pressure level
TTS	temporary threshold shift
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
U.S.C.	United States Code

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1 Purpose and Need for the Proposed Action

1.1 Introduction

The United States (U.S.) Department of the Navy (Navy) has prepared this Environmental Assessment (EA) to evaluate the impacts of conducting joint logistics over-the-shore (JLOTS) training and associated unit-level field training exercises (FTXs) on the east coast. Two installations are being considered on which to conduct the required training: Joint Expeditionary Base (JEB) Little Creek-Fort Story in Virginia Beach, Virginia and Marine Corps Base Camp Lejeune, in Jacksonville, North Carolina.

JEB Little Creek-Fort Story consists of two non-contiguous sites approximately eight miles (13 kilometers) apart: the 2,380-acre (963-hectare) Little Creek site (Little Creek) and the 1,458-acre (590-hectare) Fort Story site (Fort Story). Marine Corps Base Camp Lejeune (Camp Lejeune) comprises approximately 143,000 acres (57,870 hectares) of land used primarily for training. The locations of all three sites are shown in Figure 1.1-1.

The EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] §§ 4321-4370h); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [C.F.R.] Parts 1500-1508); and Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1D. The Navy is the lead agency for the Proposed Action.

Logistics over-the-shore is the process of transporting cargo and personnel from ships to shore in areas that do not have existing deep-draft fixed port facilities. This set of activities supports a variety of U.S. military operations ranging from large-scale conflict to maritime security and disaster relief efforts. One recent example is the earthquake in Haiti in January 2010, which required the movement of large amounts of cargo from ship to shore; the U.S. military created temporary piers that allowed for the delivery of approximately 103,000 tons of relief supplies to the island (White House Office of the Press Secretary 2010). Logistics over-the-shore is a complex operation that requires extensive training in a setting that is as close to real-life conditions as possible.

A JLOTS operation occurs when multiple branches of the military – Navy, U.S. Marine Corps (Marine Corps), and U.S. Department of the Army (Army) – conduct logistics over-the-shore activities together under a joint force commander. Joint logistics over-the-shore training consists of several coordinated FTXs, as described in Chapter 2. An FTX is an exercise conducted under the conditions in which the activity would normally occur (i.e., in the field as opposed to classroom or simulated training). The primary supporting command for JLOTS exercises on the east coast is Naval Beach Group TWO, stationed at JEB Little Creek-Fort Story. The U.S. Transportation Command, located at Scott Air Force Base, Illinois, schedules JLOTS exercises.

For the purposes of this EA, a full JLOTS training exercise is a coordinated set of FTXs (including the construction of the Elevated Causeway System – Modular [ELCAS {M}]) taking place over 60 days. An ELCAS (M) exercises can occur independently of other FTXs. Logistics over-the-shore training is also conducted throughout the year at the unit level, whereby only one

FTX or combination of a few related FTXs is conducted rather than the full suite of exercises. The Proposed Action evaluated in this EA includes a full JLOTS exercise conducted at either JEB Little Creek-Fort Story (which is broken into two sites: Little Creek and Fort Story) or Camp Lejeune as well as these smaller, unit-level FTXs or combinations of FTXs conducted at JEB Little Creek-Fort Story for purposes of preparing for a JLOTS exercise. In the following analyses, impacts were assessed based on concurrent conduct of these exercises to ensure a conservative approach in assessing the full scale of potential impacts. Similar Navy FTXs conducted at JEB Little Creek-Fort Story for purposes other than JLOTS training are not analyzed in this EA but instead in the Virginia Capes Inland Training EA (in development). Unit-level FTXs conducted solely by the Marine Corps or the Army at JEB Little Creek-Fort Story or Camp Lejeune are analyzed by those services in separate NEPA documentation.

1.2 Purpose and Need

The purpose of JLOTS training is to ensure that Navy, Marine Corps, and Army personnel develop and maintain competence in conducting joint ship-to-shore movement of cargo and personnel. The training is intended to help servicemembers gain a level of proficiency in these tasks that only can be gained through practical hands-on experience. Training in robust exercise scenarios is vital to honing warfighting skills. Because amphibious operations are inherently dangerous (being conducted in potentially high sea states and across the surf zone into potentially hostile territory), training in a realistic setting is also critical to the safety of personnel.

JLOTS training is needed to support the Navy's requirements to organize, train, and equip forces for prompt and sustained combat and to coordinate with other military branches, consistent with Title 10 U.S.C. § 5062. Joint Publication 4.01-6, *Joint Logistics Over-the-Shore (JLOTS)*, requires that Navy units, along with their Marine Corps and Army counterparts, conduct realistic and routine JLOTS exercises to ensure continued combat and humanitarian relief readiness. One of the most critical training challenges of the JLOTS exercises is the construction of the ELCAS (M), a temporary pile supported pier that facilitates transfer of cargo from ship to shore. This publication details the required capabilities, roles, and responsibilities of each military branch participating in the JLOTS exercises.

1.3 Scope of the Environmental Assessment

This EA provides an assessment of the potential impact on the human environment from conducting the proposed JLOTS training at one of three potential locations on two installations. The EA identifies a reasonable alternative for the Proposed Action and evaluates the impacts that may result from that alternative as compared to the No Action Alternative. Because the activities are amphibious, the primary areas of potential impacts include coastal environments and their associated resources.

Figure 1.1-1: Installations Analyzed for JLOTS

1.3.1 Resources Evaluated in the Environmental Assessment

Specifically, the aspects of the environment potentially affected by the Proposed Action and evaluated in this EA are:

- Air Quality
- Ambient Noise
- Public Health and Safety
- Socioeconomics
- Cultural Resources
- Water Resources
- Bathymetry, Sediments, Topography, and Soils
- Terrestrial and Aquatic Vegetation
- Terrestrial Wildlife and Birds
- Fish and Marine Invertebrates
- Sea Turtles
- Marine Mammals

When the potential for adverse impacts exists, the EA identifies measures to minimize or mitigate them. The EA also addresses cumulative impacts resulting from past, present, and reasonably foreseeable projects in the affected areas.

1.3.2 Resources Not Evaluated in the Environmental Assessment

Consistent with 40 C.F.R. § 1501.7(a)(3), the following resources are not considered in detail in the EA because the Proposed Action has no potential to affect them:

- **Land Use**: The Proposed Action would take place within and adjacent to the boundaries of existing military installations in designated training areas where military activities routinely take place. It has no potential to affect existing or planned land uses outside the installations.
- **Visual Resources**: Implementation of the Proposed Action would not adversely affect visual resources as no permanent structures would be built to support the proposed training activities.
- **Infrastructure**: The Proposed Action would not require the construction of any permanent facilities or result in a permanent increase in military personnel at any of the proposed locations. Therefore, there is no potential for impacts on infrastructure.
- **Land Transportation**: As the Proposed Action does not involve the permanent relocation of personnel to any of the installations being considered, there would be no impacts on land transportation. Cargo transportation on installation roadways would

occur with advance notice and alternate routes would be clearly labeled with signs. Potential effects on maritime transportation are discussed in the Public Health and Safety section and the Socioeconomics section.

- **Environmental Justice**: The training exercises associated with the Proposed Action would occur entirely within the fencelines of the installations being considered or in waters adjacent to those installations. The Proposed Action would not involve any activities that would disproportionately impact minority or low-income populations (Executive Order 12898, *Environmental Justice for Low Income and Minority Populations*) or children (Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*). Therefore, no impacts on minority or low-income populations or populations of children are expected. The Navy does not consider environmental justice further in this EA.

1.4 Regulatory Compliance

1.4.1 National Environmental Policy Act

NEPA (42 U.S.C. §§ 4321-4370d) requires federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. This EA will assist the Navy in deciding the recommended alternative for implementation through an analysis of environmental impacts associated with each alternative (see Chapter 2 for a discussion of alternatives). The Council on Environmental Quality was established under NEPA to implement and oversee federal processes. In 1978, the Council on Environmental Quality issued regulations (40 C.F.R. §§ 1500-1508) that specified that an EA should briefly provide sufficient analysis and evidence for determining whether to prepare an environmental impact statement or a finding of no significant impact (FONSI); aid in an agency's compliance with NEPA when an environmental impact statement is deemed unnecessary; and facilitate the preparation of an environmental impact statement when one is deemed necessary.

As required under NEPA, this EA considers various federal and state laws, regulations, and policies that are pertinent to implementation of the Proposed Action. Chapter 3 of this EA describes the impacts of each alternative to determine if the Proposed Action would result in significant impacts to the resources of the affected environment.

1.4.2 Agency Coordination

The Navy coordinated with the appropriate federal, state, and local agencies, stakeholder groups, and local communities. The correspondence with these entities to date is presented in Appendix A.

The Navy initiated informal consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to address the potential effects of the Proposed Action on terrestrial and marine species protected under the Endangered Species Act. Coordination is ongoing.

The Navy consulted with the State Historic Preservation Office (SHPO) pursuant to Section 106 of the National Historic Preservation Act for the Action Alternative, as detailed in Section 3.7.

Based on a comprehensive coastal consistency program and policy analysis, the Navy determined that implementation of the Proposed Action would be consistent to the maximum extent practicable with the enforceable policies of both the Virginia and North Carolina approved Coastal Zone Management Programs. Coastal Consistency Determinations were sent to both Virginia and North Carolina on 24 September 2013. A letter indicating concurrence was received from Virginia on 19 November 2013. Concurrence was assumed for North Carolina due to lack of written response with the required timeframe.

1.5 Public Participation

The Navy released the Draft EA for public review on 6 January 2015 to inform the public of the Proposed Action and to allow the opportunity for public comment. The Draft EA public comment period began on 6 January 2015 and ends on 21 January 2015. Notices were published in the *Virginian-Pilot* in Virginia Beach, Virginia and the *Jacksonville Daily News* in Jacksonville, North Carolina, indicating the availability of the document online at http://www.navfac.navy.mil/navfac_worldwide/atlantic/fecs/mid-atlantic/about_us/environmental_norfolk/environmental_compliance.html and at the following libraries:

Onslow County Public Library
58 Doris Avenue E.
Jacksonville, NC 28540

Virginia Beach Central Library
4100 Virginia Beach Boulevard
Virginia Beach, VA 23452

In the event that a FONSI is signed, the public will have access to the Final EA and FONSI at the same libraries and website. A notice of availability will be published in the *Virginian-Pilot* and the *Jacksonville Daily News* indicating where these documents will be available for public review. If an Environmental Impact Statement is required, additional notice and comment procedures will be published in accordance with NEPA and its implementing regulations.

1.6 Regulatory Setting

The Navy has prepared this EA consistent with:

- NEPA (42 U.S.C. §§ 4321-4370h)
- Council on Environmental Quality Regulations for implementing NEPA (40 C.F.R. §§ 1500-1508)
- Navy Procedures for Implementing NEPA (32 C.F.R. § 775)
- Chief of Naval Operations Instruction 5090.1D

The EA has also been prepared to address additional regulatory requirements listed and described in Chapter 6, Other Considerations Required by the National Environmental Policy Act.

1.7 Related Environmental Analysis, Documentation, and Permitting

In the last 20 years, various military units have regularly conducted JLOTS and associated FTXs at Little Creek, Fort Story, and Camp Lejeune. The following documents include environmental analyses of training activities that support JLOTS events:

- Environmental Assessment for Landing Craft Air Cushion/Army Lighter Air-Cushion Vehicle 30 Joint Familiarization Training (U.S. Department of the Navy 1993)
- Environmental Assessment for Combined and Joint Task Force Exercise 1996 (U.S. Department of the Navy 1996)
- Environmental Assessment for U.S. Army 7th Transportation Group Logistics Training (U.S. Department of the Army 1997)
- Environmental Assessment for Range Operations at MCB Camp Lejeune (U.S. Department of the Navy 2009)
- Atlantic Fleet Training and Testing Final Environmental Impact Statement (U.S. Department of the Navy 2013)
- Virginia Inland Training Environmental Assessment (U.S. Department of the Navy, in process)

In addition, exercise proponents will obtain applicable U.S. Army Corps of Engineers permits under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act and Water Quality Certifications under Section 401 of the Clean Water Act, as required.

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2 Proposed Action and Alternatives

The Council on Environmental Quality's regulations implementing NEPA (40 C.F.R. §§ 1500-1508) provide guidance on the consideration of alternatives to a proposed federal action and require rigorous exploration and objective evaluation of reasonable alternatives. Each of the alternatives must be feasible and reasonably foreseeable in accordance with Council on Environmental Quality regulations (40 C.F.R. § 1502.14).

The Proposed Action is to conduct joint logistics over-the-shore (JLOTS) training and associated unit-level field training exercises (FTXs) on the east coast. In order to attain proficiency and meet Navy requirements, units must train to perform seven FTXs (see Table 2.2-2). These FTXs are performed both individually and, less frequently, as a combined exercise known as a full JLOTS exercise. The Action Alternative considered in this EA was developed with due consideration to the purpose and need stated in Chapter 1. The Action Alternative and the No Action Alternative have been retained for detailed analysis.

Section 2.1 describes the main FTXs that comprise logistics over-the-shore training. The Action Alternative evaluated in this EA consists of combinations of those elements into a full scale integrated JLOTS exercise, generally lasting up to 60 days, and smaller sets of unit-level FTXs that are conducted separately and independently from full JLOTS events. The Action Alternative is described in Section 2.2.4.

2.1 Joint Logistics Over-the-Shore Exercises

Joint logistics over-the-shore training is designed to train military units in bare-shore logistics operations procedures while improving joint operations ("bare-shore" is undeveloped or unimproved shore where no structures or facilities, such as piers, are present). JLOTS training consists of several FTXs involving the operation of temporary piers, watercraft, and equipment to move cargo, rolling stock, and personnel from ships to the shore; the staging, mobilization, and transport of cargo and equipment from the shore to inland locations; and supporting activities such as shoreline and inland encampments.

2.1.1 Ship to Shore Connectors

Figure 2.1-1: Landing Craft Air Cushion

Ship-to-shore transfer exercises consist of moving personnel, cargo containers, and rolling stock (such as armored vehicles, high mobility multipurpose wheeled vehicles [Humvees], multi-ton trucks, and other military vehicles) directly from ships anchored offshore to land. On average, three cargo ships are used during full JLOTS training. A variety of small boats or craft are used to affect the transfer. They may include Landing Craft Utility boats, a type of boat used to transport equipment and troops to the shore; Landing Craft, Mechanized; Landing Craft Air Cushion hovercraft [Figure 2.1-1]); or Maritime

Prepositioning Force Utility Boats landing craft (hereafter collectively referred to as “landing craft”). Typically, up to a total of 20 such vessels (or equivalent) are used during a full JLOTS exercise.


Figure 2.1-2: Roll-On/Roll-Off Discharge Facility

The main means of ship-to-shore transport is the Improved Navy Lighterage System. The Army also operates a lighterage system that is similar to the Navy system. There would be no difference in the types of activities and impacts whether a Navy or Army system is used for a JLOTS exercise. Table 2.2-3 lists the average dimensions of the aforementioned vessels and components of the Improved Navy Lighterage System.

The Improved Navy Lighterage System is made up of floating modules and barges. Different mixes of modules and barges are used to make up different assemblies: the roll-on/roll-off discharge facility (Figure 2.1-2), which supports the discharge ramp from the cargo ship and serves as a pier; the floating causeway, which supports the discharge ramp from the cargo ship and transfers rolling stock across undeveloped shoreline; the causeway ferry, which is used to transport cargo from ship to shore or to the causeway; and the warping tug, which is used for assembling, towing, anchoring, and salvaging operations. The roll-on/roll-off discharge facility, causeway ferry, and floating causeway are assembled from interlocking modules. Warping tugs are used to install, tend, and maintain other system components, as well as to perform seaward and surf salvage.

The causeway ferry (Figure 2.1-3) is a motorized floating platform used to take vehicles and large cargo from ship to shore. Each ferry includes three sections that must be joined prior to use. A power module (with engine and controls) at the stern attaches to the discharge facility for seamless loading. The middle module is strictly for storage, and the beach module at the bow includes an unloading ramp for use when the ferry reaches its destination. A short causeway ferry with one powered module and one beach module may also be used. Vehicles, equipment, or containers are loaded and unloaded using the ramp or by cranes. It takes less than two hours to assemble the causeway ferry at sea.

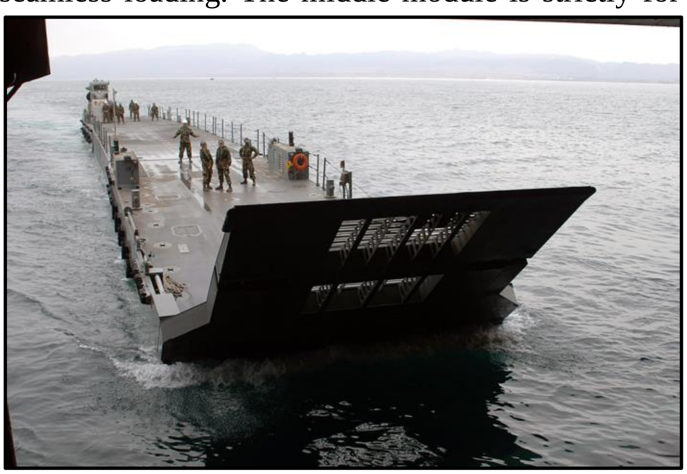


Figure 2.1-3: Causeway Ferry at Sea in Transit to Beach

A different set of Improved Navy Lighterage System sections can be assembled to make up a roll-on/roll-off discharge facility. Docking modules and up to seven combination modules can be fitted together in various ways. A causeway ferry powered module or warping tug push the roll-on/roll-off discharge facility modules into place and move the completed discharge facility into position. Once complete, the 240 by 72 foot assembly becomes a floating transfer dock onto which Maritime Prepositioning Ships and other cargo ships lower their ramps for easy off-loading. The tactical vehicles and other rolling stock can roll down the ships' ramps onto the roll-on/roll-off discharge facility and then onto waiting lighterage such as a causeway ferry. It can take up to 36 hours to assemble the roll-on/roll-off discharge facility, depending on waves and wind.

The floating causeway is a temporary pier that extends from the beach through the surf zone to a distance of up to 1,200 feet (366 meters). The term "floating causeway" in this EA refers to any modular pier constructed at the waterfront and extending into nearshore waters. A floating causeway may either be constructed by Navy or Army personnel, with an example of a Navy structure pictured in Figure 2.1-4. The "administrative pier" is another type of floating causeway that can be built by either service. Administrative piers are used to support refueling of craft or maintenance activities when existing infrastructure is not available for berthing.

Figure 2.1-4: Floating Causeway and Warping Tug

Figure 2.1-5: Example of Floating Causeway "Duck Pond"

In any floating pier configuration described above, the beach end of the pier is anchored into the sand. An area approximately 30 feet (9 meters) wide, 80 feet (24 meters) long, and five feet (1.5 meters) deep (sometimes referred to as a "duck pond" – see Figure 2.1-5) is excavated in the tidal zone using bulldozers to stabilize the causeway as it transitions from the land to sea. The individual causeway sections can be further secured to the subaqueous bottom with anchors. Deeper-draft craft (such as Landing Craft Utility and Logistics Support Vessels) use the pier to unload rolling stock, including, but not limited to, tanks, trucks, and wheeled light carts and generators. At the end of the exercise, the pier is dismantled and the "duck pond" is filled using the previously excavated material. The area is graded to its pre-training elevation. Up to two floating causeways can be constructed during a full JLOTS exercise. Either the Navy or the Army could be responsible for constructing one or both of these structures.

2.1.2 Elevated Causeway System (Modular)

The Elevated Causeway System (Modular) (ELCAS [M]) (Figure 2.1-6) is a temporary pier constructed from the beach into the water past the surf zone. Like the floating causeway, it provides a means of delivering containers, vehicles, and bulk cargo ashore without lighterage craft having to enter the surf zone.

The ELCAS (M) consists of a series of 8- by 40-foot (2.4- by 12.2-meter) pontoon sections joined together and supported by piles driven into the sea floor. The roadway section is three pontoons wide (24 feet) and the pierhead is nine pontoons wide (72 feet). The beach end of the pier is anchored into the sand with steel piles. Bulldozers are used to excavate a “duck pond” area above the mean high water mark approximately 30 feet (9 meters) wide, 25 feet (7.6 meters) long, and three feet (0.9 meter) deep. The excavated duck pond allows for the correct inclination of a ramp, facilitating the landward portion of the pier’s transition into the first roadway section.

Figure 2.1-6: Constructed Elevated Causeway System (Modular)

To build the pier, piles are driven into the sand with a diesel-powered impact hammer. The piles typically used are hollow, half-inch steel uncapped piles, 24 inches (0.5 meters) in diameter, and can be of various lengths (38 feet [11.6 meters], 57 feet [17.4 meters], or 76 feet [23.2 meters]) depending on the terrain and bathymetry. The depth to which the piles are driven is typically between 30 and 40 feet (9.1 to 12.2 meters), but can vary slightly based on site conditions. Generally, two pile drivers are used, but not simultaneously: while one is driving a pile, the other is being repositioned for the next pile. The pontoon sections are hoisted into place using two cranes. Construction takes about 20 days. Once complete, the ELCAS (M) can be up to 3,000 feet (914 meters) long, with approximately 193 supporting piles, though a shorter length ELCAS (M) is typically constructed for training exercises. For purposes of the analyses in this document, all ELCAS (M) are assumed to be 1,520 feet (463.3 meters) long, requiring 119 supporting piles. During training exercises, ELCAS (M) construction is continued until personnel become proficient in the operation of the pile driving equipment and construction techniques. This proficiency is typically achieved between 800-1,000 feet in length, but is never expected to require construction in excess of 1,520 feet (463.3 meters). After attaining proficiency with the system, there is no training benefit in continuing to build a longer structure.

Once the ELCAS (M) is constructed, offloading operations are similar to those of a conventional pier. Container-handling operations consist primarily of transferring containers from lighterage vessels (e.g., causeway ferries or landing craft) to the pier. Empty trucks or trailers are driven onto a turntable at the seaward end of the ELCAS (M) and are loaded with containers using the same cranes from construction. The ELCAS (M) is wide enough to accommodate two-way traffic. Rolling stock may be lifted by crane to the pier and driven to the beach as well. Operations typically involve the use of two forklifts and an average of six cargo trucks a day during the exercise. Power for the operation of the turntable and the lighting of the ELCAS (M) is provided by up to two 30-kilowatt (kW) and two 100-kW generators.

The ELCAS (M) is dismantled by removing the pontoon sections and removing the piles with a vibratory hammer (also known as a vibratory extractor), which takes approximately 10 days (only one pile is removed at a time). On the beach, the duck pond is graded to its original elevation.

2.1.3 Liquid Transfer Systems

Joint logistics-over-the shore training also involves the use of the Amphibious Bulk Liquid Transfer System and the Inland Petroleum Discharge System (or the Marine Corps' similar Amphibious Assault Fuel System) to transfer potable water (standing in for petroleum products) from ships to the forces on the shore and inland areas. Collectively, these are referred to as "liquid transfer systems" in this EA. Only clean hoses and components never used to transfer fuel are utilized for training. Approximately 100,000 to 200,000 gallons (378,500 to 757,000 liters) of water, typically obtained from a public water supply system or a ship's desalinized supply, are transferred ashore during any one exercise to test the system's ability to transfer fluids.

The Amphibious Bulk Liquid Transfer System uses a floating hose that is deployed at a distance of up to 10,000 feet (3,048 meters) between a ship and the Beach Interface Unit. The floating hose is marked with chem lights while in the water. The hose reels are secured to the deck of a non-powered causeway module; one warping tug and one causeway ferry maneuver the hose and mooring buoy or anchor into place. The flexible hose connects with the Inland Petroleum Discharge System through the Beach Interface Unit. The Inland Petroleum Discharge System pumps the liquid further inland through a hose that can extend up to five miles (eight kilometers) to a simulated petroleum bag farm.

After the exercise is finished, the water is disposed of through infiltration or discharge to surface waters, depending on the location and requirements imposed in the installation's discharge permits (as required by the Clean Water Act). Because the equipment used for training is never used to transfer actual petroleum products, no contaminants are introduced into the water during the exercise.

2.1.4 Tactical Water Purification System

The Tactical Water Purification System is an onshore unit that uses reverse osmosis to desalinate water extracted from the ocean offshore to make it potable. Chlorine may be used to purify the water. The desalinated water is stored in bladders on the beach (Figure 2.1-7). A Tactical Water Purification System can produce about 1,200 to 1,500 gallons (5,500 to 5,700 liters) of potable water per hour. During a full JLOTS exercise, the system produces a total of approximately 20,000 gallons (75,700 liters) of water. The desalinated water and brine are disposed of into the sanitary sewer system. Only one Tactical Water Purification System unit would operate during each JLOTS exercise.

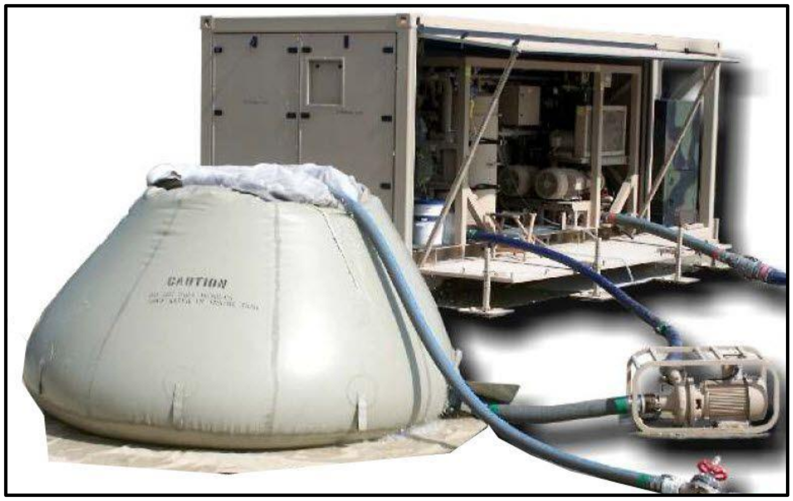


Figure 2.1-7: Tactical Water Purification System

2.1.5 Cargo Marshalling and Movement

Rolling stock and containerized cargo (equipment and supplies) are moved to shore to provide training in deploying equipment and vehicles and to verify that the ELCAS (M) and floating causeway have been built correctly and can withstand the movement of cargo. A cargo set of up to 150 motorized vehicles and 100 pieces of rolling stock (trailers, light carts, containers, etc.) typically comprises the bulk of what is transferred from ship to shore during a full JLOTS training event. For the purposes of analyses in this EA, cargo marshalling and movement begins once the cargo is moved onto the beach. Movement from the ship to the shore is captured under discussions of the Improved Navy Lighterage System.

Vehicles and equipment that have been dismantled for transport are reassembled in a marshalling or staging area where equipment and cargo are stored after unloading for transfer to inland locations. Transport from the landing points to the marshalling and staging area is by semi-truck trailers.

To facilitate the movement of the vehicles on the sand, a roll-out mobility mat system may be used (Figure 2.1-8). Mats typically 10 feet (3 meters) wide and made of polyester mesh material are rolled out onto unvegetated sand and staked to the ground to create a route parallel to the shore that vehicles use to travel to and from the marshalling and staging area. Shorter lengths of matting perpendicular to the beach connect the landing points to the main route. From the marshalling and staging area, transport to inland locations is by existing roads and dune breaks. To light up the beach during nighttime operations, up to 16 light carts powered by generators would be used.

Figure 2.1-8: Roll-Out Mats on Bare Beach

2.1.6 Tent Encampment

Tent encampments consist of personnel billeting tents; command, communications and operations tents; maintenance facilities; medical tents; portable galley facilities; portable latrine and shower facilities; and laundry facilities (Figure 2.1-9). Approximately 300 tents are erected and up to 3,000 personnel are temporarily billeted during a full JLOTS event. The average dimension of a tent is 18 by 24 feet (7 by 5 meters).

Figure 2.1-9: Typical Tent Encampment

Prior to setting up tent encampments, mowing of grass and other minor site preparation activities will typically be undertaken. Communication and electrical cables are laid through the encampment. All power is self-generated by the camp through the use of up to 30 generators of various sizes, operating 24 hours per day to support the onsite electricity demand. Light units (with additional integrated generators) are used to illuminate the area during night hours. The portable latrine facilities are located in the area of the personnel tents and no leach fields are constructed. An outside contractor would provide these facilities and oversee their proper service. Some grey water is generated by the shower facilities and is collected, stored, and disposed of into the sanitary sewer system or by removal via pump truck/contractor. Percolation pits may be constructed for training purposes. This involves digging up to two shallow pits (generally 70 feet [21 meters] wide by 100 feet [30 meters] long by 8 feet [2 meters] deep) using two bulldozers. The pits are refilled and leveled at the end of the exercise. Solid waste is collected and disposed of in accordance with the host installation’s waste disposal procedures.

In addition to the main camp, smaller tent facilities are set up on or near the landing beach, including a Joint Lighterage Control Center, a Theater Operations Command, and a medical support tent, each with a 60-kW generator. Lighting near the tents is provided by portable diesel-powered light stands that can be raised up to 30 feet (9 meters).

2.2 Alternatives Development

2.2.1 Screening Criteria

The identification, consideration, and analysis of alternatives are important aspects of the NEPA process and contribute to the goal of objective decision-making. The Council on Environmental Quality provides guidance on the development of alternatives and their regulations stipulate that of the alternatives considered, only reasonable alternatives (those that meet the stated purpose and need and are feasible) be evaluated in the EA. Alternatives that were initially considered but found not to meet the purpose and need can be briefly described and dismissed from detailed consideration in the EA.

The Proposed Action is to conduct JLOTS training at east coast locations. To develop and screen alternatives, the Navy used the following criteria:

- The training location must be as close as possible to Naval Beach Group TWO’s operational headquarters, located at JEB Little Creek-Fort Story, to minimize travel times and costs.
- The location must include undeveloped and unencumbered beach frontage to provide a realistic training environment.
- The location must have water depths equal to 20 feet (6 meters) to allow for the anchorage of support vessels alongside the ELCAS (M), floating causeway, or administrative pier.
- The location must be available year-round to provide training in all seasonal conditions.

- The location must provide a minimum of five acres (two hectares) of beach for the offloading and staging of equipment and materiel.
- The location must provide access to a minimum of 30 inland acres (12 hectares) for base camp. The land does not need to be contiguous.
- The beach location must be able to segregate training areas from other public and private uses for the duration of each training exercise.

Locations that would not meet these criteria would not meet the Navy's purpose and need to conduct realistic and routine JLOTS exercises to ensure continued combat and humanitarian relief readiness.

Based on the screening criteria, the Navy developed an Action Alternative containing two locations that would meet its purpose and need:

- **JEB Little Creek-Fort Story** – This joint base is located in the northern section of the City of Virginia Beach, Virginia where the Chesapeake Bay meets the Atlantic Ocean. The base is comprised of two non-contiguous installations. Little Creek is 2,380 acres (963 hectares) and Fort Story is 1,458 acres (590 hectares) (see Figures 2.2-1 and 2.2-2).

- **Marine Corps Base Camp Lejeune –** This base is located in Onslow County, North Carolina, approximately 170 miles southwest of Virginia Beach, Virginia. It is situated along the Atlantic coast and the Atlantic Intracoastal Waterway, and is approximately 143,000 acres (57,870 hectares) in size (see Figure 2.2-3).

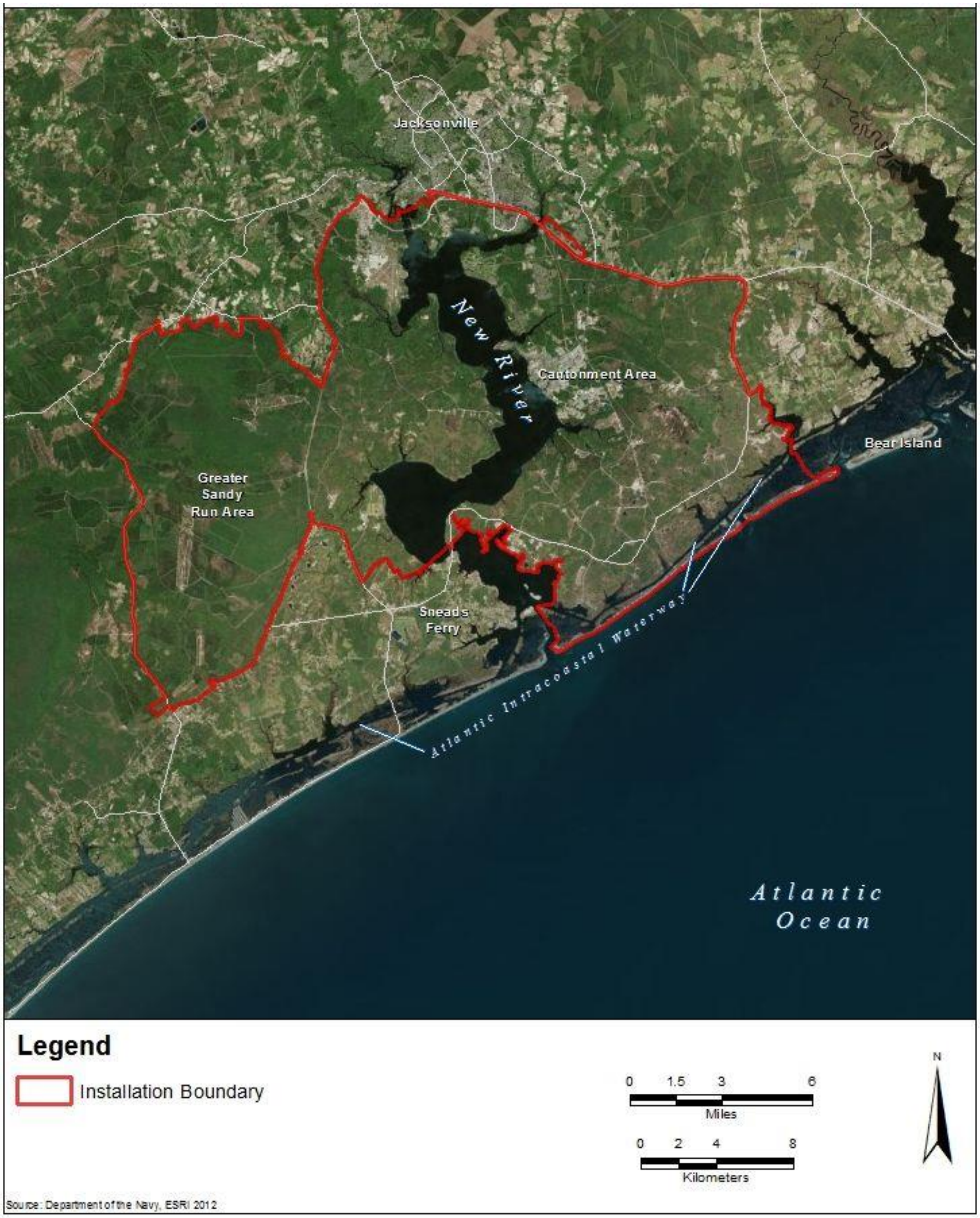
Alternatives considered but eliminated from further consideration because they did not meet the screening criteria described in Section 2.2.1.

Figure 2.2-1: Little Creek Site

Figure 2.2-2: Fort Story Site

Figure 2.2-3: Camp Lejeune Site

1



2.2.2 Alternatives Eliminated from Further Consideration

The following alternatives were considered but dismissed from further consideration because they did not meet the screening criteria.

2.2.2.1 Conduct JLOTS Training at Other Installations

Conducting JLOTS training at east coast military installations other than JEB Little Creek-Fort Story and Camp Lejeune was eliminated because the available installations (with the two exceptions addressed below) are too far from the operational headquarters of Naval Beach Group TWO, the lead Navy command for these exercises. Conducting JLOTS training at installations other than JEB Little Creek-Fort Story or Camp Lejeune would require the movement of assets (personnel and equipment) over long distances. Long transit times would reduce the frequency of training events and increase costs because of transport to and from the site. The additional fuel and equipment maintenance costs associated with lengthy travel would prove financially prohibitive.

Two installations, Naval Weapons Station Yorktown and Joint Base Langley-Eustis, are within reasonable distance of Naval Beach Group TWO’s operational headquarters. However, at both installations, the shoreline consists of a riverine environment that does not pose the required training challenges of a more dynamic tidal system. Additionally, Naval Weapons Station Yorktown has severe erosion problems with steep embankments, which would hinder amphibious landings and maneuvers.

2.2.2.2 Conduct JLOTS Training on Other Beaches at Little Creek, Fort Story, or Camp Lejeune

Other beaches at JEB Little Creek-Fort Story and Camp Lejeune were considered as possible training locations but were eliminated for the following reasons:

Little Creek: Sicily, Normandy, and Salerno beaches do not have open access roads leading inland. Without an established trail or road, new infrastructure would be required to access inland areas. Enlisted Beach is a narrow, recreational beach that does not provide adequate maneuver space. Officer’s Beach is behind the pistol and rifle range and would require closing the range during a JLOTS exercise. This lengthy closure would interfere with the training schedules of other commands. For these reasons, JLOTS training at these alternative Little Creek locations is not considered a reasonable option.

Fort Story: Inchon Beach is a narrow beach used for training and recreation; however, the breakwaters installed on the beach for erosion protection would interfere with JLOTS training. The other beach areas at the installation are heavily eroded, lack access roads, and do not provide adequate maneuver space for JLOTS and associated FTXs. Therefore, these alternative locations are not considered reasonable options.

Camp Lejeune: Beaches at Camp Lejeune other than Onslow Beach are reserved solely for conservation or recreation. Onslow Beach is intensely monitored and managed to minimize impacts on threatened and endangered species. The current swath of beach reserved for training is the largest tract of beach that can be easily monitored and managed without imposing on training hours and abilities. Therefore, training at other beaches is not a reasonable option.

2.2.2.3 Conduct JLOTS Training on Beaches Not Located on Military Installations

Beaches other than those located on federal military installations were considered as possible training locations but were eliminated since civilian use of the areas would be difficult to control. Access to the training areas by civilians would impede military personnel from easily utilizing necessary training areas. Furthermore, the presence of civilians near heavy equipment and in-water training activities poses potential for negative impacts to public health and safety. For that reason, any off-installation sites would need to be able to be segregated from civilian activity for the duration of the exercises. Privately-owned sites on the east coast of sufficient size to conduct JLOTS activities are scarce or non-existent. Therefore, training on beaches located off military installations is not a reasonable option.

2.2.3 No Action Alternative

The No Action Alternative involves the continuation of JLOTS training exercises at JEB Little Creek-Fort Story and Camp Lejeune at the current levels and intensity. The No Action Alternative does not meet all training requirements because it does not include the ELCAS (M) component of the exercise. However, the No Action Alternative is evaluated in the EA to serve as a benchmark for decision-makers to assess the environmental effects of the Action Alternative, consistent with the Council on Environmental Quality guidelines.

Several publicly available documents relate to Navy, Marine Corps, and Army JLOTS training at the locations analyzed in this EA. These include two Navy categorical exclusions to NEPA, issued 21 July 2010 for the Little Creek site and issued 20 April 2010 for the Fort Story site; an Army EA dated June 1997 titled “U.S. Army 7th Transportation Group Logistics Training” for the Little Creek and Fort Story sites; and an EA dated January 2009 by the Marine Corps titled “Environmental Assessment, MCB Camp Lejeune, Range Operations, MCB Camp Lejeune, North Carolina.” The analyses and information found in this EA supplements and/or supersedes the analyses and information found in those documents.

2.2.3.1 Continuation of Current JLOTS Training at JEB Little Creek-Fort Story

Under the No Action Alternative, the following training activities would take place at JEB Little Creek-Fort Story:

- One full JLOTS training event each year, incorporating the following FTXs (described in Section 2.1) at any time during the year:
  - Improved Navy Lighterage System training
  - Floating causeway construction training (Fort Story site only)
  - Liquid transfer system training
  - Tactical Water Purification System training
  - Cargo marshalling and movement
  - Tent encampment establishment

- In addition to the full JLOTS exercise, unit-level exercises will be conducted and may include any combination of the listed FTXs or a single FTX. These unit-level training events entail fewer personnel and less equipment (vessels, vehicles, etc.) than those described below for the full JLOTS exercise.

These activities are described in more detail in the following paragraphs.

2.2.3.1.1 Full JLOTS Exercise

A full JLOTS exercise would be conducted over approximately 60 days. Table 2.2-1 and Figures 2.2-4 through 2.2-6 show the locations of the ongoing training.

Table 2.2-1: Locations of No Action Alternative Field Training Exercises at JEB Little Creek-Fort Story

FTX	Locations
Improved Navy Lighterage System	*Little Creek:* Anzio Beach, Mudflats, and adjacent waters; Little Creek Cove *Fort Story:* Omaha and Utah beaches and their adjacent waters
Floating Causeway	*Little Creek*: none *Fort Story*: Omaha or Utah Beach and adjacent waters
Liquid Transfer Systems	*Little Creek*: Anzio Beach or Mudflats and adjacent waters *Fort Story*: Omaha or Utah Beach and adjacent waters
Tactical Water Purification System	*Little Creek*: Mudflats and adjacent waters, discharge to sanitary sewer system *Fort Story*: Omaha or Utah Beach and adjacent waters, discharge to sanitary sewer system
Cargo Marshalling and Movement	*Little Creek*: Anzio Beach or Mudflats[1] and adjacent waters *Fort Story*: Omaha or Utah Beach and adjacent waters
Tent Encampment	*Little Creek*: Rodriguez Field, Iwo Jima Field, and Amphibious Field with advance team tents at Anzio Beach and administrative tents at Anzio Beach and Mudflats *Fort Story*: Forklift Training Area, Thomas Nelson Circle Training Area, and Vung Tau Driving Range with advance team and administrative tents at Omaha or Utah Beach
Note: 1. Roll-out mats would be used to facilitate cargo movement on Anzio Beach but would not be needed at Mudflats.	

Approximately three weeks prior to the arrival of the bulk of JLOTS personnel and equipment, an advance team of about 30 people would arrive onsite. The role of the team is to prepare the beach and set up the basic infrastructure for the training. These personnel would be accommodated in two small 8-person and one large 15-person tents on the beach. Preparatory work would include beach suitability inspection, location of splash points and ingress/egress points, hydrographic survey, preparation of lighterage discharge sites, placement of mobility matting, and other similar tasks.

At the start of the full JLOTS exercise, up to two Military Sealift Command ships would anchor off the training site, one to three nautical miles out. The transfer of personnel, materiel, and equipment from these ships to the beach would then begin, using the causeway ferry, warping tugs, and roll-on/roll-off discharge facility components of the Improved Navy Lighterage System as well as landing craft, as described in Section 2.1.1. In addition to the vessels described above, 8 to 10 smaller vessels would operate in the area between the shore and the ships for the duration of the training exercise, including tug boats and security boats. Typically, up to a total of 20 vessels are used during a full JLOTS exercise.

The floating causeway, if used, would be constructed at the beginning of the exercise. Rolling stock is the bulk of equipment offloaded via a floating causeway. Discharge of equipment and rolling stock via the floating causeway would begin as soon as the structure is complete using cargo trucks, Humvees, and forklifts. Cargo offload could also occur across the beach via landing craft and the Improved Navy Lighterage System prior to construction of the floating causeway.

As cargo is discharged via the Improved Navy Lighterage System, it would be assembled and staged in the cargo marshalling area then moved to a designated inland location using existing routes. Transport would be by tractor trailers and cargo trucks, traveling in convoys. The convoys typically would consist of about ten trucks. They would leave the marshalling area at regular intervals (such as every 30 minutes for up to 5 hours each day).

The administrative tents and main inland encampment (see Section 2.1.6) would be set up in the early days of the event. They would continue in operation through its end. For a full JLOTS event, up to 3,000 personnel would be present. Similarly, the Tactical Water Purification System, which in a real-life situation would provide potable water, would be installed at the beginning of the training and would be operated throughout. The Tactical Water Purification System would be used during a full JLOTS exercise. Overall, up to 20,000 gallons (75,700 liters) of water would be produced with the intention of training personnel to use the system proficiently, but without providing the only source of potable water to the camp for the duration of the exercise.

Liquid transfer system training would take place over approximately one week (see Section 2.1.3). During a full JLOTS training exercise, the two components of the system – Amphibious Bulk Liquid Transfer System and Inland Petroleum Discharge System – could be used. As previously noted, fresh water, not fuel, would be transferred, using special equipment that has not been used for transferring actual petroleum products.

The disassembly of the different temporary structures and facilities would take one week to 10 days, after which all areas would be restored to their pre-training condition.

Figure 2.2-4: Examples of No Action Alternative JLOTS Exercises at Little Creek – Shoreline Locations

Figure 2.2-5: Examples of No Action Alternative JLOTS Exercises at Little Creek – Inland Locations

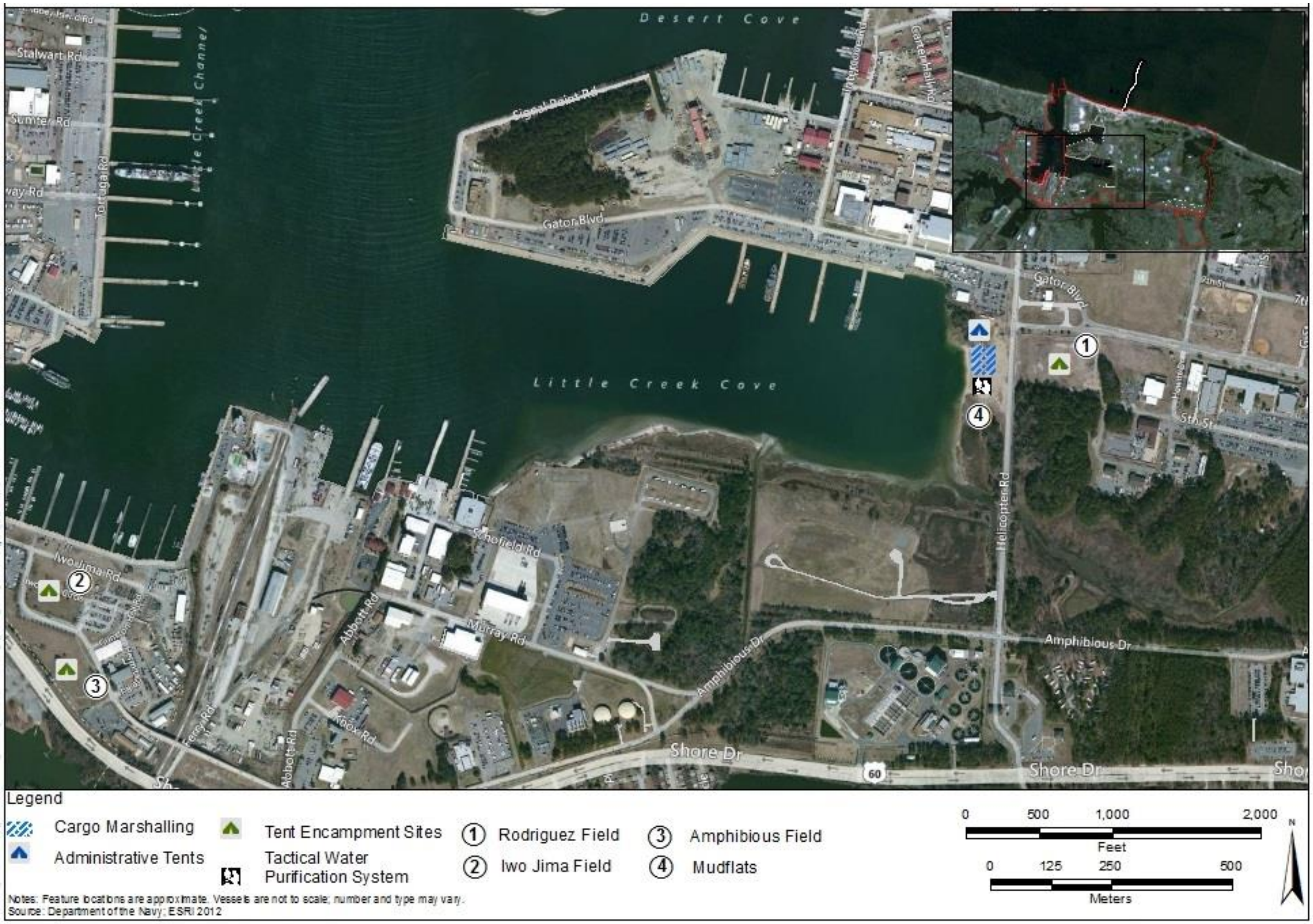


Figure 2.2-6: Examples of No Action Alternative JLOTS Exercises at Fort Story

2.2.3.1.2 Unit-Level Training

Unit-level training is performed on a smaller scale than a full JLOTS exercise. There are two types of unit-level training: quarterly and routine. Quarterly unit-level training occurs approximately once every three months and includes approximately one third the personnel of a full JLOTS exercise. Routine unit-level training occurs multiple times per week and includes less than 50 personnel. Under the No Action Alternative, smaller-scale unit-level training at JEB Little Creek-Fort Story would consist of the activities described below. Routine unit-level training only occurs at Little Creek.

Improved Navy Lighterage System

Quarterly unit-level training on the Improved Navy Lighterage System would be combined with training for cargo marshalling and movement and tent encampments. Locations would be the same as those listed in Table 2.2-1, although less equipment and personnel would be used than during a full JLOTS exercise. The training would be completed in 10-30 days. Quarterly unit-level training on the use of the Improved Navy Lighterage System typically involves one third of the personnel and equipment than would be involved in a full JLOTS training exercise.

Routine Improved Navy Lighterage System training exercises would occur an average of three times per week for approximately three hours per exercise at Little Creek (see Table 2.2-1 for locations). This FTX could be combined with cargo marshalling and movement routine training, although the exercises can be performed independently. Up to six vessels and five support vehicles onshore (bulldozer; Humvees; Lighter, Amphibious, Resupply, Cargo [LARC]; etc.) are used during a routine training exercise.

Cargo Marshalling and Movement

Quarterly unit-level training for cargo marshalling and movement would be combined with training on the Improved Navy Lighterage System and tent encampment training. Locations would be the same as those listed in Table 2.2-1. The training would be completed in about 10 days. This training exercise typically requires approximately one third of the personnel and equipment than would be involved in a full JLOTS training exercise.

Routine unit-level training for cargo marshalling and movement exercises (referred to as “routine training”) would be undertaken an average of three times per week at the Little Creek locations stated in Table 2.2-1. These FTXs would typically be performed with the Improved Navy Lighterage System. A cargo set of up to 10 motorized vehicles and rolling stock (trailers, light carts, containers, etc.) typically comprises the bulk of what is transferred from ship to shore during a routine training exercise.

Liquid Transfer

On a quarterly basis, the Amphibious Bulk Liquid Transfer System would be used to transfer fresh water from ship to shore. The exercise would take place over 96 hours. In addition to a tanker ship; a causeway ferry; warping tug; Lighter, Amphibious, Resupply, Cargo (LARC); and small rigid-hull inflatable boat would be involved, as well as two or three security boats and a medical boat. A team of about 30 people would be accommodated in tents on the beach. This encampment would be similar in scale to the advance team encampment that would occur during a full JLOTS exercise or a quarterly unit-level training exercise for cargo marshalling and movement. Routine unit-level training exercises would occur up to six times per year, each time over a two-day period. No Inland Petroleum Discharge System training would take place outside of full JLOTS exercises.

Tactical Water Purification System

Stand-alone Tactical Water Purification System training would occur four times per year. Each time, the system would be operated for a few hours only, producing 1,200 to 1,500 gallons (5,500 to 5,700 liters) of water per hour. Assuming the system is operated for four hours, a total of 4,800 to 6,000 gallons (18,170 to 22,700 liters) of water would be produced and disposed of as described in Section 2.1.4.

Tent Encampments

Quarterly unit-level training exercises on the establishment of tent encampments would be conducted at the locations listed in Table 2.2-1. For unit-level training exercises, up to 60 tents are used for up to 500 personnel. For routine unit-level training, up to 15 tents are erected for administrative purposes and not actual housing of personnel.

Summary

A summary of the annual frequency of the exercises associated with the No Action Alternative at JEB Little Creek-Fort Story can be found in Table 2.2-2. A summary of the type and number of vessels used during both full JLOTS and unit-level exercises involving offshore activities, along with the size ranges of these vessels, can be found in Table 2.2-3.

Table 2.2-2: Frequency of JLOTS Exercises at All Locations for Both Alternatives

FTX	No Action Alternative								Action Alternative							
	# Annual Occurrence as Part of a Full JLOTS Exercise[2]		# Annual Occurrences as Part of Quarterly Unit-Level Exercises[3]		# Annual Occurrences as Part of Routine Unit-Level Exercises[4]			Total # of Annual Occurrences	# Annual Occurrence as Part of a Full JLOTS Exercise[2]		# Annual Occurrences as Part of Quarterly Unit-Level Exercises[3]		# Annual Occurrences as Part of Routine Unit-Level Exercises[4]			Total # of Annual Occurrences
	JEB LC-FS	CL	JEB LC-FS	CL	LC	FS	CL		JEB LC-FS	CL	JEB LC-FS	CL	LC	FS	CL	
Improved Navy Lighterage System	1	1	4	0	152	0	0	158	1	1	4	0	152	0	0	158
Floating Causeway	2[1]	2	0	0	0	0	0	4	4	2	0	0	0	0	0	6
Liquid Transfer Systems	1	1	4	0	6	0	0	12	1	1	4	0	6	0	0	12
Tactical Water Purification System	1	1	4	0	0	0	0	6	1	1	4	0	0	0	0	6
Cargo Marshalling and Movement	1	1	4	0	152	0	0	158	1	1	4	0	152	0	0	158
Tent Encampment	1	1	4	0	6	0	0	12	1	1	4	0	6	0	0	12
ELCAS (M)	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2

Note:
1. Under the No Action Alternative, floating causeways would only be constructed on the Fort Story portion of JEB Little Creek-Fort Story.
2. All activities identified as occurring as part of full JLOTS exercises were analyzed as if they occurred concurrently at a given installation.
3. All activities identified as occurring as part of quarterly unit-level exercises were analyzed as if they occurred concurrently with other quarterly unit-level exercises.
4. All activities identified as occurring as part of routine unit-level exercises were analyzed as if they occurred concurrently with other routine unit-level exercises.

JEB LC-FS = JEB Little Creek-Fort Story
CL = Camp Lejeune
LC = Little Creek
FS = Fort Story

Table 2.2-3: Maximum Numbers of Each Type of Vessel Used During Full JLOTS and Unit-Level Exercises at All Locations

Vessel/Component	Description/Average Dimensions	Full JLOTS	Unit-Level Cargo Transfer (JEB Little Creek-Fort Story Only)	Unit-Level Amphibious Bulk Liquid Transfer (JEB Little Creek-Fort Story Only)
Military Sealift Command Ship	650-950 feet (198-290 meters) long	2	0	0
Landing Craft, Utility Boat	140 feet (42 meters) long	2	1	0
Landing Craft, Mechanized	73 feet (22 meters) long	2	1	0
Landing Craft, Air Cushion	88 feet (26 meters) long	1	1	0
Maritime Prepositioning Force Utility Boat	38 feet (12 meters) long	3	2	0
Tug Boat	Up to 230 feet (70 meters) long	2	1	0
Security Boat	Up to 35 feet (11 meters) long	4	3	3
Causeway Ferry	Interlocking modules, each 24 feet (7 meters) wide by 80 feet (24 meters) long by 8 feet (3 meters) deep	7	4	1
Roll-On/Roll-Off Discharge Facility	240 feet (73 meters) long by 72 feet (22 meters) wide	1	1	0
Warping Tug	88 feet (27 meters) long	5	4	1

Note:
Numbers represent the maximum numbers of each type of vessel potentially used in each type of training exercise. Not all vessels represented will be used during each training exercise. The exact number of vessels used at a particular time will be predicated by weather conditions, number of available personnel, etc. A full JLOTS exercise would generally consist of no more than 20 total vessels. Unit-level exercises are typically limited to up to 10 vessels.

2.2.3.2 Continuation of Current JLOTS Training at Camp Lejeune

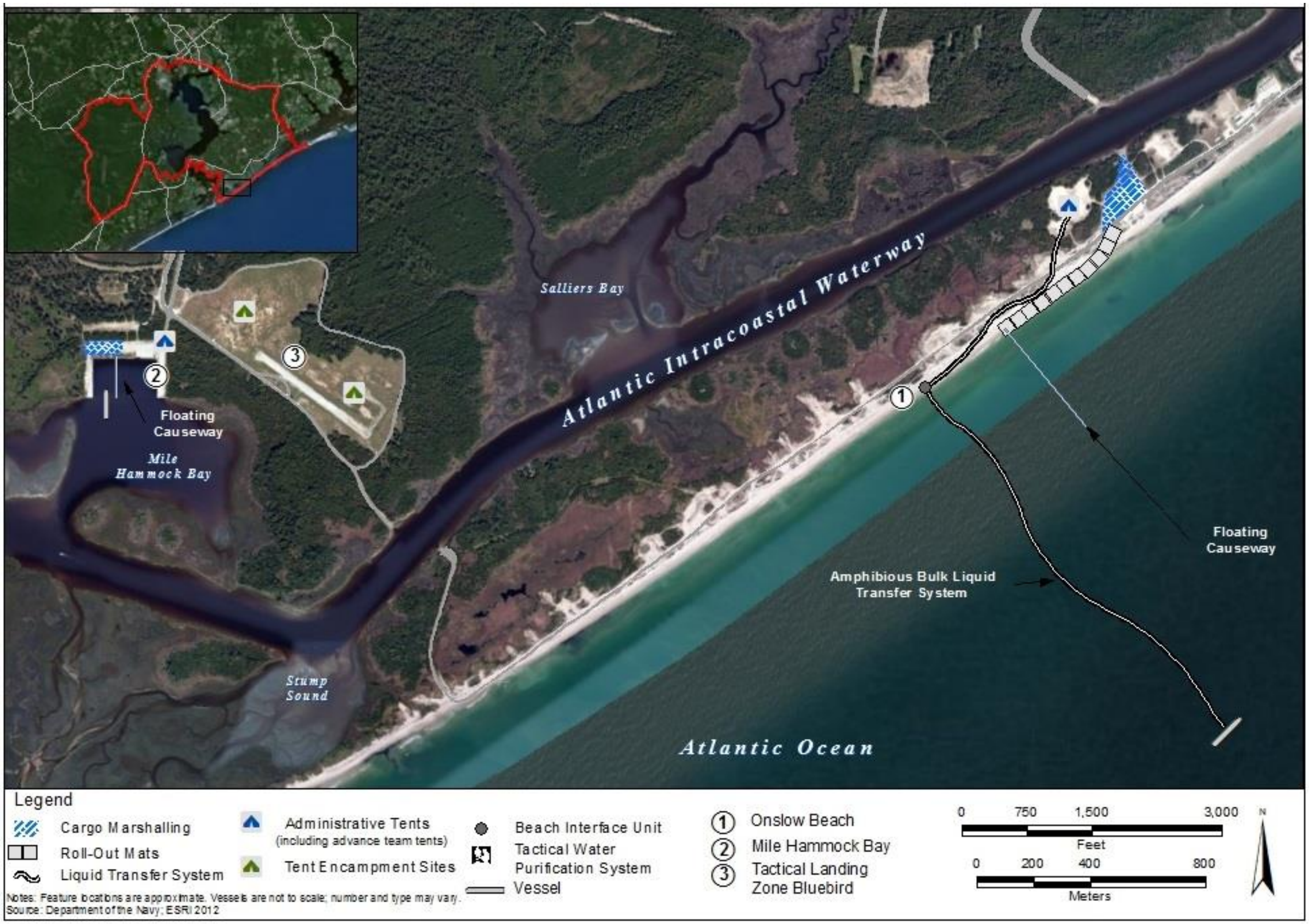
The No Action Alternative entails conducting only a full JLOTS training exercise at Camp Lejeune each year. No quarterly or routine unit-level training would occur at Camp Lejeune under the No Action Alternative.

No Action Alternative training exercises would be similar to those proposed at JEB Little Creek-Fort Story, described in Section 2.2.3.1. The FTXs that would comprise a full JLOTS exercise at Camp Lejeune are shown in Table 2.2-2. Locations of these exercises are found in Table 2.2-4 and Figure 2.2-7. A summary of the types and numbers of vessels that would be used during a full JLOTS exercise at Camp Lejeune, along with their size ranges, can be found in Table 2.2-3.

Table 2.2-4: Locations of No Action Alternative FTXs at Camp Lejeune

FTX	Location
Improved Navy Lighterage System	Mile Hammock Bay and Onslow beaches and their adjacent waters
Floating Causeway	Onslow Beach, Mile Hammock Bay, and adjacent waters
Liquid Transfer Systems	Onslow Beach and adjacent waters
Tactical Water Purification System	Mile Hammock Bay Beach and adjacent waters, discharge to sanitary sewer system
Cargo Marshalling and Movement	Onslow Beach or Mile Hammock Bay[1] and adjacent waters
Tent Encampment	Tactical Landing Zone Bluebird with administrative tents on Onslow Beach and Mile Hammock Bay Beach and advance team tent on Onslow Beach.
Note: 1. Roll-out mats would be used to facilitate cargo movement on Onslow Beach but would not be needed at Mile Hammock Bay Beach.	

Figure 2.2-7: Examples of No Action Alternative JLOTS Exercises at Camp Lejeune



2.2.4 Action Alternative

The Action Alternative would consist of the No Action Alternative plus the addition of the following:

- One ELCAS (M) exercise per year at JEB Little Creek-Fort Story at one of the sites listed in Table 2.2-5;
- One ELCAS (M) exercise per year at Camp Lejeune at the location listed in Table 2.2-5; and
- The addition of two floating causeways per year at Little Creek at the locations listed in Table 2.2-5.

Currently, the ELCAS (M) FTX is not being conducted as part of JLOTS training. The requirement for Sailors to achieve and maintain proficiency in the construction of the ELCAS (M) is the primary differentiating factor between the No Action and Action Alternatives. Due to the joint nature of JLOTS exercises and the requirement to utilize east coast training locations within close geographic proximity to Naval Beach Group TWO's operational headquarters at JEB Little Creek-Fort Story in Virginia Beach, Virginia, authorizing training at both a naval installation (JEB Little Creek-Fort Story) and a Marine Corps installation (MCB Camp Lejeune) is necessary. For this reason, the ability to train at both of these installations is incorporated into a single Action Alternative for analysis in this EA.

Comparisons of the annual numbers of FTXs for the Action Alternative with those of the No Action Alternative can be found in Table 2.2-2.

Locations of the field training exercises associated with the Action Alternative at Little Creek can be found in Figures 2.2-8 and 2.2-9, at Fort Story in Figure 2.2-10, and at Camp Lejeune in Figure 2.2-11.

The ELCAS (M) would be installed as described in Section 2.1.2 in the early days of the exercise, similar to the floating causeway detailed in Section 2.2.3.1.1. Discharge of equipment and rolling stock over the ELCAS (M) would begin as soon as the structure is complete although cargo offload could occur across the beach via landing craft and the Improved Navy Lighterage System prior to its construction.

Table 2.2-5: Additional FTXs Associated with the Action Alternative

Installation	FTX	Location
JEB Little Creek-Fort Story	ELCAS (M)	*Little Creek*: Anzio Beach and adjacent waters *Fort Story*: Omaha or Utah Beach and adjacent waters
Camp Lejeune	ELCAS (M)	Onslow Beach and adjacent waters
JEB Little Creek-Fort Story	Floating Causeway	*Little Creek*: Anzio Beach, Mudflats, and adjacent waters

Figure 2.2-8: Examples of Action Alternative JLOTS Exercises at Little Creek – Shoreline Locations

Figure 2.2-9: Examples of Action Alternative JLOTS Exercises at Little Creek – Inland Locations

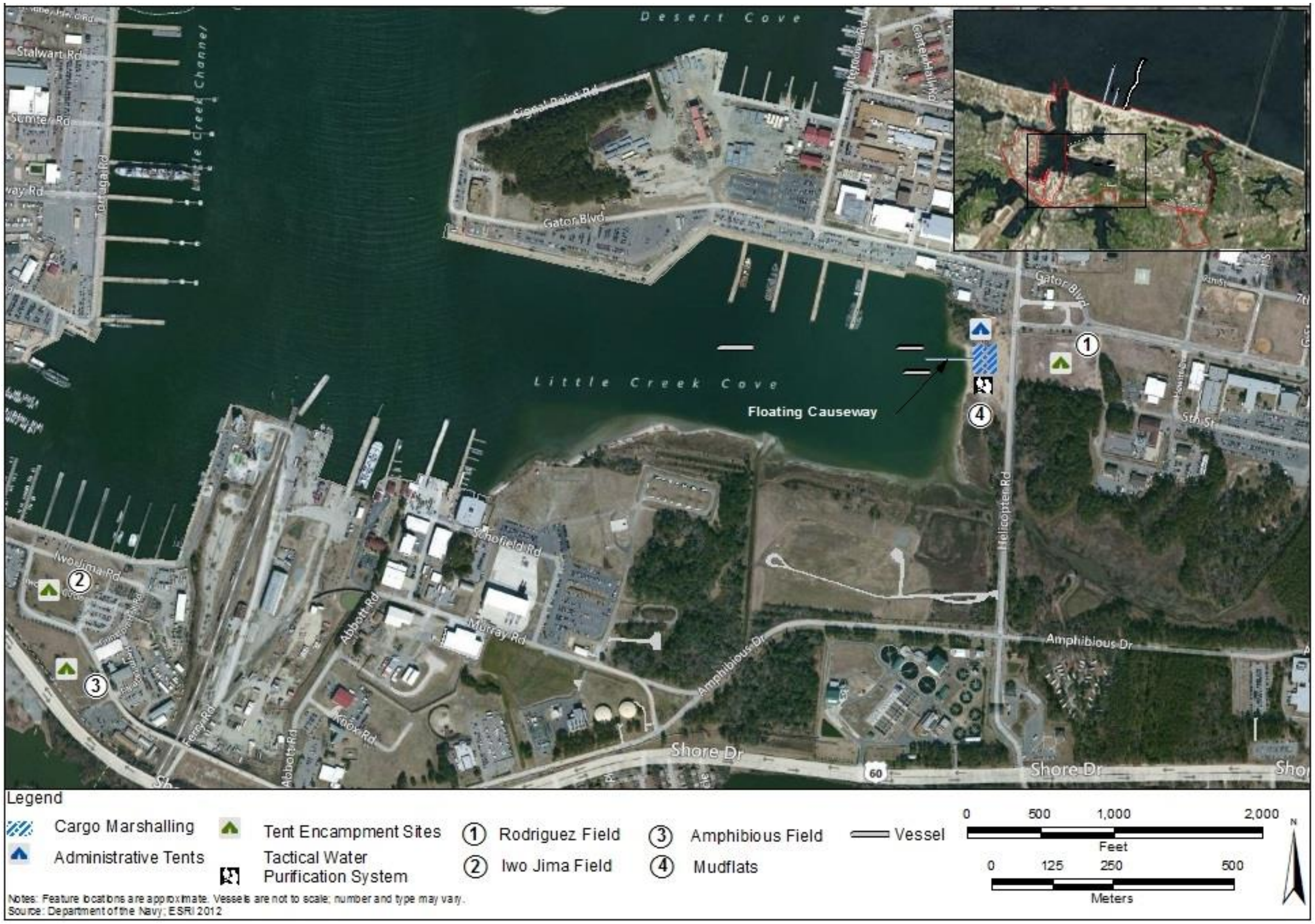
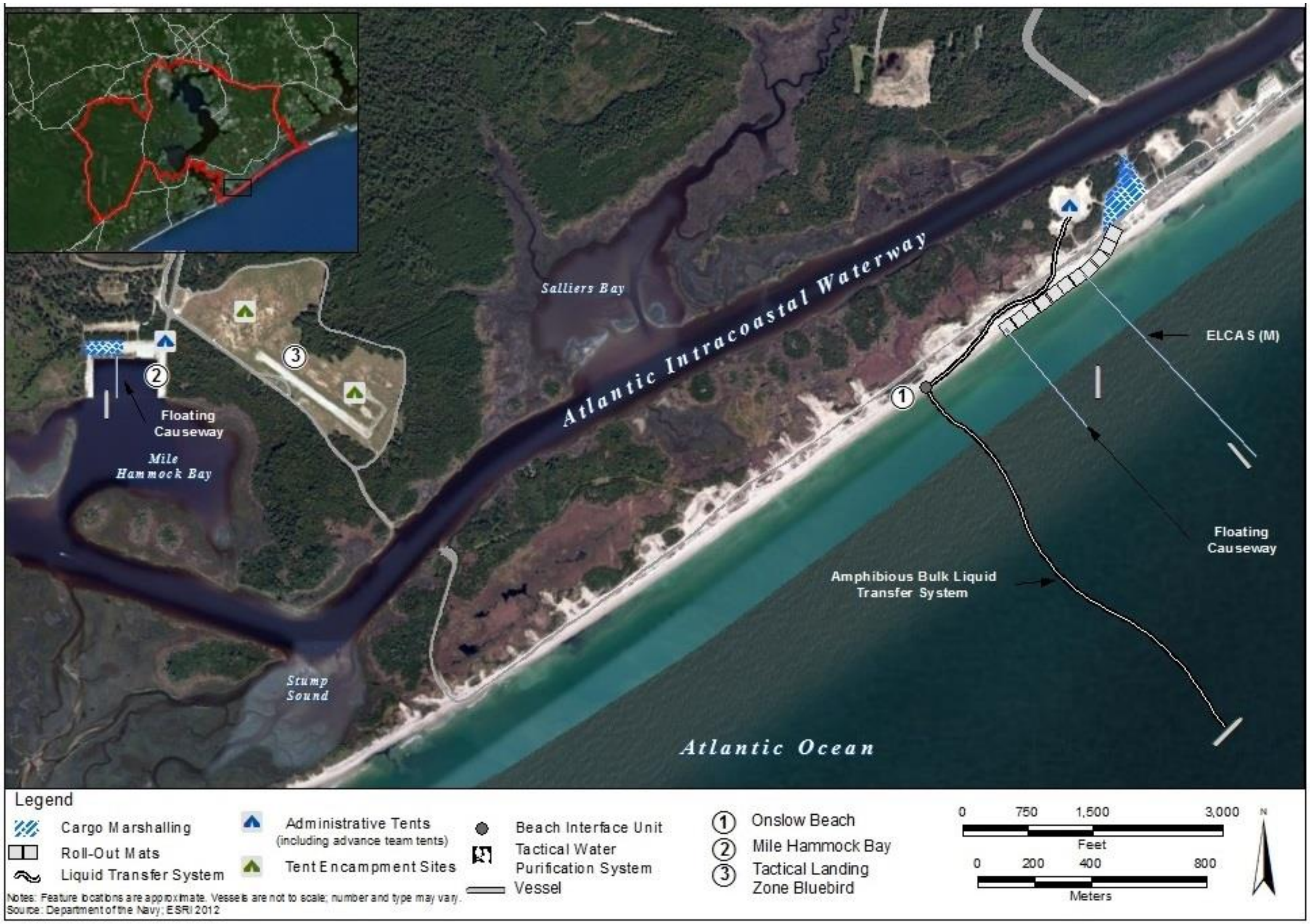


Figure 2.2-10: Examples of Action Alternative JLOTS Exercises at Fort Story

Figure 2.2-11: Examples of Action Alternative JLOTS Exercises at Camp Lejeune



3 Affected Environment and Environmental Consequences

3.0 Introduction

This section describes the existing environment and potential impacts from proposed JLOTS training activities in the study area.

For each alternative, the primary study area consists of the training beach (or beaches) and inland training areas where the proposed JLOTS activities would take place, along with adjacent waters out to approximately 3 miles (4.8 kilometers). Figures 3.0-1, 3.0-2, and 3.0-3 show the study area for each proposed location. However, a larger area is considered for calculation of impacts associated with underwater acoustic propagation related to pile driving activities to ensure that all animals potentially affected by underwater sounds produced by these activities are considered in the analysis.

The impact analyses contained within all sections of this chapter are for one occurrence of a full JLOTS exercise per year at each installation. In order to take into account the potential additive environmental impacts of conducting combinations of multiple FTXs in the course of unit-level training, the analyses of unit-level events assume all FTXs (with the exception of ELCAS (M), which is not part of unit-level training) would occur simultaneously.

Where appropriate, two types of training activities are considered separately to describe impacts: in-water training activities and shoreline and inland training activities. In-water activities include the movement of ships, boats, components of the Improved Navy Lighterage System, and amphibious equipment in water; the construction and operation of temporary piers; and the deployment of the liquid transfer system hose. Shoreline activities include the transfer of cargo and rolling stock from craft to the marshalling area; the excavation of "duck ponds" to stabilize the temporary piers; the beach encampments; and other activities taking place on the beach. Inland activities include the movement of cargo trucks from the beach to the main encampment areas and the main encampments.

Consistent with Council on Environmental Quality's regulations, the significance of the anticipated impacts is assessed taking into account context and intensity. "Context" means that the significance of impacts depends on the setting of the proposed action. For a site-specific action like JLOTS training, the relevant context is fairly localized (40 C.F.R. § 1508.27(a)). The study area at each location, as shown in Figures 3.0-1 and 3.0-2 for JEB Little Creek-Fort Story, and Figure 3.0-3 for Camp Lejeune, is the relevant context in which to analyze this Proposed Action. "Intensity" refers to the severity of the action's impacts on the environment. Intensity is, in part, a function of the context in that the same action impacts may have much more severe impact on a sensitive, pristine, or unique environment than a previously disturbed or resource-poor one.

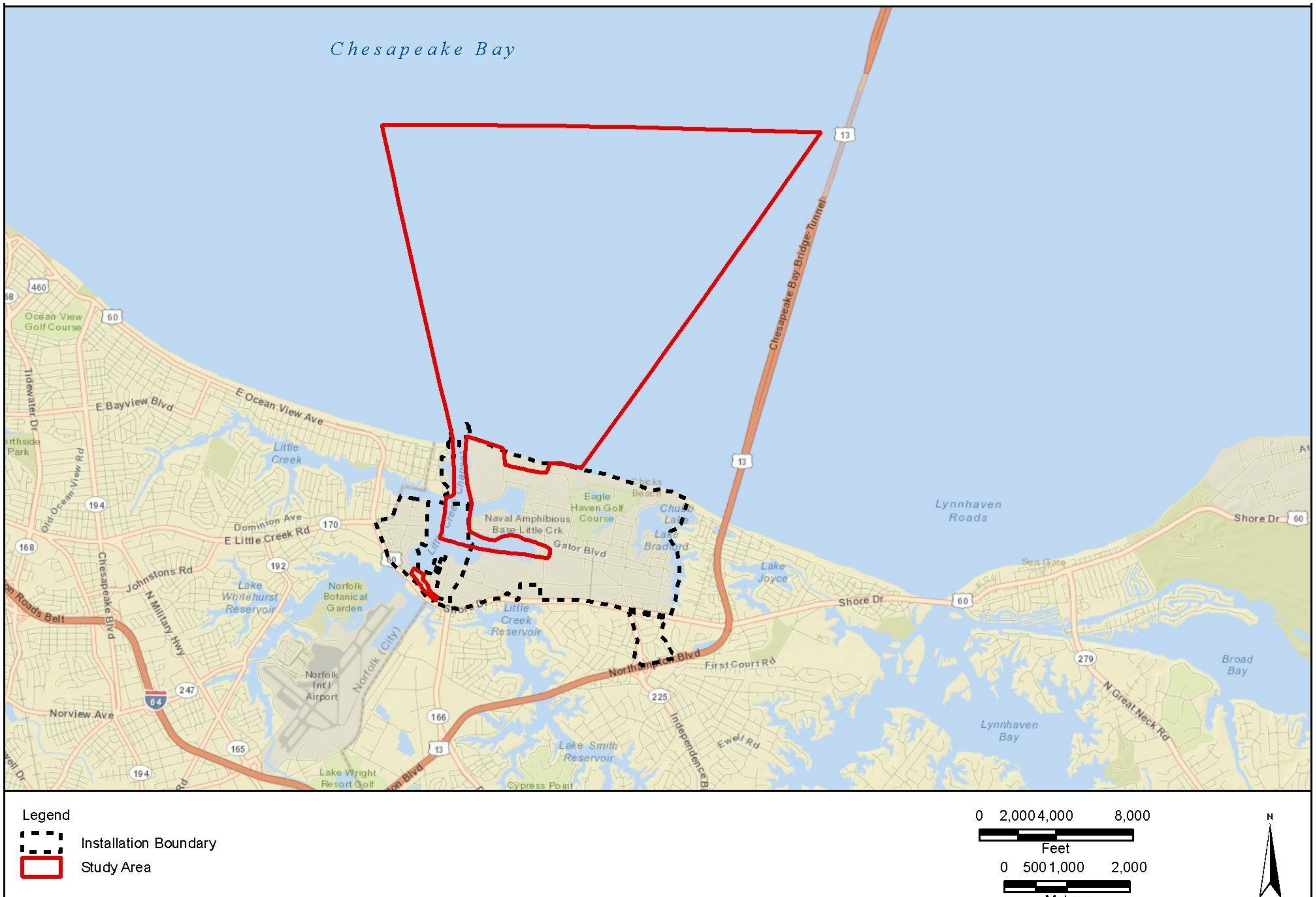
With regard to the context, the affected environment consists primarily of training beaches and the adjacent waters, which are routinely used for amphibious training activities such as those included in the Proposed Action. Inland areas (used for the encampments) also are training areas designated for the types of activities proposed.

With regard to intensity, most of the impacts of the Proposed Action would be repetitive through the year but of moderate to short duration, with days to months between training events for the environment to recover from the impacts associated with each. The beaches and nearshore waters where most of the proposed training activities would take place constitute an ever-changing, dynamic coastal environment that continuously experiences the effects of wind, waves, and tides, facilitating the absorption of a range of impacts (e.g., displacement of sediments or sand compaction) with no or minimal long-term consequences.

For each resource, the EA describes the existing environment and the anticipated impacts of the No Action Alternative and Action Alternative. Because the No Action Alternative represents a continuation of the current levels of JLOTS training at JEB Little Creek-Fort Story and Camp Lejeune, its impacts are ongoing. Therefore, the impacts of the Action Alternative are similar to the impacts of the No Action Alternative plus the impacts specifically associated with those FTXs not included in the latter: the floating causeways and ELCAS (M) at Little Creek, and the ELCAS (M) at Fort Story and Camp Lejeune.

Human activity can directly and indirectly influence habitat, behavior, and physiology of aquatic wildlife through introduction of stressors into the environment. Well-known examples of stressors include introduced invasive and exotic species, nutrient enrichment, direct human disturbance (e.g., noise and visual changes), and toxic chemicals (Munns, Jr. 2006). Potential stressors that may result from JLOTS activities were considered, and those with a reasonable potential to impact species in the vicinity are analyzed. They include artificial light; entanglement; temporary loss of habitat; temporary reduction in water quality; vehicle and vessel strikes; and vehicle, vessel, and equipment noise. In addition, airborne and underwater noise from pile driving associated with the ELCAS (M) FTX is analyzed under the Action Alternative.

Figure 3.0-1: Study Area – Little Creek



Source: Department of the Navy 2008; Bing Maps 2012

Figure 3.0-2: Study Area – Fort Story

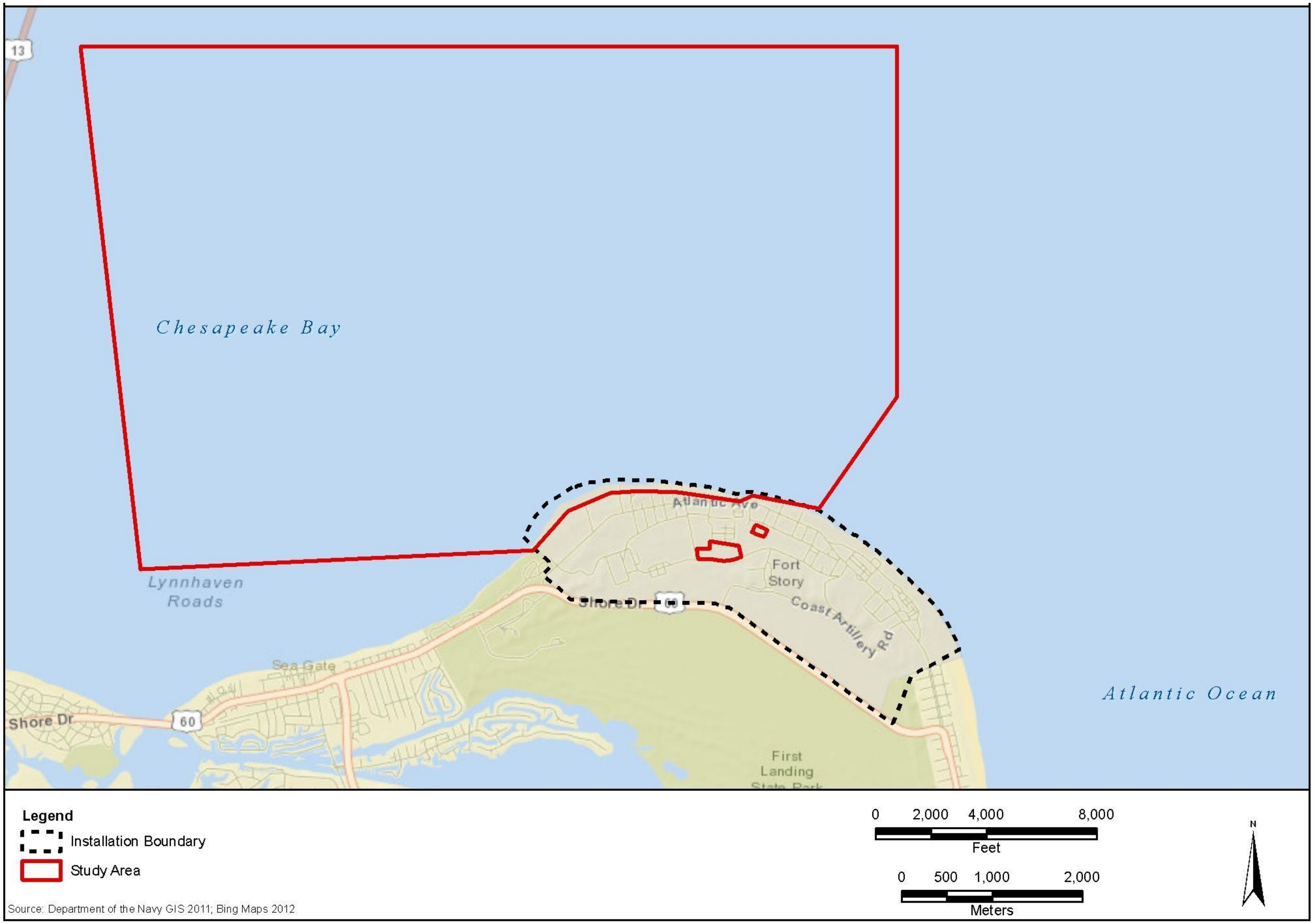
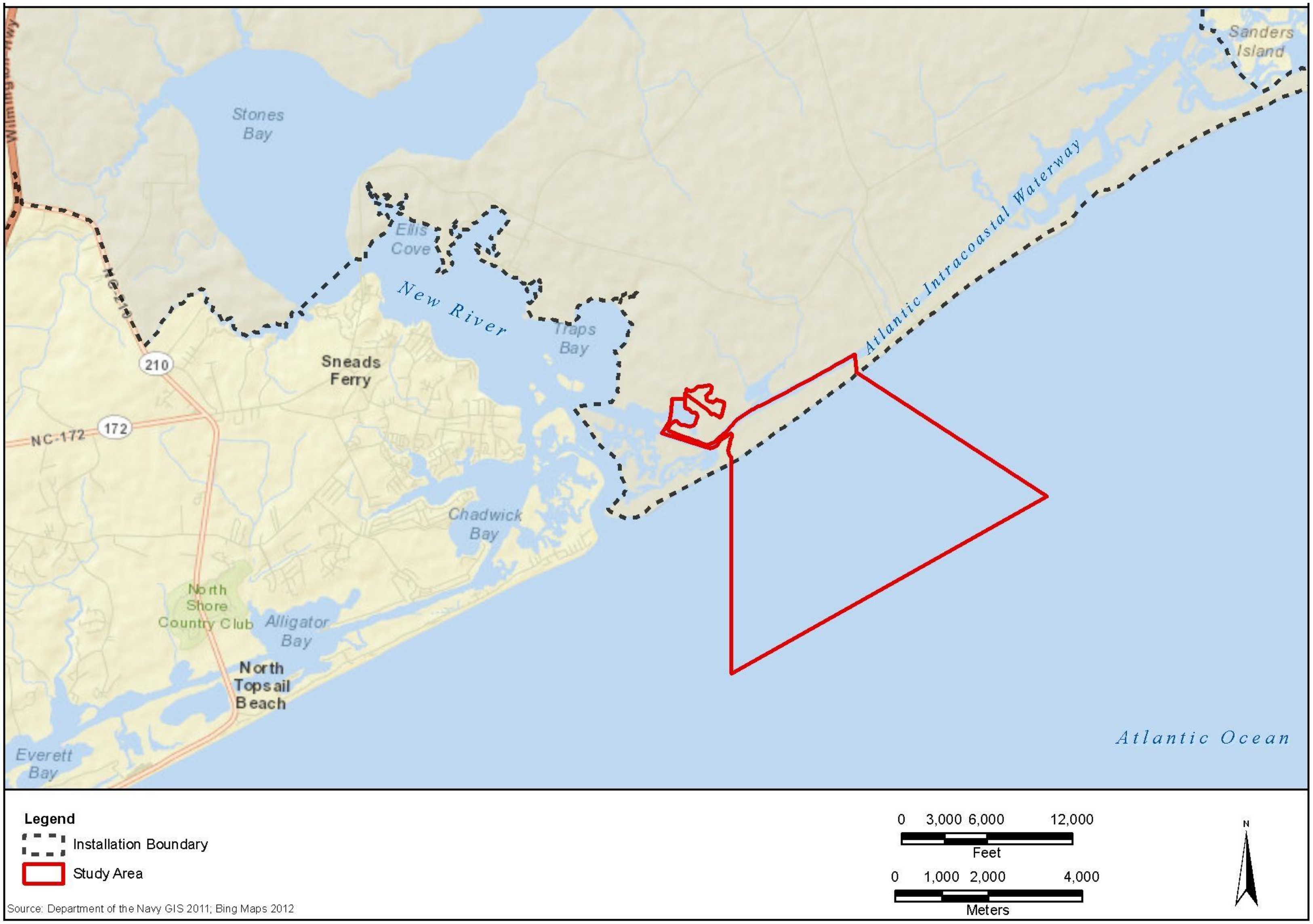


Figure 3.0-3: Study Area – Camp Lejeune



Source: Department of the Navy GIS 2011; Bing Maps 2012

3.1 Air Quality

3.1.1 Introduction

3.1.1.1 National Air Quality Standards

Six air pollutants are regulated by the U.S. Environmental Protection Agency (USEPA) under the Clean Air Act due to the risks they create for human health and welfare when present in excessive amounts in the environment. These pollutants, known as “criteria pollutants,” are ground-level ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and particulate matter (small particles suspended in the air; two types are included: particles less than ten micrometers in size, or PM_{10}, and particles less than 2.5 micrometers in size, or $PM_{2.5}$). Of the six criteria pollutants, particulate matter and ground-level ozone are the most widespread health threats. Ozone is not emitted directly but results from the chemical interaction in the atmosphere of two precursor pollutants: volatile organic compounds (VOCs) and nitrogen oxides (NO_x).

The USEPA regulates criteria pollutants by setting standards, or permitted levels, for the amount of each pollutant that air may contain. These are known as National Ambient Air Quality Standards (NAAQS). There are two sets of NAAQS: the primary standards, which set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly; and the secondary standards, which set limits to protect public welfare, including the prevention of visibility impairment, and damage to animals, crops, vegetation, and buildings. The standards, the averaging times, and the criteria for how many times these criteria can be exceeded are unique to each standard. The Clean Air Act requires periodic review of the science upon which the standards are based and of the standards themselves. Table 3.1-1 shows the current NAAQS.

3.1.1.2 National Ambient Air Quality Standards Attainment Status

The USEPA has designated specific areas as air quality control regions within which the NAAQS must be achieved or maintained. Virginia Beach, where JEB Little Creek-Fort Story is located, is within Virginia’s Hampton Roads region, which also includes Norfolk and surrounding municipalities. Onslow County, where Camp Lejeune is located, is within North Carolina’s Southern Coastal Plain region, which is comprised of 13 counties. Air quality impacts are considered in the context of those areas.

Areas that meet the NAAQS for a criteria pollutant are designated "in attainment." Areas where a criteria pollutant level exceeds the NAAQS are designated "nonattainment" areas. Ozone nonattainment areas are categorized based on the severity of the pollution problem – marginal, moderate, serious, severe, or extreme. Carbon monoxide and PM_{10} nonattainment areas are categorized as either moderate or serious.

Table 3.1-1: National Ambient Air Quality Standards

Pollutant	Primary or Secondary	Averaging Time	Level[1]	Form
Carbon Monoxide	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Nitrogen Dioxide	Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	Both	Annual	53 ppb	Annual Mean
Ozone	Both	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter 2.5	Primary	Annual	12 μg/m^3	Annual mean, averaged over 3 years
	Secondary	Annual	15 μg/m^3	Annual mean, averaged over 3 years
	Both	24-hour	35 μg/m^3	98th percentile, averaged over 3 years
Particulate Matter 10	Both	24-hour	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Lead	Both	Rolling 3-month average	0.15 μg/m^3	Not to be exceeded
Sulfur Dioxide	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

[1]ppm = parts per million; ppb = parts per billion; μg/m^3 = micrograms per cubic meter

The Clean Air Act mandates that states with areas in non-attainment adopt state implementation plans with the objective of reaching attainment. A maintenance area is one that has been redesignated from nonattainment status to attainment and has an approved maintenance plan under Section 175 of the Clean Air Act.

3.1.1.3 Clean Air Act Conformity

USEPA final rules on general conformity (40 C.F.R. Parts 51 and 93) apply to federal actions in nonattainment areas for any of the criteria pollutants. The rules specify *de minimis* (threshold) emission levels by pollutant to determine the applicability of conformity requirements for a project. Actions that generate annual emissions below the applicable *de minimis* levels do not require a formal general conformity analysis and are considered to have no significant impact on air quality under NEPA. For the purposes of general conformity applicability analysis, project emissions are compared to baseline emissions. For this Proposed Action, emissions under the No Action Alternative constitute the baseline.

The Clean Air Act Amendments of 1990 expand the scope and content of the act's conformity provisions in terms of their relationship to a state implementation plan. Under Section 176(c), a project is in conformity if it corresponds to the plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving their expeditious attainment.

Conformity further requires that such activities would not:

- Cause or contribute to any new violations of any standards in any area.
- Increase the frequency or severity of any existing violation of any standards in any area.
- Delay the timely attainment of any standard or any required interim emission reductions or other milestones in any area.

3.1.1.4 Greenhouse Gas Emissions

Greenhouse gases are compounds that contribute to the greenhouse effect. The greenhouse effect is a natural phenomenon caused by gases trapping heat within the surface-troposphere (lowest portion of the earth's atmosphere) system, heating the surface of the earth. The primary greenhouse gases generated by human activities are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

The heating effect from greenhouse gases is considered to be the probable cause of the global warming observed over the last 50 years (U.S. Environmental Protection Agency 2009). The USEPA Administrator recognized potential risks to public health or welfare and signed an endangerment finding regarding greenhouse gases under Section 202(a) of the Clean Air Act on December 15, 2009. The finding recognized that the current and projected concentrations of the six key gases listed above threaten the public health and welfare of current and future generations.

The global warming potential of the various greenhouse gases is generally expressed relative to carbon dioxide, used as a reference gas, which is assigned a global warming potential of 1. Emissions of greenhouse gases are multiplied by their global warming potential and the results are added to calculate the total equivalent emissions of carbon dioxide.

On a national scale, federal agencies are addressing emissions of greenhouse gases by reductions mandated in federal laws and Executive Orders (EOs). Most recently, EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, were enacted to address greenhouse gases, including greenhouse gas emissions inventory, reduction, and reporting. EO 13514 expands on the energy reduction and environmental performance requirement for federal agencies identified in EO 13423, establishes an integrated strategy towards sustainability in the federal government, and makes the reduction of greenhouse gas emissions a priority for federal agencies.

For information and disclosure purposes, this EA addresses greenhouse gas emissions consistent with the *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas* issued by the Council on Environmental Quality in 2010. Because the dominant greenhouse gas emitted from fossil fuel combustion is carbon dioxide (82 percent of United States emissions [U.S. Environmental Protection Agency 2014]), the analysis estimate considers carbon dioxide as representative of project-related greenhouse gas emissions.

3.1.2 No Action Alternative

3.1.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

Table 3.1-2 shows the most recent air quality monitoring data available for the area in which JEB Little Creek-Fort Story is located. On June 1, 2007, USEPA redesignated Hampton Roads from a non-attainment to a maintenance area for ozone. The Hampton Roads area is in attainment for all other NAAQS.

Table 3.1-3 presents estimates of the total amount of criteria pollutants (or their precursors) for the Hampton Roads region provided in the *Ozone Advance Action Plan Hampton Roads Area* (U.S. Environmental Protection Agency 2013) for the years 2007, 2017, and 2020. As stated in the plan, on-road vehicles and trucks and marine, air, and rail transportation were the two largest contributors of nitrogen oxides emissions in the Hampton Roads region in 2007; on-road vehicles and trucks and the "area source sector" were the two main contributors of volatile organic compounds emissions as well as carbon monoxide emissions. Area sources, consisting of large populations of small source emitters such as residences and businesses, were the main contributors of particulate matter (PM_{10} and $PM_{2.5}$) emissions while industrial facilities were the main emitters of sulfur dioxide.

Table 3.1-2: Air Quality Monitoring Data – Little Creek (2011)

Pollutant and Averaging Time	Monitored Data[1]	Primary Standard[1]	Secondary Standard[1]	Monitoring Site Location
Carbon Monoxide 8-hour maximum 1-hour maximum	2.3 ppm 8.7 ppm	9 ppm 35 ppm	9 ppm 35 ppm	181-A1, National Oceanic and Atmospheric Administration (NOAA) Lot, 2nd St and Woodis Avenue, Norfolk, VA
Nitrogen Dioxide 1-hour, 98th percentile	0.043 ppm	0.100 ppm	0.100 ppm	181-A1, NOAA Lot, 2nd St and Woodis Avenue, Norfolk, VA
Ozone 8-hour, 4th maximum average	0.076 ppm	0.075 ppm	0.075 ppm	Adjacent To Building 1196, Wythe Landing Loop, NASA-Langley Research Center, Hampton, VA
Particulate Matter (2.5) Annual Arithmetic Mean 24-hour, 98th percentile	9.6 µg/m^3 26	12 µg/m^3 35	12 µg/m^3 35	5636 Southern Boulevard, Virginia Beach, VA
Particulate Matter (10) 24-hour, 1st maximum	71 µg/m^3	150 µg/m^3	150 µg/m^3	181-A1, NOAA Lot, 2nd St and Woodis Avenue, Norfolk, VA
Sulfur Dioxide 1-hour, 99th percentile	0.054 ppm	0.075 ppm	0.075 ppm	181-A1, NOAA Lot, 2nd St and Woodis Avenue, Norfolk, VA

[1]ppm = parts per million; µg/m^3 = micrograms per cubic meter;
[2]The data shown exceed the standard. This does not contradict the area's maintenance status because the designation is based on a multi-year average.
NOAA = National Oceanic and Atmospheric Administration

Table 3.1-3: 2013 Ozone Action Plan – Estimated and Projected Criteria Pollutant Emissions for Hampton Roads Region

Hampton Roads Region	Annual Emissions (Tons)					
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2
2007	63,608	79,015	322,525	9,098	23,109	67,815
2017	48,019	47,405	249,476	8,344	22,864	27,733
2020	44,406	41,196	233,541	8,191	22,899	27,733

Source: U.S. Environmental Protection Agency 2013; VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; $PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 micrometers and 10 micrometers, respectively; SO_2 = sulfur dioxide

Table 3.1-4: 2013 Ozone Action Plan – Estimated and Projected Ozone Modeling Results for Hampton Roads Region

Hampton Roads Region	Ozone (parts per million)
2007	0.0765
2020	0.064

Source: U.S. Environmental Protection Agency 2013

3.1.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

3.1.2.2.1 Air Emissions

As stated previously, the No-Action Alternative is the baseline for assessing the potential environmental consequences of the Action Alternative. As such, the environmental consequences from the No Action Alternative represent a continuation of the existing level and intensity of JLOTS training. Regardless, it is important to establish what the impacts of the No Action Alternative would be in order to establish the baseline to which the Action Alternative is compared.

In the No Action Alternative, the operation of diesel- and gasoline-fueled vessels, amphibious and land vehicles, and construction equipment would continue to generate air emissions for the duration of each proposed training event. The generators providing the electricity for the tent encampments, lighting of night operations on the beach, and pumps used for liquid transfer are other sources of emissions. The greatest amount of pollutant emissions would occur during the annual full JLOTS training event, while unit-level events (both quarterly and routine) would result in the release of a much lower amount of air pollutants. Ground-disturbing operations at the inland encampment sites (e.g., excavation of percolation pits) would also generate some fugitive dust if conducted in dry weather, as would the movements of trucks and equipment on the base's roads, but these dust emissions would be localized and negligible.

Table 3.1-5 shows the estimated criteria pollutant emissions that would be generated by the proposed training activities under the No Action Alternative at Little Creek-Fort Story. Refer to

Appendix B, Air Emission Estimates for information on the methodology used to calculate these estimates.

Table 3.1-5: Criteria Pollutant Emissions – No Action Alternative – JEB Little Creek-Fort Story

Training Event and Number of Annual Occurrences[1]	Annual Emissions (Tons)					
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2
Full JLOTS Event	3.64	53.53	31.99	2.95	3.14	6.35
Unit-Level Cargo Transfer	0.79	15.73	11.06	0.77	0.84	2.40
Routine Unit-Level Cargo Transfer	0.26	5.19	3.71	0.26	0.28	0.79
Amphibious Bulk Liquid Transfer System	0.18	4.18	1.55	0.16	0.18	1.02
Tactical Water Purification System	0.00	0.00	0.00	0.00	0.00	0.00
Unit-Level Tent Encampments	0.81	4.85	2.65	0.48	0.50	0.14
Routine Unit-Level Tent Encampments	0.14	0.80	0.47	0.08	0.09	0.02
Reduced by 1 ELCAS (M)	-0.79	-9.98	-3.10	-0.56	-0.59	-0.22
Reduced by 1 Floating Causeway and 1 Administrative Pier	-0.01	-0.14	-0.08	-0.01	-0.01	0.00
Total Emissions	*5.02*	*74.16*	*48.25*	*4.13*	*4.43*	*10.50*

VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; $PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 micrometers and 10 micrometers, respectively; SO_2 = sulfur dioxide
[1]See Tables B-1 through B-6 in Appendix B for a list of air emissions sources calculated for each training event.

To provide a point of comparison, Table 3.1-6 shows how the annual No Action Alternative emissions at JEB Little Creek-Fort Story compare to the total estimates for the Hampton Roads region contained in the 2013 *Ozone Advance Action Plan Hampton Roads Area* (U.S. Environmental Protection Agency 2013) and shown in Tables 3.1-3 and 3.1-4. As detailed in Table 3.1-6, the emissions associated with proposed training under the No Action Alternative represent an insignificant proportion of emissions in the Hampton Roads region, even when the comparison is with the lower levels projected for 2017 and 2020.

Table 3.1-6: JEB Little Creek-Fort Story No Action Alternative Emissions as a Percentage of Total Hampton Roads Emissions

Pollutant	2007	2017	2020
VOC	0.01%	0.01%	0.01%
NO_x	0.11%	0.18%	0.20%
CO	0.02%	0.02%	0.02%
$PM_{2.5}$	0.05%	0.06%	0.06%
PM_{10}	0.02%	0.02%	0.02%
SO_2	0.02%	0.04%	0.04%

VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; $PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 micrometers and 10 micrometers, respectively; SO_2 = sulfur dioxide

Another point of comparison is provided by the Prevention of Significant Deterioration threshold, which USEPA uses to determine whether new major stationary sources or major modifications at existing stationary sources in attainment areas require permitting under the New Source Review Program. As such, this threshold does not apply to the Proposed Action since no major stationary sources are involved. However, it can be used to provide a general indication of the intensity of the air quality impacts associated with the Proposed Action, especially for those pollutants for which the project area is in attainment. For the pollutants for which the area is in non-attainment, the General Conformity Rule *de minimis* thresholds are used for evaluation. The Prevention of Significant Deterioration threshold for all regulated pollutants is 250 tons per year. As detailed in Table 3.1-5, the emissions of carbon monoxide, particulate matter, and sulfur dioxide associated with the No Action Alternative are well below this threshold. Emissions of volatile organic compounds and nitrogen oxides are addressed in the next section.

3.1.2.2.2 Greenhouse Gas Emissions

The greenhouse gas emissions associated with the proposed training under the No Action Alternative at JEB Little Creek-Fort Story were estimated in terms of carbon dioxide emissions using a similar methodology to that used for estimating the emissions of criteria pollutants or their precursors.

The No Action Alternative at JEB Little Creek-Fort Story would continue generating a total of approximately 7,833 tons of carbon dioxide annually. While there are no data available for comparison within the Hampton Roads region, state-level carbon dioxide emission inventories from fossil fuel combustion by end-use sectors (commercial, industrial, residential, transportation, and electric power) available from the USEPA (2012) may provide a broad point of reference. In 2010, total emissions in Virginia for all five sectors totaled 109.71 million tons. The emissions associated with the proposed training under the No Action Alternative represent approximately 0.00007 percent of this total, an insignificant amount.

3.1.2.2.3 Summary

Because the No Action Alternative represents a continuation of the existing level and intensity of JLOTS training at JEB Little Creek-Fort Story, its impacts on air quality are ongoing and already factored into existing conditions within the study area. Based on the estimates and comparisons presented above, the emissions associated with JLOTS training at JEB Little Creek-Fort Story under the No Action Alternative represent a minute portion of overall emissions in the Hampton Roads region and are below the Prevention of Significant Deterioration (this threshold is not applicable to the Proposed Action but it provides a useful point of comparison to assess the intensity of air quality impacts) or applicable General Conformity Rule *de minimis* thresholds. Thus, the No Action Alternative at JEB Little Creek-Fort Story would have no significant impact on air quality.

3.1.2.3 No Action Alternative – Camp Lejeune – Existing Environment

Camp Lejeune lies in Onslow County, North Carolina. Table 3.1-7 shows the most recent available air quality monitoring data in the vicinity of Camp Lejeune.

Table 3.1-7: Air Quality Monitoring Data – Camp Lejeune (2011)

Pollutant and Averaging Time	Monitored Data[1]	Primary Standard[1]	Secondary Standard[1]	Monitoring Site Location
Carbon Monoxide 8-hour maximum 1-hour maximum	1.4 ppm 1.8 ppm	9 ppm 35 ppm	9 ppm 35 ppm	3801 Spring Forest Road, Raleigh, Wake, NC
Nitrogen Dioxide 1-hour, 98th percentile	0.043 ppm	0.100 ppm	0.100 ppm	1300 Blk. Hattie Avenue, Winston-Salem, Forsyth, NC
Particulate Matter (2.5) Annual Arithmetic Mean 24-hour, 98th percentile	8.6 µg/m^3 33	12 µg/m^3 35	12 µg/m^3 35	6028 Holly Shelter Road, Castle Hayne, New Hanover, NC
Particulate Matter (10) 24-hour, 1st maximum	37 µg/m^3	150 µg/m^3	150 µg/m^3	4533 Raeford Road, Fayetteville, Cumberland, NC
Sulfur Dioxide 1-hour, 99th percentile	0.054 ppm	0.075 ppm	0.075 ppm	Highway 421 North, New Hanover, NC

[1]ppm = parts per million; µg/m^3 = micrograms per cubic meter; VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; $PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 micrometers and 10 micrometers, respectively; SO_2 = sulfur dioxide

Onslow and the surrounding counties are in attainment for all criteria pollutants. As a result, less information is available on the type and level of emissions within the county. However, the website of the North Carolina Division of Air Quality provides some data points detailing criteria pollutant emissions from point sources, as shown in Table 3.1-8. Note that these amounts do not include emissions from mobile sources (i.e., cars and trucks) or area sources (e.g., residences and small business) but only reported and assumed emissions from a limited number of permitted large point-source emitters (including Camp Lejeune).

Table 3.1-8: Reported and Assumed Point-Source Emissions of Criteria Pollutants in Onslow County (2011)

Pollutant	Reported Amount for Onslow County (Tons)	Amount from Camp Lejeune (Tons)
VOC	60.2	49.8
NO_x	507.4	497.1
CO	91.7	44.5
$PM_{2.5}$	14.8	14
PM_{10}	22.9	16.2
SO_2	670.9	664.7

Source: North Carolina Division of Air Quality 2013; VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; $PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 micrometers and 10 micrometers, respectively; SO_2 = sulfur dioxide

3.1.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

3.1.2.4.1 Air Emissions

The sources and amounts of air emissions from the proposed training activities under the No Action Alternative at Camp Lejeune are provided in Table 3.1-9.

Table 3.1-9: Criteria Pollutant Emissions – No Action Alternative – Camp Lejeune

Training Event	Annual Emissions (Tons)					
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2
Full JLOTS Event	3.64	53.53	31.99	2.95	3.14	6.35
Reduced by 1 ELCAS (M)	-0.79	-9.98	-3.10	-0.56	-0.59	-0.22
Total Emissions	*2.85*	*43.55*	*28.89*	*2.39*	*2.55*	*6.13*

VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; $PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 micrometers and 10 micrometers, respectively; SO_2 = sulfur dioxide

The point-source reported and assumed pollutant emissions for Onslow County shown in Table 3.1-8 may provide a rough point of comparison, with the caveat that the data represent only a portion of total emissions from all activities in the county. For all criteria pollutants or their precursors, emissions under the No Action Alternative would be substantially less than the reported and assumed emissions from point-source emitters alone and thus would be substantially less than total emissions. Additionally, the emissions of all criteria pollutants or their precursors are below the 250-ton-per-year Prevention of Significant Deterioration threshold.

3.1.2.4.2 Greenhouse Gas Emissions

The proposed JLOTS training activities under the No Action Alternative would generate approximately 4,552 tons of carbon dioxide emissions. While there are no data available for comparison within Onslow County, North Carolina, in 2011, North Carolina reported and assumed carbon dioxide emissions from point-source emitters amounted to 4,240,755 tons (North Carolina Division of Air Quality 2013) and the state-level carbon dioxide emission inventory from fossil fuel combustion by end-use sector (commercial, industrial, residential, transportation, and electric power) available from the USEPA show a total of 142.2 million tons of emissions for 2010 (U.S. Environmental Protection Agency 2012). Carbon dioxide emissions from the No Action Alternative represent a minute proportion of those totals.

3.1.2.4.3 Summary

Because the No Action Alternative represents a continuation of the existing level and intensity of JLOTS training at Camp Lejeune, its impacts on air quality are ongoing and already factored into existing conditions within the study area. Based on the estimates and comparisons presented above, the emissions associated with JLOTS training at Camp Lejeune represent a small portion of overall emissions in Onslow County and North Carolina. They are also well below the Prevention of Significant Deterioration threshold (this threshold is not applicable to the Proposed Action but it provides a useful point of comparison to assess the intensity of air quality impacts). Thus, the No Action Alternative at Camp Lejeune would have no significant impact on air quality.

3.1.2.5 No Action Alternative – Conclusion

Because the No Action Alternative represents a continuation of the existing level and intensity of JLOTS training at JEB Little Creek-Fort Story and Camp Lejeune, its impacts on air quality are ongoing and already factored into existing conditions within the study area. Even though the combined emissions for both installations would appear to exceed *de minimis* thresholds for some pollutants, the installations occur in different air quality regions and, for that reason, aren't summed. Based on the estimates and comparisons presented above, the emissions associated with JLOTS training at JEB Little Creek-Fort Story and Camp Lejeune represent a small to minute portion of overall emissions in the Hampton Roads region and Virginia as well as Onslow County and North Carolina. They are also well below the Prevention of Significant Deterioration threshold (this threshold is not applicable to the Proposed Action but it provides a useful point of comparison to assess the intensity of air quality impacts). Thus, the No Action Alternative at JEB Little Creek-Fort Story and Camp Lejeune would have no significant impact on air quality.

3.1.3 Action Alternative

3.1.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

Refer to Section 3.1.2.1 for existing air quality conditions at JEB Little Creek-Fort Story.

3.1.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

The Action Alternative at JEB Little Creek-Fort Story includes the same annual training activities as the No Action Alternative at JEB Little Creek-Fort Story plus the construction and use of the floating causeways at the Little Creek site (twice as part of a full JLOTS event) and the ELCAS (M) (once as part of a full JLOTS event). Therefore, the impacts of the Action Alternative on air quality would be similar to those of the No Action Alternative at JEB Little Creek-Fort Story plus the impacts associated with the construction and use of the floating causeways and the ELCAS (M).

3.1.3.2.1 Air Emissions

The types and sources of air emissions under the Action Alternative would be the same as under the No Action Alternative at JEB Little Creek-Fort Story and are described above in Section 3.1.2.2.1. However, JLOTS training would include the ELCAS (M) and floating causeways resulting in a slightly higher amount of emissions. Estimates of these emissions are presented in Table 3.1-10 (see Appendix B for a description of the methodology used to develop these estimates).

Table 3.1-10: Criteria Pollutant Emissions – Action Alternative – JEB Little Creek-Fort Story

Training Event	Annual Emissions (Tons)					
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2
No Action Alternative Emissions	5.02	74.16	48.25	4.13	4.43	10.50
ELCAS (M) Emissions	0.79	9.98	3.10	0.56	0.59	0.22
1 Floating Causeway and 1 Administrative Pier Emissions	0.01	0.14	0.08	0.01	0.01	0.00
Total Emissions	*5.82*	*84.28*	*51.43*	*4.70*	*5.03*	*10.72*

VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; $PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 micrometers and 10 micrometers, respectively; SO_2 = sulfur dioxide

As detailed in Table 3.1-10, the difference between the Action Alternative and the No Action Alternative emissions would be very small. Like the corresponding No Action Alternative emissions, the Action Alternative emissions of each criteria pollutant (or precursor) represent a minute proportion of the estimated and projected emissions for the Hampton Roads region (Table 3.1-7).

Emissions of carbon monoxide, particulate matter, and sulfur dioxide would also be well below the Prevention of Significant Deterioration threshold (250 tons per year). Emissions of volatile organic compounds and nitrogen oxides are addressed in the next section.

Table 3.1-11: Action Alternative – JEB Little Creek-Fort Story Emissions as a Percentage of Total Hampton Roads Emissions

Pollutant	2007	2017	2020
VOC	0.01%	0.01%	0.01%
NO_x	0.11%	0.18%	0.20%
CO	0.02%	0.02%	0.02%
$PM_{2.5}$	0.05%	0.06%	0.06%
PM_{10}	0.02%	0.02%	0.02%
SO_2	0.02%	0.04%	0.04%

VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; $PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 micrometers and 10 micrometers, respectively; SO_2 = sulfur dioxide

3.1.3.2.2 General Conformity Rule Applicability

Due to the Hampton Roads area being designated a maintenance area for ozone, a General Conformity Rule applicability analysis must be performed for the Action Alternative. As indicated in Section 3.1.1.3, for the purposes of the applicability analysis, the Action Alternative emissions must be compared to baseline emissions (the No Action Alternative constitutes the baseline). Therefore, General Conformity Rule applicability will be determined based on the net difference between emissions under the Action Alternative at JEB Little Creek-Fort Story and the emissions of the No Action Alternative at JEB Little Creek-Fort Story.

For the evaluation of the General Conformity Rule applicability, the Navy calculated the net increase in estimated criteria pollutants in relation to baseline conditions then compared the projected emissions to the applicable *de minimis* levels on an annual basis. The No Action Alternative defines baseline levels for this analysis. JEB Little Creek-Fort Story is located in a maintenance area for ozone. Therefore, the applicability determination is based on the amount of volatile organic compounds and nitrogen oxides (precursors of ozone) that would be generated by those training activities included in the Action Alternative but not in the No Action Alternative, i.e., the construction and use of the ELCAS (M) and floating causeways.

The estimated increases are shown in Table 3.1-12. The *de minimis* levels applicable to an ozone maintenance area are 100 tons per year of each nitrogen oxides and volatile organic compounds. As detailed in Table 3.1-12, the net increase in emissions of both precursor pollutants would be well below the *de minimis* levels. Therefore, the Action Alternative for JEB Little Creek-Fort Story does not require a formal General Conformity analysis.

Table 3.1-12: Net Increases in Emissions of Ozone Precursors under the Action Alternative – JEB Little Creek-Fort Story

Training Event	Annual Emissions (Tons per Year)	
	VOC	NO_x
ELCAS (M)	0.79	9.98
Floating Causeway and Administrative Pier	0.01	0.14
Total Net Increase	***0.80***	***10.12***
De Minimis Levels	*100*	*100*

VOC = volatile organic compounds; NO_x = nitrogen oxides

3.1.3.2.3 Greenhouse Gas Emissions

The amount of carbon dioxide emitted by the Action Alternative would be slightly higher than under the No Action Alternative at JEB Little Creek-Fort Story: approximately 9,027 tons, or a net difference of 1,194 tons. Thus, the contribution of the Action Alternative at JEB Little Creek-Fort Story to greenhouse gas emissions would be insignificant.

3.1.3.2.4 Summary

The impacts of the Action Alternative at Little Creek on air quality would be similar to those of the No Action Alternative. Emissions would be slightly greater but, based on the estimates and comparisons presented above, would continue to represent a minute portion of overall emissions in the Hampton Roads region. They would remain well below the Prevention of Significant Deterioration threshold (this threshold is not applicable to the Proposed Action but it provides a useful point of comparison to assess the intensity of air quality impacts) as well as below the applicable General Conformity Rule *de minimis* levels. Thus, the Action Alternative at JEB Little Creek-Fort Story would have no significant impact on air quality.

3.1.3.3 Action Alternative – Camp Lejeune – Existing Environment

Refer to Section 3.1.2.3 for existing air quality conditions at Camp Lejeune.

3.1.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

The Action Alternative includes the same annual training activities as the No Action Alternative at Camp Lejeune plus the ELCAS (M) (once a year as part of a full JLOTS event). Therefore, the impacts of the Action Alternative on air quality would be similar to those of the No Action Alternative at Camp Lejeune plus the impacts associated with the construction of the ELCAS (M).

3.1.3.4.1 Air Emissions

The types and sources of air emissions under the Action Alternative would be the same as under the No Action Alternative at Camp Lejeune and are described in Section 3.1.2.4.1. However, JLOTS training would include the ELCAS (M), resulting in a slightly higher amount of emissions relative to the No Action Alternative. They are shown in Table 3.1-13.

Table 3.1-13: Criteria Pollutant Emissions – Action Alternative – Camp Lejeune

Training Event	Annual Emissions (Tons)					
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2
No Action Alternative Emissions	2.85	43.55	28.89	2.39	2.55	6.13
ELCAS (M) Emissions	0.79	9.98	3.10	0.56	0.59	0.22
Total Emissions	*3.64*	*53.53*	*31.99*	*2.95*	*3.14*	*6.35*

VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; $PM_{2.5}$ and PM_{10} = particulate matter less than 2.5 micrometers and 10 micrometers, respectively; SO_2 = sulfur dioxide

For each pollutant, the net increase and total emissions would be substantially less than the reported and assumed emissions from point-source emitters in Onslow County (Table 3.1-8). For all criteria pollutants or their precursors, both net increases and total emissions would remain well below the 250-ton-per-year Prevention of Significant Deterioration threshold.

3.1.3.4.2 General Conformity Rule Applicability

Camp Lejeune is located in an area in attainment for all criteria pollutants. Therefore, the General Conformity requirements of the Clean Air Act do not apply to the Action Alternative at Camp Lejeune.

3.1.3.4.3 Greenhouse Gas Emissions

The amount of carbon dioxide emitted by the Action Alternative would be a little higher than under the No Action Alternative at Camp Lejeune: approximately 5,729 tons, or a net difference of 1,177 tons relative to the No Action Alternative. Thus, the contribution of the Action Alternative at Camp Lejeune to greenhouse gas emissions would be insignificant.

3.1.3.4.4 Summary

The impacts of the Action Alternative at Camp Lejeune on air quality would be similar to those of the No Action Alternative. Emissions would be slightly greater than under the No Action Alternative but they would remain well below the Prevention of Significant Deterioration threshold (this threshold is not applicable to the Proposed Action but it provides a useful point of comparison to assess the intensity of air quality impacts). Thus, the Action Alternative at Camp Lejeune would have no significant impact on air quality.

3.1.3.5 Action Alternative – Conclusion

The impacts of the Action Alternative at both locations would result in minimal emissions. The emissions for both installations do not exceed *de minimis* thresholds for any pollutants. It is not appropriate to sum the emissions for the two installations due to their geographic separation. The emissions associated with the Action Alternative remain well below the Prevention of Significant Deterioration threshold (this threshold is not applicable to the Proposed Action but it provides a useful point of comparison to assess the intensity of air quality impacts) as well as below the applicable General Conformity Rule *de minimis* levels. Additionally, the increase in greenhouse gas emissions would be minimal when compared to the emissions from the surrounding regions. The Action Alternative would have no significant impact on air quality.

3.2 Ambient Noise

3.2.1 Introduction

Sound is a physical phenomenon in which pressure variations within a medium (e.g., air or water) propagate energy away from a source (Kinsler et al. 1999). It is generated by both natural (e.g., wind, waves, animals, etc.) and artificial (e.g., machinery, engines, etc.) sources. Sound is characterized by its frequency (number of sound-wave cycles per second, measured in hertz [Hz]) and amplitude (the magnitude of the variations in pressure within the medium, commonly measured in pascals [Pa]). These physical characteristics are related to the perceptual qualities “pitch” and “loudness”; in general, higher frequency sounds are perceived as having higher pitch, and higher amplitude sounds of the same frequency within a receiver’s hearing range are louder.

Within this EA, measurements of sound will be given as sound pressure level (SPL) in units called decibels (dB). The dB scale provides a simplified relationship between sound pressure and the way it is perceived by the receiver, expressing the logarithmic strength of measured sound pressure relative to a standardized reference pressure. Because the dB scale is logarithmic, each additional dB indicates an exponential increase in sound pressure. Each increase of 20 dB reflects a ten-fold increase in pressure (i.e., an increase of 20 dB means ten times the pressure, 40 dB means one hundred times the pressure, 60 dB means one thousand times the pressure, and so on).

The reference pressure used when calculating SPL in dB depends on the medium in which the sound was measured. For airborne sounds, the reference value is 20 micropascals (μPa, or 10^{-6} pascals), expressed as “dB re 20 μPa”. For measurements of underwater sound, the standard reference pressure is 1 μPa, and is expressed as “dB re 1μPa.” Because sound levels measured in air and water are not directly comparable, it is important to include the correct reference pressure when giving a sound level in dB.

3.2.1.1 A-Weighting

Airborne sounds are commonly referenced to human hearing using a method which weights sound frequencies according to measures of human perception, de-emphasizing very low and very high frequencies which are not perceived well by humans. This is called A-weighting, and the decibel level measured is called the A-weighted sound level (dBA). Sounds given in dBA are assumed to be referenced to 20 μPa unless otherwise noted.

3.2.1.2 Noise

Noise is the term used to identify disagreeable, unwanted sound that interferes with normal activities or diminishes the quality of the environment (American National Standards Institute 1994; U.S. Army Center for Health Promotion and Preventive Medicine 2006), and can affect both human and non-human listeners. For humans, when sounds interfere with speech, disturb sleep, or interrupt routine tasks, they become noise.

3.2.1.3 Airborne Ambient Noise

Ambient noise is comprised of sounds from natural and manmade sources. Natural sounds include wind, rain, thunder, water movement such as surf, and wildlife vocalizations. Sound levels from these sources are typically low, but can be pronounced during violent weather events or animal congregation for feeding, etc. Ambient background noise in urbanized areas typically varies from 60 to 70 dBA, but can be higher; suburban neighborhoods experience ambient noise levels of approximately 45 to 50 dBA (U.S. Environmental Protection Agency 1974).

In highly-used areas such as the beaches, tent encampment areas, and waters off JEB Little Creek-Fort Story and Camp Lejeune, noise sources are similar to those found along industrial waterfronts. These sources include common construction equipment, such as trucks, cranes, compressors, generators, and pumps (Washington State Department of Transportation 2010). Typical source levels for common industrial noise sources are given in Table 3.2-1. Maximum noise levels may be reached when multiple sources of noise are operating simultaneously (Washington State Department of Transportation 2010). These maximum noise levels are intermittent in nature and may occur sporadically on any given day with construction or other waterfront activity.

Table 3.2-1: Maximum Noise Levels for Common Construction Equipment

Equipment Type	Maximum Noise Level (dBA)
scraper	90
backhoe	90
crane	81
pump	81
generator	81
front loader	79
air compressor	78

Sources: Washington State Department of Transportation 2008; U.S. Department of the Navy 2012; maximum sound pressure levels in dBA

The Navy has previously measured airborne ambient noise levels at an industrial waterfront in a high-use area of Naval Base Kitsap, Bangor, in the Puget Sound area of Washington (U.S. Department of the Navy 2011). Daytime noise levels ranged from 60 dBA to 104 dBA, with average values of approximately 64 dBA. Evening and nighttime levels ranged from 64 to 96 dBA, with an average level of approximately 64 dBA. Given the level of activity at JEB Little Creek-Fort Story and Camp Lejeune and the measured sound levels in similar areas, the Navy estimates that ambient airborne noise levels in the study area currently average between 60 and 65 dBA.

The effects of airborne noise on terrestrial wildlife and birds are addressed in Section 3.9.

3.2.1.4 Sensitive Noise Receptors

A sensitive noise receptor is defined as a location or facility where people involved in indoor or outdoor activities may be subject to stress or considerable interference from noise (U.S. Environmental Protection Agency 1971). Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, libraries, and parks or other outdoor recreational areas. Table 3.2-2 details distances to the closest sensitive noise receptors within the study area.

Table 3.2-2: Distances from the Study Area to Nearest Sensitive Noise Receptor

Location	Distance
Little Creek	0.68 miles (1.1 km)
Fort Story	1.33 miles (2 km)
Camp Lejeune	4.5 miles (7.24 km)

km = kilometer

3.2.1.5 Underwater Ambient Noise

Underwater ambient noise is comprised of sounds produced by a number of natural and anthropogenic sources. Natural noise sources can include wind, waves, precipitation, and biological sources such as shrimp, fish, and cetaceans. These sources produce sound in a wide variety of frequency ranges (Urick 1983; Richardson et al. 1995) and can vary over long (days to years) and short (seconds to hours) time scales. In shallow waters, precipitation may contribute up to 35 dB to the existing sound level, and increases in wind speed of 5 to 10 knots can cause a 5 dB increase in ambient ocean noise between 20 Hz and 100 kilohertz (kHz) (Urick 1983). High noise levels may also occur in nearshore areas during heavy surf, which may increase low frequency (200 Hz-2 kHz) underwater noise levels by 20 dB or more within 200 yards of the surf zone (Wilson et al. 1985). In the study area, vessel wakes may cause breaking waves on shore, contributing to the ambient acoustic environment.

Anthropogenic noise sources also contribute to ambient noise levels, particularly in ports and other high use areas in coastal regions. Normal activities include vessel traffic (from large ships, support vessels, and security boats), loading and maintenance operations, and other activities (sonar and echo-sounders from commercial and recreational vessels, construction, etc.) which all generate underwater sound (Urick 1983). Additionally, noise from mechanized equipment on wharves or adjacent shorelines may propagate underwater and contribute to underwater ambient noise levels.

The underwater acoustic environment in the study area is likely to be dominated by noise from ship traffic and military activities. These sources can create noise between 20 Hz and 16 kHz (Lesage et al. 1999), with broadband noise levels up to 180 dB re 1 μPa root mean squared (Table 3.2-3).

Table 3.2-3: Representative Levels of Underwater Noise

Noise Source	Peak Frequency Range (Hz)	Underwater Source Level (re 1μPa)	Reference
Small vessels	250-6,000	151 dB rms at 1 m	Lesage et al. 1999
Large vessels (underway)	20-1,500	170-180 dB rms at 1 m	Richardson et al. 1995
Tug docking barge	200-1,000	149 dB rms at 100 m	National Marine Fisheries Service 2002
Dredging (clamshell)	50-3,000	136-165 dB rms at 12–25 m	Integrated Concepts & Research Corp. 2007

dB = decibel, rms = root mean square, m = meter

The effects of underwater noise on diving birds are addressed in Section 3.9; on fish and marine invertebrates in Section 3.10; on sea turtles in Section 3.11; and on marine mammals in Section 3.12.

3.2.2 No Action Alternative

3.2.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

Noise levels around JEB Little Creek-Fort Story are affected by both the setting of the installation – in an urban area close to Norfolk International Airport and several military installations – and the military training activities taking place there. Vehicle traffic on and off base is a steady source of ambient noise, while aircraft operations from the nearby airport make an intermittent but substantial contribution to noise levels.

Military mission-related noise sources at JEB Little Creek-Fort Story include vessels and amphibious vehicle operations within the base and along the training beaches; training activities involving the use of off-road vehicles and small arms; small arms firing ranges; and activities of explosive ordnance disposal units. Because of the temporary and intermittent nature of training activities, actual ambient noise levels are expected to vary from day to day.

3.2.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

Under the No Action Alternative, airborne noise would result from the operation of watercraft; land vehicles and equipment, such as bulldozers, forklifts, and trucks; and generators. Construction and removal of the floating causeways (at Fort Story only under this alternative) would not make a noticeable difference in the amount of the noise generated by the other activities taking place simultaneously. The longest and most sustained source of noise would be the annual full JLOTS event, which would last for up to 60 days. Routine and quarterly unit-level

FTXs would occur more frequently, but noise levels would be lower than those of a full JLOTS because fewer vehicles and less equipment would be in use.

JLOTS training and other military training operations are ongoing activities at JEB Little Creek-Fort Story and no new or unusual loud sources of noise would be introduced during any of the training events that would take place under the No Action Alternative. Additionally, the noise sources would be confined to the immediate vicinity of the installation. Recreational users are not expected to be present in the immediate vicinity of JLOTS activities because of a lack of desirable conditions (e.g., clear waters with sites such as shipwrecks and reefs in the case of divers, and high quality fish habitat for fishermen) in the study area. If any unauthorized personnel are observed in close proximity to training, activities with the potential to injure nonparticipants would be temporarily halted until the area is cleared. Therefore, occurrence of recreational users in the study area is unlikely, and the potential for exposure to elevated noise levels from JLOTS activities is unlikely. Furthermore, the vessel/vehicle movement occurs adjacent to highly developed areas and among relatively high densities of vessel traffic (U.S. Coast Guard 2012), suggesting a noise contribution compatible with the existing ambient sound environment for sensitive noise receptors.

3.2.2.3 Summary

The No Action Alternative at JEB Little Creek-Fort Story would not result in significant noise impacts either during an annual full JLOTS event or smaller unit-level training events. The No Action Alternative represents a continuation of existing levels of JLOTS training and would introduce no new or unusually loud sources of noise. Overall ambient noise levels at and around the base would remain similar to current conditions, which are consistent with those found at other urban and waterfront areas around Hampton Roads. Thus, the No Action Alternative would have no significant impacts on ambient noise conditions at or around JEB Little Creek-Fort Story.

3.2.2.4 No Action Alternative – Camp Lejeune – Existing Environment

Ambient background noise levels in the vicinity of Camp Lejeune are typical of a semi-rural setting. However, aircraft flying overhead, boats on the river, on-base range training activities, and traffic along the main transportation routes add noise intermittently (U.S. Marine Corps 2009).

Camp Lejeune generates noise from various training operations. The dominant sources of noise are (U.S. Marine Corps 2009):

- On the land ranges: small- and large-caliber weapons firing; explosives detonation; tactical vehicle movements.
- On the water ranges: weapon firing noise from the firing of ship- and boat-based small arms; large-caliber weapons; JLOTS training, and high explosive grenades related to water range operations.

3.2.2.5 No Action Alternative – Camp Lejeune – Environmental Consequences

The noise generated by the proposed training activities under the No Action Alternative at Camp Lejeune would result from the same activities as described for JEB Little Creek-Fort Story (Section 3.2.2.2). Because no unit-level training in support of JLOTS would be conducted at Camp Lejeune, the noise generated would occur less often.

Similar to JEB Little Creek-Fort Story, JLOTS training and other military training activities are ongoing at Camp Lejeune and no new or unusual loud sources of noise would be introduced. Noise sources would mostly be confined to the installation or waters immediately off Onslow Beach and in Mile Hammock Bay. Noise from watercraft or land vehicles and equipment is not expected to be discernible from other ongoing sources. Recreational users are not expected to be present in the immediate vicinity of JLOTS activities because of a lack of desirable conditions (e.g., clear waters with sites such as shipwrecks and reefs in the case of divers, and high quality fish habitat for fishermen) in the study area. If any unauthorized personnel are observed in close proximity to training, activities with the potential to injure nonparticipants would be temporarily halted until civilians leave the area. Therefore, occurrence of recreational users in the study area is unlikely, and the potential for exposure to elevated noise levels from JLOTS activities is low. Furthermore, the vessel/vehicle movement occurs adjacent to highly developed areas and among relatively high densities of vessel traffic (U.S. Coast Guard 2012), suggesting a noise contribution compatible with the existing ambient sound environment for sensitive noise receptors.

3.2.2.6 Summary

The No Action Alternative at Camp Lejeune would not result in significant noise impacts during the annual JLOTS training event. It would introduce no new or unusually loud sources of noise, as the No Action Alternative would represent a continuation of existing training activities. Overall ambient noise levels at and around Camp Lejeune would remain similar to what they are at present.

3.2.2.7 No Action Alternative – Conclusion

The No Action Alternative would not result in significant noise impacts either during an annual JLOTS event or smaller unit-level training events (at JEB Little Creek-Fort Story only). The No Action Alternative represents a continuation of existing levels of JLOTS training, and would introduce no new or unusually loud sources of noise. Overall ambient noise levels at and around both bases would remain similar to current conditions, which are not causing deleterious effects to the environment. Thus, the No Action Alternative would have no significant impacts on ambient noise at or around JEB Little Creek-Fort Story or Camp Lejeune.

3.2.3 Action Alternative

3.2.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

The existing environment at JEB Little Creek-Fort Story is described in Section 3.2.2.1 above.

3.2.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

The Action Alternative includes the same annual training activities as the No Action Alternative at JEB Little Creek-Fort Story plus the floating causeways (at Little Creek) and the ELCAS (M). Therefore, at Little Creek, the noise impacts of the Action Alternative would be similar to those of the No Action Alternative plus the impacts associated with the construction of the floating causeways and ELCAS (M). At Fort Story, the noise impacts of the Action Alternative would be similar to those of the No Action Alternative plus the impacts associated with the construction of the ELCAS (M).

Construction and removal of the floating causeways (as described above in Section 3.2.2.2 for Fort Story) would not make a noticeable difference in the amount of the noise generated during a JLOTS exercise. However, the pile driving and removal associated with the ELCAS (M) would generate higher noise levels. Construction of the ELCAS (M) would involve intermittent impact pile driving of 24-inch, uncapped, steel pipe piles over approximately 20 days once a year. Crews may work 24 hours a day and typically drive up to 6 piles in that period. Impact pile driving creates repetitive impulsive sound, and a conservative estimate of 500 strikes is assumed for installation of each pile over 15 minutes.

At the end of the event, the structure is dismantled and the piles are removed using vibratory methods over a period of approximately seven days. In ideal conditions of calm seas and no precipitation, crews can typically up to 12 piles per 24-hour period, over the course of 10 days; extraction of each pile is expected to take approximately 6 minutes.

The intensity of pile driving sounds is influenced by the type of piles, hammers, and the physical environment in which the activity takes place. Sound pressure levels from impact driving 24-inch steel pipe piles may range from 78 dBA at a distance of approximately 420 feet (128 meters) to 110 dbA at a distance of 50 feet (15 meters) from the pile being driven, based on measurements taken during construction projects using similar sized piles (Washington State Department of Transportation 2010; U.S. Department of the Navy 2012, 2013). Vibratory extraction of the same size and type of pile is expected to result in slightly lower sound pressure levels, ranging from 82 to 102 dBA at a distance of 35-50 feet (11-15 meters) from the pile being removed (Washington State Department of Transportation 2010; U.S. Department of the Navy 2012).

Recreational users are not expected to be present in the immediate vicinity of the ELCAS (M) FTX because of a lack of desirable conditions (e.g., clear waters with sites such as shipwrecks and reefs in the case of divers, and high quality fish habitat for fishermen) in the study area. If any unauthorized personnel are detected in close proximity to JLOTS training, activities with the potential to injure nonparticipants would be temporarily halted until the area is cleared. Therefore, occurrence of recreational users in the study area is unlikely. Given the existing ambient noise conditions, the potential for recreational users' and sensitive noise receptors' exposure to noticeable elevated noise levels is low. Further, the potential for effects is expected to decrease rapidly with distance from the source of the noise, particularly if topography or vegetation attenuates the signal (Washington State Department of Transportation 2014).

3.2.3.3 Summary

Noise generated by JLOTS training including pile driving for the ELCAS (M) FTX would be temporary and intermittent. Based on the distance of the closest sensitive noise receptors, direct line-of-sight sound levels could reach 73 and 68 dBA from impact driving at Little Creek and Fort Story, respectively. However, the presence of buildings, vegetation, and other features would contribute to attenuation, and actual received sound levels may be considerably lower. No significant impacts on ambient noise conditions are anticipated in association with the Action Alternative at JEB Little Creek-Fort Story.

3.2.3.4 Action Alternative – Camp Lejeune – Existing Environment

Existing conditions for Camp Lejeune are summarized in Section 3.2.2.4 above.

3.2.3.5 Action Alternative – Camp Lejeune – Environmental Consequences

The Action Alternative would include the same annual training activities as the No Action Alternative at Camp Lejeune, plus the ELCAS (M). Unit-level training would not occur. Therefore, the potential impacts of the Action Alternative at Camp Lejeune would be similar to those described above for JEB Little Creek-Fort Story in Section 3.2.3.2.

3.2.3.6 Summary

Noise generated by JLOTS training (including pile driving for the ELCAS [M] FTX) would be temporary and intermittent. Based on the distance of the closest sensitive noise receptors, direct line-of-sight sound levels could reach 56 dBA from impact pile driving Camp Lejeune. However, the presence of buildings, vegetation, and other features would contribute to attenuation, and actual received sound levels may be considerably lower. No significant impacts on ambient noise conditions are anticipated for the Action Alternative at Camp Lejeune.

3.2.3.7 Action Alternative – Conclusion

Noise generated by the Action Alternative would be temporary and intermittent. Based on the distance of the closest sensitive noise receptors and low likelihood of recreational use of the waters in the immediate vicinity of JLOTS training, no significant impacts on ambient noise conditions are anticipated.

3.3 Public Health and Safety

3.3.1 Introduction

For each proposed location, this section addresses public health and safety from two distinct perspectives. The first one pertains to the possible presence of members of the public within the areas where JLOTS training would be conducted. This is a concern only for those training activities occurring in open waters, where JLOTS training activities might be co-located with recreational or commercial vessels passing through the area. There are no concerns about potential public exposure to training activities on beaches or inland areas, since all those activities would take place within the boundaries of the respective military installations, which are not open to the public.

The second perspective pertains to hazardous substances. Hazardous substances are materials that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, could present a danger to public health and welfare or to the environment if released into the environment, regardless of where the release would occur. In addition to hazardous materials and wastes, risks from Installation Restoration Program sites are also considered. The Installation Restoration Program addresses past releases of hazardous substances, pollutants, or contaminants that pose toxicological risks to human health or the environment.

Unlike military training activities conducted within a fenced installation on land, public access to areas at sea cannot be physically controlled. Coastal training areas may be close to fishing spots or other recreational areas that private vessels routinely or occasionally use, creating a risk that the public could be co-located with military training activities. Areas closer to shore are used for recreational and commercial activities, and are typically associated with clear waters with sites such as shipwrecks and reefs in the case of divers, and high quality fish habitat for fishermen.

Military and civilian activities have taken place simultaneously at both locations for decades. These activities coexist because there are rules and practices that lead to safe use of the shared areas. The Navy schedules the use of these areas internally and issues notices to the public before conducting full JLOTS training. During all training exercises, the Navy utilizes standard operating procedures to ensure that civilian traffic does not interact with Navy activities, preventing potential conflicts and harm to civilians.

Most of the sea space where the proposed training activities would take place is accessible to recreational and commercial activities. However, some recreational and commercial activities may be prohibited or restricted either temporarily or permanently in some parts of the study area. The areas where such restrictions occur – restricted areas or danger zones – are defined in 33 C.F.R. Part 334. A danger zone is defined as a “defined water area (or areas) used for target practice, bombing, rocket firing or other especially hazardous activities, normally for the armed forces. The danger zones may be closed to the public on a full-time or intermittent basis, as stated in the regulations.” A restricted area is defined as a “defined water area for the purpose of prohibiting or limiting public access to the area. Restricted areas generally provide security for Government property and/or protection to the public from the risks of damage or injury arising from the Government’s use of that area” (33 C.F.R. § 334.2). In addition to restricted areas and danger zones, U.S. Coast Guard regulations establish a protection zone of 100 yards around U.S.

naval vessels over 100 feet in length (33 C.F.R. 165 Subpart G), such as some of those involved in JLOTS activities.

The National Oceanic and Atmospheric Administration issues nautical charts that reflect designated restricted zones. The U.S. Coast Guard and the Department of Homeland Security publish marine information pertaining to sea space. Restricted areas are designated at both JEB Little Creek-Fort Story and Camp Lejeune (Figures 3.3-1 and 3.3-2).

Notices to Mariners provide information to private and commercial vessels regarding temporary closures of areas. These navigational warnings are disseminated through maritime frequency radio, weekly publications by the appropriate U.S. Coast Guard Navigation Center available on the internet[1], and global positioning system navigation charts. They provide information about the duration and location of closures. Civilian vessel operators are responsible for being aware of designated danger areas in surface waters and any Notices to Mariners that are in effect. Operators of recreational or commercial vessels have a duty to abide by maritime requirements as administered by the U.S. Coast Guard.

The Navy practices the fundamentals of safe navigation. While in transit, Navy surface vessel operators are alert at all times, travel at a safe speed for the prevailing conditions, use state-of-the-art satellite navigational systems, and are trained to take proper action to avoid collisions. Surface vessels are also equipped with trained and qualified Navy lookouts. Qualified Navy Lookouts are stationed on surface vessels and are trained to detect objects or activity in the water that could pose a risk to the vessel.

Training activities are conducted in accordance with guidance provided in Fleet Area Control and Surveillance Facility Instructions (U.S. Department of the Navy 2011a) and Test and Safety Planning Instructions (U.S. Department of the Navy 2008b). These instructions provide operational and safety procedures for all normal range events. They also provide information to range users that is necessary to operate safely and avoid affecting nonmilitary activities such as shipping, recreational boating, diving, and commercial or recreational fishing.

[1] Both locations are within U.S. Coast Guard District 5. Weekly Local Notices to Mariners are available at http://www.navcen.uscg.gov/?pageName=lnmDistrict&region=5.

3.3.2 No Action Alternative

3.3.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

3.3.2.1.1 Offshore Operations Areas

Little Creek

The waters offshore of Little Creek are utilized by recreational and commercial boaters and some divers. Of the divers that might be anticipated in the area, most if not all are expected to be industrial divers as the waterway doesn't, by nature, attract recreational divers due to the high maritime traffic and lack of underwater attractions.

Most of the sea space where training activities take place is accessible to the public for recreational and commercial activities. In order to ensure public safety, some civilian activities are prohibited or restricted in certain areas. The areas are defined in regulations as restricted areas or danger zones (33 C.F.R. Part 334).

A restricted area (i.e., the area within which access restrictions apply), shown on Figure 3.3-1 has been established (33 C.F.R. § 334.310) offshore of Little Creek. The following restrictions apply within this restricted area:

> (1) No fish-pound stakes or structures shall be allowed in the restricted area.
>
> (2) No person or vessel shall approach within 300 yards of any naval vessel or within 600 yards of any vessel displaying the red baker burgee[2].

In addition to this area within the Chesapeake Bay, regulations establish a danger zone for underwater demolition activities just off Little Creek. Civilian users and vessels are prohibited from entering the area at any time unless authorized to do so. In addition, there is a smalls arms firing range danger zone that does not prohibit all activities in the zone. Vessels may transit through the area and commercial fishermen can work fish nets in the area but large red warning flags are posted onshore during periods when firing is in progress and observers are on duty to look for vessels passing through the area (33 C.F.R. § 334.370).

Finally, there is a smaller Exclusion Zone present. The Little Creek Exclusion Zone is a subset of an emergency restricted area. No vessel or person may enter this area without permission of the Commanding Officer/Officer-in-Charge of JEB Little Creek-Fort Story.

As previously indicated, the public is made aware of certain naval operations through Notices to Mariners and information provided on nautical charts. Additionally, the Navy practices the fundamentals of safe navigation. While in transit, Navy surface vessel operators are alert at all

[2] A burgee is a small nautical flag or pennant, used for identification or as a signal. "Baker" stands for the letter B (same as "Bravo"), signaling the loading, unloading, or carrying of dangerous goods.

times, travel at a safe speed for the prevailing conditions, and use state-of-the-art satellite navigational systems. Exercises are suspended if members of the public enter areas that may put them at risk.

Fort Story

As indicated for Little Creek above, Fort Story's offshore waters are utilized by recreational and commercial boaters and some divers. Fort Story's offshore waters are also heavily trafficked and use of the offshore areas for diving is even less likely than at Little Creek since there is less industrial waterway use.

Most of the sea space where training activities take place at Fort Story is accessible to the public for recreational and commercial activities. Some civilian activities are prohibited or restricted in certain areas defined in regulations as restricted areas or danger zones (33 C.F.R. Part 334). A restricted area, as defined at 33 C.F.R. § 334.320, has been established off Fort Story. The extent of this restricted area is shown on Figure 3.3-1. Anchoring, trawling, crabbing, fishing, and dragging in the area are prohibited, and no object attached to a vessel shall be placed on or near the bottom in this area. These regulations do not restrict public access in the area. For each full JLOTS exercise, Notices to Mariners would be issued to advise vessel operators of when and where training is scheduled. During full JLOTS exercises along with all unit-level training, Navy personnel are required to verify that the area is clear of nonparticipants before initiating any potentially hazardous activity.

Figure 3.3-1: Restricted Areas – JEB Little Creek-Fort Story

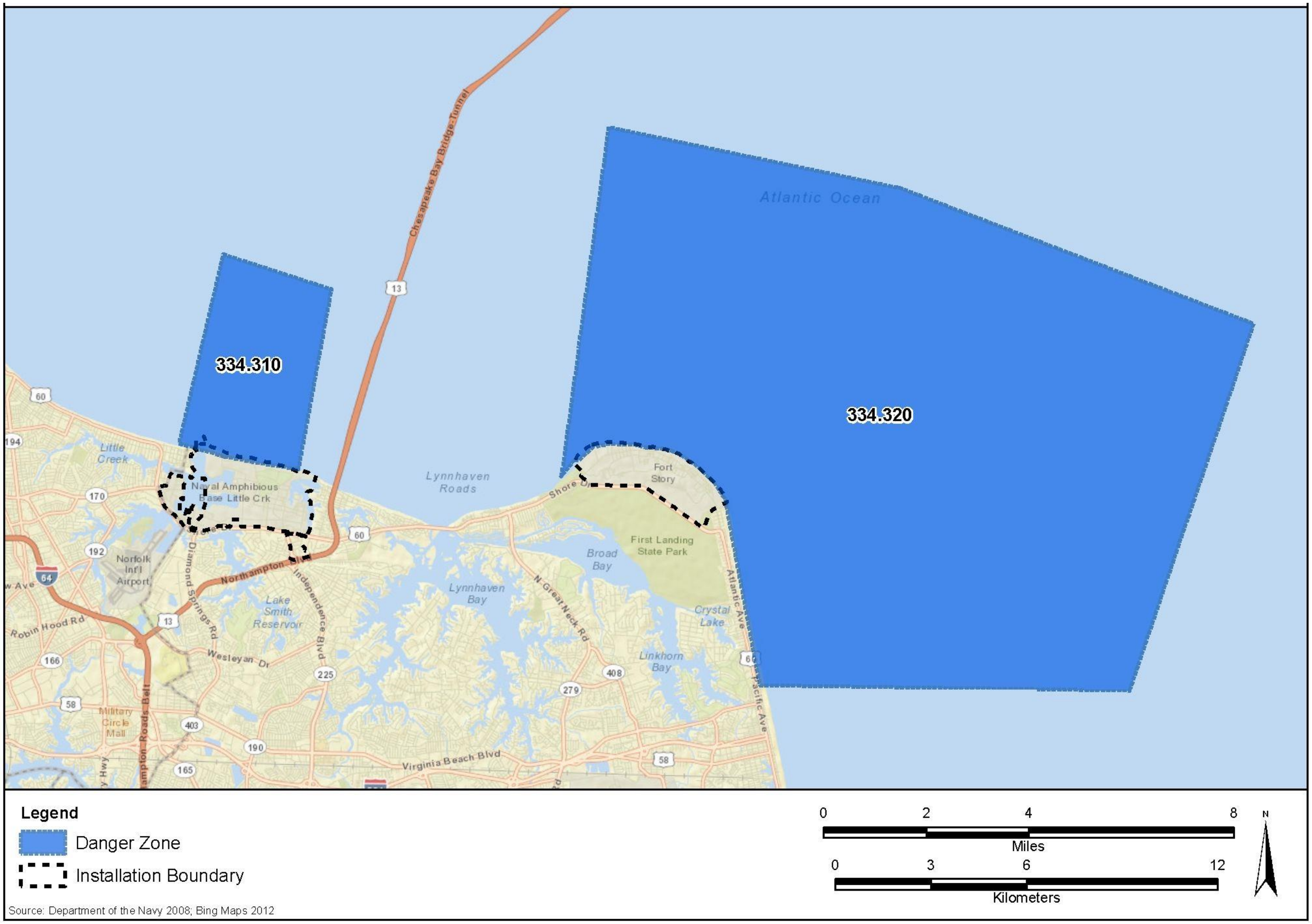
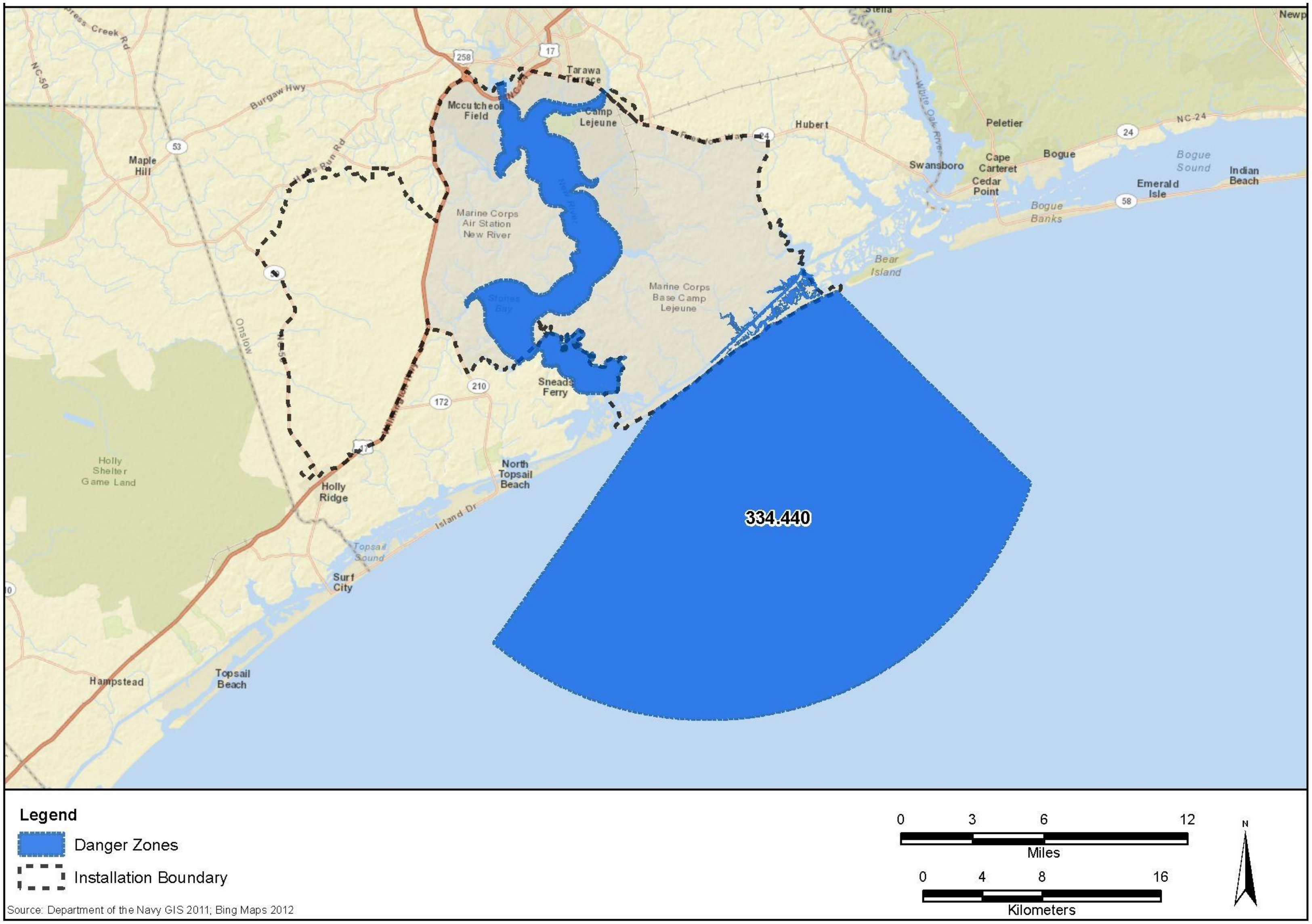


Figure 3.3-2: Restricted Areas – Camp Lejeune



3.3.2.1.2 Hazardous Substances

Hazardous Materials

All hazardous materials at JEB Little Creek-Fort Story are purchased, stored, used, and disposed of in compliance with applicable regulations and procedures. No hazardous materials are currently stored or disposed of at any of the areas planned for JLOTS activities.

JEB Little Creek-Fort Story has a Spill Prevention, Control, and Countermeasures Plan and Oil Discharge Contingency Plan in place (U.S. Department of the Navy 2009b; U.S. Department of the Navy 2011b). The plan was prepared in accordance with the provisions of 40 C.F.R. Part 112 and OPNAVINST 5090.1D. It addresses measures to prevent and initiate the cleanup of oil.

JEB Little Creek-Fort Story has access to both personal watercraft and outside spill response personnel and equipment. The Personal Watercraft Norfolk Oil Recovery Team, located at Naval Station Norfolk, maintains a full-time oil spill response staff and equipment capable of containing and cleaning up an oil spill. In the event of a large oil spill, the recovery team can call upon other local naval facilities or a commercial contractor.

Hazardous Waste – Little Creek

JEB Little Creek-Fort Story is permitted as a large quantity generator of hazardous waste. Large Quantity Generators generate 2,200 pounds (1,000 kilograms) per month or more of hazardous waste, or more than 2.2 pounds (one kilogram) per month of acutely hazardous waste. Hazardous wastes currently generated at JEB Little Creek-Fort Story include waste petroleum products, cleaning compounds, paint, sandblast waste, antifreeze, and batteries. No hazardous waste storage or disposal currently occurs at any of the proposed JLOTS FTX sites. All wastes are stored and disposed of in accordance with applicable regulations and procedures.

Hazardous Waste – Fort Story

The main generator of hazardous waste at Fort Story is vehicle maintenance. All hazardous wastes are handled in compliance with applicable environmental regulations. No hazardous waste storage or disposal currently occurs at any of the proposed JLOTS FTX sites at Fort Story.

Installation Restoration Program Sites – Little Creek

There are no Installation Restoration Program sites at Little Creek located in the JLOTS study area. The closest site (Site 7) is located on the south shore of Little Creek Cove. It originally was an arm of Little Creek Cove that was filled with dredge spoils before being used as a landfill until 1979 (U.S. Department of the Navy 2008a). It is maintained as an open access restricted site. Two other former landfills – Sites 9 and 10 – are located south and southwest of Anzio Beach. Both sites are now used for recreational purposes (U.S. Department of the Navy 2009a).

Installation Restoration Program Sites – Fort Story

None of the proposed JLOTS training areas are located at Installation Restoration Program sites. However, one Installation Restoration Program site, LARC-60 Maintenance Area, is adjacent to the Vung Tau Driving Range, a proposed staging area. To address groundwater contamination at the site, land use controls have been defined. Those controls only apply to potential future use of the groundwater as a source of drinking water (U.S. Department of the Navy 2011c).

3.3.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

3.3.2.2.1 Offshore Operations Areas

Under the No Action Alternative at JEB Little Creek-Fort Story, all in-water activities during both the annual full JLOTS training event and unit-level events would take place within the restricted areas established by 33 C.F.R. §§ 334.310 and 334.320. Both Navy and public vessels operate under maritime navigational rules requiring them to observe and avoid other vessels (Section 3.3.2.1.1). Floating platforms, ships, or boats anchored overnight in the area would be lit so as not to become safety hazards.

All Navy personnel are required to verify that training areas are clear of nonparticipants before initiating in-water activities. At the Little Creek site, security vessels would patrol the training area to ensure that non-Navy vessels do not conflict with Navy activities and to enforce the 300/600-foot stand-off distance from naval vessels. These procedures would minimize the potential for adverse interactions between nonparticipant and Navy vessels and equipment during training.

Noise produced in conjunction with the training activities at JEB Little Creek-Fort Story is addressed in Section 3.2.2.2. Under the No Action Alternative, ambient noise would not differ from what is currently occurring at the installation and would not rise to a level where it impacts civilian users of the water. As a result, it is unlikely that training activities would endanger the public, and no impact on public health and safety offshore is anticipated.

3.3.2.2.2 Hazardous Substances

As summarized in Section 3.3.2.1.2, JEB Little Creek-Fort Story has measures and procedures in place to minimize the risk of any accidental spills. All maintenance and fueling activities would be conducted in compliance with the current Spill Prevention, Control, and Countermeasures Plan. All generators and fuel storage tanks would have spill containment units to capture any incidental leaks and spills. Drip pans and containment pads would be used during all vehicle maintenance activities. All petroleum and hazardous materials would be transported and stored in accordance with applicable federal and state laws and regulations.

The Amphibious Bulk Liquid Transfer System would only be used with water; therefore, the risk of contamination of nearshore waters from use of the system would be nonexistent.

The brine and fresh water produced by the Tactical Water Purification System would be discharged into the sanitary sewer system as explained in Section 2.1.4. All bilge water would be disposed of in accordance with OPNAVINST 5090.1D, which allows the discharge of such waste within three nautical miles of shore provided there is no sheen and discharge concentration is less than or equal 15 parts per million oil. Bilge water not meeting this requirement would be pumped ashore for proper disposal. All discharges would be conducted in compliance with the installation's current National Pollutant Discharge Elimination System permit.

No Installation Restoration Program sites would be disturbed during any of the proposed training activities.

3.3.2.2.3 Summary

The No Action Alternative at JEB Little Creek-Fort Story represents a continuation of current annual training activities and would introduce no new or unusual risks to public health and safety. All activities during both the annual full JLOTS event and unit-level training events at the base would continue to be conducted in compliance with the applicable rules and regulations pertaining to conducting activities in restricted areas and to the management of hazardous substances, as described above. All environmental risks would cease after training was completed and all structures, equipment, craft, and vehicles have been dismantled and removed. Therefore, the No Action Alternative at JEB Little Creek-Fort Story would have no significant impacts on public health and safety.

3.3.2.3 No Action Alternative – Camp Lejeune – Existing Environment

3.3.2.3.1 Offshore Operations Areas

The offshore waters of Onslow Bay are utilized by recreational and commercial boaters as well as divers. Recreational users are not expected to be present in the immediate vicinity of JLOTS activities because of a lack of desirable conditions (e.g., clear waters with sites such as shipwrecks and reefs in the case of divers, and high quality fish habitat for fishermen) in the study area.

Safety precautions and regulations for operations at Camp Lejeune are contained in Base Order P3570.1C, *Range and Training Regulations, Standing Operating Procedures for Range Control* (U.S. Marine Corps 2011). Section 10 specifies that all operations involving military watercraft in the Camp Lejeune area fall under the order's jurisdiction. Warning of military training periods would be given through Notices to Mariners.

Waters subject to public access restrictions (Figure 3.3-2) at Camp Lejeune are defined at 33 C.F.R. § 334.440 and include:

- The Atlantic Ocean east of the New River Inlet within a 25,000-yard arc and eight adjacent sectors of the New River. The public access restrictions for these areas include the following:
  - Sailing vessels and any watercraft having a speed of less than 5 knots shall keep clear of any closed sector at all times after notice of firing has been given. Vessels having a speed of greater than 5 knots may enter the sections without restriction except when firing signals are being displayed, which is when vessels shall clear the closed sectors immediately.

- No person shall enter or remain within a 2 acre area surrounding a waterborne refueling training operation in either the Grey Point Sector, Farnell Bay Sector, or Morgan Bay Sector for the duration of the training operation.

- Target and bombing area in the Atlantic Ocean in vicinity of Bear Inlet. Restrictions include the following:
  - Vessels may proceed along established waterways except during military training periods.
- Inland waters between Bear Creek and Onslow Bridge over the Atlantic Intracoastal Waterway. Restrictions include the following:
  - No person shall enter or remain in the waters of this area due to possibility of unexploded projectiles. Vessels may proceed through the Atlantic Intracoastal Waterway in the area without stopping except in cases of extreme emergencies.
  - All navigable waters in the area between the south bank of Bear Creek and the north bank of the north connecting channel between the Atlantic Intracoastal Waterway and Browns Inlet shall be closed to navigation at all times due to highly sensitive unexploded projectiles in this area.
  - Vessels may proceed through the north connecting channel and the south connecting channel (Banks Channel) in the area between the Atlantic Intracoastal Waterway and Browns Inlet to the Atlantic Ocean without stopping during periods of nonmilitary use.
  - Navigable waters in the area between the south connecting channel (Banks Channel) leading to Browns Inlet and Onslow Beach Bridge on both sides of the Atlantic Intracoastal Waterway are open to unrestricted navigation during periods of nonmilitary use.

3.3.2.3.2 Hazardous Substances

Hazardous Materials

Hazardous materials present at Camp Lejeune include fuel, lubricants, munitions, and cleaning and maintenance materials. Larger volumes of these materials are stored within the cantonment area. However, many of these compounds are also used and temporarily stored in smaller quantities in training areas for the duration of training events.

Camp Lejeune personnel follow procedures established by Base Orders 5090.9 (*Hazardous Waste and Hazardous Material Management Program*) and 5090.91 (*Oil and Hazardous Substance Pollution Prevention and Pollution Abatement Facility Management Plan*) for the handling of hazardous material and petroleum, oils, and lubricants. The orders address measures to prevent and initiate cleanup of hazardous material spills.

Hazardous Waste

Base Order P3570.1B, Chapter 6, Base Order 5090.9, and the Camp Lejeune *Hazardous Waste Management Plan* provide information on management of hazardous waste. These documents provide a comprehensive compilation of procedures and requirements. Hazardous waste and materials used or generated at Camp Lejeune are handled, stored, and disposed of in accordance with the procedures mandated in these documents.

Camp Lejeune's *Range and Training Regulations (Base Order 3570.1C) Standing Operating Procedures for Range Control* (U.S. Marine Corps 2011) covers environmental procedures and specifically addresses "field waste disposal" in Chapter 6.

Most of the accumulated hazardous waste generated on Camp Lejeune is brought to the Environmental Management Division's consolidation center, and then transferred off-base through the Defense Reutilization and Marketing Office (U.S. Marine Corps 2009). These materials typically are accumulated in designated areas and then transported to licensed disposal facilities in accordance with Resource Conservation and Recovery Act guidelines.

Installation Restoration Program Sites

There are no Installation Restoration Program sites located in the areas proposed for JLOTS activities at Camp Lejeune.

3.3.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

3.3.2.4.1 Offshore Operations Areas

Most of the sea space where training activities take place is accessible to the public for recreational and commercial activities. Under the No Action Alternative at Camp Lejeune, the bulk of offshore activities would take place within the restricted areas and danger zones defined in 33 C.F.R. § 334.440. Private and commercial vessels would be subject to the applicable access restrictions, except for craft transiting between Onslow Beach and Mile Hammock Bay via the New River Inlet, as the inlet is not within the restricted area. Prior to the commencement of training activities, the Navy and the Marine Corps would publish a Notice to Mariners to alert private and commercial vessels and establish the applicable restrictions. The training area would be cleared before activities begin and security boats would patrol the area to ensure that non-Navy vessels comply with the published restrictions. Floating platforms (including the floating causeways), ships, or boats anchored overnight in the area would be lit so as not to become safety hazards. Thus, the potential for non-Navy vessels interacting with JLOTS craft and temporary piers would be minimized.

Noise produced in conjunction with the training activities at Camp Lejeune is addressed in Section 3.2.2.5. Under the No Action Alternative, ambient noise would not differ from what is currently occurring at the installation and would not rise to a level where it impacts civilian users of the water. As a result, it is unlikely that training activities would endanger the public, and no impact on public health and safety offshore is anticipated.

3.3.2.4.2 Hazardous Substances

All training activities during the annual full JLOTS training event would be conducted in compliance with Camp Lejeune's standing environmental procedures and measures.

Disposal procedures for the byproducts of the Tactical Water Purification System would be in accordance with the environmental standard operating procedure developed for use of the system at Camp Lejeune.

No Installation Restoration Program sites would be affected by the proposed activities. All risks associated with the proposed JLOTS training would cease after each event is completed and all structures, equipment, craft, and vehicles used during the training have been dismantled and removed.

3.3.2.4.3 Summary

The No Action Alternative at Camp Lejeune represents a continuation of current annual training activities and would introduce no new or unusual risks to public health and safety. All training activities during the annual full JLOTS event would continue to be conducted in compliance with the applicable rules and regulations pertaining to operations in restricted areas and danger zones defined in 33 C.F.R. § 334.440 and to the management of hazardous substances, as described above. All environmental risks would cease after training was completed and all structures, equipment, craft, and vehicles were dismantled and removed. Therefore, the No Action Alternative would have no significant impacts on public health and safety at Camp Lejeune.

3.3.2.5 No Action Alternative – Conclusion

The No Action Alternative at both locations, JEB Little Creek-Fort Story and Camp Lejeune, represents a continuation of current annual training activities and would introduce no new or unusual risks to public health and safety. All training activities would continue to be conducted in compliance with the applicable rules and regulations, including operation in restricted areas as defined in 33 C.F.R. §§ 334.310, 334.320, and 334.440 and to the management of hazardous substances, as described above. All risks would cease after training was completed and all structures, equipment, craft, and vehicles were dismantled and removed. Therefore, the No Action Alternative would have no significant impacts on public health and safety at either JEB Little Creek-Fort Story or at Camp Lejeune.

3.3.3 Action Alternative

3.3.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

See Section 3.3.2.1 for a description of existing conditions pertaining to public health and safety at JEB Little Creek-Fort Story.

3.3.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

The Action Alternative at JEB Little Creek-Fort Story includes the same annual training activities as the No Action Alternative plus the floating causeways (at Little Creek) and the ELCAS (M). Therefore, the impacts of the Action Alternative would be similar to those of the No Action Alternative at JEB Little Creek-Fort Story plus the impacts associated with the floating causeways and the ELCAS (M) FTXs.

3.3.3.2.1 Offshore Operations Areas

Under the Action Alternative at JEB Little Creek-Fort Story, all in-water activities during both the annual full JLOTS training event and unit-level events would take place within restricted areas identified in 33 C.F.R. § 334.310. Risks would be minimal due to the restrictions in the restricted area and the issuance of Notices to Mariners, as described in Section 3.3.2.2.1. While in transit, Navy surface vessel operators are alert at all times, use extreme caution, use state-of-the-art satellite navigational systems, and are trained to take proper action if there are potential risks. The floating causeways and ELCAS (M) as well as ships or boats anchored overnight in the area would be lit so as not to become safety hazards.

Noise produced in conjunction with the Action Alternative training activities at JEB Little Creek-Fort Story is addressed in Section 3.2.3.2. Under the Action Alternative, pile driving noise associated with the construction of the ELCAS (M) may produce a temporary, intermittent change in ambient noise, but would not rise to a level where it is expected to be noticeable by civilians on the water, or differentiated from existing ambient noise conditions. As a result, it is unlikely that training activities would endanger the public, and no impact on public health and safety offshore is anticipated.

3.3.3.2.2 Hazardous Substances

Management of hazardous substances during the floating causeways and ELCAS (M) FTXs would be unchanged from how hazardous substances are handled in the No Action Alternative at JEB Little Creek-Fort Story. Installation Restoration Program sites would not be disturbed. Therefore, the analysis presented in Section 3.3.2.2.2 applies to the Action Alternative at Little Creek as well.

3.3.3.2.3 Summary

Under the Action Alternative at JEB Little Creek-Fort Story, all proposed training activities during both the annual full JLOTS event and unit-level training events would be conducted in compliance with the applicable rules and regulations pertaining to operations in restricted areas and to the management of hazardous substances, as described above. The addition of the floating causeways and the ELCAS (M) FTXs to the proposed activities would likewise be conducted with these requirements. All risks to public health and safety would cease after training is complete and all structures, equipment, craft, and vehicles have been dismantled and removed. Therefore, the Action Alternative would have no significant impacts on public health and safety at JEB Little Creek-Fort Story.

3.3.3.3 Action Alternative – Camp Lejeune – Existing Environment

See Section 3.3.2.3 for a description of existing conditions pertaining to public health and safety at Camp Lejeune.

3.3.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

The Action Alternative at Camp Lejeune includes the same annual training activities as the No Action Alternative plus the ELCAS (M). Therefore, the impacts of the Action Alternative would be similar to those of the No Action Alternative at Camp Lejeune plus the impacts associated with the ELCAS (M).

3.3.3.4.1 Offshore Operations Areas

Under the Action Alternative at Camp Lejeune, all in-water activities during the annual full JLOTS training event would take place within the restricted areas and danger zones identified in 33 C.F.R. § 334.440. Risks to public health and safety would be minimal due to the restrictions applying in these areas and the issuance of Notices to Mariners, as described in Section 3.3.2.4.1. While in transit, Navy surface vessel operators are alert at all times, travel at a safe speed for the prevailing conditions, use state-of-the-art satellite navigational systems, and are trained to take proper action to avoid collisions. Additionally, the ELCAS (M) as well as floating platforms, ships, or boats anchored overnight in the area would be lit so as not to become safety hazards.

Under the Action Alternative, pile driving noise associated with the construction of the ELCAS (M) is the only potential change in ambient noise from the No Action Alternative. This additional sound would not increase levels of ambient noise so that it would impact civilian users of the water. It is unlikely that training activities would cause negative impacts on public health and safety offshore.

3.3.3.4.2 Hazardous Substances

Construction and use of the ELCAS (M) under the Action Alternative at Camp Lejeune would not change the management or handling of hazardous substances or disturb Installation Restoration Program sites relative to the No Action Alternative. Therefore, the analysis presented in Section 3.3.2.4.2 applies to the Action Alternative at Camp Lejeune as well.

3.3.3.4.3 Summary

Under the Action Alternative at Camp Lejeune, all proposed training activities would be conducted in compliance with the applicable rules and regulations pertaining to operations in restricted areas and danger zones and to the management of hazardous substances, as described above. All risks to public health and safety from the Action Alternative would cease after training was completed and all structures, equipment, craft, and vehicles have been dismantled and removed. Therefore, the Action Alternative would have no significant impacts on public health and safety at Camp Lejeune.

3.3.3.5 Action Alternative – Conclusion

The training activities associated with the Action Alternative at both sites, JEB Little Creek-Fort Story and Camp Lejeune, would not introduce new or unusual risks to public health and safety. All training would be conducted in compliance with the applicable rules and regulations pertaining to operations in restricted areas and danger zones and to the management of hazardous substances at each installation. Once the training has concluded, all structures would be removed and areas restored to their pre-existing conditions. Therefore, the Action Alternative would have no significant impacts on public health and safety.

3.4 Socioeconomics

3.4.1 Introduction

This section briefly describes the socioeconomic conditions in the regions surrounding the installations where the proposed training would take place as well as the impacts of the No Action and Action Alternatives on these conditions. As the proposed land-based activities would be contained within the installations and would not involve moving forces into or out of either location, they have no potential to significantly affect off-installation socioeconomic activities and are therefore not addressed. Therefore, this section focuses on water-related socioeconomic activities; specifically, maritime transport, recreational boating, and commercial and recreational fishing. Shoreline and inland activities have no potential to affect socioeconomic conditions and, therefore, are not addressed.

The socioeconomic study area comprises water areas in the Chesapeake Bay up to three nautical miles (5.6 kilometers) seaward of the JEB Little Creek-Fort Story shoreline, Onslow Bay up to three nautical miles (5.6 kilometers) seaward of the Camp Lejeune shoreline, the lower portion of the New River, and the Atlantic Intracoastal Waterway in the vicinity of Camp Lejeune.

3.4.2 No Action Alternative

3.4.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

As described in Section 3.3.2.1, there is a restricted area (33 C.F.R. § 334.310), a danger zone (33 C.F.R. § 334.370), and an exclusion zone in the waters surrounding JEB Little Creek-Fort Story.

3.4.2.1.1 Maritime Transport

Navigable waterways and shipping lanes connect the Chesapeake Bay to major ports to the north (New York and Boston) and the south (Savannah, Charleston, and Miami). The Port of Virginia includes three marine terminals in the Hampton Roads metropolitan area, near the mouth of the Chesapeake Bay – Norfolk International Terminals, Portsmouth Marine Terminal, and Newport News Marine Terminal (Virginia Port Authority 2008; Virginia Port Authority 2013). In 2010, a total of 22,949 commercial vessel trips were logged in Hampton Roads. A trip is defined as a vessel movement logged between points of departure and arrival for self-propelled vessels and between points of loading and unloading for non-self-propelled vessels (U.S. Army Corps of Engineers 2011).

3.4.2.1.2 Commercial Fishing

The National Marine Fisheries Service collects landings data from several sources, including state-mandated fishery or mollusc trip-tickets; landing weigh-out reports provided by seafood dealers; federal logbooks of fishery catch and effort; shipboard and portside interviews; and biological sampling of catches (National Marine Fisheries Service 2013a). These data are incorporated into the National Marine Fisheries Service Fisheries Statistics and Economics Division commercial landings databases.

Between 2007 and 2011, the commercial landings of food and bait fish in Virginia, measured by weight, averaged about 469 million pounds (213 million kilograms). Commercial landings were variable over the five years. Landings dipped to a low of less than 423 million pounds (192 million kilograms) in 2008, but recovered to a peak in 2010, when approximately 510 million pounds (231 million kilograms) of finfish and shellfish were landed. The dollar value of the landings averaged over $162 million over the five-year period. Total values ranged from a low of about $138 million in 2007 and climbed steadily to a high approaching $192 million in 2011.

In each of the five years, over two thirds of the commercial value for the Virginia marine fishery was shellfish, primarily sea scallop, blue crab, and northern quahog clam (National Marine Fisheries Service 2013a). Sea scallops alone represented 42.0 percent of the commercial value of the fishery over the five-year period. Among finfish, menhaden, Atlantic croaker, summer flounder, and striped bass dominated commercial landings measured by value. These four species comprised approximately 25.1 percent of the commercial value of the fishery, with menhaden alone representing 16.9 percent.

Although the landings at Hampton Roads area ports, measured by weight, decreased over the five years, the dollar value of the commercial fishery landings showed a marked overall increase. Commercial landings by weight decreased from 21.1 million pounds (9.6 million kilograms) in 2007 to 18 million pounds (8 million kilograms) in 2011. Over the same period, the total value of the landings increased from $71.2 million to $88 million.

3.4.2.1.3 Recreational Fishing

Marine recreational landings for Virginia state waters (i.e., the inshore saltwater and brackish water bodies combined with the state territorial sea, a zone extending seaward three nautical miles [5.6 kilometers] from shore) averaged approximately 27.3 million fish and 10.5 million pounds (4.8 million kilograms) during the five years from 2007 through 2011. Measured both by number of fish and by weight, recreational landings declined during the period. The peak annual recreational landings totaled over 37.0 million fish and over 15.2 million pounds (6.9 million kilograms) in 2007, but landings were at a low in 2011, at about 21.0 million fish and 6.9 million pounds (3.1 million kilograms).

For the 2007-2011 period, the most commonly caught species (in numbers of fish) in Virginia marine waters were Atlantic croaker, spot, summer flounder, and black sea bass, together comprising approximately 80.1 percent of total fish landed (National Marine Fisheries Service 2013b). The largest harvests by weight were Atlantic croaker, spot, striped bass, and summer flounder, totaling nearly 75.8 percent of the landings between 2007 and 2011.

3.4.2.1.4 Other Recreation

Both residents and visitors take advantage of the recreational opportunities of the Chesapeake Bay. Winter whale watching and warm month dolphin watching boat excursions are common in the mouth of the bay. 12,757 recreational boats are registered in the City of Virginia Beach (Sabo 2013). Recreational boaters may also participate in other activities such as swimming, scuba diving, snorkeling, water skiing, wake boarding, fishing, along with pleasure boating or sailing. From shore, residents and visitors may also swim, surf, fish, use personal watercraft, kayak or canoe, and snorkel. Shore-based activities typically originate from area beaches not located on the installation, though military personnel do swim off recreational beaches on the installation.

3.4.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

Little Creek

The proposed in-water training activities both during the annual full JLOTS training event and unit-level events, would take place close to shore in a restricted area (33 C.F.R. § 334.310 – see Section 3.3.2.2.1) where these and other amphibious military operations have been conducted previously. Civilian vessels could still enter the area, but would be required to maintain the appropriate standoff distances from Navy craft (Section 3.3.2.1.1). Full JLOTS training events would be announced in advance through the publication of Notices to Mariners, allowing commercial and recreational fishermen, boaters, and other recreationists to make alternative plans. Further, the Navy would monitor the presence of civilian vessels and equipment to ensure that there are no interactions with Navy vessels and equipment through the course of in-water activities. Established shipping lanes would be unaffected. Training activities within Little Creek Cove take place in an exclusion zone which prohibits all civilians from entering the area.

Fishing and tourism could be minimally displaced for short periods of time during training activities. Analyses found in Sections 3.10 through 3.12 determined, however, that there would be no population level impacts on marine species from proposed JLOTS training activities. For these reasons, there would be no indirect impacts on commercial or recreational fishing or tourism.

For a full JLOTS event, increased Navy vessel presence would be expected for up to 60 days. Unit-level events with an offshore component (cargo transfer and liquid transfer) would occur over periods ranging from several hours to seven days at a time. In both cases, the affected areas would be small in size (a few square miles offshore) compared to the Chesapeake Bay. The majority of activities would take place close to shore, as vessels converge toward landing points on the beach. Vessel density would diminish farther offshore, facilitating compliance with safe distance restrictions. No commercial shipping lanes or important commercial fisheries would be affected.

Fort Story

At Fort Story, all in-water training activities would take place in restricted areas as defined in 33 C.F.R. § 334.320 (as described in Section 3.3.2.3.1). Maritime transport shipping lanes are established farther offshore than proposed JLOTS activities would occur. Because commercial and recreational fishing and even anchoring are already prohibited in the restricted area, there would be no impact on these socioeconomic activities. Overall public access to the waters off Fort Story is not restricted. For full JLOTS events, Notices to Mariners would be issued to advise commercial and recreational vessel operators of when and where training is scheduled. No formal standoff distances are required of non-Navy vessels, but Navy security boats would ensure that no non-Navy vessels are close enough to pose a security threat and all Navy operators would constantly monitor the exercise area to ensure that there were no adverse interactions between civilian vessels and Navy vessels or equipment throughout the course of the exercise.

Fishing and tourism could be impacted if the No Action Alternative altered population levels to such an extent that fishermen and tourists could no longer find sufficient abundance of targeted species. The analyses presented in Sections 3.10 and 3.12 determined, however, that there would be no population level impacts on marine species from proposed JLOTS training activities. For these reasons, there would be no indirect impacts on commercial or recreational fishing or tourism.

3.4.2.2.1 Summary

In-water activities under the No Action Alternative during either the full JLOTS event or unit-level training at JEB Little Creek-Fort Story would have no significant impacts on maritime transport, commercial and recreational fishing, or other recreational activities. Exercise participants from out of the area may cause a short-term, minor increase in traffic while transiting to the installation prior to the training event and from the installation after the training event has concluded. However, the additional personnel could impart a positive, short-term benefit to the local economy over the course of the training event due to the purchase of local goods and services. As noted in the introduction, the proposed shoreline and inland activities would all take place on the installation at JEB Little Creek-Fort Story and have no potential to negatively affect socioeconomic conditions. Further, the No Action Alternative represents a continuation of current annual training activities and would introduce no new or unusual restrictions on socioeconomic activities. Therefore, it would have no significant socioeconomic impacts.

3.4.2.3 No Action Alternative – Camp Lejeune – Existing Environment

3.4.2.3.1 Maritime Transport

The National Marine Fisheries Service has collected data on the number of establishments, number of employees, and payroll figures for the transport, support, and marine operations industries in North Carolina in 2008. For industries for which data were available, the ship and boat building industry employed more people than any other industry in this sector, approximately 4,281 people at 77 establishments in North Carolina. In 2008, the industry also had the highest annual payroll in the state, totaling about $138.2 million.

The Atlantic Intracoastal Waterway is a toll-free boating channel – part canal, part natural waterway – that extends for almost the entire length of the east coast. It passes through Camp Lejeune between the beaches and the mainland. The most common commercial traffic using the Atlantic Intracoastal Waterway are barges moving raw materials between coastal cities and processing plants. In 2010, a total of 17,391 commercial vessel trips were logged in the waterway throughout its traverse of North Carolina (U.S. Army Corps of Engineers 2011). The Marine Corps uses the Atlantic Intracoastal Waterway at Camp Lejeune for boat and amphibious training and readiness operations. At times, portions of the waterway are closed to civilian boaters to allow for training activities. Hazardous operations are communicated to vessels and operators by use of Notices to Mariners issued by the U.S. Coast Guard.

The waters off the United States Atlantic coast support a large volume of maritime traffic. Commercial shipping comprises a substantial portion of this traffic. Nearshore shipping lanes aid ocean-going vessels in avoiding navigational conflicts and collisions in areas leading into and out of major ports. Offshore, there are no designated shipping lanes; vessels generally follow routes determined by their destination, depth requirements, and the current weather conditions. No shipping lanes are located within the study area off Camp Lejeune. In 2010, a total of only three commercial vessel trips were logged in the New River (U.S. Army Corps of Engineers 2011).

3.4.2.3.2 Commercial Fishing

The New River and its bays, the Atlantic Intracoastal Waterway, and Onslow Bay are estuarine waters that support commercial and recreational fisheries. The North Carolina Division of Marine Fisheries has designated waters for crab pots in the Atlantic Intracoastal Waterway and gill net fishing in both the waterway and the New River. There are active commercial and recreational hook and line fisheries in the New River, Atlantic Intracoastal Waterway, and Onslow Bay (U.S. Department of the Navy 2003). The navigation channel of the Atlantic Intracoastal Waterway is closed to crab pots and other fixed gear that could pose hazards to navigation (North Carolina Division of Marine Fisheries 2013).

In North Carolina, over the five-year period ending in 2011, the commercial landings of food and bait fish, measured by weight, averaged about 68.5 million pounds (31.1 million kilograms) per year. Although landings fluctuated above and below the average, the landings data show a marked overall increasing trend over the five years. Commercial landings ranged between a low of about 62.9 million pounds (28.5 million kilograms) in 2007 and a high of nearly 72.0 million pounds (32.7 million kilograms) in 2010.

The dollar values of commercial landings in North Carolina averaged almost $79.5 million. Landings by value decreased between 2007 and 2011 from a high of over $86.8 million in 2008 to a low of less than $71.2 million three years later, in 2011. Approximately 57.4 percent of the commercial value for the North Carolina marine fishery was shellfish, primarily blue crab, brown shrimp, white shrimp, and eastern oyster (National Marine Fisheries Service 2013a). Over the five years, blue crabs alone represented 31.3 percent of the commercial value of the fishery. Among finfish, summer flounder, southern flounder, and Atlantic croaker dominated commercial landings measured by value during each of the five years from 2007 through 2011.

In Onslow County, between 2007 and 2011, annual commercial seafood landings averaged 2.2 million pounds (1.1 million kilograms) with an estimated annual average value of nearly $4.8 million. Measured both by weight and by value, landings in the county peaked in 2008, but then declined to a low in 2011. For the period from 2007 through 2011, the average annual landings in the New River and in the Atlantic Intracoastal Waterway were about 591,000 pounds (268,000 kilograms) and 141,000 pounds (64,000 kilograms), respectively. Landings peaked in the New River in 2010 and in the Atlantic Intracoastal Waterway in 2007.

3.4.2.3.3 Recreational Fishing

Annual fishing tournaments are held in Onslow Bay and other recreational fishing is generated by several recreational fishing hotspots located within or adjacent to Camp Lejeune (U.S. Department of the Navy 2003). Approximately 20 artificial reefs have been established in Onslow Bay primarily to support offshore sport fishing and recreational diving (U.S. Marine Corps 2009). Although the artificial reefs are utilized throughout the year by recreational vessels and commercial charter boats, use is highest during the summer (U.S. Marine Corps 2004). Recreational fishing also occurs in the New River and Atlantic Intracoastal Waterway.

Over the five years from 2007 through 2011, the recreational landings of finfish caught in North Carolina marine waters averaged approximately 27.2 million fish and 6.8 million pounds (3.1 million kilograms). Overall, the number of fish caught declined during the five-year period, ranging from a high of nearly 30.0 million fish in 2007 to a low of about 22.5 million fish in 2011. The most commonly caught species (in numbers of fish) in North Carolina marine waters were bluefish, mullet, spot, and pinfishes, together comprising approximately one third (34.3 percent) of the fish landed (National Marine Fisheries Service 2013b). The largest harvests by weight were bluefish, striped bass, spotted sea trout, and Spanish mackerel, totaling over 39.7 percent of the landings between 2007 and 2011.

3.4.2.3.4 Other Recreation

In 2012, the number of boats registered in Onslow County was 7,380 (North Carolina Wildlife Resources Commission 2012). Personnel stationed at Camp Lejeune as well as residents upstream of the base frequently use the New River for various types of recreational boating, including sport fishing, water skiing, and crabbing (U.S. Marine Corps 2009). A number of marinas are located along the river. Navigable creeks and tributaries enable residents to moor boats at their homes. The Atlantic Intracoastal Waterway is also highly utilized by recreational boaters. Besides fishing, recreational activities in Onslow Bay include sport diving, whale watching, sailing, and power cruising (U.S. Marine Corps 2009). Recreational users are not expected to be present in the immediate vicinity of the ELCAS (M) FTX because of a lack of desirable conditions (e.g., clear waters with sites such as shipwrecks and reefs in the case of divers, and high quality fish habitat for fishermen) in the study area.

3.4.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

Under the No Action Alternative at Camp Lejeune, most of the proposed in-water training activities during the annual full JLOTS training event would take place in Onslow Bay within restricted areas as defined in 33 C.F.R § 334.440 (described in Section 3.3.2.5.1), where in-water training exercises routinely take place. Some vessel traffic would also transit through the New River Inlet to and from Mile Hammock Bay. Because JLOTS involves no live firing, there would generally be no public restrictions in the New River or Onslow Bay (except in the vicinity of Bear Inlet, which is subject to closure during military training), though security boats would patrol to ensure no non-Navy vessels pose a security threat. New River and Onslow Bay fisheries and recreational opportunities would be unaffected.

Closures or access restrictions routinely occur in certain areas when training is taking place. Such restrictions are publicized by Camp Lejeune and the U.S. Coast Guard through the issuance of Notices to Mariners. Under the No Action Alternative, the Navy and Camp Lejeune could impose temporary access restrictions on a portion of Onslow Bay near Bear Inlet and the Atlantic Intracoastal Waterway during the annual full JLOTS event, though not necessarily for the entire 60 days. Because there are fisheries in the Atlantic Intracoastal Waterway and Onslow Bay, the restrictions may have a small, temporary impact on access to commercial and recreational fishing. Fishing could occur in alternative areas during closures.

There are no commercial shipping lanes near Camp Lejeune and, therefore, there would be no impacts on maritime transport. Due to the advance notice given to boaters and the moderate size of the restricted areas, allowing boaters alternate options, impacts on recreational boating would be minimal.

Fishing and tourism could be impacted if the No Action Alternative altered population levels to such an extent that fishermen and tourists could no longer find sufficient abundance of targeted species. Analyses found in Sections 3.10 and 3.12 determined, however, that there would be no population level impacts on marine species from proposed JLOTS training activities. For these reasons, there would be no indirect impacts on commercial or recreational fishing or tourism.

3.4.2.4.1 Summary

Based on the above, the proposed in-water activities under the No Action Alternative at Camp Lejeune would have no significant impacts on maritime transport, commercial and recreational fishing, or other recreation activities near the base. Exercise participants from out of the area may cause a short-term, minor increase in traffic while transiting to the installation prior to the training event and from the installation after the training event has concluded. The additional personnel could impart a positive, short-term benefit to the local economy while participating in the training event due to the purchase of local goods and services. The proposed shoreline and inland activities would all take place within Camp Lejeune and have no potential to negatively affect socioeconomic conditions. The No Action Alternative represents a continuation of current annual training activities and would introduce no new or unusual restrictions on socioeconomic activities. Therefore, it would have no significant socioeconomic impacts at Camp Lejeune.

3.4.2.5 No Action Alternative – Conclusion

The proposed in-water activities under the No Action Alternative for both locations, JEB Little Creek-Fort Story and Camp Lejeune, would have no significant impacts on maritime transport, commercial and recreational fishing, or other recreation activities near the base. Exercise participants from out of the area may cause a short-term, minor increase in traffic while transiting to the installation prior to the training event and from the installation after the training event has concluded. The additional personnel could impart a positive, short-term benefit to the local economy while participating in the training event due to the purchase of local goods and services. The proposed shoreline and inland activities would all take place within the military installations and have no potential to negatively affect socioeconomic conditions. The No Action Alternative represents a continuation of current annual training activities and would introduce no new or unusual restrictions on socioeconomic activities. Therefore, the No Action Alternative would have no significant socioeconomic impacts at JEB Little Creek-Fort Story or Camp Lejeune.

3.4.3 Action Alternative

3.4.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

See Section 3.4.2.1 for a description of the relevant, existing socioeconomic environment at JEB Little Creek-Fort Story.

3.4.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

The Action Alternative includes the same annual training activities as the No Action Alternative at JEB Little Creek-Fort Story plus the floating causeways (at Little Creek) and the ELCAS (M). Therefore, the impacts of the Action Alternative would be similar to those of the No Action Alternative at JEB Little Creek-Fort Story plus the impacts associated with the floating causeway and ELCAS (M) FTXs.

The floating causeways would extend seaward approximately 1,200 feet (366 meters) and the ELCAS (M) approximately 1,520 feet (463.3 meters) past the surf line and remain in place for the duration of the full JLOTS event, approximately 60 days. Both piers would be lit as required for safety and the same access restrictions of restricted areas as defined in 33 C.F.R. § 334.310 and 334.320 would apply as under the No Action Alternative. As with the No Action Alternative, advisories would be announced in advance of the full JLOTS exercises through the publication of Notices to Mariners, allowing boaters to make alternate plans as needed; no commercial shipping lanes or important commercial fisheries would be affected.

Analyses in Sections 3.10 through 3.12 indicated that there would be no population level impacts on marine species from proposed JLOTS training activities, so species targeted for fishing and tourism are not anticipated to be discernibly affected. For these reasons, there would be no indirect impacts on commercial or recreational fishing or tourism.

3.4.3.2.1 Summary

The socioeconomic impacts of the Action Alternative would not be substantially different from those of the No Action Alternative at JEB Little Creek-Fort Story. The floating causeways (at Little Creek) and the ELCAS (M) FTXs would not increase water restrictions relative to impacts described under the No Action Alternative. Therefore, there would be no significant socioeconomic impacts from the Action Alternative at JEB Little Creek-Fort Story.

3.4.3.3 Action Alternative – Camp Lejeune – Existing Environment

See Section 3.4.2.3 for a description of the relevant, existing socioeconomic environment at Camp Lejeune.

3.4.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

The Action Alternative includes the same annual training activities as the No Action Alternative at Camp Lejeune plus the ELCAS (M) FTX. Therefore, the impacts of the Action Alternative would be similar to those of the No Action Alternative at Camp Lejeune plus the impacts associated with the ELCAS (M).

The ELCAS (M) would extend up to 1,520 feet (463.3 meters) past the surf line off Onslow Beach and remain in place for the duration of the full JLOTS event, approximately 60 days. The ELCAS (M) would be constructed within restricted area and danger zone as defined in 33 C.F.R. § 334.340 where in-water training exercises routinely take place at Camp Lejeune. The Action Alternative at Camp Lejeune would not result in more use restrictions beyond those imposed under the No Action Alternative and Notices to Mariners would still be issued to advise vessel operators of when and where full JLOTS training is scheduled.

Analyses in Sections 3.10 through 3.12 indicated, however, that there would be no population level impacts on marine species from proposed JLOTS training activities, so species targeted for fishing and tourism are not anticipated to be discernibly affected. For these reasons, there would be no indirect impacts on commercial or recreational fishing or tourism.

3.4.3.4.1 Summary

The socioeconomic impacts of the Action Alternative would not be substantially different from those of the No Action Alternative at Camp Lejeune. The ELCAS (M) FTXs would not increase water restrictions relative to impacts described under the No Action Alternative. Therefore, there would be no significant socioeconomic impacts from the Action Alternative at Camp Lejeune.

3.4.3.5 Action Alternative – Conclusion

The Action Alternative would not significantly impact maritime transport, commercial and recreational fishing, or other recreational activities. Construction of the floating causeways (at Little Creek) and ELCAS (M) would not discernibly alter existing socioeconomic conditions at each location. Participants from out of the area may cause a short-term, minor increase in traffic while transiting to the installation prior to the training event and from the installation after the training event has concluded. The additional personnel present during the training events could have a positive, short-term benefit to the local economy while participating in the training event due to the purchase of local goods and services. Therefore, there would be no significant socioeconomic impacts under the Action Alternative.

3.5 Water Resources

3.5.1 Introduction

A number of federal laws regulate land uses and actions that have the potential to impact water quality and wetlands due to the importance of these resources to the health of ecosystems and the human environment. Executive Order 12088, *Federal Compliance with Pollution Control Standards*; Executive Order 11990, *Protection of Wetlands*, and the Clean Water Act require federal facilities to comply with all substantive and procedural requirements applicable to point and nonpoint sources of pollution. In accordance with these requirements, JEB Little Creek-Fort Story and Camp Lejeune obtain and keep on file all appropriate federal, state, interstate, and local certifications and permits required by programs for point and nonpoint pollution control, groundwater protection, dredge and fill, and stormwater management.

The Rivers and Harbors Act of 1899 (33 U.S.C. §§ 401, 403, 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 U.S. Army Corps of Engineers prior to commencement of work or placement of structures in or affecting navigable waters of the United States.

The Action Alternative considered in this EA involves in-water construction of the ELCAS (M) and floating causeways, both temporary structures, in the Chesapeake Bay along Anzio Beach and in Little Creek Cove (Little Creek), in the Atlantic Ocean along Omaha and Utah Beaches (Fort Story), and in Onslow and Mile Hammock Bays (Camp Lejeune). The construction of these structures would require permits from the U.S. Army Corps of Engineers under Section 10 of the Rivers and Harbors Act.

The Clean Water Act was enacted to protect surface water quality in the United States. Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers 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 Clean Water Act permit also requires a Section 401 water quality certification from the responsible state authority.

Executive Order 11988, *Floodplain Management*, sets forth the responsibilities of federal agencies for reducing the risk of flood loss or damage to personal property, minimizing the impacts of flood loss, and restoring the natural and beneficial functions of floodplains. This order was issued in furtherance of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

Section 402 of the Clean Water Act regulates the discharge of pollutants from point sources into waters of the United States and prohibits spills, leaks, or other discharges of oil or hazardous substances into the waters of the United States without a permit. The Clean Water Act limits any discharge of pollutants to a level sufficient to ensure compliance with state water quality standards. Direct discharges of effluents are regulated under numerical limitations contained in the National Pollutant Discharge Elimination System permit issued by the U.S. Environmental Protection Agency (USEPA) or under the state National Pollutant Discharge Elimination System program approved by the USEPA. All discharges would be conducted in compliance with the installations' current National Pollutant Discharge Elimination System permits.

3.5.2 No Action Alternative

3.5.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

3.5.2.1.1 Surface Waters and Chesapeake Bay

Figures 3.5-1 and 3.5-2 provide an overview of the water resources present at JEB Little Creek-Fort Story. Approximately 670 acres (270 hectares) of the installation are covered by water (U.S. Department of the Navy 2010). Little Creek lies entirely within the Chesapeake Bay watershed, while Fort Story, which is situated on Cape Henry at the Chesapeake Bay's confluence with the Atlantic Ocean, drains into both the Chesapeake Bay and the Atlantic Ocean. The salinity of offshore waters ranges from 18-21 parts per thousand (ppt) (Little Creek) to 24 ppt and greater (Fort Story), with average concentrations higher in fall and lower in spring (Chesapeake Bay Program 2008; Chesapeake Bay Foundation n.d.).

The major tributary to the Chesapeake Bay from Little Creek is Little Creek Harbor, which includes Little Creek Cove, Little Creek Channel, and Desert Cove. Nontidal surface water resources at Little Creek include three fresh water lakes and five ponds in the central and eastern portions of the installation, along with several streams. Non-tidal surface water resources at Fort Story include four man-made lakes and one unnamed pond that have an approximate combined surface area of ten acres (four hectares) (U.S. Department of the Navy 2011). No non-tidal surface waters are located in areas potentially impacted by the No Action Alternative.

The stormwater drainage system at JEB Little Creek-Fort Story collects runoff from impermeable surfaces throughout developed areas. The installation's Stormwater Pollution Prevention Plan identifies potential pollutants and describes stormwater management standards, stormwater management controls, and best management practices to maintain and protect water quality. Little Creek currently has 41 permitted stormwater outfalls (U.S. Department of the Navy 2010) and Fort Story has two permitted outfalls (U.S. Department of the Navy 2009). Nonpoint source pollution is monitored at all of these outfalls under the conditions set forth in the Virginia Pollutant Discharge Elimination System permit issued for the installation.

Figure 3.5-1: Water Resources at Little Creek

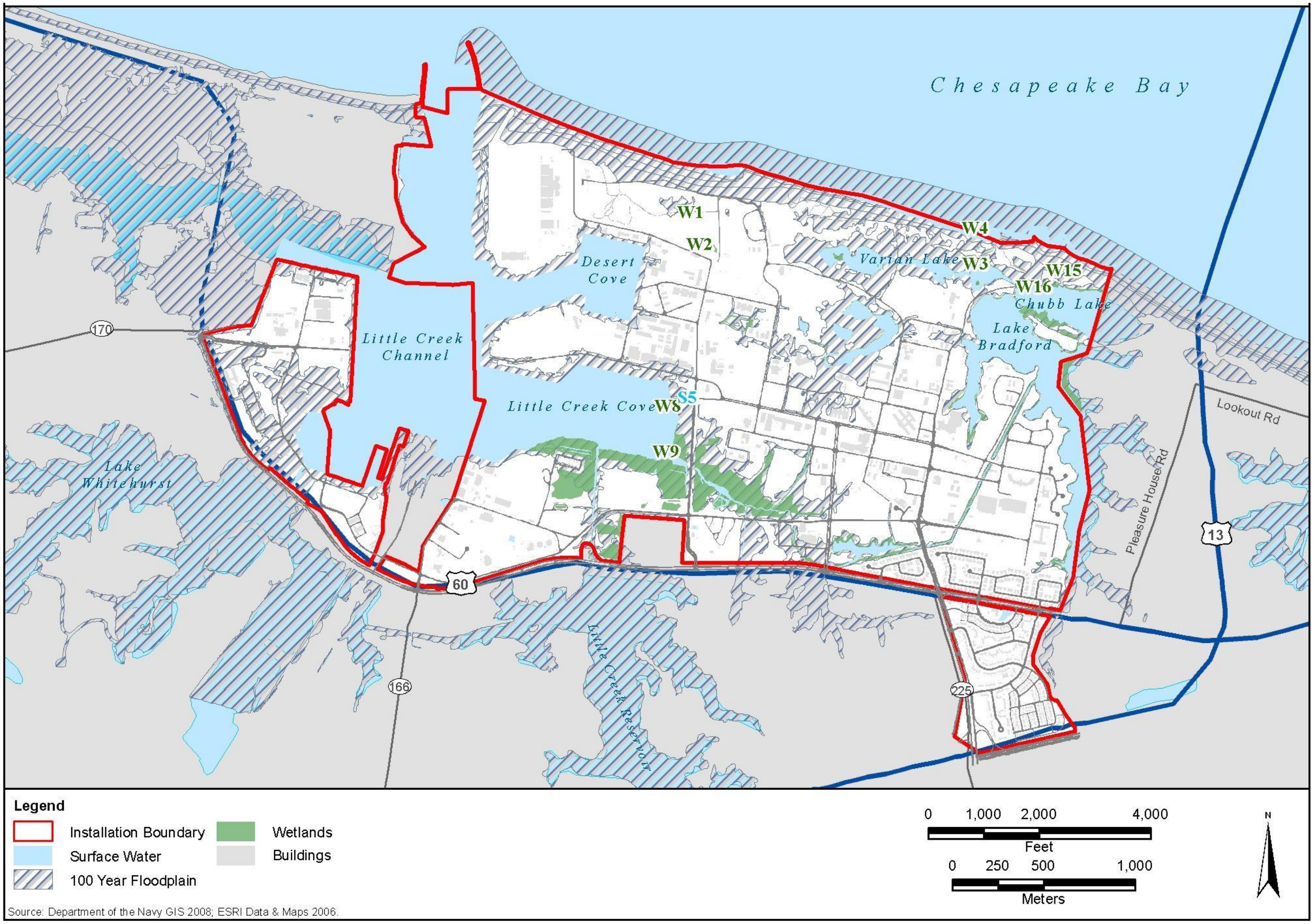
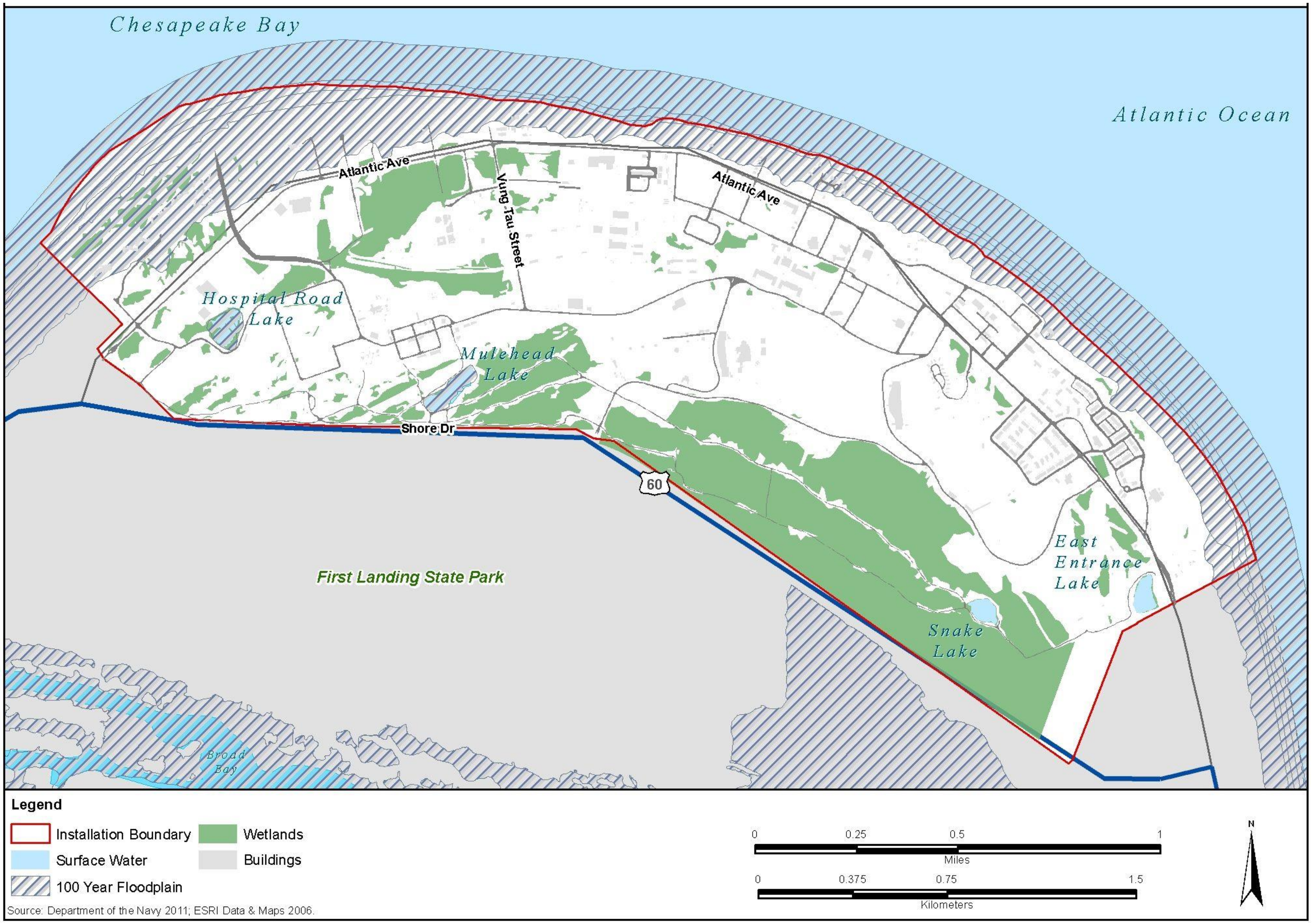


Figure 3.5-2: Water Resources at Fort Story



The Virginia Department of Environmental Quality has assessed water quality for the Chesapeake Bay and its tributaries, which is documented in the Virginia Department of Environmental Quality 2012 305(b)/303(d) Water Quality Assessment Integrated Report (Virginia Department of Environmental Quality 2012). Per this report, JEB Little Creek-Fort Story is located in segment CB8PH of the Chesapeake Bay. The designated uses for segment CB8PH are open water aquatic life and shallow water submerged aquatic vegetation (Virginia Department of Environmental Quality 2012). These uses are assessed for impairment on Virginia's 303(d) list. The standard water quality criteria measurements are of dissolved oxygen, water clarity, and Benthic Index of Biotic Integrity. The report indicates that there was no impairment of aquatic life and no impairment of the 30-day dissolved oxygen standard throughout the year for open water aquatic life. The Virginia Department of Environmental Quality assessment found that shallow water submerged aquatic vegetation was unlikely to be present, but the area has a total maximum daily load that may encourage recovery. Shellfishing is precluded in Little Creek Harbor due to high fecal coliform levels. Commercial fishing is not allowed by the state, although sport fishing is common in the western portion of the harbor.

3.5.2.1.2 Wetlands and Floodplains

In 2009, a field delineation of all wetlands, open water areas, and streams that potentially may be considered jurisdictional waters of the United States regulated under Section 404 of the Clean Water Act was performed at Little Creek. In February 2010, the U.S. Army Corps of Engineers, Norfolk District issued a preliminary jurisdictional determination for the aquatic resources identified by the 2009 survey (U.S. Department of the Navy 2010). The delineation identified approximately 76 acres (31 hectares) of wetlands at Little Creek, as shown in Figure 3.5-1. A planning-level wetland delineation of wetlands on Fort Story was completed in February 2005 (U.S. Department of the Navy 2011). The delineation identified 133 different wetland areas covering approximately 403 acres (163 hectares) (Figure 3.5-2). None of those wetlands are within or adjacent to the areas potentially affected by the No Action Alternative.

At Little Creek, Stream S5 is an intermittent stream that flows into Little Creek Cove through Wetland W8, which borders Mudflats to the north. Stream S5 is near Rodriguez Field but it is hydrologically separated from the site by a roadway. Wetland W8 is an estuarine, intertidal wetland that abuts the eastern shore of Little Creek Cove. Another similar wetland area, W9, is situated south of Mudflats. No other wetlands or streams are near the areas potentially affected by the No Action Alternative.

Federal Emergency Management Agency Flood Insurance Rate Map 5155310016F shows that a large portion of JEB Little Creek-Fort Story lies within a 100-year or 500-year floodplain. A 100-year floodplain is an area susceptible to being inundated by the base flood – that is, the flood having a one percent chance of being equaled or exceeded in any given year. A 500-year floodplain is an area susceptible to inundation by the flood having a 0.2 percent chance of being equaled or exceeded in any given year. Most of the 100-year flood area is along the shoreline and characterized by the Federal Emergency Management Agency as VE, coastal flood zone with velocity hazard (wave action).

3.5.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

3.5.2.2.1 Surface Waters and Chesapeake Bay

Impacts of In-Water Activities

JEB Little Creek-Fort Story has measures and procedures in place to minimize the risk of any accidental spills from in-water activities. All in-water operations would be conducted in compliance with Navy instruction on environmental compliance afloat (OPNAVINST 5090.1D) and the spill prevention, control, and contingency procedures in place at Little Creek. Only bilge water without an oily sheen and a concentration of less than or equal to 15 parts per million of oil would be discharged within three nautical miles of shore. Bilge water not meeting this requirement would be pumped ashore for proper disposal.

The Amphibious Bulk Liquid Transfer System would only be used with water and with equipment used only for the purpose of such simulated transfer. Therefore, there would be no risk of contamination of nearshore waters from use of the system. Excavation of duck ponds and anchoring for the floating causeway FTX at Fort Story would cause localized increases in turbidity as sediments are disturbed by vehicles and equipment. These impacts would be localized and short-lived, likely lasting for a few minutes after anchor placement or removal.

In shallow, nearshore waters along Anzio Beach, Mudflats, and Omaha and Utah Beaches, the movements of the components of the Improved Navy Lighterage System and of other vessels, boats, and amphibious vehicles would disturb sandy bottom sediments, increasing the turbidity of the affected waters. This impact would last longest during a full JLOTS event and be greatest near the shore, where landing craft would offload. Impacts from the unit-level cargo movement events would be less intense with a majority of the unit-level vessel movement occurring for only three hours per event. The predominantly sandy sediment would quickly settle back in place. Lighter particles would remain suspended longer but would eventually settle. This churning effect would amount to a temporary intensification of what occurs naturally along the shore as a result of wave and tide action. Between each occurrence, there would be ample time for turbidity to return to pre-training levels.

Dissolved oxygen levels would not be impacted as a result of the full JLOTS or the unit-level training events. These events are currently occurring and are considered as part of the Virginia Department of Environmental Quality's 2012 305(b)/303(d) Water Quality Assessment Integrated Report (Virginia Department of Environmental Quality 2012). The report also indicated that there was no impairment of aquatic life.

Impacts of Shoreline and Inland Activities

The potential for shoreline and inland activities to affect surface waters and the tidal waters of the Chesapeake Bay and Atlantic Ocean are minimal. All proposed inland training events throughout the year would be conducted in designated training areas located nearly one mile (1.6 kilometers) from inland bodies of fresh water. All generators and fuel storage tanks would have spill containment units to capture any incidental leaks and spills. Drip pans and containment pads would be used during all vehicle maintenance operations. All petroleum and hazardous materials would be transported and stored in accordance with applicable federal and state laws and regulations. As a result, petroleum and hazardous materials are not anticipated to encounter water bodies or result in impacts on water quality.

During the annual full JLOTS training event and unit-level training events, the tent encampment sites would generate grey water from showering and laundry facilities. Any grey water generated would be collected, stored, and disposed of into the sanitary sewer system. Percolation pits may be constructed for training purposes. Portable toilets would be used and solid waste would be transported offsite for proper disposal in accordance with JEB Little Creek-Fort Story's waste collection procedures. During the routine unit-level tent encampment training events, only administrative tents would be erected. Personnel would not camp overnight during these events so percolation pits would not be constructed and showering and laundry facilities would not be required. Tent encampments would not be constructed in areas with direct access to surface waters. As a result, there would be no impact on surface waters from tent encampment events.

Cargo movement events would occur during various times throughout the year. Though many of the vehicles would be on paved roads, some vehicles transit over the beach during the Improved Navy Lighterage System events. The Navy actively prevents petroleum products from spilling on the beach, and JEB Little Creek-Fort Story has spill prevention, control, and contingency procedures in place in the instance an accidental spill occurs. As a result, petroleum products are not anticipated to encounter water bodies or result in impacts on water quality.

The brine and fresh water produced by the Tactical Water Purification System (five times per year) would be discharged into the sanitary sewer system as detailed in Section 2.1.4. Up to 20,000 gallons (75,700 liters) of water could be produced during a full JLOTS event with less produced during the quarterly unit-level events. Since water and brine would be discharged into the sanitary sewer system, no impact on water quality would occur.

Fresh water used for the liquid transfer events (a total of 11 times per year) would be disposed of through infiltration into the sand at the beach. During a full JLOTS event, up to 200,000 gallons (378,500 to 757,000 liters) of water could be transferred. Liquid transfer during each quarterly unit-level exercise could occur over a 96 hour period and each routine unit-level exercise could occur over a two day period. Water would be discharged into a cloth casing bag to reduce the energy of the flow in order to prevent ground disturbance and erosion. All discharges would be conducted in compliance with the installation's current National Pollutant Discharge Elimination System permit. Discharges would be sufficiently spaced in time to allow for the water to be fully absorbed by the environment before the next exercise. Thus, impacts would be minimal.

3.5.2.2.2 Wetlands and Floodplains

No filling of wetlands would take place under the No Action Alternative. The risk of indirect impacts on wetlands would be minimal. The nearest wetland to Anzio Beach is Wetland W1 (Figure 3.5-1), a palustrine wetland located approximately 720 feet (218 meters) inland from the beach. W1 is hydrologically separated from the beach by the dunes. Wetlands W8 and W9 border Mudflats to the north and south, respectively. Any excavated material associated with the construction of the floating causeways would be stockpiled relatively close to the excavation site, which is approximately 110 yards (100 m) from the nearest wetlands along a flat beach. Based on the lack of slope and distance, stockpiled beach materials would not erode or deposit into the wetlands. Vehicles and equipment are not permitted to park in or travel through wetlands at JEB Little Creek-Fort Story. Therefore, no wetlands would be impacted by the No Action Alternative.

Most of the proposed events would take place within the 100-year floodplain due to the majority being situated within very close proximity to tidal waterbodies. No permanent structures would be erected and all temporary structures would be removed after training is complete. Grading operations would not place or remove sediment materials from the floodplain and, therefore, would not change its elevation or flood storage capacity. Furthermore, all areas disturbed during the proposed training events would be restored to pre-exercise grades at the end of the training. For these reasons, the proposed JLOTS training would not exacerbate conditions during flood events or affect the capacity of the floodplains to carry flood flows. Thus, there would be no impacts on floodplains.

3.5.2.2.3 Summary

Because the No Action Alternative represents a continuation of the existing level and intensity of annual JLOTS training at JEB Little Creek-Fort Story, its impacts on water resources, described above, are ongoing and reflected in existing conditions within the study area. The activities associated with the No Action Alternative are considered in the Virginia Department of Environmental Quality's 2012 305(b)/303(d) Water Quality Assessment Integrated Report. No additional impacts on dissolved oxygen, aquatic life, or shallow water submerged vegetation would be anticipated. The brine and fresh water produced from the Tactical Water Purification System would be discharged into the sanitary sewer system along with any grey water that is produced from the tent encampments. The Navy would discharge all water transported during the liquid transfer system events in accordance with the installation's National Pollutant Discharge Elimination System permit. Any accidental spills would be treated per established spill prevention, control, and contingency procedures. Prior to the construction of floating causeways and the duck ponds at Fort Story, permits required by Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, and a water quality certification required by Section 401 of the Clean Water Act would be obtained, ensuring that water quality standards are maintained. The anchors and duck ponds associated with the floating causeway FTX would cause localized turbidity but the sediments would quickly settle back in place. Wetlands and floodplains would not be impacted. Between each occurrence, there would be ample time for water quality to return to pre-training levels. Thus, the No Action Alternative would have no significant impacts on water resources at JEB Little Creek-Fort Story.

3.5.2.3 No Action Alternative – Camp Lejeune – Existing Environment

3.5.2.3.1 Surface Waters

Camp Lejeune is located within the White Oak River Basin. Figure 3.5-3 depicts surface waters in the southern portion of Camp Lejeune, which contains the areas potentially affected by the Proposed Action. Onslow Bay, the Atlantic Intracoastal Waterway, New River Inlet, Mile Hammock Bay, and Salliers Bay are all the main tidal bodies of waters present at the Camp Lejeune site. Salinity ranges from 30 practical salinity units (psu) at the mouth of New River to

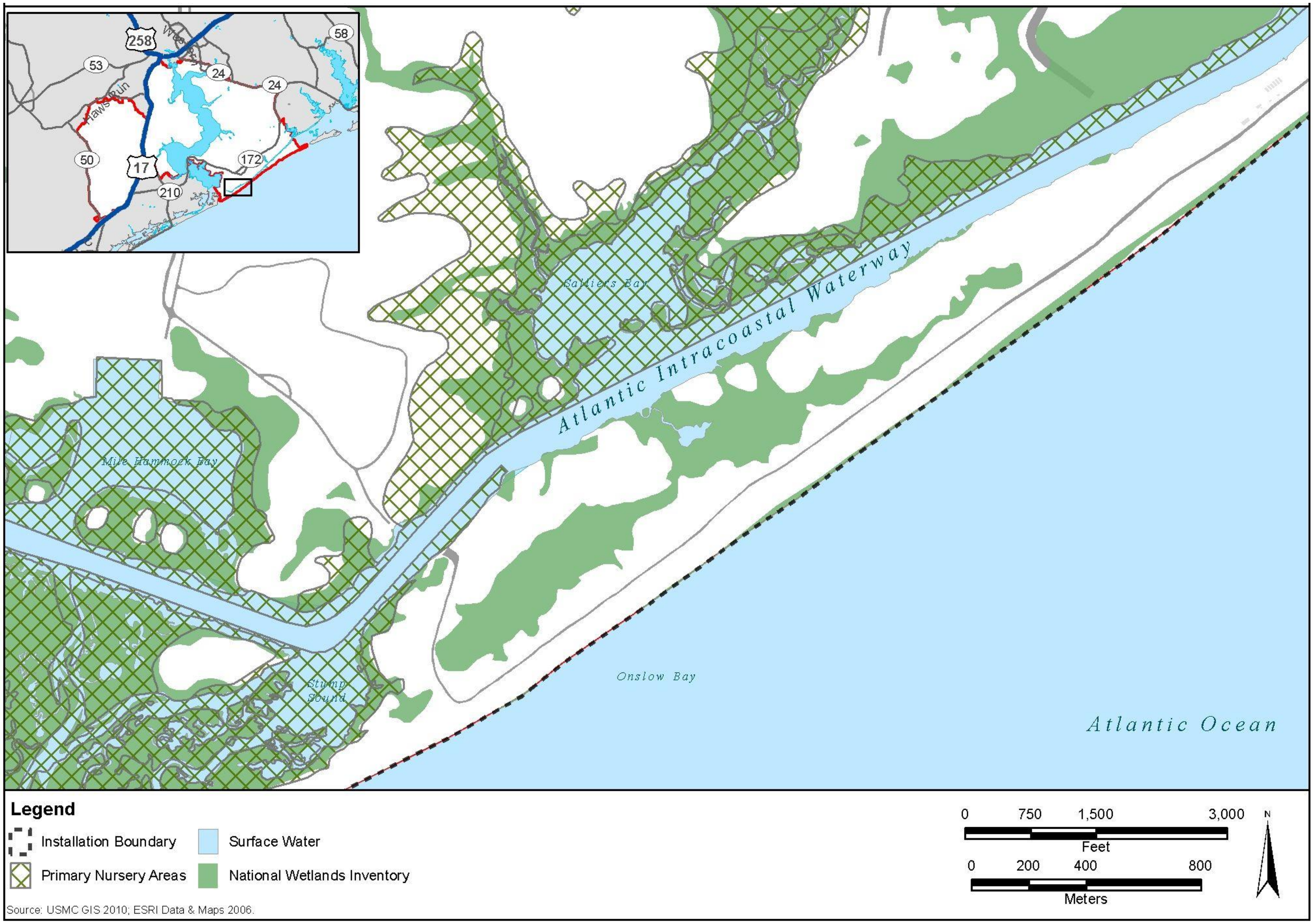
35 psu in Onslow Bay, with levels higher in fall and lower in spring (U.S. Marine Corps, Marine Corps Base Camp Lejeune, Environmental Management Division 2010; Deaton et al. 2010).

North Carolina has assigned water quality classifications to surface waters in the state (North Carolina Department of Environment and Natural Resources 2014). These designations indicate the intended uses of the water (such as swimming or fishing). Each has an associated set of water quality standards designed to protect those uses. Class C (fresh water) and SC tidal salt waters are suitable for aquatic life propagation and survival, fishing, wildlife, and secondary recreation. The intermediate rating for tidal salt waters is Class SB, waters suitable for primary recreation and other uses as specified by the SC classification. Class SA is the highest rating for tidal salt waters, designating waters intended for shellfish fishing for market purposes and the uses specified for SB and SC classifications.

In addition to these principal water quality classifications, the North Carolina Department of Environment and Natural Resources has applied supplemental classifications to describe other attributes of the water bodies (15A North Carolina Administrative Code 02B). The term “nutrient sensitive waters” identifies streams, creeks, and rivers that show decreased fish populations, decreased ambient dissolved oxygen, increased frequency of fish kills, and increased algae concentrations. “High quality waters” are waters rated as excellent based on biological or physical/chemical characteristics. “Outstanding resource waters” are unique and special waters of exceptional state or national recreational or ecological significance that require special protection to maintain existing uses.

Within the area potentially affected by the Proposed Action, Mile Hammock Bay, Salliers Bay, and the Atlantic Intracoastal Waterway are classified as SA (shell fishing for market purposes). Salliers Bay and the adjacent portion of the Atlantic Intracoastal Waterway do not meet the standards applicable to SA waters and are listed as impaired due to the presence of pathogens (U.S. Environmental Protection Agency 2010).

Figure 3.5-3: Water Resources at Camp Lejeune



The North Carolina Marine Fisheries Commission has further designated certain estuarine areas as "nursery areas" to protect the habitat for juvenile populations of economically important commercial fish species (15A North Carolina Administrative Code 3N). Nursery areas provide food, cover, suitable substrate, and appropriate salinity and temperature for young finfish and crustaceans over a major portion of their initial growing season. Primary nursery areas are located in the upper portions of creeks and bays. These areas are usually shallow with soft muddy bottoms and surrounded by marshes and wetlands. Low salinity and the abundance of food in these areas are ideal for young fish and shellfish. "Special secondary nursery areas" are located adjacent to "secondary nursery areas" but closer to the open waters of sounds and the oceans. These waters are closed to trawling the majority of the year, when juvenile species are abundant. Figure 3.5-3 identifies nursery areas within or near the training locations at Camp Lejeune.

3.5.2.3.2 Wetlands and Floodplains

There are approximately 41,853 acres (16,973 hectares) of palustrine wetlands at Camp Lejeune. Estuarine wetlands cover approximately 3,784 acres (1,531 hectares) and are found along the Atlantic Intracoastal Waterway and near the mouth of the New River, within the area potentially affected by the Proposed Action (Figure 3.5-3). Numerous interdunal estuarine, and palustrine wetlands are present behind the primary dunes along Onslow Beach. These wetlands are hydrologically separated from the beach by the dunes. Numerous estuarine and palustrine wetlands also are located along the shore of Mile Hammock Bay and between the bay and Tactical Landing Zone Bluebird.

Floodplains and flood hazard zones are generally present throughout Camp Lejeune near the New River and its creeks and estuaries, and near the Atlantic Intracoastal Waterway and Onslow Bay (North Carolina Floodplain Mapping Program 2012).

3.5.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

3.5.2.4.1 Surface Waters

Impacts of In-Water Activities

The proposed in-water training activities under the No Action Alternative at Camp Lejeune would take place in the waters of the Atlantic Ocean off Onslow Beach (Onslow Bay) and in Mile Hammock Bay. Movements of boats and equipment would also take place between Onslow Beach and Mile Hammock Bay via the New River Inlet. Amphibious vehicles may cross the Atlantic Intracoastal Waterway.

All in-water operations would be conducted in accordance with Navy environmental instruction (OPNAVINST 5090.1D) and the spill prevention, control, and contingency procedures in place at Camp Lejeune. Bilge water would be disposed of as described in Section 3.5.2.2.1.

The Amphibious Bulk Liquid Transfer System would only be used with water and with equipment used only for the purpose of such simulated transfer. Therefore, there would be no risk of contamination of nearshore waters from use of the system one time a year during the full JLOTS event.

The anchoring of each floating causeway would cause localized increases in turbidity, as the anchor buries itself into the sea floor and displaces some of the sediments. The displaced sediment would settle back in place quickly. A similar disturbance would occur when the anchors are removed after the end of the events. Each time, these impacts would be localized and short-lived, likely lasting for a few hours only after anchor placement or removal.

In shallow, nearshore waters along Onslow Beach and in Mile Hammock Bay, the movements of the components of the Improved Navy Lighterage System and of other vessels, boats, and amphibious vehicles would disturb sandy bottom sediments, increasing the turbidity of the affected waters. The predominantly sandy sediment would quickly settle back into place. Lighter particles would remain suspended longer but would eventually settle. This churning effect would amount to a temporary intensification of what occurs naturally along the shore as a result of wave and tide action. The impacts from vehicles or equipment crossing the Atlantic Intracoastal Waterway would be minimized by using only existing splash points. Between each annual occurrence, there would be ample time for turbidity to subside and the area to return to pre-training conditions.

Some of the impacts described above could affect waters that are designated Primary Nursery Areas in Mile Hammock Bay and adjacent areas, including most of the New River Inlet and the wetlands just north of the Intracoastal Waterway (Figure 3.5-3). However, the proposed in-water activities in those areas would mostly take place within the bulkheaded, previously-disturbed northern tip of Mile Hammock Bay. The movement of vessels and floating structures in the waters to the south of the bulkheaded area and through the New River Inlet would be along established channels. Thus, the risk of impact on Primary Nursery Area waters would be minimal. None of the activities associated with the No Action Alternative would increase the amount of pathogens in Salliers Bay and the adjacent portion of the Atlantic Intracoastal Waterway which are listed as impaired. As a result, the No Action Alternative would not significantly impact water quality.

Impacts of Shoreline and Inland Activities

Similar to JEB Little Creek-Fort Story, the potential for shoreline and inland activities to affect surface waters at Camp Lejeune is minimal. All annual events would be conducted in designated training areas located well away from any inland bodies of fresh water. All generators and fuel storage tanks would have spill containment units to capture any incidental leaks and spills. Drip pans and containment pads would be used during all vehicle maintenance operations. All petroleum and hazardous materials would be transported and stored in accordance with applicable federal and state laws and regulations. As a result, petroleum and hazardous materials are not anticipated to encounter water bodies or result in impacts on water quality.

The excavation of the duck ponds used to anchor the floating causeways to Onslow Beach may result in some sandy materials washing into the adjacent waters, but no significant erosion is anticipated. Increased water turbidity from this activity would be localized, and short-lived.

Disposal of the water used for the proposed liquid transfer event would be either through direct discharge into the ocean or discharge to an existing dredge spoil dewatering site at Camp Lejeune. As previously noted, since the equipment used for liquid transfer would be training equipment that has never been used with actual fuel, the water would not be contaminated. Therefore the only potential impact of discharging the water directly into the ocean would be to create a temporary area of lower salinity at the discharge site. However, it can be anticipated that this fresh water plume would quickly dissipate and create no significant risk for marine life. The risk could be decreased further by discharging the water as far offshore as possible or discharging it in several smaller amounts at different locations. All discharges would be conducted in compliance with Clean Water Act permits and in coordination with the North Carolina Department of Environment and Natural Resources, as appropriate. If the water is disposed of at an existing dredge spoil dewatering site, there would be no impact on surface waters.

The Tactical Water Purification System would be used in accordance with Camp Lejeune's Environmental Standard Operating Procedures for this exercise. If no chlorine has been added, disposal of the water produced by the system would be by direct discharge into Mile Hammock Bay in accordance with Clean Water Act permits and coordination with the North Carolina Department of Environment and Natural Resources, as appropriate, or by infiltration at Tactical Landing Zone Bluebird. Chlorinated water and brine would be disposed through the base's wastewater treatment system. Discharges would be sufficiently spaced in time to allow for the water to be fully absorbed by the environment before the next exercise. Thus, impacts on water quality would be minimal.

During the annual full JLOTS training event the encampment sites would generate grey water from showering and laundry facilities. Percolation pits may be constructed for training purposes and used to dispose of the grey water. Grey water not disposed of in this manner would be collected, stored, and transported by tanker trucks to suitable disposal facilities. Portable toilets would be used and solid waste would be transported offsite for proper disposal in accordance with Camp Lejeune's waste collection procedures. Tent encampments would not be constructed in areas with direct access to surface waters. As a result, there would be no impact on surface waters from tent encampment events.

During cargo movement events most vehicles would be on paved roads. However, some vehicles transit over the beach during Improved Navy Lighterage System events. The Navy actively prevents petroleum products from spilling on the beach, and Camp Lejeune has spill prevention, control, and contingency procedures in place in the instance an accidental spill occurs. As a result, petroleum products are not anticipated to encounter water bodies or result in impacts on water quality.

3.5.2.4.2 Wetlands and Floodplains

No filling of wetlands would take place under the No Action Alternative at Camp Lejeune. Thus, there would be no direct impacts on wetlands.

The risk of indirect impacts would be minimal. All vehicle movements on land during training events would be via existing trails or roads. The cargo marshalling and encampment areas that would be set up for the full JLOTS event would not be within wetlands. The movement of vessels and amphibious vehicles may create small wakes in the water that could cause minor contributions to shoreline erosion, including the erosion of the shoreward fringe of wetlands along the New River Inlet and the shore of Mile Hammock Bay. However, most in-water activities would take place off Onslow Beach and in the bulkheaded part of Mile Hammock Bay. Activities outside these areas would not be enough to significantly erode shoreline wetlands, even during a full JLOTS training event.

As at the other training locations, many of the proposed activities at Camp Lejeune would, by necessity, take place within the 100-year and 500-year floodplains. As described in Section 3.5.2.2.2, there would be no impacts on floodplains.

3.5.2.4.3 Summary

Because the No Action Alternative represents a continuation of the existing level and intensity of annual JLOTS training at Camp Lejeune, its impacts on water resources, described above, are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. They would only occur one time per year and would remain temporary and localized, with sufficient time between annual training events for the affected areas to return to pre-training conditions. Between each occurrence, there would be ample time for water quality to return to pre-training levels. Prior to the floating causeway FTX, permits in accordance with Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, and a water quality certification required by Section 401 of the Clean Water Act would be obtained, ensuring that water quality standards are maintained. Thus, the No Action Alternative would have no significant impacts on water resources at Camp Lejeune.

3.5.2.5 No Action Alternative – Conclusion

The No Action Alternative represents a continuation of the existing level and intensity of annual JLOTS training at both JEB Little Creek-Fort Story and Camp Lejeune. For this reason, the impacts of this ongoing training on water resources, described above, are reflected in existing conditions within the study area. Impacts would not increase under the No Action Alternative. Between each occurrence of training at each site, the potentially affected areas would be allowed to return to pre-training conditions. Prior to the construction of floating causeways, permits under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act would be obtained along with Section 401 water quality certifications, ensuring that water quality standards are maintained. The No Action Alternative would have no significant impacts on water resources at either JEB Little Creek-Fort Story or at Camp Lejeune.

3.5.3 Action Alternative

3.5.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

Existing water resources potentially affected by the Action Alternative at JEB Little Creek-Fort Story are described in Section 3.5.2.1.

3.5.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

The Action Alternative would include the same annual training activities as the No Action Alternative at JEB Little Creek-Fort Story plus the floating causeways (at Little Creek) and the

ELCAS (M). Therefore, the impacts of the Action Alternative on water resources would include those of the No Action Alternative at JEB Little Creek-Fort Story plus the impacts associated with the floating causeways (at Little Creek) and the ELCAS (M).

3.5.3.2.1 Surface Waters and Chesapeake Bay

Impacts of In-Water Activities

The control and disposal procedures described in Section 3.5.2.2.1 under the No Action Alternative would be applied during the ELCAS (M) and floating causeway FTXs.

In the early stages of a full JLOTS event, pile driving during the ELCAS (M) FTX would displace sediments and cause minor additional turbidity. Pile driving would occur for approximately 20 days during pile installation. At the end of the full JLOTS event, the piles would be removed over approximately 10 days. The additional impacts on waters of the Chesapeake Bay as a result of the ELCAS (M) FTX would be limited in duration, extent, and intensity. Larger sand particles would settle back quickly after the piles have been secured, and smaller particles would remain suspended in the water column slightly longer but would eventually settle as well. The additional turbidity would cease quickly after the end of construction or removal operations.

The floating causeway FTX at Little Creek would also cause some additional turbidity from excavation of the duck ponds and placement and removal of anchors. These additional impacts would be temporary and localized, likely lasting for a few minutes after anchor placement or removal, to a few hours after excavation of the duck ponds is complete.

Dissolved oxygen levels would not be significantly impacted as a result of the ELCAS (M) pile installation and removal. For turbidity to affect dissolved oxygen, suspended particles need remain close enough to the surface to absorb heat. The extra heat absorbed by these particles will, in turn, raise the temperature of the water and decrease dissolved oxygen levels. But as discussed previously, any additional disturbed-sediment is expected to settle quickly. The effects of the ELCAS (M) activities would be too short-lived to cause this effect.

Further, ELCAS (M) would be constructed in an area where there is constant wave action resulting in an ever-present natural turbidity. Though ELCAS (M) and other activities (anchoring the floating causeways, vessel movement, etc.) would generate some additional turbidity, the increase in turbidity would cause a negligible impact on dissolved oxygen in the already-turbid environment. Finally, the installation and removal of the ELCAS (M) would occur over relatively short periods of time. The temporary increases in turbidity associated with ELCAS (M) or the floating causeways would not significantly alter temperature or dissolved oxygen levels in the surrounding waters.

Impacts of Shoreline and Inland Activities

Relative to the No Action Alternative, the floating causeways (at Little Creek) and ELCAS (M) FTXs would require additional shoreline modifications to connect those structures to the shore. As explained in Section 3.5.2.2.1, while some sandy materials may wash into the adjacent waters during the excavation, no significant erosion is anticipated as the excavated material would be stored above the high-water line and reused to fill in the trench at the end of the training event. The additional contribution of these activities to increased water turbidity in comparison to the No Action Alternative would be minimal.

3.5.3.2.2 Wetlands and Floodplains

Impacts on wetlands and floodplains would be as described for the No Action Alternative in Section 3.5.2.2.2. Pile driving for the ELCAS (M) FTX does not constitute filling under Section 404 of the Clean Water Act.

3.5.3.2.3 Summary

The impacts of the Action Alternative on water resources would be similar to those of the No Action Alternative at JEB Little Creek-Fort Story. Impacts would remain localized and temporary. The slight increase in the intensity of impacts from the addition of the floating causeways and ELCAS (M) FTXs would be minor, and conditions are expected to return to pre-training levels between events. Prior to the floating causeway FTX, Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act permits would be obtained along with a Section 401 water quality certification, ensuring that water quality standards are maintained. Thus, the Action Alternative would have no significant impacts on water resources at JEB Little Creek-Fort Story.

3.5.3.3 Action Alternative – Camp Lejeune – Existing Environment

Existing water resources potentially affected by the Action Alternative at Camp Lejeune are described in Section 3.5.2.3.

3.5.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

The Action Alternative would include the same annual training activities as the No Action Alternative at Camp Lejeune, plus the ELCAS (M) FTX. Therefore, the impacts of the Action Alternative on water resources would include those of the No Action Alternative at Camp Lejeune plus the impacts associated with the ELCAS (M).

3.5.3.4.1 Surface Waters

Impacts on water quality under the Action Alternative would be similar to those described above for JEB Little Creek-Fort Story (Section 3.5.3.2.1). Under the Action Alternative at Camp Lejeune, the ELCAS (M) would be constructed off Onslow Beach. In the early stages of the proposed full JLOTS event, the ELCAS (M) pile driving would displace sediments and cause additional turbidity relative to the No Action Alternative. Pile driving would occur for approximately 20 days during pile installation. At the end of the full JLOTS event, the piles would be removed over a period of approximately 10 days. The additional impacts on waters in Onslow Bay as a result of the ELCAS (M) FTX would be limited in duration and intensity. Larger sediment particles would settle back quickly after the piles have been secured, and smaller particles would remain suspended in the water column slightly longer but would eventually settle as well. The additional turbidity would cease quickly after the end of construction or removal operations. Due to the short duration of pile driving activities, turbidity would not be expected to significantly impact water quality.

3.5.3.4.2 Wetlands and Floodplains

Impacts on wetlands and floodplains would be as described under the No Action Alternative. These impacts are described in Section 3.5.2.4.2. Pile driving for the ELCAS (M) FTX does not constitute filling under Section 404 of the Clean Water Act.

3.5.3.4.3 Summary

The impacts of the Action Alternative on water resources would be similar to those of the No Action Alternative at Camp Lejeune. The slight increase in their intensity from the addition of the ELCAS (M) FTX would be minor, and conditions are expected to return to pre-training levels between events. Thus, the Action Alternative would have no significant impacts on water resources at Camp Lejeune.

3.5.3.5 Action Alternative – Conclusion

Water resources would not be significantly impacted at either location under the Action Alternative. Sediment suspended in the water column during the floating causeways (at Little Creek) and ELCAS (M) FTXs would quickly resettle. Average dissolved oxygen levels are expected to remain the same. Prior to the construction of the floating causeways and duck ponds at Little Creek, permits required by Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, and a Section 401 water quality certification would be obtained, ensuring that water quality standards are maintained. Therefore, the Action Alternative would have no significant impact on water resources at JEB Little Creek-Fort Story or Camp Lejeune.

3.6 Bathymetry, Sediments, Topography, and Soils

3.6.1 Introduction

For each alternative, this section addresses the impacts of the Proposed Action on the bathymetry and sediments of the underwater environment and the topography and soils of the terrestrial environment.

3.6.2 No Action Alternative

3.6.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

3.6.2.1.1 Bathymetry and Sediments

Little Creek is located along the southern shore of the Chesapeake Bay, the largest estuary in the United States, with an area of approximately 4,440 square miles (11,500 square kilometers) (Lippson and Lippson 2006; U.S. Department of the Navy 2009a). Along Little Creek's northern shoreline, the Chesapeake Bay's floor slopes gently away from Anzio Beach. As a result, waters off Anzio Beach are shallow, ranging from 1 to 3 feet (0.3 to 1 meter) in depth. Approximately 600 feet (183 meters) from the shore, the bottom drops suddenly to a depth of about 15 feet (5 meters). Beyond this break, the gradual slope resumes to the extent that waters 4,000 feet (1,219 meters) offshore reach depths of between 24 and 26 feet (7.3 and 8 meters) (U.S. Department of Commerce 2011a). Measurements from depth soundings off Little Creek are generally consistent in both north-south and east-west directions, indicating a relatively smooth floor with few protrusions or obstructions. Fort Story is located about 8 miles (13 kilometers) east of Little Creek and occupies a similar position along the southern shore of the Chesapeake Bay. Nearshore depths along Fort Story's beaches are around 5 feet (1.5 meters). Depth reaches 20 feet (6.1 meters) within 500 feet (152 meters) of the shore. Beyond that distance, offshore depths generally range between 43 and 51 feet (13 and 16 meters). Waters off the installation become shallower moving east to west from the ocean into the bay (U.S. Department of Commerce 2011a).

Little Creek is located less than 10 miles (16 kilometers) west of the Chesapeake Bay's confluence with the Atlantic Ocean. Sediments offshore of the installation are composed largely of sand from the ocean and shoreline erosion. It is likely that eroded materials from upland land surfaces and the banks and channels of stream corridors also contribute to sediments in the lower portion of the Chesapeake Bay near Little Creek. The nearshore sediment conditions at Fort Story are similar to those found at Little Creek because of the geographic proximity of the two sites. However, sediments off Fort Story may be composed of a larger proportion of sand because of the greater intensity of wave action at the confluence of the Chesapeake Bay and Atlantic Ocean.

Little Creek Cove, one of Little Creek's two inshore berthing areas, and the navigation channel connecting it to the Chesapeake Bay, are deeper than the waters immediately off Anzio Beach. The navigation channel is maintained at 22 feet (7 meters) while depth soundings of Little Creek Cove range from 15 to 25 feet (5 to 8 meters) (U.S. Department of Commerce 2011b).

3.6.2.1.2 Topography and Soils

JEB Little Creek-Fort Story and much of the surrounding Tidewater area are located in the lowland sub-province of Virginia's Coastal Plain. Elevations range from mean sea level along the beaches and tidal marshes to approximately 85 feet (26 meters) above mean sea level in the inland and developed areas.

Elevations at Anzio, Omaha, and Utah Beaches increase gradually from sea level moving inland toward the dune line. Dune height along the beach is variable, but reaches 30 feet (9 meters) in some places. The dune line is broken in a number of locations by cleared, relatively level paths that facilitate access to and from the beach by personnel and vehicles.

As mapped by the Natural Resources Conservation Service, 19 soil varieties occur on Little Creek (U.S. Department of the Navy 2010). Beach soils with 0 to 10 percent slopes are found on Anzio, Omaha, and Utah Beaches. Such soils are typically found on long, narrow areas adjacent to the Chesapeake Bay and consist mostly of sandy material deposited by wave action and flooded daily by tides (U.S. Department of the Navy 2010). The dunes along these beaches are composed of Newhan fine sand, 2 to 30 percent slopes, a deep, undulating-to-steep soil typically found on grass- and shrub-covered high sand dunes in coastal areas. The soil has low fertility, very low available water, very rapid permeability, and slow surface runoff. Beach soils are considered hydric below the high tide line while Newhan fine sand soils have hydric inclusions. Both soil types are subject to erosion through wind and wave action (U.S. Department of the Navy 2010).

The Mudflats area is slightly above sea level and generally flat, with the exception of a slight downward slope near the water's edge along Little Creek Cove. Rodriguez Field, directly across Helicopter Road from Mudflats, is entirely flat. Soils at Mudflats and Rodriguez Field consist of Udorthents, loamy, 0 to 25 percent slopes. This type of soil consists of deep soil materials altered by excavation or covered by earthy fill found mostly in and near urban areas and canals (U.S. Department of the Navy 2010). Available water and permeability are variable, with rapid surface runoff. The soil is moderately well drained and is subject to severe erosion when present on steep, unvegetated slopes. This soil is not considered hydric, although it does have hydric inclusions.

Soils at Amphibious Field and Iwo Jima Field consist of nearly equal parts State loam, 0 to 2 percent slopes, and Urban Land, 0 to 2 percent slopes, with a small percentage of Udorthents, loamy, 0 to 25 percent slopes. State loam, 0 to 2 percent slopes is a deep, nearly level soil typically found on broad inland ridges and side slopes. This soil has low fertility, moderate available water, moderate permeability, and slow surface runoff. It is well drained and has only a slight potential for erosion. It is not considered hydric. A major component of Urban Land soil at Amphibious Field and Iwo Jima Field is Acredale, 0 to 2 percent slopes. It is a poorly drained soil that meets hydric criteria. The erosion hazard is slight (U.S. Department of Agriculture 2012).

The topography of the Vung Tau Driving Range, Forklift Training Area, and Thomas Nelson Circle is flat. The soils underlying all three areas consist of Psamments, 0 to 25 percent slopes. This soil is typically found on fills and the parent material consists of sandy alluvium. The soil is moderately well drained and is not flooded or ponded. Psamments soils are not considered hydric.

3.6.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

3.6.2.2.1 Bathymetry and Sediments

Impacts of In-Water Activities

In shallow, nearshore waters along Anzio, Omaha, and Utah Beaches, the movements of the various components of the Improved Navy Lighterage System and of other vessels and amphibious vehicles would disturb sandy bottom sediments. The mostly sandy substrate would quickly settle back in place. The greatest effect from vessel and craft movements would occur during a full JLOTS event due to the duration and intensity of the proposed activities. Localized and temporary alterations of the nearshore bathymetry may occur in places where landing craft would offload, possibly creating small depressions and ridges. Anchoring of the floating causeways at Fort Story would also disturb bottom sediments. A similar disturbance would occur when the anchors are removed at the end of the events. Each time, these impacts would be localized and short-lived, likely lasting for a few minutes after anchor placement or removal. The churning effect resulting from vessel movements would amount to a temporary intensification of what occurs naturally along the shore as a result of wave action, tides, and weather events, with no long-term consequences. After the end of the in-water activities, natural processes would quickly return the seafloor to pre-training conditions.

Impacts of Shoreline and Inland Activities

During cargo movement (either a full JLOTS or unit-level events) some vehicles would be present on the beach to assist in the movement of cargo from the Improved Navy Lighterage System to terrestrial locations. During a full JLOTS event and the quarterly unit-level events, these vehicles may move cargo from the shoreline to the tent encampment areas. During the routine unit-level events, the vehicles (usually four or less) would likely drive onto the beach and remain in place (not driving back and forth to the shoreline since cargo is not usually transferred during these events). Though these vehicles would not be expected to enter the water during a full JLOTS event or the unit-level events, and roll-out mats would be placed on the sand to assist the wheeled vehicles in transit, sediment from the vehicle movement and the placement of the roll-out mats could enter the water column adding to the turbidity. This impact would be negligible because so few vehicles will be utilized. Only a small amount of sediment is expected to enter the water column. Furthermore, the shoreline of Anzio Beach has natural tidal flow and wave action that makes this area prone to turbid conditions. Any suspended sediments would settle quickly and bathymetry would not be impacted.

3.6.2.2.2 Topography and Soils

Impacts of In-Water Activities

In-water activities would not affect soils and topography at JEB Little Creek-Fort Story.

Impacts of Shoreline and Inland Activities

On Anzio, Omaha, and Utah Beaches, roll-out mats would be used to facilitate the operation of wheeled vehicles; track vehicles would operate directly on the sand during cargo movement events. This would result in some compaction of the underlying sand, as would the storage of materiel and equipment in the marshalling area and the beach encampments. The effect will be greater during the full JLOTS events. Vehicle and personnel movements from the beach to inland areas would be through existing paths and dune breaks; dunes would not be affected. Inland, all movements would be on existing roads, with no impacts on soils. Shorter unit-level cargo transfer events, the placement of the beach interface unit of the Amphibious Bulk Liquid Transfer System, and Tactical Water Purification System would also result in some compaction on the beach at different times. After the conclusion of each training event, wind, rain, wave and tide action would return the affected portions of the beach to conditions similar to their pre-training conditions. Anzio Beach is designated, and routinely used, for these types of training activities.

Excavation of duck ponds in the intertidal zone on Utah or Omaha Beach to stabilize the floating causeways would potentially affect bathymetry and sediments under the No Action Alternative. About 12,000 cubic feet (340 cubic meters) of sandy material would be excavated to construct the duck ponds. During their excavation and filling, small amounts of material may enter the water column and settle on the seafloor some distance from the shore. However, very little material would be displaced in this manner and this impact would be negligible compared to the natural churning and stirring of nearshore bottom materials from factors such as wave action, tide, or weather events. At the end of each event, the floating causeways would be disassembled, the excavated material would be used to backfill the duck ponds, and the beach would be restored to its pre-existing grade. No significant changes in bathymetry or sediments would occur.

The set up and use of tent encampments would cause some minor ground disturbance, including the excavation of percolation pits for training purposes. Standard best management practices, such as erosion barriers and sediment traps, would be used to minimize erosion during the excavation and use of the pits. At the end of training, these pits would be filled using the excavated material. During the routine unit-level tent encampment events, only administrative tents would be erected. Percolation pits would not be excavated during these events; thus, no additional ground disturbance from these events would occur.

Federal agencies conducting regulated land disturbing activities on private and public lands in Virginia must comply with the Virginia Erosion and Sediment Control Law and Regulations, Virginia Stormwater Management Law and Regulations, and other applicable federal nonpoint source pollution mandates. If an activity would disturb one acre or more of land, it is subject to the requirements of the Stormwater Management Law and Regulations. It is not anticipated that any JLOTS activities would be of the nature to require permits. However, the Navy would review the applicability of permit requirements before each training event and obtain any required permits.

3.6.2.2.3 Summary

Because the No Action Alternative represents a continuation of the existing level and intensity of JLOTS training at JEB Little Creek-Fort Story, its impacts on bathymetry, sediments, topography, and soils, described above, are ongoing and reflected in existing conditions within the study area. As explained, these impacts would occur throughout the year, but each time they would be temporary, localized, and easily absorbed by the dynamic marine and shoreline environment. Activities would not increase under the No Action Alternative. Therefore, the No Action Alternative would not have a significant impact on bathymetry, sediments, topography, and soils at JEB Little Creek-Fort Story.

3.6.2.3 No Action Alternative – Camp Lejeune – Existing Environment

3.6.2.3.1 Bathymetry and Sediments

Camp Lejeune is located along North Carolina's southeastern Atlantic coastline adjacent to Onslow Bay, approximately midway between Cape Lookout (to the north) and Cape Fear (to the south). Ocean depths within about 1 mile (1.6 kilometers) of Onslow Beach range from less than 1 foot (0.3 meter) to approximately 33 feet (10 meters) (U.S. Department of the Navy 2009b). Bottom sediments immediately offshore consist primarily of sand and silt (U.S. Department of the Navy 2003). This material has been deposited largely as a result of the erosive effect of persistent wave action against the Atlantic shoreline as well as some limited discharge of eroded inshore sediments through the coastal inlets of inland water bodies (U.S. Department of the Navy 2003).

The depth of the Atlantic Intracoastal Waterway, from the vicinity of the vehicle splash point on Onslow Beach to Mile Hammock Bay, ranges from about 10 to about 14 feet (3 to 4.3 meters). Much of the New River Inlet ranges in depth from 15 to 20 feet (5 to 6.1 meters), although the middle portion of the inlet is less than 5 feet deep in some places (U.S. Army Corps of Engineers 2011, 2012).

Bottom sediments in the Atlantic Intracoastal Waterway are composed of sand and silt weathered from older carbonate rocks and terrigenous sediments eroded from surrounding land (U.S. Marine Corps 2009). The subaqueous bottoms of the lower New River and New River Inlet are characterized as tidal flats composed of mud or fine sand (U.S. Department of the Navy 2003). It is likely these materials primarily originate from inland terrestrial erosion and runoff as well as influxes of coastal sands eroded and transported through ocean waves and currents.

3.6.2.3.2 Topography and Soils

Between the surf zone and the dune line, Onslow Beach is approximately 100 feet wide and very flat until reaching the seaward side of the dunes. The dunes rise steeply and range in height from a few feet to 15 feet (5 meters) or more; they reach their crest at or near the edge of their seaward faces before sloping gently inland. Inland areas of Onslow Beach between the dunes and the Atlantic Intracoastal Waterway are generally flat. Multiple wide, flat breaks in the dune line facilitate beach access by personnel and vehicles.

The soils on Onslow Beach along the shoreline primarily consist of the Newhan-Corolla-Urban land complex, 0 to 30 percent slopes. The Corolla component of the Newhan-Corolla-Urban land complex is typically found in troughs on barrier islands and coastal plains. Slopes are 0 to 2 percent and the parent material consists of aeolian sands or beach sand. The component is moderately well drained and shrink-swell potential is low. The Corolla component is rarely flooded, is not ponded, and does not meet hydric criteria. Slopes of the Newhan component range from 0 to 30 percent. This component is usually found on barrier islands, urban land, and dunes. The parent material consists of aeolian sands or beach sand, and the natural drainage class is excessively drained. The Newhan component's shrink-swell potential is low, it is rarely flooded, and it is not ponded. The component does not meet hydric criteria.

Soils between the dunes and the Atlantic Intracoastal Waterway consist of Newhan fine sand, dredged, 2 to 10 percent slopes. The Newhan component is typically found on dune slacks, barrier islands, and dunes, and its parent material consists of sandy dredge spoils. The natural drainage class is excessively drained. This soil is rarely flooded, is not ponded, and is not considered hydric.

Within the boundaries of Camp Lejeune, land to either side of the New River rises steeply from the river's banks then alternates between broad, level flatlands and gently rolling terrain. Elevations east of the river range from 25 to 45 feet (8 to 14 meters) while elevations vary between 39 and 69 feet (12 and 21 meters) west of the river.

Inshore areas around the bulkheaded shoreline and concrete boat ramp on the north side of Mile Hammock Bay are generally flat. Soils in this area consist primarily of Urban and Bohicket silty clay loam, 0 to 1 percent slopes. Urban soils are found adjacent to the bulkheaded shoreline and concrete boat ramp, and tend to be highly compacted. Bohicket soils are considered hydric and are commonly found in estuaries and tidal marshes. The soil's parent material consists of silty and clayey fluvio-marine deposits. It is very poorly drained, frequently flooded and ponded.

Tactical Landing Zone Bluebird is completely flat and is underlain by Wando fine sand, 1 to 6 percent slopes. Wando soils are generally found on ridges on marine terraces and coastal plains, and its parent material consists of aeolian sands or beach sand. The soil's natural drainage class is well drained. Wando soils are neither flooded nor ponded and do not meet hydric criteria.

3.6.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

3.6.2.4.1 Bathymetry and Sediments

Impacts of In-Water Activities

In shallow, nearshore waters along Onslow Beach and in Mile Hammock Bay, the movements of the various components of the Improved Navy Lighterage System and of other vessels and amphibious vehicles would disturb sandy bottom sediments. The mostly sandy substrate along Onslow Beach would quickly settle back in place. Lighter sediments in Mile Hammock Bay may remain suspended longer before settling. In either case, this churning effect would amount to a temporary intensification of what occurs naturally along the shore as a result of wave action, tides, and weather events, with no long-term consequences. During a full JLOTS event, localized and temporary alterations of the nearshore bathymetry may occur in places along Onslow Beach where landing craft would offload, possibly creating small depressions and ridges. Additionally, vessel movement could increase turbidity in the water column. The predominantly sandy sediment would quickly settle back into place resulting in little impact on the surrounding environment. After the end of the in-water activities, however, natural processes would quickly return the seafloor to a condition similar to its pre-training condition. There would be ample time between annual occurrences for this restoration process to take place. In Mile Hammock Bay, landing craft would use the existing concrete landing ramp, with no potential effects on bathymetry.

Potential impacts from amphibious vehicles crossing the Atlantic Intracoastal Waterway would be minimized by using existing splash points or the Onslow Beach road bridge. Splash points are areas that have been established for amphibious vehicles to enter or leave the water in order to minimize the potential erosion of stream banks.

The anchoring of each floating causeway would also disturb bottom sediments. Increases in turbidity could occur as the anchors are placed on the seafloor, displacing some of the sediment. Similar disturbances would occur when the anchors are removed at the end of the events. Each time, these impacts would be localized and short-lived, likely lasting for a few hours only after anchor placement or removal. These impacts would be much shorter and more localized than those caused by the movement of craft and vessels described in the previous paragraphs.

Impacts of Shoreline and Inland Activities

The excavation of duck ponds in the intertidal zone on Onslow Beach or Mile Hammock Bay to stabilize the floating causeways has the potential to affect bathymetry and sediments under the No Action Alternative. About 12,000 cubic feet (340 cubic meters) of sandy material would be excavated. During the excavation and filling of the duck ponds, a small amount of material may enter the water column and settle on the seafloor some distance from the shore. However, very little material would be displaced in this manner and this impact would be negligible compared to the churning and stirring of nearshore bottom materials from natural factors such as wave action, tide, or weather events. At the end of the training event, the floating causeways would be disassembled, the excavated material would be used to backfill the duck ponds, and each impact area would be restored to its pre-existing grade. No significant changes in bathymetry or sediments would occur.

During cargo movement, some vehicles would be present on the beach to assist in the movement of cargo from the Improved Navy Lighterage System to terrestrial locations. During a full JLOTS event, these vehicles may move cargo from the shoreline to the tent encampment areas. Though these vehicles would not be expected to enter the water and roll-out mats would be placed on the sand to assist the wheeled vehicles in transit, the vehicle movement and the placement of the roll-out mats themselves could cause sediment to enter the water column, adding to the turbidity. This impact would be negligible due to the few vehicles utilized and the small amount of sediment that may enter the water column. Furthermore, the shorelines of Onslow Beach and Mile Hammock Bay each have natural tidal flow and wave action that leave the areas prone to turbid conditions. The sediments would settle back in place quickly and bathymetry would not be impacted.

3.6.2.4.2 Topography and Soils

Impacts of In-Water Activities

In-water activities would not affect soils and topography at Camp Lejeune.

Impacts of Shoreline and Inland Activities

As noted above, anchoring of the floating causeways to Onslow Beach and Mile Hammock Bay would require excavations in the intertidal zone. About 12,000 cubic feet (340 cubic meters) would be excavated for each structure. Each time, the excavated material would be stockpiled on the beach above the mean high water mark for the duration of the exercise. At the end of training, the temporary piers would be disassembled and the excavated material would be used to backfill the duck ponds. Each excavated area would be restored to its pre-existing grade. As noted above, any loss of material during excavation and backfilling would be negligible. Thus, no significant loss of sand or changes in elevation would occur.

Roll-out mats would be used to facilitate the operation of wheeled vehicles on Onslow Beach and land adjacent to Mile Hammock Bay; track vehicles would operate directly on the sand. This would result in some compaction of the underlying sand, as would the storage of materiel and equipment in the marshalling area and the beach encampments during the full JLOTS events. The placement of the beach interface unit of the Amphibious Bulk Liquid Transfer System and the conduct of the Tactical Water Purification System events would also result in some compaction of soil on Onslow Beach at various times during the year. After training activities end, wind, rain, wave, and tide action would return the affected areas to their pre-training condition. Onslow Beach and Mile Hammock Bay are designated, and routinely used, for these types of activities. They are expected to continue to easily recover after the end of each event.

All vehicle and personnel movements from the beach to inland areas would be through existing paths and dune breaks; dunes would not be affected. All inland movements would be on existing roads with no impacts on soils.

The establishment and use of the tent encampment at Tactical Landing Zone Bluebird would cause some minor ground disturbance, including the excavation of percolation pits for training purposes. Standard best management practices, such as erosion barriers and sediment traps, would be used to minimize erosion during the excavation and use of the pits. At the end of training, these pits would be filled using the excavated material. The use of this encampment area for several weeks during a full JLOTS event would also likely result in some soil compaction. Tactical Landing Zone Bluebird is designated, and routinely used, for this type of activity and is expected to easily recover after the end of each event. Activities on the shore of Mile Hammock Bay have no potential to affect soils or topography, as the affected areas are either paved or compacted and graveled.

Land-disturbing activities of one acre or more require the development of an erosion and sediment control plan approved by the North Carolina Department of Environment and Natural Resources, Division of Land Resources. It is not anticipated that any JLOTS activities would be of the nature to require permits. However, the Navy would review and comply with any applicable requirements before commencement of each training event.

3.6.2.4.3 Summary

Because the No Action Alternative represents a continuation of the existing type and intensity of JLOTS training at Camp Lejeune, its impacts on bathymetry, sediments, topography, and soils are ongoing and reflected in the current conditions in the study area. As explained, these impacts would occur on an annual basis, but each time they would be temporary, localized, and easily absorbed by the dynamic marine and shoreline environment. Activities would not increase under the No Action Alternative. Therefore, the No Action Alternative would not have a significant impact on bathymetry, sediments, topography, and soils at Camp Lejeune.

3.6.2.5 No Action Alternative – Conclusion

The No Action Alternative represents a continuation of the existing type and intensity of JLOTS training at both sites, JEB Little Creek-Fort Story and Camp Lejeune. The potential impacts on bathymetry, sediments, topography, and soils are described above and are reflected in the current conditions present in the study areas. Each time JLOTS training events occur, the impacts associated with those events are anticipated to be temporary, localized, and easily absorbed by the dynamic marine and shoreline environments. Therefore, the No Action Alternative would not have a significant impact on bathymetry, sediments, topography, and soils at either JEB Little Creek-Fort Story or Camp Lejeune.

3.6.3 Action Alternative

3.6.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

Existing bathymetry, sediments, topography, and soils potentially affected by the Action Alternative at JEB Little Creek-Fort Story are described in Section 3.6.2.1.

3.6.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

The Action Alternative would include the same annual training activities as the No Action Alternative at JEB Little Creek-Fort Story, plus the floating causeways (at Little Creek) and the ELCAS (M). Therefore, the impacts associated with the Action Alternative would be similar to those of the No Action Alternative at JEB Little Creek-Fort Story plus the impacts associated with the floating causeways and the ELCAS (M) FTXs.

3.6.3.2.1 Bathymetry and Sediments

Impacts of In-Water Activities

Additional sediment disturbance relative to the No Action Alternative would result from the ELCAS (M) pile driving and removal and, to a much smaller extent, anchoring of the floating causeways. Sediment particles would quickly settle after the piles have been secured. Larger particles would remain suspended in the water column longer but would eventually settle as well. Disturbance from the ELCAS (M) would only occur during construction (approximately 20 days) and removal (up to 10 days). Between occurrences of the ELCAS (M) construction, the seafloor would have ample time to return to pre-construction conditions. As a result, no significant impacts on bathymetry or sediments would be anticipated.

Anchoring of the floating causeways at Little Creek would also disturb bottom sediments, although the displaced sediment would settle back in place quickly. A similar disturbance would occur when the anchors are removed after the end of the events. These impacts would be temporary and highly localized. In Little Creek Cove, where sediments are less sandy than along Anzio Beach, particles may remain suspended longer before settling. However, sediments would still be anticipated to settle relatively quickly.

Impacts of Shoreline and Inland Activities

The impacts of shoreline and inland activities under the Action Alternative at JEB Little Creek-Fort Story would be the same as under the No Action Alternative plus the impacts associated with the floating causeways (at Little Creek) and ELCAS (M) FTXs. The excavation of duck ponds on Anzio Beach or Mudflats (for the floating causeways), and Omaha and Utah Beaches, would result in additional disturbance of the intertidal zone relative to the No Action Alternative. This would potentially increase the amount of material that may enter the water column and settle on the seafloor some distance from the shore. However, even with these additional excavations, very little material would be displaced in this manner and this impact would remain negligible compared to the churning and stirring of nearshore bottom materials from natural factors such as wave action, tide, or weather events. At the end of each training event, the temporary piers would be disassembled and the excavated material would be returned to its original location. Thus, no significant changes in bathymetry or sediments would occur.

3.6.3.2.2 Topography and Soils

Impacts of In-Water Activities

The in-water activities associated with the floating causeways (at Little Creek) and ELCAS (M) FTXs would not affect topography or soils at JEB Little Creek-Fort Story.

Impacts of Shoreline and Inland Activities

Under the Action Alternative at JEB Little Creek-Fort Story, the impacts of shoreline and inland activities would be the same as under the No Action Alternative plus the impacts associated with the floating causeways and ELCAS (M) FTXs. For the floating causeways and ELCAS (M), approximately 12,000 cubic feet (340 cubic meters) and 6,000 cubic feet (170 cubic meters) of beach material would be moved, respectively. Each time, the excavated material would be stockpiled on the beach above the mean high water mark for the duration of the exercise. At the end of training, the floating causeways and ELCAS (M) would be disassembled and the excavated material would be returned to its original location. Any loss of material during excavation and backfilling would be very small. Thus, no significant loss of sand or changes in elevation would occur because of these two additional structures relative to the No Action Alternative.

Construction and removal of the floating causeways and ELCAS (M) may result in slightly more movement of tracked and wheeled vehicles on the beach during construction than under the No

Action Alternative, but this incremental increase would not be such as to prevent the processes of wind, rain, wave, and tide action from returning the compacted portions of the beach to their pre-training condition, as would occur under the No Action Alternative. Because all vehicle and personnel movements from the beach to inland areas would be through existing paths, dune breaks, and existing roads, the incremental increase in vehicle movements would not be discernible.

Construction and use of the floating causeways and ELCAS (M) would have no impact on inland areas. The number of personnel involved in the proposed training events and activities at the encampment sites would be the same under the Action Alternative at JEB Little Creek-Fort Story as under the No Action Alternative.

3.6.3.2.3 Summary

The impacts of the Action Alternative on bathymetry, sediments, topography, and soils at JEB Little Creek-Fort Story would be similar to those of the No Action Alternative. Impacts would remain localized and temporary and the affected areas would return to conditions similar to pre-training conditions between events. Therefore, the Action Alternative would have no significant impacts on bathymetry, sediments, topography, and soils at JEB Little Creek-Fort Story.

3.6.3.3 Action Alternative – Camp Lejeune – Existing Environment

Existing bathymetry, sediments, topography, and soils potentially affected by the Action Alternative at Camp Lejeune are described in Section 3.6.2.3.

3.6.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

The Action Alternative would include the same annual training activities as the No Action Alternative at Camp Lejeune, plus the ELCAS (M) once a year as part of a full JLOTS event. Therefore, the impacts of the Action Alternative would be similar to those of the No Action Alternative at Camp Lejeune plus the impacts associated with the ELCAS (M) FTX.

Given the similarity of the affected environments, the incremental impacts of the ELCAS (M) on Onslow Beach under the Action Alternative at Camp Lejeune would be the same as those of the ELCAS (M) at JEB Little Creek-Fort Story, addressed in Section 3.6.3.2.

3.6.3.4.1 Summary

The impacts of the Action Alternative on bathymetry, sediments, topography, and soils at Camp Lejeune would be similar to those of the No Action Alternative. Impacts would remain localized and temporary, and the affected areas would return pre-training conditions between events. Therefore, the Action Alternative would have no significant impacts on bathymetry, sediments, topography, and soils at Camp Lejeune.

3.6.3.5 Action Alternative – Conclusion

Bathymetry, sediments, topography, and soils would be minimally impacted by the Action Alternative. The construction of the floating causeways (at Little Creek) and ELCAS (M) would create temporary impacts on the bathymetry and sediments in the immediate area; however excavated areas would be returned to pre-existing conditions, and no long-term consequences would occur. Therefore, the Action Alternative would have no significant adverse impacts on bathymetry, sediments, topography, and soils at JEB Little Creek-Fort Story or Camp Lejeune.

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3.7 Cultural Resources

3.7.1 Introduction

Cultural resources are found at the Fort Story and Camp Lejeune sites. The approach for the assessment of cultural resources includes defining the resources; presenting the regulatory requirements for the identification, evaluation, and treatment within the established jurisdictional parameters; and providing the method for impact analysis.

Cultural resources are generally defined as districts, landscapes, sites, structures, objects, and ethnographic resources, as well as other physical evidence of human activities that are considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources include archaeological resources, historic architectural resources, and traditional cultural properties related to precontact (prior to European contact) and post-contact periods.

Archaeological resources can have a surface component, a subsurface component, or both. Prehistoric resources are physical properties resulting from human activities predating written records. These can include village sites, temporary camps, lithic scatters, roasting pits, hearths, petroglyphs, and burial sites. Historic resources postdate the advent of written records in a region and can include building foundations, refuse scatters, wells, cisterns, and privies. Submerged cultural resources include shipwrecks and other submerged historical materials, such as sunken airplanes and other prehistoric cultural remains. Architectural resources are elements of the built environment consisting of standing buildings or structures from the historic period. These resources can include existing buildings, dams, bridges, lighthouses, and forts.

3.7.1.1 Identification, Evaluation, and Treatment of Cultural Resources

Procedures for the identification, evaluation, and treatment of cultural resources on terrestrial sites, within state territorial waters (up to 3 nautical miles offshore), and within U.S. territorial waters (up to 12 nautical miles offshore) are contained in a series of federal and state laws, regulations, and agency guidelines. Archaeological, architectural, and Native American resources are protected by a variety of laws and their implementing regulations: the National Historic Preservation Act of 1966 as amended in 2006, the Archeological and Historic Preservation Act of 1974, the Archeological Resources Protection Act of 1979, the American Indian Religious Freedom Act of 1978, the Native American Graves Protection and Repatriation Act of 1990, the Submerged Lands Act of 1953, the Abandoned Shipwreck Act of 1987, and the Sunken Military Craft Act of 2004. The Advisory Council on Historic Preservation further guides treatment of archaeological and architectural resources through regulations at 36 C.F.R. Part 800, Protection of Historic Properties. Historic properties, as defined under the National Historic Preservation Act and these regulations, represent the subset of cultural resources listed in, or eligible for listing in, the National Register of Historic Places (National Register).

Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of their actions on cultural resources listed in or eligible for listing in the National Register. The regulations implementing the National Historic Preservation Act are found at 36 C.F.R. Part 800 and specify a consultation process to satisfy the requirement. All necessary consultations with the Virginia and North Carolina State Historic Preservation Officer(s) as required by Section 106 of the National Historic Preservation Act have been completed.

3.7.1.2 Methods

Under NEPA, the government must address the direct and indirect effects of a proposed major federal action on historical and cultural resources (40 C.F.R. § 1508.8). Under the implementing regulations of Section 106 of the National Historic Preservation Act, federal agencies must take into account the effects that an action would have on cultural resources listed in or eligible for listing in the National Register. The term "historic properties" is synonymous with National Register-eligible or listed archaeological, architectural, or traditional resources. Cultural resources not formally evaluated may also be considered potentially eligible and, as such, are afforded the same regulatory consideration as those resources listed in the National Register.

Historic properties are defined in the National Historic Preservation Act (16 U.S.C. § 470w(5)) as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register, including artifacts, records, and material remains related to such a property or resource. Properties are evaluated for nomination to the National Register and for evaluating eligibility of properties using the following criteria (36 C.F.R. §§ 60.4(a)-(d)):

- Criterion A: Be associated with events that have made a significant contribution to the broad patterns of American history.
- Criterion B: Be associated with persons significant in the American past.
- Criterion C: Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D: Yield, or may be likely to yield, information important to prehistory or history.

A historic property also must possess several of the aspects of integrity (of location, design, setting, materials, workmanship, feeling, and association) to convey its significance and qualify it for the National Register.

3.7.1.3 Data Used

Cultural resources information relevant to this EA was derived from a variety of sources including previous environmental documents such as Integrated Cultural Resource Management Plans for JEB Little Creek-Fort Story and Camp Lejeune, previous technical memoranda on submerged cultural resource predictive models (Southeastern Archaeological Research, Inc. 2008 and 2009), and national and international shipwreck databases.

National and international shipwreck databases researched included the National Oceanic and Atmospheric Administration Advanced Wreck and Obstruction Information System, National Oceanic and Atmospheric Administration Aids to Navigation, the United States Coast Guard Hazards to Navigation, the General Dynamics Global Maritime Wrecks Database, and Virginia and North Carolina state archeological master site files. Many of these sources contain overlapping information and repetitiveness in data. However, the intent of this analysis is not to provide a definitive number of shipwrecks, obstructions, or hazards within a defined geographic area, but rather to provide an overview of potential resources within a given area.

3.7.1.4 General Information on Known Shipwrecks, Obstructions, and "Unknowns" for All Alternative Sites

Ships and boats of all kinds, including fishing vessels, passenger vessels, freighters, tankers, warships, and submarines have been sunk, lost, or run aground in the Chesapeake Bay and western Atlantic Ocean. Natural activities have played important roles in creating submerged cultural resources, including powerful currents, winds, rough seas, and bathymetric features such as shoals and sandbars. Wars, including the Revolutionary War, the War of 1812, and the Civil War, contributed to numerous ship losses in many parts of the Atlantic Ocean and Chesapeake Bay.

No previously identified National Register-eligible or listed submerged historic properties are present within the study areas at any of the three sites at the two installations. It is unlikely that any of these submerged resources have been formally evaluated for National Register eligibility by the appropriate State Historic Preservation Officers since they have not been proposed to be impacted by Navy activity in the past, nor are they being proposed to be impacted in association with the Proposed Action in this EA. In lieu of formal eligibility evaluations, Navy cultural resources experts have preliminarily indicated their likely ineligibility based on the information on these resources that is available based on the maps and literature. Because no comprehensive surveys or evaluations of submerged historic resources have occurred in these areas, additional previously unidentified shipwrecks or other submerged historic resources may exist. The Navy's standard operating procedures include avoidance of known underwater obstructions in order to prevent damage to sensitive Navy equipment and vessels and to ensure the accuracy of training exercises.

3.7.2 No Action Alternative

3.7.2.1 No Action Alternative – Little Creek-Fort Story – Existing Environment

3.7.2.1.1 Submerged Cultural Resources

Approximately 70 previously identified shipwrecks and/or obstructions occur within the study area in waters in and around JEB Little Creek-Fort Story (Figure 3.7-1). As stated previously in Section 3.7.1.4, these resources are not listed in, nor determined to be eligible for listing in, the National Register of Historic Places.

3.7.2.1.2 Terrestrial Archaeological and Architectural Resources

Little Creek

Previous studies of cultural resources on the Little Creek portion of JEB Little Creek-Fort Story have concluded that no National Register-listed or -eligible architectural resources are present on the installation (U.S. Department of the Navy 2009b). Furthermore, no National Register-eligible or -listed architectural resources present on properties adjoining the installation would be within the area of potential effect of the JLOTS activities.

Based on information contained within a report titled *An Archaeological Assessment of Naval Amphibious Base Little Creek, Virginia Beach, Virginia* and dated 19 December 2003 (U.S. Department of the Navy 2003), it has been determined that no archaeological sites listed in, or eligible for listing in, the National Register of Historic Places are present at Little Creek.

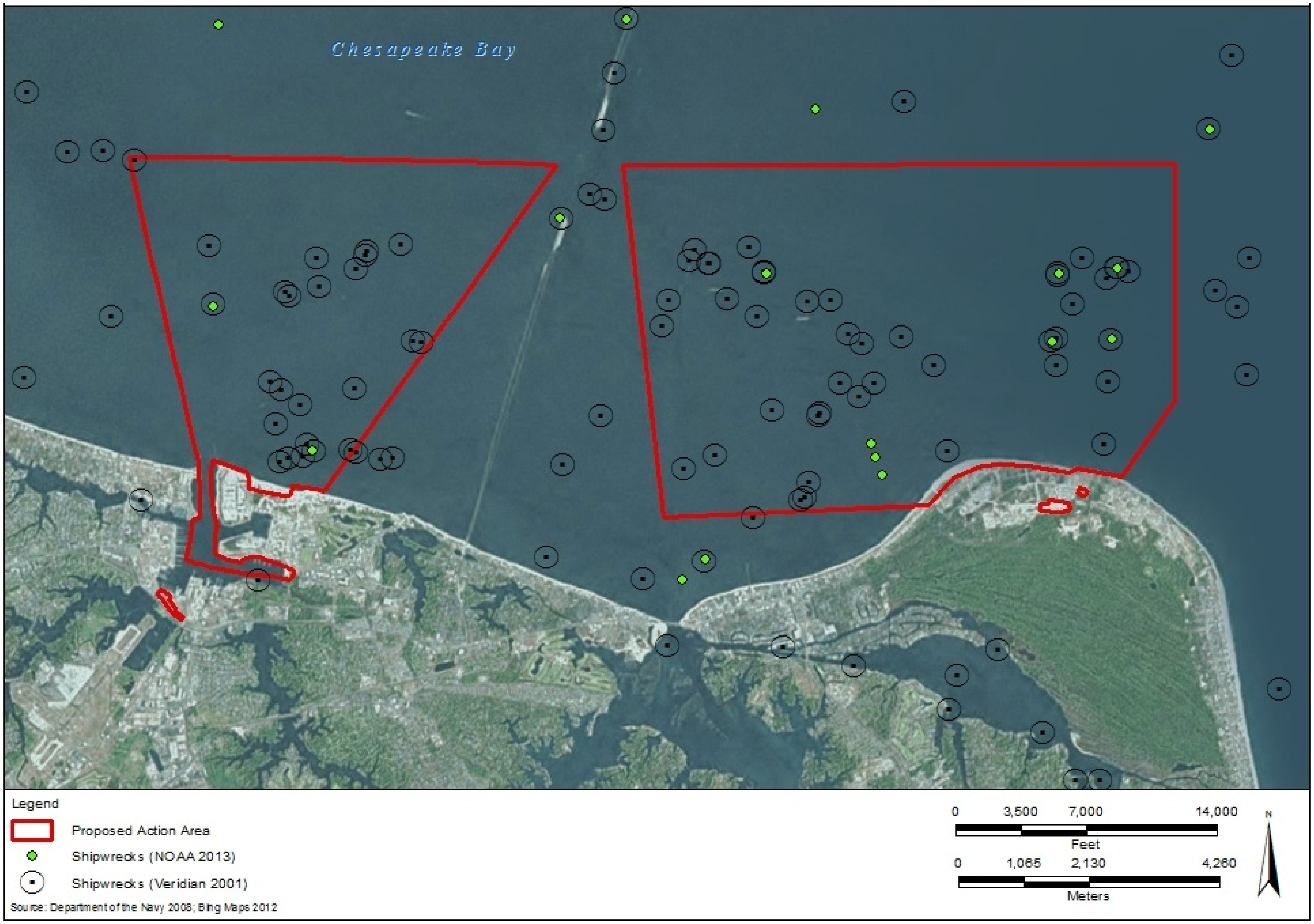
Fort Story

The Fort Story portion of JEB Little Creek-Fort Story was originally known as Cape Henry Military Reservation and was founded in 1914 when the Virginia General Assembly gave six parcels of land totaling 343 acres to the U.S. Government for military purposes (U.S. Army Corps of Engineers 2008). Construction on the installation commenced in 1916 and over the following years, the installation was used continuously as an Army base until being designated a joint base with the Navy on 1 October 2009 (U.S. Department of the Navy 2014).

The Fort Story site as a whole contains archaeological sites including coastal artillery batteries, railguns, and a casemate, all of which have served to provide protection from aircraft, ships, and submarines from World War I to World War II (U.S. Army Corps of Engineers 2008). Not all of the archaeological sites have been previously evaluated with regard to their eligibility for listing on the National Register. Of the terrestrial archaeological sites that have been identified along the beachfront portion of Fort Story, one terrestrial prehistoric archaeological site is located in proximity of JLOTS activities, although outside of the footprint of the ongoing or proposed exercises. This site was determined to be ineligible for listing in the National Register (U.S. Department of the Navy 2009a).

In addition to archaeological resources, the installation contains National Register-eligible or -listed architectural properties including the original and new Cape Henry lighthouses, the Chesapeake Transit Company Railroad Station, and the Cape Henry House (U.S. Department of the Navy 2009a). The architectural resources on the installation are numerous enough and of such historic importance as an assemblage that they have been jointly characterized as the Fort Story Historic District, previously determined to be National Register-eligible (U.S. Department of the Navy 2009a).

Figure 3.7-1: Submerged Shipwrecks and/or Obstructions at JEB Little Creek-Fort Story



3.7.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

3.7.2.2.1 Submerged Cultural Resources

Due to the lack of presence of National Register-eligible or -listed submerged cultural resources in the waters off JEB Little Creek-Fort Story sites and the Navy's avoidance of submerged obstructions, no impacts to submerged cultural resources would be anticipated to occur in association with the continuing conduct of JLOTS training activities as detailed in the No Action Alternative.

3.7.2.2.2 Terrestrial Archaeological and Architectural Resources

Due to the lack of presence of National Register-eligible or -listed architectural or archaeological resources at Little Creek, no impacts to terrestrial archaeological and architectural resources would be anticipated in association with the continuing conduct of JLOTS training activities as detailed in the No Action Alternative.

JLOTS training activities associated with the No Action Alternative would take place in the National Register-listed Fort Story Historic District and within the viewshed of both of the Cape Henry lighthouses. Since the base is an established military installation and military activities similar to those conducted in JLOTS FTXs are routinely performed on Fort Story, these activities would not change the nature of use of the these areas. Furthermore, the activities associated with the No Action Alternative would not impart direct physical impacts on the historic properties. As a result, the activities associated with the No Action Alternative would not adversely affect the historic character of these architectural resources pursuant to Section 106 of the National Historic Preservation Act.

3.7.2.2.3 Summary

Based on the Navy's standard operating procedures with regard to avoidance of submerged obstructions and the lack of presence of National Register-eligible or -listed submerged historic properties within the aquatic study area and the lack of terrestrial archaeological and architectural historic properties, the No Action Alternative training activities would not have a significant impact on cultural resources at Little Creek. Under Section 106 of the National Historic Preservation Act, the continuing conduct of the No Action Alternative activities would have no effect on National Register-eligible or -listed archaeological or architectural resources at Little Creek.

Based on the Navy's standard operating procedures with regard to avoidance of submerged obstructions and the lack of presence of National Register-eligible or -listed submerged historic properties within the aquatic study area; the lack of National Register-eligible or -listed terrestrial archaeological sites within the footprint of the ongoing activities; and the lack of alteration of the historic character of terrestrial architectural sites, the No Action Alternative training activities would not have a significant impact on cultural resources at Fort Story. Under Section 106 of the National Historic Preservation Act, the continuing conduct of the No Action Alternative activities would have no effect on National Register-eligible or -listed archaeological resources, and no adverse effect on National Register-eligible or -listed architectural resources at Fort Story.

3.7.2.3 No Action Alternative – Camp Lejeune – Existing Environment

3.7.2.3.1 Submerged Cultural Resources

No previously identified shipwrecks and/or obstructions occur within the Camp Lejeune study area in the Atlantic Ocean (Figure 3.7-2).

3.7.2.3.2 Terrestrial Archaeological and Architectural Resources

Marine Corps Base Camp Lejeune was originally established in 1941 and known as Marine Barracks at New River (United States Marine Corps 2009). World War II was well underway at the time of its establishment and the U.S. government was very anxious to establish a new Marine Corps training facility for amphibious and ground activities for the 1st Marine Division.

A number of archaeological surveys have been performed on the installation over the years. The results of those surveys coupled with information on the soils present on the installation were used to develop a model to predict areas of high probability for archaeological resources (U.S. Marine Corps 2009). At current time, over 1,200 archaeological sites have been identified throughout the base. Some of the identified sites have been determined to be eligible for listing in the National Register, some are currently being evaluated for their eligibility, and some have yet to be evaluated (U.S. Marine Corps 2009).

In addition to archaeological surveys performed at Camp Lejeune, architectural evaluations have been performed on all structures on the base. The architectural context of the base is of the World War II period. As of August of 2008, 188 structures on the installation had been determined to be eligible for listing in the National Register (U.S. Marine Corps 2009).

3.7.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

3.7.2.4.1 Submerged Cultural Resources

Due to the lack of National Register-eligible or -listed submerged cultural resources within the study area of the Camp Lejeune site and the Navy's avoidance of submerged obstructions, no impacts to submerged cultural resources are anticipated to occur in association with the continuing conduct of the No Action Alternative activities.

Figure 3.7-2: Submerged Shipwrecks and/or Obstructions at Camp Lejeune

3.7.2.4.2 Terrestrial Archaeological and Architectural Resources

There is one National Register-eligible archaeological site located in close proximity to the ongoing JLOTS training activities at Camp Lejeune, although outside of the proposed footprint of JLOTS activities (U.S. Marine Corps 2009). This site is well marked in the field and operators are briefed by the installation's environmental office staff on the avoidance of all sensitive resources prior to the commencement of training activities onsite. For these reasons, impacts to archaeological sites would not be anticipated as a result of JLOTS activities included in the No Action Alternative at Camp Lejeune.

JLOTS activities associated with the No Action Alternative at Camp Lejeune would not take place in the vicinity of, nor within the viewshed of, the National Register-eligible or -listed architectural resources on the base (U.S. Marine Corps 2009). For this reason, the No Action Alternative activities would not have any impacts on architectural resources at Camp Lejeune.

3.7.2.4.3 Summary

Based on the Navy's standard operating procedures with regard to avoidance of submerged obstructions and the lack of presence of National Register-eligible and -listed submerged historic properties and terrestrial archaeological properties within the footprint of the JLOTS No Action Alternative activities, the continuing conduct of the No Action Alternative training activities would not have a significant impact on submerged historic properties or terrestrial archaeological sites at Camp Lejeune. Furthermore, the continuing conduct of the No Action Alternative activities would not occur in the vicinity of, nor affect the historic character of, the architectural cultural resources at Camp Lejeune.

Under Section 106 of the National Historic Preservation Act, the continuing conduct of the No Action Alternative activities at Camp Lejeune would have no effect on National Register-listed or -eligible archaeological or architectural resources.

3.7.2.5 No Action Alternative – Conclusion

National Register-listed and -eligible archaeological resources are present at JEB Little Creek-Fort Story (at the Fort Story site only) and Camp Lejeune. Due to the nature of the JLOTS training activities conducted at these sites at the proposed locations, no significant impacts to cultural resources would be anticipated as a result of the No Action Alternative.

Pursuant to Section 106 of the National Historic Preservation Act:

- No effect to National Register-eligible or -listed archaeological or architectural properties would be anticipated at either the Little Creek site of JEB Little Creek-Fort Story, or Camp Lejeune, in association with the No Action Alternative.
- No effect to National Register-eligible or -listed archaeological properties and no adverse effect to National Register-eligible or -listed architectural properties would be anticipated at the Fort Story site of JEB Little Creek-Fort Story in association with the No Action Alternative.

3.7.3 Action Alternative

3.7.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

All aspects of the existing environment for cultural resources at JEB Little Creek-Fort Story are described in Section 3.7.2.1.

3.7.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

3.7.3.2.1 Submerged Cultural Resources

Due to the lack of presence of National Register-eligible or -listed submerged cultural resources at JEB Little Creek-Fort Story and the Navy's avoidance of submerged obstructions, no impacts to submerged cultural resources would be anticipated to occur in association with the Action Alternative at this location.

3.7.3.2.2 Terrestrial Archaeological and Architectural Resources

Due to the lack of presence of National Register-eligible or -listed architectural or archaeological resources at Little Creek, no impacts to terrestrial archaeological or architectural resources would be anticipated in association with the proposed JLOTS training activities as detailed in the Action Alternative.

JLOTS training activities associated with the Action Alternative would take place in the National Register-listed Fort Story Historic District and within the viewshed of both of the Cape Henry lighthouses. Since the base is an established military installation and military activities similar to those conducted in JLOTS FTXs are routinely performed on Fort Story, these activities would not change the nature of use of the these areas. Furthermore, the activities associated with the Action Alternative would not impart direct physical impacts on the historic properties. As a result, the activities associated with the Action Alternative would not adversely affect the historic character of these architectural resources pursuant to Section 106 of the National Historic Preservation Act.

3.7.3.2.3 Summary

Based on the Navy's standard operating procedures with regard to avoidance of submerged obstructions and the lack of presence of National Register-eligible or -listed submerged historic properties within the aquatic study area and the lack of terrestrial archaeological and architectural historic properties, the proposed Action Alternative training activities would not have a significant impact on cultural resources at Little Creek.

Based on the Navy's standard operating procedures with regard to avoidance of submerged obstructions and the lack of presence of National Register-eligible or -listed submerged historic properties within the aquatic study area; the lack of National Register-eligible or -listed terrestrial archaeological sites within the footprint of the proposed activities; and the lack of alteration of the historic character of terrestrial architectural sites, the Action Alternative training activities would not have a significant impact on cultural resources at Fort Story. Under Section

106 of the National Historic Preservation Act, the proposed Action Alternative activities would have no effect on National Register-eligible or -listed archaeological resources, and no adverse effect on National Register-eligible or -listed architectural resources at Fort Story.

3.7.3.3 Action Alternative – Camp Lejeune – Existing Environment

All aspects of the existing environment for cultural resources at Camp Lejeune are described in Section 3.7.2.3.

3.7.3.4 Proposed Action – Camp Lejeune – Environmental Consequences

3.7.3.4.1 Submerged Historic Resources

Due to the lack of presence of National Register-eligible or -listed submerged cultural resources at Camp Lejeune and the Navy's avoidance of submerged obstructions, no impacts to submerged cultural resources would be anticipated to occur in association with the Action Alternative's activities.

3.7.3.4.2 Terrestrial Archaeological and Architectural Resources

The one National Register-eligible archaeological site located in close proximity to the proposed JLOTS training activities at Camp Lejeune is outside of the proposed footprint of JLOTS activities (U.S. Marine Corps 2009). Due to the fact that the site is well marked in the field and operators are briefed by the installation's environmental office staff on the avoidance of all sensitive resources prior to the commencement of training activities onsite, impacts to archaeological sites would not be anticipated as a result of the Action Alternative at Camp Lejeune.

Furthermore, JLOTS activities associated with the Action Alternative at Camp Lejeune would not take place in the vicinity of, or within the viewshed of, of the National Register-eligible or -listed architectural resources on the base (U.S. Marine Corps 2009). For this reason, the Action Alternative would not have any impacts on architectural resources at Camp Lejeune.

3.7.3.4.3 Summary

Based on the Navy's standard operating procedures with regard to avoidance of submerged obstructions, the location of the National Register-eligible or -listed architectural properties at Camp Lejeune in reference to the Action Alternative, and the marking of the National Register-eligible archaeological site in the field along with the briefs provided to operators prior to the commencement of training activities onsite, the Action Alternative would not have a significant impact on cultural resources at Camp Lejeune.

Under Section 106 of the National Historic Preservation Act, the Action Alternative at Camp Lejeune would have no effect on National Register-eligible or -listed archaeological or architectural resources.

3.7.3.5 Action Alternative - Conclusion

National Register-listed and -eligible archaeological resources are present at Little Creek-Fort Story (at the Fort Story site only) and Camp Lejeune. Due to the nature of the JLOTS training activities proposed at these sites and the locations of the proposed FTXs, no significant impacts to cultural resources would be anticipated as a result of the Action Alternative.

Pursuant to Section 106 of the National Historic Preservation Act:

- No effect to National Register-eligible or -listed archaeological or architectural properties would be anticipated at either the Little Creek site of JEB Little Creek-Fort Story, or Camp Lejeune, in association with the Action Alternative.
- No effect to National Register-eligible or -listed archaeological properties and no adverse effect to National Register-eligible or -listed architectural properties would be anticipated at the Fort Story site of JEB Little Creek-Fort Story in association with the Action Alternative.

3.8 Terrestrial and Aquatic Vegetation

3.8.1 Introduction

This section addresses terrestrial and aquatic vegetation communities in the JLOTS study area, and the impacts that may result from training activities. The Endangered Species Act (ESA) is introduced here and is applicable not only to plants, but also birds, reptiles and amphibians, invertebrates, fish, and terrestrial and marine mammals, which are addressed in subsequent sections.

The Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531 et seq.) establishes the protection and conservation of threatened and endangered species and the ecosystems upon which they depend. An "endangered" species is a species in danger of extinction throughout all or a significant portion of its range. A "threatened" species is one that is likely to become endangered within the foreseeable future throughout all or in a significant portion of its range. The United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) jointly administer the ESA and are also responsible for the listing of species (designating a species as either threatened or endangered). The ESA allows the designation of geographic areas as critical habitat for threatened or endangered species. Section 7(a)(2) requires each federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a federal agency's action "may affect" a listed species, that agency is required to consult with NMFS or USFWS, depending on the species at issue (50 C.F.R. § 402.14(a)).

3.8.2 No Action Alternative

3.8.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

3.8.2.1.1 Terrestrial Vegetation

Little Creek

The majority of the land area at Little Creek is developed and has vegetation types that consist of mowed lawn, shade trees, and ornamental trees and shrubs (U.S. Department of the Navy 2013). Rodriguez Field, Iwo Jima Field, and Amphibious Field are typical in this respect: all three sites are mowed grass fields with a few, scattered ornamental trees.

Anzio Beach consists of a sandy strip bordered to the south by vegetated primary and secondary dune systems. Vegetation in the upper beach area (just above the mean high tide limit, but flooded by high spring tides and storm surges) is mostly limited to salt-tolerant, succulent annuals such as American searocket (*Cakile edentula*) or Russian thistle (*Salsola kali*) (U.S. Department of the Navy 2013).

Further inland, in the dunes along Anzio Beach, a recent vegetation survey (U.S. Department of the Navy 2012) conducted as part of a dune ecological assessment has identified two vegetative communities: Maritime Dune Grassland and Maritime Dune Scrub. Maritime Dune Grassland is the most common dune vegetative community at Little Creek. It covers most of the primary and secondary dunes at Anzio Beach. In the primary dunes, common species include American beach grass (*Ammophila breviligulata*), sea oats (*Uniola paniculata*), bitter seabeach grass (*Panicum amarum amarum*), beach panic grass (*P. amarum amarulum*), seaside goldenrod (*Solidago sempervirens*), and sea-coast marsh-elder (*Iva imbricata*). In the secondary dunes dominant species are saltmeadow cordgrass (*Spartina patens*), beach panic grass, seaside little bluestem (*Schizachyrium littorale*), seaside goldenrod, and persimmon (*Diospyros virginiana*).

Small areas of Maritime Dune Scrub are also present, scattered across the secondary dunes. The most common species found there is live oak (*Quercus virginiana*). Other tree and shrub species include black cherry (*Prunus serotina*), persimmon, northern bayberry (*Morella pensylvanica*), and beach heather (*Hudsonia tomentosa*). Common grasses, forbs, and vines include seaside little bluestem, Gray's flatsedge (*Cyperus grayi*), seaside goldenrod, wisteria (*Wisteria* spp.), yellow jessamine (*Gelsemium sempervirens*), coral honeysuckle (*Lonicera sempervirens*) and the nonnative Japanese honeysuckle (*Lonicera japonica*).

Mudflats is devoid of vegetation but is bordered to the south and north by small areas of Mesic Mixed Pine Hardwood Forest. Canopy dominants in this community include loblolly pine (*Pinus taeda*), white oak (*Quercus alba*), water oak (*Quercus nigra*), red maple (*Acer rubrum*), and sweetgum (*Liquidambar styraciflua)* (U.S. Department of the Navy 2013).

Fort Story

The inland areas of Fort Story that would be used for the proposed JLOTS training are developed areas with minimal vegetation. The Forklift Training Area is an expanse of crushed gravel, the Vung Tau Driving Range is entirely paved, and the Thomas Nelson Circle Training Area consists of maintained grass with a few ornamental trees.

The vegetation on Omaha Beach, Utah Beach, and the adjacent dune systems is characterized in the previously referenced 2012 dune ecological assessment (U.S Department of the Navy 2012). The most common community in the dunes along both beaches is the Maritime Dune Grassland community, briefly described in Section 3.8.2.1.1, Terrestrial Vegetation, above. At the eastern end of Utah Beach, small tracts of Maritime Dune Scrub and Maritime Upland Forest have been identified. The Maritime Dune Scrub community is also briefly described in Section 3.8.2.1.1, Terrestrial Vegetation, above. The Maritime Upland Forest community is mostly characterized by live and other oak species, American holly (*Ilex opaca*), and black cherry. Other species present include English ivy (*Hedera helix*), muscadine grape (*Vitis rotundifolia*), and Japanese privet (*Ligustrum japonica*).

3.8.2.1.2 Aquatic Vegetation

Little Creek

The study area around Anzio Beach is a high-energy, sandy beach lacking wetland plants. A comprehensive mapping of the nearshore waters along Anzio Beach identified no seagrass beds (Virginia Institute of Marine Science 2011). Generally, it is difficult for macroalgae (seaweed) to persist along beaches with shifting sand substrate (Nybakken 1993). However, the shipwrecks documented in the area may provide artificial substrate for attached macroalgae to persist in nearshore waters. Floating macroalgae may also occur in the action area as dislodged seaweeds from the bottom or as stray clumps of buoyant *Sargassum*.

In Little Creek Cove, submerged rooted vegetation beds are mapped along the south shoreline (National Oceanic and Atmospheric Administration 2011). Efforts to increase the amount of submerged rooted vegetation at Little Creek Cove have included the planting of 2,000 shoots of aquatic vegetation within a 215 square foot (20 square meter) area on the south shore of the cove (U.S. Department of the Navy 2013), with plans to plant more and monitor aquatic vegetation at suitable locations. There are also marsh wetlands along the south side of Little Creek Cove (National Oceanic and Atmospheric Administration 2005). The oyster reef along the south shore of the cove (U.S. Department of the Navy 2013) and submerged artificial structures along the north shoreline could also support aquatic vegetation (Gosner and Peterson 1999). Floating macroalgae may also occur in the action area as dislodged seaweeds grown on the bottom or as stray clumps of buoyant *Sargassum*.

Fort Story

There are no known contiguous submerged aquatic vegetation beds off Fort Story.

3.8.2.1.3 Protected Plant Species

No federally-listed plants occur in the study area at JEB Little Creek-Fort Story.

3.8.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

3.8.2.2.1 Terrestrial Vegetation

All shoreline activities would take place on Anzio Beach and Mudflats at Little Creek, and Omaha and Utah Beach at Fort Story. These sandy areas are largely devoid of vegetative cover. No activities would take place in the primary and secondary dunes. During all training exercises, personnel and vehicle movements to and from the beach would be through existing dune breaks and trails. Dune vegetation would not be disturbed.

Inland activities (tent encampments) would be limited to designated training areas consisting of mowed grass fields with a few, scattered ornamental trees. Tents and equipment would be installed and stored in a manner that does not damage the existing trees. The grass cover would be compacted and damaged but those areas are routinely used for such activities and are expected to recover between training exercises. No natural or sensitive habitat would be affected.

3.8.2.2.2 Aquatic Vegetation

The areas where in-water activities would take place under the No Action Alternative include nearshore waters off Anzio Beach and Little Creek Cove off Mudflats at Little Creek, and Omaha and Utah Beaches at Fort Story. These locations consist of sandy bottoms with no submerged aquatic vegetation. In-water activities in Little Creek Cove would take place off Mudflats, in the northeast corner of the cove and away from the bed of aquatic vegetation along the south shoreline. The waters off JEB Little Creek-Fort Story have been used for military training activities for decades. Frequent vehicle and vessel traffic on and around the beaches has created disturbed conditions in the nearshore marine environment. This frequent activity combined with sandy substrate and wave action results in turbid waters and an absence of substantial established submerged aquatic vegetation communities. “No wake” speed restrictions in Little Creek Cove would reduce the likelihood of disturbance of any submerged aquatic vegetation or attached macroalgae that is present. The high-energy conditions created by the tides and wave action result in habitat that is naturally inhospitable to many submerged aquatic vegetation species that are found in the region (National Oceanic and Atmospheric Administration n.d.; Hurley 1990). The proposed activities would not compromise the capacity of the area to continue supporting the type of aquatic vegetation it currently supports.

3.8.2.2.3 Protected Plant Species

No federally-listed plants occur in the study area at JEB Little Creek-Fort Story, therefore there would be no impacts to federally-listed plants.

3.8.2.2.4 Summary

Because the No Action Alternative represents a continuation of the existing levels and intensity of training at JEB Little Creek-Fort Story, its impacts on existing plant communities are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. They would remain temporary and localized. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. Some individual plants may be crushed or damaged by equipment or vehicles on land, but no community-level consequences are expected. The No Action Alternative would not compromise the capacity of the area to continue supporting the plant communities it currently supports. Thus, there would be no significant impact to terrestrial or aquatic vegetation at JEB Little Creek-Fort Story under the No Action Alternative.

3.8.2.3 No Action Alternative – Camp Lejeune – Existing Environment

3.8.2.3.1 Terrestrial Vegetation

Among the areas of Camp Lejeune where the proposed JLOTS training would take place under the No Action Alternative, the Mile Hammock Bay landing is an open, partly paved, partly graveled expanse with no vegetative cover. Tactical Landing Zone Bluebird is an open grass field surrounded by forest where loblolly pine (*Pinus taeda*) dominates. Onslow Beach is a long, narrow sand beach subject to seasonal and episodic erosion and deposition. The beach and dune systems that parallel it are classified in the installation’s Natural Resources Management Plan as Maritime Dunes, Swales, and Marshes land type (U.S. Marine Corps 2007). Fresh dunes are colonized by sea oats. Other grasses include panic grass and lovegrass (*Eragrostis* spp.). Saltmarsh cordgrass is more common on the lower dunes in wet transition areas. Stable dunes may succeed to shrubby red cedar *(Juniperus virginiana),* live oak, or maritime shrubs such as waxmyrtle (*Myrica cerifera*), mulletbush (*Baccharis halimifolia*), or bigleaf marsh elder (*Iva frutescens*). Where flats and slight swales are protected, common marsh grasses such as saltmarsh cordgrass (*Spartina alternifolia*), black needlerush (*Juncus roemerianus*), and seaside goldenrod may become established. Shoreline marsh-maritime forest hummocks include live oak, loblolly pine, and gum-bay-magnolia (*Nyssa-Persea-Magnolia*) communities.

3.8.2.3.2 Aquatic Vegetation

The ocean portion of the study area includes a high-energy, sandy beach where wetland plants do not persist. A comprehensive mapping of the nearshore waters along Onslow Beach did not identify any seagrass beds (Albemarle Pamlico National Estuarine Program 2011). Generally, it is difficult for macroalgae to persist along beaches with shifting sand substrate (Nybakken 1993). However, the live hard bottoms documented in the area may provide suitable substrate for attached macroalgae to persist in the nearshore waters. Floating macroalgae may also occur in the action area as dislodged seaweeds grown on the bottom or as stray clumps of buoyant *Sargassum*.

Large sections of shorelines adjacent to the Atlantic Intracoastal Waterway and Mile Hammock Bay are classified as salt-brackish marsh or shrub-scrub wetlands (National Oceanic and Atmospheric Administration 2000). The shallow margins of those water bodies have a growth of submerged aquatic vegetation (either attached macroalgae or submerged rooted vegetation) that has been documented with recent mapping (Albemarle Pamlico National Estuarine Program 2011). Attached macroalgae may also be growing on the bulkheaded shoreline in Mile Hammock Bay and on shallow soft bottoms in the more sheltered areas of the estuary.

3.8.2.3.3 Protected Plant Species

Seabeach Amaranth

The federally threatened seabeach amaranth (*Amaranthus pumilus*) is an annual plant that typically grows in overwash areas or along the beachfront. It has been described as a dune-builder because it frequently occupies areas seaward of primary dunes, often growing closer to the high tide line than any other coastal plant. The stems are fleshy and pinkish-red or red, with small rounded leaves that are 0.5 to 1 inch (1.3 to 2.5 centimeters) in diameter (U.S. Fish and Wildlife Service 2012).

The strongholds for populations of seabeach amaranth are the states of North Carolina, South Carolina, and New York. Annual survey data are sporadic, but it is clear that North Carolina and New York lead all states in supporting remaining populations of seabeach amaranth. In 2005, North Carolina was home to 44 percent of known occurrences, with New York second at 35 percent. In that year alone, Camp Lejeune accounted for 4 percent of the species throughout its range (U.S. Fish and Wildlife Service 2007).

On Camp Lejeune, the most persistent locations for seabeach amaranth have been in the vicinity of the New River Inlet and in the area of Onslow North Tower, which are south and north of the area in which JLOTS training would be centered, respectively. However, given that it is an opportunistic colonizer when conditions become appropriate, seabeach amaranth may be found anywhere seaward of the dunes. Management of this species on Camp Lejeune consists of annual surveys and the marking of occupied sites to prevent damage by people and vehicles. Throughout its range, the most significant threats to the seabeach amaranth are beach stabilization structures, beach grooming, and, in certain areas, unauthorized off-road recreational vehicle use. Because the seabeach amaranth is an annual plant and its location cannot be reliably predicted from year to year, all possible habitat locations are surveyed each summer to ensure that populations receive adequate protection. At Camp Lejeune, potential habitat in overwash areas is protected from vehicle traffic year-round with a system of poles and signs designed to keep drivers to the seaward side of certain areas.

3.8.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

The proposed training activities under the No Action Alternative at Camp Lejeune would be the same as those of the No Action Alternative at JEB Little Creek-Fort Story. However, quarterly and routine unit-level JLOTS training would not occur at Camp Lejeune. For that reason, analyses in Section 3.8.2.2 are generally applicable to the No Action Alternative at Camp Lejeune, but potential impacts to vegetative communities are expected to be of lower frequency, duration, and intensity.

3.8.2.4.1 Terrestrial Vegetation

Shoreline activities during all JLOTS training exercises would take place on Onslow Beach or the Mile Hammock Bay landing, which are largely devoid of vegetative cover. No activities would take place in the primary and secondary dunes that line Onslow Beach. All personnel and vehicle movements to and from the beach would be through existing dune breaks and trails. Dune vegetation would not be disturbed.

Inland activities (tent encampments) would take place at Tactical Landing Zone Bluebird, an open grass field, once per year. The grass cover would be compacted and damaged by the installation and use of tents and equipment, but the area is routinely used for similar activities and the vegetation is expected to recover between training exercises. No activities would take place in the pine forest surrounding the landing zone. No natural or sensitive habitat would be affected.

3.8.2.4.2 Aquatic Vegetation

The areas where in-water activities would take place under the No Action Alternative include nearshore waters off Onslow Beach and estuarine waters of the Atlantic Intracoastal Waterway and Mile Hammock Bay. Off Onslow Beach, the affected area consists of sandy bottom with no submerged aquatic vegetation. In-water activities in Mile Hammock Bay and the Atlantic Intracoastal Waterway would be close to, but would not overlap, the beds of aquatic vegetation along the shallow margins of the New River estuary. Submerged vegetation nearby may be resilient to the low wakes created by slow moving vessels or amphibious vehicles working in the area.

The increased turbidity caused by vessels or amphibious vehicles transiting to and from Mile Hammock Bay and the Intracoastal Waterway could reduce light availability in the water column for plant growth but these impacts would be localized and temporary, occurring once annually during a full JLOTS exercise. The time that would elapse between exercises would allow any affected vegetation to recover. Thus, the proposed training activities would not compromise the capacity of the area to continue supporting the type of aquatic vegetation it currently supports.

3.8.2.4.3 Protected Plant Species

Seabeach Amaranth

During cargo marshalling and movement, established paths, dune breaks, and roads would be used for the transfer of vehicles and equipment. A marshalling and staging area would be designated. Equipment would be transported from the landing points to the marshalling and staging area by truck or forklift (where needed, routes would be stabilized by mobility matting). From the marshalling and staging area, transport to inland locations would be by existing dune breaks, paths, and roads using semi-truck trailers. Any effects would occur over one 60-day full JLOTS annual training exercise.

The areas where the tent encampments would be established are open, cleared, or paved areas that are commonly used for similar activities and where ESA-listed species would not be present. Therefore, the potential for physical disturbances from establishment of tent encampments is minimal. Known seabeach amaranth populations are well-documented at Camp Lejeune and largely protected by the procedures and mitigation measures listed in Chapter 4. Specifically, Camp Lejeune personnel survey for emerging seabeach amaranth every year and map and mark new populations with warning signs. Furthermore, access to the far southwest end of Onslow Beach, where the largest known population of seabeach amaranth occurs, is restricted. All JLOTS training exercises would be conducted in accordance with Camp Lejeune's standing protective measures, minimizing the risk of effects.

3.8.2.4.4 Summary

Because the No Action Alternative represents a continuation of the existing levels and intensity of annual JLOTS training at Camp Lejeune, its impacts on existing plant communities are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. They would remain temporary and localized. There would be no permanent loss of habitat and all impacts would cease entirely between annual training exercises. Some individual plants may be crushed or damaged by equipment or vehicles on land, but no community-level consequences are expected. Protective measures currently in place would minimize the likelihood of this occurring for seabeach amaranth plants. The No Action Alternative would not compromise the capacity of the area to continue supporting the plant communities it currently supports. Thus, there would be no significant impacts to terrestrial or aquatic vegetation under the No Action Alternative at Camp Lejeune.

Pursuant to the ESA, the No Action Alternative at Camp Lejeune may affect but is not likely to adversely affect the ESA-listed seabeach amaranth.

3.8.2.5 No Action Alternative - Conclusion

Activities associated with the No Action Alternative at JEB Little Creek-Fort Story and Camp Lejeune may result in impacts to terrestrial plants from vehicles, but they are expected to be very limited in scope and duration based on restrictions to established transit corridors. No submerged aquatic vegetation populations exist in the study area with the exception of non-contiguous areas in Little Creek Cove and Mile Hammock Bay. Aquatic plant communities that do exist would not be significantly impacted because of speed restrictions on vessels.

Pursuant to the ESA, the No Action Alternative may effect, but is not likely to adversely affect, the ESA-listed seabeach amaranth.

3.8.3 Action Alternative

3.8.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

The existing environment at JEB Little Creek-Fort Story is described in Section 3.8.2.1.

3.8.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

The Action Alternative at JEB Little Creek-Fort Story would include the same annual training activities as the No Action Alternative plus the floating causeway FTX at Little Creek, and the ELCAS (M). The ELCAS (M) FTX would take place no more than once annually at JEB Little Creek-Fort Story. Therefore, the impacts of the Action Alternative on terrestrial and aquatic vegetation would be similar to those of the No Action Alternative, with the addition of the impacts described below.

3.8.3.2.1 Terrestrial Vegetation

Additional activities under the Action Alternative would entail disturbance of beach areas to allow for construction of the floating causeway and ELCAS (M). These areas are already disturbed and have little or no vegetation. Therefore, impacts to terrestrial vegetation would be minimal.

3.8.3.2.2 Aquatic Vegetation

The ELCAS (M) and floating causeway FTXs would involve higher levels of disturbance than other FTXs. However, this disturbance would be in areas where no aquatic vegetation is present. Underwater sound generated by pile driving and extraction is not known to affect plants.

3.8.3.2.3 Protected Plant Species

No federally-listed plants occur in the study area at JEB Little Creek-Fort Story, therefore there would be no impacts to federally-listed plants.

3.8.3.2.4 Summary

Effects to terrestrial and aquatic vegetation under the Action Alternative at JEB Little Creek-Fort Story are not expected to discernibly exceed those resulting from the other FTXs already described in the No Action Alternative.

The Action Alternative represents a continuation of the existing frequency and intensity of annual, quarterly, and routine JLOTS training at JEB Little Creek-Fort Story, with the addition of the minimal impacts associated with the construction of the floating causeways and ELCAS (M) FTXs. These impacts would not discernibly increase those associated with the No Action Alternative; they would remain temporary and localized. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. Some individual plants may be crushed or damaged by equipment or vehicles on land, but no community-level consequences are expected. The Action Alternative would not compromise the capacity of the training areas to continue supporting the plant communities they currently support. Thus, there would be no significant impacts to terrestrial or aquatic vegetation under the Action Alternative at JEB Little Creek-Fort Story.

3.8.3.3 Action Alternative – Camp Lejeune – Existing Environment

The existing environment at Camp Lejeune is described in Section 3.8.2.5.

3.8.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

The Action Alternative would include the same annual training activities as the No Action Alternative at Camp Lejeune, plus the ELCAS (M). Quarterly or routine training in support of JLOTS would not occur at Camp Lejeune. Therefore, the impacts of the Action Alternative on terrestrial and aquatic vegetation would be similar to those of the No Action Alternative at Camp Lejeune, with the addition of the impacts described below.

3.8.3.4.1 Terrestrial Vegetation

Additional activities under the Action Alternative would include disturbance of beach areas to allow for the construction of the ELCAS (M). These areas are already disturbed and have little or no vegetation. Therefore, impacts to terrestrial vegetation would be minimal.

3.8.3.4.2 Aquatic Vegetation

Additional activities associated with the ELCAS (M) FTX would involve higher levels of disturbance. However, this disturbance would be in areas where no aquatic vegetation is present. Underwater sound generated by pile driving and extraction is not known to affect plants.

3.8.3.4.3 Protected Plant Species

Seabeach Amaranth

Potential impacts to seabeach amaranth are as described in Section 3.8.2.4.3 under the No Action Alternative at Camp Lejeune. As with the floating causeways, temporary beach modifications to allow for the construction of the ELCAS (M) would result in a slightly higher level of disturbance. However, the modifications would occur in areas with little or no vegetation. New and existing populations of seabeach amaranth would continue to be protected by signage and the procedures and mitigation measures described in Chapter 4. Further, access to the far southwest end of Onslow Beach, the location of the largest known population of seabeach amaranth on base, is restricted. Thus, there would be no significant impacts terrestrial or aquatic vegetation under the Action Alternative at Camp Lejeune.

3.8.3.4.4 Summary

The Action Alternative represents a continuation of the existing frequency and intensity of annual JLOTS training at Camp Lejeune, with the addition of minimal impacts associated with the ELCAS (M) FTX. The overall impacts from JLOTS training would not increase significantly with the conduct of the Action Alternative. Impacts would remain temporary and localized. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. Some individual terrestrial plants may be crushed or damaged by equipment or vehicles on land, but no community-level consequences are expected. Protective measures and procedures described in Chapter 4, *Standard Operating Procedures and Mitigation Measures* would minimize the likelihood of impacts to seabeach amaranth. The Action Alternative would not compromise the capacity of the area to continue supporting the plant communities it currently supports. Thus, there would be no significant impacts to terrestrial or aquatic vegetation under the Action Alternative at Camp Lejeune.

Pursuant to the ESA, the Action Alternative at Camp Lejeune may affect but is not likely to adversely affect the ESA-listed seabeach amaranth.

3.8.3.5 Action Alternative - Conclusion

As a result of activities associated with the Action Alternative, some individual plants may be crushed or damaged by equipment or vehicles, but no community-level consequences are expected. Impacts are likely to be relatively infrequent, intermittent in nature, and highly localized within the study area. Little or no submerged aquatic vegetation exists in the study area with the exception of small populations in Little Creek Cove and Mile Hammock Bay. Aquatic plant communities that do exist would not be significantly impacted because of speed restrictions on vessels. No adverse impacts to population recruitment, survival, or recovery (in the case of seabeach amaranth) for any plant species or communities that may be present in the study area are expected. Mitigation measures and standard operating procedures detailed in Chapter 4, *Standard Operating Procedures and Mitigation Measures,* would reduce the likelihood of potential adverse impacts to terrestrial and aquatic vegetation. Therefore, no significant impact to terrestrial or aquatic vegetation is anticipated as a result of the Action Alternative at JEB Little Creek-Fort Story or Camp Lejeune.

Pursuant to the ESA, the Action Alternative may effect, but is not likely to adversely affect, the ESA-listed seabeach amaranth.

3.9 Terrestrial Wildlife and Birds

3.9.1 Introduction

This section addresses terrestrial wildlife and birds that may be present in the JLOTS study area, as well as the potential impacts to these animals that may result from training activities. Applicable regulations for terrestrial wildlife and birds include the Endangered Species Act (introduced in Section 3.8, *Terrestrial and Aquatic Vegetation*), the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. Sea turtles are addressed separately in Section 3.11.

The Migratory Bird Treaty Act established federal responsibilities for protecting nearly all migratory species of birds, their eggs, and nests. Bird migration is defined as the periodic seasonal movement of birds from one geographic region to another, typically coinciding with available food supplies or breeding seasons. Of the 1,007 species protected under the Migratory Bird Treaty Act, approximately 200 could occur in the study area (Appendix D, *Bird Species Potentially Occurring in the JLOTS Study Area*). Under the Migratory Bird Treaty Act (50 C.F.R. Part 21), the U.S. Fish and Wildlife Service promulgated a rule that permits the incidental take of migratory birds during military readiness activities. Military readiness activities include, among other things, all training of the armed forces that relates to combat (such as JLOTS). Routine operations of installations and their supporting functions are not included in the definition of military readiness activities (50 C.F.R. § 21.3).

The Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Bald and Golden Eagle Protection Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Bald and Golden Eagle Protection Act defines "take" as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb" means: “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

3.9.2 No Action Alternative

3.9.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

The terrestrial wildlife and bird species found in the vicinity of JEB Little Creek-Fort Story are typical of the Chesapeake Bay and Mid-Atlantic region, with the most commonly occurring species detailed below. An ecological assessment was conducted at this installation in 2012 (U.S. Department of the Navy 2012). Included in this assessment was a study of mammals, amphibians, and reptiles present in the installation's beach areas (U.S. Department of the Navy 2012a; 2012b). There are no federally listed terrestrial mammals, reptiles, or amphibians known to occur at JEB Little Creek-Fort Story.

3.9.2.1.1 Terrestrial Mammals

Among the small mammals of the southeastern Virginia coastal region, house mice (*Mus musculus*) and white-footed mice (*Peromyscus leucopus*) are the most common early colonizing dune mammals. Other rodent and insectivorous species found in primary and secondary dune habitats include least shrew (*Cryptotis parva*), southern short-tailed shrew (*Blarina carolinensis*), northern short-tailed shrew (*Blarina brevicauda*), meadow vole (*Microtus pennsylvanicus*), eastern harvest mouse (*Reithrodontomys humulis*), and hispid cotton rat (*Sigmodon hispidus*). Larger mammals may include striped skunk (*Mephitis mephitis*), Virginia opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), northern raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), and white-tailed deer (*Odocoileus virginianus*). These same disturbance-tolerant species (Washington Department of Fish and Wildlife 2014; Indiana Division of Fish & Wildlife 2012; McGill University Urban Nature Information Service 2008) are also those most likely to occur in the other areas of JEB Little Creek-Fort Story where JLOTS training would take place (i.e., Rodriguez Field, Iwo Jima Field, Amphibious Field, and Mudflats). Bat species may include big brown (*Eptescicus fuscus*), eastern red (*Lasiurus borealis*), little brown (*Myotis lucifugus*), and eastern pipistrelle (*Pipistrellus subflavus*) (U.S. Department of the Navy 2013).

3.9.2.1.2 Reptiles and Amphibians

Common herpetofauna with the potential to occur at JEB Little Creek-Fort Story include reptiles such as eastern snapping turtle (*Chelydra serpentina serpentina*), yellow-bellied slider (*Trachemys scripta scripta*), eastern mud turtle (*Kinosternon subrubrum*), and northern watersnake (*Nerodia sipedon sipedon*). Common amphibians associated with wetland areas include American bullfrog (*Lithobates catesbeianus*), northern green frog (*L. clamitans melanota*), and southern leopard frog (*L. sphenocephalus*). Species occurring in forested areas adjacent to temporary or isolated wetlands include the eastern redbacked salamander (*Plethodon cinereus*), Atlantic coast slimy salamander (*P. chlorobryonis*), Cope's gray treefrog (*Hyla chrysocelis*), green treefrog (*H. cinerea*), southern toad (*Anaxyrus terrestris*), Fowler's toad (*A. fowleri*), and eastern box turtle (*Terrapene carolina*). Upland species are generally composed of reptile species, including eastern garter snake (*Thamnophis sirtalis sirtalis)*, black rat snake (*Elaphe obsoleta*), common five-lined skink (*Plestidon fasciatus*), and the little brown skink (*Scincella lateralis*). The red-eared slider (*Trachemys scripta elegans*) may also occur in wetland habitats (U.S. Department of the Navy 2013). Reptile and amphibian species observed during 2012/2013 surveys are summarized in Table E-1 in Appendix E, *Reptiles and Amphibians Potentially Occurring in the JLOTS Study Area*.

3.9.2.1.3 Birds

The bird community at JEB Little Creek-Fort Story is the most diverse faunal community on the installation. Bird surveys and the annual Audubon Christmas bird counts have documented 183 species (U.S. Department of the Navy 2013). One large group of birds on base is the *Passeriformes* (perching birds), found in forests, open grounds, and other terrestrial areas. Migratory seabirds and shorebirds can be found along the shoreline at different times of the year. Common species include brown pelicans (*Pelecanus occidentalis)*, loons (*Gavia* spp.), grebes (*Podiceps auritus* and *Podilymbus podiceps)*, and cormorants (*Phalacrocorax* spp.). Common shorebirds include plovers (*Charadrius semipalmatus* and *Pluvialis squatarola*) and sandpipers (*Actitis hypoleucos)*. Several species of gulls (*Larus* spp.), terns (*Sterna* spp.), ducks (*Anas* spp.), and geese (*Branta* spp.) are also common offshore and in the beach area. Due to proximity to the Atlantic Flyway, hundreds of bird species have the potential to occur at JEB Little Creek-Fort Story throughout the year. Appendix D, *Bird Species Potentially Occurring in the JLOTS Study Area* summarizes the most commonly observed birds in the vicinity of JEB Little Creek-Fort Story based on annual citizen bird counts and incidental reports.

3.9.2.1.4 Protected Birds – Endangered Species Act and Bald and Golden Eagle Protection Act

Nearly all bird species occurring at JEB Little Creek-Fort Story are protected by the Migratory Bird Treaty Act. The piping plover, roseate tern, and red knot have additional federal protection under the ESA, and the bald eagle has additional federal protection under the Bald and Golden Eagle Protection Act.

Piping Plover

The piping plover is divided into two subspecies: *Charadrius melodus melodus* (Atlantic Coast of North America) and *Charadrius melodus circumcinctus* (Northern Great Plains of North America). Those birds that breed on the Atlantic coast belong to the Atlantic Coast subspecies and could occur in the study area (U.S. Fish and Wildlife Service 2009). This species is listed as threatened under the ESA throughout its range with the exception of individuals belonging to the Great Lakes watershed population, which are classified as endangered. Those with the potential to occur at JEB Little Creek-Fort Story belong to the Atlantic Coast population, and are therefore federally threatened. Critical habitat for wintering populations of piping plovers was designated in 2001. However, no critical habitat is found in the study area.

The piping plover is a small shorebird that inhabits open sandy beaches and salt flats. Feeding habitats of breeding piping plovers include intertidal portions of ocean beaches, washover areas, mudflats, wrack lines, and marshes (Gratto-Treveor et al. 2012; U.S. Fish and Wildlife Service 1996). They hunt visually using a start-and-stop running method, probing prey (including marine worms, crustaceans, molluscs, insects, and larvae) from the substrate (Maslo et al. 2012).

The 2012 Atlantic Coast piping plover preliminary population estimate is 1,898 pairs, 259 of which were in Virginia (U.S. Fish and Wildlife Service 2013). Piping plovers are not known to occur at the Little Creek installation of JEB Little Creek-Fort Story, but a small number of individuals were observed at Fort Story in the spring of 2013 (U.S. Department of the Navy 2013a). The closest historical nesting location is Craney Island, approximately 10.5 miles (17 km) to the west (Boettcher et al. 2007). Piping plovers have also been observed at Fisherman Island, approximately 12 miles (20 kilometers) to the northeast of JEB Little Creek-Fort Story, where two pairs were observed (Virginia Department of Game and Inland Fisheries 2012). Nesting takes place from April to July (U.S. Fish and Wildlife Service 1999).

Roseate Tern

Five subspecies of the roseate tern have been described, though some taxonomic designations are uncertain. *S. dougallii dougallii* is the subspecies that could occur in the JLOTS study area (Gochfeld et al. 1998). All subspecies are similar in appearance to *S. dougallii dougallii*, with slight differences in wing length and bill color (U.S. Fish and Wildlife Service 2010).

In 1987, the roseate tern was listed as endangered under the ESA along the Atlantic coast of the United States (Maine to North Carolina), in Canadian provinces of Newfoundland, Nova Scotia, and Quebec, as well as in Bermuda. The species is listed as threatened under the ESA in the rest of the western hemisphere, including Florida, Puerto Rico, and the Virgin Islands (U.S. Fish and Wildlife Service 2010a). No critical habitat has been designated for this species in the United States. The U.S. population was estimated to be 3,457 breeding pairs in 2004 (Roseate Tern Recovery Team 2005).

Roseate terns arrive at their breeding grounds in late April and early May and spend approximately two weeks feeding before they occupy nesting grounds (U.S. Fish and Wildlife Service 1998). They migrate in late August and early September, traveling in groups to wintering grounds along the northern and eastern South American coast (Gochfeld et al. 1998; Kirkham and Nettleship 1987; U.S. Fish and Wildlife Service 1998). Their migration route is believed to traverse directly south across the western North Atlantic (U.S. Fish and Wildlife Service 1998). Local commutes of up to 16 miles (25 kilometers) from nesting grounds to dependable foraging sites have been documented (Nisbet and Spendelow 1999).

Roseate terns are colonial breeders, and both the North Atlantic and Caribbean populations are known to nest on a limited number of small islands off New York and Massachusetts (Gochfeld et al. 1998). They nest on islands near or under cover, such as vegetation, rocks, driftwood, and even human-made objects. They have also been documented nesting on sand dunes found at the end of barrier beaches (U.S. Fish and Wildlife Service 1998). North American roseate terns use moderately to heavily vegetated sites for nesting (Burger and Gochfeld 1988). They forage at sea, and their diet is composed of small fish, including sand lance and herring (Heinemann n.d.; U.S. Fish and Wildlife Service 2011). The roseate tern has been recorded in the City of Virginia Beach and may be present at JEB Little Creek-Fort Story although it has not been sighted on JEB Little Creek-Fort Story.

Red Knot

Red knots found on the Atlantic coast of the United States and Canada belong to the subspecies *C. canutus rufa* (Harrington 2013). This subspecies of red knot was listed as threatened (79 FR 73705-73748) under the ESA on December 11, 2014.

Red knots breed on the central Canadian arctic tundra and migrate along the Atlantic coast to winter as far as South America. Important stopover areas during migration include the Delaware Bay and Virginia's barrier islands along the Delmarva Peninsula. Based on resightings of birds banded in South Carolina and Georgia from 1999 to 2002, the southeast wintering population was estimated at 11,700 ± 1,000 (standard error) red knots. Although there appears to have been a gradual shift in the migratory paths of some of the southeastern knots from the Florida Gulf coast to the Atlantic coasts of Georgia and South Carolina, population estimates for the southeast region in the 2000s were at about the same level as during the 1980s. Based on recent modeling using resightings of marked birds staging in Georgia in the fall as well as other evidence, the southeast wintering group may number as high as 20,000, but field survey data are not available to corroborate this estimate (U.S. Fish and Wildlife Service 2013a).

Red knots forage by surface pecking and probing for intertidal invertebrates and various species of mussels and molluscs (Harrington 2013). During spring migration, a major food source for red knots are horseshoe crab eggs; millions of which can be found in the Delaware Bay during late May (Botton et al. 1994). Red knot migration coincides with the horseshoe crabs laying their eggs, allowing birds to restore fat reserves to continue northward migration to the arctic (Harrington 2013; Tsipoura and Burger 1999);

In Virginia, red knots have been observed foraging during the day and at night (Cohen et al. 2011) on invertebrates and blue mussel spat (Atkinson et al. 2006). Red knot numbers around the study area typically peak in mid to late spring (U.S. Fish and Wildlife Service 2007); Fisherman's Island, 12 miles (19 kilometers) northeast of JEB Little Creek-Fort Story, is an important stopover location for this species (Smith et al. 2008).

Bald Eagle

Under the Endangered Species Preservation Act of 1966, which preceded the ESA, bald eagles were officially declared an endangered species in 1967 in all areas of the United States south of the 40th parallel. On July 4, 1976, the U.S. Fish and Wildlife Service officially listed the bald eagle as endangered in 43 of the lower 48 states, and threatened in Wisconsin, Minnesota, Michigan, Washington, and Oregon. In 1995, the bald eagle's status was changed to threatened in all of the lower 48 states. In 2007, the species was removed from the ESA list of threatened and endangered species as their population in the lower 48 states rebounded from 417 breeding pairs in 1963 to just under 9,800. Bald eagles remain protected under the Bald and Golden Eagle Protection Act.

Bald eagles are opportunistic feeders that generally prefer fish. The adults are known to scavenge prey items from other species, and capture smaller birds as prey from the water's surface (Buehler 2000).

Bald eagles nest, forage, and winter along the Atlantic coast, and are regularly observed in the Chesapeake Bay region. The area around JEB Little Creek-Fort Story is important for bald eagles as it is a convergence point for all three geographically distinct populations (northeast, southeast, and Chesapeake Bay) (Watts et al. 2007). In 2011, the breeding population in Virginia was estimated to be over 730 pairs (Virginia Department of Game and Inland Fisheries 2014). While no bald eagles are known to nest on JEB Little Creek-Fort Story, incidental sightings are common in the area (Virginia Beach Audubon Society 2013; Huxley-Nelson pers. obs. 2014; Schaeffer pers. comm. 2014).

3.9.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

Potential impacts on terrestrial wildlife and birds are summarized in Table 3.9-2. The details are discussed in the following sections.

3.9.2.2.1 Artificial Light

Illuminance is a measure of how much light illuminates a surface and is expressed in foot candles or lux. Table 3.9-1 illustrates illumination from various sources; how bright sources appear depend greatly on ambient conditions; light from a flashlight looks much brighter in a dark room than in full sunlight. Various administrative manuals indicate that portable lights used for construction activities (expected to be similar to those used during the various JLOTS FTXs) can range from 50-200 lux, depending on the requirements of the particular work being performed (Vecellio and McCarthy 2006). While illuminance measurements of military vehicles are not available, the illuminance of passenger vehicle headlights can be up to 4 lux at a distance of 250 feet (76 meters) (Chrysler et al. 2003).

Table 3.9-1: Illumination from Common Sources

Source	Illumination (lux)
Full sunlight	103,000
Partly sunny	50,000
Operating table	18,000
Bright office	400 - 600
Full moon, clear conditions	0.1 – 0.3
Overcast night sky	0.0003 – 0.0001

Adapted from Rich and Longcore 2005

Lights are used on the floating causeways. However, illuminance from these lights is expected to be consistent with other light sources used during JLOTS FTXs.

Terrestrial Mammals, Reptiles, and Amphibians

The use of artificial lights on vehicles, equipment and land during the Improved Navy Lighterage System, cargo marshalling and movement, and tent encampment FTXs may result in physiological or behavioral changes for mammals, reptiles, and amphibians in the study area. Studies have suggested that behaviors such as vigilance, foraging, reproduction, and locomotion can be altered by artificial lights. The level of these behavioral changes can be influenced by the species' visual acuity and light intensity relative to the animals' surroundings (Lashley et al. 2014; Le Tallec et al. 2013; Baker and Richardson 2006; Bird et al. 2004). Artificial lighting may attract bats to the study area because they feed on insects that are drawn to portable lights (Rydell 1992; Truxa and Fiedler 2012). However, lighting that would be used during the FTXs would be of moderate intensity and would be no greater than lights used in commercial and some residential areas. Impacts would be highly localized to the immediate area where they are being used, and the potential for effects is expected to decrease rapidly with distance from the source of the artificial light. Since wildlife is not expected to be in the immediate activity area, no significant impacts from artificial lighting would be anticipated.

Birds

Overall effects of artificial lighting are expected to be similar to those that may be experienced by mammals. Changes in physiology (e.g., stress and reproductive hormone levels) and behavior (e.g., avoidance or pursuit of flying insects that may be attracted to the area) may occur

(Dominoni et al. 2013; Titulaer et al. 2012; Schroeder et al. 2012), but are expected to be temporary and insignificant. Further, effects would be largely limited to avian species that are active at night.

Table 3.9-2: Potential Terrestrial Wildlife and Bird Stressors Resulting from JLOTS Activities – No Action Alternative

FTX	Artificial Light	Entanglement	Temporary Loss of Habitat	Temporary Reduction in Water Quality	Vehicle and Vessel Strikes	Vehicle, Vessel, and Equipment Noise
Improved Navy Lighterage System	all locations	--	--	all locations	all locations	all locations
Amphibious Bulk Liquid Transfer System	--	--	--	--	--	all locations
Tactical Water Purification System	--	--	--	all locations	--	all locations
Cargo Marshalling and Movement	all locations	--	all locations	--	all locations	all locations
Tent Encampment	all locations	--	all locations	--	--	all locations
Floating Causeway	Fort Story; Camp Lejeune	--	Fort Story; Camp Lejeune	Fort Story; Camp Lejeune	Fort Story; Camp Lejeune	Fort Story; Camp Lejeune
Effects Analysis						
Timing	year-round (all locations)	n/a	year-round (all locations)			
Proximity	Limited to the immediate area around the activity; intensity diminishes with distance from source.	n/a	Limited to the immediate area around the activity			Intensity of potential effects is expected to correlate positively with proximity to sources of noise.
Duration, Frequency, and Distribution	≤ 60 days during full JLOTS (all locations); intermittent during night hours for the rest of the year (Little Creek-Fort Story)	n/a	≤ 60 days during full JLOTS (all locations); several additional intermittent days year-round (JEB Little Creek-Fort Story)			
Expected Recurrence	Recurrence coincides with frequency of applicable FTX (Table 2-2.2); lower intensity throughout the year (excluding Camp Lejeune, which has no quarterly or routine JLOTS training) , and higher intensity during full JLOTS. No recurrence once FTX ends.	n/a	Recurrence coincides with frequency of applicable FTX (Table 2-2.2); lower intensity throughout the year (excluding Camp Lejeune, which has no quarterly or routine JLOTS training), and higher intensity during full JLOTS. No recurrence once FTX ends.			

-- = this stressor is not expected to result from the FTX. For the purposes of this analysis, cargo marshalling occurs only in the terrestrial environment. Impacts from cargo marshalling in the marine environment are addressed under the Improved Navy Lighterage System

3.9.2.2.2 Entanglement

Common sources of entanglement risks for terrestrial wildlife and birds are fishing line, landscape netting, decorative strings (e.g., from kites, balloons), and plastic debris such as six-pack rings (Chicago Bird Collision Monitors 2012). None of these materials would be used during JLOTS activities. Refuse is disposed of through standard Navy procedures, and any remaining materials that would pose an entanglement threat to terrestrial wildlife or birds would be limited to the tent encampment area, which animals are expected to avoid. Therefore, entanglement risks for terrestrial wildlife and birds are discountable.

3.9.2.2.3 Temporary Loss of Habitat

Shoreline activities would take place on beaches that are largely devoid of vegetative cover; no activities would take place in the primary and secondary dunes that line those beaches. During all training exercises, personnel and vehicle movements to and from the beach would be through existing dune breaks and trails. Dune vegetation would not be disturbed.

Inland activities (tent encampments) would be limited to designated training areas consisting mostly of grass fields with a few, scattered ornamental trees. The grass cover would be compacted and damaged, but those areas are routinely used for such activities and are expected to recover between training exercises. No natural or sensitive habitat would be affected.

Construction of the floating causeway (at Fort Story only under the No Action Alternative) may result in a temporary loss of habitat. Temporary reductions of water quality resulting from the floating causeway would be limited to birds that forage underwater, and would be highly localized to the causeway itself. The duration and scope are limited to no more than 60 days per year for a full JLOTS exercise, and quarterly or routine training; and the actual footprint of the pier (see Section 2.1.1), respectively. Birds are expected to avoid the immediate area, but if they do occur, the structure of the floating causeway would not prohibit them from diving underneath it.

While these areas may be utilized by terrestrial wildlife and birds when military training is not taking place, the quality of the habitat is relatively low. Impacts would be limited to the time and space occupied by military personnel and equipment. No permanent loss of habitat would occur.

3.9.2.2.4 Temporary Reduction of Water Quality

Since sediments are expected to be disturbed in the immediate vicinity of the activities taking place (e.g., beneath vessels, next to anchors, etc.), potential effects would be limited to diving birds foraging in those areas. Sediment disturbance would be most concentrated toward the sea floor, away from where birds would forage. This combined with the low likelihood of birds being in the immediate vicinity as they avoid the noise and activity (McClure et al. 2013; Dooling 2002) and movement of vessels minimizes the likelihood of impacts on birds from temporary reductions of water quality.

3.9.2.2.5 Vehicle and Vessel Strikes

Based on the terrain and safety requirements, vehicles and vessels are not expected to attain speeds that would be likely to result in collisions with terrestrial wildlife and birds.

3.9.2.2.6 Vehicle, Vessel, and Equipment Noise

Terrestrial Mammals, Reptiles and Amphibians

Elevated noise levels would be expected in the immediate vicinity of the FTXs as a result of equipment and vehicle operation, and personnel communications. Behavioral responses may include avoidance, changes in vocalization patterns (Penna and Zúñiga 2014) or temporary cessation of foraging or reproductive activities. Another effect of JLOTS activities may be masking of vocalizations (Vargas-Salinas and Amézquita 2014). Natural and artificial sounds can disrupt behavior by auditory masking, or interfering with an animal's ability to detect and interpret other relevant sounds, such as communication signals (Wartzok et al. 2003).

Masking occurs when both the signal and masking sound have similar frequencies and either overlap or occur very close to each other in time. A signal could be masked if the noise is within a certain "critical bandwidth" around the signal's frequency and its energy level is similar or higher (Holt 2009). Additional factors influencing masking are the temporal structure of the noise and the behavioral and environmental context in which the signal is produced. Continuous noise is more likely to mask signals than intermittent noise of the same amplitude; quiet "gaps" in the intermittent noise allow detection of signals which may not be detectable during continuous noise (Brumm and Slabbekoorn 2005). Noise from FTX activities could cause masking if it disrupts communication and other hearing-dependent behavior. Species occurring in the study area may have habituated to noise (Brown et al. 2012) from military activities as a result of year-round, active use of the location for other training exercises. Further, effects would be expected to diminish rapidly with distance from the JLOTS exercise.

Birds

Overall effects of noise are expected to be similar to those that may be experienced by mammals, reptiles, and amphibians. Changes in physiology (e.g., stress, reproductive hormone levels) (Blickley et al. 2012; Sanyal et al. 2013) and behavior (e.g., avoidance, foraging, vocalization, attention) (Shen 1983; Bowles 1995) may occur, but are expected to be temporary and insignificant. Research suggests that bird populations in urban environments can rebound very shortly after even large-scale, extremely noisy events (Payne et al. 2012). Further, potential for effects would be expected to decrease rapidly with distance from the source of the noise, particularly if topography or vegetation attenuates the signal (Washington State Department of Transportation 2014).

3.9.2.2.7 Summary

Because the No Action Alternative represents a continuation of the existing frequency and intensity of annual JLOTS training at JEB Little Creek-Fort Story, its impacts on terrestrial wildlife and birds are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. They would remain temporary and localized. There would be no permanent loss of habitat. All impacts would cease entirely between training exercises. Some individual animals may experience temporary physiological or behavioral effects such as avoidance while training activities are taking place, but no species-level consequences are expected. The No Action Alternative would not compromise the capacity of the area to continue supporting the terrestrial wildlife and bird species it currently support. Thus, there would be no significant impacts on terrestrial wildlife and birds under the No Action Alternative.

Pursuant to the ESA, the No Action Alternative at JEB Little Creek-Fort Story:

- ***may affect, but is not likely to adversely affect the ESA-listed piping plover.***
- ***would have no effect on the ESA-listed roseate tern.***
- ***would have no effect on the ESA-listed red knot.***
- ***would have no effect on piping plover critical habitat.***

Under the Migratory Bird Treaty Act regulations applicable to military readiness activities (50 C.F.R. Part 21), the No Action Alternative at JEB Little Creek-Fort Story would not result in a significant adverse effect on migratory bird populations.

Pursuant to the Bald and Golden Eagle Protection Act, the No Action Alternative at JEB Little Creek-Fort Story would not be expected to result in any incidental takes of bald eagles.

3.9.2.3 No Action Alternative – Camp Lejeune – Existing Environment

Terrestrial wildlife and bird species at Camp Lejeune are typical of those found in the Mid-Atlantic and barrier islands of North Carolina. The most common species are as described above in Section 3.9.2.1, with differences described below.

3.9.2.3.1 Terrestrial Mammals

In addition to the species described in Section 3.9.2.1.1, black bear and fox squirrels are also known to occur at Camp Lejeune (U.S. Marine Corps 2006).

3.9.2.3.2 Reptiles and Amphibians

Many of the reptiles and amphibians included in the Existing Conditions section for JEB Little Creek-Fort Story may also be observed at Camp Lejeune. Species not previously listed that are known to occur in coastal North Carolina are summarized Table E-2 in Appendix E, *Reptiles and Amphibians Potentially Occurring in the JLOTS Study Area*.

3.9.2.3.3 Birds

Bird species potentially occurring at Camp Lejeune are expected to be similar to those described in Section 3.9.2.1.3.

3.9.2.3.4 Protected Birds – Endangered Species Act and Bald and Golden Eagle Protection Act

Piping Plover

North Carolina is important to piping plovers during all stages of their life cycle. The state represents the northern extreme of the wintering range, the southern extreme of the breeding range, and is an important stop-over area during spring and fall migration (Cameron et al. 2005). The 2012 Atlantic Coast piping plover preliminary population estimate indicates 70 nesting pairs in North Carolina (U.S. Fish and Wildlife Service 2013). USFWS has designated several areas along the North Carolina coast as critical wintering habitat for the piping plover. The nearest unit is NC-10, located to the northeast of Camp Lejeune on both sides of Bogue Inlet (U.S. Fish and Wildlife Service 2008). There is no designated critical habitat on Camp Lejeune. There is, however, suitable piping plover habitat. This species has been documented foraging on Onslow Beach during the winter, spring and fall migration periods, and during the nesting season. Beginning in 2000, biweekly shorebird surveys along the accessible portion of Onslow Beach have been conducted. While piping plovers can forage almost anywhere along Onslow Beach, only the large overwash area and wider areas of accreting sand along the inlets are considered suitable for plover breeding. Suitable nesting habitat falls largely outside of the study area.

Roseate Tern

Roseate terns are not known to occur at Camp Lejeune.

Red Knot

Monitoring conducted for the Bogue Inlet Channel Erosion Response Project (to the northeast of Camp Lejeune) resulted in several hundred observations of red knots between 2004 and 2009, with a peak of 409 in 2008. Red knots were observed roosting and foraging in intertidal habitat, and the highest numbers were seen during spring migration (U.S. Army Corps of Engineers 2009). Bear Island, Lea-Hutaff Island, and shoals in Onslow Bay are important migratory stopover sites for piping plovers and red knots (Cameron et al. 2005; U.S. Fish and Wildlife Service 2007). This species may occur in the study area during annual migration.

Bald Eagle

In 2004, at least 60 active bald eagle nesting territories were established and over 80 juveniles fledged in North Carolina (North Carolina Wildlife Resources Commission 2005). Since 2000, there has been a bald eagle nest at the junction of Snead’s Creek and the New River. Protective buffers have been established around the nest to limit air and ground activities that could disrupt nesting (U.S. Marine Corps 2009).

3.9.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

Potential impacts on terrestrial wildlife and birds at Camp Lejeune are summarized in Table 3.9-2. The proposed training activities under the No Action Alternative at Camp Lejeune would be the same as those of the No Action Alternative at JEB Little Creek-Fort Story. However, quarterly and routine JLOTS training would not occur. Therefore, analyses in Section 3.9.2.2 are applicable to the No Action Alternative at Camp Lejeune, but potential impacts on terrestrial wildlife and birds are expected to be of lower frequency, duration, and intensity.

3.9.2.4.1 Summary

The proposed training activities under the No Action Alternative at Camp Lejeune would be the same as those of the No Action Alternative at JEB Little Creek-Fort Story. However, routine and quarterly training in support of JLOTS would not occur. Therefore, analyses in Section 3.9.2.2 are applicable to the No Action Alternative at Camp Lejeune, but potential impacts to terrestrial wildlife are expected to be of lower frequency, duration, and intensity.

Because the No Action Alternative at Camp Lejeune represents a continuation of the existing frequency and intensity of annual JLOTS training at this location, its impacts on terrestrial species and birds are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. Some individual animals may experience temporary physiological or behavioral effects such as avoidance while training activities are taking place, but no species-level consequences would be expected. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. The No Action Alternative would not compromise the capacity of the area to continue supporting the terrestrial wildlife and bird species they currently support. Thus, there would be no significant impacts on terrestrial wildlife and birds under the No Action Alternative at Camp Lejeune.

Pursuant to the ESA, the No Action Alternative at Camp Lejeune:

- ***may affect, but is not likely to adversely affect the ESA-listed piping plover.***
- ***would have no effect on the ESA-listed roseate tern.***
- ***would have no effect on the ESA-listed red knot.***
- ***would have no effect on piping plover critical habitat.***

Under the Migratory Bird Treaty Act regulations applicable to military readiness activities (50 C.F.R. Part 21), the No Action Alternative at Camp Lejeune would not result in a significant adverse effect on migratory bird populations.

Pursuant to the Bald and Golden Eagle Protection Act, the No Action Alternative at Camp Lejeune would not be expected to result in any incidental takes of bald eagles.

3.9.2.5 No Action Alternative – Conclusion

Because the No Action Alternative represents a continuation of the existing frequency and intensity of annual JLOTS training at this location, its impacts on terrestrial species and birds are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. Some individual animals may experience temporary physiological or behavioral effects such as avoidance while training activities are taking place, but no species-level consequences would be expected. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. The No Action Alternative would not compromise the capacity of the area to continue supporting the terrestrial wildlife and bird species they currently support. Thus, there would be no significant impacts on terrestrial wildlife and birds under the No Action Alternative.

Pursuant to the ESA, the No Action Alternative:

- ***may affect, but is not likely to adversely affect the ESA-listed piping plover.***
- ***would have no effect on the ESA-listed roseate tern.***
- ***would have no effect on the ESA-listed red knot.***
- ***would have no effect on piping plover critical habitat.***

Under the Migratory Bird Treaty Act regulations applicable to military readiness activities (50 C.F.R. Part 21), the No Action Alternative would not result in a significant adverse effect on migratory bird populations.

Pursuant to the Bald and Golden Eagle Protection Act, the No Action Alternative would not be expected to result in any incidental takes of bald eagles.

3.9.3 Action Alternative

3.9.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

The existing environment at JEB Little Creek-Fort Story is described in Section 3.9.2.1.

3.9.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

Potential impacts on terrestrial wildlife and birds at JEB Little Creek-Fort Story are summarized in Table 3.9-3.

The Action Alternative at JEB Little Creek-Fort Story would include the same annual training activities as the No Action Alternative, plus floating causeway (described in the No Action Alternative for Fort Story) and ELCAS (M) FTXs. Therefore, the impacts of the Action Alternative on terrestrial wildlife and birds would be similar to those of the No Action Alternative at JEB Little Creek-Fort Story, with the addition of the impacts described below.

3.9.3.2.1 Artificial Light

Lights are used on the floating causeways and ELCAS (M). However, potential effects from artificial light are expected to be consistent with those from other light sources in use during JLOTS FTXs as described in Section 3.9.2.2.1 under the No Action Alternative at JEB Little Creek-Fort Story.

3.9.3.2.2 Entanglement

Common sources of entanglement risks for terrestrial wildlife and birds are fishing line, landscape netting, decorative strings (e.g., from kites, balloons), and plastic debris such as six-pack rings (Chicago Bird Collision Monitors 2012). None of these materials would be used during JLOTS activities. Refuse is disposed of through standard Navy procedures, and any remaining materials that would pose an entanglement threat to terrestrial wildlife or birds would be limited to the tent encampment area, which animals are expected to avoid. No entanglement risks would be associated with the floating causeway or ELCAS (M) FTXs. Therefore, entanglement risks for terrestrial wildlife and birds are discountable.

3.9.3.2.3 Temporary Loss of Habitat

Construction of the floating causeway and ELCAS (M) may result in a temporary loss of habitat. Because the ELCAS (M) is also a temporary pier that would be constructed from shore, effects (limited to sea birds) are expected to be consistent with those described for the floating causeway at Fort Story in Section 3.9.2.2.3 under the No Action Alternative.

Temporary reductions of water quality resulting from the floating causeway and ELCAS (M) FTXs are expected to be consistent with those of the No Action Alternative, and resulting effects would be limited to birds that forage underwater. However, impacts would last no more than 30 days at each location (60 days total) in any given year for the ELCAS (M). As with anchors, piles being driven or extracted for the ELCAS (M) FTX may disturb sediments, but the results would be highly localized to the piles themselves.

Table 3.9-3: Potential Terrestrial Wildlife and Bird Stressors Resulting from JLOTS Activities – Action Alternative

FTX	Artificial Light	Entanglement	Temporary Loss of Habitat	Temporary Reduction in Water Quality	Vehicle and Vessel Strikes	Noise	
						Vehicles, Vessels, and Equipment	Pile Driving
Improved Navy Lighterage System	all locations	--	--	all locations	all locations	all locations	--
Amphibious Bulk Liquid Transfer System	--	--	--	--	--	all locations	--
Tactical Water Purification System	--	--	--	all locations	--	all locations	--
Cargo Marshalling and Movement	all locations	--	all locations	--	all locations	all locations	--
Tent Encampment	all locations	--	all locations	--	--	all locations	--
Floating Causeway	all locations	--	all locations	all locations	all locations	all locations	--
ELCAS (M)	all locations	--	all locations				
Effects Analysis							
Timing	year-round (all locations)	n/a	year-round (all locations)				
Proximity	Limited to the immediate area around the activity; intensity diminishes with distance from source	n/a	Limited to the immediate area around the activity.			Intensity of potential effects can be expected to correlate positively with proximity to sources of noise.	
Duration, Frequency, and Distribution	≤ 60 days during full JLOTS; intermittent during night hours for the rest of the year (JEB Little Creek-Fort Story only). Lower intensity throughout the year (excluding Camp Lejeune[1]) and higher intensity during full JLOTS.	n/a	≤ 60 days during full JLOTS (all locations); several additional intermittent days year-round (JEB Little Creek-Fort Story only); lower intensity throughout the year (excluding Camp Lejeune[1]), and higher intensity during full JLOTS.				Once annually at JEB Little Creek-Fort Story and Camp Lejeune, for ≤30 days; 1.5 net hours max. per day.
Expected Recurrence	Recurrence coincides with frequency of applicable FTX (Table 2.2-2); No recurrence once FTX ends	n/a	Recurrence coincides with frequency of applicable FTX (Table 2.2-2); No recurrence once FTX ends.				

-- = this stressor is not expected to result from the FTX. For the purposes of this analysis, cargo marshaling occurs only in the terrestrial environment. Impacts from cargo marshaling in the marine environment are addressed under the Improved Navy Lighterage System; [1]no quarterly or routine JLOTS training would occur at Camp Lejeune

3.9.3.2.4 Vehicle and Vessel Strikes

Potential impacts from vehicle and vessel strikes would be expected to increase only slightly as a result of the floating causeway and ELCAS (M) FTXs, and would be limited to sea birds. Much of the activity associated with these exercises takes place on the piers themselves and onshore; the net increase in vehicle and vessel traffic from what is expected for the No Action Alternative would be insignificant.

3.9.3.2.5 Vehicle, Vessel, and Equipment Noise

Potential impacts from vehicle, vessel, and equipment noise would be expected to increase only slightly as a result of the floating causeway and ELCAS (M) FTXs. Much of the activity associated with these exercises takes place on the piers themselves and onshore; the net increase in vehicle, vessel, and equipment noise from the Action Alternative would be insignificant.

3.9.3.2.6 Airborne Noise – Pile Driving (Construction of the Elevated Causeway System, Modular)

Mammals, Reptiles and Amphibians

While specific behavioral and physiological responses to pile driving noise in terrestrial mammals, reptiles and amphibians are not well understood, effects are expected to be similar to those described in Section 3.9.2.2.6 under the No Action Alternative. The potential exposure time for pile driving and extraction noise on mammals, reptiles and amphibians on any given day would be no more than 1.5 net hours (Table 3.9-3).

Birds

Behavioral and physiological responses of birds to pile driving are not well studied. Effects of pile driving noise are expected to be similar to those described in Section 3.9.2.2.6 under the No Action Alternative. Effects could include flushing, aborted feeding attempts, cessation of feeding, interrupted resting attempts, increased stress hormone levels, and avoidance of the activity area (Ronconi and St. Clair 2002; Wasser et al. 1997; Remage-Healey and Romero 2000a, 2000b, 2001; Weimerskirch et al. 2002). These behavioral changes may impair birds' ability to forage, provision chicks in the nest, create and maintain pair bonds, or rest. Energy expenditures due to avoidance of elevated sound pressure levels may increase. Conversely, if small fish are killed or injured as a result of pile driving, foraging birds may be attracted to the work area to feed on them in spite of the noise levels (Cooper 1982).

Even without the attractant of stunned or killed fish, birds could continue to forage close to the study area and be exposed to noise from pile driving and extraction. For example, monitoring work at the Hood Canal Bridge in Washington demonstrated that marbled murrelets would continue to dive and forage within 984 ft. (300 m) of active pile driving operations (Entranco and Hamer Environmental 2005), indicating that foraging birds may habituate to such noise. During construction of the offshore wind farm Egmond aan Zee in the Netherlands, observers reported that birds (mainly gulls and terns) passing by the activity area did not show a noticeable reaction to pile driving noise (Leopold and Camphuysen 2009).

Airborne noise levels from the Action Alternative are not expected to be injurious to birds within the study area. The source levels for airborne noise from pile driving and extraction (Table 3.9-4) would be well below those known to cause injury to birds in laboratory situations. Studies of captive birds indicate that long-term exposure to high levels (greater than or equal to 93 dBA) of non-impulsive noise (i.e., vibratory pile extraction) or to multiple impulses over 125 dBA can cause temporary threshold shifts (Dooling and Popper 2007). However, birds may recover auditory function even after repeated exposure to elevated sound levels (Niemiec et al. 1994; Corwin and Cotanche 1988).

Table 3.9-4: Estimated Source Levels for Airborne Pile Driving Noise

Driving Type	Source Level
Impact Driving[1]	100 dBA at 36 ft. (11 m)
Vibratory Extraction[2]	96 dBA at 50 ft. (15 m)

Note: m = meters; dBA = A-weighted decibel scale; ft. = feet; Sources: [1]Washington State Department of Transportation 2010; [2]Illingworth & Rodkin 2012.

Use of soft starts would allow birds an opportunity to leave the immediate vicinity before full driving power is reached. Impact driving and vibratory extraction performed during the ELCAS (M) FTX would be intermittent, lasting 7 to 15 minutes per pile, and not exceeding approximately 1.5 net hours on any day. Over the course of the ELCAS (M) FTX, pile driving would not occur for more than 30 days at each location, for a maximum total of 60 days annually. Therefore, if birds were to remain in the vicinity, possible behavioral or physiological effects experienced as a result of pile driving are expected to be temporary and not cause permanent hearing loss or injury.

3.9.3.2.7 Underwater Noise – Pile Driving (Construction of the Elevated Causeway System, Modular)

Diving birds (e.g., loons, pelicans, some ducks, terns, and cormorants) may not hear well under water, compared to other (non-avian) terrestrial species, based on adaptations that protect their ears from pressure changes (Dooling and Therrien 2012). Common murres (*Uria aalge*) were deterred from gillnets by acoustic transmitters emitting 1.5 kHz pings at 120 dB re 1 μPa; however, there was no significant reduction in rhinoceros auklet (*Cerorhinca monocerata*) bycatch in the same nets (Melvin et al. 1999). Stemp (1985) found no effect from seismic survey activity on the distribution and abundance of seabirds, and Parsons (in Stemp 1985) reported that shearwaters with their heads underwater were observed within 100 ft. (30 m) of seismic sources (impulsive sounds) and did not respond[1]. Use of soft starts would allow diving birds an opportunity to leave the immediate vicinity before full driving power is reached. Exposure to underwater pile driving and extraction noise would be expected to occur only for very brief intervals, if at all, and at shallow depths. Combined with the hypothesized reduction in bird hearing sensitivity underwater, impacts on all diving birds from underwater pile driving and

[1] Effects of seismic survey underwater sound cannot directly be compared to effects of pile driving, particularly in shallow waters where sound propagation differs from that in deeper waters generally studied in seismic surveys.

extraction noise associated with the Action Alternative are expected to be insignificant and discountable.

3.9.3.2.8 Summary

Terrestrial wildlife is not expected to experience negative effects from the ELCAS (M) FTX in excess of those resulting from the other FTXs. As described above, bird responses to pile driving and extraction noise are expected to be variable. Some individuals may occupy the study area during pile driving without apparent disturbance, but others may be displaced with undetermined temporary effects.

Behavioral disturbance of some birds may occur, but it would be limited in duration, continuity, and range, and they would not cause population-level impacts or affect the continued survival of the species. These effects would be insignificant for individual birds; and discountable for the species as a whole. The ongoing conservation program measures implemented by the Navy (Chapter 4, *Standard Operating Procedures and Mitigation Measures*) are designed to further reduce potential impacts to birds. Based on the analysis performed above and the standard operating procedures and mitigation measures described in Chapter 4, the Action Alternative would have no significant impact on terrestrial wildlife and birds at JEB Little Creek-Fort Story.

Pursuant to the ESA, the Action Alternative at JEB Little Creek-Fort Story:

- ***may affect, but is not likely to adversely affect the ESA-listed piping plover.***
- ***would have no effect on the ESA-listed roseate tern.***
- ***would have no effect on the ESA-listed red knot.***
- ***would have no effect on piping plover critical habitat.***

Under the Migratory Bird Treaty Act regulations applicable to military readiness activities (50 C.F.R. Part 21), the Action Alternative at JEB Little Creek-Fort Story would not result in a significant adverse effect on migratory bird populations.

Pursuant to the Bald and Golden Eagle Protection Act, the Action Alternative at JEB Little Creek-Fort Story would not be expected to result in any incidental takes of bald eagles.

3.9.3.3 Action Alternative – Camp Lejeune – Existing Environment

Existing conditions for Camp Lejeune are summarized in Section 3.9.2.3 above.

3.9.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

Potential impacts on terrestrial wildlife and birds at Camp Lejeune are summarized in Table 3.9-3. The Action Alternative would include the same annual training activities as the No Action Alternative at Camp Lejeune, plus the ELCAS (M). Therefore, the potential impacts of the Action Alternative on terrestrial wildlife and birds would be similar to those of the No Action Alternative at Camp Lejeune, with the addition of the impacts associated with the ELCAS (M) described above in Sections 3.9.3.2.6 and 3.9.3.2.7 for airborne and underwater noise resulting from construction and dismantling.

3.9.3.4.1 Summary

Terrestrial wildlife would not be expected to experience effects from the ELCAS (M) that exceed those resulting from the other FTXs. As described above, bird responses to pile driving and extraction noise are expected to be variable. Some individuals may occupy the study area during pile driving without apparent disturbance, but others may be displaced with undetermined temporary effects.

Behavioral disturbance of some birds may occur, but it would be limited in duration, continuity, and range, and they would not cause population-level impacts or affect the continued survival of the species. These effects would be insignificant for individual birds; and discountable for the species as a whole. The ongoing conservation program measures implemented by the Navy (Chapter 4, *Standard Operating Procedures and Mitigation Measures*) are designed to further reduce potential impacts to birds. Based on the analysis performed above and the standard operating procedures and mitigation measures described in Chapter 4, the Action Alternative would have no significant impact on terrestrial wildlife and birds at Camp Lejeune.

Pursuant to the ESA, the Action Alternative at Camp Lejeune:

- ***may affect, but is not likely to adversely affect the ESA-listed piping plover.***
- ***would have no effect on the ESA-listed roseate tern.***
- ***would have no effect on the ESA-listed red knot.***
- ***would have no effect on piping plover critical habitat.***

Under the Migratory Bird Treaty Act regulations applicable to military readiness activities (50 C.F.R. Part 21), the Action Alternative would not result in a significant adverse effect on migratory bird populations.

Pursuant to the Bald and Golden Eagle Protection Act, the Action Alternative would not be expected to result in any incidental takes of bald eagles.

3.9.3.5 Action Alternative – Conclusion

Individual animals may be exposed to artificial light, temporary loss of habitat, vehicle or vessel strikes, or elevated noise levels under the Action Alternative. However, these threats are expected to be relatively infrequent, intermittent in nature, and highly localized within the study area. In addition, high sound pressure levels during pile installation and extraction under the Action Alternative may result in behavioral changes. Any animals that would be exposed may change their normal behavior patterns (e.g., vocalizations foraging habits, etc.) or be temporarily displaced from the immediate activity area. Any exposures would likely have only a minor effect on individuals, and no effect on their populations. Mitigation measures and standard operating procedures such as soft starts (Chapter 4, *Standard Operating Procedures and Mitigation Measures*) are expected to reduce the likelihood of potential adverse impacts to terrestrial wildlife and birds from pile driving. Nevertheless, some exposure may be unavoidable. These exposures would not be anticipated to have any adverse impact on population recruitment, survival, or recovery (in the case of piping plovers, roseate terns, and red knots) for any species that may be present in the study area. Therefore, no significant impact on terrestrial wildlife or birds would be anticipated as a result of the Action Alternative at JEB Little Creek-Fort Story or Camp Lejeune.

Pursuant to the ESA, the Action Alternative:

- ***may affect, but is not likely to adversely affect the ESA-listed piping plover.***
- ***would have no effect on the ESA-listed roseate tern.***
- ***would have no effect on the ESA-listed red knot.***
- ***would have no effect on piping plover critical habitat.***

Under the Migratory Bird Treaty Act regulations applicable to military readiness activities (50 C.F.R. Part 21), the Action Alternative would not result in a significant adverse effect on migratory bird populations.

Pursuant to the Bald and Golden Eagle Protection Act, the Action Alternative would not be expected to result in any incidental takes of bald eagles.

3.10 Fish and Marine Invertebrates

3.10.1 Introduction

This section addresses fish and marine invertebrates that may occur in the JLOTS study area, and the impacts on them that may result from training activities. Applicable regulations for fish include the Endangered Species Act (introduced in Section 3.8) and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

The Magnuson-Stevens Act establishes federal management authority over all fishing within the U.S. Exclusive Economic Zone; all anadromous fish (fish that move from the sea to rivers to breed) throughout their migratory range; and all fish on the continental shelf and slope. Essential fish habitat is defined as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The National Marine Fisheries Service regulations further define the following terms (National Marine Fisheries Service 1999, 67 Federal Register 2343):

> **Waters** – Aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate.
>
> **Substrate** – Sediment, hard bottom, structures underlying the waters, and associated biological communities.
>
> **Necessary** – The habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem.
>
> **Spawning, breeding, feeding, or growth to maturity** – Stages representing a species' full life cycle.

As required by the Magnuson-Stevens Act, federal agencies must consult with the National Marine Fisheries Service's Habitat Conservation Division on any proposed federal action that may adversely affect essential fish habitat. An adverse effect under the act is any impact that reduces the quality or quantity of essential fish habitat. 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 or quantity of essential fish habitat. Adverse effects to essential fish habitat may result from actions occurring within essential fish habitat or outside of it and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 C.F.R. § 600.810).

In addition to essential fish habitat designations, Habitat Areas of Particular Concern are designated to provide additional focus for conservation efforts. These areas represent a subset of designated essential fish habitat that are especially important ecologically to a species or species life stage or are vulnerable to degradation (50 C.F.R. §§ 600.805-600.815). Categorization as a Habitat Area of Particular Concern does not confer additional protection or restriction to the designated area, however.

3.10.2 No Action Alternative

3.10.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

3.10.2.1.1 Fish and Marine Invertebrates

Fish

Numerous estuarine and marine fish use the lower Chesapeake Bay as a juvenile nursery and adult residence. Estuarine residents include bay anchovies, oyster toadfish, sheepshead minnows, killifishes, silversides, pipefish, gobies, and hogchokers (Stone et al. 1994). The anchovies and silversides are pelagic species, whereas the other species are more structure oriented (e.g., marsh surface, tidal creeks, oyster reefs) (Minello 1999). All life stages of these species are spent within the estuary and several of the species are highly abundant. Fish such as mullets, bluefish, pinfish, butterfish, and drums (croaker, weakfish, seatrout, spot, red drum) are coastal ocean and inlet spawners; eggs and larval stages free-drift from spawning grounds and juvenile stages migrate to the coastal nurseries. Bluefish, spot, and Atlantic croaker are particularly abundant in the area.

Other species also can be found within the estuary seasonally. Several anadromous fish including alewife, blueback herring, American shad, striped bass, and white perch spawn in freshwater portions of the James and Nansemond rivers upstream of the site (Stone et al. 1994). Adults are common to abundant in this portion of Chesapeake Bay using the area for adult residence. Atlantic sturgeon may also occur in the study area (refer to 3.10.2.1.2, *Protected Fish*, below). The catadromous American eel migrate past the area to fresh water residential areas in the rivers. Some highly migratory species of billfish, tuna, and sharks may also occur in the study area (refer to Appendix F, *Essential Fish Habitat Descriptors for the JLOTS Study Area* for specifics).

Marine Invertebrates

Available mapping suggests absence of natural shellfish reefs in the area (National Oceanic and Atmospheric Administration 2011), although some reef material was planted in Little Creek as part of the Navy's commitment to the *Chesapeake Bay 2000 Agreement* and Executive Order 13508. In the spring of 2010, several small oyster reefs were installed in Little Creek Cove. Clean shell material was placed to provide habitat for eastern oyster, mud crabs, and other aquatic organisms. A total volume of 4,093 bushels of oyster shell were used to create the reef habitat. Annual surveys of the habitat are conducted in late summer to assess recruitment of new oysters (U.S. Department of the Navy 2013). Unmapped sedentary invertebrate beds occurring in soft bottom are formed by various clam or tube worm species, whereas oysters, mussels (*Mytilus* species), barnacles, and sponges grow attached to artificial structures and subtidal reef areas (Gosner and Peterson 1999).

Several mobile invertebrates are present in the estuary and include periwinkle snails, mud crabs, blue crabs, grass shrimp, and brown shrimp (Gosner and Peterson 1999; Stone et al. 1994; National Oceanic and Atmospheric Administration 2011a). Juvenile and adult blue crabs are abundant; mating and larval stages are also observed in the estuary, although females usually migrate to coastal ocean waters to brood and release eggs (Stone et al. 1994). Juvenile brown shrimp are common in the estuary during the spring and summer months (National Oceanic and Atmospheric Administration 2011a). Periwinkle snails, mud crabs, and grass shrimp spend all life stages in the estuary (Gosner and Peterson 1999; Stone et al. 1994) along shallow intertidal shorelines, marsh surfaces, seagrass beds, sedentary invertebrate beds, and oyster reefs (Minello 1999).

3.10.2.1.2 Protected Fish

Atlantic Sturgeon

The Atlantic sturgeon population is comprised of five distinct population segments. In 1996, USFWS and NMFS published a joint policy defining the phrase “distinct population segment” (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1996). The Southeast region includes the Carolina and South Atlantic distinct population segments, both of which are listed as endangered. The Northeast region includes the Chesapeake Bay and New York Bight distinct population segments, which are listed as endangered, and the Gulf of Maine distinct population segment, which is listed as threatened. No critical habitat has been proposed to date. Atlantic sturgeon near JEB Little Creek-Fort Story would most likely be part of the Chesapeake Bay distinct population segment. However, individuals from other distinct population segments could occur as well. Therefore, all five distinct population segments have been considered in this assessment.

As anadromous fish, mature Atlantic sturgeon undergo seasonal migrations between freshwater habitats, where they spawn, and marine waters, where they forage and grow. During nonspawning years, adults remain in marine waters either year-round or seasonally (Bain 1997). Spawning adults migrate upriver in the fall in the Chesapeake Bay, beginning in August (Balazik et al. 2012; Hager et al. 2014). Atlantic sturgeon return to their natal river to spawn, as indicated by tagging records and the relatively low rates of gene flow reported in population genetic studies (Atlantic Sturgeon Status Review Team 2007). After spawning in freshwater in the fall, adults migrate back into estuarine and marine waters. Males usually begin their spawning migration early and leave after the spawning season while females make rapid spawning migrations upstream and quickly depart following spawning (Bain 1997).

Tagging data indicate that immature Atlantic sturgeon disperse widely once they move into coastal waters (Secor et al. 2000). Dispersal is extensive: north and south along the Atlantic coast and seaward to the edge of the continental shelf (Bain 1997; National Marine Fisheries Service 2010).

In the United States, Atlantic sturgeon can occur as far north as the St. Croix River in Maine and as far south as the St. Johns River in Florida. Juveniles in the Northeast U.S. Continental Shelf and Scotian Shelf Large Marine Ecosystems may occur in salinities ranging from 5 to 25 parts per thousand in estuaries, usually over a mud-sand bottom (Dadswell 2006). Sub-adults and adults live in coastal waters and estuaries when not spawning, generally in shallow (35 to 165 feet [10 to 50 meters]) areas of the continental shelf, where they feed (National Marine Fisheries Service 2010). In a 2004 study using fisheries bycatch data, Atlantic sturgeon were found to be strongly associated with specific coastal areas such as the mouths of Narragansett Bay and Chesapeake Bay and the inlets of the North Carolina Outer Banks. Most fish were caught within a narrow range of depths (30 to 160 feet [10 to 50 meters]) over gravel and sand, and to lesser extent, silt and clay (Stein et al. 2004).

Like all sturgeon, the Atlantic sturgeon feeds along the bottom on invertebrates such as isopods, crustaceans, worms, and molluscs (National Marine Fisheries Service 2010a). It has also been documented to feed on fish (Bain 1997).

Atlantic sturgeon remain at the bottom and move into deeper waters (197 to 213 feet [60 to 65 meters]) when the temperature drops to between 37º and 46º F (3º and 8º C). They disperse back into shallower waters as temperatures rise again. Limited tracking has shown that they can stay in the same area for months, although sub-adults may move over large areas of the coast (Hager pers. comm. 2011). In the James River, adult fish enter in August and exit by late November (Balazik et al. 2012).

The Chesapeake Bay distinct population segment has two known spawning populations, which are found in the James River and the York River (Balazik et al. 2012; Hager et al., *in review*). The spawning population of the James River is thought to consist of fewer than 300 adults (National Marine Fisheries Service 2013), while the York River spawning population for a given year may consist of approximately 75 adults (Kahn et al. 2014).

The Navy initiated a study to track sturgeon movements in the lower Chesapeake Bay, including the waters off JEB Little Creek-Fort Story, in December 2012 through the establishment of a telemetry array (U.S. Department of the Navy 2014). The Navy's array consists of over 70 VEMCO acoustic receivers that detect the movements of fish that have been tagged with acoustic transmitters. Within the array, 126 and 135 tagged individual Atlantic sturgeon were detected off Little Creek and Fort Story, respectively, in 2013. Some of these detections may have been of the same individuals between Little Creek and Fort Story. Atlantic sturgeon were present each month throughout the year. During the colder months lower numbers were observed, followed by a dramatic increase in the spring (Figures 3.10-1 and 3.10-2).

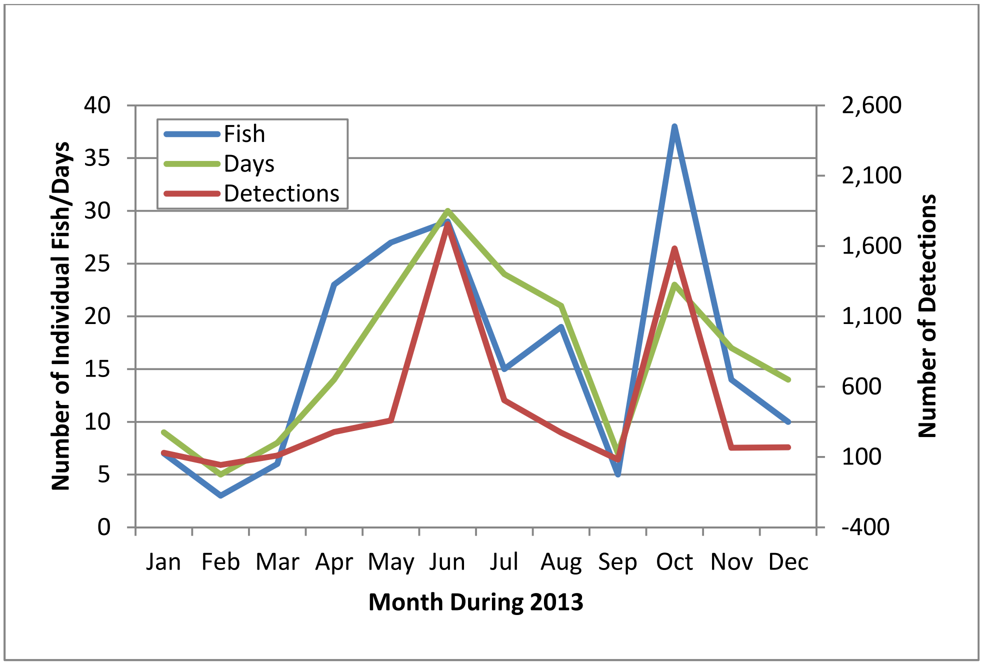


Figure 3.10-1: Atlantic Sturgeon Occurrence in the Waters off Little Creek

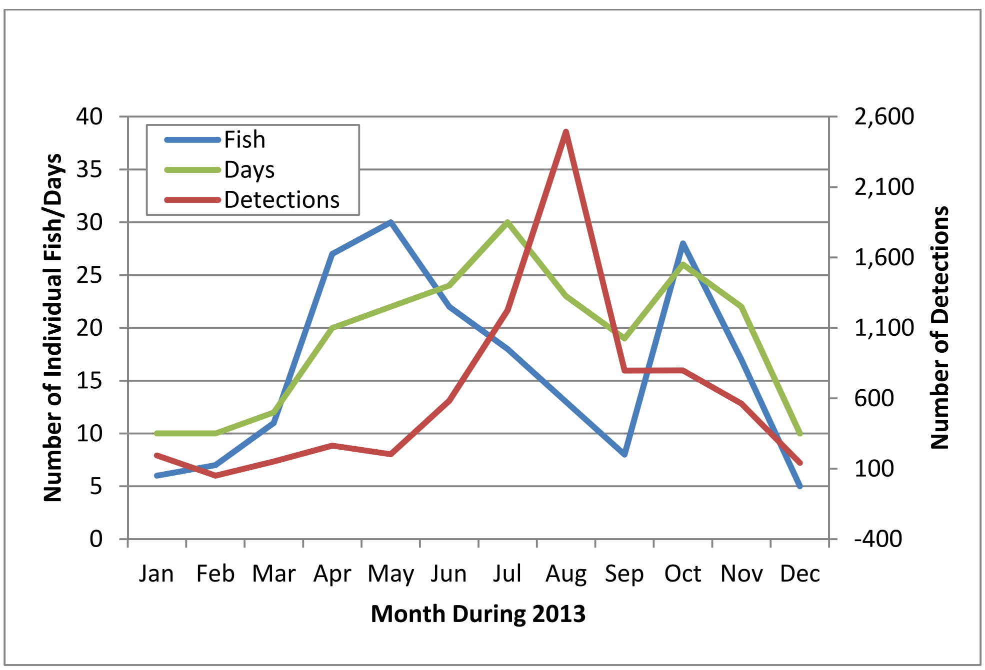


Figure 3.10-2: Atlantic Sturgeon Occurrence in Waters off Fort Story

Because the receivers only covered approximately 23 percent of the area off JEB Little Creek-Fort Story, it is important to note that tagged Atlantic sturgeon may have been present within the area more often during any given month, yet remained undetected. Also, as population estimates are unavailable for the species, it is not known what proportion of the total population the tagged sturgeon represent.

Shortnose Sturgeon

The shortnose sturgeon (*Acipenser brevirostrum*) is listed as endangered throughout its range. There are 19 distinct population segments in 25 river systems identified in the *Final Recovery Plan for the Shortnose Sturgeon Acipenser brevirostrum* (National Marine Fisheries Service 1998). The Chesapeake Bay distinct population segment is the only distinct population segment in Virginia; however, this distinct population segment represents shortnose sturgeon in the upper to mid-bay north of, and including, the Potomac River (National Marine Fisheries Service 2010a). Shortnose sturgeon are believed to move into the upper reaches of the Chesapeake Bay from the Delaware River via the Chesapeake and Delmarva canal and are not known to occur in the southern portion of the Bay south of the Potomac River (National Marine Fisheries Service 2010a). Critical habitat has not been designated for this species.

After hatching in the upstream reaches of rivers, shortnose sturgeon larvae orient into the river current and away from light sources, generally staying near the bottom and seeking cover. By two weeks of age, the larvae emerge from cover and swim in the water column, moving downstream from the spawning site. By two months, juvenile behavior becomes similar to adults, with active swimming in a wide range of thermal conditions (Deslauriers and Kieffer 2012) and foraging at night along the bottom (Richmond and Kynard 1995).

The shortnose sturgeon primarily occurs in freshwater rivers and coastal estuaries of the northeast and southeast U.S. Continental Shelf Large Marine Ecosystems, occasionally moving short distances to the mouths of estuaries and into the nearshore coastal waters (Dadswell 2006; National Marine Fisheries Service 1998). In estuarine systems, juveniles and adults occupy areas with little or no current over a bottom composed primarily of mud and sand (Secor et al. 2000). Adults are found in deep water (35 to 100 feet [10 to 30 meters]) in winter and in shallow water (7 to 35 feet [2 to 10 meters]) during summer (Welsh et al. 2002). Individual shortnose sturgeon do not disperse far along the coastline beyond their home river estuaries (National Marine Fisheries Service 1998).

The feeding patterns of the shortnose sturgeon vary seasonally between northern and southern river systems. In northern rivers, some sturgeon feed in freshwater during summer and over sand-mud bottoms in the lower estuary during fall, winter, and spring (National Marine Fisheries Service 1998). In contrast, in southern rivers, feeding has been observed during winter at or just downstream of where saltwater and freshwater meet (Kynard 1997).

The shortnose sturgeon feeds by suctioning polychaetes (marine worms), crustaceans, molluscs, and small fish from the bottom (National Marine Fisheries Service 1998; Stein et al. 2004). Young-of-the-year sturgeon (i.e., individuals less than one year old) have been found in the stomachs of yellow perch (National Marine Fisheries Service 1998); predation on older sturgeon is not well-documented, although sharks likely prey on them in the marine environment (National Marine Fisheries Service 1998).

There are no recent records of shortnose sturgeon in the Chesapeake Bay near JEB Little Creek-Fort Story (U.S. Fish and Wildlife Service 2008). There are also no current records of shortnose sturgeon in the James River, the closest major river to these sites, although shortnose sturgeon were recorded near the mouth of the James River in the late 1970s (Dadswell et al. 1984). Based on the lack of sightings for more than 30 years, it is unlikely that this species would be found in the study area near JEB Little Creek-Fort Story.

3.10.2.1.3 Essential Fish Habitat

Essential fish habitat has been designated in the waters off JEB Little Creek-Fort Story, as shown in Table F-1 in Appendix F, *Essential Fish Habitat Descriptors for the JLOTS Study Area.* The table also identifies the fisheries management plans that designated the essential fish habitat and the fishery management council that manages each of the species for which such habitat has been designated. The habitat descriptors occurring in the study area include:

- Offshore ocean waters, nearshore ocean waters, and estuarine waters.
- Pelagic and demersal waters.
- Soft bottom, floating macroalgae, attached macroalgae, and submerged rooted vegetation.

The list of managed species in the study area was assembled using a combination of regulatory descriptions referenced in Appendix F and geographic information system shapefiles of essential fish habitat gathered online from National Oceanic and Atmospheric Administration (2011a).

Habitat Areas of Particular Concern for summer flounder and sandbar shark also intersect the study area. These areas consist of submerged aquatic vegetation for juvenile summer flounder and shallow areas in the mouth of selected estuaries for neonate or juvenile sandbar sharks (refer to previous section for documentation of habitat occurrence).

3.10.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

Potential impacts to fish and marine invertebrates at JEB Little Creek-Fort Story are summarized in Table 3.10-1.

Table 3.10-1: Potential Fish and Marine Invertebrate Stressors Resulting from JLOTS Activities – No Action Alternative

FTX	Artificial Light	Entanglement	Temporary Loss of Habitat		Temporary Reduction in Water Quality	Vehicle and Vessel Strikes	Vehicle, Vessel, and Equipment Noise
			Fish	Marine Invertebrates			
Improved Navy Lighterage System	--	--	--	all locations	all locations	all locations	all locations
Amphibious Bulk Liquid Transfer System	--	all locations	--	all locations	--	--	all locations
Tactical Water Purification System	--	all locations	--	--	all locations	--	all locations
Cargo Marshalling and Movement	--	--	--	--	--	--	--
Tent Encampment	--	--	--	--	--	--	--
Floating Causeway	--	--	Fort Story; Camp Lejeune				
Effects Analysis							
Timing	n/a	year-round (all locations)					
Proximity		Limited to the immediate area around the activity					Intensity of potential effects can be expected to correlate positively with proximity to sources of noise
Duration, Frequency, and Distribution		≤ 60 days during full JLOTS (all locations); several additional intermittent days year-round (JEB Little Creek-Fort Story)					
Expected Recurrence		Recurrence coincides with frequency of applicable FTX (Table 2.2-2); lower intensity throughout the year (excluding Camp Lejeune, which has no routine or quarterly unit-level training in support of JLOTS), and higher intensity during full JLOTS. There will be no recurrence once the FTX ends.					

-- = this stressor is not expected to result from the FTX. For the purposes of this analysis, cargo marshalling occurs only in the terrestrial environment. Impacts from cargo marshalling in the marine environment are addressed under the Improved Navy Lighterage System.

3.10.2.2.1 Artificial Light

Section 3.9.2.2.1 under *Terrestrial Wildlife and Birds* introduces artificial light, illuminance, and common sources. No artificial light sources are being introduced into the water column. Therefore, no impacts to fish or marine invertebrates from artificial light would occur.

3.10.2.2.2 Entanglement

Based on the size of the hose and configuration of its attachments and buoys, deployment of floating hoses during liquid transfer system exercises presents a very minor risk of entanglement for fish. Hoses are kept taut, and are of sufficient diameter that the chance of loops forming that could potentially entangle large fish is extremely low. The lack of a significant length of either type of hose in the water column further decreases the likelihood of entanglement. The small diameter of the hose and the strainer on the Tactical Water Purification System intake apparatus would prevent any small fish from being drawn into the system.

3.10.2.2.3 Temporary Loss of Habitat

Fish

No loss of fish habitat would occur under the No Action Alternative at JEB Little Creek-Fort Story.

Marine Invertebrates

Sedentary invertebrate beds could be crushed by ship anchors or disturbed by liquid transfer hoses. However, the anchor footprints would be very small compared to the great expanse of resilient soft bottom in the study area. The surf zone and nearshore bottom are dynamic environments subjected to frequent disturbance from waves and currents. The species potentially affected are also small and relatively fast growing (e.g., tube worms) or hard-shelled (e.g., clams) and resilient; there were no slower-growing reefs documented in the study area. Highly mobile species would move away from the falling anchors or hoses.

Highly mobile invertebrates (e.g., blue crabs, commercial shrimps) and fish would move away from slow-moving amphibious vessels/vehicles in the surf zone. Any disturbance from equipment or amphibious vessels/vehicles would be most intense during the 60-day full JLOTS exercise but would also occur during quarterly and routine training. While this could cause some behavioral disruption in foraging or breeding activities, the affected area is frequently used as a training beach and is landward of a major shipping channel – suggesting some level of habituation to such disturbances.

3.10.2.2.4 Temporary Reduction of Water Quality

Fish and Marine Invertebrates

In study area waters, various activities are expected to disturb sediments, resulting in a temporary decrease in water quality. Vessel and amphibious vehicle movements would disturb sediments, with impacts of the greatest duration and intensity resulting during a full JLOTS exercise. Impacts are expected to be greatest closer to shore, where vessels would offload. Quarterly and routine JLOTS training would occur more frequently but with fewer vessels, resulting in impacts of lower intensity. Between each occurrence, there would be ample time for water quality to return to pre-training levels. The sandy sediment that dominates the sea floor off JEB Little Creek-Fort Story (National Oceanic and Atmospheric Administration 2011) is expected to quickly settle back in place (National Marine Fisheries Service 2009a), with fine sediments taking slightly longer.

Anchoring would also cause highly localized increases in turbidity as the anchor settles on the bottom and displaces some of the sediments. A similar disturbance would occur when the anchor is pulled after the end of the exercises. Each time, these impacts would be very localized and short-lived.

Impacts on marine invertebrates and fish (negative or positive) from temporary increase in turbidity are expected to be minimal. Excessive suspended sediments can directly impact aquatic animals by clogging gills and pores, which can result in mortality or reduced feeding (Ross and Lancaster 1996). The ability to forage in the immediate area of a moving vessel or amphibious vehicle, anchor, or transfer hose could be impacted by the reduced visual perception in turbid waters (Lindquist and Manning 2001). However, some less visual species benefit from the disturbing of bottom sediments and dislodging of invertebrate food (Bruton 1985). Some forage species (e.g., anchovies) may also receive temporary cover from visual predators in more turbid waters (Livingston 1975). Significant population-level impacts from excess turbidity require prolonged exposure over large areas. The proposed JLOTS training would affect a relatively small area and increases in turbidity would be temporary.

Essential Fish Habitat

Waters, pelagic or demersal – The No Action Alternative at JEB Little Creek-Fort Story could cause localized and temporary turbidity and reduced light availability in the water column for managed species (e.g., visual predators) and other essential fish habitat (e.g., submerged plants) in the affected area. However, no submerged plants are documented or likely to inhabit the surf zone of Anzio, Omaha, or Utah beaches (see Section 3.8, *Terrestrial and Aquatic Vegetation* for supporting details) and nearshore erosion/turbidity from boat wakes is unlikely in Little Creek Cove given the associated no-wake vessel speeds. The insignificant impact of such localized and temporary turbidity on the water column is supported in previous paragraphs on water quality degradation.

Habitat Areas of Particular Concern – Submerged aquatic vegetation for juvenile summer flounder (e.g., attached macroalgae and submerged rooted vegetation) could be impacted by temporary turbidity from the proposed training activities, if the activities were occurring within their immediate vicinity (which they are not); the mud flats training beach is over 100 yards (91 meters) from the nearest seagrass bed. For sandbar sharks, water column Habitat Areas of Particular Concern could be impacted by the localized and temporary turbidity, but the impact is not expected to be measurable (see previous paragraphs for supporting details) and would not reduce the quantity or quality of essential fish habitat.

3.10.2.2.5 Vehicle and Vessel Strikes

Fish and Marine Invertebrates

The impact of vessel/vehicle strikes on common and commercial species of invertebrates or fish is also not a stressor referenced in the literature. However, hull and propeller strikes have been implicated in endangered sturgeon mortalities.

Protected Fish

Despite their ability to detect approaching vessels using a combination of sensory cues (sight, hearing, and lateral line), large slow-moving fish such as sturgeon may not avoid all collisions. Vessel collisions may cause blunt trauma, lacerations, fin damage, or mortality (Speed et al. 2008). In Virginia, Balazik et al. (2012a) investigated Atlantic sturgeon mortalities due to vessel strikes that occurred in the James River. When not moving, the sturgeon tended to spend most of the time near the bottom. However, one sturgeon traveled downriver a distance of about 13 miles (21 kilometers) and during that time maintained a depth of about 16 feet (5 meters) below the surface, even when in much deeper water. The depth in the water column while swimming, combined with the sturgeon's preference for being in the navigation channel, make these fish potentially more susceptible to strikes by large vessels with deep drafts, such as ocean cargo vessels. Both the full JLOTS and unit level training involve the use of numerous vessels in areas where Atlantic sturgeon may be found throughout much of the year. Most of the vessels used during the exercises, including the various types of landing craft, tug boats, utility boats, and security and medical boats, all have a relatively shallow draft of less than 6 feet (1.8 meters) and are unlikely to interact with sturgeon in the area. The larger vessels with deeper drafts, such as the military sealift command ships and the tanker ships, would be confined to the deeper waters of the navigation channels where sturgeon tend to congregate. During the exercises these vessels would be anchored in place and, as a result, should not pose a threat to sturgeon in the immediate vicinity.

Shortnose sturgeon have not been documented to occur in the vicinity of the lower Chesapeake Bay since the late 1970s (Dadswell et al. 1984). Even those sightings have been called into question on the grounds that they may have actually been Atlantic sturgeon rather than shortnose. Given this, it is not anticipated that shortnose sturgeon would be encountered in waters off JEB Little Creek-Fort Story.

Essential Fish Habitat

Although no species-level impacts are anticipated for aquatic life, there may be insignificant impacts on essential fish habitat. The effects from the No Action Alternative at JEB Little Creek-Fort Story to essential fish habitat descriptors were described in their respective resource section above. The following paragraphs are organized by habitat descriptor. The managed species impacted addressed in Appendix F, *Essential Fish Habitat Descriptors for the JLOTS Study Area*.

Soft bottoms – No long term or permanent conversion of soft bottom to any other substrate type is anticipated. However, there would be a short-term change from soft bottom to artificial substrate, where the liquid transfer hose anchors or mooring devices would be placed on the shoreline or bottom.

Floating macroalgae – No damage to floating macroalgae is anticipated (see Section 3.8 for supporting details). Water quality impacts on floating macroalgae are covered under "waters, pelagic or demersal" above.

Attached macroalgae – Macroalgae growing along the artificial shoreline of Little Creek Cove would not be impacted by the no-wake speed of vessels transiting the area. Macroalgae growing on the bottom of the subtidal "mudflats" training area could be damaged by liquid transfer hoses placed along the bottom. However, estuarine macroalgae species are fast growing and resilient and therefore, the quantity or quality of this habitat in the area would not be appreciably reduced (see Section 3.8 for supporting details).

Submerged rooted vegetation – Submerged rooted vegetation would not be impacted by the no-wake speed of vessels transiting the area (see Section 3.8 for supporting details).

Habitat Areas of Particular Concern – Submerged aquatic vegetation for juvenile summer flounder (e.g., attached macroalgae and submerged rooted vegetation) would not be impacted by the no-wake speed of vessels transiting the area.

3.10.2.2.6 Vehicle, Vessel, and Equipment Noise

Fish and Marine Invertebrates

Vessels and craft would move between ships and shore for much of the duration of the proposed 60-day annual, quarterly, and routine JLOTS training, generating noise. During each exercise, sound levels would fluctuate with the level of activity, as vessels would not operate continuously. Furthermore, the vessel/vehicle movement occurs adjacent to highly developed areas and among relatively high densities of vessel traffic (U.S. Coast Guard 2012), suggesting a noise contribution compatible with the existing ambient sound environment. Vessel traffic has the potential to expose fish in the water column to sound and general disturbance, potentially resulting in short-term behavioral or physiological responses (e.g., avoidance, stress, decreased foraging efficiency) (Purser and Radford 2011).

Studies documenting behavioral responses of fish to vessels show that Barents Sea capelin (*Mallotus villosus*) may exhibit avoidance responses to engine noise, sonar, depth finders, and fish finders (Jørgensen et al. 2004). Avoidance reactions are quite variable depending on the type of fish, its life history stage, behavior, time of day, and the sound propagation characteristics of the water (Schwartz 1985). Misund (1997) found that fish ahead of a ship, that showed avoidance reactions, did so at ranges of 160 to 490 feet (49-150 meters). When the vessel passed over them, some species of fish responded with sudden escape responses that included lateral avoidance or downward compression of the school.

Fish occurring in the vicinity of JLOTS activities may have habituated to frequent disturbance and vessel noise. Studies have shown that habituation to different stimuli can, but does not always, occur in a variety of species and conditions (Laming and Ennis 1982; Matsunaga and Watanabe 2010; Wong et al. 2010; Folkedal et al. 2010). In a study by Chapman and Hawkins (1973) the low-frequency sounds of large vessels or accelerating small vessels caused avoidance responses by herring. Avoidance ended within 10 seconds after the vessel departed. Twenty-five percent of the fish groups habituated to the sound of the large vessel and 75 percent of the responsive fish groups habituated to the sound of small boats.

3.10.2.2.7 Summary

Table 3.10-1 identifies potential stressors for fish and marine invertebrates under the No Action Alternative at JEB Little Creek-Fort Story. Because the No Action Alternative represents a continuation of the existing frequency and intensity of JLOTS training at JEB Little Creek-Fort Story (with the exception of the floating causeway at Little Creek), its impacts on fish and marine invertebrates are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. They would remain temporary and localized. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences are expected. Sedentary or surf zone-burying invertebrates may be killed, but no population-level consequences are expected. The No Action Alternative would not compromise the capacity of the affected waters to continue supporting fish and marine invertebrate species, and the essential fish habitat they currently support. Thus, there would be no significant impacts on fish and marine invertebrates under the No Action Alternative at JEB Little Creek-Fort Story.

Pursuant to the ESA, the No Action Alternative at JEB Little Creek-Fort Story:

- ***may affect, but is not likely to adversely affect, the ESA-listed Atlantic sturgeon.***
- ***would have no effect on the ESA-listed shortnose sturgeon.***

Pursuant to the essential fish habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the No Action Alternative at JEB Little Creek-Fort Story would not adversely affect essential fish habitat or Habitat Areas of Particular Concern, as the effects would not appreciably reduce the quantity or quality of habitat in the area.

3.10.2.3 No Action Alternative – Camp Lejeune – Existing Environment

3.10.2.3.1 Fish and Marine Invertebrates

Fish

More than 685 species of fish have been recorded in the waters off Camp Lejeune (U.S. Marine Corps 2009). Resident estuarine species include bay anchovies, mummichogs, silversides, and sheepshead minnows (National Oceanic and Atmospheric Administration 2011a), oyster toadfish, killifish, gobies, and hogchokers (Epperly and Ross 1986). The anchovies and silversides are pelagic species, whereas the other species are more structure oriented (e.g., marsh surface, tidal creeks, oyster reefs) (Minello 1999). All life stages of these species are spent within the estuary and several of the species are highly abundant. Coastal ocean or inlet spawners in the area include Atlantic menhaden, striped mullet, bluefish, sheepshead, cobia, southern kingfish, Spanish mackerel, the flounders (summer, southern, and gulf), and the drums (croaker, weakfish, seatrout, spot, red drum, black drum). The eggs and larval stages of those species free-drift from spawning grounds and the juvenile stages migrate to coastal nurseries. Some highly migratory species of sharks may also occur in the study area (refer to Section 3.10.2.3.3 for specifics). Other species are also common within the estuary seasonally. Juvenile gray snapper are only common during the summer (National Oceanic and Atmospheric Administration 2011a). The catadromous American eel migrates upstream to freshwater residential areas in fall and winter, though juveniles are common year-round. The anadromous herrings (blueback and alewife) and American shad pass through the area from offshore during the spring months.

Marine Invertebrates

Bay scallops are common in high salinity seagrass beds of North Carolina and elsewhere within their range (Thayer et al. 1984). Available mapping suggests no shellfish reefs in the study area but does indicate the presence of "shell bottom" and low densities of living shellfish in the Atlantic Intracoastal Waterway (Deaton et al. 2010). Unmapped sedentary invertebrate beds occurring in soft bottom are formed by various clam species or bay scallops, whereas oysters, mussels, barnacles, and sponges grow attached to artificial structures or hard substrates (Gosner and Peterson 1999). All these organisms may be found in the estuarine portion of the study area (Gosner and Peterson 1999, Deaton et al. 2010; National Oceanic and Atmospheric Administration 2011a); only oysters and bay scallops do not occur along the ocean portion of the action area.

Several mobile invertebrates are present in the estuary and include periwinkle snails, mud crabs, grass shrimp, blue crabs, and commercial shrimp (Gosner and Peterson 1999; Deaton et al. 2010; National Oceanic and Atmospheric Administration 2011a). Juvenile and adult blue crabs are abundant year-round, whereas mating and larval stages are observed in the estuary during March to November (National Oceanic and Atmospheric Administration 2011a). Commercial shrimp juveniles (brown, white, and pink) are abundant in the estuary during the spring and summer months (National Oceanic and Atmospheric Administration 2011a), while adults utilize the ocean portion as an overwintering habitat (South Atlantic Fishery Management Council 1998). Periwinkle snails, mud crabs, and grass shrimp spend all life stages in the estuary (Gosner and Peterson 1999; Deaton et al. 2010) along shallow intertidal shorelines, marsh surfaces, seagrass beds, sedentary invertebrate beds, and oyster reefs (Minello 1999). These primarily estuarine invertebrates would be mostly absent along the beach and nearshore ocean portion of the study area; mole crabs (*Emerita* spp.) and coquinas (*Donax* spp.) are common invertebrates in the surf zone of the study area.

3.10.2.3.2 Protected Fish

Atlantic Sturgeon

Atlantic sturgeon are described in Section 3.10.2.1.2. Sturgeon near Camp Lejeune would likely be part of the Carolina distinct population segment. However, Atlantic sturgeon from other distinct population segments could occur at this location. In the Carolina distinct population segment, spawning has been recently recorded in only five of the seven to ten historical spawning populations (National Marine Fisheries Service 2013a). Atlantic sturgeon are caught frequently as bycatch in the Albemarle Sound gillnet fishery (Kahn pers. comm. 2014) and the North Carolina Division of Marine Fisheries has been tagging Atlantic sturgeon in both the Albemarle Sound and the Cape Fear River (Collier pers. comm. 2013). Recent tracking data have confirmed Atlantic sturgeon in the vicinity of Camp Lejeune (Collier pers. comm. 2013a).

Shortnose Sturgeon

Shortnose sturgeon are described in Section 3.10.2.1.2. The Cape Fear distinct population segment is the only distinct population segment in North Carolina and would include shortnose sturgeon in the vicinity of Camp Lejeune. The nearest record of shortnose sturgeon occurrence to Camp Lejeune is the Cape Fear River population, which is one of the smallest documented populations. Since the first confirmed capture of shortnose sturgeon in the Cape Fear River in 1987, an extensive sampling program has produced eight additional specimens (Moser and Ross 1993). All nine specimens captured were adults; no juveniles were collected. No information is available on the population dynamics of this population segment, which probably numbers less than 50 fish (Moser and Ross 1995). Cape Fear River meets the ocean at Cape Fear Point, located approximately 50 miles (80 kilometers) south of Camp Lejeune. Although riverine, estuarine, and nearshore habitats associated with the New River appear to be potentially suitable for the shortnose sturgeon, there is no evidence of its occurrence in or near these waters (U.S. Department of the Navy 2003). Giving consideration to the population at Cape Fear, it is possible, but unlikely that this species would occur in the study area at Camp Lejeune.

3.10.2.3.3 Essential Fish Habitat

Essential fish habitat has been designated in the waters off Camp Lejeune, as shown in Table F-2 in Appendix F, *Essential Fish Habitat Descriptors for the JLOTS Study Area*. The table also identifies the fisheries management plans that designate the essential fish habitat and the fishery management council that manages each of the species for which such habitat has been designated. The habitat descriptors occurring in the study area include offshore ocean waters, nearshore ocean waters, and estuarine waters; pelagic and demersal waters; soft shores, soft bottoms, hard bottoms, floating macroalgae, vegetated shores, attached macroalgae, submerged rooted vegetation, and sedentary invertebrate beds (refer to previous affected environment sections for supporting details). The list of managed species in the study area was assembled using a combination of regulatory descriptions referenced in Appendix F and geographic information system shapefiles of essential fish habitat gathered online from National Oceanic and Atmospheric Administration (2011a).

The Habitat Areas of Particular Concern that intersect the study area include habitats for snapper/grouper, commercial shrimps (white, brown, and pink), summer flounder, coastal migratory pelagics, and dolphin/wahoo (South Atlantic Fishery Management Council 1998). The following habitats describe the Habitat Areas of Particular Concern for federally managed species (refer to previous sections for documentation of habitat occurrence) that intersect the study area:

- Submerged rooted vegetation (e.g, seagrass) for summer flounder and snapper/grouper.
- Floating macroalgae (specifically *Sargassum*) in the ocean environment for snapper/grouper, coastal migratory pelagics, and dolphin/wahoo.
- Sedentary invertebrate beds or reefs (specifically oysters) for snapper/grouper.
- Live nearshore hard bottoms for snapper/grouper.

- The water column and bottom of the Atlantic Intracoastal Waterway and Mile Hammock Bay for coastal migratory pelagics (Spanish mackerel only), snapper/grouper and commercial shrimps. These waterbodies are state designated Primary Nursery Areas (Deaton et al. 2010), with a high abundance of Spanish mackerel.
- The water column and bottom of the ocean portion of the study area for commercial shrimps; the area is considered an overwintering habitat for the species group.

3.10.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

Potential impacts to fish and marine invertebrates at Camp Lejeune are summarized in Table 3.10-1. The proposed training activities under the No Action Alternative at Camp Lejeune would be the same as those of the No Action Alternatives at JEB Little Creek-Fort Story. However, quarterly and routine JLOTS training would not occur. Therefore, analyses in Section 3.10.2.2 are applicable to the No Action Alternative at Camp Lejeune, but potential impacts on fish and marine invertebrates would be of lower frequency, duration, and intensity.

3.10.2.4.1 Summary

Because the No Action Alternative represents a continuation of the existing frequency and intensity of JLOTS training at this location, its impacts on fish, marine invertebrates, and essential fish habitat are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. Sedentary or surf zone-burying invertebrates may be killed, but no population-level consequences would be expected. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. The No Action Alternative would not compromise the capacity of the area to continue supporting the fish and marine invertebrate species they currently support. Thus, there would be no significant impacts on fish, marine invertebrates, or essential fish habitat under the No Action Alternative at Camp Lejeune.

Pursuant to the ESA, the No Action Alternative at Camp Lejeune:

- ***may affect, but is not likely to adversely affect, the ESA-listed Atlantic sturgeon.***
- ***may affect, but is not likely to adversely affect, the ESA-listed shortnose sturgeon.***

Pursuant to the essential fish habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the No Action Alternative at Camp Lejeune would have no adverse impacts on essential fish habitat or Habitat Areas of Particular Concern.

3.10.2.5 No Action Alternative – Conclusion

Because the No Action Alternative represents a continuation of the existing levels and intensity of JLOTS training, its impacts on fish, marine invertebrates, and essential fish habitat are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. Sedentary or surf zone-burying invertebrates may be killed, but no population-level consequences would be expected. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. The No Action Alternative would not compromise the capacity of the study area to continue supporting the fish and marine invertebrate species they currently support. Thus, there would be no significant impacts on fish, marine invertebrates, or essential fish habitat under the No Action Alternative at JEB Little Creek-Fort Story or Camp Lejeune.

Pursuant to the ESA, the No Action Alternative:

- ***may affect, but is not likely to adversely affect, the ESA-listed Atlantic sturgeon.***
- ***may affect, but is not likely to adversely affect, the ESA-listed shortnose sturgeon.***

Pursuant to the essential fish habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the No Action Alternative would have no adverse impacts on essential fish habitat or Habitat Areas of Particular Concern.

3.10.3 Action Alternative

3.10.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

The existing environment at JEB Little Creek-Fort Story is described in Section 3.10.2.1.

3.10.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

Potential impacts to fish and marine invertebrates at JEB Little Creek-Fort Story are summarized in Table 3.10-2. The Action Alternative at JEB Little Creek-Fort Story would include the same annual training activities as the No Action Alternative, as well as the deployment of floating causeway (at Little Creek) and ELCAS (M) FTX. Therefore, the impacts of the Action Alternative at JEB Little Creek-Fort Story on fish and marine invertebrates would be similar to those of the No Action Alternative, with the addition of the impacts described below.

3.10.3.2.1 Artificial Light

Lights are used on the floating causeways and ELCAS (M). However, no artificial light would be introduced into the water column. Therefore, fish and marine invertebrates would not be impacted by artificial light under the Action Alternative.

3.10.3.2.2 Entanglement

No entanglement risks would be associated with the floating causeway or ELCAS (M).

3.10.3.2.3 Temporary Loss of Habitat

Construction of the floating causeway and ELCAS (M) may result in a temporary disturbance of surf-zone sand habitat, and small-scale temporary loss of habitat for fish in the water column as a result of the physical presence of the piers themselves. Beach excavations could displace and bury surf-zone bivalves and other burrowing invertebrates, possibly causing localized mortalities. However, the affected areas would be relatively small areas in a dynamic surf-zone habitat and animals would be expected to return from surrounding undisturbed habitats after excavations are filled and the piers dismantled. Further, the duration and scope of FTXs that may cause temporary disturbances of habitat would be limited to no more than 60 days per year for a full JLOTS exercise, and only several days for quarterly and routine training. Temporary loss of habitat for fish in the water column would be limited to the same timeframe, and the actual footprint of the piers (Section 2.1.1), respectively. Therefore, a measurable reduction in the quantity or quality of surf-zone sand habitat is not anticipated and no adverse effect on essential fish habitat would result. The structure of the floating causeway and ELCAS (M) would not prohibit animals from swimming underneath it.

Table 3.10-2: Potential Fish and Marine Invertebrate Stressors Resulting from JLOTS Activities – Action Alternative

FTX	Artificial Light	Entanglement	Temporary Loss of Habitat		Temporary Reduction in Water Quality	Vehicle and Vessel Strikes	Noise	
			Fish	Marine Invertebrates			Vehicle, Vessel, and Equipment	Pile Driving
Improved Navy Lighterage System	--	--	--	all locations	all locations	all locations	all locations	--
Amphibious Bulk Liquid Transfer System	--	all locations	--	all locations	--	--	all locations	--
Tactical Water Purification System	--	all locations	--	--	all locations	--	all locations	--
Cargo Marshalling and Movement	--	--	--	--	--	--	--	--
Tent Encampment	--	--	--	--	--	--	--	--
Floating Causeway	--	--	all locations					--
ELCAS (M)	--	--	all locations					
Effects Analysis								
Timing	n/a	year-round (all locations)						
Proximity		Limited to the immediate area around the activity					Intensity of potential effects can be expected to correlate positively with proximity to sources of noise (ref. Table 3.10-5 [JEB Little Creek-Fort Story], Table 3.10-8 [Camp Lejeune] for pile driving)	
Duration, Frequency, Distribution		≤ 60 days during full JLOTS (all locations); several additional intermittent days year-round (JEB Little Creek-Fort Story)						Once annually at JEB Little Creek-Fort Story, and Camp Lejeune, for ≤ 30 days; 1.5 net hours max. per day
Expected Recurrence		Recurrence coincides with frequency of applicable FTX (Table 2.2-2); lower intensity throughout the year (excluding Camp Lejeune, which has no quarterly or routine unit-level JLOTS training), and higher intensity during full JLOTS. There would be no recurrence once the FTX ends.						

-- = this stressor is not expected to result from the FTX. For the purposes of this analysis, cargo marshalling occurs only in the terrestrial environment. Impacts from cargo marshalling in the marine environment are addressed under the Improved Navy Lighterage System.

3.10.3.2.4 Temporary Reduction of Water Quality

Temporary reductions of water quality resulting from the floating causeway and ELCAS (M) FTXs are expected to be consistent with those of the No Action Alternative. However, impacts from ELCAS (M) pile driving would last no more than 30 days at each location (60 days total) in any given year. Like anchors, piles being driven or extracted for the ELCAS (M) FTX may disturb sediments, but the results would be highly localized to the piles themselves. The environment where they are being driven is also highly dynamic, with nearshore sediment particles that are constantly being redistributed by surf zone wave action and longshore currents. The impact of temporarily elevated sand turbidity would be compatible with the affected environment of the surf zone. However, the temporary turbidity would be somewhat less compatible with bottom conditions in nearshore waters seaward of the surf zone.

3.10.3.2.5 Vehicle and Vessel Strikes

Potential impacts from vehicle and vessel strikes would be expected to increase only slightly as a result of the floating causeway and ELCAS (M) FTXs. Much of the activity associated with these exercises takes place on the piers themselves and onshore; the net increase in vehicle and vessel traffic from the Action Alternative would be insignificant.

3.10.3.2.6 Vehicle, Vessel, and Equipment Noise

Potential impacts from vehicle, vessel, and equipment noise are expected to increase only slightly as a result of the floating causeway and ELCAS (M) FTXs. Much of the activity associated with these exercises takes place on the piers themselves and onshore; the net increase in vehicle, vessel, and equipment noise from the Action Alternative would be insignificant.

3.10.3.2.7 Underwater Noise – Pile Driving (Construction of the Elevated Causeway System, Modular)

The degree to which an individual fish exposed to underwater sound would be affected depends on a number of variables including size, physiology (e.g., presence of a swim bladder), and physical condition of the fish; maximum sustained sound pressure and frequency; shape of the sound wave (rise time); depth of the water; depth of the fish in the water column; sea state; bottom substrate composition and texture; and currents (National Marine Fisheries Service 2005). Depending on these factors, effects on fish can range from no observed changes in behavior to mortality.

Sound Exposure Threshold

Sound level criteria for fish were determined by NMFS in 2005. In 2008, the fish criteria were reviewed and revised following a multi-agency (including NMFS, USFWS) agreement (Fisheries Hydroacoustic Working Group 2008); they are now referred to as the “Interim Criteria” (Table 3.10-3). No criteria have been developed for injury from vibratory pile driving.

Table 3.10-3: Injury and Behavioral Thresholds for Fish

Functional Hearing Group	Impact Pile Driving (re 1μPa)		Vibratory Extraction (re 1μPa)	
	Injury Threshold	Behavioral Threshold	Injury Threshold	Behavioral Threshold
Fish (≥ 2 grams)	187 dB (re: 1μPa^2*sec) cumulative SEL	150 dB rms	n/a	150 dB rms
Fish (< 2 grams)	183 dB (re: 1μPa^2*sec) cumulative SEL			
Fish (all sizes)	206 dB peak			

Note: rms = root mean square

Underwater Sound Propagation

Appendix C, *Fundamentals of Acoustics* provides definitions and fundamental principles of acoustic modeling. Pile driving has the potential to generate underwater noise that may result in disturbance to marine species. Modeling sound propagation is useful in evaluating the distance noise might travel from the pile driving activity. The decrease in acoustic intensity as a sound wave propagates outward from a source is known as transmission loss.

The formula for transmission loss is:

$$TL = B * log_{10}\left(\frac{R_1}{R_2}\right) + C * R_1, \text{ where:}$$

B = logarithmic (predominantly spreading) loss

C = linear (scattering and absorption) loss

R_1 = range from source in meters

R_2 = range from driven pile to original measurement location (generally 10 m for pile driving activities)

The amount of linear loss (C) is proportional to the frequency of a sound. Due to the low frequencies of sound generated by impact and vibratory pile driving, this factor was assumed to be zero for all calculations in this assessment and transmission loss was calculated using only logarithmic spreading. Therefore, using practical spreading (B=15), the revised formula for transmission loss is TL = 15 log_{10} (R_1/10).

Acoustic Modeling

Noise levels produced by pile driving are greatly influenced by factors including pile type, driving method, and the physical environment in which the activity takes place. To determine the most appropriate sound pressure levels for this project, data from studies which met the following parameters were considered:

- Pile size and type
- Installation method – impact driving or vibratory extraction.
- Physical environment – water depth, sediment type.

Table 3.10-4 details the physical characteristics of the waters and substrate off JEB Little Creek-Fort Story.

Table 3.10-4: Physical Characteristics of the Waters off JEB Little Creek-Fort Story

Location	Little Creek	Fort Story
Substrate	Sand with shell debris[1, 2]	
Average Depth	3 ft. (1 m) nearshore; 15 ft. (4.5 m) past 600 ft. (183 m) from shore[3]	5 ft. (1.5 m) nearshore; 20 ft. (6.1 m) at 500 ft. (152 m) from shore[3]
Salinity	18-21 ppt; higher in fall, lower in spring[4, 5]	>24 ppt; higher in fall, lower in spring[4, 5]

Sources: [1]Lamont-Doherty Earth Observatory 1997; [2]National Oceanic and Atmospheric Administration 1983; [3]National Oceanic and Atmospheric Administration 2014; [4]Chesapeake Bay Program 2008; [5]Chesapeake Bay Foundation n.d.
ft. = feet; m = meter(s); ppt = parts per thousand

Source levels were selected from Naval Facilities Engineering Command Atlantic's comprehensive dataset based on similarity to site conditions at JEB Little Creek-Fort Story (sand with shell debris sediments, average depth 1-5 meters). Impact driving source levels derived from similar installation methodologies (i.e., diesel hammer), and lacking conditions that might introduce extra noise into the measurements, such as collection in a riverine environment, were also factored into the selection process.

Due to the limited data available on vibratory extraction of 24-inch pipe piles, source level proxies for the two locations were considered together. Source levels for vibratory extraction were considered if site depth was less than 15 meters and there were no conditions (i.e., riverine environments) that might introduce extra noise into the measurements. From these proxy data, averages were calculated, resulting in the source levels used for acoustic modeling that are summarized in Table 3.10-5.

Table 3.10-5: Summary of Source Levels Selected for JEB Little Creek-Fort Story

Method	dB re 1µPa rms	dB re 1µPa peak	dB re 1µPa^{2}sec SEL
Impact Installation	188	207	179
Vibratory Extraction	160	n/a	n/a

All averages were calculated by converting decibel values to linear values using the formula $y = 10^{(x_1/15)}$, where x_1 is the dB value. Linear values were averaged and the calculated value was re-converted to dB by $x_2 = 15*\log_{10}(y_{avg})$.

The practical spreading loss model (TL =15 $\log_{10}$ [R_1/10]) discussed above was used to calculate the underwater propagation of pile driving sound in and around the two proposed locations. A conservative total of 30 days of pile driving were modeled; 20 days of impact driving, and 10 days of vibratory extraction. Actual installation and extraction of the piles during the ELCAS (M) FTX may take less time or require fewer piles to be driven per day. No noise mitigation methods (bubble curtains, cofferdams, etc.) are proposed and therefore no attenuation was included in the acoustic model.

For impact driving, modeling assumed 6 piles would be installed per day. Each pile would require a maximum of 500 strikes of the impact hammer, and driving is expected to take no more than 15 minutes to complete. Generally, two pile drivers are used, but not simultaneously: while one is installing a pile, the other is being repositioned for the next pile.

For vibratory extraction, the acoustic analysis used the assumption that a maximum of 12 piles would be removed each day, taking approximately 6 minutes each, over the course of 10 days.

Impacts to fish from ELCAS (M) pile driving and extraction are expected to result primarily from acoustic pathways. As such, the degree of effect is 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. Table 3.10-6 lists the modeled ranges to effect for fish in waters of JEB Little Creek-Fort Story. The farther away from the source, the less intense the exposure would be. 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 rapid sound attenuation. In addition, substrates that are soft (i.e., sand), such as those in the waters off JEB Little Creek-Fort Story, would absorb and attenuate the sound more readily than hard substrates (rock) which may reflect the acoustic wave. Soft porous substrates would also likely require less time to drive the pile, and possibly less powerful equipment, which would ultimately decrease the intensity of the sound.

Table 3.10-6: Calculated Range to Effects for Fish at JEB Little Creek-Fort Story

Driving Method	Threshold	Range
Impact Installation	Injury (all): 206 dB re 1 μPa peak	13 yd. (12 m)
	Injury (≥ 2g): 187 dB re 1 μPa^2sec SEL	666 yd. (609 m)
	Injury (< 2g): 183 dB re 1 μPa^2sec SEL	1,231 yd. (1,126 m)
	Behavioral (all): 150 dB re 1 μPa rms	3,735 yd. (3,415 m)
Vibratory Extraction	Behavioral (all): 150 dB re 1 μPa rms	50 yd. (46 m)

Note: no injury criteria for fish for vibratory pile driving; all sound levels expressed in dB re 1 μPA rms; dB = decibel; rms = root mean square; μPa = micropascal; yd. = yards; m = meters; g = grams

Behavioral impacts could occur, but the type and severity of these effects are difficult to define due to individual differences in response and limited studies addressing the behavioral effects of sounds on fish. The behavioral responses most likely to occur during the proposed pile driving are habituation and temporary relocation (Ridgway et al. 1997; Finneran et al. 2003; Wartzok et al. 2003). The time required to impact drive or vibratorily extract each pile would be approximately 15 minutes or 6 minutes per pile, respectively. Therefore, potential behavioral disturbances are anticipated to be intermittent and brief. If injurious effects occur, they would be the result of physiological responses to both the type and strength of the acoustic signature (Viada et al. 2008; Halvorsen et al. 2012) as described below.

Physiological Responses

As with the underwater noise impacts on behavior, the injury threshold levels and these effects on fish at different intensities of underwater sound are unclear (Hastings and Popper 2005). Many of the previous studies cited for the physical effects of underwater sound on fish were based on seismic airgun and underwater explosives studies (Hastings and Popper 2005). These physical effects can include swim bladder, otolith, and other organ damage; hearing loss; and mortality (Hastings and Popper 2005).

A more recent study examining the impacts of pile driving on species with an open swim bladder (lake sturgeon), a closed swim bladder (Nile tilapia), and no swim bladder (hogchoker) found that species with a swim bladder suffered a wide range of physical trauma ranging from delayed mortality resulting from renal hemorrhaging and rupturing of the swim bladder (Nile tilapia only) to moderate injuries including hematomas to numerous internal organs and partially deflated swim bladders (both Nile tilapia and lake sturgeon) (Halvorsen et al. 2012). The hogchokers, representative of species lacking a swim bladder, displayed no external or internal injuries as a result of exposure to simulated pile driving noise (Halvorsen et al. 2012). None of the sturgeon tested suffered acute mortality as a result of exposure to the pile driving sounds. It is important to note that the conditions of this study attempted to replicate sound levels at a range of 32 feet (10 meters); however, other factors such as existing ambient noise and open waters which would allow fish to exhibit natural behaviors, including avoidance of aversive stimuli, were not incorporated.

Fish with swim bladders are more susceptible to barotraumas from impulsive sounds (sounds of very short duration with a rapid rise in pressure) because of swim bladder resonance (vibration at a frequency determined by the physical parameters of the vibrating object). When a sound pressure wave strikes a gas-filled space, such as the swim bladder, it causes that space to vibrate (expand and contract) at its resonant frequency. When the amplitude of this vibration is sufficiently high, the pulsing swim bladder can press against, and strain, adjacent organs, such as the liver and kidney. This pneumatic compression may cause injury in the form of ruptured capillaries, internal bleeding, and maceration of highly vascular organs (California Department of Transportation 2002; Halvorsen et al. 2012). Halvorsen et al. (2012) notes that the results of the study support an argument that fishes appear to be less susceptible to energy from impulsive pile driving than is currently allowed before the onset of physiologically significant injuries and an increase in the current criteria may be warranted.

Hastings and Popper (2005) also noted that sound waves can cause different types of tissue to vibrate at different frequencies, and that this differential vibration can cause tearing of mesenteries and other sensitive connective tissues. Exposure to high noise levels can also lead to injury through “rectified diffusion,” the formation and growth of bubbles in tissues. These bubbles can cause inflammation, cellular damage, and blockage or rupture of capillaries, arteries, and veins (Crum and Mao 1996; Stroetz et al. 2001; Vlahakis and Hubmayr 2000). These effects can lead to overt injury or even mortality. Death from barotrauma and rectified diffusion injuries can be instantaneous, or delayed for variable times after exposure. Conversely, fish have also been shown to recover from mild barotrauma injuries during laboratory experiments (Casper et al. 2012).

Noise may modify fish behavior which in turn may make them more susceptible to predation. Fish suffering damage to hearing organs may suffer equilibrium problems, and may have a reduced ability to detect predators and prey (Turnpenny et al. 1994; Hastings et al. 1996). Other types of sublethal injuries can place the fish at increased risk of predation and disease. Adverse effects on survival and fitness can occur even in the absence of overt injury. Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift, or TTS), decreasing sensory capability for periods lasting from hours to days (Turnpenny et al. 1994; Hastings et al. 1996; Smith et al. 2004). The severity of effects from high noise levels produced by impact driving of steel piles depends on several factors, including the size and species of fish exposed. Regardless of species, smaller fish appear to be more sensitive to injury of non-auditory tissues (Yelverton et al. 1975). For example, NMFS biologists observed that approximately 100 surf perch from three different species (*Cymatogaster aggregata, Brachyistius frenatus,* and *Embiotoca lateralis*) were killed during impact pile driving of 30-inch diameter steel pilings at Bremerton, Washington (Stadler NMFS, pers. obs. 2002). Dissections revealed complete swim bladder destruction across all species in the smallest fish (80-millimeter fork length), while swim bladders in the largest fish (170-millimeter fork length) were nearly intact. However, swim bladder damage was typically more extensive in *C. aggregata* when compared to *B. frenatus* of similar size.

Behavioral Responses

Pile driving of all types produces particle motions that may be perceptible to fishes' lateral line, resulting in some degree of avoidance behavior for ESA-listed fish that are both close to the pile being driven and deeper in the water column. Individual fish moving through the area may change course to avoid the ensonified area. However, given the small extent of the ensonified area relative to the available waters of the lower Chesapeake Bay where the behavioral and injury thresholds would not be exceeded, and that any avoidance behavior would likely occur for no more than 1.5 net hours per day, any disturbance of individuals should be considered insignificant (National Marine Fisheries Service 2012). Use of soft starts would allow fish an opportunity to move away from the immediate area before full pile driving power is reached. As explained in National Marine Fisheries Service (2012), it is unlikely these minor changes in behavior would preclude a fish from completing any normal behaviors such as resting, foraging, or migrating or that the fitness of any individuals would be affected. Further, there is not expected to be an increase in energy expenditure that has any detectable effect on the physiology of individual fish or any future effect on growth, reproduction, or general health. Therefore, avoidance behavior by individual fish during pile driving activities should be considered insignificant and discountable.

Essential Fish Habitat

Federally managed fish species and life stages that have water column descriptors as essential fish habitat or Habitat Areas of Particular Concern (Table F-1 in Appendix F, *Essential Fish Habitat Descriptors for the JLOTS Study Area*), could be displaced or injured within the range to effects (Table 3.10-6). The temporary effect of impulsive sound from pile driving represents an adverse impact on water column essential fish habitat and Habitat Areas of Particular Concern.

The impact is likely elevated for species possessing hearing specializations such as Atlantic herring (a commercial forage species). The distress and possible death of large numbers of forage species could, in turn, attract larger predatory species into the range to effects. However, the once-a-year frequency of the ELCAS (M) FTX at JEB Little Creek-Fort Story does not suggest a substantial impact on essential fish habitat or Habitat Areas of Particular Concern.

3.10.3.2.8 Summary

Construction of the floating causeway and ELCAS (M) may result in a temporary disturbance of habitat. However, the duration and scope are limited to no more than 60 days per year at each location for a full JLOTS exercise, and the actual footprint of the piers (reference sections 2.1.1 and 2.1.2), respectively. Though they are expected to disperse away from the immediate vicinity, fishes' ability to swim under the piers would not be affected.

In estimating the potential effects on fish from pile driving noise, the acoustic model assumes 500 strikes per pile with 6 piles being impact driven per day for the cumulative range to effect. However, the number of strikes per pile may be significantly lower than what was modeled. Therefore, the actual range to effect could be smaller than what is presented in Table 3.10-6 above.

Further, when the model applies the 187 or 183 dB re 1 μPa^2sec SEL injury thresholds it assumes fish are remaining within the range of effect during the entirety of a given 24-hour period. In other words, a fish that remained within the calculated range to effects (as described in *Acoustic Modeling*, above) for an entire day of pile driving activity would accumulate energy from every impact strike. Fish that spent part of the day outside of this range due to avoidance or natural behavioral motivations would accumulate a lesser amount of energy, and may not reach the 187 or 183 dB re 1 μPa^2sec SEL injury thresholds. As explained in National Marine Fisheries Service (2012), use of the SEL thresholds is less relevant in this instance since fish are not expected to remain within the area during the entire duration of pile driving.[2] When assessing the potential for physiological impacts, the 206 dB re 1µPa peak threshold is more appropriate as it represents the instantaneous noise level versus a cumulative noise level that would be practically impossible to receive under real world conditions.

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[2] The National Marine Fisheries Service Northeast Region evaluated pile driving impacts on Atlantic and shortnose sturgeon in a 2012 biological opinion and concluded "*...in order for this criteria [SEL] to be relevant, we would need to expect that shortnose sturgeon would remain in that area for the entire duration of the pile driving activity. This is not a reasonable expectation because it does not take into account any behavioral response to noise stimulus. We expect sturgeon to respond behaviorally to noise stimulus and avoid areas above their noise tolerance. This behavioral response is expected to occur at noise levels of 150 dB re 1µPa RMS. We expect that any sturgeon close to piles when pile driving begins to react by leaving the area and expect that any sturgeon approaching the piles while pile driving is ongoing would move around the area. Because of this, it is extremely unlikely that a sturgeon would remain in the ensonified area over the duration of the installation of an entire pile. As evidenced in the figure above (Figure 12), the SEL 187 dB re 1µPa area never occupies the entire width of the river; therefore, there is no danger that a fish would not be able to "escape" from the area while pile driving is ongoing. Because we do not expect sturgeon to remain within the ensonified area for more than the time it would take them to swim out of the area (no more than a few minutes), we have determined that when assessing the potential for physiological impacts, the 206 dB re 1µPa peak criteria is more appropriate. This represents the instantaneous noise level. Thus, considering the area where this noise level will be experienced would account for fish that were in the area when pile driving started or were temporarily present in the area.*"

If fish remain in the vicinity of pile driving for an extended period of time, they may be vulnerable to injury or potential mortality. Mortalities are likely to be limited to small fish, which are more vulnerable to the effects of barotrauma (Fisheries Hydroacoustic Working Group 2008; Yelverton et al. 1975). However, fish close to piles when pile driving begins are expected to react by leaving the area, and any fish approaching the piles while pile driving is ongoing would most likely avoid the area (National Marine Fisheries Service 2012; McCauley et al. 2000; Pearson et al. 1992; Scripps Institution of Oceanography and National Science Foundation 2008). It is reasonable to assume that on hearing pile driving noise at reduced intensity during soft starts (described in Chapter 4, *Standard Operating Procedures and Mitigation Measures*), fish would move away from the immediate vicinity of the activity before full driving intensity is reached, thereby reducing the likelihood of exposure to sound levels that could cause injury or further behavioral disturbance (National Marine Fisheries Service 2012). This, combined with the intermittent occurrence of pile driving for a maximum of 1.5 net hours per day on no more than 20 days (impact driving) or 10 days (vibratory extraction) in any given year at each location, suggests that while physiological or behavioral impacts may occur, they would be limited in duration, intensity, and continuity. No population level impacts on fish or marine invertebrates would be anticipated to occur, and the continued survival of all species would be unaffected.

Navy telemetry data have indicated that Atlantic sturgeon are present in the waters off JEB Little Creek-Fort Story year-round. Adverse effects on Atlantic and shortnose sturgeon are unlikely because: 1) Halvorsen et al. (2012) suggests that the current criteria and range to effects are overly conservative; 2) a sturgeon would have to remain within the range to effects for an extended period of time to accumulate enough energy to cross the SEL injury thresholds, which is unlikely based on natural behavioral motivations that would cause it to move elsewhere; 3) the use of soft starts would likely cause fish to leave the immediate area of pile driving and potential injury zone; and 4) pile driving activity would occur at most once annually. As noted above, it is problematic to consider short-term avoidance behavior an adverse impact; therefore, behavioral impacts on sturgeon (if any) are discountable. Based on the analysis performed above, and the standard operating procedures and mitigation measures described in Chapter 4, *Standard Operating Procedures and Mitigation Measures* the Action Alternative at JEB Little Creek-Fort Story would have no significant impact on fish and marine invertebrates.

Pursuant to the ESA, the Action Alternative at JEB Little Creek-Fort Story:

- ***may affect, but is not likely to adversely affect, the ESA-listed Atlantic sturgeon.***
- ***would have no effect on the ESA-listed shortnose sturgeon.***

Pursuant to the essential fish habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the Action Alternative at JEB Little Creek-Fort Story may have adverse impacts on water column essential fish habitat and Habitat Areas of Particular Concern from pile driving activities. An essential fish habitat consultation over these effects was completed with the National Marine Fisheries Service as part of the Navy's Atlantic Fleet Training and Testing essential fish habitat consultation.

3.10.3.3 Action Alternative – Camp Lejeune – Existing Environment

Existing conditions for Camp Lejeune are summarized in Section 3.10.2.3 above.

3.10.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

Potential impacts on fish and marine invertebrates at Camp Lejeune are summarized in Table 3.10-2. The Action Alternative at Camp Lejeune would include the same annual training activities as the No Action Alternative, plus the ELCAS (M) once per year. Therefore, the potential impacts on fish and marine invertebrates at this location would be similar to those of the No Action Alternative at Camp Lejeune, with the addition of the impacts associated with the ELCAS (M) (described above in Section 3.10.3.2.7).

Because of slightly different site conditions in the waters off Camp Lejeune (Table 3.10-7), source levels used for modeling were selected accordingly and are described in Table 3.10-8; the resulting ranges to effect are listed in Table 3.10-9.

Table 3.10-7: Physical Characteristics of the Waters off Camp Lejeune

Substrate	Low sedimentation; hardbottom in some areas; littered with rocks and boulders[1,2, 3, 4, 5]
Average Depth	10 feet (3 meters) nearshore; 20 feet (6 meters) at 500 feet (152 meters) from shore[6,7]
Salinity	30 practical salinity units (mouth of New River) to 35 practical salinity units in Onslow Bay[7]; higher in fall, lower in spring[8,9]

Sources: [1]Southeast Area Monitoring and Assessment Program 2001; [2]Coastal Ocean Research Monitoring Program; [3]Riggs et al. 1998; [4]Newton et al. 1971; [5]Pilkey et al. 1977; [6]U.S. Marine Corps 2009; [7]National Oceanic and Atmospheric Administration 2014; [8]Mallin and McIver 2010; [9]Deaton et al. 2010.

Table 3.10-8: Summary of Source Levels Selected for Camp Lejeune

Method	dB re 1µPa rms	dB re 1µPa peak	dB re 1µPa^{2}sec SEL
Impact Installation	189	207	183
Vibratory Extraction	160	n/a	n/a

All averages were calculated by converting decibel values to linear values using the formula y = 10^(x_1/15), where x_1 is the dB value. Linear values were averaged and the calculated value was re-converted to dB by $x_2 = 15*\log_{10}(y_{avg})$; rms = root mean square

Table 3.10-9: Calculated Range to Effects for Fish during Pile Driving at Camp Lejeune

Driving Method	Threshold	Range
Impact Installation	Injury (all): 206 dB re 1 μPa peak	13 yd. (12 m)
	Injury (≥ 2g): 187 dB re 1 μPa^2sec SEL	1,231 yd. (1,126 m)
	Injury (< 2g): 183 dB re 1 μPa^2sec SEL	2,275 yd. (2,080 m)
	Behavioral (all): 150 dB re 1 μPa rms	4,353 yd. (3,981 m)
Vibratory Extraction	Behavioral (all): 150 dB re 1 μPa rms	50 yd. (46 m)

Note: no injury criteria for fish for vibratory pile driving; all sound levels expressed in dB re 1 μPA rms; dB = decibel; rms = root mean square; μPa = micropascal; m = meters, yd. = yards; g = grams

The range to effects for underwater noise is assumed to take a circular shape around the notional pile bring driven at the furthest offshore point of the ELCAS (M) (approximately 1,500 feet [457 meters] from shore). Zones with radii larger than 1,500 feet (457 meters) would be truncated by the shoreline, and were therefore modeled as semicircles extending to the north, east, and south at Camp Lejeune since the beach would represent the boundary for underwater propagation. The calculated ranges assume no obstructions, and sounds would attenuate as they encounter land or other solid obstacles. As a result, the distances calculated may not actually be attained at Camp Lejeune.

3.10.3.4.1 Summary

Based on discussions with the North Carolina Division of Marine Fisheries (Collier pers. comm. 2013), Atlantic sturgeon utilize waters in the vicinity off Camp Lejeune, but shortnose sturgeon are unlikely to occur. Construction of the ELCAS (M) may result in a temporary disturbance and minimal loss of habitat (for fish in the water column) similar to that described in previous sections. However, the duration and scope would be limited to no more than 60 days per year, and the actual footprint of the pier (reference section 2.1.2). Though they are expected to disperse away from the immediate vicinity, fishes' ability to swim under the piers would not be affected. As described above in Section 3.10.3.2.7 for the Action Alternative at JEB Little Creek-Fort Story, based on the conservative modeling assumptions, standard operating procedures, and intermittent, temporary occurrence of pile driving in any given year, no population level impacts for fish or marine invertebrates would be anticipated to occur, and the continued survival of all species would be unaffected. Therefore, the Action Alternative at Camp Lejeune would have no significant impact on fish and marine invertebrates.

Pursuant to the ESA, the Action Alternative at Camp Lejeune:

- ***may affect, but is not likely to adversely affect, the ESA-listed Atlantic sturgeon.***
- ***may affect, but is not likely to adversely affect, the ESA-listed shortnose sturgeon.***

Pursuant to the essential fish habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the Action Alternative at Camp Lejeune may have minimal and temporary adverse impacts on water column essential fish habitat and Habitat Areas of Particular Concern from pile driving activities. An essential

fish habitat consultation over these effects was completed with the National Marine Fisheries Service as part of the Navy's Atlantic Fleet Training and Testing essential fish habitat consultation.

3.10.3.5 Action Alternative - Conclusion

Individual animals may be exposed to a variety of stressors under the Action Alternative. However, these threats are expected to be relatively infrequent, intermittent in nature, and highly localized within the study area. Any fish that are exposed to high sound levels may change their normal behavior patterns (i.e., swimming speed, foraging habits, etc.) or be temporarily displaced from the area of construction. Any exposures would likely have only a minor effect on individuals and no effect on their populations. Soft starts may reduce potential adverse underwater impacts on fish and marine invertebrates from pile driving noise. Effects from JLOTS training are not anticipated to have any adverse impact on population recruitment, survival, or recovery (in the case of Atlantic and shortnose sturgeon). Therefore, no significant impact on fish, marine invertebrates, or essential fish habitat would be anticipated as a result of the Action Alternative at JEB Little Creek-Fort Story or Camp Lejeune.

Pursuant to the ESA, the Action Alternative:

- ***may affect, but is not likely to adversely affect, the ESA-listed Atlantic sturgeon.***
- ***may affect, but is not likely to adversely affect, the ESA-listed shortnose sturgeon.***

Pursuant to the essential fish habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, the Action Alternative may have minimal and temporary adverse impacts on water column essential fish habitat and Habitat Areas of Particular Concern.

3.11 Sea Turtles

3.11.1 Introduction

This section addresses sea turtles that have the potential to occur in the JLOTS study area, and the impacts that may result from training activities. The ESA (introduced in Section 3.8, *Terrestrial and Aquatic Vegetation*) is applicable to all species of sea turtles found in U.S. waters; biological assessments for USFWS and NMFS have been prepared to address impacts on listed species.

Note: Terrestrial turtle species are addressed separately in Section 3.9, *Terrestrial Wildlife and Birds*.

3.11.2 No Action Alternative

3.11.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

Sea turtle species found on the U.S. Atlantic coast that could occur at JEB Little Creek-Fort Story are described below, and summarized in Table 3.11-1.

3.11.2.1.1 Green Sea Turtle

The green sea turtle is listed as threatened, except for breeding populations in Florida and along the Pacific coast of Mexico, which are listed as endangered. Critical habitat for this species has been designated; however, it is located outside the study area.

Green sea turtle adults commonly reach a straight carapace length of 3.3 feet (1 meter) and 300 to 350 pounds (136 to 159 kilograms) in weight and a maximum size of 4.0 feet (1.2 meters) and 440 pounds (200 kilograms) in weight (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991; National Marine Fisheries Service 2012). The adult carapace ranges in color from solid black to gray, yellow, green, and brown, while the plastron is yellowish white (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2012).

In U.S. Atlantic and Gulf of Mexico waters, green sea turtles are found in inshore and nearshore waters from Texas to Massachusetts, and are also found around the U.S. Virgin Islands and Puerto Rico (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991; National Marine Fisheries Service 2012). Green sea turtles share the same general life history pattern as other sea turtles and use three types of habitat – oceanic beaches (for nesting), convergence zones in the open ocean, and benthic feeding grounds in coastal areas (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2012).

Table 3.11-1: Sea Turtles Potentially Occurring in the JLOTS Study Area

Common Name	Scientific Name	ESA Status	Year Listed	Population / DPS	Potential for Occurrence in the Study Area	
					JEB Little Creek-Fort Story	Camp Lejeune
Green sea turtle	*Chelonia mydas*	T/E[1]	1978	n/a	Rare – more likely in summer	Seasonally common – late spring to early fall
Hawksbill sea turtle	*Eretmochelys imbricata*	E	1970	n/a	Not expected (extralimital)	
Kemp's ridley sea turtle	*Lepidochelys kempii*	T	1970	n/a	Rare – more likely in spring and fall	Rare – more likely in spring and fall
Leatherback sea turtle	*Dermochelys coriacea*	E	1970	n/a	Rare – more likely in summer	Seasonally common – late spring to early fall
Loggerhead sea turtle	*Caretta caretta*	T	2011	Northwest Atlantic Ocean	Seasonally common – late spring to early fall	

[1] As a species, the green turtle is listed as threatened, but the Florida and Mexican Pacific coast nesting populations are listed as endangered. This represents the closest nesting population of significant size to the study area, however population identifications cannot be confirmed; common = confirmed, regular sightings of the species inside the study area; rare = there have been few confirmed sightings/strandings in the vicinity, or the distribution of the species is near enough to the study area that the species could occur there; however, occurrences would be infrequent and/or in very small numbers; not expected = species is not expected to occur inside the study area based on unsuitability of habitat or conditions; unprecedented

Post-hatchling and early-juvenile green turtles are found in the convergence zones in the open ocean (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991; National Marine Fisheries Service 2012). Green turtles grow slowly (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991). Once they reach a carapace length of about 7.9 to 9.8 inches (20 to 25 centimeters), they migrate to shallow, nearshore areas (less than 164 feet [50 meters] in depth), where they tend to remain. The optimal developmental habitats for late juveniles and foraging adults are warm, shallow waters (10 to 16 feet [3 to 5 meters] in depth), with an abundance of submerged aquatic vegetation, close to nearshore reefs or rocky areas that are used by green turtles for resting.

Green sea turtles hatchlings eat a variety of plants and animals but adult green turtles feed mainly on seagrasses and marine algae. While offshore, green turtles are not obligate herbivores and may consume invertebrates (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2007). Important adult feeding areas are found in Florida, where seagrasses are abundant.

Juvenile green turtles use estuaries along the Atlantic coast, including the Chesapeake Bay, as summer developmental habitat (Epperly et al. 1995). They are more likely to be sighted in Virginia during the warmer months. Adults are predominantly tropical and are less common north of southern Florida. Three live and nine dead strandings of green sea turtles in the Tidewater area and along the Eastern Shore were reported in 2012 by the Virginia Aquarium (Swingle et al. 2013); all were during the fall and winter. Although the green sea turtle is less common than loggerhead or Kemp’s ridley sea turtles in the Chesapeake Bay area, it may be sighted near JEB Little Creek-Fort Story during the warmer months of the year.

3.11.2.1.2 Hawksbill Sea Turtle

The hawksbill sea turtle is listed as endangered under the ESA. Critical habitat for this species has been designated; however, it is not located near the study area.

The 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.

Hawksbills are found throughout the tropics, including in the Atlantic, Pacific, and Indian Oceans and associated water bodies. Hawksbills are highly migratory with females nesting on sandy beaches surrounding islands or mainland coasts in the tropics or subtropics. Hawksbills do not nest north of Florida in the continental United States and there are no records of them nesting in Virginia. Although hawksbills have been sighted as far north as Massachusetts, their occurrence north of Florida is extremely rare.

Like other sea turtles, this species uses different habitats during different life stages. Post-hatchlings are thought to occupy the pelagic environment, and some drift in mats of macroalgae (*Sargassum*). Recruitment to coastal areas occurs after several years, where feeding takes place in the benthic environment. Coral reefs are recognized as optimal habitat for juvenile, sub-adult, and adult hawksbill turtles likely because of the presence of sponges, a favored prey item that comprises as much as 95 percent of their diet (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1993; U.S. Department of the Navy 2008).

Hawksbill turtles are considered extralimital in the Chesapeake Bay. The first verified account of a hawksbill turtle in the Chesapeake Bay occurred in November 1991, when a commercial fisherman caught a juvenile hawksbill at the mouth of the James River (Keinath et al. 1991). Since then, there have only been two additional reports of hawksbill sea turtles in the Chesapeake Bay: one in December 2000 and one in November 2004 (Virginia Institute of Marine Science 2008). These individuals were both cold-stunned juveniles. Thus, it is possible but very unlikely, that this species would occur in the study area. Individuals that may occur would likely be stressed or ill, and certainly outside of their normal range.

3.11.2.1.3 Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle is listed as endangered under the ESA. In 2010, NOAA Fisheries and USFWS were jointly petitioned to designate critical habitat for Kemp's ridley sea turtles in nesting beaches along the Texas coast and marine habitats in the Gulf of Mexico and Atlantic Ocean (WildEarth Guardians 2010). Consideration of this petition is currently in progress.

Kemp's ridley sea turtles are considered the smallest marine turtles in the world, with a straight carapace length of approximately 2.0 to 2.3 feet (60 to 70 centimeters) (with shell length and width being nearly equal) and weight of about 100 pounds (45 kilograms) (National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Secretary of Environment and Natural Resources, Mexico 2010; National Marine Fisheries Service 2013). The carapace is round to somewhat heart-shaped and the coloration changes from grey-black in hatchlings to the lighter grey-olive carapace and cream-white or yellowish plastron of adults (National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Secretary of Environment and Natural Resources, Mexico 2010).

The Kemp's ridley's range includes the U.S. Atlantic seaboard from New England to Florida and the Gulf of Mexico. Kemp's ridleys display the same general life history pattern as other sea turtles, such as the loggerhead (National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Secretary of Environment and Natural Resources, Mexico 2010). Feeding grounds and developmental areas are found on the Atlantic and Gulf coasts. Young Kemp's ridley hatchlings and small juveniles feed on the macroalgae *Sargassum* and associated infauna and epipelagic species in habitats of the Gulf of Mexico and Gulf Stream current. As large juveniles and adults, Kemp's ridleys move to benthic, nearshore feeding grounds along the U.S. Atlantic and Gulf coasts (Morreale and Standora 2005).

After the loggerhead, the Kemp's ridley is the second most abundant sea turtle in mid-Atlantic waters. Some Kemp's ridley juveniles may migrate as far north as New York and New England, arriving in these areas around June (Morreale and Standora 2005). Young Kemp's ridleys may forage during warmer months in the Chesapeake Bay area, generally heading southward out of Chesapeake Bay by early November (Lutcavage and Musick 1985; Keinath 1993). During the winter, Kemp's ridleys migrate south to warmer waters in Florida (Marquez 1994).

Kemp's ridley turtles feed primarily on crabs, especially portunid crabs such as the blue crab (National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Secretary of Environment and Natural Resources, Mexico 2010). However, they are also known to prey on molluscs, shrimp, fish, jellyfish, and plant material (Marquez 1994). A limited amount of data collected by the Virginia Institute of Marine Science suggests that blue crabs and spider crabs (*Libinia* spp.) are important components of the Kemp's ridley's diet in the Chesapeake Bay (Seney 2003).

Nesting is primarily limited to the beaches of the western Gulf of Mexico (National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Secretary of Environment and Natural Resources, Mexico 2010). Kemp's ridleys display synchronized nesting, a behavior known as arribada (Spanish for arrival) and gather in large numbers at three main beaches in the state of Tamaulipas, Mexico (National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Secretary of Environment and Natural Resources, Mexico 2010; National Marine Fisheries Service 2013a). A few additional nesting sites are known, primarily in Mexico and Texas (National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Secretary of Environment and Natural Resources, Mexico 2010). Exceptions occur, however, such as in 2012 when a Kemp's ridley nested at the Dam Neck Annex to the Oceana Naval Air Station, Virginia (Hutchins 2012). Forty seven (47) strandings of Kemp's ridley sea turtles were reported in the lower Chesapeake Bay in 2012, several in the vicinity of JEB Little Creek-Fort Story (Swingle et al. 2013). This species may occur, but with relatively low frequency, in the waters off JEB Little Creek-Fort Story.

3.11.2.1.4 Leatherback Sea Turtle

The leatherback sea turtle is listed as endangered under the ESA. Critical habitat has been designated for this species. However, it is not located near the study area. This species is the largest sea turtle species in the world. Mature individuals measure over 6 feet (1.8 meters) long and weigh nearly 2,000 pounds (907 kilograms). The leatherback is the only sea turtle species that lacks a hard, bony shell. Unlike other sea turtles, leatherbacks are able to regulate their internal temperature and, therefore, can range from the tropics to cool, temperate waters.

Limited information is available on the habitats used by post-hatchling and early juvenile leatherback sea turtles because these age classes are entirely oceanic (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1992). These life stages are restricted to waters warmer than 79°F (26°C); consequently, much time is spent in the tropics (Eckert 2002). Late juvenile and adult leatherback sea turtles are known to range from mid-ocean to the continental shelf and nearshore waters (Grant and Ferrell 1993; Schroeder and Thompson 1987; Shoop and Kenney 1992). Juvenile and adult foraging habitats include both coastal and offshore feeding areas in temperate waters and offshore feeding areas in tropical waters (Frazier 2001). The movements of adult leatherback sea turtles appear to be linked to the seasonal availability of their prey and the requirements of their reproductive cycles (Collard 1990; Davenport and Balazs 1991).

Leatherbacks lack the crushing, chewing plates that are characteristic of hard-shelled sea turtles that feed on hard-bodied prey (National Marine Fisheries Service 2010). Instead, they have pointed tooth-like cusps and sharp-edged jaws that are adapted for a diet of soft-bodied open-ocean prey such as jellyfish and salps (Aki et al. 1994; Bjorndal 1997; James and Herman 2001; Salmon et al. 2004).

Leatherback nesting in the western North Atlantic is restricted to coarse-grained beaches in subtropical and tropical latitudes (National Marine Fisheries Service & U.S. Fish and Wildlife

Service 1992). Along the Atlantic coast of the United States, leatherback turtles nest on beaches from southern Florida to Georgia, with occasional records from the Carolinas (U.S. Department of the Navy 2003). Leatherbacks are occasionally observed in the Chesapeake Bay but do not appear to be regular inhabitants (U.S. Department of the Navy 2009). Aerial surveys off the Virginia coastline have documented leatherbacks congregating off the mouth of the Chesapeake Bay, especially from May to July, presumably to feed on abundant jellyfish (U.S. Department of the Navy 2009). Leatherback occurrences decrease in the fall, likely due to the fact that prey abundance has decreased (U.S. Department of the Navy 2009). The most recent live stranding of a leatherback in the vicinity of the study area was in 2012 in the James River (Swingle et al. 2013); there are no recent records of leatherbacks stranding at JEB Little Creek-Fort Story. This species may occur, but with relatively low frequency, in the nearshore waters off JEB Little Creek-Fort Story.

3.11.2.1.5 Loggerhead Sea Turtle

The loggerhead sea turtle is listed as threatened or endangered throughout its range. In 2009, a status review identified nine distinct population segments within the global population (Conant et al. 2009). In a September 2011 rulemaking, NMFS and USFWS listed five of these distinct population segments as endangered and kept four as threatened (76 Federal Register [FR] 58868). Only the Northwest Atlantic distinct population segment occurs entirely within the study area. Loggerheads from other distinct population segments may occur as well, although they will be less common.

In July 2014, NMFS issued a final rule for the designation of loggerhead turtle critical habitat (78 FR 43005); Table 3.11-2 details the Primary Constituent Elements in this proposed rule. Of the 36 marine areas identified, the closest to JEB Little Creek-Fort Story (LOGG-N-01 and LOGG-N-02) are approximately 60 nautical miles (111 kilometers) south along the Atlantic coast (National Marine Fisheries Service 2013c).

The loggerhead sea turtle inhabits temperate and tropical regions of the Atlantic, Pacific, and Indian oceans. It occurs in habitats ranging from coastal estuaries to waters far beyond the continental shelf and may be found hundreds of miles out to sea as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers (Dodd 1988). Loggerhead distribution along the U.S. Atlantic coast is determined by seasonal water temperatures. Loggerheads prefer water temperatures between 56 and 82°F (13 and 28°C) (U.S. Department of the Navy 2009).

Table 3.11-2: Summary of Critical Habitat and Primary Constituent Elements for Loggerhead Sea Turtles

Proposed Habitat Type	Critical Habitat Areas in the Vicinity of the Study Area				
	LOGG-N-01	LOGG-N-02	LOGG-N-03	LOGG-N-04	LOGG-N-05
Migratory					
1) Constricted continental shelf area relative to nearby continental shelf waters that concentrate migratory pathways 2) Passage conditions to allow for migration to and from nesting, breeding, and/or foraging areas	✓	--	--	--	--
Winter					
1) Water temperatures above 10° C during colder months of November through April 2) Continental shelf waters in proximity to the western boundary of the Gulf Stream 3) Water depths between 20 and 100 meters	✓	✓	--	--	--
Nearshore Reproductive					
1) Waters directly off the highest density nesting beaches to 1.6 km (1 mile) offshore 2) Waters sufficiently free of obstructions or artificial lighting to allow transit through the surf zone and outward toward open water 3) Waters with minimal manmade structures that could promote predators (e.g., submerged offshore structures), disrupt wave patterns necessary for orientation, and/or create excessive longshore currents	--	--	✓	✓	✓

Source: National Marine Fisheries Service 2013c

The loggerhead is the most abundant sea turtle species in U.S. Atlantic coastal waters (National Marine Fisheries Service 2013b) and the most commonly sighted sea turtle in Virginia (U.S. Department of the Navy 2008, 2009).

The life history pattern of the loggerhead sea turtle is characterized by three basic ecosystem zones:

- Terrestrial zone – the nesting beach where both egg laying and embryonic development occur.
- Neritic zone – the nearshore (including bays and sounds) marine environment where water depths are less than 660 feet (200 meters), including the continental shelf.

- Oceanic zone – the vast open ocean environment (from the surface to the sea floor) where water depths are greater than 660 feet (200 meters).

Female loggerhead sea turtles lay their eggs on coastal beaches where the eggs incubate in sandy nests for about two months (depending on temperature). The hatchlings emerge together and crawl rapidly toward the ocean, where they find food and protection among floating mats of vegetation (*Sargassum*) in the Gulf Stream (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2008). In the ocean, they feed and grow until returning to nearshore coastal habitats.

Young loggerheads may forage on pelagic (free swimming) crabs, molluscs, jellyfish, and vegetation captured at or near the surface, benthic (bottom dwelling) invertebrates such as molluscs and benthic crabs comprise the majority of their diet (Dodd 1988; National Marine Fisheries Service and U.S. Fish and Wildlife Service 2008). Adult loggerheads are also found foraging in the neritic zone. Limited studies of adult loggerheads indicate that molluscs and benthic crabs make up their primary diet as during the better-studied neritic juvenile stage (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2008). On average, loggerheads spend most (over 90 percent) of their time underwater, generally remaining at depths shallower than 328 feet (100 meters).

The waters off Virginia are important transitional habitat for juvenile sea turtles. Juvenile sea turtles along the U.S. Atlantic coast exhibit seasonal foraging movements, migrating north along the coast in the early spring to developmental habitats, and south in the fall (Morreale and Standora 2005). The coastal waters of Virginia, particularly the Chesapeake Bay, serve as developmental habitat for juveniles that take up residency during the summer months (Lutcavage and Musick 1985). The presence of juvenile sea turtles in the Chesapeake Bay area and in Virginia coastal waters peaks from May through October (U.S. Department of the Navy 2009). As waters cool in the fall, most sea turtles migrate south to avoid cold stunning.

Along the U.S. coast, loggerheads successfully nest from Texas to Virginia with the majority of nests – about 80 percent – occurring in six Florida counties (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2008). Nesting in the mid-Atlantic generally is rare and no nesting has been documented at JEB Little Creek-Fort Story. However, loggerhead sea turtle nesting has occurred at Back Bay National Wildlife Refuge and Sandbridge Beach, both located in southeastern Virginia (U.S. Department of the Navy 2012). This species may occur in the waters off JEB Little Creek-Fort Story.

3.11.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

Potential impacts on sea turtles at JEB Little Creek-Fort Story are summarized in Table 3.11-3.

3.11.2.2.1 Artificial Light

Section 3.9.2.2.1 in *Terrestrial Wildlife and Birds* introduces the concepts of artificial light and illuminance, listing common sources of both. The use of artificial lights on vehicles, equipment and land during the Improved Navy Lighterage System, cargo marshalling, and tent encampment

FTXs have the potential to result in physiological or behavioral changes for sea turtles in the study area.

Based on knowledge of their sensory biology (Bartol and Musick 2003; Levenson et al. 2004; Narazaki et al. 2013; Brudenall et al. 2008), sea turtles may detect objects within the water column (e.g., vessels, prey, predators) via a combination of auditory and visual cues. However, research examining the ability of sea turtles to avoid collisions with vessels and detect prey shows they may rely more on their vision than auditory cues (Hazel et al. 2007; Constantino and Salmon 2003; Southwood et al. 2007). Similarly, while sea turtles may rely on acoustic cues to identify nesting beaches, they appear to rely on other nonacoustic cues for navigation such as magnetic fields (Lohmann 1991; Lohmann and Lohmann 1996; Irwin and Lohmann 2005) and light (Avens and Lohmann 2003). Studies have shown that artificial light can cause behavioral changes in sea turtles including potential alteration to nest site selection and seafinding (location of the ocean from the nest by hatchlings) (Salmon et al. 1995; Salmon and Witherington 1995; Lorne and Salmon 2007; Ferreira and Martins 2013). These changes can in turn result in increased mortality rates for hatchlings (National Marine Fisheries Service 2010). However, the level to which artificial light might affect sea turtle behavior depends on a number of factors, including the spectrum/color, illuminance, and duration of exposure (Reintsma et al. 2014; Sella et al. 2006).

Lighting that would be used during the FTXs would be of moderate intensity, and impacts would be highly localized to the immediate area where the lights would be utilized. Further, potential for effects would be expected to decrease rapidly with distance from the source of the artificial light. Sea turtles near the study area would be expected to avoid the immediate vicinity of training activities due to the lack of high quality foraging habitat (e.g., abundant marine fauna, large seagrass beds, and diverse marine vegetation species). Individual animals that may occur in the waters off JEB Little Creek-Fort Story would not be affected by light in the marine environment since artificial light is not being introduced into the water column.

Table 3.11-3: Potential Sea Turtle Stressors Resulting from JLOTS Activities – No Action Alternative

FTX	Artificial Light	Entanglement	Temporary Loss of Habitat	Temporary Reduction of Water Quality	Vehicle and Vessel Strikes	Vehicle, Vessel, and Equipment Noise
Improved Navy Lighterage System	all locations	--	--	all locations	all locations	all locations
Amphibious Bulk Liquid Transfer System	--	all locations	--	--	--	all locations
Tactical Water Purification System	--	all locations	--	all locations	--	all locations
Cargo Marshalling and Movement	all locations	--	--	all locations	all locations	all locations
Tent Encampment	all locations	--	--	--	--	all locations
Floating Causeway	Fort Story, Camp Lejeune	--	Fort Story, Camp Lejeune			
Effects Analysis						
Timing	Year-round					
Proximity	Intensity of potential effects can be expected to correlate positively with proximity to light sources	Limited to the immediate area of the activity	--	Limited to the immediate area around the activity		Intensity of potential effects can be expected to correlate positively with proximity to sources of noise
Duration, Frequency, and Distribution	≤ 60 days during full JLOTS exercise; several days during the rest of the year; effects may be constant or intermittent during night hours	≤ 60 days during full JLOTS exercise; several days during the rest of the year; intermittent throughout the year	--	Once per year during full JLOTS exercise; intermittent during the rest of the year (excluding Camp Lejeune)		
Expected Recurrence	Recurrence coincides with frequency of applicable FTX; lower intensity throughout the year, higher intensity during full JLOTS exercise; lower intensity during quarterly or routine training (excluding Camp Lejeune); none once FTX is complete		--	Recurrence coincides with frequency of applicable FTX; lower intensity throughout the year, higher intensity during full JLOTS exercise; lower intensity during quarterly or routine training (excluding Camp Lejeune); none once FTX is complete		

-- = this stressor is not expected to result from the FTX; For the purposes of this analysis, cargo marshalling occurs only in the terrestrial environment. Impacts from cargo marshalling on the marine environment are addressed under the Improved Navy Lighterage System.

Use of light offshore would be limited to shipboard lights and chem lights deployed on the Amphibious Bulk Liquid Transfer System at the water's surface for a few days each year, at most. Impacts to sea turtles from artificial lighting used at the tent encampments and other onshore training would be limited to animals that have left the marine environment, presumably to nest. Since the likelihood of any sea turtle species nesting at JEB Little Creek-Fort Story is extremely low and the majority of the tent encampment equipment would be well away from the beach at Rodriguez, Iwo Jima, and Amphibious Fields, the potential for impacts to sea turtles from artificial light is negligible. In addition, measures detailed in Chapter 4, *Standard Operating Procedures and Mitigation Measures* further reduce the likelihood of impacts to sea turtles onshore.

3.11.2.2.2 Entanglement

Based on the size of the hose and configuration of its attachments and buoys, deployment of floating hoses during liquid transfer system exercises presents a very minor risk of entanglement for very large sea turtles only. Hoses are kept taut, minimizing the chance of loops that could potentially entangle large marine species. The lack of a significant length of either type of hose in the water column further decreases the likelihood of entanglement. In the very unlikely event of entanglement, all the equipment in use would be recovered, providing an opportunity to disentangle any affected animal. Additionally, the small diameter of the orifice and the presence of the strainer on the Tactical Water Purification System intake apparatus would prevent any small sea turtles from being drawn into the system.

3.11.2.2.3 Temporary Loss of Habitat

The waters off JEB Little Creek-Fort Story have been used for military training activities for decades. Frequent vehicle and vessel traffic on and around Anzio Beach, Little Creek Cove, Mudflats, and Omaha and Utah Beaches has created disturbed conditions in the nearshore marine and terrestrial environment. This frequent activity combined with sandy substrate and wave action results in turbid waters and a lack of established submerged aquatic vegetation or abundant invertebrate fauna.

Construction of the floating causeway (at Fort Story only under this Alternative) may result in a temporary loss of habitat. However, the duration and scope are limited to no more than 60 days per year for a full JLOTS exercise, and the actual footprint of the piers (reference sections 2.1.1 and 2.1.2), respectively. Sea turtles' ability to swim under the piers would not be affected, though behavioral reactions to construction sounds may occur. Because sea turtles would not be expected to frequent the study area, the habitat itself is of low quality for foraging, and is not preferred for nesting, impacts on sea turtles resulting from temporary loss of habitat would not be considered significant.

3.11.2.2.4 Temporary Reduction of Water Quality

In study area waters, various activities would be expected to disturb sediments, resulting in a temporary decrease in water quality. Vessel and amphibious vehicle movements disturb sediments, with impacts of the greatest duration and intensity resulting during a full JLOTS exercise. Impacts are expected to be greatest closer to shore, where landing craft would offload.

Quarterly and routine cargo movement exercises would be less intense but occur more frequently. The sandy sediment that dominates the seafloor off JEB Little Creek-Fort Story would be expected to quickly settle back in place (National Marine Fisheries Service 2009), with finer particles taking slightly longer.

Anchoring to stabilize floating causeways would also cause highly localized increases in turbidity as the anchors settle onto the seafloor and displace some of the sediments. Similar disturbances would occur when the anchors were retrieved after the end of the exercises. Each time, these impacts would be temporary and localized, lasting only for a few hours after completion of the activity.

Impacts on sea turtles from temporary decreases in water quality are expected to be minimal. The ability to forage in the immediate area of a moving vessel, amphibious vehicle, or anchor could be impacted by the reduced sensory capability in turbid waters. Existing foraging habitat conditions are poor, decreasing the likelihood that animals would select this location for foraging.

The major causes of reduced water quality (vessel and craft movement) would occur once per year over 60 days (full JLOTS exercise); other quarterly and routine exercises would be of a significantly lower intensity but higher frequency. Routine exercises would be limited to a few hours each day. Between each occurrence, there would be ample time for water quality to return to pre-training levels.

3.11.2.2.5 Vehicle and Vessel Strikes

Sea turtles can detect approaching vessels, likely by sight rather than by sound (Bartol and Ketten 2006; Hazel et al. 2007). Sea turtles seem to react more to slower moving vessels (2.2 knots) than to faster vessels (5.9 knots or greater). Since vessel and vehicle movements would be restricted based on the terrain and safety requirements in the terrestrial environment, and required maneuvers and safety requirements in the marine environment, sea turtles are expected to be able to move away from them as they approach (National Marine Fisheries Service 2012a). Lookout procedural measures (Chapter 4) may reduce the likelihood of vessel strikes. Larger ships would be at anchor during most of the FTXs. Although the likelihood of being struck is minimal, sea turtles that overlap with Navy exercises would be more likely to encounter vessels. Exposure to vessel traffic may cause changes in an individual’s behavior but would not be expected to result in population-level impacts. Vessel movements would not overlap with any designated sea turtle critical habitat.

3.11.2.2.6 Vehicle, Vessel, and Equipment Noise

High levels of sound have the potential to temporarily or permanently injure sea turtles. Elevated noise levels would be expected in the immediate vicinity of the FTXs as a result of equipment and vehicle operation, and personnel communications. None of these sound sources reach levels with the potential to injure sea turtles based on criteria set by NMFS. However, sea turtles may exhibit a behavioral response or combinations of behavioral responses upon exposure to anthropogenic sounds. If a sound is detected, a stress response (i.e., startle or annoyance) or a cueing response (based on a past stressful experience) can occur. Marine species naturally experience stressors within their environment and as part of their life histories. Changing weather and ocean conditions, exposure to diseases and naturally occurring toxins, lack of prey availability, social interactions with members of the same species, nesting, and interactions with predators all contribute to stress. Activities associated with JLOTS training have the potential to provide additional stressors above and beyond those that occur in the absence of human activity.

Immature Kemp's ridley turtles have shown physiological responses to the acute stress of capture and handling through increased levels of the stress hormone corticosterone, along with biting and rapid flipper movement (Gregory and Schmid 2001). Captive olive ridley hatchlings showed heightened blood glucose levels indicating physiological stress (Rees et al. 2008; Zenteno et al. 2007). Repeated exposure to stressors, including human disturbance such as vessel disturbance and anthropogenic sound, may result in negative consequences to the health and viability of an individual or population (Gregory and Schmid 2001). One factor to consider when predicting a stress or cueing response is whether an animal is naïve or has prior experience with a stressor. Prior experience with a stressor may be of particular importance because repeated experience with a stressor may dull the stress response via acclimation.

The response of a sea turtle to an anthropogenic sound would likely depend on the frequency, duration, temporal pattern, and amplitude of the sound as well as the animal's prior experience with the sound and the context in which the sound is encountered (i.e., what the animal is doing at the time of the exposure). Distance from the sound source and whether it is perceived as approaching or moving away could also affect the response. Potential behavioral responses to anthropogenic sound could include startle reactions, disruption of feeding, disruption of migration, changes in respiration, alteration of swim speed, alteration of swim direction, and area avoidance.

Repeated exposures of an individual to multiple sound-producing activities over a season, year, or life stage could cause reactions with energetic costs that can accumulate over time to cause long-term consequences for the individual. Conversely, some sea turtles may habituate to or become tolerant of repeated exposures over time, learning to ignore a stimulus that in the past did not accompany any overt threat, such as high levels of ambient noise found in areas of high vessel traffic (Hazel et al. 2007; Lester et al. 2013) like JEB Little Creek-Fort Story. In an experiment, after initial avoidance reactions, loggerhead sea turtles habituated to repeated exposures to airguns in an enclosure, and the habituation behavior was retained by the sea turtles when exposures were separated by several days (Moein et al. 1994). While this type of habituation may result in a reduction in behavioral effects, it could also increase the likelihood of a vessel strike if a sea turtle were to occur in the study area. While minor behavioral disturbances from sounds produced by the activities may occur, they are expected to be minor/temporary and to not rise to the level of a take, given the nature of the ambient conditions at the study area and the low presence of turtles.

Since sea turtles are not known to produce sounds underwater for communication, sound may play a limited role in their environment, and potential for masking (introduced in Section 3.9.2.2.6 in *Terrestrial Wildlife and Birds*) may be limited.

3.11.2.2.7 Summary

Because the No Action Alternative at JEB Little Creek-Fort Story represents a continuation of the existing frequency and intensity of annual, quarterly, and routine JLOTS training at this location, its impacts on sea turtles are reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. Lookout procedural measures may reduce the likelihood of vessel strikes. Mitigation measures (Chapter 4) implemented by the Navy are designed to further reduce potential impacts to sea turtles. There would be no permanent loss of habitat and impacts would cease entirely between training exercises. The No Action Alternative would not compromise the capacity of the area to continue supporting the sea turtle species it currently supports. Thus, there would be no significant impacts on sea turtles under the No Action Alternative.

Pursuant to the ESA, the No Action Alternative at JEB Little Creek-Fort Story:

- ***may affect but is not likely to adversely affect green, Kemp's ridley, leatherback or loggerhead sea turtles.***
- ***would have no effect on hawksbill sea turtles.***
- ***would have no effect on green, hawksbill, leatherback, or loggerhead sea turtles' critical habitat.***

3.11.2.3 No Action Alternative – Camp Lejeune - Existing Environment

The most common sea turtle species are introduced in Section 3.11.2.1, with differences described below.

3.11.2.3.1 Green Sea Turtle

Although green sea turtles can be found year-round in North Carolina, they are most abundant from spring through fall. They have been reported in nearshore, shelf, and edge waters, generally in less than 164 feet (50 meters) of depth. Nearshore estuarine waters, plentiful in the vicinity of Camp Lejeune, are important for the juvenile phase of green sea turtles and adults who are foraging between nesting sessions.

Green turtles nest from North Carolina south, with most of the primary nesting beaches occurring in a six-county area in east central and southeastern Florida (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991). Green sea turtles occasionally nest on Onslow Beach at Camp Lejeune; these nests are relatively few compared to the number of nests made by loggerheads (Schwartz 1989). This species may occur in waters off Camp Lejeune.

3.11.2.3.2 Hawksbill Sea Turtle

There are no records of hawksbill turtles nesting in North Carolina, and they are considered extralimital to the waters off Camp Lejeune (U.S. Department of the Navy 2003).

3.11.2.3.3 Kemp's Ridley Sea Turtle

Off North Carolina, Kemp's ridley sea turtles are most likely to be seen during the spring and fall (Lutcavage and Musick 1985), although they may be sighted year-round. Kemp's ridleys have been known to nest in North Carolina, but this occurs rarely, and no incidences of nesting at Camp Lejeune have been documented. Past fishery bycatch records for the Bogue Inlet area indicate that only 12 percent of the sea turtles caught are Kemp's ridleys (Epperly et al. 1995).

3.11.2.3.4 Leatherback Sea Turtle

Off North Carolina, leatherback sea turtles are primarily observed from April to June in relatively shallow waters, although they have been reported year-round in the Cherry Point Operating Area offshore (Schwartz 1989). 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). There are no recent records of leatherback strandings at Camp Lejeune. Although no leatherback nesting has been documented at Camp Lejeune, nesting activities in North Carolina were confirmed in 2012 and 2013 (National Park Service 2012; Godfrey 2013).

3.11.2.3.5 Loggerhead Sea Turtle

The loggerhead is the most abundant sea turtle species in U.S. coastal waters (National Marine Fisheries Service 2012b) and the most commonly sighted sea turtle in North Carolina (U.S. Department of the Navy 2008, 2009). In North Carolina, sighting data indicate that loggerheads are found year-round south of Cape Hatteras (U.S. Department of the Navy 2008). Although many loggerheads travel north of Cape Hatteras in the summer, some females remain in North Carolina to nest from April through September (Schwartz 1989). The waters off the North Carolina coast are important transitional habitat for juvenile sea turtles. As waters cool in the fall, most sea turtles migrate southward at least as far as Cape Hatteras, North Carolina to avoid cold stunning. Nesting loggerhead sea turtles were confirmed in North Carolina in 2012 and 2013 (National Park Service 2012; Godfrey 2013), and nesting has occurred at Camp Lejeune.

As described in Section 3.11.2.1.5 for JEB Little Creek-Fort Story, of the 36 marine areas identified under the critical habitat designation, distances of the closest marine areas from Camp Lejeune are listed in Table 3.11-4 (National Marine Fisheries Service 2013c).

Table 3.11-4: Critical Habitat Areas in the Vicinity of Camp Lejeune

Marine Area	Distance from Camp Lejeune to Closest Point of Boundary
LOGG-N-01	35 nm (65 km)
LOGG-N-02	15 nm (28 km)
LOGG-N-03	15 nm (28 km)
LOGG-N-04	0 nm (0 km)
LOGG-N-05	40 nm (74 km)

Source: National Marine Fisheries Service 2013c; nm = nautical miles; km = kilometers

3.11.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

Potential impacts to sea turtles at Camp Lejeune are summarized in Table 3.11-3. The proposed training activities under the No Action Alternative at Camp Lejeune would be the same as those of the No Action Alternative at JEB Little Creek-Fort Story. However, quarterly and routine JLOTS training would not occur. Therefore, analyses in Section 3.11.2.2 are applicable to the No Action Alternative at Camp Lejeune (with the exception of loggerhead sea turtle critical habitat described below), but potential impacts on sea turtles are expected to be of lower frequency, duration, and intensity.

3.11.2.4.1 Loggerhead Sea Turtle Critical Habitat

Critical habitat areas LOGG-N-01 through -03, and LOGG-N-05, would not be affected by the activities being addressed under the No Action Alternative based on their distance from the study area. The primary constituent elements outlined previously in Table 3.11-2 for LOGG-N-04 (Nearshore Reproductive) include waters directly off the highest density nesting beaches to 1 mile (1.6 kilometers) offshore; waters sufficiently free of obstructions or artificial lighting to allow transit through the surf zone and outward toward open water; and waters with minimal manmade structures that could promote predators (e.g., submerged offshore structures), disrupt wave patterns necessary for orientation, and/or create excessive longshore currents.

The primary constituent elements previously outlined for LOGG-N-04 (Nearshore Reproductive) include waters directly off the highest density nesting beaches to 1.6 kilometers (1 mile) offshore; waters sufficiently free of obstructions or artificial lighting to allow transit through the surf zone and outward toward open water; and waters with minimal manmade structures that could promote predators (e.g., submerged offshore structures), disrupt wave patterns necessary for orientation, and/or create excessive longshore currents. Most impacts to the primary constituent elements of Nearshore Reproductive habitat are expected to result from activities that result in a loss of habitat conditions that allow for hatchling egress from the water's edge to open water, and nesting females' transit back and forth between the open water and the beach during nesting season. The loss of such habitat conditions could come from offshore structures, lights on land or in the water, oil spills and response activities, offshore alternative energy development, fishing gear, or dredging and disposal activities (78 FR 43006). Of these, only offshore structures and artificial light are associated with JLOTS activities. Since structures such as the floating causeway would not be permanent, and light is not being introduced into the water column, no adverse effects on proposed Nearshore Reproductive habitat are anticipated. In addition, during discussions between the Navy and NMFS regarding potential national security impacts of the critical habitat areas, the Navy identified training activities off of Camp Lejeune as potentially being impacted by the designation; NMFS responded by stating these activities were not the types of activities that may affect or adversely modify critical habitat for the loggerhead sea turtle or its primary constituent elements (see 78 FR 43030). In the final rule (79 FR 39856), it was determined that Camp Lejeune's Integrated Natural Resources Management Plan (INRMP) benefited loggerhead sea turtles; Onslow Beach and Brown's Inlet were subsequently excluded from the designation in accordance with section 4(a)(3) of the ESA. Therefore, the Action Alternative would have no effect on green, hawksbill, leatherback, or loggerhead sea turtles' critical habitat. No significant impact on sea turtles would be anticipated as a result of the No Action Alternative at Camp Lejeune.

3.11.2.4.2 Summary

Because the No Action Alternative at Camp Lejeune represents a continuation of the existing frequency and intensity of annual JLOTS training at this location, its impacts on sea turtles are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. Lookout procedural measures may reduce the likelihood of vessel strikes. Mitigation measures (Chapter 4) implemented by the Navy are designed to further reduce potential impacts to sea turtles. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. The No Action Alternative would not compromise the capacity of the area to continue supporting the sea turtle species they currently support. Thus, there would be no significant impacts on sea turtles under the No Action Alternative at Camp Lejeune.

Pursuant to the ESA, the No Action Alternative at Camp Lejeune:

- ***may affect, but is not likely to adversely affect, green, Kemp's ridley, leatherback or loggerhead sea turtles;***
- ***would have no effect on hawksbill sea turtles;***
- ***would have no effect on green, hawksbill, leatherback, or loggerhead sea turtles' critical habitat.***

3.11.2.5 No Action Alternative – Conclusion

Because the No Action Alternative represents a continuation of the existing levels and intensity of annual JLOTS training, its impacts on sea turtles are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. Lookout procedural measures may reduce the likelihood of vessel strikes, and mitigation measures (Chapter 4) implemented by the Navy are designed to further reduce potential impacts to sea turtles. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. The No Action Alternative would not compromise the capacity of the study area to continue supporting the sea turtle species they currently support. Thus, there would be no significant impacts on sea turtles under the No Action Alternative at JEB Little Creek-Fort Story or Camp Lejeune.

Pursuant to the ESA, the No Action Alternative:

- ***may affect, but is not likely to adversely affect, green, Kemp's ridley, leatherback or loggerhead sea turtles;***
- ***would have no effect on hawksbill sea turtles;***
- ***would have no effect on green, hawksbill, leatherback, or loggerhead sea turtles' critical habitat.***

3.11.3 Action Alternative

3.11.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

The existing environment at JEB Little Creek-Fort Story is described in Section 3.11.2.1.

3.11.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

Potential impacts to sea turtles at JEB Little Creek-Fort Story are summarized in Table 3.11-5. The Action Alternative at JEB Little Creek-Fort Story would include the same annual training activities as the No Action Alternative, plus the deployment of the floating causeway and ELCAS (M). Therefore, the impacts of the Action Alternative at JEB Little Creek-Fort Story on sea turtles would be similar to those of the No Action Alternative, with the addition of the impacts described below.

3.11.3.2.1 Artificial Light

Lights are used on the floating causeway and ELCAS (M). However, as described in the No Action Alternative at JEB Little Creek-Fort Story (Section 3.11.2.2.1), they would be temporary and of moderate intensity, and potential effects would be limited to the immediate vicinity of the structures, which would be deployed away from documented nesting locations. In the case of the causeways themselves, lights would be offshore. Disorientation in turtle hatchlings is generally associated with light sources on the landward side of the beach, which can lead hatchlings into dunes or roads. This combined with the procedures and mitigation measures described in Chapter 4 (*Standard Operating Procedures and Mitigation Measures*), is expected to result in a low likelihood of impacts from artificial lighting.

Table 3.11-5: Potential Sea Turtle Stressors Resulting from JLOTS Activities – Action Alternative

<table>
<tr><th rowspan="2">FTX</th><th rowspan="2">Artificial Light</th><th rowspan="2">Entanglement</th><th rowspan="2">Temporary Loss of Habitat</th><th rowspan="2">Temporary Reduction of Water Quality</th><th rowspan="2">Vehicle and Vessel Strikes</th><th colspan="2">Noise</th></tr>
<tr><th>Vehicle, Vessel, and Equipment</th><th>Pile Driving</th></tr>
<tr><td>Improved Navy Lighterage System</td><td>all locations</td><td>--</td><td>--</td><td>all locations</td><td>all locations</td><td>all locations</td><td>--</td></tr>
<tr><td>Amphibious Bulk Liquid Transfer System</td><td>--</td><td>all locations</td><td>--</td><td>--</td><td>--</td><td>all locations</td><td>--</td></tr>
<tr><td>Tactical Water Purification System</td><td>--</td><td>all locations</td><td>--</td><td>all locations</td><td>--</td><td>all locations</td><td>--</td></tr>
<tr><td>Cargo Marshalling and Movement</td><td>all locations</td><td>--</td><td>--</td><td>all locations</td><td>all locations</td><td>all locations</td><td>--</td></tr>
<tr><td>Tent Encampment</td><td>all locations</td><td>--</td><td>--</td><td>--</td><td>--</td><td>all locations</td><td>--</td></tr>
<tr><td>Floating Causeway</td><td>all locations</td><td>--</td><td colspan="4">all locations</td><td>--</td></tr>
<tr><td>ELCAS (M)</td><td>all locations</td><td>--</td><td colspan="5">all locations</td></tr>
<tr><th colspan="8">Effects Analysis</th></tr>
<tr><td>Timing</td><td colspan="7">Year-round</td></tr>
<tr><td>Proximity</td><td>Intensity of potential effects can be expected to correlate positively with proximity to light sources</td><td>Limited to the immediate area of the activity</td><td>--</td><td colspan="2">Limited to the immediate area around the activity</td><td colspan="2">Intensity of potential effects can be expected to correlate positively with proximity to sources of noise (ref. Sections 3.11.3.2.7 and 3.11.3.6 for pile driving)</td></tr>
<tr><td>Duration, Frequency, and Distribution</td><td>≤ 60 days during full JLOTS exercise; several days during the rest of the year (excl. Camp Lejeune); effects may be constant or intermittent during night hours</td><td>≤ 60 days during full JLOTS exercise; several days during the rest of the year; intermittent throughout the year (excludes Camp Lejeune)</td><td>--</td><td colspan="3">Once per year during full JLOTS exercise; intermittent during the rest of the year (excluding Camp Lejeune)</td><td>Once annually for ≤30 days at JEB Little Creek-Fort Story and Camp Lejeune; 1.5 net hours max. per day</td></tr>
<tr><td>Expected Recurrence</td><td colspan="2">Recurrence coincides with frequency of applicable FTX; lower intensity throughout the year (excluding Camp Lejeune), higher intensity during full JLOTS exercise; none once FTX is complete</td><td>--</td><td colspan="4">Recurrence coincides with frequency of applicable FTX; lower intensity throughout the year (excluding Camp Lejeune), higher intensity during full JLOTS exercise; none once FTX is complete</td></tr>
</table>

-- = this stressor is not expected to result from the FTX; For the purposes of this analysis, cargo marshalling occurs only in the terrestrial environment. Impacts from cargo marshalling on the marine environment are addressed under the Improved Navy Lighterage System.

3.11.3.2.2 Entanglement

No entanglement risks are associated with the floating causeway or ELCAS (M).

3.11.3.2.3 Temporary Loss of Habitat

Construction of the floating causeway and ELCAS (M) may result in a temporary loss of habitat. However, the duration and scope are limited to no more than 60 days per year and the actual footprint of the piers (reference sections 2.1.1 and 2.1.2), respectively. Sea turtles' ability to swim under the piers would not be affected.

3.11.3.2.4 Temporary Reduction of Water Quality

Temporary reductions of water quality from the ELCAS (M) pile driving are expected to be consistent with those of the No Action Alternative, lasting no more than 30 days at each location in any given year. As with anchors, piles being driven or extracted for the ELCAS (M) FTX may disturb sediments, but the results would be highly localized to the piles themselves. Because sea turtles are highly mobile, individuals are expected to avoid any sediment disturbance that may occur and any effect on their movements or behavior is likely to be insignificant (National Marine Fisheries Service 2012a). Any additional impacts to water quality from construction of the floating causeway would be limited to 60 days in any given year.

3.11.3.2.5 Vehicle and Vessel Strikes

Potential impacts from vehicle and vessel strikes would be expected to increase only slightly as a result of the floating causeway and ELCAS (M) FTXs. Lookout procedural measures may reduce the likelihood of vessel strikes for sea turtles. Much of the activity associated with these exercises takes place on the piers themselves and onshore; the net increase in vehicle and vessel traffic from the No Action Alternative at JEB Little Creek-Fort Story would be insignificant.

3.11.3.2.6 Vehicle, Vessel, and Equipment Noise

Potential impacts from vehicle, vessel, and equipment noise would be expected to increase only slightly as a result of the floating causeway and ELCAS (M) FTXs. Much of the activity associated with these exercises takes place on the piers themselves and onshore; the net increase in vehicle, vessel, and equipment noise from the No Action Alternative at JEB Little Creek-Fort Story would be insignificant.

3.11.3.2.7 Underwater Noise – Pile Driving (Construction of the Elevated Causeway System, Modular)

Acoustic Modeling

Fundamentals and modeling of acoustic impacts are described in Appendix C, *Fundamentals of Acoustics* and Section 3.10.3.2.7 in *Fish and Marine Invertebrates*, respectively. Therefore, only details specific to sea turtles are described for the remainder of this section.

Sound Exposure Threshold

Acoustic impacts criteria and thresholds were developed in cooperation with NMFS for sea turtle exposures to various sound sources. Only one criterion applicable to sound produced by pile driving exists for sea turtles. The NMFS threshold value for onset of injury to sea turtles due to both impact pile driving and vibratory pile driving is 190 dB re 1 μPa sound pressure level root mean square. This criterion was developed in cooperation with NMFS and is not based on experimental evidence of injuries caused to sea turtles by pile driving sound, but instead was derived from pinniped thresholds and applied as a precautionary measure when addressing impacts from pile driving on sea turtles. The calculated range to effect for sea turtles is 23 ft. (7 m).

There are limited data available on sea turtle behavioral reactions to sound. No behavioral criterion has been adopted by the NMFS for sea turtles for pile driving noise. Therefore, behavioral effects must be assessed qualitatively. Startle responses to anthropogenic sound have been documented in sea turtles (O'Hara and Wilcox 1990; Moein Bartol et al.1995; McCauley et al. 2000). It can be conservatively assumed that pile driving has the potential to cause startle responses. Note that all sea turtle species regularly encounter natural events that can cause startle reactions, such as the appearance of predators or changing weather conditions.

Physiological Responses

Physiological effects on sea turtles from pile driving noise are not well studied. One study using flatback sea turtles in a model indicated that there may be impacts on hatching success from high amplitude vibration (Ripcke et al. 2011). The physiological effects described above in Section 3.11.3.2.6 could also be experienced as a result of underwater pile driving noise in the study area. Given the limited duration of impact pile driving (less than 1.5 hours on any day of active driving), the procedures and mitigation measures outlined in Chapter 4, *Standard Operating Procedures and Mitigation Measures*), and the exceptionally small range to possible effects (less than 23 feet [7 meters]), it is very unlikely that any sea turtle would be injured during pile driving activities.

Behavioral Responses

A few studies examined sea turtle reactions to airguns, which produce broadband impulsive sound. O'Hara and Wilcox (1990) attempted to create a sound barrier at the end of a canal using seismic airguns. They reported that loggerhead turtles kept in a 984-foot by 148-foot (300-meter x 45-meter) enclosure in a 33-foot (10-meter) deep canal maintained a standoff range of 98 feet (30 meters) from airguns fired simultaneously at intervals of 15 seconds with strongest sound components within the 25-1,000 Hz frequency range. McCauley et al. (2000) estimated that the received level at which turtles avoided sound in the O'Hara and Wilcox (1990) experiment was 175–176 dB re 1 μPa root mean square.

Moein Bartol et al. (1995) investigated the use of airguns to repel juvenile loggerhead sea turtles from hopper dredges. Sound frequencies of the airguns ranged from 100 to 1,000 Hz at three levels: 175, 177, and 179 dB re 1 μPa at 1 m. The turtles avoided the airguns during the initial exposures (mean range of 79 feet [24 meters]), but additional trials several days afterward did not elicit statistically significant avoidance. They concluded that this was due to either habituation or a temporary shift in the turtles' hearing capability.

McCauley et al. (2000) exposed caged green and loggerhead sea turtles to an approaching-departing single airgun to gauge behavioral responses. The trials showed that above a received level of 166 dB re 1 μPa root mean square, the turtles noticeably increased their swimming activity compared to nonoperational periods, with swimming time increasing as airgun levels increased during approach. Above 175 dB re 1 μPa (root mean square), behavior became more erratic, possibly indicating the turtles were in an agitated state (McCauley et al. 2000). The authors noted that the point at which the turtles showed the more erratic behavior and exhibited possible agitation would be expected to approximate the point at which active avoidance would occur for unrestrained turtles (McCauley et al. 2000).

No obvious avoidance reactions by free-ranging sea turtles, such as swimming away, were observed during a multi-month seismic survey using airgun arrays, although fewer sea turtles were observed when the seismic airguns were active than when they were inactive (Weir 2007). The author noted that sea state and the time of day affected both airgun operations and sea turtle surface basking behavior, making it difficult to draw conclusions from the data. However, DeRuiter and Doukara (2012) noted several possible startle or avoidance reactions to a seismic airgun array in the Mediterranean Sea by basking loggerhead turtles.

Soft starts may reduce the likelihood of impacts to sea turtles by allowing an opportunity for animals to leave the area prior to full driving power being reached. While minor behavioral disturbances from sounds produced by the activities may occur, they are expected to be minor and temporary, given the nature of the ambient conditions at the study area and the low presence of turtles.

3.11.3.2.8 Summary

Construction of the floating causeway and ELCAS (M) may result in a temporary loss of habitat. However, the duration and scope are limited to no more than 60 days per year, and the actual footprint of the piers (reference sections 2.1.1 and 2.1.2), respectively. Sea turtles' ability to swim under the piers would not be affected, though they would be expected to disperse away from the immediate vicinity.

Based on the very small size of the range to effects, the temporary and intermittent occurrence of pile driving noise (no more than 30 days in any given year at each location, for a maximum of 1.5 hours of sound production per day on those days), and the use of standard operating procedures such as soft starts, physiological or behavioral impacts may occur but would be extremely limited in duration, continuity, and range. Mitigation measures (Chapter 4) implemented by the Navy are designed to further reduce potential impacts. No population level impacts would occur, and the continued survival of any sea turtle species would not be affected. Therefore, the Action Alternative at JEB Little Creek-Fort Story would have no significant impact on sea turtles potentially occurring in the JLOTS study area.

Pursuant to the ESA, the Action Alternative at JEB Little Creek-Fort Story:

- ***may affect, but is not likely to adversely affect, green, Kemp's ridley, leatherback or loggerhead sea turtles.***
- ***would have no effect on hawksbill sea turtles.***
- ***would have no effect on green, hawksbill, leatherback, or loggerhead sea turtles' critical habitat.***

3.11.3.3 Action Alternative – Camp Lejeune – Existing Environment

Existing conditions for Camp Lejeune are summarized in Section 3.11.2.3 above.

3.11.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

Potential impacts to sea turtles at Camp Lejeune are summarized in Table 3.11-5. The Action Alternative would include the same annual training activities as the No Action Alternative at Camp Lejeune, plus the ELCAS (M) FTX. Therefore, the potential impacts of the Action Alternative on sea turtles and critical habitat would be similar to those of the No Action Alternative at Camp Lejeune, with the addition of the impacts associated with the ELCAS (M) FTX described above in Section 3.11.3.2.7.

Based on slightly different site conditions in the waters off Camp Lejeune, source levels used for modeling were selected accordingly and resulted in a slightly larger range to effect of 28 feet (8.6 meters) for sea turtles.

3.11.3.4.1 Summary

Construction of the ELCAS (M) may result in a temporary loss of habitat similar to that described for the floating causeway. However, the duration and scope would be limited to no more than 60 days per year, and the actual footprint of the pier (reference sections 2.1.1 and 2.1.2), respectively. Sea turtles' ability to swim under the pier would not be affected, though they would be expected to disperse away from the immediate vicinity.

Based on the very small size of the range to effects, the temporary and intermittent occurrence of pile driving noise (no more than 30 days in any given year at each location, for a maximum of 1.5 hours of sound production per day on those days), and use of standard operating procedures such as soft starts, physiological or behavioral impacts may occur but would be extremely limited in duration, continuity, and range. Mitigation measures (Chapter 4) implemented by the Navy are designed to further reduce potential impacts to sea turtles. No population level impacts would occur, and the continued survival of any sea turtle species would not be affected. Therefore, the Action Alternative at Camp Lejeune would have no significant impact on sea turtles.

As detailed in Section 3.11.2.4.1, LOGG-N-01 through -03, and LOGG-N-05, would not be affected by the activities being addressed under the Action Alternative at Camp Lejeune based on their distance from the study area. The primary constituent elements outlined previously in for LOGG-N-04 (Nearshore Reproductive) include waters directly off the highest density nesting beaches to 1 mile (1.6 km) offshore; waters sufficiently free of obstructions or artificial lighting to allow transit through the surf zone and outward toward open water; and waters with minimal manmade structures that could promote predators (e.g., submerged offshore structures), disrupt wave patterns necessary for orientation, and/or create excessive longshore currents. Most impacts on the primary constituent elements of Nearshore Reproductive habitat are expected to result from activities that result in a loss of habitat conditions that allow for hatchling egress from the water's edge to open water, and nesting females' transit back and forth between the open water and the beach during nesting season. The loss of such habitat conditions could come from offshore structures, lights on land or in the water, oil spills and response activities, offshore alternative energy development, fishing gear, or dredging and disposal activities (78 FR 43006). Of these, only offshore structures and artificial light are associated with JLOTS activities. Since structures such as the floating causeway would not be permanent, and light is not being introduced into the water column, no adverse impacts on proposed Nearshore Reproductive habitat are anticipated. In addition, during discussions between the Navy and NMFS regarding potential national security impacts of the critical habitat areas, the Navy identified training activities off of Camp Lejeune as potentially being impacted by the designation; NMFS responded by stating these activities were not the types of activities that may affect or adversely modify critical habitat proposed for the loggerhead sea turtle or its primary constituent elements (see 78 FR 43030). Therefore, the Action Alternative at Camp Lejeune would have no effect on green, hawksbill, leatherback, or loggerhead sea turtles' critical habitat.

Pursuant to the ESA, the Action Alternative at Camp Lejeune:

- ***may affect, but is not likely to adversely affect, green, Kemp's ridley, leatherback or loggerhead sea turtles.***
- ***would have no effect on hawksbill sea turtles.***
- ***would have no effect on green, hawksbill, leatherback, or loggerhead sea turtles' critical habitat.***

3.11.3.5 Action Alternative - Conclusion

Individual animals may be exposed to varying frequencies and levels of intensity of artificial light exposure, entanglement risk, temporary loss of habitat or reduction of water quality, or elevated noise levels under all alternatives. However, these threats are expected to be relatively infrequent, intermittent in nature, and highly localized within the study area. In addition, high sound pressure levels during pile installation and extraction under the Action Alternative at JEB Little Creek-Fort Story and Camp Lejeune may result in behavioral changes. Any animals that are exposed may change their normal behavior patterns or be temporarily displaced from the immediate activity area. Any exposures would likely have only a minor effect on individuals and no effect on their populations. Standard operating procedures may reduce the likelihood of vessel strikes and exposure to elevated noise from pile driving, and mitigation measures (Chapter 4) implemented by the Navy are designed to further reduce potential impacts. Nevertheless, some exposure may be unavoidable. These exposures are not anticipated to have any adverse impact on population recruitment, survival, or recovery of any sea turtle species that may be present in the study area.

Most impacts to the primary constituent elements of Nearshore Reproductive habitat are expected to result from activities that result in a loss of habitat conditions that allow for hatchling egress from the water's edge to open water, and nesting females' transit back and forth between the open water and the beach during nesting season. The loss of such habitat conditions could come from offshore structures, lights on land or in the water, oil spills and response activities, offshore alternative energy development, fishing gear, or dredging and disposal activities (78 FR 43006). Of these, only offshore structures and artificial light are associated with JLOTS activities. Since structures such as the floating causeway and ELCAS (M) would not be permanent, and light is not being introduced into the water column, no adverse effects on proposed Nearshore Reproductive habitat are anticipated. In addition, during discussions between the Navy and NMFS regarding potential national security impacts of the critical habitat areas, the Navy identified training activities off of Camp Lejeune as potentially being impacted by the designation; NMFS responded by stating these activities were not the types of activities that may affect or adversely modify critical habitat for the loggerhead sea turtle or its primary constituent elements (see 78 FR 43030). In the final rule (79 FR 39856), it was determined that Camp Lejeune's Integrated Natural Resources Management Plan (INRMP) benefited loggerhead sea turtles; Onslow Beach and Brown's Inlet were subsequently excluded from the designation in accordance with section 4(a)(3) of the ESA. Therefore, the Action Alternative would have no effect on green, hawksbill, leatherback, or loggerhead sea turtles' critical habitat. No significant impact on sea turtles would be anticipated as a result of the Action Alternative at JEB Little Creek-Fort Story and Camp Lejeune.

Pursuant to the ESA, the Action Alternative:

- ***may affect, but is not likely to adversely affect, green, Kemp's ridley, leatherback or loggerhead sea turtles.***
- ***would have no effect on hawksbill sea turtles.***
- ***would have no effect on green, hawksbill, leatherback, or loggerhead sea turtles' critical habitat.***

3.12 Marine Mammals

3.12.1 Introduction

This section addresses marine mammals that have the potential to occur in the JLOTS study area, and the impacts that may result from training activities. Applicable regulations for marine mammals include the Endangered Species Act (introduced in Section 3.8, *Terrestrial and Aquatic Vegetation*), and the Marine Mammal Protection Act.

The Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S.C. Section § 1371(a)(5)), authorizes the issuance of regulations for the incidental taking of marine mammals by a specified activity for a period of not more than five years. The issuance occurs when the Secretary of Commerce, after notice has been published in the Federal Register and opportunity for comment has been provided, finds that such taking would have a negligible impact on the species and stocks of marine mammals and would not have an unmitigable adverse impact on their availability for subsistence uses. The National Marine Fisheries Service (NMFS) has promulgated implementing regulations under 50 Code of Federal Regulations (CFR) §§ 216.101-106 that provide a mechanism for allowing the incidental, but not intentional, taking of marine mammals while engaged in a specific activity.

3.12.2 No Action Alternative

3.12.2.1 No Action Alternative – JEB Little Creek-Fort Story – Existing Environment

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 – Odontoceti and Mysticeti. The toothed whales, dolphins, and porpoises (Odontocetes) 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. The baleen whales (suborder Mysticetes) are universally large (more than 15 feet [5 meters] as adults). They are batch feeders that use this baleen instead of teeth to engulf, suck, or skim large numbers of prey, such as small schooling fish, shrimp, or microscopic sea animals (i.e., plankton) from the water or out of ocean floor sediments (Heithaus and Dill 2008). Detailed reviews of the different groups of cetaceans can be found in Perrin et al. (2009). Marine mammal distribution is influenced by many factors, primarily patterns of major ocean currents, which in turn affect prey productivity. The continuous movement of water from the ocean bottom to the surface creates a nutrient-rich, highly productive environment for marine mammal prey (Jefferson et al. 2008). For most cetaceans, prey distribution, abundance, and quality largely determine where they occur at any specific time (Heithaus and Dill 2008). Most of the baleen whales are migratory, but many of the toothed whales do not migrate in the strictest sense. Instead, they undergo seasonal dispersal or shifts in density.

The Navy has reviewed marine mammal species with the potential to occur in nearshore waters off the Atlantic coast between Virginia and North Carolina. A list of species considered but not brought forward for analysis is included in Appendix G, *Marine Mammals Potentially Occurring* *in Waters off Virginia and North Carolina*; species brought forward for analysis are described below. Table 3.12-1 summarizes the expected occurrence of marine mammals in the study area.

3.12.2.1.1 Mysticetes

Fin Whale

Fin whales are listed as endangered under the ESA and depleted under the MMPA. They are found in all of the world's oceans, and are the second largest species of whale (Jefferson et al. 2008). Four management stocks have been identified by NMFS; individuals of the Western North Atlantic stock could occur in the study area. No critical habitat has been designated for this species. 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 6,600 feet (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 (underwater motion) and the resultant increased prey density (Azzellino et al. 2008). In addition to krill, herring, capelin, sand lance, copepods, and squid are preyed upon by this species (Goldbogen et al. 2006; Jefferson et al. 2008; National Marine Fisheries Service 2013). Like most other mysticetes, fin whales are not expected to occur in groups (National Marine Fisheries Service 2013).

The Chesapeake Bay region is considered to be a normal part of the range of the fin whale. Recent records of fin whales in the Chesapeake Bay area include a single dead animal beached in Ocean View, east of Naval Station Norfolk, in 2012 (Nealon 2012), and another dead individual in the middle Chesapeake Bay near the Maryland/Virginia border in February 2014 (Phillips pers. comm. 2014).

Aerial observations in Onslow Bay, North Carolina, from August 2009 through August 2010 resulted in the sighting of a single fin whale (U.S. Department of the Navy 2013). The closest limited occurrence is predicted to occur in winter in shelf waters and steeply sloping waters over the shelf break between Cape Lookout and Cape Hatteras (U.S. Department of the Navy 2008). This likelihood of this species occurring in the shallow inshore waters off JEB Little Creek-Fort Story or Camp Lejeune is very low.

Humpback Whale

Humpback whales are listed as endangered under the ESA, and depleted under the MMPA. They are distributed worldwide in all major oceans and most seas. Individuals of the Gulf of Maine stock could occur in the study area. No critical habitat has been designated for this species. They typically are found during the summer on high-latitude feeding grounds and during the winter in the tropics and subtropics around islands, over shallow banks, and along continental coasts, where calving occurs. Most humpback whale sightings are in nearshore and continental shelf

Table 3.12-1: Marine Mammals Potentially Occurring in the JLOTS Study Area

Common Name	Scientific Name	Status		Stock(s)	Potential for Occurrence in the Study Area	
		ESA	MMPA		JEB Little Creek-Fort Story	Camp Lejeune
Mysticetes						
fin whale	*Balaenoptera physalus*	E	strategic; depleted	Western North Atlantic	not expected; seen in Mid-Atlantic waters in late winter/early spring	
humpback whale	*Megaptera novaeangliae*	E	depleted	Gulf of Maine	not expected; seen in Mid-Atlantic waters in late winter/early spring	
North Atlantic right whale	*Eubalaena glacialis*	E	strategic; depleted	Western North Atlantic	rare; higher likelihood late fall to late spring	
sei whale	*Balaenoptera borealis*	E	strategic; depleted	Nova Scotia	not expected	
Odontocetes						
Atlantic spotted dolphin	*Stenella frontalis*	--	--	Western North Atlantic	not expected	rare; more likely in summer
bottlenose dolphin	*Tursiops truncatus*	--	strategic	Northern North Carolina Estuarine System	common; higher in summer	rare; more likely in summer
			strategic	Southern North Carolina Estuarine System	rare; more likely in summer	common; higher in summer
			strategic; depleted	Western North Atlantic Southern Migratory Coastal	common; higher in summer	rare; more likely in summer
Sirenians						
West Indian manatee, Florida subspecies	*Trichechus manatus latirostris*	E	strategic	Florida	not expected	

common = confirmed, regular sightings of the species inside the study area; rare = there have been few confirmed sightings/strandings in the vicinity, or the distribution of the species is near enough to the study area that the species could occur there; however, occurrences would be infrequent and/or in very small numbers; not expected = species is not expected to occur inside the study area based on unsuitability of habitat or conditions; unprecedented; Sources: Waring et al. 2013; National Marine Fisheries Service 2010, 2010a, 2012a; U.S. Fish and Wildlife Service 2014 waters; however, humpback whales frequently travel through deep oceanic waters during migration (Calambokidis et al. 2001; Clapham and Mattila 1990).

Humpback whales feed on a variety of invertebrates and small schooling fishes. The most common invertebrate prey are krill; the most common fish prey are herring, mackerel, sand lance, sardines, anchovies, and capelin (Clapham and Mead 1999). Feeding occurs both at the surface and in deeper waters, wherever prey is abundant. The humpback whale is the only species of baleen whale that shows strong evidence of cooperation when feeding in large groups (D'Vincent et al. 1985). Humpback feeding habitats are typically shallow banks or ledges with high seafloor relief (Hamazaki 2002; Payne et al. 1990).

On breeding grounds, females with calves occur in much shallower waters than other groups of whales, and breeding adults use deeper waters farther offshore (Ersts and Rosenbaum 2003; Smultea 1994). Humpback whale groups are typically small and (except for mother/calf pairs) unstable, and individuals frequently change associates. Stable groups which remain together in feeding areas over weeks or even years have occasionally been recorded, but these represent an exception and their basis is not clear (Clapham n.d.).

Humpback whales are most likely to occur in the Chesapeake Bay between January and March; however, based on sighting and stranding data in both Mid-Atlantic waters and the Chesapeake Bay, they could be found in the area year-round (Barco et al. 2002; Swingle et al. 1993). Photo-identification data support the repeated use of the Mid-Atlantic region by individual humpback whales (Barco et al. 2002). Barco et al. suggest that the Mid-Atlantic region may be where some mother humpbacks wean and separate from their calves. The most recent documented sighting of a humpback whale near the study area occurred during Navy transect surveys in April 2014 (Engelhaupt pers. comm. 2014) off north Virginia Beach.

Sightings off North Carolina peak from April through May during the northbound migration, and from September through December, during the southbound migration. Many sightings and strandings are juveniles, suggesting that this region may be an important habitat for younger animals (Wiley et al. 1995). Most sightings are made from 66 to 240 feet (20 to 73 meters) of water depth although some individuals have been sighted closer to shore (U.S. Department of the Navy 2008). The likelihood of this species' occurrence in the shallow nearshore waters off JEB Little Creek-Fort Story or Camp Lejeune is low.

North Atlantic Right Whale

North Atlantic right whales are listed as endangered under the ESA and depleted under the MMPA. 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. Most sightings are concentrated within five high-use areas: coastal waters of the southeastern U.S. (Georgia and Florida), Cape Cod and Massachusetts bays, the Great South Channel, the Bay of Fundy, and the Nova Scotian Shelf (Winn et al. 1986; Silber and Clapham 2001). Critical habitat has been designated for this species, but is not located near the study area.

North Atlantic right whales feed primarily on copepods (largely of the genera *Calanus* and *Pseudocalanus*). Research suggests that this species locates and exploits extremely dense patches of zooplankton to feed efficiently (Mayo and Marx 1990). During spring and early summer, foraging takes place both near the surface and at depth (Parks et al. 2011). As summer progresses, North Atlantic right whales will follow prey to deeper waters (Baumgartner et al. 2003).

North Atlantic right whales are most often seen alone or in pairs (New England Aquarium 2013); occasionally they are observed in larger social or breeding aggregations known as surface active groups (Parks et al. 2007). They have been observed in waters off Cape Henry and Virginia Beach during fall and spring aerial surveys, and occasional occurrences have been documented inside the lower Chesapeake Bay itself. There are also regular seasonal occurrences in Onslow Bay during winter months (Northeast Fisheries Science Center 2014). Individuals potentially observed in the study area are expected to be in transit to and from winter calving grounds in waters off the east coast of Florida. Occurrences of this species in the shallow nearshore waters off JEB Little Creek-Fort Story or Camp Lejeune are expected to be rare.

Sei Whale

Sei whales are listed as endangered under the ESA and depleted under the MMPA. Sei whales have a worldwide distribution and are found primarily in cold temperate to subpolar latitudes. During the winter, sei whales are found from 20° N to 23° N and during the summer from 35° N to 50° N (Horwood 2009; Masaki 1976, 1977; Smultea et al. 2010). The species' Nova Scotia stock range overlaps with the study area. Critical habitat has not been designated for this species. Similar to humpback and North Atlantic right whales, sei whales spend the summer feeding in high latitudes and return to lower latitudes to calve in winter. They are usually observed in deeper waters far from the coastline.

Feeding occurs primarily around dawn, which appears to be correlated with vertical migrations of prey species that include krill, copepods, small schooling fish, and squid (Horwood 2009).

Sei whales are usually observed singly or in small groups of 2-5 animals, but are occasionally found in larger (30-50) loose aggregations (National Marine Fisheries Service 2012). No recent observations of sei whales in the Chesapeake Bay or Onslow Bay have been recorded, and the likelihood of their occurrence in waters off JEB Little Creek-Fort Story or Camp Lejeune is very low.

3.12.2.1.2 Odontocetes

Atlantic Spotted Dolphin

This species is found in nearshore tropical to warm-temperate waters, predominantly over the continental shelf and upper slope. 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 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.

Atlantic spotted dolphins are highly gregarious, and are frequently observed in mixed-aged groups numbering up to several hundred individuals. Smaller subgroups, this species can be age and sex segregated to a small degree. Tightly bonded mother and calf pairs are typical to the age of 3 (Herzing n.d.).

The Atlantic spotted dolphin regularly occurs in the nearshore waters south of Chesapeake Bay and near the continental shelf edge and continental slope waters north of this region, usually at least 4.9 to 12.4 miles (8 to 20 kilometers) offshore (Payne et al. 1984; Mullin and Fulling 2003; Davis et al. 1998; Perrin 2002; Perrin et al. 1994). Therefore, while it is unlikely to occur in the shallow waters where the JLOTS exercises would take place, it is more probable at Camp Lejeune than at JEB Little Creek-Fort Story. Navy density data suggest this species may be more likely to occur during summer months (U.S. Department of the Navy 2012).

Bottlenose Dolphin

Along the U.S. east coast, the bottlenose dolphin stock structure is well studied. Of the management stocks identified by NMFS, three may occur in the JLOTS study area: the Northern North Carolina Estuarine System stock, the Southern North Carolina Estuarine System stock, and the Western North Atlantic Southern Migratory Coastal stock. 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. They occur in 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; Wells et al. 2009). Bottlenose dolphins are also often found in bays, lagoons, channels, and river mouths and are known to occur in very deep waters of some ocean regions. Open ocean populations occur far from land; however, population density appears to be highest in nearshore areas (Scott and Chivers 1990). They are common in the lower Chesapeake Bay and in Onslow Bay (Chesapeake Bay Program 2012; McAlarney et al. 2011).

Bottlenose dolphins typically occur in groups of 2-15 individuals, but significantly larger groups have also been reported (Shane et al. 1986; Kerr et al. 2005). Coastal bottlenose dolphins typically exhibit smaller group sizes than the larger offshore form, as water depth appears to be a significant influence on group size (Shane et al. 1986). Shallow, confined areas typically support smaller group sizes, some degree of regional site fidelity, and limited movement patterns (Shane et al. 1986; Wells et al. 1987). Bottlenose dolphins have a varied diet, feeding on small fish, crustaceans, and squid (Wells and Scott 2002).

An unusual mortality event was declared for bottlenose dolphins along the Atlantic coast in June 2013 and is ongoing to date. An increased number of strandings have occurred from New York to Florida, with 345 taking place in Virginia and 181 in North Carolina. Off JEB Little Creek-Fort Story and Camp Lejeune, 32 and 10 bottlenose dolphin strandings have occurred, respectively, since the declaration of the unusual mortality event. The unusual mortality event is being tentatively attributed to cetacean morbilivirus, but further research is ongoing (National Marine Fisheries Service 2014). This species is commonly observed in waters off JEB Little Creek-Fort Story and Camp Lejeune.

3.12.2.1.3 Sirenians

West Indian Manatee

West Indian manatees are listed as endangered under the ESA. The Florida subspecies has the potential to occur in the study area, but only at Camp Lejeune. Critical habitat has been designated for this species but none is located near the study area. West Indian manatees occur in warm, subtropical, and tropical waters of the western North Atlantic Ocean, from the southeastern U.S. to Central America, northern South America, and the West Indies (Lefebvre et al. 2001). During winter months, the West Indian manatee population confines itself to inshore and inner shelf waters of the southern half of peninsular Florida and to springs and warm water outfalls (e.g., power plant cooling water outfalls) extending into southern Georgia. As water temperatures rise in spring, West Indian manatees disperse from winter aggregation areas. West Indian manatees are frequently reported in coastal rivers of Georgia and South Carolina during warmer months (Lefebvre et al. 2001).

Historically, West Indian manatees were likely restricted to southernmost Florida during winter and expanded their distribution northward during summer. However, industrial development has made warm-water refuges available (e.g., power plant effluent plumes), and the introduction of several exotic aquatic plant species has expanded the available food supply. These factors have enabled an expansion of West Indian manatee winter range (U.S. Fish and Wildlife Service 2001; Laist and Reynolds III 2005). Several patterns of seasonal movement are known along the Atlantic coast ranging from year-round residence to long-distance migration (Deutsch et al. 2003). Individuals may be highly consistent in seasonal movement patterns and show strong fidelity to warm and winter ranges, both within and across years (Deutsch et al. 2003).

West Indian manatees may occur in loose groups, and are known to congregate in warm waters during winter. Mother/calf pairs are observed starting in spring, and weaning typically occurs about a year after birth. This species eats a wide variety of aquatic plants; they seem to prefer submerged, floating, and emergent vegetation, in that order. In marine areas they subsist mostly on seagrass leaves and rhizomes. They will feed on mangroves, and will eat bank-growing vegetation such as salt-marsh grass along tidal creeks (O’Shea n.d.).

West Indian manatees have been observed infrequently in nearshore waters of North Carolina, as far north as Carteret County (North Carolina Division of Parks and Recreation 2011). The waters off JEB Little Creek-Fort Story are outside of this species’ normal range. The overall likelihood of occurrence in waters off Camp Lejeune is very low based on the installation’s location at the far north extent of the West Indian manatee’s range. Further, Onslow Bay is lacking in abundant marine vegetation cover that could attract foraging manatees. Therefore, this species is not expected in the study area.

3.12.2.2 No Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

Potential impacts to marine mammals occurring in the waters off JEB Little Creek-Fort Story are summarized in Table 3.12-2.

3.12.2.2.1 Artificial Light

Section 3.9.2.2.1 in *Terrestrial Wildlife and Birds* introduces artificial light, illuminance, and common sources. No artificial light sources are being introduced into the water column. Therefore, no impacts to marine mammals from artificial light would occur.

3.12.2.2.2 Entanglement

Based on the size of the hose and configuration of its attachments and buoys, deployment of floating hoses during liquid transfer system exercises presents a very minor risk of entanglement for marine mammals. Hoses are kept taut, minimizing the chance of loops that could potentially entangle large marine species. The lack of a significant length of either type of hose in the water column further decreases the likelihood of entanglement.

3.12.2.2.3 Temporary Loss of Habitat

Construction of the floating causeway (at Fort Story and Camp Lejeune under this alternative) may result in a temporary loss of habitat. However, the duration and scope are limited to no more than 60 days per year for a full JLOTS exercise and several days for quarterly or routine training; and the actual footprint of the pier (reference sections 2.1.1 and 2.1.2), respectively. The structure of the floating causeways would not prohibit smaller marine mammals from swimming underneath it. Because large whales are not likely to occur in the shallow waters immediately adjacent to the shore where the floating causeway would be constructed, potential impacts are discountable.

3.12.2.2.4 Temporary Reduction of Water Quality

In study area waters, various activities are expected to disturb sediments, resulting in a temporary decrease in water quality. Vessel and amphibious vehicle movements disturb sediments, with impacts of the greatest duration and intensity resulting during a full JLOTS exercise. Impacts are expected to be greatest closer to shore, where landing craft would offload. Quarterly and routine cargo movement exercises would be less intense but occur more frequently. The sandy sediment that dominates the sea floor off JEB Little Creek-Fort Story is expected to quickly settle back in place (National Marine Fisheries Service 2009), with finer particles taking slightly longer.

Anchoring would also cause highly localized increases in turbidity as the anchor buries itself into the sea floor and displaces some of the sediments. A similar disturbance would occur when the anchor is retrieved after the end of the exercises. Each time, these impacts would be temporary and localized, lasting for a few hours only the activity.

Table 3.12-2: Potential Marine Mammal Stressors Resulting from JLOTS Activities – No Action Alternative

FTX	Artificial Light	Entanglement	Temporary Loss of Habitat	Temporary Reduction in Water Quality	Vehicle and Vessel Strikes	Vehicle, Vessel, and Equipment Noise
Improved Navy Lighterage System	--	--	--	all locations	all locations	all locations
Amphibious Bulk Liquid Transfer System	--	all locations	--	--	--	all locations
Tactical Water Purification System	--	all locations	--	all locations	--	all locations
Cargo Marshalling and Movement	--	--	--	--	--	--
Tent Encampment	--	--	--	--	--	--
Floating Causeway	--	--	Fort Story, Camp Lejeune	Fort Story, Camp Lejeune	Fort Story, Camp Lejeune	Fort Story, Camp Lejeune
Effects Analysis						
Timing	n/a	Year-round				
Proximity	n/a	Limited to the immediate vicinity of the activity				Intensity of potential effects is expected to correlate positively with proximity to source of noise
Duration, Frequency, and Distribution	n/a	≤ 60 days during full JLOTS exercise; several days, intermittently, during the rest of the year (excluding Camp Lejeune)				
Expected Recurrence	n/a	Recurrence coincides with frequency of applicable FTX (Table 2.2-2); lower intensity throughout the year (excluding Camp Lejeune), higher intensity during full JLOTS exercise; no recurrence once FTX is complete				

-- = this stressor is not expected to result from the FTX; For the purposes of this analysis, cargo marshalling occurs only in the terrestrial environment. Impacts from cargo marshalling in the marine environment are addressed under the Improved Navy Lighterage System.

Impacts on marine mammals from temporary decreases in water quality are expected to be minimal. The ability to forage in the immediate area of a moving vessel, amphibious vehicle, or anchor could be impacted by the reduced sensory capability in turbid waters. However, the increased level of activity and noise in these areas is expected to decrease the attractiveness of these locations for any marine species, and existing foraging habitat conditions are poor.

The major causes of reduced water quality (vessel and craft movement) would occur during an annual JLOTS exercise; quarterly or routine training would be of a significantly lower intensity but higher frequency. Routine exercises would be limited to approximately three hours each day, several days a week. Between each occurrence, there would be ample time for water quality to return to pre-training levels.

3.12.2.2.5 Vehicle and Vessel Strikes

Military vessels and amphibious vehicles in the study area have the potential to collide with slow moving marine mammals at the ocean surface. The North Atlantic right whale, humpback whale, and West Indian manatee are particularly vulnerable to vessel strikes. Studies of strikes to North Atlantic right whales have shown that a majority of serious injuries and mortalities occurred when vessels were moving at speeds above 14 knots and few occurred at speeds of 10 knots or less (National Marine Fisheries Service 2008). Also, most of the documented lethal or severe injuries to whales caused by vessel strikes have been found to be by vessels 262 ft. (80 m) long or more (Laist et al. 2001). One of the largest craft intensely used during the proposed training, the causeway ferry, is about 240 feet (72 m) and travels at speeds of up to ten knots. Other craft used during the training may travel faster (e.g., the Landing Craft Air Cushion can reach 40 knots), but they are also smaller than 262 ft. (80 m).

Larger vessels, such as Military Sealift Command ships and the tanker ship used during liquid transfer exercises, would only be present a few days each year and mostly at anchor. While in transit, ships and boats would be alert at all times and use extreme caution so that the vessel can take proper and effective action to avoid a collision with a marine mammal, consistent with the standard operating procedures summarized in Chapter 4.

3.12.2.2.6 Vehicle, Vessel, and Equipment Noise

The operation of craft, vessels, and amphibious equipment during training exercises would generate underwater sound. Marine mammals react to vessel-generated sounds in a variety of ways (Watkins 1986). A recent study found that low-frequency ship noise may be associated with chronic stress in baleen whales, with implications for whales in heavy ship traffic areas (Rolland et al. 2012). However, given the current ambient sound levels in the marine environment near JEB Little Creek-Fort Story, the amount of sound contributed by Navy vessels during the proposed activities would be small and mostly limited to nearshore areas where whales are not likely to be present. Marine mammals transiting the waters offshore during the proposed training exercises may hear sounds associated with them, but any reactions would be short-term. There would not be any long-term consequences from ship noise.

Underwater noise could impact other species in the food web, including prey species that marine mammals feed upon. Impacts would differ depending on the type of prey species in the area of the noise being generated. Prey species might exhibit a startle reaction to noise that might include swimming to the surface or scattering away from the source. This startle and flight response is the most common secondary defense among animals (Hanlon and Messenger 1996). The abundances of prey species in the immediate vicinity of JLOTS activities could be diminished for a short period before being repopulated by animals from adjacent waters.

Because the No Action Alternative represents a continuation of the existing frequency and intensity of JLOTS training at JEB Little Creek-Fort Story (with the exception of the floating causeway at Little Creek), impacts on marine mammals are ongoing and already factored into existing conditions within the study area. Thus, the No Action Alternative at JEB Little Creek-Fort Story would have no significant impact on marine mammals in the vicinity.

3.12.2.2.7 Summary

Because the No Action Alternative represents a continuation of the existing levels and intensity of annual JLOTS training at JEB Little Creek-Fort Story, its impacts on marine mammals are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. They would remain temporary and localized, there would be no permanent loss of habitat, and all impacts would cease entirely between training exercises. Standard operating procedures may reduce the likelihood of impacts to marine mammals. The No Action Alternative would not compromise the capacity of the waters off JEB Little Creek-Fort Story to continue supporting the marine mammal species they currently support. Thus, there would be no significant impacts on marine mammals under the No Action Alternative at JEB Little Creek-Fort Story.

Pursuant to the MMPA, the No Action Alternative at JEB Little Creek-Fort Story would not have any Level A or Level B incidental takes of marine mammals.

Pursuant to the ESA, the No Action Alternative at JEB Little Creek-Fort Story:

- ***may affect but is not likely to adversely affect the ESA-listed fin whale, humpback whale, and North Atlantic right whale.***
- ***would have no effect on the ESA-listed sei whale and West Indian manatee.***
- ***would have no effect on North Atlantic right whale or West Indian manatee critical habitat.***

3.12.2.3 No Action Alternative – Camp Lejeune – Existing Environment

The potentially affected marine mammal species are the same as those addressed for JEB Little Creek-Fort Story. They are described in Section 3.12.2.1.

3.12.2.4 No Action Alternative – Camp Lejeune – Environmental Consequences

Potential impacts to marine mammals occurring in the waters off Camp Lejeune are summarized in Table 3.12-2. The proposed training activities under the No Action Alternative at Camp Lejeune would be the same as those of the No Action Alternative at JEB Little Creek-Fort Story. However, quarterly and routine training would not occur. Therefore, analyses in Section 3.12.2.2 are applicable to the No Action Alternative at Camp Lejeune, but potential impacts on marine mammals are expected to be of lower frequency, duration, and intensity.

3.12.2.4.1 Summary

Because the No Action Alternative represents a continuation of the existing levels and intensity of annual JLOTS training at this location, its impacts on marine mammals are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. Standard operating procedures may reduce the likelihood of impacts to marine mammals. The No Action Alternative would not compromise the capacity of the waters off Camp Lejeune to continue supporting the marine mammal species they currently support. Thus, there would be no significant impacts on marine mammals under the No Action Alternative at Camp Lejeune.

Pursuant to the MMPA, the No Action Alternative at Camp Lejeune would not have any Level A or Level B incidental takes of marine mammals.

Pursuant to the ESA, the No Action Alternative at Camp Lejeune:

- ***may affect but is not likely to adversely affect the ESA-listed fin whale, humpback whale, North Atlantic right whale, and West Indian manatee.***
- ***would have no effect on the ESA-listed sei whale.***
- ***would have no effect on North Atlantic right whale or West Indian manatee critical habitat.***

3.12.2.5 No Action Alternative – Conclusion

Because the No Action Alternative represents a continuation of the existing levels and intensity of JLOTS training at JEB Little Creek-Fort Story and Camp Lejeune, its impacts on marine mammals are ongoing and reflected in existing conditions within the study area. These impacts would not increase under the No Action Alternative. Some individual animals may experience temporary physiological or behavioral effects, but no species-level consequences would be expected. There would be no permanent loss of habitat and all impacts would cease entirely between training exercises. Standard operating procedures may reduce the likelihood of impacts to marine mammals. The No Action Alternative would not compromise the capacity of the waters off JEB Little Creek-Fort Story and Camp Lejeune to continue supporting the marine mammal species they currently support. Thus, there would be no significant impacts on marine mammals at any location under the No Action Alternative.

Pursuant to the MMPA, the No Action Alternative would not have any Level A or Level B incidental takes of marine mammals.

Pursuant to the ESA, the No Action Alternative:

- ***may affect but is not likely to adversely affect the ESA-listed fin whale, humpback whale, North Atlantic right whale, and West Indian manatee.***
- ***would have no effect on the ESA-listed sei whale.***
- ***would have no effect on North Atlantic right whale or West Indian manatee critical habitat.***

3.12.3 Action Alternative

3.12.3.1 Action Alternative – JEB Little Creek-Fort Story – Existing Environment

The existing environment at JEB Little Creek-Fort Story is described in Section 3.12.2.1.

3.12.3.2 Action Alternative – JEB Little Creek-Fort Story – Environmental Consequences

The Action Alternative would include the same annual training activities as the No Action Alternative at JEB Little Creek-Fort Story, plus construction of the floating causeway (at Little Creek) and ELCAS (M). Therefore, the impacts of the Action Alternative at JEB Little Creek-Fort Story on marine mammals would be similar to those of the No Action Alternative, with the addition of the impacts described below. Potential impacts to marine mammals occurring in the waters off JEB Little Creek-Fort Story are summarized in Table 3.12-3.

3.12.3.2.1 Artificial Light

Lights are used on the floating causeway and ELCAS (M). However, no artificial light would be introduced into the water column. Therefore, marine mammals would not be impacted by artificial light under the Action Alternative.

3.12.3.2.2 Entanglement

No entanglement risks would be associated with the floating causeway or ELCAS (M).

Table 3.12-3: Potential Marine Mammal Stressors Resulting from JLOTS Activities – Action Alternative

FTX	Artificial Light	Entanglement	Temporary Loss of Habitat	Temporary Reduction in Water Quality	Vehicle and Vessel Strikes	Noise	
						Vehicles, Vessels, and Equipment	Pile Driving
Improved Navy Lighterage System	--	--	--	all locations	all locations	all locations	--
Amphibious Bulk Liquid Transfer System	--	all locations	--	--	--	all locations	--
Tactical Water Purification System	--	all locations	--	all locations	--	all locations	--
Cargo Marshalling and Movement	--	--	--	--	--	--	--
Tent Encampment	--	--	--	--	--	--	--
Floating Causeway	--	--	all locations				
ELCAS (M)	--	--	all locations				
Effects Analysis							
Timing	n/a	Year-round					
Proximity	n/a	Limited to the immediate area of the activity				Intensity of potential effects can be expected to correlate positively with proximity to sources of noise (ref. Table 3.12-4 [JEB Little Creek-Fort Story], Table 3.12-5 [Camp Lejeune] for pile driving)	
Duration, Frequency, and Distribution	n/a	≤ 60 days during full JLOTS exercise; several intermittent days throughout the rest of the year (excluding Camp Lejeune)					Once annually for ≤30 days at JEB Little Creek-Fort Story and Camp Lejeune; 1.5 net hours max. per day
Expected Recurrence	n/a	Recurrence coincides with frequency of applicable FTX (Table 2.2-2); lower intensity throughout the year (excluding Camp Lejeune), higher intensity during full JLOTS exercises; none once FTX is complete					

-- = this stressor is not expected to result from the FTX; For the purposes of this analysis, cargo marshalling occurs only in the terrestrial environment. Impacts from cargo marshalling in the marine environment are addressed under the Improved Navy Lighterage System.

3.12.3.2.3 Temporary Loss of Habitat

Construction of the floating causeway and ELCAS (M) may result in a temporary loss of habitat. However, the duration would be limited to no more than 60 days per year if conducted in association with an annual JLOTS exercise, and several intermittent days for quarterly or routine training. The scope would be limited to the actual footprint of the pier (reference sections 2.1.1 and 2.1.2). The structure of the floating causeway would not prohibit smaller marine mammals from swimming underneath it. Because large whales are not likely to occur in the shallow waters immediately adjacent to the shore where the floating causeway and ELCAS (M) would be constructed, potential impacts are discountable.

3.12.3.2.4 Temporary Reduction of Water Quality

Temporary reductions of water quality resulting from the floating causeway and ELCAS (M) FTXs are expected to be consistent with those of the No Action Alternative. However, impacts would last no more than 30 days at each location (i.e., the days piles are being driven or extracted) in any given year for the ELCAS (M). Like anchors, piles being driven or extracted for the ELCAS (M) FTX may disturb sediments, but the results would be highly localized to the piles themselves. Any additional impacts on water quality from construction of the floating causeway would be limited to 60 days in any given year.

3.12.3.2.5 Vehicle and Vessel Strikes

Potential impacts from amphibious vehicle and vessel strikes would be expected to increase only slightly as a result of the floating causeway and ELCAS (M) FTXs. Much of the activity associated with these exercises takes place on the piers themselves and onshore; the net increase in vehicle and vessel traffic from the No Action Alternative at JEB Little Creek-Fort Story would be insignificant.

3.12.3.2.6 Vehicle, Vessel, and Equipment Noise

Potential impacts from vehicle, vessel, and equipment noise would be expected to increase only slightly as a result of the floating causeway and ELCAS (M) FTXs. While in transit, ships and boats would be alert at all times and use extreme caution so that the vessel can take proper and effective action to avoid a collision with a marine mammal, consistent with the standard operating procedures summarized in Chapter 4. Much of the activity associated with these exercises takes place on the piers themselves and onshore; the net increase in vehicle, vessel, and equipment noise from the No Action Alternative at JEB Little Creek-Fort Story would be insignificant.

3.12.3.2.7 Underwater Noise – Pile Driving (Construction of the Elevated Causeway System, Modular)

The Navy has prepared a *Request for Regulation and Letter of Authorization for the Incidental Taking of Marine Mammals Resulting from U.S. Navy Joint Logistics Over-the-Shore Training in Virginia and North Carolina*. Full details on modeling and the calculated number of incidental takes for marine mammals for the Action Alternative can be found in that document.

Sound Exposure Threshold

Since 1997, NMFS has used generic sound exposure thresholds to determine when an activity in the ocean that produces sound might result in impacts on a marine mammal such that a take by harassment might occur (70 FR 1871). Current NMFS practice regarding exposure of marine mammals to pile driving sounds is that cetaceans exposed to impulsive sounds greater than or equal to 180 re 1 μPa root mean square are considered to have been taken by Level A (i.e., injurious) harassment. Level A injury thresholds have not been established for non-impulsive sounds such as vibratory pile driving, but the Navy has applied the threshold values for impulsive sounds to vibratory sound in this analysis.

Behavioral harassment (Level B) is considered to have occurred when marine mammals are exposed to underwater sounds below the injury threshold, but greater than or equal to 160 dB re 1 μPa root mean square for impulsive sounds (e.g., impact pile driving) and greater than or equal to 120 dB re 1 μPa root mean square for non-impulsive noise (e.g., vibratory pile extraction).

Limitations of Existing Noise Criteria

To date, there is no research or data supporting a response by odontocetes to non-impulsive sounds from vibratory pile driving as low as the 120 dB re 1 μPa root mean square threshold. The application of the 120 dB root mean square re 1μPa threshold can be problematic because this threshold level can be either at or below the ambient noise level of certain locations. For example, noise levels at some industrialized ports in Puget Sound, Washington have been measured at between 120 and 130 dB re 1μPa (Washington State Department of Transportation 2012). Assuming a 120 dB disturbance threshold in such environments implies any animals in the area would be disturbed with or without additional pile driving noise. This has led to analyses that may be overly conservative, and as a result of these issues, the threshold level is subject to ongoing discussion (74 FR 41684). NMFS is developing new science-based thresholds to improve and replace the current generic exposure level thresholds, but the criteria have not been finalized (National Oceanic and Atmospheric Administration 2013). The 120 dB re 1 μPa root mean square threshold level for non-impulsive noise originated from research conducted by Malme et al. (1984, 1988) for California gray whale response to non-impulsive industrial sounds such as drilling operations. Note that the 20 dB re 1 μPa root mean square *non-impulsive* sound threshold should not be confused with the 120 dB re 1 μPa root mean square *impulsive* sound criterion established for migrating bowhead whales in the Arctic as a result of research in the Beaufort Sea (Richardson et al. 1995; Miller et al. 1999).

Acoustic Modeling

Fundamentals of acoustics are introduced in Appendix C, and modeling of pile driving noise is introduced in Section 3.10.3.2.7 under *Fish and Marine Invertebrates*. Therefore, only details specific to marine mammals are described for the remainder of this section. The calculated ranges to effect for marine mammals are summarized in Table 3.12-4.

Table 3.12-4: Calculated Range to Effects for Marine Mammals during Pile Driving at JEB Little Creek-Fort Story

Driving Method	Threshold	Range
Impact Installation	Injury: 180 dB re 1 μPa rms	37 yd. (34 m)
	Behavioral: 160 dB re 1 μPa rms	805 yd. (736 m)
Vibratory Removal	Injury: 180 dB re 1 μPa rms	n/a
	Behavioral: 120 dB re 1 μPa rms	5,077 yd. (4,642 m)

Note: all sound levels expressed in dB re 1 μPA rms; dB = decibel; rms = root mean square; μPa = micropascal; m = meters; yd. = yards

Physiological Responses

Use of standard operating procedures such as soft starts would reduce the likelihood of injurious impacts to marine mammals. Physiological responses to impact/impulsive sound stimulation range from non-injurious vibration or compression of tissue to injurious tissue trauma, although mitigations would prevent such occurrences during the ELCAS (M) FTX. Sound-related trauma can be lethal or sub lethal; lethal impacts are those resulting in immediate death or serious debilitation in or near an intense sound source (Ketten 1995); no trauma of this level is anticipated under the Action Alternative. Sub-lethal damage to the ear from a pressure wave can rupture the tympanum, fracture the ossicles, and damage the cochlea, cause hemorrhage, or cause leakage of cerebrospinal fluid into the middle ear (Ketten 1995). Sub-lethal impacts also include hearing loss, which is caused by exposure to perceptible sounds. Moderate injury implies partial hearing loss. Permanent hearing loss (also called permanent threshold shift or 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 temporary threshold shifts 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 (Ridgway et al. 1997; Kastak et al. 1999; Finneran et al. 2005). While injuries to other sensitive organs are possible, they are less likely since pile driving impacts are almost entirely acoustically mediated, versus explosive sounds which also include a shock wave resulting in damage.

Behavioral Responses

Over a five-year period, 250 Level B exposures for bottlenose dolphins were modeled for the ELCAS (M) FTX at JEB Little Creek-Fort Story. Studies of marine mammal responses to vibratory pile driving noise are limited. Marine mammal monitoring at the Port of Anchorage marine terminal redevelopment project found no response by marine mammals swimming within the threshold distances to noise impacts from construction activities, including pile driving (both impact hammer and vibratory driving) (Integrated Concepts & Research Corporation 2009). Background noise levels at this port are typically at 125 dB. Most marine mammals observed during the two lengthy construction seasons – beluga whales, harbor seals, harbor porpoises, and Steller sea lions – were observed in smaller numbers.

Responses to impact installation are expected to be more acute than response to vibratory extraction. Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway et al. 1997; Finneran et al. 2003).

Observed responses of wild marine mammals to loud impulsive sound sources (typically seismic guns or acoustic harassment devices) have been varied, but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Dähne et al. 2013; Morton and Symonds 2002; also see reviews in Gordon et al. 2003; Wartzok et al. 2003; and Nowacek et al. 2007).

Regardless of the source of the sound, behavioral responses to sound are highly variable. The magnitude of each potential behavioral 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.

A comprehensive review of acoustic and behavioral responses to noise exposure by Nowacek et al. (2007) concluded one of the most common 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 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.

Marine mammals exposed to pile driving sound over the course of the ELCAS (M) FTX would likely avoid affected areas if they experience noise-related discomfort. As described in the section above, individual responses to pile driving noise are expected to be variable. Some individuals may occupy waters that are within the range to effects during pile driving without apparent discomfort while others may be displaced with undetermined long-term effects. Noise-related disturbance may also inhibit some marine mammals from entering the vicinity of the JLOTS exercise in the first place. Based on the time required to install and remove each pile, behavioral disturbances are expected to be discreet and brief.

Habituation is a response that occurs when an animal's reaction 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. 2003). 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 surfacing time and temporary cessation of foraging in the project area could indicate disturbance or discomfort in marine mammals.

3.12.3.2.8 Summary

Construction of the floating causeway and ELCAS (M) may result in a temporary loss of habitat. However, the duration and scope are limited to no more than 60 days per year (in association with a full JLOTS exercise), and the actual footprint of the piers (reference sections 2.1.1 and

2.1.2), respectively. Though marine mammals are expected to disperse from the immediate vicinity during the exercises, their ability to swim under the piers would not be affected.

Based on the very small size of the range to effects, the temporary and intermittent occurrence of pile driving noise (no more than 30 days in any given year, for a maximum of 1.5 hours on those days), and standard operating procedures, physiological or behavioral impacts may occur, but would be extremely limited in duration, continuity, and range. Mitigation measures implemented by the Navy (Chapter 4) are designed to further reduce potential impacts, and no Level A takes for marine mammals are expected. No population level impacts would occur, and the continued survival of marine mammal species would not be affected. Therefore, the Action Alternative would have no significant impact on marine mammals potentially occurring in the waters off JEB Little Creek-Fort Story.

Pursuant to the MMPA, the Action Alternative at JEB Little Creek-Fort Story:

- ***would result in no Level A incidental takes for marine mammals.***
- ***may result in up to 250 Level B incidental takes for bottlenose dolphins.***

Pursuant to the ESA, the Action Alternative at JEB Little Creek-Fort Story:

- ***may affect but is not likely to adversely affect the ESA-listed fin whale, humpback whale, and North Atlantic right whale.***
- ***would have no effect on the ESA-listed sei whale and West Indian manatee.***
- ***would have no effect on North Atlantic right whale or West Indian manatee critical habitat.***

3.12.3.3 Action Alternative – Camp Lejeune – Existing Environment

Existing conditions for Camp Lejeune are summarized in Section 3.12.2.1 above.

3.12.3.4 Action Alternative – Camp Lejeune – Environmental Consequences

Potential impacts to marine mammals occurring in the waters off Camp Lejeune are summarized in Table 3.12-3. The Action Alternative would include the same annual training activities as the No Action Alternative at Camp Lejeune, plus the ELCAS (M) FTX. Therefore, the potential impacts of the Action Alternative on marine mammals would be similar to those of the No Action Alternative at Camp Lejeune, with the addition of the impacts associated with the ELCAS (M) (described above in Section 3.12.3.2). Table 3.12-5 details the calculated range to effects for ELCAS (M) pile driving at Camp Lejeune. Based on this range to effect and the marine mammal species' density at Camp Lejeune, a total of 300 incidental Level B takes of bottlenose dolphins and 250 incidental Level B takes of Atlantic spotted dolphins were calculated for the ELCAS (M) FTX at Camp Lejeune over five years.

Table 3.12-5: Calculated Range to Effects for Marine Mammals During Pile Driving at Camp Lejeune

Driving Method	Threshold	Range
Impact Installation	Injury: 180 dB re 1 μPa rms	44 yd. (40 m)
	Behavioral: 160 dB re 1 μPa rms	938 yd. (858 m)
Vibratory Removal	Injury: 180 dB re 1 μPa rms	n/a
	Behavioral: 120 dB re 1 μPa rms	5,077 yd. (4,642 m)

Note: all sound levels expressed in dB re 1 μPA rms; dB = decibel; rms = root mean square; μPa = micropascal; m = meters; yd. = yards

3.12.3.4.1 Summary

Construction of the ELCAS (M) may result in a temporary loss of habitat. However, the duration and scope are limited to no more than 60 days per year, and the actual footprint of the pier (section 2.1.2), respectively. Though they are expected to disperse away from the immediate vicinity, marine mammals' ability to swim under the piers would not be affected.

Based on the very small size of the range to effects, the temporary and intermittent occurrence of pile driving noise (no more than 30 days in any given year, for a maximum of 1.5 hours on those days), and standard operating procedures, physiological or behavioral impacts may occur, but would be extremely limited in duration, continuity, and range. Mitigation measures implemented by the Navy (Chapter 4) are designed to further reduce potential impacts, and no Level A takes for marine mammals are expected. No population level impacts would occur, and the continued survival of any marine mammal species would not be affected. Therefore, the Action Alternative would have no significant impact on marine mammals potentially occurring in the waters off Camp Lejeune.

Pursuant to the MMPA, the Action Alternative at Camp Lejeune:

- ***would result in no Level A incidental takes for marine mammals.***
- ***may result in up to 300 Level B incidental takes for bottlenose dolphins.***
- ***may result in up to 250 Level B incidental takes of Atlantic spotted dolphins.***

Pursuant to the ESA, the Action Alternative at Camp Lejeune:

- ***may affect but is not likely to adversely affect the ESA-listed fin whale, humpback whale, North Atlantic right whale, and West Indian manatee.***
- ***would have no effect on the ESA-listed sei whale.***
- ***would have no effect on North Atlantic right whale or West Indian manatee critical habitat.***

3.12.3.5 Action Alternative - Conclusion

Individual marine mammals may be exposed to a variety of stressors under each Alternative. However, these threats are expected to be relatively infrequent, intermittent in nature, and highly localized within the study area. In addition, high sound pressure levels during pile removal and installation under the Action Alternatives may result in Level B behavioral harassment under the MMPA. Any marine mammals that are exposed (harassed) may change their normal behavior patterns (i.e., swimming speed, foraging habits, etc.) or be temporarily displaced from the area of construction. Any exposures would likely have only a minor effect on individuals and no effect on their populations. The sound generated from vibratory pile driving is non-impulsive, which is not known to cause injury to marine mammals. Standard operating procedures and mitigation measures would be expected to reduce or prevent most potential adverse underwater impacts to marine mammals from pile driving. Effects from JLOTS training would not be expected to have any adverse impact on population recruitment, survival, or recovery (in the case of fin whales, humpback whales, North Atlantic right whales, sei whales, or West Indian manatees) for any species described in Table 3.12-1. Therefore, no significant impact on marine mammals would be anticipated as a result of the Action Alternative at JEB Little Creek-Fort Story or Camp Lejeune.

Pursuant to the MMPA, the Action Alternative:

- ***would result in no Level A incidental takes for marine mammals.***
- ***may result in up to 550 Level B incidental takes for bottlenose dolphins.***
- ***may result in up to 250 Level B incidental takes of Atlantic spotted dolphins[3].***

Pursuant to the ESA, the Action Alternative:

- ***may affect but is not likely to adversely affect the ESA-listed fin whale, humpback whale, North Atlantic right whale, and West Indian manatee.***
- ***would have no effect on the ESA-listed sei whale.***
- ***would have no effect on North Atlantic right whale or West Indian manatee critical habitat.***

[3] Since an ELCAS (M) FTX would take place no more than once annually at JEB Little Creek-Fort Story, and once annually at Camp Lejeune, the highest seasonal marine mammal density at each location was assumed, providing a conservative estimate of incidental takes. These estimates are the number of incidental takes modeled over five years if the ELCAS (M) FTX were to occur at each location every year, and the total number requested in the *Request for Regulation and Letter of Authorization for the Incidental Taking of Marine Mammals Resulting from U.S. Navy Joint Logistics Over-the-Shore Training in Virginia and North Carolina*.

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4 Standard Operating Procedures and Mitigation Measures

4.1 Introduction

The Navy will employ the procedures and mitigation measures listed in this section to reduce and avoid potential impacts resulting from JLOTS activities.

4.2 Plants

The existing environment and potential environmental consequences for plant communities in the study area are detailed in Section 3.8, *Terrestrial and Aquatic Vegetation*. At all locations, activities taking place in the terrestrial environment, such as cargo marshalling and tent encampments, will be limited to existing improved and disturbed areas such as grass fields and trails. No activities would take place in primary or secondary dunes. During all training events, personnel and vehicle movements to and from the beach would be through existing dune breaks and trails.

Seabeach amaranth, the only federally-protected plant known to occur in the study area, is found at Camp Lejeune. Procedures and measures for this species are detailed below. Note that they also may apply to birds and sea turtles.

4.2.1 Seabeach Amaranth

During the proposed JLOTS training, the protective measures in place to avoid and minimize potential effects on seabeach amaranth at Camp Lejeune would continue. These measures are described in Base Order, P3570.1C, *Standing Operating Procedures for Range Control* (U.S. Marine Corps 2011); Base Order 5090.11, *Protected Species Program* (U.S. Marine Corps 2005); Base Order 5090.111, *Use of Off-road Recreational Vehicles* (U.S. Marine Corps 2006); the *Environmental Handbook for Trainers* (U.S. Marine Corps 2003); and Camp Lejeune's *Integrated Natural Resources Management Plan, 2007- 2011* (U.S. Marine Corps 2007).

A number of previous consultations under section 7 of the ESA have occurred between the Marine Corps and USFWS are still relevant and applicable to the Proposed Action assessed in this EA. These documents are the basis for avoidance and minimization measures currently being implemented at Camp Lejeune with respect to seabeach amaranth. In particular, the following USFWS Biological Opinions contain conservation measures for protected species at Camp Lejeune:

- 2002 - Biological Opinion on the Effects of Current Use and Modification of Training Areas, Dune Stabilization and Continued Recreational Use of Onslow Beach, Marine Corps Base Camp Lejeune, North Carolina.
- 2006 - Biological Opinion on the Effects of Implementing the Revised Integrated Natural Resources Management Plan (2007-2011) at Marine Corps Base Camp Lejeune, North Carolina.

- 2008 - Biological Opinion of the Expeditionary Fighting Vehicle Prototypes Effects on Terrestrial Species at Marine Corps Base Camp Lejeune, North Carolina.

Avoidance and minimization measures currently being implemented at Camp Lejeune from all of the above documents are combined and presented below. All of these measures are considered inherently part of the No Action and Action Alternatives, and are thus treated as such in the effects analysis and determinations.

- Potential habitat locations are surveyed each summer. Once identified, seabeach amaranth sites are marked with signs to prevent military, off-road recreational vehicles, and pedestrian traffic from harming the plants.
- Plants are monitored for webworm herbivory and other causes of mortality.
- Potential habitat in overwash areas are protected from vehicle traffic year-round. Driving on the amphibious landing beach (Riseley Pier to the South Tower) is restricted between April 1 and August 31 (*Base Order 5090.111*).
- For operations near/on the beach: it is prohibited to remove or disturb grass or plants from the beach; the beach is only accessed at designated areas marked with yellow-black poles; heavy equipment and vehicles are kept off sand dunes and vegetation; bivouac is carried out on the north side of the beach road, not on the beach itself.
- No sand fencing is erected and no dune stabilization is established where seabeach amaranth has most frequently occurred: in the southern end of Onslow Beach and in the vicinity of the North Tower.
- Prior to initiation of sand-pushing or bulldozing, the area is surveyed for seabeach amaranth germinations and adult plants; if seabeach amaranth is found in an area to be disturbed by dune building activities, the project is delayed until natural plant senescence.
- Occurrences of seabeach amaranth in the area of a special beach entertainment event are clearly marked and protected to prevent disturbance.

4.3 Terrestrial Wildlife and Birds

The existing environment and potential environmental consequences for terrestrial wildlife and birds in the study area are detailed in Section 3.9, *Terrestrial Wildlife and Birds*.

4.3.1 Standard Operating Procedures

4.3.1.1 Soft Starts

Soft starts are performed at the beginning of impact pile driving. During a soft start, an initial set of strikes from the impact hammer at reduced energy are performed before it is able to be operated at full power and speed. The energy reduction of an individual hammer cannot be quantified because of the variance between drivers. Also, the number of strikes at reduced energy will vary because raising the hammer at less than full power and then releasing it causes the hammer to recoil as it strikes the pile, resulting in multiple strikes. Initiating impact pile driving at a lower power may allow birds, fish, marine mammals, and other wildlife to move away from the immediate vicinity of the activity, before noise levels are at their greatest, thereby reducing the likelihood of exposure to sound levels that could cause further behavioral disturbance or injury.

4.3.1.2 Ongoing Conservation Program Measures – Birds at JEB Little Creek-Fort Story

Ongoing protective measures for piping plovers, red knots, roseate terns, and bald eagles encountered at JEB Little Creek-Fort Story are described in the installations' respective *Integrated Natural Resources Management Plans*. They include minimizing human activities within fenced or posted wildlife protection areas; restricting approach or lingering near piping plovers or their nests (if nesting were to occur); requiring all dogs be kept on leashes and cats be kept indoors; requiring beachgoers to dispose of all trash and food scraps in appropriate receptacles to avoid attracting predators which may prey upon beach nesting bird species, including piping plovers; and establishing and maintaining an emergency response plan for oil and chemical spills. Nesting boxes and platforms are also provided for other migratory birds.

4.3.1.3 Ongoing Conservation Program Measures – Piping Plovers at Camp Lejeune

- From April to August, portions of the New River Inlet beach are closed to vehicle traffic with signs.
- Beginning in 2000, bi-weekly shorebird surveys along the accessible portion of Onslow Beach have been conducted. Birds have been documented foraging on Onslow Beach during the winter, spring, and fall migration periods, and during the nesting season, although to date no nests have been found.
- Starting in April, high quality potential nesting habitat is posted as protected, and the surveys become more intensive as the beach is monitored for evidence of piping plover nesting behavior.
- The portion of Onslow Beach outside the recreational and training beaches is allowed to remain in a natural state.
- Piping plover census counts are conducted over winter and in the breeding season. If piping plovers are sighted during the nesting season, they are observed for signs of breeding behavior.
- Off-road recreational vehicle rules restrict recreational vehicle access south of the South Tower between April 1 and August 31. Only base personnel or volunteers conducting surveys, base range inspectors and Conservation Law Enforcement personnel are allowed on this portion of the beach during that timeframe.
- Camp Lejeune posts shorebird sites to discourage pedestrian impacts and enforces Base Order 10570.1c requiring pets to be leashed on Onslow Beach.
- Camp Lejeune has actively removed predators from Onslow Beach, and will do so again as appropriate.

- In order to help conserve piping plovers and other species, no sand fencing or dune planting takes place south of South Tower or north of North Tower.
- In the remote possibility the plovers will nest at Camp Lejeune, incidental take for this species was applied for and was granted by USFWS in 2002 (U.S. Fish and Wildlife Service 2002). The conditions of this permit include conservation measures required by USFWS:
    - Surveying bi-monthly for piping plover to document plover use of Onslow Beach; if nesting behavior is identified, the area is immediately posted with signs prohibiting vehicular or human access.
    - Prior to dune construction activities, project areas and the surrounding area are surveyed for adult, young, or nests of piping plover.
    - If a nest is located or adults are exhibiting breeding behavior within 91 meters (300 feet) of a proposed dune building project site, the project is delayed until the breeding season is complete.

4.4 Fish and Marine Invertebrates

The existing environment and potential environmental consequences for fish, marine invertebrates, and Essential Fish Habitat in the study area are detailed in Section 3.10, *Fish and Marine Invertebrates*. The soft start procedures described above in Section 4.3.1.1 may reduce potential impacts from pile driving noise on all fish, including the ESA-listed Atlantic sturgeon and shortnose sturgeon.

4.5 Sea Turtles

The existing environment and potential environmental consequences for sea turtles in the study area are detailed in Section 3.11, *Sea Turtles*.

4.5.1 Standard Operating Procedures

4.5.1.1 Soft Starts

Soft start procedures described above in Section 4.3.1.1 may reduce potential impacts from pile driving noise on sea turtles.

4.5.1.2 Lookout Procedural Measures

Vessels have personnel assigned to stand watch at all times while underway. Standard watch personnel may perform watch duties in conjunction with responsibilities that extend beyond looking at the water or air (such as supervision of other personnel). This section will introduce Lookouts, whose duties satisfy safety of navigation and mitigation requirements.

The Navy will have two types of Lookouts for the purposes of conducting visual observations: (1) those positioned on vessels, and (2) those positioned on small boats. Lookouts positioned on vessels will be dedicated solely to diligent observation of the air and surface of the water. They will have multiple observation objectives, which include, but are not limited to, detecting the presence of biological resources and vessel traffic, observing the applicable mitigation zones, and monitoring for vessel and personnel safety concerns.

Minimally manned vessels and vessels less than 65 feet (20 meters) in length will have one Lookout at the forward position of the vessel due to space and manning restrictions. Lookouts positioned on small boats may include the boat crew. Lookouts positioned in small boats may be responsible for tasks in addition to observing the surface of the water (e.g., navigation). However, small boat Lookouts will, to the maximum extent practicable and consistent with safety and training requirements, comply with the observation objectives described above for Lookouts positioned on larger vessels.

All vessels use extreme caution and proceed at a “safe speed” so they can take proper and effective action to avoid a collision with any sighted object or disturbance and can be stopped within a distance appropriate to the prevailing circumstances and conditions.

4.5.1.3 Ongoing Conservation Program Measures – All Locations

Military training staff and installation conservation staff are cognizant of the potential presence of marine species and are able adjust operations, if deemed appropriate. Shore patrols and other units at JEB Little Creek-Fort Story and Camp Lejeune that may occasionally encounter stranded sea turtles must report strandings (alive or dead) to natural resources staff, who report the incident to the appropriate response networks (Appendix H, *Procedures for Reporting Stranded Sea Turtles and Marine Mammals at JEB Little Creek-Fort Story and Marine Corps Base Camp Lejeune*). Natural resources personnel receive training in the identification of sea turtles and are available to assist other base personnel in their identification when needed.

4.5.2 Mitigation Measures

4.5.2.1 Marine Species Awareness Training

Consistent with current requirements, all personnel standing watch on the bridge, Commanding Officers, Executive Officers, and Lookouts will successfully complete the Marine Species Awareness Training prior to standing watch or serving as a Lookout. The Marine Species Awareness Training is designed to improve the effectiveness of visual observations for marine resources, including marine mammals and sea turtles. The Marine Species Awareness Training provides information on sighting cues, visual observation tools and techniques, and sighting notification procedures.

4.5.2.2 Elevated Causeway System (Modular) Mitigation – All Locations

For both locations, mitigation will include visual observation from one platform (which could include the shore, an elevated causeway, or on a ship) starting 30 minutes prior to and during the exercise within a mitigation zone of 60 yards (55 meters) around the pile driver. The exercise will not commence if concentrations of floating vegetation (*Sargassum*, or kelp paddies) are observed in the mitigation zone. Pile driving will cease if a marine mammal or sea turtle is sighted within the mitigation zone. Pile driving will recommence if any one of the following conditions is met: (1) the animal is observed exiting the mitigation zone, (2) the animal is thought to have exited the mitigation zone based on its course and speed, or (3) the mitigation zone has been clear from any additional sightings for a period of 30 minutes.

4.6 Marine Mammals

4.6.1 Standard Operating Procedures

Soft starts and lookout procedures described above in Sections 4.3.1 and 4.5.1.1 apply to marine mammals.

JEB Little Creek-Fort Story reports all marine mammal strandings to Virginia Aquarium’s Stranding Response Team and National Marine Fisheries Service (Appendix H).

Camp Lejeune reports all marine mammal strandings to the Marine Mammal Stranding Network at the University of North Carolina, Wilmington.

4.6.2 Mitigation Measures

Marine Species Awareness Training and ELCAS (M) mitigation measures described above in Section 4.5.2 under *Sea Turtles* apply to marine mammals

4.6.2.1 North Atlantic Right Whale Mid-Atlantic Migration Corridor

A North Atlantic right whale migratory route is located off the mid-Atlantic coast of the United States. This mitigation area applies from November 1 through April 30 and is defined as follows:

- Block Island Sound: The area bounded by 40˚51'53.7" N / 070˚36'44.9" W; 41˚20'14.1" N / 070˚49'44.1" W; 41˚4'16.7" N / 071˚51'21" W; 41˚35'56.5" N / 071˚38'26.1" W; then back to first set of coordinates.
- New York and New Jersey: Within a 20 nm radius of the following (as measured seaward from the COLREGS lines): 40˚29'42.2" N / 073˚55'57.6" W.
- Delaware Bay: Within a 20 nm radius of the following (as measured seaward from the COLREGS lines): 38˚52'27.4" North / 075˚01'32.1" West.
- Chesapeake Bay: Within a 20 nm radius of the following (as measured seaward from the COLREGS lines): 37˚00'36.9" North / 075˚57'50.5" West.
- Morehead City, North Carolina: Within a 20 nm radius of the following (as measured seaward from the COLREGS lines): 34˚41'32.0" North / 076˚40'08.3" West.
- Wilmington, North Carolina, through South Carolina, and to Brunswick, Georgia: Within a continuous area 20 nautical miles from shore and west back to shore bounded by 34˚10'30" North / 077˚49'12" West; 33˚56'42" North / 077˚31'30" West; 33˚36'30" North / 077˚47'06" West; 33˚28'24" North / 078˚32'30" West; 32˚59'06" North / 078˚50'18" West; 31˚50'00"North / 080˚33'12" West; 31˚27'00" North / 080˚51'36" West.

When transiting within the migration corridor, the Navy will practice increased vigilance, exercise extreme caution, and proceed at the slowest speed that is consistent with safety, mission, and training and testing objectives.

4.6.2.2 West Indian Manatee Measures – Camp Lejeune

The following measures would apply to ELCAS (M) construction activities at Camp Lejeune for the West Indian manatee:

- All personnel associated with ELCAS (M) will be informed that manatees may be present in the project area, and care must be taken to avoid any harm to these endangered marine mammals. Personnel will be briefed on the general appearance of the species and their habit of moving completely or partially submerged in shallow water. All personnel will be informed that they are responsible for observing water-related activities for the presence of manatees.
- Personnel will be briefed on civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act and the Endangered Species Act.
- If a manatee is seen within 100 yards (91 meters) of active pile driving, all appropriate precautions will be implemented to ensure protection of the manatee. These precautions will include the immediate shutdown of pile driving equipment if a manatee comes within 60 yards (55 meters) of the equipment. Activities will not resume until the manatee has departed the 60-yard (55-meter) shutdown area on its own volition (i.e., it may not be herded or harassed from the area).
- Any injury to a manatee will be reported immediately. The report must be made to the U.S. Fish and Wildlife Service at (919) 856-4520, ext. 28, the National Marine Fisheries Service at (252) 728-8762, and the North Carolina Wildlife Resources Commission at (252) 448-1546.
- A log detailing all sightings and/or injuries to manatees during pile driving will be maintained. Upon completion of the action, the project manager will prepare a report which summarizes all information on manatees encountered and submit the report to the U.S. Fish and Wildlife Service's Raleigh Field Office.

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5 Cumulative Impacts

5.1 Introduction

Analysis of cumulative impacts (or cumulative effects) presented in this section follows the requirements of the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) regulations and guidance. The regulations define “cumulative impacts” as “impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 C.F.R. § 1508.7). Consistent with CEQ regulations the significance of the anticipated cumulative impacts is assessed taking into account the context and intensity as described at the beginning of Chapter 3 (*Affected Environment and Environmental Consequences*).

The CEQ interprets NEPA and their own NEPA regulations on cumulative effects as requiring analysis and a concise description of the identifiable present effects of past actions to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have a continuing, additive and significant relationship to those effects. Agencies look for present effects of past actions that are, in the judgment of the agency, relevant and useful because they have a significant cause-and-effect relationship with the direct and indirect effects of the proposal for agency action and its alternatives.

5.2 Approach to Analysis

5.2.1 Overview

Cumulative impacts were analyzed for each resource addressed in Chapter 3 (*Affected Environment and Environmental Consequences*) for the No Action Alternative and the Action Alternative in combination with past, present, and reasonably foreseeable future actions. The cumulative impacts analysis included the following steps, described in more detail below:

1. Identify appropriate level of analysis for each resource.
2. Define the geographic boundaries and timeframe for the cumulative impacts analysis.
3. Describe the current resource conditions and trends.
4. Identify potential impacts of each alternative that might contribute to cumulative impacts.
5. Identify past, present, and other reasonably foreseeable future actions that affect each resource.
6. Analyze potential cumulative impacts.

5.2.2 Identify Appropriate Level of Analysis for Each Resource

While a single project may have minor impacts, overall impacts may be collectively significant when the project is considered together with other projects or activities on a regional scale. A cumulative impact is the additive effect of all projects in the geographic area. CEQ guidance observes that it is not practical to analyze how the cumulative effects of an action interact with the universe; the analysis of environmental effects must focus on the aggregate effects of past, present and reasonably foreseeable future actions that are truly meaningful. The level of analysis for each resource was commensurate with the intensity of the impacts identified in Chapter 3 (*Affected Environment and Environmental Consequences*). The rationale for the level of analysis applied to each resource is described in Section 5.4 (*Analysis of Potential Cumulative Impacts*).

The scope of the cumulative impact analysis is related to the magnitude of the environmental impacts of a proposed action. Proposed actions of limited scope typically do not require as comprehensive an assessment of cumulative impacts as proposed actions that have significant environmental impacts over a large area. Proposed actions that are typically finalized with a finding of no significant impact usually involve only a limited cumulative impact assessment to confirm that the effects of the proposed action do not reach a point of significant environmental impacts.

5.2.3 Define Geographic Boundaries and Timeframe for Analysis

The geographic boundaries for the cumulative impacts analysis included the study area for the Action Alternative. The geographic boundaries for marine mammals and sea turtles were expanded to include activities that might impact migratory marine mammals and sea turtles.

In determining the timeframe for the cumulative impact analysis, consideration was given to the length of time the impacts of the Proposed Action would last and considering the specific resource in terms of its history of degradation (Council on Environmental Quality 1997). The Proposed Action includes ongoing and anticipated future training activities. While the Navy's training requirements change over time in response to world events and other factors, the general types of activities covered by this Environmental Assessment are expected to continue indefinitely and the associated impacts could occur indefinitely. Likewise, some reasonably foreseeable actions addressed in the cumulative impact analysis are expected to continue indefinitely (recreational fishing, etc.). Therefore, the cumulative impacts analysis is not bounded by a specific future timeframe. However, it should be recognized that available information, uncertainties to predicting future actions, and other practical constraints limit the ability to analyze cumulative impacts for the indefinite future. Navy environmental compliance for training activities in an ongoing process and new or supplemental environmental planning documents covering changes in training activities will be prepared as necessary. These future environmental planning documents will also include updated cumulative impacts analysis based upon information available at the time of preparation.

5.2.4 Describe Current Resource Conditions and Trends

The affected environment sections of Chapter 3 describe current resource conditions and trends, and they discuss how past and present activities influence each resource. The current aggregate impacts of past and present actions are reflected in the baseline information presented in the affected environment sections.

5.2.5 Identify Potential Impacts of the Alternatives That Might Contribute to Cumulative Impacts

Direct and indirect impacts of the alternatives discussed in Chapter 3 were reviewed to identify impacts that may contribute to cumulative impacts. Key factors considered included current status and sensitivity of each resource and the intensity, duration, and spatial extent of the impacts to each resource. For public health and safety, the Navy determined the No Action Alternative and the Action Alternative had no direct or indirect impacts, therefore no further cumulative impact analysis will be conducted.

5.2.6 Identify Other Actions That Affect Each Resource

A list of other actions was compiled for the study area and surrounding areas based on communications with other agencies, a review of other military activities, literature review, previous NEPA analyses for some of the other actions, and other available information. Identified future actions were reviewed to determine if they should be considered further in the cumulative impacts analysis. Factors considered when identifying other actions to be included in the cumulative impacts analysis included the following:

- Whether the action is likely or probable (i.e., reasonably foreseeable), rather than merely possible or speculative;
- The timing and location of the other action in relationship to the proposed training exercises;
- Whether the other action and each alternative would affect the same resources;
- The current conditions, trends, and vulnerability of resources affected by the other action;
- The duration and intensity of the other action; and
- Whether the impacts have been truly meaningful, historically significant, or identified previously as a cumulative impact concern.

5.2.7 Analyze Potential Cumulative Impacts

The current impacts of past and present actions and the anticipated impacts of reasonably foreseeable future actions were characterized and summarized. The incremental impacts of each alternative were then added to the combined impacts of all other actions to describe the cumulative impacts that could result if the No Action Alternative or the Action Alternative were implemented. The cumulative impacts analysis considers additive, synergistic, and antagonistic impacts. The analysis in Chapter 3 (*Affected Environment and Environmental Consequences*) indicates that the direct and indirect impacts of the No Action Alternative and the Action Alternative would be similar for many of the stressors analyzed. Therefore, much of the cumulative impacts discussion applies to both alternatives. Specific differences between alternatives are discussed when appropriate.

5.3 Other Actions Analyzed in the Cumulative Impacts Analysis

As documented throughout this chapter, most impacts under both alternatives would be localized and largely limited to the nearshore waters and training beaches where the proposed training activities would take place. Therefore, at both JEB Little Creek-Fort Story and Camp Lejeune, the federal actions that could result in cumulative impacts consist primarily of past, ongoing, and future shoreline and nearshore training activities that would take place at the installations themselves.

With regard to non-federal actions, only at-sea activities and their associated air quality impacts in the vicinity of the proposed JLOTS training beaches could potentially generate measurable cumulative impacts. The main such activities include recreational boating, recreational and commercial fishing, as well as commercial shipping in and out of the Chesapeake Bay.

Table 5.3-1 lists the other relevant actions identified for cumulative impact analysis.

Table 5.3-1: Past, Present, and Reasonably Foreseeable Actions that May Contribute to Cumulative Impacts

Name of Action	Agency or Proponent	Location	Description of Action	Timeframe (past, present, future)	Resource Areas Impacted (air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, vegetation, wildlife, protected species [and EFH])
Beach Nourishment Program	Navy/U.S. Army Corps Engineers	JEB Little Creek-Fort Story (Fort Story site only), VA	Construct a shoreline restoration and protection project at Joint Expeditionary Base (JEB) Little Creek-Fort Story in the City of Virginia Beach. The shoreline at Fort Story, particularly the beaches and primary dunes, has experienced sporadic episodes of severe erosion during major storm events placing both rare terrestrial habitats and man-made structures, including aids to navigation, military training facilities, and historic resources, at risk of damage or destruction. Under the proposed action, sand on the beaches at Fort Story would be replenished and a single stone breakwater would be constructed.	Present, future	Air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, vegetation, wildlife, protected species
Atlantic Fleet Aerial Target Operations Facility (ATOF)		Naval Air Station Oceana, Dam Neck, VA	The project consists of the construction of a 1,635 square meter (m^2), two-story ATOF, and a 115 m^2 stand-alone Center-of-Gravity (CG) Alignment and Range Operations Facility for Naval Air Warfare Center Aircraft Division/Atlantic Target Marine Operations (NAWCAD/ATMO). The proposed action would also include the demolition of four buildings at Dam Neck Annex. NAWCAD/ATMO provides an average of 54 BQM-74 aerial target launches per year.	Present, future	Air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, vegetation, wildlife, protected species
Atlantic Fleet Testing and Training (AFTT) Environmental Impact Statement/Overseas Environmental Impact Statement	U.S. Navy	JEB Little Creek-Fort Story, Camp Lejeune, NC	Military readiness training and research, development, test and evaluation activities conducted within the Atlantic Fleet Training and Testing (AFTT) study area. Virginia offshore and inland coastal waters in the study area includes the Virginia Capes (VACAPES) Range Complex and the lower Chesapeake Bay.	Past, present, future	Air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, wildlife, protected species, and Essential Fish Habitat (EFH)

Name of Action	Agency or Proponent	Location	Description of Action	Timeframe (past, present, future)	Resource Areas Impacted (air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, vegetation, wildlife, protected species [and EFH])
Virginia Inland Training (VITEA) Environmental Assessment	U.S. Navy	JEB Little Creek-Fort Story, VA	Beach assaults involving assault landing craft to transfer troops, heavy equipment, and supplies ashore. The types of equipment and numbers of personnel vary depending on the unit conducting the assault. Landing craft maneuver operations involving amphibious assault vehicles, Landing Craft Air Cushions, landing vehicle tractors, and other assault landing craft, occurring on an average of two times per month. These maneuvers primarily take place offshore and on the beach. Beach party teams and high mobility military vehicles operate in the beaches and dunes areas, foot patrols, the excavation of fighting positions, and bivouac activities. The use of small arms (blank ammunition) and pyrotechnics is authorized.	Past, present, future	Air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, vegetation, wildlife, protected species, and EFH
Sea, Air, Land (SEAL) delivery vehicle team training	U.S. Navy	JEB Little Creek-Fort Story, VA	The Sea, Air, Land delivery vehicle team, concentrating on deployment of mini-submarines with training consisting of diving and beach operations, occurring on a weekly basis.	Present and future	Air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, wildlife, protected species, and EFH
Camp Lejeune Range Operations	U.S. Marine Corps	Camp Lejeune, NC	Training operations including amphibious training at land and water ranges and special use airspace within and near MCB Camp Lejeune.	Past, present, future	Air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, vegetation, wildlife, protected species, and EFH
Reserve AAV Training EA	U.S. Marine Corps Reserves	JEB Little Creek-Fort Story (Little Creek only), VA	Environmental Assessment covers land and water-based training of Marine Corps Reserves with Amphibious Assault Vehicles.	Present, future	Air quality, noise, socioeconomic, water resources, bathymetry/sediment/topology/soils, wildlife, protected species, and EFH
Recreational Boating & Fishing	Private Industry	Coastal areas near JEB Little Creek-Fort Story, VA; Camp Lejeune, NC	Private citizens boating and fishing activities using various size water craft in the coastal areas near each installation and proposed action training areas.	Past, present, future	Air quality, noise, socioeconomics, water resources, wildlife, protected species, and EFH

Name of Action	Agency or Proponent	Location	Description of Action	Timeframe (past, present, future)	Resource Areas Impacted (air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, vegetation, wildlife, protected species [and EFH])
Commercial Fishing	Private Industry	Coastal areas near JEB Little Creek-Fort Story, VA; Camp Lejeune, NC	Commercial fishing activities using various size watercraft in the coastal areas near each installation and Proposed Action training areas.	Present, future	Air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, wildlife, protected species, and EFH
Community Activities	Private and public entities and people	Communities and coastal areas near JEB Little Creek-Fort Story, VA; Camp Lejeune, NC	Daily activities in the community include commuter traffic, industrial businesses, construction projects, road maintenance, etc.	Present, future	Air quality, noise, socioeconomics, water resources, bathymetry/sediments/soils, vegetation, wildlife, protected species, and EFH

5.4 Analysis of Potential Cumulative Impacts

5.4.1 Air Quality

As detailed in Section 3.1 (*Air Quality*), training activities conducted under both alternatives would generate, emissions of criteria pollutants and greenhouse gases, contributing to air pollution in the study area. Emissions of these pollutants would increase under the Action Alternative, although the emissions under either alternative are extremely small relative to current and projected regional emissions. The impacts of either alternative could be cumulative with other actions that involve criteria air pollutant and hazardous air pollutant emissions.

Taken together, the combined emissions are not expected to create significant cumulative air quality impacts because of the limited nature of the emissions, as well as the short-term and intermittent nature of the emissions. For similar reasons, emissions of nitrogen oxides and volatile organic compounds at JEB Little Creek-Fort Story, which is located in a maintenance area for ozone, would not exceed the applicable *de minimis* thresholds. When considered cumulatively, they would not affect the attainment status of the Hampton Roads region under the Clean Air Act or prevent it from remaining in attainment, consistent with the current ozone maintenance plan. Thus, no cumulative impacts on air quality are anticipated.

5.4.1.1 Greenhouse Gas Emissions and Climate Change

Climate change is a global issue, and greenhouse gas emissions are a concern from a cumulative perspective because individual sources of greenhouse gas emissions are not large enough to have an appreciable impact on climate change. Federal agencies address emissions of greenhouse gases by reporting and meeting reductions mandated in laws, executive orders (EOs), and agency policies. The most recent of these is EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, 5 October 2009. EO 13514 impacts the way the federal government operates by establishing greenhouse gases as a metric for tracking progress in federal sustainability; requiring deliberative planning processes; and linking budget allocations and Office of Management and Budget scorecards to ensure achievement of goals related to energy efficiency and reducing greenhouse gas emissions.

Greenhouse gas emissions from relevant past, ongoing, and reasonably foreseeable future activities at both installations generate, and would continue to generate, greenhouse gases, such as carbon dioxide, methane, and nitrous oxide. The contribution of the No Action Alternative or the Action Alternative to cumulative greenhouse gas emission levels would be insignificant because of the limited scope and intermittent nature of the activities. Therefore, no significant cumulative impacts on climate change and greenhouse gas emissions are anticipated.

5.4.2 Ambient Noise

Relevant past, ongoing, and reasonably foreseeable future activities at both installations generate, and would continue to generate, ambient noise from the operation of equipment, watercraft, and vehicles, and from the use of firing ranges. Past actions resulting in temporary noise increases in and around the study area have included military training and testing activities; infrastructure repairs (including pile driving); new construction by the Navy, Marine Corps, and private and municipal/state government entities in the cities of Virginia Beach, Virginia, and Jacksonville, North Carolina; and recreational activities. The noise contributions from each of these actions are temporary and cease upon completion of each project or event. Taken together, most of the activities included either the No Action Alternative or the Action Alternative and past, present, and reasonably foreseeable activities (including AFTT, VITEA, SEAL training and Camp Lejeune range operations, on-base construction activities, and civilian recreational activities) are consistent with those already taking place at or near the two installations and are factored into existing ambient noise levels. One exception is the ELCAS (M), an activity associated with the Action Alternative, which would generate noise from pile driving (20 days) and removal (10 days) once per year at each installation. Although members of the public using the waters in the immediate vicinity of the pile driving may be subjected to higher levels of ambient noise exposure, given the short duration and limited scope of the impacts from ELCAS (M) and other activities, no significant cumulative impacts are expected.

5.4.3 Socioeconomics

The socioeconomic impacts of the relevant past, ongoing, and reasonably foreseeable future activities (including AFTT, VITEA, SEAL team training, and Camp Lejeune range operations) are minimal given the limited and temporary restrictions on access to nearshore waters off the installations during amphibious training activities, in danger zones and consistent with existing regulations. Most of the activities included in the No Action Alternative are already taking place at the project installations and the additional activities associated with the Action Alternative (including the ELCAS [M]) would not require additional restrictions that could affect boating, maritime transport, or commercial or recreational fishing. When all impacts of the Proposed Action are considered together with other past, present, and reasonably foreseeable future actions, the impacts on recreational and commercial fishing, boating, maritime transport and other activities are insignificant given the short-term, intermittent nature of the activities associated with either alternative at both installations. Thus, no significant cumulative impacts to socioeconomics are anticipated.

5.4.4 Water Resources

While past, ongoing, and reasonably foreseeable future activities in the waters off the two proposed training installations may have had impacts on water quality through accidental discharges of pollutants or increased turbidity, the additive contribution of either the No Action Alternative or the Action Alternative to these other impacts would be small, localized, and temporary, consisting mostly of short-term increases in turbidity of nearshore waters. Most of the activities included in the No Action Alternative are already taking place at both installations and their impacts, along with those of the other actions, are already factored into existing water conditions. The Action Alternative, including the ELCAS (M), would not generate significant additional impacts on water quality given the short-term, localized, and temporary nature of the training exercises. Thus, no significant cumulative impacts to water resources are anticipated.

5.4.5 Bathymetry, Sediments, Topography, and Soils

Relevant past, ongoing, and reasonably foreseeable future activities at both installations are expected to generate some minor impacts on bathymetry, sediments, topography, and soils, including displacement of bottom sediments during in-water activity, and some soil erosion and compaction for shoreline activities. Because most of the activities included in the No Action Alternative are already taking place at the two installations, their impacts are already factored into existing conditions along with those of other actions cumulatively affecting the same resources. The activities associated with the Action Alternative would result in some additional disturbance of subaqueous bottom sediments and to the beach environment, but these impacts would be localized, short-term, and easily absorbed by the dynamic shoreline environment. When combined, the impacts of either the No Action or the Action Alternative, along with the activities listed in Table 5.3-1 would still only result in short-term localized impacts. Thus there would be no significant cumulative impacts on bathymetry, sediments, topography, or soils.

5.4.6 Cultural Resources

While past and ongoing activities in the waters off the two proposed training installations may have had impacts on cultural resources, the contribution of either the No Action Alternative or the Action Alternative along with reasonably foreseeable future activities would be minimal. In the case of the Little Creek site at JEB Little Creek-Fort Story and Camp Lejeune, no effects to cultural resources would occur and, as a result, no cumulative impacts would occur.

At the Fort Story site at JEB Little Creek-Fort Story, no effect to archaeological properties would occur, therefore neither the No Action Alternative nor the Action Alternative will result in cumulative impacts. No adverse effects to National Register-listed or -eligible architectural properties would occur at the Fort Story site; however, most of the activities included in the Proposed Action are already taking place at the installation. For that reason, any impacts are already factored into existing conditions along with those of other actions cumulatively affecting the same resources.

Neither the No Action Alternative nor the Action Alternative would result in cumulative impacts on cultural resources when combined with additional impacts from other actions. Thus, neither alternative would have significant cumulative impacts on cultural resources.

5.4.7 Terrestrial and Aquatic Vegetation

5.4.7.1 Terrestrial Vegetation

Relevant past, ongoing, and reasonably foreseeable future activities at both installations (including beach nourishment at Fort Story, VITEA, SEAL team training, and Camp Lejeune range operations) may generate short-term, highly localized impacts on terrestrial plants in areas of activity. Because the activities included in the No Action Alternative are already taking place at the project installations, their impacts are already factored into existing conditions along with those of other actions cumulatively affecting the same resources. The additional activities associated with the Action Alternative would generate only short-term and minimal impacts with no long-term additional impacts on vegetation. Together, there would be no significant cumulative impacts from implementation of either alternative at either of the two installations because aggregate impacts are expected to be short-term, localized, and temporary.

5.4.7.2 Aquatic Vegetation

Conditions in the study area consist of hardened shorelines, in Little Creek Cove and Mile Hammock Bay, and nearshore areas that are heavily traveled by military vessels. Many of the potential cumulative physical impacts have already occurred to areas where aquatic vegetation is present. JLOTS training activities associated with either alternative would result in no alteration of aquatic vegetative communities since aquatic areas are already frequently disturbed and are therefore reflected in the existing conditions at each location. When impacts from the No Action Alternative or the Action Alternative are combined with those of other actions in the study area, cumulative impacts of all activities combined would still only result in short-term, temporary impacts. Thus, there would be no significant cumulative impacts on aquatic vegetation.

5.4.8 Terrestrial Wildlife and Birds

Ongoing activities at both installations (beach nourishment at Fort Story, VITEA, SEAL team training, and Camp Lejeune range operations) may cause displacement of some terrestrial wildlife and bird species and temporary changes to prey availability (in the case of diving birds). Over time, recreational and military uses of the waters off JEB Little Creek-Fort Story and Camp Lejeune have resulted in increased human presence, underwater and airborne noise, boat movement, and other activities, likely impacting coastal wildlife in the area. Terrestrial wildlife and birds may avoid areas with continuous activity or with periodic occurrences of loud noises. Increased anthropogenic noise in the underwater and in-air environment has the potential to cause behavioral reactions in terrestrial wildlife and birds, including avoidance of certain areas (McClure et al. 2013; Dooling 2002). However, the abundance and coexistence of these species with existing anthropogenic activities suggests that cumulative effects have not been significant. Because terrestrial wildlife and birds are mobile, the noise impacts of either the No Action Alternative or the Action Alternative could have additive effects due to underwater and airborne noise impacts from other actions and activities in and around the study area. However, because the expected impacts of either of the two alternatives on birds in general would be temporary, cumulative impacts associated with JLOTS exercises (in particular ELCAS [M]) are considered unlikely. Continued regulation of anthropogenic disturbance impacts on birds under the Migratory Bird Treaty Act, ESA (in the case of piping plovers, roseate terns, and red knots [proposed]), and the Bald and Golden Eagle Protection Act, combined with population monitoring, documentation of mortality causes, and research into acoustic effects, ensure that cumulative effects would be minimized. No long term, permanent impacts on terrestrial wildlife or bird populations are expected, either as a result of either the No Action Alternative or the Action Alternative or cumulatively when combined with other past, present, and reasonably foreseeable actions. Therefore, no significant cumulative impacts on terrestrial wildlife or birds are expected.

5.4.9 Fish and Marine Invertebrates

JLOTS training exercises would result in no permanent alteration of habitat for fish or marine invertebrates in the study area. Taken together, most of the activities (e.g., vessel movement, beach landings/disturbance) included in either alternative along with other past, present, and foreseeable actions (Table 5.3-1) are already taking place at the project installations and are factored into the baseline conditions, suggesting some level of habituation. An exception would be the ELCAS (M), which would generate noise and turbidity from pile driving (20 days) and removal (10 days) once a year at each location.

Most of the other actions with the exception of Atlantic Fleet Training and Testing activities and in-water pile driving construction activities that are a subset of "community activities" do not involve impulsive sound sources in the water and would not impart additive effects. The mine neutralization training that routinely occurs within a small portion of the surface danger zone north of JEB Little Creek-Fort Story was analyzed in the Atlantic Fleet Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement is a source of impulsive underwater sound. Due to the relative infrequency of the full JLOTS training (and, hence, the use of pile drivers to construct the ELCAS [M]), the chances of this mine neutralization training coinciding with the full JLOTS training are minimal and the likelihood of cumulative effects is low.

Because the anticipated impacts of JLOTS training are short-term and localized, cumulative impacts would not significantly affect fish populations in the study area. Nevertheless, either alternative combined with other future actions would contribute incrementally to cumulative fish impacts in the waters off JEB Little Creek-Fort Story and Camp Lejeune. Continued adherence to the requirements of the ESA would limit disturbance to fish and ensure that important habitats do not become further degraded. Additionally, existing regulatory mechanisms and impact minimization measures would protect fish and further decrease the likelihood of potential cumulative impacts on fish and marine invertebrate species.

5.4.10 Sea Turtles

In the marine environment, past, ongoing, and reasonably foreseeable future activities, such as boating, commercial vessel traffic, and fishing at both installations, have the potential to impact (through vessel strike, entanglement, or disturbance) protected sea turtles. On land, past, ongoing, and reasonably foreseeable future activities, including beachfront training not associated with JLOTS, have a low potential to disturb or injure protected sea turtles or hatchlings, or disturb nests. When these other activities are combined with the JLOTS exercises under the No Action Alternative or the Action Alternative, no significant impacts on sea turtles are anticipated because of the limited, localized, and short-term nature of the potential impacts and activities involved, the fact that sea turtles are likely to avoid these areas due to human activity, and the measures undertaken at the installations to protect natural resources. As indicated in Section 3.11.1 under *Sea Turtles*, JEB Little Creek-Fort Story is not a preferred or common location for sea turtle nesting (for any species), although several species are known to nest at Camp Lejeune beaches. Therefore, no significant impacts on nesting sea turtles at JEB Little Creek-Fort Story are anticipated due to their infrequent occurrence and the intermittent and temporary nature of the impacts associated with either alternative. At Camp Lejeune, the potential for effects is very low based on the intermittent, temporary nature of the Proposed Action as well as the measures detailed in Chapter 4, *Standard Operating Procedures and Mitigation Measures*.

Bycatch in commercial fisheries, ship strikes, and marine debris are some of the primary threats to sea turtles (Lutcavage et al. 1997). One comprehensive study estimates that worldwide, 447,000 sea turtles are killed each year from bycatch in commercial fisheries (Wallace et al.

2010). Precise data are lacking for sea turtle mortalities directly caused by ship strikes; however, live and dead turtles are often found with deep cuts and fractures indicative of collisions with boat hulls or propellers (Hazel et al. 2007; Lutcavage et al. 1997). Marine debris can also be a problem for sea turtles by causing entanglement or ingestion (Lazar and Gracan 2011; Macedo et al. 2011). Sea turtles can mistake debris for prey; one study found that 37 percent of dead leatherback turtles had ingested various types of plastic (Mrosovsky et al. 2009). Plastic ingestion was identified as the cause of death in 9 percent of these cases. Other marine debris, including derelict fishing gear and cargo nets, can entangle and drown turtles in all life stages.

No long-term, permanent impacts on sea turtle populations are expected when the No Action Alternative or Action Alternative is combined with other past, present, and reasonably foreseeable actions. Therefore, no cumulative adverse effects on sea turtles are expected.

5.4.11 Marine Mammals

Ongoing military training and recreation activities in the waters off JEB Little Creek-Fort Story and Camp Lejeune may have resulted in intermittent, temporary impacts on marine mammals such as displacement, changes in prey distribution or abundance, and temporary localized decreases in water quality. Increased anthropogenic noise in the marine environment has the potential to cause behavioral reactions in marine mammals, including avoidance of certain areas. However, the abundance and coexistence of these species with existing military and recreational activities suggests that cumulative effects have not been detrimental. Because marine mammals are highly mobile, the noise impacts of the Action Alternative may be cumulative with underwater and noise impacts from other actions and activities in and around Norfolk and Virginia Beach, Virginia, and Jacksonville, North Carolina. However, because the expected impacts of the Action Alternative on marine mammals in general would be intermittent and temporary, cumulative impacts associated with increased underwater noise levels would not be significant. The regulatory process also ensures that each project proposing a take of marine mammals is assessed in light of the status of the species and other actions affecting it in the same region. Given the short duration and intermittent nature of the proposed activities, impacts are not expected to be significant when combined with other actions in the study area. Standard operating procedures and mitigation measures such as visual monitoring and use of shutdown zones implemented (Chapter 4, *Standard Operating Procedures and Mitigation Measures*) would further reduce the likelihood of impacts on marine mammal populations in the study area. Nevertheless, the Action Alternative and other future actions would contribute incrementally to cumulative marine mammal disturbance impacts in and around JLOTS locations. Continued adherence to the requirements of the ESA and MMPA would limit potential injuries and disturbance to marine mammals. Furthermore, existing regulatory mechanisms and mitigation measures would protect marine mammals and further decrease the likelihood of potential cumulative impacts on these species.

No long-term, permanent impacts on populations of marine mammals are expected when combined with other past, present, and reasonably foreseeable actions. Therefore, no significant cumulative effects to marine mammals are expected.

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6 Other Considerations Required by the National Environmental Policy Act

Activities associated with the Proposed Action would comply with applicable federal, state and local requirements with respect to the human environment. Section 6.1 discusses the consistency of the Proposed Action with other federal, state and local land use plans, policies and objectives. Section 6.2 discusses the irreversible and irretrievable commitments of resources. Section 6.3 discusses the relationship between short-term use of the environment and long-term productivity.

6.1 Consistency with Other Federal, State and Local Land Use Plans, Policies, and Controls

The Navy adheres to all relevant laws and requirements applicable to its operations, maintenance, and new construction activities. Table 6.1-1 provides a comprehensive list, organized by environmental resource, of federal and state environmental statutes, regulations and executive orders (EOs) relevant to environmental analysis of the Proposed Action and, to a lesser extent, to the supplemental analysis of environmental impacts. The table is followed by a more detailed description of the applicable laws and regulations.

Table 6.1-1: Summary of Applicable Statutes and Regulations

Authority	Citation
Air Quality	
Clean Air Act of 1970 and Amendments of 1977 and 1990, including the General Conformity Rule and the Greenhouse Gas Rule	42 U.S.C. § 7401 et seq., as amended
Federal Leadership in Environmental, Energy, and Economic Performance	EO 13514
Strengthening Federal Environmental, Energy, and Transportation Management	EO 13423
Water Resources	
Clean Water Act of 1972	33 U.S.C § 1251 et seq., as amended
Protection of Wetlands	EO 11990
Floodplain Management	EO 11988
Rivers and Harbors Act of 1899	33 U.S.C. §§ 401,403,407
Biological Resources	
Endangered Species Act of 1973	16 U.S.C. §§ 1531-1543
Marine Mammal Protection Act of 1972	16 U.S.C. § 1361 et seq.
Migratory Bird Treaty Act	16 U.S.C. §§ 703-712
Magnuson-Stevens Fishery Conservation and Management Act	16 U.S.C. §§ 1801-1882
Bald and Golden Eagle Protection Act	16 U.S.C. § 668-668c

Authority	Citation
Coastal Zone Management	
The Coastal Zone Management Act of 1972	16 U.S.C. § 1451 et seq., as amended, and 15 C.F.R. §§ 921-930
Cultural Resources	
National Historic Preservation Act of 1966	16 U.S.C. § 470 et seq., as amended

6.1.1 Federal Actions, Executive Orders, Policies, and Plans

6.1.1.1 National Environmental Policy Act

The Navy has prepared this EA to evaluate the potential impacts of conducting JLOTS training and associated unit-level FTXs at east coast locations. This EA was prepared in accordance with the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370d, as implemented by Council on Environmental Quality regulations, 40 C.F.R. §§ 1500-1508, and Department of the Navy regulations described in Office of the Chief of Naval Operations Instruction 5090.1D of 10 January 2014.

6.1.1.2 Clean Air Act

The Clean Air Act of 1970 and subsequent amendments specify requirements for control of the nation's air quality. Federal and state ambient air standards have been established for specific criteria pollutants. The 1990 amendments to the Clean Air Act require federal facility compliance with all requirements for air pollution control to a similar extent as nongovernmental entities. Virginia Beach is a maintenance area for ozone and in attainment for all other National Ambient Air Quality Standards. Air emissions for the Proposed Action at JEB Little Creek-Fort Story, in Virginia Beach, are below the *de minimis* threshold and a formal General Conformity analysis is not required. Onslow County is in attainment and as a result, General Conformity requirement does not apply for the Proposed Action at Camp Lejeune.

6.1.1.3 Coastal Zone Management Act

The Coastal Zone Management Act (16 U.S.C. § 1451 et seq., as amended) provides assistance to states in development of land and water use programs in coastal zones. The act encourages states, in cooperation with federal and local agencies, to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources, such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife supported by those habitats.

Coastal Zone Management Act policy is implemented through state coastal zone management programs. Federal lands are excluded from the definition of "coastal zone" (16 U.S.C. § 1453). However, federal actions that have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone should be consistent, to the maximum extent practicable, with the enforceable policies of approved state management programs (16 U.S.C. § 1456(c))..

JEB Little Creek-Fort Story and Camp Lejeune are statutorily excluded from the Coastal Zone Management Act's definition of the coastal zone because they are federal lands (16 U.S.C. § 1453(1)). Since activities that take place on the installations have the potential to affect coastal resources or uses beyond the boundaries of the federal properties, the Section 307 federal consistency requirement applies.

The Navy has reviewed the Action Alternative for how and to what degree the proposed training exercises at JEB Little Creek-Fort Story and Camp Lejeune could affect the coastal uses and resources of each state. Based on this review, the Navy has found that the Action Alternative would be consistent to the maximum extent practicable with the enforceable policies of each state's Coastal Zone Management Program. Coastal Zone Management Act correspondence with the states is included in Appendix A.

6.1.1.4 Endangered Species Act

The ESA of 1973, as amended, requires that any action authorized by a federal agency shall not jeopardize the continued existence of an endangered or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. Section 7 of the ESA requires that the responsible federal agency consult with USFWS concerning endangered and threatened species under their jurisdiction that may be affected by a proposed action.

Federally listed threatened and endangered species potentially occurring within the study area include:

- Shortnose sturgeon
- Atlantic sturgeon
- Loggerhead turtle
- Kemp's ridley turtle
- Green turtle
- Leatherback turtle
- Hawksbill turtle
- North Atlantic right whale
- Humpback whale
- Fin whale
- Sei whale
- West Indian manatee
- Piping plover
- Roseate tern
- Red knot
- Seabeach amaranth

ESA determinations for the Proposed Action are as follows:

- May affect, but not likely to adversely affect the Atlantic sturgeon and shortnose sturgeon;
- May affect, but not likely to adversely affect green, Kemp's ridley, leatherback, and loggerhead sea turtles;
- No effect on hawksbill sea turtles;
- No effect on green, hawksbill, or leatherback sea turtles' critical habitat;
- No effect on loggerhead sea turtle critical habitat;

- May affect, but not likely to adversely affect the North Atlantic right whale, humpback whale, fin whale, and West Indian manatee;
- No effect on sei whales;
- May affect, but not likely to adversely affect the piping plover;
- No effect on the ESA-listed roseate tern or the red knot), and;
- May affect, but not likely to adversely affect the seabeach amaranth.

6.1.1.5 Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972 established, with limited exceptions, a moratorium on the “taking” of marine mammals in waters or lands under U.S. jurisdiction. The act further regulates “takes” of marine mammals in the global commons (the high seas) by vessels or persons under U.S. jurisdiction. The term “take” as defined in Section 3 (16 U.S.C. § 1362) of the MMPA, means “to harass, hunt, capture, kill, or attempt to harass, hunt, capture, or kill any marine mammal.” In 2004 the National Defense Authorization Act adopted a definition of “military readiness activity” under which the Proposed Action is considered (16 U.S.C. § 1362(18)(B)(ii)).

The MMPA authorization requests for the Action Alternative were developed based on conservative analyses for JEB Little Creek-Fort Story and Camp Lejeune. The calculated potential incidental takes associated with the Action Alternative over five years are:

- No Level A incidental takes for marine mammals;
- Up to 550 Level B incidental takes for bottlenose dolphins;
- Up to 250 Level B incidental takes of Atlantic spotted dolphins.

The Navy is seeking a Letter of Authorization from NMFS for impacts to marine mammals as a result of the Proposed Action. In the future, the Navy will obtain additional MMPA permits as needed for the Proposed Action, at least once every five years.

6.1.1.6 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act of 1976 as amended by the Sustainable Fisheries Act in 1996, mandates identification and conservation of essential fish habitats. Federal agencies are required to consult with NMFS and prepare an essential fish habitat assessment if potential adverse effects on essential fish habitats are anticipated as a result of their activities. The No Action Alternative would not adversely affect essential fish habitat or Habitat Areas of Particular Concern, as the effects would not appreciably reduce the quantity or quality of habitat in the area. The Action Alternative may have adverse impacts on water column essential fish habitat and Habitat Areas of Particular Concern from pile driving activities. An essential fish habitat consultation over these effects was completed with the National Marine Fisheries Service as part of the Navy’s Atlantic Fleet Training and Testing essential fish habitat consultation. As a result, a separate essential fish habitat assessment is not required.

6.1.1.7 Migratory Bird Treaty Act

All birds, with the exception of non-native species, that occur in the study area are protected under the Migratory Bird Treaty Act and EO 13186, which direct federal agencies to avoid or minimize negative effects on migratory birds, to protect their habitats, and to consider effects on migratory birds in NEPA documents. The Navy concluded that there would be no adverse effects on migratory birds as a result of the Proposed Action.

6.1.1.8 National Historic Preservation Act

The National Historic Preservation Act was passed in 1966 to provide for the protection, enhancement, and preservation of those properties that possess significant architectural, archaeological, historical, or cultural characteristics. Section 106 of the National Historic Preservation Act requires the head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally financed undertaking, prior to the expenditure of any federal funds on the undertaking, to take into account the effect of the undertaking on any historic property. The Navy is currently consulting with the Virginia and North Carolina State Historic Preservation Officers. Correspondence is included in Appendix A.

6.1.1.9 Rivers and Harbors Act

The Rivers and Harbors Act was enacted to ensure that navigable waters are not obstructed or fouled by the placement of material or disposal of refuse in them. Under Section 10 of the Rivers and Harbors Act (33 U.S.C. § 403), a U.S. Army Corps of Engineers permit is required for structures or work in or affecting any navigable waters of the United States. The placement and removal of the piles for the Elevated Causeway System, Modular (ELCAS [M]) constitute regulated activities under the Rivers and Harbors Act. The Navy will obtain all necessary permits in advance of commencement of work in regulated waterways.

6.2 Irreversible and Irretrievable Commitment of Resources

NEPA (42 U.S.C. § 4332 Section 102(2)(C)(v) as implemented by Council on Environmental Quality regulation 40 C.F.R. § 1502.16) requires an analysis of significant, irreversible effects resulting from implementation of a proposed action. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the impacts that the uses of these resources have on future generations. Irreversible impacts primarily result from the use or destruction of a specific resource (e.g., energy or minerals) that cannot be replaced within a reasonable time. Irretrievable resource commitments involve the loss in values of an affected resource that cannot be restored as a result of the action (e.g., the disturbance of a cultural site).

For the Proposed Action, most resource commitments would neither be irreversible or irretrievable. The impacts would be short term and temporary. Because there would be no building or facility construction, the consumption of material associated with such construction would not occur. Energy associated with construction activities would not be expended and irretrievably lost. Implementation of the Proposed Action would require fuels to be used by vehicles and vessels. Since vessel use would increase relative to the baseline, total fuel use would increase. As a result, the Proposed Action would increase the total amount of fuel consumed. Since fuel is not a renewable resource, it would be irretrievably lost.

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

In accordance with the Council on Environmental Quality regulations (Part 1502.16), this EA analyzes the relationship between short-term use of the environment and the impacts that such use could have on the maintenance and enhancement of long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. Such impacts include the possibility that choosing one alternative could reduce future flexibility to pursue other alternatives, or that choosing a certain use could eliminate the possibility of other uses at the site.

Implementation of the Proposed Action would not result in any environmental impacts that would narrow the range of beneficial uses of the study area or vicinity. The Proposed Action would not represent a new short-term use and would not impact the productivity of the natural environment. In addition, biological productivity would not be affected as implementation of the Proposed Action would not result in significant direct, indirect, or cumulative impacts to any biological resources.

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8 References

8.1 Chapter 3 – Affected Environment and Environmental Consequences

Munns, Jr., W.R. (2006). Assessing risks to wildlife populations from multiple stressors: overview of the problem and research needs. *Ecology and Society, 11*(1), 23.

8.1.1 Section 3.1 – Air Quality

North Carolina Division of Air Quality. (2013). *Point source emissions report*. Retrieved from http://xapps.ncdenr.org/aq/ToxicsReport/toxrpt.jsp?ibeam=true as accessed on 2013, July 23.

U.S. Environmental Protection Agency. (2009). *Technical support document for endangerment and cause or contribute findings for greenhouse gases under Section 202(a) of the Clean Air Act*. Washington, D.C.: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. (2012). *Inventory of U.S. greenhouse gas emissions and sinks 1990-2010*. Retrieved from http://www.epa.gov/statelocalclimate/resources/state_energyco2inv.html as accessed on 2013, July 23.

U.S. Environmental Protection Agency. (2013). *Ozone advance action plan, Hampton Roads area*. Retrieved from http://www.epa.gov/ozoneadvance/pdfs/HRActionPlan.pdf as accessed on 2014, April 16.

U.S. Environmental Protection Agency. (2014). *Climate change, overview of greenhouse gases*. Retrieved from http://www.epa.gov/climatechange/ghgemissions/gases/co2.html as accessed on 2014, October 9.

8.1.2 Section 3.2 – Ambient Noise

American National Standards Institute. (1994). *ANSI S1.1-1994 (R 2004) American National Standard Acoustical Terminology (Vol. S1.1-1994 (R 2004)*. New York, NY: Acoustical Society of America.

Integrated Concepts & Research Corporation. (2007). *Port of Anchorage marine terminal development project; underwater noise survey test pile driving program, Anchorage, Alaska*. Prepared by URS. Anchorage, AK: Integrated Concepts & Research Corporation.

Kinsler, L.E., Frey, A.R., Coppens, A.B. & Sanders, J.V. (1999). *Fundamentals of acoustics*. New York, NY: Wiley.

Lesage, V., Barrette, C., Kingsley, M.C.S. & Sjare, B. (1999). The effect of vessel noise on the vocal behavior of belugas in the St. Lawrence River estuary, Canada. *Marine Mammal Science, 15*(1), 65-84.

National Marine Fisheries Service. (2002). *Acoustic measurements in Cook Inlet, Alaska, during August 2001* (Contract Number 40HANF100123). Prepared by Blackwell, S.B. & Greene, C.R. Anchorage, AK: National Marine Fisheries Service.

Richardson, W.J., Greene, Jr., C.R., Malme, C.I. & Thomson, D.H. (1995). *Marine mammals and noise*. San Diego, CA: Academic Press.

Urick, R.J. (1983). *Principles of underwater sound*. Los Altos, CA: Peninsula Publishing.

U.S. Army Center for Health Promotion and Preventive Medicine. (2006). Fact Sheet: How does the Department of Defense Assess Noise and Its Impacts? Operational Noise Program. Retrieved from http//chppm-www.apgea.army.mil/ dehe/morenoise. Jacksonville Environmental Protection Board. 1995. Rule 4, Noise Pollution Control.

U.S. Coast Guard. (2012). *Atlantic coast port access route study interim report* (docket number USCG-2011-0351). Retrieved from http://www.uscg.mil/lantarea/acpars/docs/ACPARS_Interim_Report-Final_09AUG.pdf as accessed on 2013, November.

U.S. Department of the Navy. (2011). *Environmental noise survey: Submarine Base Bangor*. Prepared by Michael C. Sargeant. Silverdale, WA: NAVFAC Northwest.

U.S. Department of the Navy. (2012). *Naval Base Kitsap at Bangor test pile program acoustic monitoring report*. Prepared by Illingworth & Rodkin, Inc. Bangor, WA: U.S. Department of the Navy.

U.S. Department of the Navy. (2013). *Naval Base Kitsap at Bangor trident support facilities explosive handling wharf (EHW-2) project acoustic monitoring report (2nd draft)*. Prepared by Illingworth & Rodkin, Inc. Bangor, WA: U.S. Department of the Navy.

U.S. Environmental Protection Agency. (1971). *Noise from construction equipment and operations, building equipment, and home appliances* (NTID 300-1). Washington, D.C.: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. (1974). *Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety*. Washington, D.C.: U.S. Environmental Protection Agency.

U.S. Marine Corps. (2009). *Environmental assessment – MCB Camp Lejeune range operations*. Prepared by TEC, Inc. Marine Corps Base Camp Lejeune, NC: U.S. Marine Corps.

Washington State Department of Transportation. (2010). *Underwater sound levels associated with driving steel piles for the State Route 520 bridge replacement and HOV Project, Pile Installation Test Program*. Prepared by Illingworth & Rodkin, Inc. Olympia, WA: Washington State Department of Transportation.

Washington State Department of Transportation (2014). Biological assessment preparation advanced training manual, chapter 7. Retrieved from http://www.wsdot.wa.gov/environment/biology/ba/baguidance.htm#manual as accessed 2014, April 16.

Wilson, O.B., Jr., Wolf, S.N. & Ingenito, F. (1985). Measurements of acoustic ambient noise in shallow water due to breaking surf. *The Journal of the Acoustical Society of America, 78*(1), 190-195.

8.1.3 Section 3.3 – Public Health and Safety

U.S. Department of the Navy, Naval Engineering Facilities Command Mid-Atlantic Division. (2008a). *Site management plan. Fiscal years 2009 through 2013. Naval Amphibious Base Little Creek Virginia Beach, Virginia*. Prepared by CH2MHill. Norfolk, VA: U.S. Department of the Navy.

U.S. Department of the Navy. (2008b). *Test and safety planning* (NSWCPCDINST 5100.30D).

U.S. Department of the Navy, Naval Engineering Facilities Command Mid-Atlantic Division. (2009a). *Final five-year site review, Naval Amphibious Base Little Creek, Virginia Beach, Virginia*. Prepared by CH2MHill. Norfolk, VA: U.S. Department of the Navy.

U.S. Department of the Navy. (2009b). *Spill prevention, control and countermeasure plan*. Virginia Beach, VA: Joint Expeditionary Base Fort Story.

U.S. Department of the Navy. (2011a). *Manual for the utilization of Fleet Area Control and Surveillance Facility, Virginia Capes Operations Areas*. (FACSFACVACAPESINST 3120.1L).

U.S. Department of the Navy. (2011b). *Spill prevention, control and countermeasures plan (SPCC)*. Virginia Beach, VA: Joint Expeditionary Base Little Creek.

U.S. Department of the Navy. (2011c). *Integrated natural resources management plan – Joint Expeditionary Base Fort Story, Virginia*. Virginia Beach, VA: Joint Expeditionary Base Fort Story.

U.S. Marine Corps. (2009). *Environmental assessment – MCB Camp Lejeune range operations*. Prepared by TEC, Inc. Marine Corps Base Camp Lejeune, NC: U.S. Marine Corps.

U.S. Marine Corps. (2011). *Marine Corps Base, Camp Lejeune, range and training regulations, standing operating procedures for range control (Base Order 3570.1C)*. Marine Corps Base Camp Lejeune, NC: U.S. Marine Corps.

8.1.4 Section 3.4 – Socioeconomics

National Marine Fisheries Service. (2013a). Commercial fisheries statistics. Retrieved from http://www.st.nmfs.noaa.gov/commercial-fisheries/index as accessed on 2013, February 12 and 13.

National Marine Fisheries Service. (2013b). Recreational fisheries statistics. Retrieved from http://www.st.nmfs.noaa.gov/recreational-fisheries/index as accessed on 2013, February 15.

North Carolina Division of Marine Fisheries. (2013). Designated pot areas. Retrieved from http://portal.ncdenr.org/web/mf/designated-pot-areas as accessed on 2013, February 18.

North Carolina Wildlife Resources Commission. (2012). North Carolina report of boating accidents and fatalities 2012. Retrieved from http://www.ncwildlife.org/Portals/0/Boating/documents/boating_accident12.pdf as accessed on 2014, March 6.

Sabo, M. (2013, March 27). Gloucester boats: more are taxed here than are registered. *The Daily Press*. Retrieved from http://www.dailypress.com/news/gloucester-county/gloucester-blog/dp-gloucester-has-more-boats-taxed-than-registered-20130327,0,6265348.story as accessed on 2014, March 4.

U.S. Army Corps of Engineers. (2011). *Waterborne commerce of the United States, calendar year 2010, Part 1-waterways and harbors, Atlantic coast (WR-WCUS-10-1)*. Alexandria, VA: U.S. Army Corps of Engineers, Institute for Water Resources.

U.S. Department of the Navy. (2003). *Marine resource assessment for the Cherry Point and Southern Virginia Capes (VACAPES) inshore and estuarine areas. Final report*. Prepared by Geo-Marine, Inc. Norfolk, VA: U.S. Department of the Navy, Commander, U.S. Atlantic Fleet.

U.S. Marine Corps. (2004). *Environmental assessment for the US Joint Maritime Complex at MCB Camp Lejeune, North Carolina*. Marine Corps Base Camp Lejeune, North Carolina: U.S. Marine Corps.

U.S. Marine Corps. (2009). *Environmental assessment – MCB Camp Lejeune range operations*. Prepared by TEC, Inc. Marine Corps Base Camp Lejeune, NC: U.S. Marine Corps.

Virginia Port Authority. (2008). *The fiscal year 2006 Virginia economic and fiscal impacts of Virginia Port Authority operations*. Prepared by Pearson, R.L., Bradley, J.R., Swan, K.S. & Guerrero, H.H. Williamsburg, VA: Mason School of Business Compete Center, College of William & Mary.

Virginia Port Authority. (2013). The Port of Virginia website. Retrieved from: http://www.portofvirginia.com/ as accessed on 2013, February 12.

8.1.5 Section 3.5 – Water Resources

Chesapeake Bay Foundation. (n.d.). Spring and fall salinity levels. Retrieved from http://www.cbf.org/about-the-bay/maps/seasonal-salinity-changes as accessed on 2014, February 21.

Chesapeake Bay Program. (2008). Chesapeake Bay mean surface salinity. Retrieved from http://www.chesapeakebay.net/images/maps/cbp_20323.pdf as accessed on 2014, February 21.

Deaton, A.S., Chappell, W.S., Hart, K., O'Neil, J. & Boutin, B. (2010). *North Carolina coastal habitat protection plan*. Retrieved from https://164.223.10.96/marlinrepository/26536/ as accessed on 2013, May 3.

U.S. Marine Corps, Marine Corps Base Camp Lejeune, Environmental Management Division. (2010). *New River Estuary Water Quality 2008-2009 (UNCW-CMS Report 10-02)*. Prepared by Mallin, M.A. & McIver, M.R. Wilmington, NC: University of North Carolina Wilmington, Center for Marine Science.

U.S. Department of the Navy. (2009b). *Spill prevention, control and countermeasure plan*. Virginia Beach, VA: Joint Expeditionary Base Fort Story.

U.S. Department of the Navy. (2011). *Integrated natural resources management plan – Joint Expeditionary Base Fort Story, Virginia*. Virginia Beach, VA: Joint Expeditionary Base Fort Story.

U.S. Department of the Navy. (2013). Integrated Natural Resources Management Plan – Joint Expeditionary Base Little Creek

U.S. Environmental Protection Agency. (2010). Watershed assessment, tracking & environmental results. 2010 waterbody report for Salliers Bay. Retrieved from ofmpub.epa.gov/tmdl/attains_waterbody.control?p_au_id=NC19-41-3&p_cycle=2010&p_state=NC&p_report_type=#attainments as accessed on 2013, August 7.

Virginia Department of Environmental Quality. (2012). Integrated 303(d)/305(b) Assessment Report. Chapter 4.4. Chesapeake Bay Assessment. Retrieved from http://www.deq.state.va.us/Portals/0/DEQ/Water/WaterQualityAssessments/IntegratedReport/2012/ir12_Ch4.4_CBP_Assessment.pdf as accessed on 2012, October 4.

8.1.6 Section 3.6 – Bathymetry, Sediments, Topography, and Soils

Lippson, Alice Jane & Lippson, R.L. (2006). *Life in the Chesapeake Bay*. Baltimore, Maryland: Johns Hopkins University Press.

U.S. Army Corps of Engineers. (2011). *Waterborne commerce of the United States, calendar year 2010, Part 1-waterways and harbors, Atlantic coast (WR-WCUS-10-1)*. Alexandria, VA: U.S. Army Corps of Engineers, Institute for Water Resources.

U.S. Army Corps of Engineers. (2012). *After dredging survey: New River Inlet and Cedar Bush Cut*. Wilmington, NC: United States Army Corps of Engineers.

U.S. Department of Agriculture. (2012). *Custom soil resource report for City of Virginia Beach, Virginia, and Tidewater Cities Area, Virginia*. Retrieved from http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx as accessed on 2012, June 6.

U.S. Department of Commerce. (2011a). *Raster navigational chart 12205: Cape Henry, VA to Currituck Sound, NC*.

U.S. Department of Commerce. (2011b). *Raster navigational chart 12254: Chesapeake Bay – Cape Henry to Thimble Shoals Light*.

U.S. Department of the Navy. (2003). *Marine resource assessment for the Cherry Point and Southern Virginia Capes (VACAPES) inshore and estuarine areas. Final report*. Prepared by Geo-Marine, Inc. Norfolk, VA: U.S. Department of the Navy, Commander, U.S. Atlantic Fleet.

U.S. Department of the Navy. (2009a). *Marine resources assessment for the Chesapeake Bay*. Prepared by Geo-Marine, Inc. Norfolk, VA: U.S. Department of the Navy, U.S. Fleet Forces Command.

U.S. Department of the Navy. (2009b). Final overseas environmental impact statement/ environmental impact statement for undersea warfare training range. Prepared by Earth Tech/AECOM Environment and Geo-Marine, Inc. Norfolk, VA: U.S. Department of the Navy, U.S. Fleet Forces Command.

U.S. Department of the Navy. (2012). *Final sand nourishment and shoreline stabilization study*. Virginia Beach, VA: JEB Little Creek-Ft. Story.

U.S. Department of the Navy. (2013). Integrated Natural Resources Management Plan – Joint Expeditionary Base Little Creek

U.S. Marine Corps. (2009). *Environmental assessment – MCB Camp Lejeune range operations*. Prepared by TEC, Inc. Marine Corps Base Camp Lejeune, NC: U.S. Marine Corps.

8.1.7 Section 3.7 – Cultural Resources

Southeastern Archaeological Research, Inc. (2009a). *Technical memorandum: Submerged cultural resource predictive model for the Cherry Point Range Complex*. Norfolk, VA: Parsons, Inc.

Southeastern Archaeological Research, Inc. (2009b). *Technical memorandum: Submerged cultural resource predictive model for the Virginia Capes Range Complex*. Norfolk, VA: Parsons, Inc.

U.S. Army Corps of Engineers. (2008). *Final site inspection report, Fort Story, Virginia, Military Munitions Response Program*. Prepared by URS Group, Inc. Baltimore, MD: U.S. Army Corps of Engineers, Baltimore District.

U.S. Department of the Navy. (2003). *An archaeological assessment of Naval Amphibious Base Little Creek*. Virginia Beach, VA: Naval Amphibious Base Little Creek.

U.S. Department of the Navy. (2009a). *Integrated cultural resources management plan: Fort Story, Virginia*. Virginia Beach, VA: Fort Story.

U.S. Department of the Navy. (2009b). *Programmatic agreement for Navy's historic buildings in Hampton Roads*. Norfolk, VA: Commander Navy Region Mid-Atlantic.

U.S. Department of the Navy. (2014). Joint Expeditionary Base Little Creek-Fort Story. Retrieved from http://cnic.navy.mil/regions/cnrma/installations/jeb_little_creek_fort_story.html as accessed on 2014, March 10.

U.S. Marine Corps. (2009). *Marine Corps Base Camp Lejeune, integrated cultural resources management plan, FY2009-2014*. Marine Corps Base Camp Lejeune, NC: U.S. Marine Corps.

8.1.8 Section 3.8 – Terrestrial and Aquatic Vegetation

Albemarle Pamlico National Estuarine Program. (2011). *Submerged aquatic vegetation maps (2007-2008).* Retrieved from http://portal.ncdenr.org/web/apnep/resources/maps as accessed on 2011, October.

Gosner, K.L. & Peterson, R.T. (1999). *A field guide to the Atlantic seashore: from the Bay of Fundy to Cape Hatteras*. New York, NY: Peterson Field Guides.

Hurley, L.M. (1990). Field Guide to the Submerged Aquatic Vegetation of Chesapeake Bay. Book excerpt retrieved from http://www.dnr.state.md.us/irc/docs/00000260_02.pdf as accessed on 2014, June 2.

National Oceanic and Atmospheric Administration. (n.d.). Submerged Aquatic Vegetation. Chesapeake Bay Office. Retrieved from http://chesapeakebay.noaa.gov/submerged-aquatic-vegetation as accessed on 2014, June 2.

National Oceanic and Atmospheric Administration. (2000). *Environmental sensitivity (ESI) maps - North Carolina*. Retrieved from http://archive.orr.noaa.gov/esi_download as accessed on 2012, October 4.

National Oceanic and Atmospheric Administration. (2005). *Environmental sensitivity (ESI) maps - Virginia*. Retrieved from http://archive.orr.noaa.gov/esi_download as accessed on 2012, October 4.

National Oceanic and Atmospheric Administration. (2011). *Chesapeake Bay benthic habitat integration*. Retrieved from http://chesapeakebay.noaa.gov/acoustic-seafloor-mapping/chesapeake-bay-benthic-habitat-integration as accessed on 2011, October.

Nybakken, J.W. (1993). *Marine Biology, an Ecological Approach*. New York, NY: Harper Collins College Publishers.

Virginia Institute of Marine Science. (2011). *Chesapeake Bay SAV annual monitoring GIS dataset (2010 data) (Vol. 2011)*. Retrieved from http://www.vims.edu/bio/sav as accessed on 2011, October.

U.S. Department of the Navy. (2012). *Vegetation survey report. Dune ecological assessment project*. Prepared by Tetra Tech. Arlington, VA: U.S. Department of the Navy.

U.S. Department of the Navy. (2013). Integrated Natural Resources Management Plan – Joint Expeditionary Base Little Creek

U.S. Fish and Wildlife Service. (2007). *Seabeach amaranth (*<u>Amaranthus pumilus</u>*) 5-year Review: Summary and Evaluation*. Raleigh, NC: Southeast Region, Ecological Services.

U.S. Fish and Wildlife Service. (2012). *Seabeach amaranth (*<u>Amaranthus pumilus</u>). Retrieved from http://www.fws.gov/raleigh/species/es_seabeach_amaranth.html as accessed on 2013, February22.

8.1.9 Section 3.9 – Terrestrial Wildlife and Birds

Atkinson, P.W., Baker, A.J., Bennett, K.A., Clark, N.A., Clark, J.A., Cole, K.B., Dey, A., Duiven, A.G., Gillings, S., Gonzalez, P.M., Harrington, B.A., Kalasz, K., Minton, C.D.T., Newton, J., Niles, L.J., Robinson, R.A., de L. Serrano, I. & Sitters, H.P. (2006). *Hard or soft-shelled prey? Migration strategy determines resource use by red knot* <u>Calidris canutus</u> *on their final stopover in Delaware Bay*.

Baker, B.J. & Richardson, J.M.L. (2006). The effect of artificial light on male breeding-season behavior in green frogs, *Rana clamitans melanota*. *Canadian Journal of Zoology, 84*, 1528-1532.

Bird, B.L., Branch, L.C. & Miller, D.L. (2004). Effects of coastal lighting on foraging behavior of beach mice. *Conservation Biology, 18*(5), 1435-1439.

Blickley, J.L., Word, K.R., Krakauer, A.H., Phillips, J.L., Sells, S.N., Taff, C.C., Wingfield, J.C. & Patricelli, G.L. (2012). Experimental chronic noise is related to elevated fecal corticosteroid metabolites in lekking male greater sage-grouse (*Centrocercus urophasianus*). *PLoSONE, 7*(11), e50462. doi: 10.1371/journal.pone.0050462.

Boettcher, R., Penn, T., Cross, R.R., Terwilliger, K.T. & Beck, R.A. (2007). An overview of the status and distribution of piping plovers in Virginia. *Waterbirds, 30* (S.P. 1), 138-151.

Botton, A.E., Loveland, R.E. & Jacobsen, T.R. (1994). Site selection by migratory birds in Delaware Bay, and its relationship to beach characteristics and abundance of horseshoe crab (*Limulus polyphemus*) eggs. *Auk, 111*(3), 605-616.

Bowles, A.E. (1995). *Responses of Wildlife to Noise in Knight, R.L., Gutzwiller, K., Kerlinger, P. & Burger, J. (1995). Wildlife and Recreationists: Coexistence through Management and Research*. Washington, D.C.: Island Press.

Brown, C.L., Hardy, A.R., Barber, J.R., Fristrup, K.M., Crooks, K.R. & Angeloni, L.M. (2012). The effect of human activities and their associated noise on ungulate behavior. *PLoSONE, 7*(7), e40505. doi:10.1371/journal.pone.0040505.

Brumm, H. & Slabbekoorn, H. (2005). Acoustic Communication in Noise. In P. J. B. Slater, C. T. Snowdon, T. J. Roper, H. J. Brockmann & M. Naguib (Eds.). *Advances in the Study of Behavior, 35*, 151-209. Philadelphia, PA: Academic Press.

Buehler, D.A. (2000). Bald eagle (*Haliaeetus leucocephalus*). Retrieved from http://bna.birds.cornell.edu/bna/species/506/articles/introduction as accessed on 2014, April 17.

Burger, J. & Gochfeld, M. (1988). Nest-site selection and temporal patterns in habitat use of roseate terns. *The Auk, 105*(3), 433-438.

Cameron, S.E., Allen, D.H., Lyons, M.M., Cordes, J.R. & Maddock, S.B. (2005). *Compilation and assessment of piping plover wintering and migratory staging area data in North Carolina*. Proceedings of the Symposium on the Wintering Ecology and Conservation of Piping Plovers.

Cape Fear Audubon Society. (2012). *Bird lists from seasonal walks*. Retrieved from http://www.capefearaudubon.org/HTML/events.htm as accessed on 2014, March 8.

Chicago Bird Collision Monitors. (2012). Entanglement. Retrieved from http://www.birdmonitors.net/Entanglement.php as accessed on 2014, June 20.

Chrysler, S.T., Carlson, P.J. & Hawkins, H.G. (2003). *Headlamp illumination provided to sign positions by passenger vehicles*. Prepared by the Texas Transportation Institute. Austin, TX: Texas Department of Transportation.

Cohen, J.B., Gerber, B.D., Karpanty, S.M., Fraser, J.D. & Truitt, B.R. (2011). Day and night foraging of red knots (*Calidris canutus*) during spring stopover in Virginia, USA. *Waterbirds, 34*(3), 352-356.

Cooper, J. (1982). Methods of reducing mortality of seabirds caused by underwater blasting. *Cormorant, 10*, 109-113.

Corwin, J.T. & Cotanche, D.A. (1988). Regeneration of sensory hair cells after acoustic trauma. *Science, 240*(4860), 1772-1774.

Dominoni, D.M., Quetting, M., & Partecke, J. (2013). Long-term effects of chronic light pollution on seasonal functions of European blackbirds (*Turdus merula*). *PlosOne, 8*(12), e85069. doi:10.1371/journal.pone.0085069

Dooling, R. (2002). *Avian hearing and the avoidance of wind turbines* (NREL/TP-500-30844). Golden, CO: National Renewable Energy Laboratory.

Dooling, R.J. & Popper, A.N. (2007). *The effects of highway noise on birds* (Contract Number 43A0139). Prepared by Jones and Stokes Associates. Sacramento, CA: California Department of Transportation.

Dooling, R.J. & Therrien, S.C. (2012). Hearing in birds: what changes from air to water. *Advances in Experimental Medicine and Biology, 730*, 77-82. doi: 10.1007/978-1-4419-7311-5_17

Dorcas, M. (2007). Frogs and toads of North Carolina. Retrieved from http://www.herpsofnc.org/herps_of_NC/anurans/anurans.html as accessed on 2014, March 10.

Entranco and Hamer Environmental L.P. (2005). *Marbled murrelet hazing report - SR 104*. Hood Canal Bridge East-Half Replacement and West-Half Retrofit Project.

Gochfeld, M., Burger, J. & Nisbet, I.C. (1998). Roseate Tern (*Sterna dougallii*). *The Birds of North America Online 370*, 1-32. doi: 10.2173/bna.370

Gratto-Treveor, C., Amirault-Langlais, D., Catlin, D., Cuthbert, F., Fraser, J., Maddock, S., Roche, E. & Shaffer, F. (2012). Connectivity in piping plovers: Do breeding populations have distinct winter distributions? *The Journal of Wildlife Management, 76*(2), 348-355. doi:10.1002/jwmg.261

Harrington, B.A. (2013). Red Knot (*Calidris canutus*). Retrieved from http://bna.birds.cornell.edu/bna/species/563/articles/introduction as accessed 2014, March 9.

Heinemann, D. (n.d.). *Roseate terns breeding on Bird Island, Buzzards Bay, Massachusetts, final report*. Massachusetts: U.S. Fish and Wildlife Service.

Holt, M.M., Noren, D.P., Veirs, V., Emmons, C.K. & Veirs, S. (2009). Speaking up: Killer whales (Orcinus orca) increase their call amplitude in response to vessel noise. *The Journal of the Acoustical Society of America, 125*(1), EL27-EL32.

Illingworth & Rodkin, Inc. (2001). Noise and vibration measurements associated with the pile installation demonstration project for the San Francisco-Oakland Bay Bridge east span. Prepared by Illingworth and Rodkin, Inc. Sacramento, CA: California Department of Transportation.

Indiana Division of Fish & Wildlife. (2012). *Urban deer technical guide*. Retrieved from http://www.in.gov/dnr/fishwild/files/fw-UrbanDeerTechnicalGuide.pdf as accessed on 2014, April 17.

Kirkham, I.R. & Nettleship, D.N. (1987). Status of the roseate tern in Canada. *Journal of Field Ornithology, 58*(4), 505-515.

Lashley, M.A., Chitwood, M.C., Biggerstaff, M.T., Morina, D.L., Moorman, C.E., & DePerno, C.S. (2014). White-tailed deer vigilance: the influence of social and environmental factors. *PLoSONE, 9*(3), e90652.

Leopold, M.F. & Camphuysen, C.J. (2009). Did the pile driving during the construction of the Offshore Wind Farm Egmond aan Zee, the Netherlands, impact local seabirds? Wageningen IMARES Report C062/07.

Le Tallec, T., Perret, M. & Théry, M. (2013). Light pollution modified the expression of daily rhythms and behavior patterns in a nocturnal primate. *PLoSONE, 8*(11): e79250.

McClure, C.J.W., Ware, H.E., Carlisle, J., Kaltenecker, G. & Barber, J.R. (2013). *An experimental investigation into the effects of traffic noise on distributions of birds: avoiding the phantom road*. Proceedings of the Royal Society B, 280(1773). doi: 10.1098/rspb.2013.2290

Maslo, B., Burger, J. & Handel, S.N. (2012). Modeling foraging behavior of piping plovers to evaluate habitat restoration success. *The Journal of Wildlife Management, 76*(1): 181-188. doi:10.1002/jwmg.210

McGill University Urban Nature Information Service. (2008). Rodents. Retrieved from http://unis.mcgill.ca/en/uw/mammals/rodents.html as accessed on 2014, March 9.

Melvin, E.F., Parrish, J.K., & Conquest, L.L. (1999). Novel tools to reduce seabird bycatch in coastal gillnet fisheries. *Conservation Biology, 13*(6), 1386-1397.

National Park Service. (n.d.) Cape Hatteras National Seashore – Reptiles. Retrieved from http://www.nps.gov/caha/naturescience/reptiles.htm as accessed on 2014, March 10.

Niemiec, A.J., Yehoash, R., & Moody, D.B. (1994). Return of auditory function following structural regeneration after acoustic trauma: behavioral measures from quail. *Hearing Research, 79*(1-2), 1-16.

Nisbet, I.C.T. & Spendelow, J.A. (1999). Contribution of research to management and recovery of the roseate tern: review of a twelve-year project. *Waterbirds: The International Journal of Waterbird Biology, 22*(2), 239-252.

North Carolina Wildlife Resources Commission. (2005). Bald eagle fact sheet. Retrieved from http://216.27.39.103/Portals/0/Conserving/documents/FactSheets/nongame_baldeagle_lores.pdf as accessed 2014, April 17.

Payne, C.J., Jessop, T.S., Guay, P., Johnstone, M., Feore, M. & Mulder, R.A. (2012). Population, behavioural and physiological responses of an urban population of black swans to an intense annual noise event. *PloSONE,7*(9): e45014. doi:10.1371/journal.pone.0045014

Penna, M. & Zúñiga, D. (2014). Strong responsiveness to noise interference in an anuran from the southern temperate forest. *Behavioral Ecology and Sociobiology, 68*(1), 85-97.

Remage-Healey, L. & Romero, L.M. (2000a). Daily and seasonal variation in response to stress in captive starlings (*Sturnus vulgaris*): glucose. *General and Comparative Endocrinology, 119*(1), 60-68.

Remage-Healey, L. & Romero, L.M. (2000b). Daily and seasonal variation in response to stress in captive starlings (*Sturnus vulgaris*): corticosterone. *General and Comparative Endocrinology, 119*(1), 52-59.

Remage-Healey, L. & Romero, L.M. (2001). Corticosterone and insulin interact to regulate glucose and triglyceride levels during stress in a bird. *American Journal of Physiology, 281*: R994-R1003.

Rich, C. & Longcore, T. (2005). *Ecological consequences of artificial night lighting*. Washington, D.C.: Island Press.

Ronconi, R.A. & St. Clair, C.C. (2002). Management options to reduce boat disturbance on foraging black guillemots (*Cepphus grylle*) in the Bay of Fundy. *Biological Conservation, 108*, 265-271.

Roseate Tern (Northeast Population) Recovery Team. (2005). Numbers of nesting pairs (peak/total) and productivity in chicks fledged per pair of Roseate Terns in the Northeastern United States, 1998-2004 (January 18, 2005 version). Unpublished data provided by Carolyn Mostello, Massachusetts Division of Fisheries & Wildlife, Natural Heritage & Endangered Species Program. Retrieved from http://www.biologicaldiversity.org/campaigns/esa_works/profile_pages/NortheastRoseateTern.html as accessed on 2014, March 10.

Rydell, J. (1992). Exploitation of insects around streetlamps by bats in Sweden. *Functional Ecology, 6*, 744-750.

Schroeder, J., Nakagawa, S., Cleasby, I.R. & Burke, T. (2012). Passerine birds breeding under chronic noise experience reduced fitness. *PLoSONE, 7*(7), e39200. doi:10.1371/journal.pone.0039200

Sanyal, T., Kumar, V., Nag, T.C., Jain, S., Sreenivas, S., Sreenivas, V. & Wadhwa, S. (2013). Prenatal loud music and noise: differential impact on physiological arousal, hippocampal synaptogenesis, and spatial behavior in one day-old chicks. *PLoSONE, 8*(7), e67347. doi: 10.1371/journal.pone.0067347

Shen, J. (1983). A behavioral study of vibrational sensitivity of the pigeon (*Columba livia*). *Journal of Comparative Physiology, 152*(2), 251-255.

Smith, Sgt. T.D. (2009). Living in harmony with wildlife. Retrieved from http://www.lejeune.marines.mil/News/ArticleView/tabid/1108/Article/3853/living-in-harmony-with-wildlife.aspx as accessed on 2014, March 10.

Smith, F.M., Duerr, A.E., Paxton, B.J. & Watts, B.D. (2008). *An investigation of stopover ecology of the red knot on the Virginia barrier islands* (CCBTR-07-14). Prepared by the Center for Conservation Biology. Williamsburg, VA: College of William and Mary.

Stemp, R. (1985). *Observations on the effects of seismic exploration on seabirds*. In G.D. Greene, F.R. Engelhardt & R.J. Paterson (Eds), Proceedings of the Workshop on Effects of Explosives Use in the Marine Environment, January 29-31, 1985, Halifax. Canada Oil and Gas Lands Administration, Environmental Protection Branch, Technical Report No. 5.

Titulaer, M., Spoelstra K., Lange, C.Y.M.J.G. & Visser, M.E. (2012). Activity patterns during food provisioning are affected by artificial light in free living great tits (*Parus major*). *PLoSONE, 7*(5), e37377. doi:10.1371/journal.pone.0037377

Truxa, C. & Fiedler, K. (2012). Attraction to light – from how far do moth (*Lepidoptera*) return to weak artificial sources of light? *European Journal of Entomology, 109*(1), 77-84

Tsipoura, N. & Burger, J. (1999). Shorebird diet during spring migration stopover on Delaware Bay. *Condor, 101*(3), 635-644.

U.S. Army Corps of Engineers. (2009). *Final environmental impact statement – North Topsail Beach shoreline protection project, vol. I*. Prepared by Coastal Planning & Engineering of North Carolina, Inc. Wilmington, NC: U.S. Army Corps of Engineers.

U.S. Department of Defense. (In prep). *Herpetofauna of Marine Corps Base Camp Lejeune*. DoD Legacy Program.

U.S. Department of the Navy. (2012). *Vegetation survey report. Dune ecological assessment project. Joint Expeditionary Base Little Creek – Fort Story, Virginia*. Prepared by Tetra Tech. Arlington, VA: U.S. Department of the Navy.

U.S. Department of the Navy. (2012a). *Mammals survey report. Dune ecological assessment project. Joint Expeditionary Base Little Creek – Fort Story, Virginia*. Prepared by Tetra Tech. Arlington, VA: U.S. Department of the Navy.

U.S. Department of the Navy. (2012b). *Amphibian and reptile survey report. Dune ecological assessment project. Joint Expeditionary Base Little Creek – Fort Story, Virginia*. Prepared by Tetra Tech. Arlington, VA: U.S. Department of the Navy.

U.S. Department of the Navy. (2013). Integrated Natural Resources Management Plan – Joint Expeditionary Base Little Creek

U.S. Department of the Navy. (2013a). Final Field Summary Report Species Survey at Joint Expeditionary Base, Fort Story, Virginia Beach, Virginia. Gulf South Research Corporation.

U.S. Fish and Wildlife Service. (1996). *Piping plover (*Charadrius melodus*) Atlantic coast population, revised recover plan*. Prepared by Atlantic Coast Piping Plover Recovery Team. Hadley, MA: USFWS.

U.S. Fish and Wildlife Service. (1998). *Roseate Tern (*Sterna dougallii*) Northeastern Population Recovery Plan*. Prepared by The Northeast Roseate Tern Recovery Team. Hadley, MA: US Fish and Wildlife Service.

U.S. Fish and Wildlife Service. (1999). *Piping Plover (*Charadrius melodus*) fact sheet*. Retrieved from http://www.fws.gov/midwest/endangered/pipingplover/pdf/piplfactsheet.pdf as accessed on 2014, April 17.

U.S. Fish and Wildlife Service. (2007). *Status of the Red Knot (*Calidris canutus rufa*) in the Western Hemisphere*. Pleasantville, NJ: U.S. Fish and Wildlife Service, Ecological Services, Region 5.

U.S. Fish and Wildlife Service. (2008). *Endangered and threatened wildlife and plants; Revised designation of critical habitat for the wintering population of the piping plover (*Charadrius melodus*) in North Carolina*. 50 Code of Federal Regulations Part 17 73 Federal Register, October 21, 2008.

U.S. Fish and Wildlife Service. (2009). *Piping Plover (*Charadrius melodus*) 5-Year Review: Summary and Evaluation*. Hadley, MA: United States Fish and Wildlife Service.

U.S. Fish and Wildlife Service. (2010). *Caribbean roseate tern and North Atlantic roseate tern (*Sterna dougallii dougallii*) 5-year review: Summary and evaluation*. Retrieved from http://www.fws.gov/northeast/EcologicalServices/pdf/endangered/ROST%205-year%20final.pdf as accessed on 2014, April 17.

U.S. Fish and Wildlife Service. (2010a). Species profile: roseate tern (*Sterna dougallii dougallii*). Retrieved from http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B07O as accessed on 2014, April 17.

U.S. Fish and Wildlife Service. (2011). Roseate Tern: North American Subspecies, *Sterna dougallii dougallii*. Retrieved from http://www.fws.gov/northeast/pdf/Roseatetern0511.pdf as accessed on 2013, February 22.

U.S. Fish and Wildlife Service. (2013). *Preliminary 2012 Atlantic Coast Piping Plover Abundance and Productivity Estimates*. Retrieved from http://www.fws.gov/northeast/pipingplover/pdf/preliminary2012_18April2013.pdf as accessed on 2014, April 17.

U.S. Fish and Wildlife Service. (2013a). *Rufa red knot ecology and abundance supplement to endangered and threatened plants; Proposed threatened status for the rufa red knot (*Calidris canutus rufa*)* (Docket # FWS-R5-ES-2013-0097; RIN 1018-AY17). Retrieved from http://www.fws.gov/northeast/redknot/pdf/20130923_REKN_PL_Supplement02_Ecology%20Abundance_Final.pdf as accessed on 2014, April 17.

U.S. Marine Corps. (2006). *Integrated Natural Resources Management Plan (2007 – 2011) Marine Corps Base Camp Lejeune*. Marine Corps Base Camp Lejeune: U.S. Marine Corps.

U.S. Marine Corps. (2009). *Environmental assessment – MCB Camp Lejeune range operations*. Prepared by TEC, Inc. Marine Corps Base Camp Lejeune, NC: U.S. Marine Corps.

Vargas-Salinas, F. & Amézquita, A. (2014). Abiotic noise, call frequency and stream-breeding anuran assemblages. *Evolutionary Ecology, 28*(2), 341-359.

Vecellio, R.L. & McCarthy, J.R. (2006). *Lighting specifications for nighttime construction work zones on active highways, final report* (930-470). Auburn, AL: Auburn University, Samuel Ginn College of Engineering.

Virginia Beach Audubon Society. (2013). Pleasure House Point bird list. Retrieved from www.vabeach-audubon.org/php.html as accessed on 2014, March 8.

Virginia Department of Game and Inland Fisheries. (2012). Piping Plovers in Virginia. Retrieved from http://www.dgif.virginia.gov/wildlife/birds/piping-plovers/ as accessed on 2012, October 25.

Virginia Department of Game and Inland Fisheries. (2014). Bald eagle facts. Retrieved from http://www.dgif.virginia.gov/wildlife/birds/bald-eagles.asp as accessed on 2014, March 9.

Wartzok, D., Popper, A.N., Gordon, J. & Merrill, J. (2003). Factors affecting the responses of marine mammals to acoustic disturbance. *Marine Technology Society Journal, 37*(4), 6-15.

Washington Department of Fish and Wildlife. (2014). Living with wildlife – raccoons. Retrieved from http://wdfw.wa.gov/living/raccoons.html as accessed on 2014, March 9.

Washington State Department of Transportation. (2010). *Underwater sound levels associated with driving steel piles for the State Route 520 bridge replacement and HOV Project, Pile Installation Test Program*. Prepared by Illingworth & Rodkin, Inc. Olympia, WA: Washington State Department of Transportation.

Washington State Department of Transportation. (2014). Biological assessment preparation advanced training manual, Chapter 7. Retrieved from http://www.wsdot.wa.gov/environment/biology/ba/baguidance.htm#manual as accessed 2014, April 16.

Wasser, S.K., Bevis, K., King, G. & Hanson, E. (1997). Noninvasive physiological measures of disturbance in the northern spotted owl. *Conservation Biology, 11*, 1019-1022.

Watts, B.D., Therres, G.D. & Byrd, M.A. (2007). Status, distribution, and the future of bald eagles in the Chesapeake Bay area. *Waterbirds, 30*, 25-38.

Weimerskirch, H., Shaffer, S.A., Mabille, G., Martin, J., Boutard, O., Rouanet, J.L. (2002). Heart rate and energy expenditure of incubating wandering albatrosses: basal levels, natural variation, and the effects of human disturbance. *Journal of Experimental Biology 205*, 475–483.

8.1.10 Section 3.10 – Fish and Marine Invertebrates

Atlantic Sturgeon Status Review Team. (2007). *Status review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus)*. Retrieved from http://www.nero.noaa.gov/prot_res/candidatespeciesprogram/AtlSturgeonStatusReviewReport.pdf as accessed on 2014, April 17.

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.

Balazik, M.T., Garmen, G.C., Van Eenennaam, J.P., Mohler, J. & Woods, L.C., III. (2012). Empirical evidence of fall spawning by Atlantic sturgeon in the James River, Virginia. *Transactions of the American Fisheries Society 141*(6), 1465-1471.

Balazik, M.T., Reine, K.J., Spells, A.J., Fredrickson, C.A., Fine, M.L., Garman, G.C. & McIninch, S.P. (2012a). The potential for vessel interactions with adult Atlantic sturgeon in the James River, Virginia. *North American Journal of Fisheries Management, 32*, 1062-1069.

Bruton, M.N. (1985). The effect of suspensoids on fish. *Hydrobiologia, 125*, 221-241.

California Department of Transportation. (2002). Biological assessment for the Benicia Martinez new bridge project for NMFS. Prepared by Caltrans. Sacramento, CA: U.S. Department of Transportation.

Carlson, T.J. (1994). Use of sound for fish protection at power production facilities: a historical perspective of the state of the art (Project 92-071). Prepared by Pacific Northwest Laboratories. Portland, OR: Bonneville Power Administration.

Casper, B.M., Popper, A.N., Matthews, F., Carlson, T.J. & Halvorsen, M.B. (2012). Recovery of barotrauma injuries in Chinook salmon, *Onchorhynchus tshawytscha* from exposure to pile driving sound. *PLoS ONE, 7*(6): e39593. doi: 10.1371/journal.pone.0039593

Chapman, C.J. & Hawkins, A.D. (1973). Field study of hearing in cod, gadus-morhua-l. *Journal of Comparative Physiology, 85*(2): 147-167.

Chesapeake Bay Foundation (n.d.). Spring and fall salinity levels. Retrieved from http://www.cbf.org/about-the-bay/maps/seasonal-salinity-changes as accessed on 2014, February 21.

Chesapeake Bay Program. (2008). *Chesapeake Bay mean surface salinity*. Retrieved from http://www.chesapeakebay.net/images/maps/cbp_20323.pdf as accessed on 2014, February 21.

Coastal Ocean Research Monitoring Program. (2006). Description of Onslow Bay coastal climatology. Retrieved from http://www.cormp.org/climate/OB_climatology.html as accessed on 2006, May 23.

Crum, L.A. & Mao, Y. (1996). Acoustically enhanced bubble growth at low frequencies and its implications for human diver and marine mammal safety. *Journal of the Acoustical Society of America, 99*(5), 2898-2907.

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.

Dadswell, M.J., Taubert, B.D., Squiers, T.S., Marchette, D. & Buckley, J. (1984). *NOAA Technical Report NMFS 14, Synopsis of biological data on shortnose sturgeon,* Acipenser brevirostrum, *LeSueur 1818*. Washington, D.C.: U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service.

Deaton, A.S., Chappell, W.S., Hart, K., O'Neil, J. & Boutin, B. (2010). *North Carolina coastal habitat protection plan*. Morehead City, NC: North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries.

Deslauriers, D. & Kieffer, J.D. (2012). The effects of temperature on swimming performance of juvenile shortnose sturgeon (*Acipenser brevirostrum*). *Journal of Applied Ichthyology*. doi:10.1111/j.1439-0426.2012.01932.x

Epperly, S. P. & Ross, S.W. (1986). *Characterization of the North Carolina Pamlico-Albemarle estuarine complex* (NMFS-SEFC-175). Beaufort, NC: National Marine Fisheries Service - Southeast Fisheries Center.

Fisheries Hydroacoustic Working Group. (2008). *Memorandum of agreement in principle for interim criteria for injury to fish from pile driving*. Retrieved from http://www.wsdot.wa.gov/NR/rdonlyres/4019ED62-B403-489C-AF05 5F4713D663C9/0/InterimCriteriaAgreement.pdf on unknown date.

Finneran, J., Dear, R., Carder, D., & Ridgway, S.H. (2003). Auditory and behavioral responses of California sea lions (*Zalophus californianus*) to single underwater impulses from an arc-gap transducer. *The Journal of the Acoustical Society of America, 114*(3), 1667-1677.

Folkedal, O., Torgersen, T., Nilsson, J., & Oppedal, F. (2010). Habituation rate and capacity of Atlantic salmon (*Salmo salar*) parr to sudden transitions from darkness to light. *Aquaculture, 307*, 170-172.

Gosner, K.L. & Peterson, R.T. (1999). *A field guide to the Atlantic seashore: From the Bay of Fundy to Cape Hatteras*. New York, NY: Peterson Field Guides.

Hager, C.H. (2012). *Atlantic sturgeon habitat occupation and migration patterns in the James River* (Contract Number EA133F10CN0317). Silver Spring, MD: National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources.

Hager, C., Khan, J., Watterson, C., Russo, J., & Hartman, K. (2014). *Evidence of Atlantic sturgeon (*Acipenser oxyrinchus*) spawning in the York River system*. Transactions of the American Fisheries Society.

Halvorsen, M.B., Casper, B.M., Matthews, F., Carlson, T.J. & Popper, A.N. (2012). *Effects of exposure to pile-driving sounds on the lake sturgeon, Nile tilapia and hogchoker*. Proceedings of the Royal Society B, 279. doi: 10.1098/rspd.2012.1544

Hastings, M.C. & Popper. A.N. (2005). *Effects of sound on fish*. Retrieved from http://www.dot.ca.gov/hq/env/bio/files/Effects_of_Sound_on_Fish23Aug05.pdf as accessed on 2014, April 17.

Hastings, M.C., Popper, A.N., Finneran, J.J. & Lanford, P. (1996). Effects of low frequency underwater sound on hair cells of the inner ear and lateral line of the teleost fish *Astronotus ocellatus*. *Journal of the Acoustical Society of America, 99*(3), 1759-1766.

Jørgensen, R., Handegard, N.O., Gjøsæter, H. & Slotte, A. (2004). Possible vessel avoidance behaviour of capelin in a feeding area and on a spawning ground. *Fisheries Research, 69*(2), 251-261.

Kahn, J.E., Hager, C., Watterson, C., Russo, J., Moore, K. & Hartman, K. (2014). Atlantic sturgeon (*Acipenser oxyrinchus*) annual spawning run abundance in the Pamunkey River, Virginia.

Kynard, B. (1997). Life history, latitudinal patterns and status of the shortnose sturgeon, *Acipenser brevirostrum*. *Environmental Biology of Fishes*, *48*(1-4), 319-334.

Laming, P.R. & Ennis, P. (1982). Habituation of fright and arousal responses in the teleosts *Carassius auratus* and *Rutilus rutilus*. *Journal of Comparative and Physiological Psychology*, *96*(3), 460-466.

Lamont-Doherty Earth Observatory. (1997). *Megascopic Description of a Surface Sample* retrieved from http://www.ngdc.noaa.gov/mgg/curator/data/cape_henlopen/nv891/grabs/nv891_16ss.pdf as accessed on 2014, February 21.

Linquist, N. & Manning, L. (2001). *Impacts of beach nourishment and beach scraping on critical habitat and productivity of surf fishes*. NC Division of Marine Fisheries, Fisheries Resource Grant 98-EP-05: 41 pages.

Livingston, R.J. (1975). Impact of kraft pulp-mill effluent on estuarine and coastal fishes in Apalachee Bay, Florida, U.S.A. *Marine Biology, 32*(1), 19-48.

Mallin, M.A. & McIver, M.R. (2010). *New River Estuary Water Quality 2008-2009*, UNCW-CMS Report 10-02.

Matsunaga, W. & Watanabe, E. (2010). Habituation of medaka (*Oryzias latipes*) demonstrated by open-field testing. *Behavioural Processes*, *85*(2), 142-150.

McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J. & McCabe, K. (2000). *Marine seismic surveys: analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid*. (REPORT R99-15) Centre for Marine Science and Technology, Curtin University.

Mid-Atlantic Fishery Management Council. (1998a). Amendment 8 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. Dover, Delaware: Mid-Atlantic Fishery Management Council.

Mid-Atlantic Fishery Management Council. (1998b). Amendment 12 to the Surfclam and Ocean Quahog Fishery Management Plan. Dover, Delaware: Mid-Atlantic Fishery Management Council.

Mid-Atlantic Fishery Management Council. (2008). Amendment 9 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. Dover, Delaware: Mid-Atlantic Fishery Management Council.

Mid-Atlantic Fishery Management Council. (2010). Amendment 11 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. Dover, Delaware: Mid-Atlantic Fishery Management Council.

Minello, T.J. (1999). Nekton densities in shallow estuarine habitats of Texas and Louisiana and the identification of Essential Fish Habitat. In: L. R. Benaka (Ed.), *Fish habitat: Essential Fish Habitat and rehabilitation* (pp. 43-75). Bethesda, Maryland.

Misund, O.A. (1997). Underwater acoustics in marine fisheries and fisheries research. *Reviews in Fish Biology and Fisheries, 7*, 1-34.

Moser, M. L. & Ross, S.W. (1993). *Distribution and movements of shortnose sturgeon (*Acipenser brevirostrum*) and other anadromous fishes of the lower Cape Fear River, North Carolina*. Final Report to the U.S. Army Corps of Engineers, Wilmington, North Carolina.

Moser, M.L. & Ross, S.W. (1995). *Habitat use and movements of shortnose and Atlantic sturgeon in the Lower Cape Fear River*, North Carolina. *Transactions of the American Fisheries Society 124*, 225-234.

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

National Marine Fisheries Service. (1999). Essential Fish Habitat: New Marine Fish Habitat Conservation Mandate for Federal Agencies. St. Petersburg, Florida: NMFS, Habitat Conservation Division, Southeast Regional Office.

National Marine Fisheries Service. (2002). Magnuson-Stevens Act Provisions; Essential Fish Habitat (EFH). Final rule. Federal Register 67(12):2,343-2,383.

National Marine Fisheries Service. (2005). Appendix D to the *Pacific Coast Groundfish Fishery Management Plan Non-fishing Impacts to Essential Fish Habitat and Recommended Conservation Measures*. p 29.

National Marine Fisheries Service. (2009). Amendment 1 to the consolidated Atlantic highly migratory species fishery management plan: Essential Fish Habitat.

National Marine Fisheries Service. (2009a). Biological Opinion for Proposed Homeporting of Additional Surface Ships at Naval Station Mayport, Florida.

National Marine Fisheries Service. (2010). Endangered and Threatened Wildlife; Notice of 90-Day Finding on a Petition to List Atlantic Sturgeon as Threatened or Endangered under the Endangered Species Act (ESA). [Proposed Rule]. Federal Register, 75(3), 838-841.

National Marine Fisheries Service. (2010a). Species of Concern: Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) (Vol. 2010, pp. Species of Concern factsheet): National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources.

National Marine Fisheries Service. (2012). Biological Opinion – Tappan Zee Bridge Replacement Project. Northeast Region, Gloucester, MA. 2012, June 22.

National Marine Fisheries Service. (2013*). Atlantic Sturgeon Chesapeake Bay Distinct Population Segment: Endangered*. Retrieved from http://www.nmfs.noaa.gov/pr/pdfs/species/atlanticsturgeon_chesapeakebay_dps.pdf as accessed on 2013, February 18.

National Marine Fisheries Service. (2013a). *Atlantic Sturgeon Carolina Distinct Population Segment: Endangered*. Retrieved from http://www.nmfs.noaa.gov/pr/pdfs/species/atlanticsturgeon_carolina_dps.pdf as accessed 2012, February 18.

National Oceanic and Atmospheric Administration. (1983). *National Geophysical Data Center Index to Marine and Lacustrine Geological Samples*. Retrieved from http://www.ngdc.noaa.gov/geosamples/showsample.jsp?imlgs=imlgs0134678 as accessed on 2014, February 21.

National Oceanic and Atmospheric Administration. (2011). *Chesapeake Bay benthic habitat integration*. Retrieved from Chesapeake Bay Office: http://chesapeakebay.noaa.gov/acoustic-seafloor-mapping/chesapeake-bay-benthic-habitat-integration as accessed in October 2011.

National Oceanic and Atmospheric Administration. (2011a). EFH text descriptions and GIS data inventory (Vol. 2011). Retrieved from: http://www.habitat.noaa.gov/protection/efh/newInv/index.html as accessed in March 2012.

National Oceanic and Atmospheric Administration. (2014). National Geophysical Data Center Bathymetry Map. Retrieved from http://maps.ngdc.noaa.gov/viewers/bathymetry/ as accessed on 2014, February 20.

New England Fisheries Management Council. (1998). Final amendment #11 to the northeast multispecies fishery management plan, amendment #9 to the Atlantic sea scallop fishery management plan, amendment #1 to the monkfish fishery management plan, amendment #1 to the Atlantic salmon fishery management plan, and components of the proposed Atlantic herring fishery management plan for Essential Fish Habitat. Newburyport, Massachusetts: New England Fisheries Management Council.

Newton, J.G., Pilkey, O.H. & Blanton, J.G. (1971). *An oceanographic atlas of the Carolina continental margin*. Raleigh, North Carolina: Division of Mineral Resources, North Carolina Department of Conservation and Development.

Pearson, W.H., Skalski, J.R. & Malme, C.I. (1992). Effects of sounds from a geophysical survey device on behavior of captive Rockfish (*Sebastes* spp.*). Canadian Journal of Fisheries and Aquatic Sciences*, *49*, 1343-1356.

Pilkey, O.H., Keer, F. & Keer, S. (1977). Surficial sediments of the U.S. Atlantic southeastern United States continental shelf. In *Geology*, ed. P. Popenoe. Final report, environmental studies, southeastern United States Atlantic outer continental shelf. U.S. Geological Survey open-file report 80-146.

Purser, J. & Radford, A.N. (2011). *Acoustic noise induces attention shifts and foraging performance in three-spined sticklebacks (*Gasterosteus aculeatus*). PLoS ONE, 6*(2), e17478.

Richmond, A.M. & Kynard, B. (1995*). Ontogenetic behavior of shortnose sturgeon,* Acipenser brevirostrum. *Copeia, 1995*, 172-182.

Ridgway, S.H., Carder, D.A., Smith, R.R., Kamolnick, T., Schlundt, C.E. & Elsberry, W.R. (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, California: Naval Sea Systems Command.

Riggs, S.R., Ambrose, Jr., W.G., Cook, J.W., & Snyder, S.W. (1998). Sediment production on sediment-starved continental margins: The interrelationship between hardbottoms, sedimentological and benthic community processes, and storm dynamics. *Journal of Sedimentary Research, 68*(1), 155-168.

Ross, S.W. & Lancaster, J.E. (1996). *Movements of juvenile fishes using surf zone nursery habitats and the relationship of movements to beach nourishment along a North Carolina beach: pilot project*. Final report submitted to NOAA Office of Coastal Resource Management and the US Army Corps of Engineers. Wilmington, NC: North Carolina National Estuarine Research Reserve.

Schwartz, A.L. (1985). The behavior of fishes in their acoustic environment. *Environmental Biology of Fishes*, *13*(1), 3-15.

Secor, D.H., Niklitschek, E.J., Stevenson, J.T, Gunderson, T.E., Minkkinen, S.P., Richardson, B., Florence, B., Mangold, M., Skjeveland, J. & Henderson-Arzapalo, A. (2000). Dispersal and growth of yearling Atlantic sturgeon, *Acipenser oxyrinchus* released into Chesapeake Bay. *Fishery Bulletin 98*(4), 800-810.

Scripps Institution of Oceanography & National Science Foundation. (2008). Environmental Assessment of a marine geophysical survey by the R/V Melville in the Santa Barbara Channel. Scripps Institution of Oceanography, LaJolla, CA and National Science Foundation, Arlington, VA.

Smith, M.E., Kane, A.S. & Popper, A.N. (2004). Noise-induced stress response and hearing loss in goldfish (*Carassius auratus*). *Journal of Experimental Biology, 207*, 427-435.

South Atlantic Fishery Management Council. (1998). Final habitat plan for the south Atlantic region: Essential Fish Habitat requirements for fishery management plans of the South Atlantic Fishery Management Council.

South Atlantic Fishery Management Council. (2012). *Comprehensive ecosystem-based amendment 2 for the south Atlantic region*.

Southeast Area Monitoring and Assessment Program. (2001). South Atlantic Bight bottom mapping CD-ROM, Version 1.2 Washington, D.C.: Atlantic States Marine Fisheries Commission, SEAMAP-South Atlantic Bottom Mapping Workgroup.

Speed, C.W., Meekan, M.G., Rowat, D., Pierce, S.J., Marshall, A.D. & Bradshaw, C.J.A. (2008). Scarring patterns and relative mortality rates of Indian Ocean whale sharks. *Journal of Fish Biology, 72*(6), 1488-1503.

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.

Stone, S.L., Lowery, T.A., Field, J.D., Williams, C.D., Nelson, D.M. & Jury, S.H. (1994). *Distribution and abundance of fishes and invertebrates in Mid-Atlantic estuaries*. Silver Spring, Maryland: Strategic Environmental Assessments Division, National Oceanic and Atmospheric Administration.

Stroetz, R.W., Vlahakis, N.E., Walters, B.J., Schroeder, M.A. & Hubmayr, R.D. (2001). Validation of a new live cell strain system: Characterization of plasma membrane stress failure. *Journal of Applied Physiology, 90*: 2361-2370.

Thayer, G.W., Kenworthy, W.J. & Fonseca, M.S. (1984). The ecology of eelgrass meadows of the Atlantic coast: a community profile. U.S. Fish and Wildlife Service, FWS/OBS-84/02, 147 p.

Turnpenny, A.W.H., Thatcher, K.P. & Nedwell, J.R. (1994). The effects on fish and other marine animals of high-level underwater sound. Fawley Aquatic Research Laboratory, Ltd., Report FRR 127/94, United Kingdom (October 1994). 79 p.

U.S. Coast Guard. (2012). Atlantic Coast Port Access Route Study Interim Report. Docket Number USCG-2011-0351 ACPARS Workgroup. Retrieved from http://www.uscg.mil/lantarea/acpars/docs/ACPARS_Interim_Report-Final_09AUG.pdf as accessed in November 2013.

U.S. Department of the Navy. (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.

U.S. Department of the Navy. (2013). Integrated Natural Resources Management Plan – Joint Expeditionary Base Little Creek

U.S. Department of the Navy. (2014). *Telemetry Tracking of Atlantic Sturgeon in the Lower Chesapeake Bay*. 2013 Annual Report. Contract #N62470-10-D-3011, CTO XE19

U.S. Fish and Wildlife Service. (2008). *Shortnose sturgeon captured in Atlantic sturgeon reward program data*. Received October 2008 from Mike Mangold. Annapolis, Maryland: U.S. Fish and Wildlife Service, Maryland Fishery Resource Office.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. (1996). Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act. 61 Federal Register 4722, February 7, 1996.

U.S. Marine Corps. (2009). *Environmental Assessment – MCB Camp Lejeune Range Operations*.

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.

Vlahakis, N.E. & Hubmayr, R.D. (2000). Plasma membrane stress failure in alveolar epithelial cells. *Journal of Applied Physiology, 89*, 2490-2496.

Wartzok, D., Popper, A.N., Gordon, J. & Merrill, J. (2003). Factors affecting the responses of marine mammals to acoustic disturbance. *Marine Technology Society Journal*. 37(4), 6-15.

Welsh, S.A., Mangold, M.F., Skjeveland, J.E., & Spells, A.J. (2002). Distribution and movement of shortnose sturgeon (*Acipenser brevirostrum*) in Chesapeake Bay. *Estuaries* 25(1), 101-104.

Wong, K., Elegante, M., Bartels, B., Elkhavat, S., & Tien, D. (2010). Analyzing habituation responses to novelty in zebrafish (*Danio rerio*). *Behavioural Brain Research*, *208*(2), 450-457.

Yelverton, J.T., Richmond, D.R., Hicks, W., Saunders, K. & Fletcher, R.E. (1975). *The Relationship Between Fish Size and Their Response to Underwater Blast.* Lovelace Foundation for Medical Education and Research, Albuquerque, NM (June 18, 1975). 39 p.

8.1.11 Section 3.11 – Sea Turtles

Aki, K., Brock, R., Miller, J., Mobley, J. R., Jr., Rappa, P.J., Tarnas, D. & Yuen, M. (1994). A site characterization study for the Hawaiian Islands Humpback Whale National Marine Sanctuary. K. Des Rochers (Ed.). (HAWAU-T-94-001 C2, pp. 119) National Oceanic and Atmospheric Administration. Prepared by University of Hawaii Sea Grant Program.

Bartol, S.M. & Musick, J.A. (2003). Sensory Biology of Sea Turtles P. L. Lutz, J. A. Musick and J. Wyneken (Eds.), The Biology of Sea Turtles (Vol. 2, pp. 16).

Bartol, S.M. & Ketten, D.R. (2006). Turtle and tuna hearing. In Y. Swimmer and R. W. Brill (Eds.), Sea Turtle and Pelagic Fish Sensory Biology: Developing Techniques to Reduce Sea Turtle Bycatch in Longline Fisheries. (NOAA Technical Memorandum NMFS-PIFSC-7, pp. 98-103) U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Bjorndal, K. (1997). Foraging ecology and nutrition of sea turtles. In P.L. Lutz and J.A. Musick (Eds.), The Biology of Sea Turtles (Vol. 1, pp. 199-231). Boca Raton, Florida: CRC Press.

Brudenall, D.K., Schwab, I.R. & Fritsches, K.A. (2008). Ocular morphology of the Leatherback sea turtle (*Dermochelys coriacea*). *Veterinary Opthamology, 11*(2), 99-110.

Collard, S.B. (1990). Leatherback turtles feeding near a watermass boundary in the eastern Gulf of Mexico. *Marine Turtle Newsletter, 50,* 12-14.

Conant, T.A., Dutton, P.H., Eguchi, T., Epperly, S.P., Fahy, C.C., Godfrey, M.H., MacPherson, S.L., Possardt, E.E., Schroeder, B.A., Seminoff, J.A., Snover, M.L., Upite, C.M. & Witherington, B.E. (2009). Loggerhead sea turtle (*Caretta caretta*) 2009 status review under the U.S. Endangered Species Act. Report of the Loggerhead biological review team to the National Marine Fisheries Service. August 2009. (pp. 222).

Constantino, M.A. & Salmon, M. (2003). Role of chemical and visual cues in food recognition by leatherback posthatchlings (*Dermochelys coriacea*). *Zoology, 106*, 173-181.

Davenport, J. & Balazs, G.H. (1991). 'Fiery bodies' - Are pyrosomas an important component of the diet of leatherback turtles? *British Herpetological Society Bulletin, 37*, 33-38.

DeRuiter, S.L. & Doukara, K.L. (2012). Loggerhead turtles dive in response to airgun sound exposure. *Endangered Species Research, 16*(1), 55-63.

Dodd, C.K., Jr. (1988). Synopsis of the biological data on the Loggerhead sea turtle *Caretta caretta* (Linnaeus 1758). (Biological Report 88 (14)), pp. 110). Washington, D.C.: U.S. Fish and Wildlife Service.

Eckert, S.A. (2002). Distribution of juvenile leatherback sea turtle *Dermochelys coriacea* sightings. *Marine Ecology Progress Series, 230*, 289-293.

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

Ferreira, R.L. & Martins, H.R. (2013). Nesting hawksbill turtle, *Eretmochelys imbricata*, disorientation on Príncipe Island, West Africa. *Marine Turtle Newsletter, 136,* 7-9.

Frazier, J.G. (2001). General natural history of marine turtles. In K. L. Eckert and F. A. Abreu-Grobois (Eds.), Marine turtle conservation in the wider Caribbean region: A dialogue for effective regional management: Proceedings (pp. 3 - 17). Widecast, Marine Turtle Specialist Group, World Wildlife Fund, United Nations Environment Programme.

Godfrey, M. (2013). It's a banner year for sea turtle nesting in North Carolina. North Carolina Wildlife Resources Commission blog. Retrieved from http://www.ncwildlife.org/News/Blogs/NCWRCBlog/tabid/715/EntryId/127/It-s-a-Banner-Year-for-Sea-Turtle-Nesting-in-North-Carolina.aspx as accessed on 2014, March 18.

Gregory, L.F. & Schmid, J.R. (2001). Stress response and sexing of wild Kemp's ridley sea turtles (*Lepidochelys kempii*) in the Northern Gulf of Mexico. General and *Comparative Endocrinology 124*, 66-74.

Grant, G.S. & Ferrell, D. (1993). Leatherback turtle, *Dermochelys coriacea* (Reptilia: Dermochelidae): Notes on near-shore feeding behavior and association with cobia. *Brimleyana, 9,* 77-81.

Hazel, J., Lawler, I.R., Marsh, H. & Robson, S. (2007). Vessel speed increase collision risk for the green turtle *Chelonia mydas*. *Endangered Species Research, 3*, 105-113.

Hutchins, S. (2012). Biologists race to Dam Neck to shield rare turtle nest. The Virginian-Pilot. 22 June 2012. Retrieved from http://hamptonroads.com/2012/06/biologists-race-dam-neck-shield-rare-turtle-nest

Irwin, W.P. & Lohmann, K.J. (2005). Disruption of magnetic orientation in hatchling loggerhead sea turtles by pulsed magnetic fields. *Journal of Comparative Physiology A, 191,* 475-480.

James, M.C. & Herman, T.B. (2001). Feeding of *Dermochelys coriacea* on medusae in the northwest Atlantic. *Chelonian Conservation and Biology, 4*(1), 202-205.

Keinath, J.A. (1993). Movements and behavior of wild and head-started sea turtles. PhD dissertation. College of William and Mary, Williamsburg, VA.

Keinath, J.A., Musick, J.A. & Swingle, W.M. (1991). First verified record of the hawksbill sea turtle (*Eretmochelys imbricata*) in Virginia waters. *Catesbeiana, 11*(2):35-38.

Keinath, J.A., Musick, J.A., & 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.

Lester, L.A., Avery, H.W., Harrison, A.S. & Standora, E.A. (2013). Recreational boats and turtles: behavioral mismatches result in higher rates of injury. *PLoS ONE, 8*(12): e82370. doi: 10.1371/journal.pone.0082370.

Levenson, D.H., Eckert, S.A., Crognale, M.A., Deegan II, J.F. & Jacobs, G.H. (2004). Photopic spectral sensitivity of green and loggerhead sea turtles. *Copeia, 4,* 908-914.

Lohmann, K.J. (1991). Magnetic orientation by hatchling loggerhead sea turtles (*Caretta caretta*). *The Journal of Experimental Biology, 155*(1), 37-49.

Lohmann, K.J. & Lohmann, C.M.F. (1996). Orientation and open-sea navigation in sea turtles. *Journal of Experimental Biology, 199*(1), 73-81.

Lorne, J.K. & Salmon, M. (2007). Effects of exposure to artificial lighting on orientation of hatchling sea turtles on the beach and in the ocean. *Endangered Species Research, 3,* 23-30.

Lutcavage, M. & Musick, J.A. (1985). Aspects of the biology of sea turtles in Virginia. *Copeia* 1985: 449-456.

Márquez-M.R. (1994). Synopsis of biological data on the Kemp's ridley turtle, *Lepidochelys kempi* (Garman, 1880). (NOAA Technical Memorandum NMFS-SEFSC-343 or OCS Study MMS 94-0023, pp. 91) U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.-N., Penrose, J.D., Prince, R I. T., Adhitya, A., Murdoch, J. & McCabe, K.A. (2000). Marine Seismic Surveys: Analysis and Propagation of Air-gun Signals; and Effects of Air-gun Exposure on Humpback Whales, Sea Turtles, Fishes and Squid. (R99-15, pp. 198). Western Australia: Centre for Marine Science and Technology.

Moein, S.E., Musick, J.A., Keinath, J.A., Barnard, D.E., Lenhardt, M. & George, R. (1994). Evaluation of seismic sources for repelling sea turtles from hopper dredges Final Report submitted to the U.S. Army Corps of Engineers Waterways Experiment Station. (pp. 33). Gloucester Point, VA: Virginia Institute of Marine Science.

Moein Bartol, S.E., Musick, J.A., Keinath, J.A., Barnard, D.E., Lenhardt, M.L. & George, R. (1995). Evaluation of Seismic Sources for Repelling Sea Turtles from Hopper Dredges L. Z. Hales (Ed.), Sea Turtle Research Program: Summary Report (Vol. Technical Report CERC-95, pp. 90-93). Kings Bay, GA: U.S. Army Engineer Division, South Atlantic, Atlanta, GA and U.S. Naval Submarine Base.

Morreale, S.J. & Standora, E.A. (2005). Western North Atlantic waters: crucial developmental habitat for Kemp's ridley and loggerhead sea turtles. *Chelonian Conservation and Biology, 4*(4), 872-882.

Narazaki, T., Sato, K., Abernathy, K.J., Marshall, G.J. & Miyazaki, N. (2013). Loggerhead turtles (*Caretta caretta*) use vision to forage on gelatinous prey in mid-water. *PLoS ONE, 8*(6): e66043. doi: 10.1371/journal.pone.0066043.

National Marine Fisheries Service. (2009). Biological Opinion for Proposed Homeporting of Additional Surface Ships at Naval Station Mayport, Florida.

National Marine Fisheries Service. (2010). NOAA Fisheries Office of Protected Resources- Marine Turtles: National Marine Fisheries Service and National Oceanic and Atmospheric Administration.

National Marine Fisheries Service. (2012). Green Turtle (*Chelonia mydas*). Retrieved from http://www.nmfs.noaa.gov/pr/species/turtles/green.htm as accessed on 2013, February 18.

National Marine Fisheries Service. (2012a). Biological Opinion – Tappan Zee Bridge Replacement Project. Northeast Region, Gloucester, MA. 2012, June 22.

National Marine Fisheries Service. (2012b). Loggerhead sea turtle (*Caretta caretta*). Retrieved from http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm as accessed on 2013, February 17.

National Marine Fisheries Service. (2013). Kemp's ridley turtle (*Lepidochelys kempii*). Retrieved from http://www.nmfs.noaa.gov/pr/species/turtles/kempsridley.htm as accessed on 2013, February 18.

National Marine Fisheries Service. (2013a). Kemp’s ridley turtle (*Lepidochelys kempii*). Retrieved from http://www.nmfs.noaa.gov/pr/species/turtles/kempsridley.htm as accessed on 2013, February 18.

National Marine Fisheries Service. (2013b). Loggerhead Turtle (*Caretta caretta*). Retrieved from http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm as accessed on 2014, March 16.

National Marine Fisheries Service. (2013c). Proposed Loggerhead Sea Turtle Critical Habitat. Retrieved from http://www.nmfs.noaa.gov/pr/species/criticalhabitat_loggerhead.htm as accessed on 2014, March 21.

National Marine Fisheries Service & U.S. Fish and Wildlife Service. (1991). Recovery Plan for the U.S. Population of the Atlantic Green Turtle (*Chelonia mydas*). USFWS, Southeast Region, Atlanta, Georgia and NMFS, Washington, D.C.

National Marine Fisheries Service & U.S. Fish and Wildlife Service. (1992). Recovery Plan for Leatherback Turtles *Dermochelys coriacea* in the U.S. Caribbean, Atlantic and Gulf of Mexico (pp. 65). Washington, D.C.: National Marine Fisheries Service.

National Marine Fisheries Service & U.S. Fish and Wildlife Service. (1993). Recovery Plan for the Hawksbill Turtle *Eretmochelys imbricata* in the U.S. Caribbean, Atlantic and Gulf of Mexico (pp. 52). St. Petersburg, Florida: National Marine Fisheries Service.

National Marine Fisheries Service & U.S. Fish and Wildlife Service. (2007). Green Turtle (*Chelonia mydas*). 5-Year Review: Summary and Evaluation. NMFS, Office of Protected Resources, Silver Spring, MD and USFWS, Southeast Region, Jacksonville, Florida.

National Marine Fisheries Service & U.S. Fish and Wildlife Service. (2008). Recovery Plan for the Northwest Atlantic Population of the Loggerhead sea turtle (*Caretta caretta*). Second Revision. NMFS Office of Protected Resources, Silver Spring, MD and USFWS Southeast Region.

National Marine Fisheries Service, U.S. Fish and Wildlife Service & Secretary of Environment and Natural Resources, Mexico. (2010). Bi-National Recovery Plan for the Kemp’s Ridley Sea Turtle (*Lepidochelys kempii*), Second Revision. National Marine Fisheries Service. Silver Spring, Maryland.

National Park Service. (2012). Cape Hatteras National Seashore Sea Turtle Monitoring – 2012 Annual Report. NPS: Manteo, North Carolina.

O'Hara, J. & Wilcox, J.R. (1990). Avoidance responses of loggerhead turtles, *Caretta caretta*, to low frequency sound. *Copeia, 2,* 564-567.

Rees, A.F., Frick, M., Panagopoulou, A. & Williams, K. (2008). Proceedings of the twenty-seventh annual symposium on sea turtle biology and conservation NOAA Technical Memorandum. pp. 262.

Reintsma, N., Young, M., & Salmon, M. (2014). Do lighthouses disrupt the orientation of sea turtle hatchlings? Hypothesis testing with arena assays at Hillsboro Beach, Florida, U.S.A. Marine Turtle Newsletter, 140: 2-3.

Ripcke, M., Guinea, M., & McGuiness, K. (2011). Preliminary results of the effects of simulated pile driving vibrations on sea turtle embryogenesis in Proceedings of the Thirty-First Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-631.

Salmon, M. & Witherington, B.E. (1995). Artificial lighting and seafinding by loggerhead hatchlings: evidence for lunar modulation. *Copeia* 1995: 931-938.

Salmon, M. Reiners, R., Lavin, C., & Wyneken, J. (1995). Behavior of loggerhead sea turtles on an urban beach. I. Correlates of nest placement. *Journal of Herpetology, 29*: 560-567.

Salmon, M., Jones, T.T. & Horch, K.W. (2004). Ontogeny of diving and feeding behavior in juvenile seaturtles: Leatherback seaturtles (*Dermochelys coriacea*) and green seaturtles (*Chelonia mydas*) in the Florida current. *Journal of Herpetology, 38*(1), 36-43.

Schwartz, F.J. (1989). Biology and ecology of sea turtles frequenting North Carolina. In: R. Y. George & A. W. Hulbut (Eds.). Proc. North Carolina Oceanography Symposium, NOAA-NURP Report 89-2.

Sella, K.N., Salmon, M. & Witherington, B.E. (2006). Filtered streetlights attract hatching marine turtles. *Chelonian Conservation and Biology, 5*(2), 255-261.

Seney, E.E. (2003). Historical diet analysis of loggerhead (*Caretta caretta*) and Kemp's ridley (*Lepidochelys kempi*) sea turtles in Virginia. Unpublished Master of Science thesis. College of William and Mary, Williamsburg, Virginia. 123 pages.

Schroeder, B.A. & Thompson, N.B. (1987). Distribution of the loggerhead turtle, Caretta caretta, and the leatherback turtle, *Dermochelys coriacea*, in the Cape Canaveral, Florida area: results of aerial surveys. In W. N. Witzell (Ed.), Proceedings of the Cape Canaveral, Florida Sea Turtle Workshop. (NOAA Technical Report NMFS 53, pp. 45-53) U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Shoop, C.R. & Kenney, R.D. (1992). Seasonal distributions and abundances of loggerhead and leatherback sea turtles in waters of the northeastern United States. *Herpetological Monographs, 6*, 43-67.

Southwood, A.L., Higgins, B., Brill, R., & Swimmer, Y. (2007). Chemoreception in loggerhead sea turtles: an assessment of the feasibility of using chemical deterrents to prevent sea turtle interactions with longline fishing gear. NOAA Tech Memo NMFS-PIFSC-10.

Swingle, W.M., Trapani, C.M., D'Eri, L.R. & Lynott, M.C. (2013). Marine Mammal and Sea Turtle Stranding Response – 2012 Grant Report. VAQF Scientific Report Volume 2013 No. 01. NOAA Grant # NA11NOS4190122, Task # 49.

U.S. Department of the Navy. (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.

U.S. Department of the Navy. (2008). Marine Resources Assessment for the Cherry Point Operating Area. Final Report.

U.S. Department of the Navy. (2009). Marine resources assessment for the Chesapeake Bay. Prepared by Geo-Marine, Inc. Washington, D.C.: U.S. Department of the Navy.

U.S. Department of the Navy. (2012). Commander Task Force 20, 4th, and 6th Fleet Navy Marine Species Density Database [Technical Report]. Norfolk, Virginia: Naval Facilities Engineering Command Atlantic.

Virginia Institute of Marine Science. (2008). Sea turtle stranding data for the state of Virginia (1998 through 2007). [Excel file]. Gloucester Point, Virginia: Virginia Institute of Marine Science.

Jones, T.T. & Wallace, B.P. (2011). Proceedings of the Thirty-First Annual Symposium on Sea Turtle Biology and Conservation. San Diego. NOAA – Southeast Fisheries Science Center.

Weir, C.R. (2007). Observations of marine turtles in relation to seismic airgun sound off Angola. Marine Turtle Newsletter (116).

WildEarth Guardians. (2010). Petition to Designate Critical Habitat for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) [Petition]. 27 pp.

Zenteno, M., Herrera, M., Barragan, A. & Sarti, L. (2007). Impact of Different Kinds and Times of Retention in Olive Ridley's (*Lepidochelys olivacea*) Hatchlings in Blood Glucose Levels. Presented at the Twenty-Seventh Annual Symposium on Sea Turtles, Myrtle Beach, South Carolina.

8.1.12 Section 3.12 – Marine Mammals

Aissi, M., Celona, A., Comparetto, G., Mangano, R., Wurtz, M. & Moulins, A. (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. doi:10.1017/S0025315408000891

Azzellino, A., Gaspari, S., Airoldi, S. & Nani, B. (2008). Habitat use and preferences of cetaceans along the continental slope and the adjacent pelagic waters in the western Ligurian Sea. *Deep Sea Research I, 55*, 296–323.

Barco, S., McLellan, W., Allen, J., Asmutis, R., Mallon-Day, R., Meagher, E., Pabst, D. A., Robbins, J., Seton, R., Swingle, W. M., Weinrich, M. & Clapham, P. (2002). Population identity of humpback whales (*Megaptera novaeangliae*) in the waters of the U.S. Mid-Atlantic states. *Journal of Cetacean Research and Management, 4*(2), 135-141.

Baumgartner, M.F., Cole, T.V.N., Campbell, R.G., Teegarden G.J., & Durbin, E.G. (2003). Associations between North Atlantic right whales and their prey, *Calanus finmarchicus*, over diel and tidal time scales. *Mar Ecol Prog Ser, 264,*155–166.

Calambokidis, J., Steiger, G.H., Straley, J.M., Herman, L.M., Cerchio, S., Salden, D.R., Urban R.J., Jacobsen, J.K., von Ziegesar, O., Balcomb, K.C., Gabriele, C.M., Dahlheim, M.E., Uchida, S., Ellis, G., Miyamura, Y., Ladron de Guevara P.P., Yamaguchi, M., Sato, F., Mizroch, S.A., Schlender, L., Rasmussen, K., Barlow, J. & Quinn, T.J., II (2001). Movements and population structure of humpback whales in the North Pacific. *Marine Mammal Science, 17*(4), 769-794.

Chesapeake Bay Program. (2012). Field Guide – Bottlenose Dolphin. Retrieved from http://www.chesapeakebay.net/fieldguide/critter/bottlenose_dolphin as accessed on 2014, February 28.

Clapham, P. (n.d.). Humpback whale (*M. novaeangliae*) retrieved from http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=426&Itemid=282 as accessed on 2014, February 28.

Clapham, P.J. & Mattila, D.K. (1990). Humpback whale songs as indicators of migration routes. *Marine Mammal Science, 6*(2), 155-160.

Clapham, P. J. & Mead, J.G. (1999). *Megaptera novaeangliae*. *Mammalian Species, 604*, 1-9.

Coastal Ocean Research Monitoring Program. (2006). Description of Onslow Bay coastal climatology. Retrieved from http://www.cormp.org/climate/OB_climatology.html as accessed on 2006, May 23.

Dähne, M., Gilles, A., Lucke, K., Peschko, V., Adler, S., Krugel, K., Sundermeyer, J., & Siebert, U. (2013). Effects of pile-driving on harbor porpoises (*Phocoena phocoena*) at the first offshore wind farm in Germany. *Environ. Res. Letters, 8* (2013).

Davis, R.W., Fargion, G.S., May, N., Leming, T.D., Baumgartner, M., Evans, W.E., Hansen, L. J. & Mullin, K. (1998). Physical habitat of cetaceans along the continental slope in the north-central and western Gulf of Mexico. *Marine Mammal Science, 14*(3), 490-507.

Deutsch, C.J., Reid, J.P., Bonde, R.K., Easton, D.E., Kochman, H.I. & O'Shea, T.J. (2003). Seasonal movements, migratory behavior, and site fidelity of West Indian manatees along the Atlantic coast of the United States. *Wildlife Monographs, 151*:1-77.

D'Vincent, C.G., Nilson, R.M. & Hanna, R.E. (1985). Vocalization and coordinated feeding behavior of the humpback whale in southeastern Alaska. Scientific Reports of the *Whales Research Institute, 36,* 41-47.

Ersts, P.J. & Rosenbaum, H.C. (2003). Habitat preference reflects social organization of humpback whales (*Megaptera novaeangliae*) on a wintering ground. *Journal of Zoology*, London, 260, 337-345.

Fertl, D. & Leatherwood, S. (1997). Cetacean interactions with trawls: A preliminary review. *Journal of Northwest Atlantic Fishery Science, 22,* 219-248.

Fertl, D. & Würsig, B. (1995). Coordinated feeding by Atlantic spotted dolphins (*Stenella frontalis*) in the Gulf of Mexico. *Aquatic Mammals, 21*: 3-5.

Finneran, J., Dear, R., Carder, D. A. & Ridgway, S. H. (2003). Auditory and behavioral responses of California sea lions (*Zalophus californianus*) to single underwater impulses from an arc-gap transducer. *The Journal of the Acoustical Society of America, 114*(3), 1667-1677.

Finneran, J.J., Carder, D.A., Schlundt, C.E. & Ridgway, S.H. (2005). Temporary threshold shift in bottlenose dolphins (*Tursiops truncatus*) exposed to mid-frequency tones. *The Journal of the Acoustical Society of America, 118*(4), 2696-2705.

Fulling, G.L., Mullin, K.D. & Hubard, C.W. (2003). Abundance and distribution of cetaceans in outer continental shelf waters of the U.S. Gulf of Mexico. *Fishery Bulletin, 101,* 923-932.

Goldbogen, J.A., Calambokidis, J., Shadwick, R.E., Oleson, E.M., McDonald, M.A. & Hildebrand, J.A. (2006). Kinematics of foraging dives and lunge-feeding in fin whales. *Journal of Experimental Biology, 209,* 1231-1244.

Gordon, J., Gillespie, D., Potter, J., Frantzis, A., Simmonds, M.P., Swift, R. & Thompson, D. (2003). A review of the effects of seismic surveys on marine mammals. *Marine Technology Society Journal, 37*(4), 16-34.

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.

Hanlon, R.T. & Messenger, J.B. (1996). Cephalopod behaviour. Cambridge, NY: Cambridge University Press.

Heithaus, M.R. & Dill, L.M. (2008). Feeding strategies and tactics. In W.F. Perrin, B. Würsig, and J.G.M. Thewissen (Eds.), Encyclopedia of Marine Mammals (2nd ed., pp 1100-1103). Academic Press.

Herzing, D. (n.d.). Atlantic spotted dolphin (*S. frontalis*). Retrieved from http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=434&Itemid=284 as accessed on 2014, February 28.

Horwood, J. (2009). Sei whale *Balaenoptera borealis*. In W. F. Perrin, B. Würsig and J.G.M. Thewissen (Eds.),Encyclopedia of Marine Mammals (2nd ed., pp. 1001-1003). San Diego, CA: Academic Press.

Integrated Concepts and Research Corporation. (2009). Marine mammal monitoring final report, 15 July 2008 through 14 July 2009: Construction and scientific marine mammal monitoring associated with the Port of Anchorage marine terminal redevelopment project. United States Department of Transportation Maritime Administration, Port of Anchorage.

Jefferson, T.A., Webber, M.A. & Pitman, R.L. (2008). Marine Mammals of the World: A Comprehensive Guide to their Identification (pp. 573). London, UK: Elsevier.

Kastak, D., Schusterman, R.J., Southall, B.L. & Reichmuth, C.J. (1999). Underwater temporary threshold shift induced by octave-band noise in three species of pinniped. *The Journal of the Acoustical Society of America, 106*(2), 1142-48.

Kerr, K.A., Defran, R.H. & Campbell, G.S. (2005). Bottlenose dolphins (Tursiops truncatus) in the Drowned Cayes, Belize: Group size, site fidelity and abundance. *Caribbean Journal of Science, 41*(1), 172-177.

Ketten, D.R. (1995). Estimates of blast injury and acoustic trauma zones for marine mammals from underwater explosions. In R. Kastelein, J. Thomas & P. Natchtigall (Eds.), Sensory Systems of Aquatic Mammals (pp. 391-407). The Netherlands: De Spil Publishers.

Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. & Podesta, M. (2001). Collisions between ships and whales. *Marine Mammal Science, 17*(1), 35-75.

Laist, D.W. & Reynolds, J.E., III (2005). Influence of power plants and other warm-water refuges on Florida manatees. *Marine Mammal Science, 21*(4):739-764.

Lefebvre, L.W., Marmontel, M., Reid, J.P., Rathbun, G.P. & Domning, D.P. (2001). Status and biogeography of the West Indian manatee. Pages 425-474 in Woods, C.A. and F.E. Sergile, Eds. Biogeography of the West Indies: Patterns and perspectives, 2d ed. Boca Raton, Florida: CRC Press.

Malme, C.I., Miles, P.R., Clark, C.W., Tyack, P.L., & Bird, J.E. (1984). Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior. Phase II, January 1984 migration. Prepared by Bolt, Beranek, and Newman, Cambridge, MA. Prepared for United States Minerals Management Service, Alaska, OCS Office, Anchorage, AK.

Malme, C I., Würsig, B., Bird, J.E. & Tyack, P.L. (1988). Observations of feeding gray whale responses to controlled industrial noise exposure. In Port and Ocean Engineering Under Arctic Conditions, ed. Sackinger, W.M., M.O. Jefferies, J.L. Imm and S.D. Treacy. Vol. II. Fairbanks, AK: University of Alaska. 55-73.

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.

Mayo, C.A. & Marx, M.K. (1990). Surface foraging behaviour of the North Atlantic right whale, *Eubalaena glacialis*, and associated zooplankton characteristics. *Canadian Journal of Fisheries and Aquatic Sciences,68*, 2214 – 2220.

McAlarney, R., McLellan, W., Pabst, D.A., Cummings, E., Urian, K., Nilsson, P., Waples, D., Dunn, J., Johnston, D. & Read, A. (2011). Cetacean species diversity during four years of survey effort in Onslow Bay, NC, USA. Navy Marine Species Monitoring Program.

Miller, G.W., Elliott, R.E., Koski, W.R., Moulton, V.D. & Richardson, W.J. (1999). Whales. In: Marine Mammal and Acoustical Monitoring of Western Geophysical's Open-Water Seismic Program in the Alaskan Beaufort Sea, 1998, LGL and Greeneridge, eds. LGL Report TA 2230-3. King City, Ont., Canada: LGL Ecological Research Associates, Inc., 109 pp.

Morton, A. B. & Symonds, H.K. (2002). Displacement of Orcinus orca (L.) by high amplitude sound in British Columbia, Canada. *ICES Journal of Marine Science 59*, 71-80.

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

Mullin, K.D. & Fulling, G.L. (2004). Abundance of cetaceans in the oceanic northern Gulf of Mexico, 1996-2001. *Marine Mammal Science, 20*(4), 787-807.

National Marine Fisheries Service. (2008). Final environmental impact statement to implement vessel operational measures to reduce ship strikes to north Atlantic right whales. Silver Spring, Maryland: National Marine Fisheries Service.

National Marine Fisheries Service. (2009). Biological Opinion for Proposed Homeporting of Additional Surface Ships at Naval Station Mayport, Florida.

National Marine Fisheries Service. (2010). Bottlenose Dolphin (*Tursiops truncatus truncatus*) Southern North Carolina Estuarine System Stock Assessment Report. November 2010.

National Marine Fisheries Service. (2010a). Bottlenose Dolphin (*Tursiops truncatus truncatus*): Western North Atlantic Southern Migratory Coastal Stock Assessment Report. November 2010.

National Marine Fisheries Service. (2012). Sei Whale (*Balaenoptera borealis*). Retrieved from http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/seiwhale.htm as accessed on 2014, February 28.

National Marine Fisheries Service. (2012a). Bottlenose Dolphin (*Tursiops truncatus truncatus*) Northern North Carolina Estuarine System Stock Assessment Report. December 2012.

National Marine Fisheries Service. (2013). Fin Whale (*Balaenoptera physalus*). Retrieved from http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/finwhale.htm as accessed on 2014, February 28.

National Marine Fisheries Service. (2014). 2013-2014 Bottlenose Dolphin Unusual Mortality Event in the Mid-Atlantic. Retrieved from http://www.nmfs.noaa.gov/pr/health/mmume/midatldolphins2013.html as accessed on 2014, February 28.

National Oceanic and Atmospheric Administration. (2013). Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammals – Acoustic Threshold Levels for Onset of Permanent and Temporary Threshold Shifts.

National Research Council. (2003). Ocean noise and marine mammals. Washington, DC: National Research Council Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals; The National Academies Press.

Nealon, C. (2012). Beached sei whale a big attraction in Norfolk's Ocean View. Retrieved from http://www.dailypress.com/news/science/dead-rise-blog/dp-beached-sei-whale-a-big-attraction-in-norfolks-ocean-view-20120221,0,972057.story as accessed on 2014, February 7.

New England Aquarium. (2013). North Atlantic Right Whale. Retrieved from http://www.neaq.org/animals_and_exhibits/animals/northern_right_whale/. Accessed on 2013, June 11.

North Carolina Division of Parks and Recreation. (2011). Mammals of North Carolina: Their Distribution and Abundance. Retrieved from http://www.dpr.ncparks.gov/mammals/county_records.php?speciesID=85&county=_Carteret_inshore&Submit=Submit as accessed on 2014, March 3.

Northeast Fisheries Science Center. (2014). Interactive North Atlantic Right Whale Sightings Map. Retrieved from http://www.nefsc.noaa.gov/psb/surveys/ as accessed on 2014, February 28.

Nowacek, D.P., Thorne, L.H., Johnston, D.W. & Tyack, P.L. (2007). Responses of cetaceans to anthropogenic noise. *Mammal Review 37*(2): 81-115.

O'Shea, T. (n.d.). West Indian manatee (*T. manatus*). Retrieved from http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=414&Itemid=277 as accessed on 2014, March 3.

Parks, S.E., Brown, M.W., Conger, L.A., Hamilton, P.K., Knowlton, A.R., Kraus, S.D., Slay, C.K. & Tyack, P.L. (2007). Occurrence, composition, and potential functions of North Atlantic right whale (*Eubalaena glacialis*) surface active groups. *Marine Mammal Science, 23*(4), 868-887.

Parks, S.E., Warren, J.D., Stamieszkin, K., Mayo, C.A. & Wiley, D. (2011). Dangerous dining: surface foraging of North Atlantic right whales increases risk of vessel collisions. *Biology Letters*, 03 August 2011. doi:10.1098/rsbl.2011.0578

Payne, P.M., Selzer, L.A. & Knowlton, A.R. (1984). Distribution and density of cetaceans, marine turtles, and seabirds in the shelf waters of the northeastern United States, June 1980-December 1983, based on shipboard observations. NOAA/NMFS Contract No. NA-81-FA-C-00023.

Payne, P.M., Heinemann, D.W. & Selzer, L.A. (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 [Contract report]. (pp. 108). Woods Hole, MA: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center.

Perrin, W.F. (2002). *Stenella frontalis*. *Mammalian Species, 702*, 1-6.

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

Perrin, W.F., Mitchell, E.D., Mead, J.G., Caldwell, D.K., Caldwell, M.C., van Bree, P.J.H. & Dawbin, W.H. (1987). Revision of the spotted dolphins, *Stenella* spp. *Marine Mammal Science, 3*(2), 99-170.

Perrin, W.F., Wilson, C.E. & Archer, F.I., II (1994). Striped dolphin - *Stenella coeruleoalba* (Meyen, 1833). In S. H. Ridgway and R. Harrison (Eds.), Handbook of Marine Mammals (Vol. 5: The first book of dolphins, pp. 129 - 159). San Diego, CA: Academic Press

Perrin, W.F., Baker, C.S., Berta, A., Boness, D.J., Brownell, R.L., Jr., Dalebout, M.L., Domning, D.P., Hamner, R.M., Jefferson, T.A., Mead, J.G., Rice, D.W., Rosel, P.E., Wang, J.Y. & Yamada, T. (2009). Marine Mammal Species and Subspecies (Vol. 2010): Society of Marine Mammalogy, Committee on Taxonomy.

Reeves, R.R., Stewart, B.S., Clapham, P.J. & Powell, J.A. (2002). National Audubon Society Guide to Marine Mammals of the World (pp. 527). New York, NY: Alfred A. Knopf.

Rice, D.W. (1998). Marine mammals of the world: systematics and distribution. (Special Publication Number 4, pp. 231). Lawrence, KS: Society for Marine Mammology.

Richardson, W.J., Greene, C.R., Jr., Malme, C.I, & Thomson, D.H. (1995). Marine mammals and noise. San Diego, CA: Academic Press. 576 pp.

Ridgway, S.H., Carder, D.A., Smith, R.R., Kamolnick, T., Schlundt, Elsberry, C.E. & W.R. (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, California: Naval Sea Systems Command.

Rolland, R.M., Parks, S.E., Hunt K.E., Castellote, M., Corkeron, P.J., Nowacek, D.P., Wasser, S.K. & Kraus S.D. (2012). Evidence that ship noise increases stress in right whales. *Proceedings of the Royal Society* (2012).

Scott, M.D. & Chivers, S.J. (1990). Distribution and herd structure of bottlenose dolphins in the eastern tropical Pacific Ocean. In S. Leatherwood and R. R. Reeves (Eds.), The Bottlenose Dolphin (pp. 387-402). Academic Press.

Shane, S.H., Wells, R.S. & Würsig, B. (1986). Ecology, behavior and social organization of the bottlenose dolphin: A review. *Marine Mammal Science 2*(1), 34-63.

Silber, G.K. & Clapham, P.J. (2001). Draft updated recovery plan for the western North Atlantic right whale, *Eubalaena glacialis*. Silver Spring, Maryland: National Marine Fisheries Service.

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., Jefferson, T.A. & Zoidis, A.M. (2010). Rare sightings of a Bryde's whale (*Balaenoptera edeni*) and sei whales (*B. borealis*) (Cetacea: Balaenopteridae) northeast of O'ahu, Hawai'i. *Pacific Science*, 64: 449-457.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., & Greene Jr., C.R. (2007). Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. *Aquatic Mammals, 33*(4), 411-521.

Swingle, W.M., Barco, S.G., Pitchford, T.D., McLellan, W.A. & Pabst, D.A. (1993). Appearance of juvenile humpback whales feeding in the nearshore waters of Virginia. *Marine Mammal Science, 9*(3), 309-315.

U.S. Department of the Navy. (2008). Marine Resources Assessment for the Cherry Point Operating Area.

U.S. Department of the Navy. (2010). Marine Species Monitoring for the U.S. Navy's Virginia Capes, Cherry Point and Jacksonville Range Complexes [Final Annual Report 2009]. (pp. 50) U.S. Department of the Navy, United States Fleet Forces Command.

U.S. Department of the Navy. (2012). Commander Task Force 20, 4th, and 6th Fleet Navy Marine Species Density Database, Naval Facilities Engineering Command Atlantic.

U.S. Fish and Wildlife Service. (2001). Florida manatee recovery plan, (*Trichechus manatus latirostris*), third revision. Atlanta, Georgia: U.S. Fish and Wildlife Service.

U.S. Fish and Wildlife Service. (2014). West Indian Manatee (*Trichechus manatus*); Florida Stock (Florida subspecies, *Trichecus manatus latirostris*) Stock Assessment Report. Jacksonville, Florida Field Office.

Waring, G.T., Josephson, E., Maze-Foley, K. & Rosel, P.E. (Eds.) (2013). U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2012 [Technical Memorandum]. (NMFS NE 219, pp. 425). Woods Hole, MA: National Oceanic and Atmospheric Administration.

Wartzok, D., Popper, A.N., Gordon, J. & Merrill, J. (2003). Factors affecting the responses of marine mammals to acoustic disturbance. *Marine Technology Society Journal, 37*(4), 6-15.

Washington State Department of Transportation. (2012). Underwater vibratory sound levels from a steel and plastic on steel pile installation at the Anacortes Ferry Terminal. Prepared by Jim Laughlin. March 2012.

Watkins, W.A. (1986). Whale reactions to human activities in Cape Cod waters. *Marine Mammal Science, 2*(4), 251-262.

Wells, R.S., Scott, M.D., & Irvine, A.B. (1987). The social structure of free-ranging bottlenose dolphins. Pages 247-305 in Genoways, H.H., Ed. Current Mammalogy. Volume 1. New York, New York: Plenum Press.

Wells, R. & Scott, M. (2002). Bottlenose Dolphins. In Perrin, W.; Wursig, B. and Thewissen, J. Encyclopedia of Marine Mammals. Academic Press. pp. 122–127.

Wells, R.S., Manire, C.A., Byrd, L., Smith, D.R., Gannon, J.G., Fauqiuer, D. & Mullin, K.D. (2009). Movements and dive patterns of a rehabilitated Risso's dolphin, *Grampus griseus*, in the Gulf of Mexico and Atlantic Ocean. *Marine Mammal Science, 25*(2), 420-429.

Wiley, D.N., Asmutis, R.A., Pitchford, T.D. & Gannon, D.P. (1995). Stranding and mortality of humpback whales, Megaptera novaeangliae, in the mid-Atlantic and southeast United States, 1985-1992. *Fishery Bulletin, 93*, 196-205.

Winn, H.E., Price, C.A. & Sorensen, P.W. (1986). The distributional biology of the right whale (*Eubalaena glacialis*) in the western North Atlantic. Reports of the International Whaling Commission (Special Issue 10):129-138.

8.2 Chapter 4 – Standard Operating Procedures and Mitigation Measures

U.S. Marine Corps. (2003). Environmental Handbook for Trainers. Marine Corps Base Camp Lejeune, North Carolina: U.S. Marine Corps.

U.S. Marine Corps. (2005). Protected Species Program (Base Order 5090.11). Marine Corps Base Camp Lejeune, North Carolina: U.S. Marine Corps.

U.S. Marine Corps. (2006). Use of Off-road Recreational Vehicles (Base Order 5090.111). Marine Corps Base Camp Lejeune, North Carolina: U.S. Marine Corps.

U.S. Marine Corps. (2007). Final Integrated Natural Resources Management Plan. Marine Corps Base Camp Lejeune, North Carolina: U.S. Marine Corps.

U.S. Marine Corps. (2011). Marine Corps Base, Camp Lejeune, Range and Training Regulations (BO 3570.1C), Standing Operating Procedures for Range Control. 2011, May 2.

U.S. Fish and Wildlife Service. (2002). Biological opinion on the effects of current use and modification of training areas, dune stabilization and continued recreational use of Onslow Beach, Marine Corps Base Camp Lejeune, North Carolina. Raleigh Field Office, Raleigh, NC. May 2002.

8.3 Chapter 5 – Cumulative Impacts

Council on Environmental Quality. (1997). Considering cumulative effects under the National Environmental Policy Act. Retrieved from http://ceq.hss.doe.gov/nepa/ccenepa/ccenepa.htm as accessed on 2012, April 26.

Dooling. R. (2002). Avian Hearing and the Avoidance of Wind Turbines. National Renewable Energy Laboratory Technical Report NREL/TP-500-30844.

Hazel, J., Lawler, I.R., Marsh, H. & Robson, S. (2007). Vessel speed increase collision risk for the green turtle *Chelonia mydas*. *Endangered Species Research, 3*, 105-113.

Lazar, B. & Gracan, R. (2011). Ingestion of marine debris by loggerhead sea turtles, Caretta caretta, in the Adriatic Sea. *Marine Pollution Bulletin, 62*(1), 43-47.

Lutcavage, M., Plotkin, P., Witherington, B. & Lutz, P. (1997). Human impacts on sea turtle survival. In P. Lutz and J. A. Musick (Eds.), The biology of sea turtles (Vol. 1, pp. 387-409). Boca Raton, FL: CRC Press.

McClure, C.J.W., Ware, H.E., Carlisle, J., Kaltenecker, G. & Barber, J.R. (2013). An experimental investigation into the effects of traffic noise on distributions of birds: avoiding the phantom road. *Proceedings of the Royal Society B, 280*(1773). doi: 10.1098/rspb.2013.2290

Macedo, G.R., Pires, T.T., Rostan, G., Goldberg, D.W., Leal, D.C. & Neto, A.F.G. (2011). Anthropogenic debris ingestion by sea turtles in the northern coast of Bahia, Brazil. *Ciencia Rural, 41*(11), 1938-1943.

Mrosovsky, N., Ryan, G.D. & James, M. C. (2009). Leatherback turtles: The menace of plastic. *Marine Pollution Bulletin, 58,* 287-289.

Wallace, B.P., Lewison, R.L., McDonald, S.L., McDonald, R.K., Kot, C.Y. & Kelez, S. (2010). Global patterns of sea turtle bycatch. *Conservation Letters, 3*(3), 131-142. doi: 10.1111/j.1755-263X.2010.00105.x.

8.4 Appendix B – Air Emission Estimates

U.S. Environmental Protection Agency. (1993). 40 C.F.R. Parts 6, 51, and 93. Determining conformity of federal actions to state or federal implementation plans. Federal Register. November 30, 1993. Revisions to Parts 51 and 93. Federal Register. March 24, 2010.

U.S. Environmental Protection Agency. (2008). Nonroad model emission factor worksheet. 2008, December 31.

U.S. Environmental Protection Agency. (2010). Watershed assessment, tracking & environmental results. 2010 waterbody report for Salliers Bay. Retrieved from: ofmpub.epa.gov/tmdl/attains_waterbody.control?p_au_id=NC19-41-3&p_cycle=2010&p_state=NC&p_report_type=#attainments as accessed on 2013, August 7.

8.5 Appendix C – Fundamentals of Acoustics

American National Standards Institute. (1994). ANSI S1.1-1994 (R 2004) American National Standard Acoustical Terminology (Vol. S1.1-1994 (R 2004). New York, NY: Acoustical Society of America.

Kinsler, L.E., Frey, A.R., Coppens, A.B., & Sanders, J.V. (1999). Fundamentals of Acoustics (4th ed.). New York, NY: Wiley.

Richardson, W.J., Greene, C.R., Malme, C.I. & Thomson, D.H. (1995). Marine Mammals and Noise: Academic Press.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., & Greene Jr., C.R. (2007). Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals, 33(4), 411-521.

Urick, R.J. (1983). *Principles of underwater sound*. Los Altos, CA: Peninsula Publishing.

Ward, W.D. (1997). Effects of high-intensity sound. In M. J. Crocker (Ed.), Encyclopedia of Acoustics (pp. 1497-1507). New York, NY: Wiley.

8.6 Appendix D – Bird Species Potentially Occurring in the JLOTS Study Area

Cape Fear Audubon Society. (2012). Bird lists from seasonal walks. Retrieved from http://www.capefearaudubon.org/HTML/events.htm as accessed on 2014, March 8.

U.S. Department of the Navy. (2013). Integrated Natural Resources Management Plan – Joint Expeditionary Base Little Creek.

U.S. Marine Corps. (2006). Integrated Natural Resources Management Plan (2007-2011) Marine Corps Base Camp Lejeune.

Virginia Beach Audubon Society. (2013). Pleasure House Point bird list. Retrieved from www.vabeach-audubon.org/php.html as accessed on 2014, March 8.

8.7 Appendix E – Reptiles and Amphibians Potentially Occurring in the JLOTS Study Area

Dorcas, M. (2007). Frogs and Toads of North Carolina. Retrieved from http://www.herpsofnc.org/herps_of_NC/anurans/anurans.html as accessed on 2014, March 10.

National Park Service. (n.d.) Cape Hatteras National Seashore – Reptiles. Retrieved from http://www.nps.gov/caha/naturescience/reptiles.htm as accessed on 2014, March 10.

U.S. Department of Defense. (In prep). Herpetofauna of Marine Corps Base Camp Lejeune. DoD Legacy Program.

U.S. Department of the Navy. (2013). Integrated Natural Resources Management Plan – Joint Expeditionary Base Little Creek.

8.8 Appendix F – Essential Fish Habitat Descriptors for the JLOTS Study Area

Mid-Atlantic Fishery Management Council. (1998a). Amendment 8 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. Dover, Delaware: Mid-Atlantic Fishery Management Council.

Mid-Atlantic Fishery Management Council. (1998b). Amendment 12 to the Surfclam and Ocean Quahog Fishery Management Plan. Dover, Delaware: Mid-Atlantic Fishery Management Council.

Mid-Atlantic Fishery Management Council. (2008). Amendment 9 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. Dover, Delaware: Mid-Atlantic Fishery Management Council.

Mid-Atlantic Fishery Management Council. (2010). Amendment 11 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. Dover, Delaware: Mid-Atlantic Fishery Management Council.

National Marine Fisheries Service. (2009). Amendment 1 to the consolidated Atlantic highly migratory species fishery management plan: Essential Fish Habitat.

New England Fisheries Management Council. (1998). Final amendment #11 to the northeast multispecies fishery management plan, amendment #9 to the Atlantic sea scallop fishery management plan, amendment #1 to the monkfish fishery management plan, amendment #1 to the Atlantic salmon fishery management plan, and components of the proposed Atlantic herring fishery management plan for Essential Fish Habitat. Newburyport, Massachusetts: New England Fisheries Management Council.

South Atlantic Fishery Management Council. (1998). Final habitat plan for the south Atlantic region: Essential Fish Habitat requirements for fishery management plans of the South Atlantic Fishery Management Council.

South Atlantic Fishery Management Council. (2012). Comprehensive ecosystem-based amendment 2 for the south Atlantic Region.

8.9 Appendix G – Marine Mammals Potentially Occurring in Waters off Virginia and North Carolina

U.S. Department of the Navy. (2012). Commander Task Force 20, 4th, and 6th Fleet Navy Marine Species Density Database, Naval Facilities Engineering Command Atlantic.

Waring, G.T., Josephson, E., Maze-Foley, K. & Rosel, P.E. (Eds.) (2013). U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2012 [Technical Memorandum]. (NMFS NE 219, pp. 425). Woods Hole, MA: National Oceanic and Atmospheric Administration.

8.10 Appendix H – Procedures for Reporting Stranded Sea Turtles and Marine Mammals at JEB Little Creek-Fort Story and Marine Corps Base Camp Lejeune

U.S. Fish and Wildlife Service. (2002). Biological opinion on the effects of current use and modification of training areas, dune stabilization and continued recreational use of Onslow Beach, Marine Corps Base Camp Lejeune, North Carolina. Raleigh Field Office, Raleigh, NC. May 2002.

A Agency Correspondence

Appendix A contains the correspondence between the Navy and federal and state agencies with respect to cooperating agency status (A.1), Coastal Zone Management Act (A.2), Endangered Species Act (A.3), Marine Mammal Protection Act (A.4), and National Historic Preservation Act (A.5).

A.1 Cooperating Agency Status

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, DC 20350-2000

5090
Ser N454/14U132742
3 September 2014

Ms. Jolie Harrison
Chief, Division of Permits and Conservation
National Marine Fisheries Service
1315 East West Highway
Silver Spring, MD 20910

Dear Ms. Harrison:

SUBJECT: ENVIRONMENTAL ASSESSMENT ASSOCIATED WITH JOINT LOGISTICS OVER-THE-SHORE EXERCISE

In accordance with the National Environmental Policy Act (NEPA), the Department of the Navy (Navy) is initiating the preparation of an Environmental Assessment (EA) to evaluate the potential environmental effects associated with military readiness training activities conducted in association with Joint Logistics Over-the-Shore (JLOTS) exercises at Joint Expeditionary Base Little Creek-Fort Story in Virginia Beach, Virginia and Marine Corps Base Camp Lejeune in Jacksonville, North Carolina.

Logistics over-the-shore is the transport of cargo and personnel from ships to shore in areas that do not have existing port facilities; a JLOTS occurs when multiple branches of the military conduct the activity. The Proposed Action is to conduct JLOTS training and associated field training exercises, including construction of the Elevated Causeway System (ELCAS). The ELCAS is a temporary pier which involves the use of an impact hammer and vibratory extractor for installation and removal.

An important aspect of the JLOTS EA will be the analysis of the acoustic effects to marine species protected under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). To complete the analysis required by the permitting and consultation processes, the Navy and the National Marine Fisheries Service (NMFS) will need to work together. Therefore, in accordance with the Council on Environmental Quality's (CEQ's) NEPA guidelines (specifically 40 C.F.R. Part 1501) and

5090
Ser N454/14U132742
3 September 2014

CEQ's 2002 guidance on cooperating agencies, Navy requests that NMFS serve as a cooperating agency for the development of the JLOTS EA.

As the lead agency, the Navy will be responsible for overseeing preparation of the EA that will include, but not be limited to, the following:

a. Gathering the necessary background information and preparing the necessary permit applications associated with the proposed action.

b. Working with NMFS personnel to determine the method of estimating potential effects to protected marine species, including threatened and endangered species.

c. Determining the scope of the EA, including the alternatives evaluated.

d. Circulating the NEPA document to the public, including any other interested parties.

e. Compiling any comments on the NEPA document received from the public.

f. Maintaining an administrative record and responding to any Freedom of Information Act requests relating to the EA.

Navy respectfully requests that NMFS, in its role as a cooperating agency, provide support as follows:

a. Provide timely comments on working drafts of the EA. The Navy requests that comments on draft EA documents be provided within 30 working days.

b. Respond to Navy requests for information, in particular related to review of the acoustic effects analysis and evaluation of the effectiveness of protection and mitigation measures.

c. Adhere to the overall schedule as agreed upon by the Navy and NMFS.

d. Provide a written response to this request.

5090
Ser N454/14U132742
3 September 2014

The Navy views this agreement as important to the successful completion of the environmental planning process for the JLOTS EA. NMFS assistance will be invaluable in this endeavor.

Sincerely,

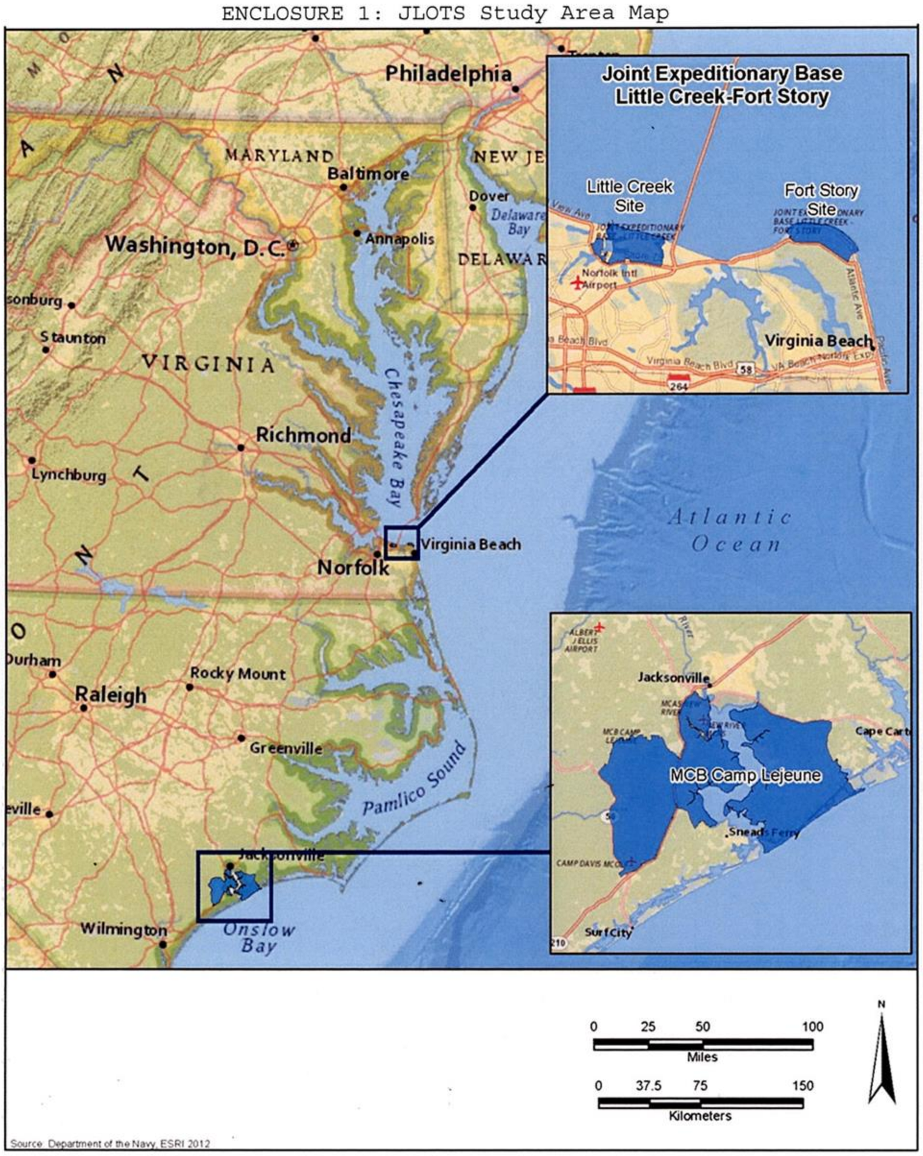
Karnig Ohannessian

KARNIG H. OHANNESSIAN
Deputy Director,
Energy and Environmental
Readiness Division (OPNAV N45)

Enclosures: 1. JLOTS Study Area Map
2. Notional Schedule of Events

Copy to:
ASN (EI&E)
DASN (E)
OAGC (EI&E)
Commander, U.S. Fleet Forces Command (N46)
Commander, Navy Installations Command (N45)

ENCLOSURE 1: JLOTS Study Area Map



Enclosure (1)

Enclosure 2:
NOTIONAL SCHEDULE OF EVENTS
ENVIRONMENTAL ASSESSMENT FOR
JOINT LOGISTICS OVER-THE-SHORE TRAINING
JEB LITTLE CREEK-FORT STORY
MCB CAMP LEJEUNE

Draft EA Version 5 Review	13 Aug - 24 Sep 14
Request for Marine Mammal Protection Act Letter of Authorization to National Marine Fisheries Service	13 Aug 2014
Draft EA Version 5 Tiger Team Meeting	29 Sep 2014
Public Release EA Red-Line Review	3 - 14 Nov 2014
Public Review of Draft EA	6 - 21 Jan 2015
Pre-Final EA Fatal Flaw Review	13 - 26 Feb 2015
Final EA and Draft FONSI Delivered	6 Mar 2015
Navy Signs FONSI	10 Jun 2015

Enclosure (2)

A.2 Coastal Zone Management Act

Under the CZMA, states have 60 days to respond to federal consistency determinations or their concurrence is assumed. Consistency determinations were submitted to Virginia and North Carolina. A letter indicating concurrence was received from Virginia on 19 November 2013. Concurrence was assumed for North Carolina.

A.2.1 Virginia

DEPARTMENT OF THE NAVY
COMMANDER
U.S. FLEET FORCES COMMAND
1562 MITSCHER AVENUE SUITE 250
NORFOLK, VA 23551-2487

5090
Ser N46/256
September 24, 2013

Ms. Ellie Irons
Department of Environmental Quality
629 E. Main Street
Richmond, VA 23219

Dear Ms. Irons:

In accordance with the Coastal Zone Management Act (16 United States Code [U.S.C.] § 1456(c) and 15 Code of Federal Regulations Part 930 Subpart C), the United States Department of the Navy (Navy) requests concurrence with its Federal Consistency Determination for proposed Joint Logistics Over-the-Shore (JLOTS) activities. JLOTS is the movement of cargo from ship to shore including the construction of temporary expeditionary piers. The Proposed Action is to conduct JLOTS training at two locations at Joint Expeditionary Base Little Creek-Fort Story, Virginia Beach, Virginia and at Marine Corps Base Camp Lejeune, Jacksonville, North Carolina. The enclosed Draft Environmental Assessment (EA) contains analysis of potential impacts from JLOTS training.

The Navy reviewed Virginia's Coastal Management Program in preparing the enclosed consistency determination for activities conducted at Joint Expeditionary Base Little Creek-Fort Story. Based on the analyses, the Navy has determined that the Proposed Action will be consistent to the maximum extent practicable with Virginia's Coastal Management Program. The Navy cannot be fully consistent with the program because doing so would limit the Navy's ability to fulfill its mission as mandated by federal law (Title 10 U.S.C. § 5062), which charges the Chief of Naval Operations with the responsibility for ensuring the readiness of the nation's naval forces.

We look forward to your timely review of and concurrence with the Navy's determination. My point of contact for this matter is Ms. Laura Busch and she can be reached at 757-836-8471 or laura.busch@navy.mil.

Sincerely,

Joseph W Murphy

J. W. MURPHY
Deputy Chief of Staff
for Fleet Installations
and Environmental Readiness

Enclosures: 1. Hard copy of the Draft EA
2. Federal Consistency Determination

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Douglas W. Domenech
Secretary of Natural Resources

Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
TDD (804) 698-4021
www.deq.virginia.gov

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

November 19, 2013

Mr. J.W. Murphy
U.S. Fleet Forces Command
Department of the Navy
1562 Mitscher Avenue, Suite 250
Norfolk, Virginia 23551-2487

RE: Federal Consistency Determination for the Joint Logistics Over-the-Shore Training, Joint Expeditionary Base Little Creek/Fort Story, City of Virginia Beach, DEQ 13-176F.

Dear Mr. Murphy:

The Commonwealth of Virginia has completed its review of the Federal Consistency Determination (FCD) for the above-referenced project. The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of Federal Consistency Determinations and responding to appropriate officials on behalf of the Commonwealth. This letter is in response to your submission dated September 24, 2013 (received on October 1, 2013) requesting concurrence with the Federal Consistency Determination prepared by the Department of the Navy. The following agencies, locality, and planning district commission participated in this review:

Department of Environmental Quality
Department of Game and Inland Fisheries
Department of Conservation and Recreation
Virginia Marine Resources Commission
Department of Health
Department of Historic Resources
City of Virginia Beach
Hampton Roads Planning District Commission

In addition, the Department of Agriculture and Consumer Services was invited to comment on the proposal.

PROJECT DESCRIPTION

The Department of the Navy (Navy) is proposing to conduct annual Joint Logistics Over-the-Shore (JLOTS) training at Joint Expeditionary Base (JEB) Little Creek-Fort Story in the City of Virginia Beach. Logistics over-the-shore is the process of transporting cargo and personnel from ships to shore in areas that do not have existing deep-draft fixed port facilities. The training consists of several, coordinated field training exercises (FTXs) including:

- use of the improved Navy lighterage system to move personnel, cargo containers, and rolling stock directly from ships anchored offshore to land;
- construction and use of the elevated causeway system (ELCAS), a temporary pier constructed from the beach into the water past the surf zone;
- construction and use of the administrative pier, a floating temporary pier that supports refueling as well as maintenance activities for improved Navy lighterage system components and small boats;
- use of the offshore petroleum discharge system, amphibious bulk liquid transfer system, and inland petroleum discharge system, which are used to transfer potable water (standing in for petroleum and other liquids) from ship to shore;
- use of the tactical water purification system, an onshore unit that uses reverse osmosis to desalinate water extracted from the ocean offshore and make it potable;
- cargo marshalling and movement, rolling stock and containerized cargo (equipment and supplies) that are moved to shore; and
- tent encampment, where personnel participating in JLOTS training are temporarily billeted in tents.

PUBLIC PARTICIPATION

In accordance with 15 CFR §930.2, the public was invited to participate in the review of the FCD. Public notice of this proposed action was published on the DEQ website from October 16, 2013 through November 5, 2013. No public comments were received in response to the notice.

FEDERAL CONSITENCY UNDER THE COASTAL ZONE MANAGEMENT ACT

Pursuant to the Coastal Zone Management Act of 1972 (§ 1456(c)), as amended, and the federal consistency regulations implementing the CZMA (15 CFR Part 930, Subpart C, § 930.30 *et seq.*) federal actions that can have reasonably foreseeable effects on Virginia's coastal uses or resources must be conducted in a manner which is consistent, to the maximum extent practicable, with the Virginia Coastal Zone Management Program (VCP). The VCP is comprised of a network of programs administered by several agencies. In order to be consistent with the VCP, the federal agency activities must be consistent with all the applicable enforceable policies of the VCP prior to commencing the project.

FEDERAL CONSISTENCY CONCURRENCE

Based on our review of the Navy's consistency determination and the comments submitted by agencies administering the enforceable policies of the VCP, DEQ concurs that the proposal is consistent with the VCP provided all applicable permits and approvals are obtained as described below. However, other state approvals which may apply to this project are not included in this consistency concurrence. Therefore, the Navy must ensure that this project is constructed and operated in accordance with all applicable federal, state, and local laws and regulations.

FEDERAL CONSISTENCY ANALYSIS

According to information in the FCD, the proposed activity would have no effect on the following enforceable policies: fisheries management; dunes management; and point source pollution control. The resource agencies that are responsible for the administration of the enforceable policies of the VCP generally agree with the Navy's determination. The Navy must ensure that the proposed action is consistent with the aforementioned policies. The analysis which follows responds to the Navy's discussion of the enforceable policies of the VCP that apply to this project and review comments submitted by agencies that administer the enforceable policies.

1. Fisheries Management. According to the FCD (page 15), no marine fish, shellfish, or organisms would be removed from the waterways under the proposed action.

1(a) Agency Jurisdiction. The Department of Game and Inland Fisheries (DGIF) (Virginia Code §29.1-100 to §29.1-570) and the Virginia Marine Resources Commission (VMRC) (Virginia Code §28.2-200 to §28.2-713) administer the fisheries management enforceable policy of the VCP. In addition, the Virginia Department of Health (VDH) Division of Shellfish Sanitation (DSS) is responsible for protecting the health of the consumers of molluscan shellfish and crustacea by ensuring that shellfish growing waters are properly classified for harvesting, and that molluscan shellfish and crustacea processing facilities meet sanitation standards.

1(b) Agency Findings.

(i) Virginia Department of Game and Inland Fisheries

DGIF defers to the VMRC regarding consistency with the fisheries management enforceable policy of the VCP, as the training sites drain to marine waters.

(ii) Virginia Marine Resources Commission

According the VMRC, the project will be reviewed under the Joint Permit Application (JPA) process to include a full public and agency interest review. VMRC did not indicate any concerns with potential project impacts to fisheries under its jurisdiction and notes that similar projects have been permitted in the past.

(iii) Department of Health

VDH-DSS finds that the project is located in both condemned and approved shellfish growing waters. However, the activity as described will not require a change in the size or type of the existing closures.

1(c) Conclusion. The proposal is consistent with the fisheries management enforceable policy of the VCP.

For additional information, contact DGIF, Amy Ewing at (804) 367-2211; VMRC, Justin Worrell at (757) 247-8063; or VDH-DSS, Keith Skiles at (804) 864-7487.

2. Subaqueous Lands Management. The FCD (page 16) states that the proposed action would temporarily make use of subaqueous lands off Anzio Beach (Little Creek) or Omaha or Utah Beach (Fort Story) through the construction of the ELCAS, for which piles would be driven into the seabed. The total affected area would be approximately 87,000 square feet. After the exercise is complete, the ELCAS would be dismantled and the piles would be removed. According to the FCD, while use of the ELCAS is the type of activity that requires a permit under the policy, the federal government has not waived sovereign immunity for any permit or enforcement penalties imposed by the state statute.

2(a) Agency Jurisdiction. Pursuant to Section 28.2-1204 of the Code of Virginia the Virginia Marine Resources Commission has jurisdiction over any encroachments in, on, or over any state-owned rivers, streams, or creeks in the Commonwealth. Accordingly, any portion of the project involving encroachments channelward of mean low water below the fall line may require a permit.

VMRC serves as the clearinghouse for the JPA used by:

- VMRC for encroachments on or over state-owned subaqueous beds as well as tidal wetlands;
- U.S. Army Corps of Engineers (Corps) for issuing permits pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act;
- DEQ for issuance of a Virginia Water Protection Permit; and
- local wetlands board for impacts to wetlands.

2(b) Agency Findings. VMRC finds that a permit will be required for project activities impacting subaqueous lands at either Fort Story or Little Creek. VMRC notes that similar projects from the Army and the Navy have been permitted in the past by VMRC for impacts to state-owned submerged bottomlands. VMRC will ensure that the application and drawings are forwarded to the City of Virginia Beach, the U.S. Army Corps, and the DEQ. VMRC will then initiate a public interest review and request comments from various state agencies. After the comment periods have ended and local approvals have been granted, VMRC staff will determine if a permit will be issued to impact state-owned submerged bottomlands.

2(c) Conclusion. For consistency with the VCP, the proposed action must be consistent with the subaqueous management enforceable policy of the VCP.

3. Wetlands Management. According to the FCD (page 17), the proposed action does not include activities in vegetated wetlands, although non-vegetated intertidal wetlands will be affected by the construction of temporary pier structures. In addition, trenches will be excavated in the intertidal zone to stabilize the temporary piers. Impacts from in-water activities (movement of vessels, craft; the Improved Navy Lighterage System platforms; and construction of the temporary piers) would be localized and temporary, and the area would quickly return to conditions similar to pre-training conditions.

3(a) Agency Jurisdiction. The wetlands management enforceable policy is administered by the Virginia Marine Resources Commission for tidal wetlands (Virginia Code 28.2-1301 through 28.2-1320) and the Department of Environmental Quality through the Virginia Water Protection Permit program for tidal and non-tidal wetlands (Virginia Code §62.1-44.15:5 and Water Quality Certification pursuant to Section 401 of the Clean Water Act).

3(b) Agency Findings.

(i) Department of Environmental Quality

The Virginia Water Protection Permit Program (VWPP) program at the DEQ Tidewater Regional Office (TRO) finds that there is the potential for wetlands to be present at the Little Creek site in the area identified as "Mudflats" described in the Environmental Assessment accompanying the FCD. However, the presence of wetlands at Fort Story is unlikely

(ii) Virginia Marine Resources Commission

According to VMRC, the Virginia Beach Wetlands Board will need to approve the project as it appears to include impacts to tidal wetlands and jurisdictional beach areas.

3(c) Recommendations. The project must comply with section 404 (b)(1) guidelines of the Clean Water Act and with the Commonwealth's wetlands mitigation policies. Both federal and state guidelines recommend avoidance and minimization of wetlands impacts as the first steps in the mitigation process.

- Operate machinery and construction vehicles outside of stream-beds and wetlands; use synthetic mats when in-stream work is unavoidable;
- Place heavy equipment, located in temporarily impacted wetland areas, on mats,

geotextile fabric, or use other suitable measures to minimize soil disturbance, to the maximum extent practicable.

- Restore all temporarily disturbed wetland areas to pre-construction conditions and plant or seed with appropriate wetlands vegetation in accordance with the cover type (emergent, scrub-shrub, or forested). The applicant should take all appropriate measures to promote re-vegetation of these areas. Stabilization and restoration efforts should occur immediately after the temporary disturbance of each wetland area instead of waiting until the entire project has been completed.
- Place all materials which are temporarily stockpiled in wetlands, designated for use for the immediate stabilization of wetlands, on mats, geotextile fabric in order to prevent entry in state waters. These materials should be managed in a manner that prevents leachates from entering state waters and must be entirely removed within thirty days following completion of that construction activity. The disturbed areas should be returned to their original contours, stabilized within thirty days following removal of the stockpile, and restored to the original vegetated state.
- Flag or mark all non-impacted surface waters within the project or right-of-way limits that are within 50 feet of any clearing, grading, or filling activities for the life of the construction activity within that area. The project proponent should notify all contractors that these marked areas are surface waters where no activities are to occur.
- Employ measures to prevent spills of fuels or lubricants into state waters.

3(d) Requirements.

(i) Department of Environmental Quality

The Navy should conduct a wetland delineation at the "Mudflats" area by a competent wetland delineator and have the delineation confirmed by the Corps. If it is determined that the project will impact wetlands, the project will require authorization from DEQ from the issuance of a VWPP.

(ii) Virginia Marine Resources Commission

A JPA will need to be completed by the Navy and submitted to the VMRC for review. VMRC will ensure that the application and drawings are forwarded to the City of Virginia Beach Wetlands Board.

3(e) Conclusion. The project will be consistent with the wetlands management enforceable policy of the VCP, provided the applicant obtains and complies with applicable permits and authorizations.

4. Nonpoint Source Pollution Control. According to the FCD (page 18), soil-disturbing activities are limited to the shoreline excavations needed to stabilize the temporary piers and minor site preparation at the locations to be used for the inland encampments (e.g., construction of percolation pits). The sand from the shoreline excavations will be stockpiled above the mean high water mark and used to backfill the trenches after the temporary piers are removed. The document concludes that, based on the surface area of the proposed excavation activities, the area of disturbance does not exceed the threshold requiring a permit under the Virginia's Erosion and Sediment Control Program.

4(a) Agency Jurisdiction. Effective July 1, 2013, the Department of Environmental Quality administers the *Virginia Erosion and Sediment Control Law and Regulations* (*VESCL&R*) and *Virginia Stormwater Management Law and Regulations* (*VSWML&R*). In addition, DEQ is responsible for the issuance, denial, revocation, termination and enforcement of the Virginia Stormwater Management Program (VSMP) General Permit for Stormwater Discharges from Construction Activities related to municipal separate storm sewer systems (MS4s) and construction activities for the control of stormwater discharges from MS4s and land disturbing activities under the Virginia Stormwater Management Program. Note that these programs were previously administered by the Department of Conservation and Recreation.

4(b) Requirements.

(i) Erosion and Sediment Control and Stormwater Management Plans

According to DEQ, the Navy and its authorized agents conducting regulated land-disturbing activities on private and public lands in the state must comply with the *Virginia Erosion and Sediment Control Law and Regulations* (*VESCL&R*) and *Virginia Stormwater Management Law and Regulations* (*VSWML&R*), including coverage under the general permit for stormwater discharge from construction activities, and other applicable federal nonpoint source pollution mandates (e.g. Clean Water Act-Section 313, federal consistency under the Coastal Zone Management Act). Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, borrow areas, soil stockpiles, and related land-disturbing activities that result in the total land disturbance of equal to or greater than 10,000 square feet (2,500 square feet in Chesapeake Bay Preservation Area) would be regulated by *VESCL&R*. Accordingly, the applicant must prepare and implement an erosion and sediment control (ESC) plan to ensure compliance with state law and regulations. The ESC plan is submitted to the DEQ Tidewater Regional Office that serves the area where the project is located for review for compliance. The applicant is ultimately responsible for achieving project compliance through oversight of on-site contractors, regular field inspection, prompt action against non-compliant sites, and other mechanisms consistent with agency policy. [Reference: VESCL 62.1-44.15 *et seq.*]

(ii) Virginia Stormwater Management Program General Permit for Stormwater Discharges from Construction Activities

The operator or owner of a construction project involving land-disturbing activities equal to one acre (2,500 square feet or more in areas analogous to Chesapeake Bay Preservation Area) is required to register for coverage under the General Permit for

Discharges of Stormwater from Construction Activities and develop a project-specific stormwater pollution prevention plan (SWPPP). The SWPPP must be prepared prior to submission of the registration statement for coverage under the general permit and the SWPPP must address water quality and quantity in accordance with the *VSMP Permit Regulations*. General information and registration forms for the General Permit are available on DEQ's website at http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/ConstructionGeneralPermit.aspx. [Reference: Virginia Stormwater Management *Act* 62.1-44.15 *et seq.*] VSMP Permit Regulations 9 VAC 25-870-10 *et seq.*].

4(c) Conclusion. The proposed action would be consistent with the nonpoint source pollution control enforceable policy of the VCP, provided the project complies with applicable ESC and SWM requirements.

5. Shoreline Sanitation. The FCD (page 19) states that the percolation pits would be used to dispose of greywater (e.g., water for field showers, kitchens, and laundries). However, they do not meet the definition of "alternative discharging sewage systems," which is any device or system which results in a point source discharge of treated sewage under Virginia Code §32.1-163 as administered by the Virginia Department of Health (VDH). The document concludes that since the percolation pits do not meet the definition of an "alternative discharging sewage system," no permit would be required from VDH.

5(a) Agency Jurisdiction. The purpose of this program is to regulate the installation of septic tanks, set standards concerning soil types suitable for septic tanks, and specify minimum distances that tanks must be placed away from streams, rivers, and other waters of the Commonwealth. This program is administered by the Department of Health Division of Onsite Sewage and Water Services (DOSWS) under Virginia Code §32.1-164 through §32.1-165. VDH is responsible for adopting and implementing regulations for marinas, private wells, and onsite wastewater treatment and disposal.

5(b) Agency Findings. VDH finds that the percolation pits would not be considered an alternative onsite sewage system. However, they would likely be considered a treatment works, which is subject to regulation and permitting in accordance with Virginia Code Sections 32.1-164 A. and B.

5(c) Recommendation. The Navy should coordinate with VDH under Virginia Code Sections 32.1-164 A. and B through its office at the Virginia Beach Department of Public Health. VDH may conduct an engineering review of the proposed percolation pits.

5(d) Conclusion. To be consistent with the shoreline sanitation enforceable policy of the VCP, the Navy should coordinate with VDH prior to implementation of the project.

6. Air Pollution Control. According to the FCD (page 20), the total annual emissions the proposed action would generate have been estimated and would not exceed the applicable *de minimis* levels for volatile organic compounds and nitrogen oxides, which are the precursors of ozone. Therefore, the General Conformity requirements of the Clean Air Act do not apply and the proposed action is consistent with the Hampton Roads ozone maintenance plan.

6(a) Agency Jurisdiction. The program implements the federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards. This program is administered by the State Air Pollution Control Board (DEQ) (Virginia Code §10-1.1300 through §10.1-1320).

6(b) Agency Findings. According to the DEQ Air Division, the project site is located in the Hampton Roads ozone (O_3) maintenance area and an emission control area for the contributors to ozone pollution, which are volatile organic compounds (VOCs) and nitrogen oxides (NO_x).

6(c) Recommendations. The Navy should take all reasonable precautions to limit emissions of VOCs and NO_x, principally by controlling or limiting the burning of fossil fuels.

6(d) Requirements.

(i) Fugitive Dust

During construction, fugitive dust must be kept to a minimum by using control methods outlined in 9 VAC 5-50-60 *et seq.* of the *Regulations for the Control and Abatement of Air Pollution*. These precautions include, but are not limited to, the following:

- Use, where possible, of water or chemicals for dust control;
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials;
- Covering of open equipment for conveying materials; and
- Prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion.

(ii) Open Burning

If project activities include the open burning or use of special incineration devices for the disposal of debris, this activity must meet the requirements of 9 VAC 5-130-10 through 9 VAC 5-130-60 and 9 VAC 5-130-100of the *Regulations* for open burning, and it may require a permit. The *Regulations* provide for, but do not require, the local adoption of a model ordinance concerning open burning. The Navy should contact City of Virginia Beach fire officials to determine what local requirements, if any, exist.

6(e) Conclusion. The project is consistent with the air pollution control enforceable policy of the VCP provided the Navy obtains and complies with all applicable approvals prior to implementation of the project.

7. Coastal Lands Management. According to the FCD (page 15), while certain localities may have designated Chesapeake Bay Preservation Areas (CBPAs) on Navy property, such designations are not binding on the federal government. Accordingly, the document finds that no designated Resource Protection Areas (RPAs) or Resource Management Areas (RMAs) exist on JEB Fort Story. However, the Navy attempts to demonstrate consistency with the relevant pollution reduction goals identified in the CBPA. The document concludes that the proposed activity will be implemented pursuant to the laws and policies implementing the coastal lands management enforceable policy.

7(a) Agency Jurisdiction. Effective July 1, 2013, the Department of Environmental Quality administers the coastal lands management enforceable policy of the VCP which is governed by the Chesapeake Bay Preservation Act (Bay Act) (Virginia Code §62.1-44.15 *et seq.*) and *Chesapeake Bay Preservation Area Designation and Management Regulations* (*Regulations*) (9 VAC 25-830-10 *et seq.*). Note that this enforceable policy was previously administered by the Department of Conservation and Recreation.

7(b) Agency Findings. DEQ finds that the project includes temporary impacts to areas that are analogous to Resource Protection Areas (RPAs) (within tidal wetlands, tidal shores, nontidal wetlands that are connected and contiguous to tidal wetlands or water bodies with perennial flow or within 100 feet of the prior listed features or any water body with perennial flow). These temporary impacts would be mitigated by restoration activities after the termination of a specific practice event.

7(c) Conclusion. As the activities are temporary in nature, infrequent in occurrence, and mitigated by restoration activities, DEQ concludes that the proposal is consistent with the coastal lands management enforceable policy of the VCP as administered through the Bay Act and *Regulations*.

ADDITIONAL ENVIRONMENTAL CONSIDERATIONS

In addition to the enforceable policies of the VCP, comments were also provided with respect to applicable requirements and recommendations of the following programs:

1(a) Agency Jurisdiction. Solid and hazardous wastes in Virginia are regulated by the Virginia Department of Environmental Quality, the Virginia Waste Management Board (VWMB) and the U.S. Environmental Protection Agency. They administer programs created by the federal Resource Conservation and Recovery Act, Comprehensive Environmental Response Compensation and Liability Act, commonly called Superfund, and the Virginia Waste Management Act. DEQ administers regulations established by the VWMB and reviews permit applications for completeness and conformance with facility standards and financial assurance requirements. All Virginia localities are required, under the Solid Waste Management Planning Regulations, to identify the strategies they will follow on the management of their solid wastes to include items such as facility siting, long-term (20-year) use, and alternative programs such as materials recycling and composting.

1(b) Agency Findings. The DEQ Division of Land Protection and Revitalization (DLPR) conducted a cursory search under zip codes 23459 and 23451 and identified four Resource Conservation and Recovery Act (RCRA) hazardous waste sites, one Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) site, five Formerly Used Defense Sites (FUDS) and seven petroleum release sites in the same zip codes (23459 and 23451) that might impact or be impacted by the proposed project. A list of those sites is contained in DEQ-DLPR's detailed comments attached to this response.

1(c) Recommendations.

(i) RCRA and CERCLA Sites

The following websites may be accessed to locate additional information for the RCRA and CERCLA sites using their identification numbers:

http://www.epa.gov/superfund/sites/cursites/index.htm or
http://www.epa.gov/enviro/html/rcris/rcris_query_java.html.

The DEQ's Federal Facilities Restoration Program recommends contacting the Remedial Project Manager (RPM) at NAVFAC MIDLANT for information concerning CERCLA obligations at JEB Little Creek/Fort Story.

(ii) Petroleum Release Sites

The petroleum release sites should be evaluated by the project engineer or manager to establish the exact location of the release and the nature and extent of the petroleum release and the potential to impact the proposed project. Contact the DEQ Tidewater Regional Office at (757) 518-2115 for further information and the administrative records of the sites which are in close proximity to the proposed project.

(iii) Pollution Prevention

DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

1(d) Requirements. Any soil that is suspected of contamination or wastes that are generated during construction-related activities must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations. All construction and demolition debris must be characterized in accordance with the *Virginia Hazardous Waste Management Regulations* prior to disposal at an appropriate facility.

Questions or requests for further information regarding these comments may be directed to DEQ-LPRD, Steve Coe at (804) 698-4029.

2. Natural Heritage Resources.

2(a) Agency Jurisdiction.

(i) Department of Conservation and Recreation

The mission of the Virginia Department of Conservation and Recreation (DCR) is to conserve Virginia's natural and recreational resources. The DCR-Natural Heritage Program's (DCR-DNH) mission is conserving Virginia's biodiversity through inventory, protection, and stewardship. The *Virginia Natural Area Preserves Act*, 10.1-209 through 217 of the *Code of Virginia*, was passed in 1989 and codified DCR's powers and duties related to statewide biological inventory: maintaining a statewide database for conservation planning and project review, land protection for the conservation of biodiversity, and the protection and ecological management of natural heritage resources (the habitats of rare, threatened, and endangered species, significant natural communities, geologic sites, and other natural features).

(ii) Department of Agriculture and Consumer Services

The Endangered Plant and Insect Species Act of 1979, Chapter 39, §3.1-102- through 1030 of the *Code of Virginia*, as amended, authorizes the Virginia Department of Agriculture and Consumer Services (VDACS) to conserve, protect and manage endangered species of plants and insects. The VDACS Virginia Endangered Plant and Insect Species Program personnel cooperates with the U.S. Fish and Wildlife Service, DCR-DNH and other agencies and organizations on the recovery, protection or conservation of listed threatened or endangered species and designated plant and insect species that are rare throughout their worldwide ranges. In those instances where recovery plans, developed by the U.S. Fish and Wildlife Service, are available, adherence to the order and tasks outlines in the plans are followed to the extent possible.

2(b) Agency Findings. The DCR Biotics Data System documents the presence of natural heritage resources in the project area. However, due to the scope of the activity and the distance to the resources, DCR-DNH does not anticipate that this project will adversely impact these natural heritage resources.

(ii) Threatened and Endangered Plant and Insect Species

VDACS has regulatory authority to conserve rare and endangered plant and insect species through the Virginia Endangered Plant and Insect Species Act. Under a Memorandum of Agreement established between VDACS and DCR, DCR has the authority to report for VDACS on state-listed plant and insect species. DCR-DNH finds that the current activity will not affect any documented state-listed plants or insects.

(iii) State Natural Area Preserves

DCR files do not indicate the presence of any State Natural Area Preserves under the agency's jurisdiction in the project vicinity.

2(c) Recommendations. The Navy should contact DCR-DNH to secure updated information on natural heritage resources if a significant amount of time passes before the project is implemented. New and updated information is continually added to the Biotics Data System.

3. Wildlife Resources and Protected Species.

3(a) Agency Jurisdiction. The Department of Game and Inland Fisheries (DGIF), as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over wildlife and freshwater fish, including state or federally listed endangered or threatened species, but excluding listed insects (*Virginia Code* Title 29.1). The DGIF is a consulting agency under the U.S. Fish and Wildlife Coordination Act (16 U.S.C. sections 661 *et seq.*), and provides environmental analysis of projects or permit applications coordinated through DEQ and several other state and federal agencies. DGIF determines likely impacts upon fish and wildlife resources and habitat, and recommends appropriate measures to avoid, reduce, or compensate for those impacts.

3(b) Agency Findings. DGIF did not indicate that the project would adversely impact wildlife resources and protected species under its jurisdiction.

3(c) Recommendations. DGIF recommends the Navy address possible impacts upon federally-listed species (sea turtles and marine mammals) known from the training areas and coordinate with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NOAA Fisheries) regarding these proposed activities.

For additional information regarding these comments, contact DGIF, Amy Ewing at (804) 367-2211.

4. Water Supply.

4(a) Agency Jurisdiction. The Virginia Department of Health (VDH), Office of Drinking Water (ODW) reviews projects for the potential to impact public drinking water sources (groundwater wells, springs and surface water intakes).

4(b) Agency Comments. VDH reviewed the FCD and found that there are no groundwater wells within a 1 mile radius of the project site and one surface water intake (City of Norfolk, In-Town Lakes Intake) located approximately 3.5 miles from the project site. The project is not within Zone 1 (up to 5 miles into the watershed) or Zone 2 (greater than 5 miles into the watershed) of any public surface water sources.

4(c) Conclusion. VDH concludes that there are no apparent impacts to public drinking water sources due to this project.

Contact VDH, Ezekiel Dufore at (804) 864-7201 for additional information.

5. Historic and Archaeological Resources.

5(a) Agency Jurisdiction. The Department of Historic Resources (DHR) conducts reviews of projects to determine their effect on historic structures or cultural resources under its jurisdiction. DHR, as the designated State's Historic Preservation Office, ensures that federal actions comply with *Section 106 of the National Historic Preservation Act of 1966* (NHPA), as amended, and its implementing regulation at 36 CFR Part 800. The NHPA requires federal agencies to consider the effects of federal projects on properties that are listed or eligible for listing on the National Register of Historic Places. Section 106 also applies if there are any federal involvements, such as licenses, permits, approvals or funding.

5(b) Agency Findings. Pursuant to Section 106 of the National Historic Preservation Act, DHR has been in direct consultation with the Navy regarding this project and the parties have reached consensus that the proposed action will not affect historic properties.

For additional information, contact DHR, Roger Kirchen at (804) 482-6091.

6. Local and Regional Comments.

6(a) Agency Jurisdiction. In accordance with the Code of Virginia, Section 15.2-4207, planning district commissions encourage and facilitate local government cooperation and state-local cooperation in addressing, on a regional basis, problems of greater than local significance. The cooperation resulting from this is intended to facilitate the recognition and analysis of regional opportunities and take account of regional influences in planning and implementing public policies and services. Planning district commissions promote the orderly and efficient development of the physical, social and economic elements of the districts by planning, and encouraging and assisting localities to plan, for the future.

6(b) Agency Findings.

(i) City of Virginia Beach

The City of Virginia Beach reviewed the project has no substantive comments offer.

(ii) Hampton Roads Planning District Commission

The staff of the Hampton Roads Planning District Commission (HRPDC) reviewed the consistency determination and contacted the City of Virginia Beach. HRPDC finds that the proposal appears to be consistent with regional plans and policies.

For more information, contact the City of Virginia Beach, Clay Bernick at (757) 385-4899 or HRPDC, Dwight Farmer at (757) 420-8300.

REGULATORY AND COORDINATION NEEDS

1. Fisheries Management. The submission of a Joint Permit Application by the Navy will include a review by VMRC of potential impacts to finfish and shellfish resources. For additional information and coordination, contact VRMC, Justin Worrell at (757) 247-8063.

2. Subaqueous Lands Management. The proposal must be consistent with the subaqueous lands management enforceable policy of the VCP as administered by the Virginia Marine Resources Commission pursuant to Section 28.2-1200 *et seq.* of the *Code of Virginia*. VMRC indicated that proposed jurisdictional impacts will require the submission of a Joint Permit Application for review and approval by VMRC. For additional information and coordination, contact Justin Worrell, VMRC at (757) 247-8063.

3. Wetlands Management. Surface water impacts, including wetlands, will require authorization through the Virginia Water Protection Permit program pursuant to Virginia Code §62.1-44.15:5. Review under the VWPP program is accomplished through the Joint Permit Application process involving the VMRC, DEQ, Corps, and local wetlands boards. Tidal wetland impacts will require review by the Virginia Beach Wetlands Board. For additional information and coordination regarding the VWPP, contact DEQ-TRO, Bert Parolari at (757) 518-2166. Coordination with the Virginia Beach Wetlands Board may be accomplished by contacting the Environment and Sustainability Office at (757) 385-4621 and/or VMRC, Justin Worrell at (757) 247-8063.

4. Shoreline Sanitation. The construction and operation of the percolation pits for the treatment of greywater must be consistent with the shoreline sanitation enforceable policy of the VCP. The pits may be subject to regulation and permitting in accordance with Virginia Code Sections 32.1-164 A. and B. The Navy should coordinate with VDH through its office at the Virginia Beach Department of Public Health, Environmental Health at (757) 518-2646.

5. Nonpoint Source Pollution Control.

5(a) Erosion and Sediment Control and Stormwater Management Plans. This project must comply with Virginia's *Erosion and Sediment Control Law* (Virginia Code § 62.1-44.15:61) and *Regulations* (9 VAC 25-840-30 *et seq.*) and *Stormwater*

Management Law (Virginia Code § 62.1-44.15:31) and *Regulations* (9 VAC 25-870-210 *et seq.*) as administered by DEQ. Activities that disturb 10,000 square feet or more of land (2,500 square feet or more in CBPAs) would be regulated by *VESCL&R* and *VSWML&R*. Erosion and sediment control, and stormwater management requirements should be coordinated with the DEQ Tidewater Regional Office, Noah Hill at (757) 518-2024.

5(b) Virginia Stormwater Management Program General Permit for Stormwater Discharges from Construction Activities. For projects involving land-disturbing activities of equal to or greater than one acre (2,500 square feet or more in CBPAs), the applicant is required to apply for registration coverage under the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-880-1 *et seq.*). Specific questions regarding the Stormwater Management Program requirements should be directed to DEQ, Holly Sepety at (804) 698-4039.

6. Air Pollution Control. Guidance on minimizing the emission of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) during construction may be obtained from DEQ-TRO. Activities associated with this project are subject to air regulations administered by DEQ. The state air pollution regulations that may apply to the construction phase of the project are:

- fugitive dust and emissions control (9 VAC 5-50-60 *et seq.*); and
- open burning restrictions (9 VAC 5-130 *et seq.*).

Contact the City of Virginia Beach fire officials for any local requirements on open burning. For additional information, contact DEQ-TRO, Troy Breathwaite at (757) 518-2006.

7. Coastal Lands Management. This project must be consistent to the maximum extent practicable with the coastal lands management enforceable policy of the VCP as administered by DEQ through the *Chesapeake Bay Preservation Act* (Virginia Code §§ 62.1-44.15:67 through 62.1-44.15:78) and *Chesapeake Bay Preservation Area Designation and Management Regulations* (Virginia Code 4 VAC 50-90-10 *et seq.*). For additional information and coordination, contact DEQ, Shawn Smith at (804) 527-5037.

8. Solid and Hazardous Wastes. All solid waste, hazardous waste, and hazardous materials must be managed in accordance with all applicable federal, state, and local environmental regulations. Some of the applicable state laws and regulations are:

- *Virginia Waste Management Act* (Code of Virginia Section 10.1-1400 *et seq.*);
- *Virginia Hazardous Waste Management Regulations* (*VHWMR*) (9 VAC 20-60);
- *Virginia Solid Waste Management Regulations* (*VSWMR*) (9 VAC 20-80); and
- *Virginia Regulations for the Transportation of Hazardous Materials* (9 VAC 20-110).

Some of the applicable Federal laws and regulations are:

- *Resource Conservation and Recovery Act* (*RCRA*) (42 U.S.C. Section 6901 *et seq.*);
- Title 40 of the Code of Federal Regulations; and
- U.S. Department of Transportation Rules for Transportation of Hazardous materials (49 CFR Part 107).

For additional information, contact DEQ-TRO, Milt Johnston at (757) 518-2151.

8(a) Comprehensive Environmental Response Compensation and Liability Act. The Navy should contact the Remedial Project Manager at NAVFAC MIDLANT, Bryan Peed at (757) 341-0480 for information on potential project impacts to CERCLA actions at JEB Little Creek/Fort Story. In addition, contact DEQ-DLPR, Wade Smith at (804) 698-4125 or wade.smith@deq.virginia.gov with any additional questions.

9. Natural Heritage Resources. The Navy should contact DCR-DNH, Rene Hypes at (804) 786-7951 to secure updated information on natural heritage resources if a significant amount of time passes before the project is implemented.

10. Wildlife Resources and Protected Species. Contact the USFWS Virginia Field Office at (804) 693-6694 and NOAA Fisheries at the Virginia Institute of Marine Science at (804) 684-7382 to discuss potential project impacts on federally-listed species (sea turtles and marine mammals).

Thank you for the opportunity to comment on this FCD. The detailed comments of reviewing agencies are attached for your review. If you have questions, please call me at (804) 698-4325 or John Fisher at (804) 698-4339.

Sincerely,

Ellie Irons

Ellie Irons, Program Manager
Environmental Impact Review

Enclosures

Ec: Cindy Keltner, DEQ-TRO
Steve Coe, DEQ-DLPR
Kotur Narasimhan, DEQ-AIR
Larry Gavan, DEQ-Water
Holly Sepety, DEQ-Water
Daniel Moore, DEQ-Water
Tony Watkinson, VMRC
Amy Ewing, DGIF
Robbie Rhur, DCR

A.2.2 North Carolina

DEPARTMENT OF THE NAVY
COMMANDER
U.S. FLEET FORCES COMMAND
1562 MITSCHER AVENUE SUITE 250
NORFOLK, VA 23551-2487

5090
Ser N46/257
September 24, 2013

Mr. Steve Rynas
Division of Coastal Management
Department of Environment and Natural Resources
400 Commerce Avenue
Morehead City, NC 28557-3421

Dear Mr. Rynas:

In accordance with the Coastal Zone Management Act (16 United States Code [U.S.C.] § 1456(c) and 15 Code of Federal Regulations Part 930 Subpart C), the United States Department of the Navy (Navy) requests concurrence with its Federal Consistency Determination for proposed Joint Logistics Over-the-Shore (JLOTS) activities. JLOTS is the movement of cargo from ship to shore including the construction of temporary expeditionary piers. The Proposed Action is to conduct JLOTS training at Marine Corps Base Camp Lejeune, Jacksonville, North Carolina and at Joint Expeditionary Base Little Creek-Fort Story, Virginia Beach, Virginia. The enclosed Draft Environmental Assessment (EA) contains analysis of potential impacts from JLOTS training.

The Navy reviewed North Carolina's Coastal Management Program in preparing the enclosed consistency determination for activities conducted at Marine Corps Base Camp Lejeune. Based on the analyses, the Navy has determined that the Proposed Action will be consistent to the maximum extent practicable with North Carolina's Coastal Management Program. The Navy cannot be fully consistent with the program because doing so would limit the Navy's ability to fulfill its mission as mandated by federal law (Title 10 U.S.C. § 5062), which charges the Chief of Naval Operations with the responsibility for ensuring the readiness of the nation's naval forces.

We look forward to your timely review of and concurrence with the Navy's determination. My point of contact for this matter is Ms. Laura Busch and she can be reached at 757-836-8471 or laura.busch@navy.mil.

Sincerely,

Joseph W Murphy

J. W. MURPHY
Deputy Chief of Staff
for Fleet Installations
and Environmental Readiness

Enclosures: 1. Hard copy of the Draft EA
2. Federal Consistency Determination

A.3 Endangered Species Act

A.3.1 U.S. Fish and Wildlife Service

DEPARTMENT OF THE NAVY
COMMANDER
1562 MITSCHER AVE, SUITE 250
U.S. FLEET FORCES COMMAND
NORFOLK, VA 23551-2487

5090
Ser N46/098
June 25, 2013

Mr. Pete Benjamin
Field Supervisor
United States Fish and Wildlife Service
Raleigh Ecological Services Field Office
551 Pylon Drive, Suite F
Raleigh, North Carolina 27606

Dear Mr. Benjamin:

The United States Navy (Navy) has prepared a section 7 consultation package in accordance with the Endangered Species Act (ESA) to assess the potential effects on threatened and endangered species and their critical habitat from proposed Joint Logistics Over-the-Shore (JLOTS) training activities. The proposed training activities would take place annually at one of three alternative locations: Joint Expeditionary Base Little Creek-Fort Story (Little Creek site and Fort Story site) in Virginia Beach, Virginia; and Marine Corps Base Camp Lejeune, in Onslow County, North Carolina. Because the proposed action would take place in Virginia and North Carolina, the same consultation package is also being sent to U.S. Fish and Wildlife Service's (USFWS) Virginia Ecological Services Field Office.

The enclosed summary table shows the species addressed in the Biological Assessment (BA) and the Navy's determination of effects for each of these species. The enclosed consultation package consists of a BA that includes a description of the proposed action; a list and description of the ESA-listed species under USFWS' jurisdiction that could potentially be affected by the proposed action; a description of standard operating procedures, mitigation measures, and monitoring and reporting protocols currently in place in the proposed action areas; and an evaluation of the effects of the proposed action on those species and their critical habitat.

The Navy has also initiated section 7 consultation with the National Oceanic and Atmospheric Administration's National Marine Fisheries Services (NMFS) for the ESA-listed species under their jurisdiction that may occur at the proposed training

5090
Ser N46/098
June 25, 2013

locations, including the shortnose sturgeon (*Acipenser brevirostrum*); Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*); loggerhead turtle (*Caretta caretta*) (marine life phases); Kemp's ridley turtle (*Lepidochelys kempii*) (marine life phases); green turtle (*Chelonia mydas*) (marine life phases); leatherback turtle (*Dermochelys coriacea*) (marine life phases); hawksbill turtle (*Eretmochelys imbricata*) (marine life phases); North Atlantic right whale (*Eubalaena glacialis*); humpback whale (*Megaptera novaeangliae*); fin whale (*Balaenoptera physalus*); and sei whale (*Balaenoptera borealis*).

We request your concurrence with the "may affect, not likely to adversely affect" findings therein and appreciate your continued support in helping the Navy to meet its environmental responsibilities.

The point of contact for this matter is Ms. Laura Busch. Ms. Busch may be reached at (757) 836-8471 or laura.busch@navy.mil.

Sincerely,

J. W. MURPHY
Deputy Chief of Staff
for Fleet Installations
and Environmental Readiness

Enclosures: 1. Summary of Findings
2. Biological Assessment

SUMMARY OF FINDINGS FOR ENDANGERED AND THREATENED SPECIES UNDER THE JURISDICTION OF USFWS

Federal Status	Common Name (Scientific Name)	Effect Determination for Little Creek and Fort Story Sites	Effect Determination for Camp Lejeune Site
Plants			
T	Seabeach amaranth *(Amaranthus pumilus)*	Not applicable	May affect, not likely to adversely affect
Sea Turtles (Nesting)[1]			
T[2]	Loggerhead turtle *(Caretta caretta)* Northwest Atlantic DPS	May affect, not likely to adversely affect	May affect, not likely to adversely affect
T	Kemp's ridley turtle *(Lepidochelys kempii)*	May affect, not likely to adversely affect	May affect, not likely to adversely affect
T/E[3]	Green turtle *(Chelonia mydas)*	No effect	May affect, not likely to adversely affect
E	Leatherback turtle *(Dermochelys coriacea)*	No effect	May affect, not likely to adversely affect
Birds			
T	Piping plover *(Charadrius melodus)*	No effect	May affect, not likely to adversely affect
E	Roseate tern *(Sterna dougallii dougallii)* Northeast DPS	No effect	Not applicable
Marine Mammals			
E	West Indian manatee *(Trichechus manatus)*	No effect	May affect, not likely to adversely affect

Notes:
E = Endangered; T= Threatened. Status refers to the distinct population segment (DPS), when applicable.
1. Sea turtles in the marine environment are under the jurisdiction of NMFS.
2. Nine DPSs of loggerhead turtles were determined in 2011 within the global population (76 C.F.R. 58868). The only DPS that occurs within the proposed action areas for this BA - the Northwest Atlantic Ocean DPS - is listed as threatened.
3. As a species, the green turtle is listed as threatened, but the Florida and Mexican Pacific coast nesting populations are listed as endangered. It is likely that green turtles found at the three proposed training sites do not belong to the Florida nesting population but the possibility cannot be excluded.

Enclosure (1)

United States Department of the Interior

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

August 14, 2013

Mr. Joseph W. Murphy
Deputy Chief of Staff,
Fleet Installations and Environmental Readiness
1562 Mitscher Avenue, Suite 250
U.S. Fleet Forces Command
Norfolk, Virginia 23551-2487

Dear Mr. Murphy:

The U. S. Fish and Wildlife Service Raleigh Ecological Services Field Office (Service) has reviewed your June 25, 2013 letter and consultation package to assess the potential effects from the proposed Joint Logistics Over-the-Shore (JLOTS) exercises on federally listed threatened and endangered species. The proposed training activities would take place annually at one of three alternative locations. The first two are located on Joint Expeditionary Base Little Creek-Fort Story in Virginia Beach, Virginia. The third location is aboard Marine Corps Base Camp Lejeune in Onslow County, North Carolina. This letter addresses the effects analysis and biological determination made for JLOTS activities to be conducted on the third location, Marine Corps Base Camp Lejeune. The proposed training exercises have the potential to affect federally listed threatened and endangered species including nesting sea turtles, the piping plover (*Charadrius melodus*), West Indian manatee (*Trichechus manatus*) and seabeach amaranth (*Amaranthus pumilus*). Our comments are provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 USC 1531 et seq.).

According to the biological assessment contained in your June 25, 2013 correspondence, a full JLOTS training exercise would last approximately 60 days. However, individual exercise components lasting up to a month could be practiced year-round. Exercise components include training with amphibious transfer and Navy lighterage systems, elevated causeway systems, liquid transfer systems, tactical water purification systems, cargo marshaling and movement and tent encampment. JLOTS training simulates real-world conditions when deep draft port facilities are unavailable but supplies are needed on shore. A complete description of each of these activities is found in Section 2 of the biological assessment. The proposed exercises would take place in Camp Lejeune's coastal training areas and waterways currently used by the Marine Corps: Mile Hammock Bay, Tactical Landing Zone Bluebird, South Onslow Beach, Onslow Bay and the Atlantic Intra-coastal Waterway.

The Service's 2002 Biological Opinion on the Effects of Current Use and Modification of Training Areas, Dune Stabilization, and Continued Recreational Use of Onslow Beach, Marine Corps Base, Camp Lejeune, North Carolina and the 2006 Biological Opinion on the Effects of Implementing the Revised Integrated Natural Resource Management Plan (INRMP)(2007 -2011) at Marine Corps Base Camp Lejeune, North Carolina contain conservation measures that apply to the proposed JLOTS training.

Camp Lejeune applies these measures through implementation of base orders that direct range operations (standard operating procedures), education of personnel and carrying out of management actions prescribed in the INRMP. Conservation measures expressed by Camp Lejeune and reasonable and prudent measures issued by the Service during the formal section 7 consultations referenced above have been adopted as part of the proposed JLOTS training. Avoidance and minimization measures currently being implemented by the installation are outlined in Table 2-4, located on pages 41 through 43 of the biological assessment.

Camp Lejeune identifies potential habitat locations on Onslow Beach for seabeach amaranth and surveys these areas each summer. Identified sites are marked with signs to prevent military and off-road recreational vehicles and pedestrian traffic from harming the plants. Potential habitat in overwash areas is protected from vehicle traffic year-round. ORV driving on the amphibious landing beach (between Riseley Pier and the South Tower; approximately 1.4 linear miles) is restricted between April 1 and August 31 (Base Order 5090.111). Removal or disturbance of grass and plants on the beach is prohibited and the beach is only accessed at designated, well-marked entry/exit points. Heavy equipment and vehicles are kept off sand dunes and vegetation. Bivouac is carried out on the north side of the beach road instead of on the beach itself.

For piping plover conservation, Camp Lejeune conducts bi-monthly surveys for piping plovers. Starting in April, high quality potential nesting habitat is posted as protected, and the surveys become more intensive as the beach is monitored for evidence of piping plover nesting behavior. Areas of accreting sand along the New River Inlet beach, and the large washover area (about 1 mile south of the historic location of the Onslow Beach South Tower; -77.306314° W, 34.546412° N; no longer present) represent the most likely nesting habitat for the species. Due to the historic absence of nesting by piping plovers on Onslow Beach and the lack of suitable nesting habitat on the training beach, the proposed JLOTS training is expected to have minimal impacts on piping plovers.

Camp Lejeune has a well-established program for facilitating use of Onslow Beach for military training while minimizing potential impacts to nesting sea turtles. Relevant components of the program are listed in Table 2-4 of the BA. Camp Lejeune Environmental Conservation staff monitors Onslow Beach during the sea turtle nesting season (May 15 through October 31). Nests found between the historic locations for Riseley Pier (-77.2863° W, 34.5585° N; no longer there) and South Tower will be relocated to safe locations outside the amphibious landing beach. Environmental Conservation staff will also move nests from the area extending 2,460 feet north of the old Riseley Pier location, and from the ingress/egress area south of the historic South Tower area going toward the splash point road.

The BA evaluates the potential effects of the proposed JLOTS activities on nesting sea turtles, including the potential for vehicles and equipment to run over nesting females and emerging hatchlings or destroy nests. The document also recognizes the potential for noise and lighting to significantly affect nesting turtles and hatchlings on the beach. JLOTS training will incorporate the standard operating procedures, conservation measures, monitoring, and reporting in place at Camp Lejeune as part of the proposed action.

Table 2-4 lists the following as measures that would be implemented through JLOTS training to avoid or minimize potential impacts to the West Indian manatee:

- Everyone conducting waterborne operations should be alert for possible manatee encounters. If a manatee is sighted, personnel should immediately slow to a no-wake speed.
- Allow sufficient room for the manatee, and maneuver cautiously away from the encounter area.
- Do not approach the manatee.
- Report all sightings to the Camp Lejeune Environmental Conservation Branch.
- Survey the area for harmful objects such as abandoned wire, netting and other debris.

The BA also list specific measures for the specific JLOTS training component, Elevated Causeway System (ELCAS) construction. Specifically:

- All personnel associated with ELCAS will be informed that manatees may be present in the project area, and the need to avoid any harm to these endangered marine mammals. Personnel will be briefed on the general appearance of the species and their habit of moving about completely or partially submerged in shallow water. All personnel will be informed that they are responsible for observing water-related activities for the presence of manatees.
- Personnel will be briefed on civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act and the Endangered Species Act.
- If a manatee is seen within 100 yards (91 meters) of the active pile driving, all appropriate precautions will be implemented to ensure protection of the manatee. These precautions will include the immediate shutdown of pile driving if a manatee comes within 60 yards (55 meters) of the pile driving equipment. Activities will not resume until the manatee has departed the 60-yard (55-meter) shutdown area on its own volition (i.e., it may not be herded or harassed from the area).
- Any injury to a manatee will be reported immediately. The report must be made to the U.S. Fish and Wildlife Service (phone number 919-856-4520 ext. 28), the National Marine Fisheries Service (phone number 252-728-8762), and the North Carolina Wildlife Resources Commission (phone number 252-448-1546).
- A log detailing all sightings and/or injuries to manatees during pile driving will be maintained. Upon completion of the action, the project manager will prepare a report which summarizes all information on manatees encountered and submit the report to the Service's Raleigh Field Office.

Based on a review of the information contained in your June 25, 2013 letter and consultation package the Service concurs with your determination that the proposed JLOTS training on Onslow Beach and training areas of Marine Corps Base, Camp Lejeune is not likely to adversely affect the loggerhead and green sea turtles, piping plover, West Indian manatee, seabeach amaranth, or any other federally listed endangered or threatened species or species currently proposed for federal listing under the Endangered Species Act, as amended. 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.

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

Cc: Ann Marie Lauritsen, USFWS
Jim Valade, USFWS

DEPARTMENT OF THE NAVY
COMMANDER
1562 MITSCHER AVE, SUITE 250
U.S. FLEET FORCES COMMAND
NORFOLK, VA 23551-2487

5090
Ser N46/097
June 25, 2013

Ms. Cindy Schulz
Field Supervisor
United States Fish and Wildlife Service
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, Virginia 23061

Dear Ms. Schulz:

The United States Navy (Navy) has prepared a section 7 consultation package in accordance with the Endangered Species Act (ESA) to assess the potential effects on threatened and endangered species and their critical habitat from proposed Joint Logistics Over-the-Shore (JLOTS) training activities. The proposed training activities would take place annually at one of three alternative locations: Joint Expeditionary Base Little Creek-Fort Story (Little Creek site and Fort Story site) in Virginia Beach, Virginia; and Marine Corps Base Camp Lejeune, in Onslow County, North Carolina. Because the proposed action would take place in Virginia and North Carolina, the same consultation package is also being sent to U.S. Fish and Wildlife Service's (USFWS) Raleigh Ecological Services Field Office.

The enclosed summary table shows the species addressed in the Biological Assessment (BA) and the Navy's determination of effects for each of these species. The enclosed consultation package consists of a BA that includes a description of the proposed action; a list and description of the ESA-listed species under USFWS' jurisdiction that could potentially be affected by the proposed action; a description of standard operating procedures, mitigation measures, and monitoring and reporting protocols currently in place in the proposed action areas; and an evaluation of the effects of the proposed action on those species and their critical habitat.

The Navy has also initiated section 7 consultation with the National Oceanic and Atmospheric Administration's National Marine Fisheries Services (NMFS) for the ESA-listed species under their jurisdiction that may occur at the proposed training

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Ser N46/097
June 25, 2013

locations, including the shortnose sturgeon (*Acipenser brevirostrum*); Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*); loggerhead turtle (*Caretta caretta*) (marine life phases); Kemp's ridley turtle (*Lepidochelys kempii*) (marine life phases); green turtle (*Chelonia mydas*) (marine life phases); leatherback turtle (*Dermochelys coriacea*) (marine life phases); hawksbill turtle (*Eretmochelys imbricata*) (marine life phases); North Atlantic right whale (*Eubalaena glacialis*); humpback whale (*Megaptera novaeangliae*); fin whale (*Balaenoptera physalus*); and sei whale (*Balaenoptera borealis*).

We request your concurrence with the "may affect, not likely to adversely affect" findings therein and appreciate your continued support in helping the Navy to meet its environmental responsibilities.

The point of contact for this matter is Ms. Laura Busch. Ms. Busch may be reached at (757) 836-8471 or laura.busch@navy.mil.

Sincerely,

J. W. MURPHY
Deputy Chief of Staff
for Fleet Installations
and Environmental Readiness

Enclosures: 1. Summary of Findings
2. Biological Assessment

SUMMARY OF FINDINGS FOR ENDANGERED AND THREATENED SPECIES UNDER THE JURISDICTION OF USFWS

Federal Status	Common Name (Scientific Name)	Effect Determination for Little Creek and Fort Story Sites	Effect Determination for Camp Lejeune Site
Plants			
T	Seabeach amaranth *(Amaranthus pumilus)*	Not applicable	May affect, not likely to adversely affect
Sea Turtles (Nesting)[1]			
T[2]	Loggerhead turtle *(Caretta caretta)* Northwest Atlantic DPS	May affect, not likely to adversely affect	May affect, not likely to adversely affect
T	Kemp's ridley turtle *(Lepidochelys kempii)*	May affect, not likely to adversely affect	May affect, not likely to adversely affect
T/E[3]	Green turtle *(Chelonia mydas)*	No effect	May affect, not likely to adversely affect
E	Leatherback turtle *(Dermochelys coriacea)*	No effect	May affect, not likely to adversely affect
Birds			
T	Piping plover *(Charadrius melodus)*	No effect	May affect, not likely to adversely affect
E	Roseate tern *(Sterna dougallii dougallii)* Northeast DPS	No effect	Not applicable
Marine Mammals			
E	West Indian manatee *(Trichechus manatus)*	No effect	May affect, not likely to adversely affect

Notes:
E = Endangered; T= Threatened. Status refers to the distinct population segment (DPS), when applicable.
1. Sea turtles in the marine environment are under the jurisdiction of NMFS.
2. Nine DPSs of loggerhead turtles were determined in 2011 within the global population (76 C.F.R. 58868). The only DPS that occurs within the proposed action areas for this BA - the Northwest Atlantic Ocean DPS - is listed as threatened.
3. As a species, the green turtle is listed as threatened, but the Florida and Mexican Pacific coast nesting populations are listed as endangered. It is likely that green turtles found at the three proposed training sites do not belong to the Florida nesting population but the possibility cannot be excluded.

Enclosure (1)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

Date: July 17, 2014

Online Project Review Certification Letter

Project Name: Navy Joint Logistics Over-the-Shore Training Environmental Assessment

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Virginia Field Office online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the referenced project in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA), and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c, 54 Stat. 250), as amended (Eagle Act). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA and Eagle Act conclusions. These conclusions resulted in "no effect" and/or "not likely to adversely affect" determinations for listed species and critical habitat and/or "no Eagle Act permit required" determinations for eagles regarding potential effects of your proposed project. We certify that the use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the "no effect" and "not likely to adversely affect" determinations for listed species and critical habitat and "no Eagle Act permit required" determinations for eagles. Additional coordination with this office is not needed.

Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species.

Should project plans change or if additional information on the distribution of listed species, critical habitat, or bald eagles becomes available, this determination may be reconsidered. This certification letter is valid for one year.

Information about the online project review process including instructions and use, species information, and other information regarding project reviews within Virginia is available at our website http://www.fws.gov/northeast/virginiafield/endspecies/project_reviews.html. If you have any questions, please contact Kimberly Smith of this office at (804) 693-6694, extension 124.

Sincerely,

/s/ Cynthia A. Schulz

Cindy Schulz
Supervisor
Virginia Field Office

Enclosures - project review package

A.3.2 National Marine Fisheries Service

DEPARTMENT OF THE NAVY
COMMANDER
1562 MITSCHER AVE, SUITE 250
U.S. FLEET FORCES COMMAND
NORFOLK, VA 23551-2487

5090
Ser N46/084
August 8, 2014

Ms. Donna Wieting
Director, Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
1315 East-West Highway, SSMC3, Room 13821
Silver Spring, MD 20910-3282

SUBJECT: SECTION 7 CONSULTATION FOR U.S. NAVY JOINT LOGISTICS OVER-THE-SHORE TRAINING

In accordance with section 7 of the Endangered Species Act (ESA), the U.S. Navy requests concurrence on our determination that Joint Logistics Over-the-Shore (JLOTS) training activities occurring at Joint Expeditionary Base Little Creek-Fort Story, Virginia Beach, Virginia and at Marine Corps Base Camp Lejeune, Jacksonville, North Carolina will not adversely affect listed species.

The proposed action may affect listed species that reside within the JLOTS action area to sound and other environmental stressors associated with training activities. The enclosed Biological Assessment (BA) is the Navy's primary document that provides the required information pursuant to 50 C.F.R. §402.12(f). Additional information can be found in the enclosed JLOTS Environmental Assessment (EA).

We request National Marine Fisheries Service concurrence on our may affect, not likely to adversely affect determinations for the following species: Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus), green sea turtle (Chelonia mydas), Kemp's ridley sea turtle (Lepidochelys kempii), leatherback sea turtle (Dermochelys coriacea), loggerhead sea turtle (Caretta caretta), fin whale (Balaenoptera physalus), humpback whale (Megaptera novaeangliae), and North Atlantic right whale (Eubalaena glacialis) at JEB Little Creek-Fort Story and Camp Lejeune; and the shortnose sturgeon (Acipenser brevirostrum) at Camp Lejeune only.

This BA supersedes the BA that was sent to the Northeast Regional Office and Southeast Regional Office on November 13,

5090
Ser N46/084
August 8, 2014

2012 for potential effects on listed species from JLOTS training.

We appreciate your continued support in helping the U.S. Navy to meet its environmental responsibilities. Please direct any questions to Ms. Laura Busch (757-836-8471).

Sincerely,

Joseph Murphy

J. W. MURPHY
Deputy Chief of Staff
for Fleet Installations
and Environmental Readiness

Enclosures: 1. JLOTS BA
2. JLOTS EA (CD)

Copy to: Ms. Jolie Harrison, NMFS Office of Protected Resources
Ms. Cathryn Tortorici, NMFS Office of Protected Resources

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

OCT 16 2014

Joseph W. Murphy
Deputy Chief of Staff for Fleet Installations and Environmental Readiness
Department of the Navy, U.S. Fleet Forces Command
1562 Mitscher Avenue, Suite 250
Norfolk, Virginia 23551-2487

Re: Endangered Species Act section 7(a)(2) programmatic informal consultation on U.S. Navy Joint Logistics Over-the-Shore Training in Virginia and North Carolina. Refer to consultation No: FPR-2014-9099.

Dear Mr. Murphy:

On 8 August, 2014, NOAA's National Marine Fisheries Service (NMFS) received your request for concurrence that joint logistics over-the-shore (JLOTS) training in Virginia and North Carolina is not likely to adversely affect species listed as threatened or endangered or critical habitat designated under the Endangered Species Act (ESA) that NMFS oversees. This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for preparation of letters of concurrence.

Below, we describe the proposed action, the ESA-listed species that may be affected by the proposed action, and the minimization measures included in the proposed action; we consider the effects of the proposed action on listed species and critical habitats; and we explain how the consultation will be carried out. Unless otherwise noted, information in this document was extracted from the Navy's *Marine Species Biological Assessment for the U.S. Navy Joint Logistics Over-The-Shore Training in Virginia and North Carolina* (Navy 2014).

Consultation History

On 8 August 2014, NMFS received a Biological Assessment (BA), for ESA consultation, and an Environmental Assessment (EA), pursuant to the National Environmental Policy Act, from the U.S. Navy Fleet Forces Command (Navy) describing the proposed action and requesting concurrence with the determination that the action may affect, but is not likely to adversely affect, listed threatened or endangered species or critical habitats designated under the ESA. On 25 August 2014, NMFS emailed the Navy to clarify a discrepancy between the BA and EA on the number of activities proposed for the JLOTS training and received confirmation the BA was in error on the same day. On 29 August 2014, NMFS emailed the Navy for additional details regarding the proposed action; specifically, whether vessels would be transiting from other homeports, to clarify the Navy's "no effect" determination made for the hawksbill sea turtle and sei whale, and to clarify if the Navy had considered effects to blue and sperm whales. On 8 September 2014, the Navy responded to our request for additional information by email and provided vessel transit information and clarified their determinations of no effect for the hawksbill sea turtle and blue, sei, and sperm whales.

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Description of the Proposed Action

The Navy proposes an expansion in activities of the existing JLOTS training and associated quarterly and routine unit-level field training exercises at Joint Expeditionary Base (JEB) Little Creek-Fort Story (comprising two separate installations: Little Creek and Fort Story) in Virginia Beach, Virginia, and Marine Corps Base Camp Lejeune, North Carolina. Specifically, the proposed action includes field training exercises, which will be performed in combination as a full-scale annual JLOTS training event, or as part of quarterly or routine training (Table 1). A full JLOTS training event will occur over approximately 60 days once a year at each installation for a total of two full JLOTS trainings per year. At the beginning of an exercise one to three military Sealift Command ships will anchor up to three miles off the coast. Up to 20 vessels will operate during a full JLOTS exercise and generally no more than 10 will be used during unit-level exercises. Most vessels used during JLOTS training have drafts of less than 1.8 meters (m) (6 feet (ft)) in depth. Our assessment of field training exercises with potential to affect ESA-listed species under NMFS jurisdiction is provided below. The JLOTS training already occurs at JEB Little Creek and Camp Lejeune. The Navy proposes to add two floating causeway exercises at Little Creek and one elevated causeway system, modular (ELCAS [M]) exercise each at JEB Little Creek-Fort Story and Camp Lejeune. Full JLOTS training events will include the transport of one or two large cargo ships from Norfolk, Virginia to Camp Lejeune carrying necessary equipment and vessels for the exercise. These ships will operate within transit lanes and anchor 2 to 5 miles offshore.

Table 1. Summary of proposed annual field training exercise occurrences.

Field Training Exercise	Annual JLOTS		Unit-Level Training*	
	JEB Little Creek-JEB Fort Story	Camp Lejeune	Quarterly	Routine*
Improved Navy Lighterage System	1	1	4	152
Floating Causeway	4	2	0	0
ELCAS (M)	1	1	0	0
Liquid Transfer System	1	1	4	6
Tactical Water Purification System	1	1	4	0

*Unit level training will not occur at Camp Lejeune; Routine training will occur at JEB Little Creek only.

Improved Navy Lighterage System

The Improved Navy Lighterage System is a floating pier system made of modules and barges, which can be configured in a number of patterns to support the movement of rolling stock from cargo ships to the shore. The primary vessels used during Improved Navy Lighterage System implementation are the causeway ferry and the warping tug. The causeway ferry is a motorized floating platform 7.3 m (24 ft) wide by 24 m (80 ft) long and 2.4 m (8 ft) deep. The ferries can be interlocked to form larger platforms or used alone to transport cargo to the shore. Warping tugs are used to install, tend, and maintain the floating module system components and are approximately 27 m (88 ft) in length. Floating modules can be used to for a roll-on/roll-off discharge facility (73 m (240 ft) by 22 m (72 ft)) that acts as a floating transfer dock onto which cargo ships can lower ramps and unload equipment. It takes up to 36 hours to assemble a

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complete roll-on/roll-off discharge facility. The Improved Navy Lighterage System is part of a full JLOTS training as well as independent quarterly unit (up to four times per year at JEB site) and smaller routine training events (up to 152 times per year at Little Creek only). Routine training typically involves up to six vessels. Improved Navy Lighterage System exercises will continue at the current level of activity.

Floating Causeway
A floating causeway is a temporary pier extending from the beach to a distance up to 366 m (1,200 ft). The beach end is anchored into the sand of the tidal zone within an excavated area measuring approximately 9 m (30 ft) wide by 24 m (80 ft) long by 1.5 m (5 ft) deep using bulldozers. Floating causeway sections may be secured to the ocean floor with anchors. Up to two floating causeways may be constructed during a full JLOTS exercise. The floating causeway provides a means of delivering containers, vehicles, and cargo ashore without lighterage craft entering the surf zone. The excavated area is filled and graded to its pre-training conditions following exercise completion. Floating causeways will not be constructed as part of quarterly or routine unit-level training. Up to six floating causeway exercises may be implemented per year with four at JEB Little Creek-Fort Story, and two at Camp Lejeune. Floating causeway exercises will remain at current levels at JEB Fort Story and Camp Lejeune and will be conducted two times (previously zero) at JEB Little Creek.

Elevated Causeway System, Modular (ELCAS [M])
The ELCAS (M) is a temporary pier constructed from the beach into the water past the surf zone. The ELCAS (M) is made of 2.4 m (8 ft) by 12 m (40 ft) pontoons joined together and supported by piles driven into the sea floor. An ELCAS (M) of approximately 457 m (1,500 ft) long is typically constructed for training exercises and requires 119 piles. Piles (24-inch diameter and various lengths) are driven into the sand up to 12 m (40 ft) with an impact hammer. The pontoon sections are hoisted into place using cranes. Six piles are installed per day (15 minutes per pile) for up to 20 days. Once constructed, the ELCAS (M) is used as a traditional pier where cranes are used to load and unload cargo and rolling stock to and from leverage craft. Power for the ELCAS (M) is provided by up to two 30-kilowatt (kW) and two 100-kW generators. The ELCAS (M) is dismantled by removing the pontoon sections by crane and removing piles with a vibratory hammer. Extraction of a pile using a vibratory hammer takes approximately 6 minutes. Up to 12 piles may be removed per day for up to 10 days. The beach end of the pier is graded to pre-existing conditions following exercise completion. ELCAS (M) construction will occur twice per year, once at JEB Little Creek-Fort Story and once at Camp Lejeune as part of full annual JLOTS training. Under the proposed training, ELCAS (M) exercises will be increased from the current level of activity (no exercises) to one exercise annually at each of JEB Little Creek-Fort Story and Camp Lejeune.

Liquid Transfer Systems
An amphibious bulk liquid transfer system and inland petroleum discharge system are used to transfer potable water (standing in for petroleum products) from ships to forces inland. Only clean hoses and components never used for fuel transfer are used for training, removing the risk of petroleum contamination from the hose systems. Up to 200,000 gallons of potable water could be transferred ashore during an exercise. The amphibious bulk liquid transfer system uses a floating hose that may be deployed up to two miles between a ship anchored offshore and

a beach interface unit. The hose is affixed with lights and is held in place by anchors or mooring buoys. The beach interface unit connects the hose to the inland petroleum discharge system to transfer water further inland. The liquid transfer systems training will take place over approximately one week. Following the exercise the potable water is disposed of through infiltration or to surface waters as required by the Clean Water Act. Liquid transfer will be part of a full JLOTS training in addition to quarterly and routine training events for a total of 12 times per year between the JEB and Camp Lejeune sites. During routine training liquid transfer systems will run for approximately two days. Liquid transfer systems training activities will continue at current levels.

Tactical Water Purification System

The water purification unit is an onshore unit using reverse osmosis to desalinate ocean water. Ocean water is pumped to the purification unit through a small, screened intake to prevent fish and other materials from being drawn into the system. Chlorine may be used to further purify the water. Desalinated water (up to 20,000 gallons per JLOTS exercise) is stored in bladders on the beach. Desalinated water and brine are disposed of into the sanitary sewer system or are removed via contracted pump trucks. Water purification is part of the two full JLOTS trainings as well as quarterly training events at JEB for a total of six exercises per year between the JEB and Camp Lejeune sites. During quarterly unit-level training events approximately 6,000 gallons of water is produced. Tactical water purification system training activities will continue at current levels.

Cargo Marshalling and Movement

The movement of rolling stock and containerized cargo (approximately 250 units in total) may be between ship and shore to verify the floating causeway and ECLAS (M) have been constructed properly. Roll-out mats are used on unvegetated beach to facilitate movement of vehicles to and from the land-based staging areas to the constructed pier systems. Inland movement of vehicles is by existing roads and dune breaks. Under the proposed training, cargo marshalling and movement will increase to accommodate additional floating causeway and ECLAS (M) training.

Tent Encampments

Up to 300 tents are constructed to house up to 3,000 personnel on an inland area during a full JLOTS training. Power is supplied to the camp through the use of up to 30 generators operating 24 hours per day. Lights (and their own generators) are used to illuminate the camp during the night. Portable latrines are used and no leach fields are constructed. Grey water generated by showering facilities is collected and disposed of in accordance with applicable laws and regulations. Solid waste is collected and disposed of in accordance with the camp's waste disposal procedures. Under the proposed training, the number of tent encampments will likely increase to accommodate larger JLOTS exercises.

Action Area

Under the ESA, the "action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for the proposed action includes the proposed offshore training areas of JEB-Little Creek (approximately 25 square kilometers (sq km)), JEB-Fort Story (approximately 50 sq km) and Camp Lejeune (approximately 80 sq km). The action area also includes the cargo ship route between Norfolk, Virginia and Camp Lejeune. JEB-Little Creek-Fort Story is located in Virginia Beach, Virginia while Camp Lejeune is located in Jacksonville, North Carolina. In addition to the proposed training area and cargo ship route, the action area includes areas potentially subjected to acoustical energy from pile driving; although most of the acoustical energy capable of eliciting a biological response from ESA-listed species will be within the training areas.

Status of Species in the Action Area

A summary of the species potentially occurring in the action area is presented in Table 2 and the descriptions that follow.

Table 2. Species listed under the Endangered Species Act that may occur in the action are of the proposed U.S. Navy Fleet Forces Command JLOTS training.

Species	ESA listing status	ESA listing date (FR number)	Critical Habitat listing date (FR number)
Sperm whale (*Physeter macrocephalus*)	Endangered	Dec. 2, 1970 (35 FR 18319)	not designated
Blue whale *(Balaenoptera musculus)*	Endangered	Dec. 2, 1970 (35 FR 18319)	not designated
Fin whale *(Balaenoptera physalus)*	Endangered	Dec. 2, 1970 (35 FR 18319)	not designated
Sei whale *(Balaenoptera borealis)*	Endangered	Dec. 2, 1970 (35 FR 18319)	not designated
Humpback whale *(Megaptera novaeangliae)*	Endangered	Dec. 2, 1970 (35 FR 18319)	not designated
North Atlantic right whale (*Eubalaena glacialis*)	Endangered	Dec. 2, 1970 (35 FR 18319)	June 3, 1994 (59 FR 28805)
Green sea turtle *(Chelonia mydas)*	Threatened[1]	July 28, 1978 (43 FR 32800)	Sep 02, 1998 (63 FR 46693)
Hawksbill sea turtle *(Eretmochelys imbricata)*	Endangered	June 2, 1970 (35 FR 8491)	Sep 02, 1998 (63 FR 46693)
Kemp's ridley sea turtle *(Lepidochelys kempii)*	Endangered	Dec 02, 1970 (35 FR 18319)	not designated
Leatherback sea turtle *(Dermochelys coriacea)*	Endangered	June 2, 1970 (35 FR 8491)	March 23, 1979 (44 FR 17710) Jan 26, 2012 (77 FR 4170)
Loggerhead sea turtle[3] *(Caretta caretta)* ○ Northwest Atlantic Ocean Distinct Population Segment (DPS)	Threatened	July 28, 1978 (43 FR 32800)	July 2014 (filed)

Atlantic sturgeon *(Acipenser oxyrinchus)* ○ Gulf of Maine DPS ○ New York Bight DPS ○ Chesapeake Bay DPS ○ Carolina DPS ○ South Atlantic DPS	 Threatened Endangered Endangered Endangered Endangered	Feb 06, 2012 (77 FR 5880) (77 FR 5914)	not designated
Shortnose sturgeon *(Acipenser brevisrostrum)*	Endangered	March 11, 1967 (32 FR 4001)	not designated

[1] *As a species the green sea turtle is listed as threatened, but the Florida and Mexican Pacific coast nesting populations are listed as endangered.*

The Atlantic sturgeon (particularly the Chesapeake Bay Distinct Population Segment (DPS) and the Carolina DPS) may inhabit offshore waters within the proposed action areas. In 2013, Navy acoustic arrays identified 126 tagged Atlantic sturgeon within the JEB Little Creek area and 135 individuals within the JEB Fort Story area. These detections may not represent individual fish as some fish may have been detected more than once; however, the array did not cover all of the proposed action area and not all sturgeon in the area were likely tagged. Therefore, the actual number of Atlantic sturgeon in the JEB action area may differ. Abundance data for Atlantic sturgeon in the Camp Lejeune action area is not known.

The shortnose sturgeon occurs along many rivers of the eastern United States including the Chesapeake Bay area of Virginia and the Cape Fear area of North Carolina. However, the Navy's BA reports no shortnose sturgeon have been sighted in the JEB Little Creek-Fort Story area in 30 years. The BA also reports the Cape Fear population is likely less than 50 fish, approximately 80 km south of the proposed training area, and there is no indication shortnose sturgeon occur in the Camp Lejeune area.

Green sea turtles potentially occur near all three proposed training areas. Adult green sea turtles are primarily a tropical or subtropical species and therefore are less common at more northern latitudes. However, during the warmer months they are likely to be found off both the North Carolina and Virginia coasts. Juvenile green sea turtles may use the Chesapeake Bay as developmental habitat. Green sea turtles are not known to nest at JEB Little Creek-Fort Story and only occasionally nest at Camp Lejeune.

Kemp's ridley sea turtle is the second most abundant sea turtle in the water off all three action areas as described in the BA. Juvenile Kemp's ridley sea turtles may use Chesapeake Bay as developmental habitat. However, they are expected to be rare in the JEB Little Creek-Fort Story area although stranding data around the Chesapeake Bay area is not uncommon (BA; Halpin et al. 2009). Kemp's ridley sea turtles are more abundant off the North Carolina coast in spring and fall. There are no documented cases of Kemp's ridley sea turtles nesting at any of the proposed training areas.

The leatherback sea turtle primarily nests south of Georgia although occasional nesting occurs as far north as North Carolina. No nesting has been observed at any of the proposed training areas. While leatherback sea turtles may be present near the training areas it likely occurs at low frequency. Readily available sightings data suggest the leatherback sea turtle is consistently found along the coasts of Virginia and North Carolina although often well offshore (greater than 50 km) of the proposed training areas (Halpin et al. 2009).

The loggerhead sea turtle is the most abundant sea turtle off the coast of Virginia and North Carolina. Nesting is known to occur on Camp Lejeune but has never been recorded nesting at JEB Little Creek-Fort Story.

The hawksbill sea turtle, although potentially occurring within the action area, is rare north of Florida in the western Atlantic Ocean. The hawksbill sea turtle is not known to nest at the training sites. The BA indicates the hawksbill sea turtle is rarely sighted in the Chesapeake Bay area and those individuals are often ill or experiencing cold shock. Readily available sightings data for hawksbill sea turtles occur along the coast of Virginia and North Carolina (Halpin et al. 2009) suggesting their presence is possible although unlikely.

The sei whale is primarily a deep water oceanic species preferring to inhabit water off the continental shelf and is considered a rare occurrence in the coastal waters off Virginia and North Carolina. Sei whale strandings in the Chesapeake Bay area have rarely been documented but do occur (Halpin et al. 2009).

The blue whale is primarily a deep water (normally greater than 68 m non-foraging or 140 m when foraging) oceanic species and is considered rare in the coastal waters off Virginia and North Carolina, although they are occasionally found in coastal waters. Readily available sightings data suggests the nearest blue whale record to the proposed training area is approximately 300 km off the coast of Virginia in 1969 (Halpin et al. 2009).

Fin whales are primarily a deep water (greater than 200 m deep), offshore species although they occasionally are found in coastal waters of the western Atlantic Ocean. A reported sighting of a fin whale off the coast of North Carolina (in 2010) was more than 140 km from the proposed Camp Lejeune training area while sightings (in 2012) and strandings (in 1994) have occurred within, or within close proximity to, the JEB Fort Story training area (Halpin et al. 2009).

Sperm whales are primarily a deep water, offshore species and rarely occur in waters less than 300 m deep. We are unaware of specific data for the occurrence of this species near the training areas and it is likely to be rare.

Humpback whales often use shallow coastal waters (typically less than 60 m) to feed and calve. The BA indicates a humpback whale was sighted near Virginia Beach, Virginia in 2014. Readily available sightings data indicate a humpback whale was spotted 83 km east of Camp Lejeune in 1995 (Halpin et al. 2009). The BA indicates, although potentially present, the likelihood of humpback whales occurring in the training areas off JEB Little Creek-Fort Story and Camp Lejeune is low.

The North Atlantic right whale is a shallow water species frequently occurring on the continental shelf. The BA indicates North Atlantic right whales are known to occur off the coast of the three training areas although they are anticipated to be encountered rarely. Readily available sightings data also suggests that although North Atlantic right whales occur near the proposed training areas they are likely to be rare occurrences (Halpin et al. 2009). The JEB Fort Story training area occurs just west of a portion of the North Atlantic right whale migratory corridor at the southern entrance to Chesapeake Bay. Cargo ships transiting from Norfolk to Camp Lejeune will pass through a portion of the migratory corridor for this species

Minimization Measures
To minimize the potential for impacts to ESA-listed species the Navy has incorporated the following measures.

- While in motion, all vessels greater than 65 ft in length will have two watch personnel. Vessels less than 65 ft in length will have at least one watch person. Small craft may not have space for a dedicated watch person; therefore, the crew of these small craft will be responsible for acting as watch personnel and monitoring the surrounding environment for potential strike risks. All watch personnel will be trained and provided binoculars or night vision equipment as appropriate.

- All vessels will use extreme caution and proceed at "safe speeds" so proper and effective actions to avoid collision with any sighted object can be implemented. Moving vessels will maintain a 457 m (1500 ft) mitigation zone around observed whales and 183 m (600 ft) from other marine mammals except bow-riding dolphins, provided it is safe to do so. Any vessel transiting within the North Atlantic right whale Mid-Atlantic migration corridor will practice increased vigilance and will proceed at the slowest speed consistent with safety and mission training objectives.

- ELCAS (M) construction will utilize soft starts at the beginning of pile driving. Soft starts are performed using an initial set of reduced energy strikes with the impact hammer prior to operation at full speed and power. Reduced energy impacts from soft starts may allow fish, marine mammals, and sea turtles to move away from the immediate area prior to full strength pile driving. This should reduce the likelihood of animal exposure to sound levels that could cause further behavioral disturbance or physical injury.

- ELCAS (M) will have a dedicated lookout responsible for monitoring the area (including a 55 m (180 ft) mitigation zone around pile driving activities) for biological resources. The mitigation zone will be monitored for 30 minutes prior to commencement of pile driving to ensure no protected biological resources or floating vegetation is present near pile driving activities. If a marine mammal or protected species is observed in the mitigation zone pile driving will cease and not recommence until they have exited the area.

Affected Species, Critical Habitat and the Action Agency Determinations
The Navy has determined the proposed action "may affect, but is not likely to adversely affect" the fin whale, humpback whale, North Atlantic right whale, Atlantic sturgeon, shortnose sturgeon, green sea turtle, Kemp's ridley sea turtle, loggerhead sea turtle, and leatherback sea turtle. The Navy has determined there will be "no effect" to sperm, blue, and sei whales and the

hawksbill sea turtle. The Navy has also determined the proposed training will have "no effect" on designated critical habitat.

Effects Analysis of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. A no effect determination is appropriate when an action has no potential to affect a species listed under the ESA.

The proposed action was assessed and potential factors that may adversely affect ESA-listed species are entanglement; vessel strikes; noise disturbance from encampment, vessel and rolling-stock movement; pile driving noise from ELCAS (M) construction; temporary habitat loss; and temporary water quality degradation. A summary of the effects of the action on each species is presented below and in Table 3.

Entanglement

Entanglement in liquid transfer and purification hoses is possible but unlikely to occur. Liquid transfer hoses float and are kept taut. They are also of sufficient diameter that loops capable of entangling sturgeon, sea turtles, or marine mammals are exceedingly unlikely. The tactical water purification system intake hose is short and fitted with a screen to keep fish or debris from entering the purification system. No more than short lengths of either hose will be present in the water column and training exercises will be of limited duration occurring on 35 days at JEB Little Creek-Fort Story and 7 days at camp Lejeune. Given the limited time hoses will be in the water, the fact hoses will not generally be present in the water column, the limited likelihood of hoses forming loops capable of entangling listed species, and the limited occurrences of most listed species in the project area; we concur that entanglement of ESA-listed species is so unlikely as to not be reasonably expected to occur. Therefore, effects to ESA-listed species are discountable.

Vessel Strikes

A majority of vessels used during training exercises are small craft with drafts less than 6 ft deep. The few large ships used during training will be confined to deeper ship channels and once in place will be anchored throughout the training exercises. One or two cargo ships will travel from Norfolk, Virginia to Camp Lejeune once per year for the annual full JLOTS training, resulting in a negligible increase in ship traffic. The increased use of ships in the area to accommodate the additional floating causeway (2 per year at the JEB Fort Story training area) and ELCAS (M) (1 per year at each of the JEB Little Creek-Fort Story and Camp Lejeune training areas) field training exercises is not a substantial increase in the pre-existing ship traffic passing through the water around the training areas. It is possible ESA-listed species have become acclimated to the level of ship traffic within and around the training areas. The Navy uses watch personnel (including crew members on small vessels) on all moving vessels and training vessels will be operated at slow speeds to avoid striking observable objects as described in the minimization measures above. Sturgeon, although present in the vicinity of the training areas, prefer to swim near the bottom of the water column. Therefore, they are not expected to interact with smaller low-draft vessels. Few large ships are involved in the training exercises (including the cargo ships traveling from Norfolk to Camp Lejeune) and it is not reasonably likely a sturgeon vessel strike will occur from the infrequent proposed large ship movements (discountable) and any avoidance behavior sturgeon display will not be expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant). Sea turtles, one of which (hawksbill sea turtle) is uncommon in the training areas and unlikely to be encountered (discountable, see species description above), are expected to exhibit avoidance behavior in the event they encounter a vessel and it is not reasonable expected that given the minimization measures implemented and behavioral avoidance sea turtle strikes will occur (discountable). The deflection of sea turtle swimming patterns associated with vessel movements are not expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant); therefore, any potential effects from avoidance behavior are considered insignificant.

ESA-listed whales are not regularly expected to occur within the training areas and it is not reasonably likely they will be encountered by moving vessels (discountable). In the event ESA-listed whales are encountered, we expect individuals to exhibit avoidance behavior. However, the minimal deflection of whale swimming patterns associated with vessel movements are not expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant). The endangered North Atlantic right whale appears to be particularly prone to vessel collisions in comparison to other large whale species (Vanderlaan and Taggart 2007), possibly due to their slow swimming speeds, positive buoyancy, and largely coastal distribution (NMFS 2008). However, given the proposed levels of vessel movements, minimization measures implemented, and the rarity of some ESA-listed marine mammals (particularly sperm, blue, and sei whales) in the action area, the JLOTS activities are not expected to result in a measurable likelihood of take from vessel strikes (discountable) and any behavioral avoidance of vessels by species present is not expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant).

Based on the above information we find that the risk of vessel strikes to all ESA-listed species considered in this consultation is discountable. Any behavioral avoidance of moving vessels by all ESA-listed species is insignificant and does not rise to the level of take because it is expected to occur infrequently, over short durations, ESA-listed species are expected to return to normal behavior once out of the way, ESA-listed species in the action area are highly mobile, and because the habitat around the action area is not uniquely important to these species or rare. Behavioral avoidance by ESA-listed species will have negligible impacts on their energy budgets, health, and reproductive output; therefore, these effects are insignificant and biologically irrelevant.

Noise Disturbance from Encampment, Rolling-stock Movement, and Vessel Movement

The noise disturbance from the proposed encampment, vehicle movements, and vessel movements is not anticipated to be substantially increased over pre-existing baseline noise levels. The training area and its surroundings already receive considerable ship traffic and inland areas are already under various levels of development. The proposed training events generating noise from encampment will likely be sufficiently far away from any marine environments to reduce noise levels experienced by marine species. Vessel movement and rolling-stock movement will not occur for extended periods of time and is not likely to be substantially greater than pre-existing noise levels at the sites. Several ESA-listed species (sperm whales, blue whales, sei whales, hawksbill sea turtles, and shortnose sturgeon) are rare in the action area and it is not reasonable to assume they will be affected by the noise generated from encampment, rolling-stock, or vessels (discountable). Any ESA-listed species that may occur in the area including fish, sea turtles, and marine mammals are likely acclimated to the pre-existing noise levels from these sources (or similar sources) and any additional negative effects from noise (including short-term behavioral avoidance if it occurs) is not expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant).

Based on the above information we find that behavioral avoidance caused by noise disturbance from these sources for all ESA-listed species is either discountable or insignificant and does not rise to the level of take because it is expected to occur infrequently, over short durations, ESA-listed species are expected to return to normal behavior once the disturbance is over or they have moved sufficiently away, ESA-listed species in the action area are highly mobile, and because the habitat around the action area is not uniquely important to these species or rare. Any behavioral avoidance by ESA-listed species will have negligible impacts on their energy budgets, health, and reproductive output; therefore, these effects are insignificant and biologically irrelevant.

ELCAS (M) Construction and Pile Driving

The Navy BA indicates the peak sound level at the source is 207 dB re 1μPa. Pile driving will occur for approximately 90 minutes per day over 20 days to install the pier. Vibratory extraction will take 72 minutes per day over 10 days to remove the piles upon pier deconstruction. The Navy will maintain a 55 m (180 ft) mitigation zone around pilings and will begin driving using soft starts as described in the minimization measures above. ELCAS (M) training does not currently occur at the training sites and so no acclimation of ESA-listed species to this activity is expected. For aquatic species experiencing pile driving noise it is biologically relevant to analyze the possibility of being exposed to noise levels capable of inducing physical injury and behavioral responses.

For Atlantic and shortnose sturgeon it is appropriate to use the peak threshold for fish (206 dB re 1μPa; Fisheries Hydroacoustic Working Group 2008) when considering the potential for physical injury because chronic exposure injuries are likely to be behaviorally avoided by fleeing the area. The Navy assessed that sturgeon must be within 12 m (39 ft) of the pile while it is being driven at full strength to incur physical injury. Sturgeon may initially be attracted to the temporary stirring of sediments from pile driving as it may provide increased bottom-feeding opportunities. However, given the implementation of the mitigation zone and soft starts it is unlikely sturgeon will remain within the 12 m range for physical injury to occur if the noise levels increase to the point of causing physical discomfort. If noise levels are 150 dB re 1µPa rms or greater it is expected to result in behavioral avoidance by sturgeon. The level of sound from impact driving capable of inducing behavioral avoidance by sturgeon is expected to potentially occur out to 3,415 m at JEB Little Creek-Fort Story and to 3,981 m at Camp Lejeune. The sound level from vibratory extraction capable of inducing behavioral avoidance is expected to potentially occur out to 46 m (150 ft). Shortnose sturgeon are unlikely to be present within any of the training areas and effects to these species are not reasonably expected to occur (discountable). Atlantic sturgeon are likely to occur at the JEB training site and potentially occur at the Camp Lejeune site. However, given the availability of vast offshore expanses not exposed to levels of sound capable of inducing behavioral responses, the mobility of these species, and the short time driving (<90 minutes per day over 20 days) and extraction (72 minutes per day over 10 days) will occur at each site per year, any behavioral avoidance is not expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant).

The injury threshold for sea turtles from sound produced by impact driving and vibratory extraction is 190 dB re 1µPa rms (as derived cooperatively between NMFS and the Navy to match the threshold for pinnipeds (NMFS 2014)) and is expected to occur out to 7.3 m (24.1 ft) at JEB and 8.6 m (28.1 ft) at Camp Lejeune. Given the implementation of the mitigation zone and soft starts it is unlikely sea turtles will remain within the 7–9 m range for physical injury to occur if the noise levels increase to the point of causing physical discomfort. Furthermore, sea turtle species such as the hawksbill sea turtle may occur so infrequently at the proposed training sites that effects are not reasonably expected to occur and are discountable. No criteria have been set for behavioral responses of sea turtles to sound produced by impact driving or from vibratory extraction; however, as with the other species analyzed, the mobility of the species, and the short time driving (<90 minutes per day over 20 days) and extraction (72 minutes per day over 10 days) will occur at each site per year, any behavioral avoidance is not expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant).

The injury threshold for marine mammals from sound produced by impact driving is 180 dB re 1µPa rms (NMFS 2005) and is expected to occur out to 34 m at JEB and 40 m at Camp Lejeune. Given the implementation of the mitigation zone and soft starts it is unlikely marine mammals will remain within the 34–40 m range for physical injury to occur if the noise levels increase to the point of causing physical discomfort. If impact driving noise levels are 160 dB re 1µPa rms or greater (NMFS 2005) it is expected to result in behavioral avoidance by marine mammals. The level of sound from impact driving capable of inducing behavioral avoidance by marine mammals is expected to potentially occur out to 736 m at JEB Little Creek-Fort Story and to 858 m at Camp Lejeune. The sound level from vibratory extraction capable of inducing behavioral avoidance (120 dB re 1µPa rms) is expected to potentially occur out to 4,642 m at both sites. We do not expect large whale species (sperm, blue, and sei whales) to occur in vicinity of the training areas and their presence will be so unlikely that we consider the potential for exposure to stressors to be discountable. Those species that may be within range of the behavioral noise thresholds (fin, humpback, and north Atlantic right whale) will be expected to avoid the area. However, given the availability of vast expanses not exposed to levels of sound capable of inducing behavioral responses, the mobility of marine mammal species, and the short time driving (<90 minutes per day over 20 days) and extraction (72 minutes per day over 10 days) will occur at each site per year, any behavioral avoidance is not expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant).

Based on the above information we find that any behavioral avoidance caused by pile driving for all ESA-listed species is either discountable or insignificant and does not rise to the level of take because it is expected to occur infrequently, over short durations, soft starts will reduce the magnitude of startle response, ESA-listed species are expected to return to normal behavior once the disturbance is over or they have moved sufficiently away, ESA-listed species in the action area are highly mobile, and because the habitat around the action area is not uniquely important to these species or rare. Any behavioral avoidance by ESA-listed species will have negligible impacts on their energy budgets, health, and reproductive output; therefore, these effects are insignificant and biologically irrelevant.

Temporary Water Quality Degradation

Pile driving as part of ELCAS (M) construction will temporarily suspend sediments in the water column in the area around pilings. Shortnose sturgeon are not reasonably likely to occur in the action area (discountable) and turbidity is not likely to impact Atlantic sturgeon, which may find it easier to feed when bottom sediments are disturbed (beneficial) or have no increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant). Hawksbill sea turtles are not reasonably certain to occur in the action area (discountable). Sea turtle foraging habitat is already of poor quality (Navy 2014) suggesting any temporary increase in turbidity is not expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant) for these species. The presence of sperm, blue, and sei whales in the action area is not reasonably expected to occur (discountable) and any temporary increase in turbidity is not expected to result in an increased likelihood of injury to ESA-listed marine mammals due to the significant disruption of breeding, feeding, or sheltering (insignificant).

Based on the above information we find that effects to ESA-listed species resulting from temporary increases in turbidity caused by pile driving is discountable or insignificant and does not rise to the level of take. Increases in turbidity are expected to occur infrequently, over short durations, ESA-listed species are expected to return to normal behavior once the disturbance is over or they have moved sufficiently away, ESA-listed species in the action area are highly mobile, and because the habitat around the action area is not uniquely important to these species or rare. Effects to ESA-listed species resulting from temporary increases in turbidity will have negligible impacts on their energy budgets, health, and reproductive output; therefore, these effects are insignificant and biologically irrelevant.

Temporary Habitat Loss

The construction of the floating causeway and ELCAS (M) will not prohibit the use of the marine environment under the structures by ESA-listed species potentially occurring in the area. ESA-listed species are also likely acclimated to the pre-existing levels of vessel traffic and noise of the action area. Several of the ESA-listed species (sperm whale, blue whale, sei whale, hawksbill sea turtle, and shortnose sturgeon) are unlikely to occur in the training areas and we have determined potential effects to these species to be discountable. Any avoidance of the area due to noise, ship movement, or ELCAS (M) construction is discussed in the relevant effect analyses above. We do not expect temporary displacement of these species from habitat for reasons not already discussed above. Any potential disruption of breeding, feeding, or sheltering will be insignificant.

Effects to Critical Habitat

The JLOTS training areas do not include critical habitat for any ESA-listed species. However, nearshore reproductive critical habitat is designated for the loggerhead sea turtle along the shoreline immediately south of the Camp Lejeune training area. This critical habitat unit was designated to protect offshore areas where hatchlings egress into the ocean and where nesting females can transit between the ocean and the beach. The primary constituent elements supporting these turtle activities are adjacency to high-density nesting habitat, a lack of manmade structures preventing movement between the beach and ocean, lack of artificial lighting that could disrupt turtle movements, and a lack of manmade structures promoting higher turtle predator densities. Given the action will not occur in the critical habitat south of Camp Lejeune, there will be no structures or lighting in this area. Therefore, we concur with the Navy's determination that JLOTS training will have "no effect" on critical habitat for the loggerhead sea turtle. No other critical habitat designations occur within the vicinity of the action area and no effects are expected.

Conclusion

After review of the proposed action including minimization measures, using substantive requirements of ESA section 7, and using the best scientific and commercially available data, we determined the likelihood of take from entanglement; vessel strikes; noise disturbance from encampment, vessel and rolling-stock movement; pile driving noise from ELCAS (M) construction; temporary habitat loss; and temporary water quality degradation of all ESA-listed species were either so unlikely to occur based on the frequency of the disturbance and rarity of the species in the action area as to be discountable, or in the event species did coincide with the disturbance the effects will not be expected to result in an increased likelihood of injury due to the significant disruption of breeding, feeding, or sheltering (insignificant). Therefore, we concur with the Navy's determination that JLOTS training may affect, but is not likely to adversely affect fin whales, humpback whales, North Atlantic right whales, green sea turtles, Kemp's ridley sea turtles, leatherback sea turtles, loggerhead sea turtles, Atlantic sturgeon, and shortnose sturgeon. We believe a determination of "may affect, but is not likely to adversely affect" for sperm, blue, and sei whales and the hawksbill sea turtle is more appropriate than "no effect." Although the potential to affect these species is unlikely, the possibility does exist due to ship movements and propagated underwater sound. We do not expect direct or indirect effects of JLOTS training activities to rise to the level of take for any ESA-listed species and no take is authorized. The proposed training activities will not occur in designated critical habitat or affect the primary constituent elements of nearby critical habitat; therefore, we concur the with the Navy's determination that JLOTS training will have "no effect" on critical habitat.

Reinitiation of Consultation

As provided in 50 CFR 402.16, the Navy must reinitiate ESA consultation if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, the action is modified in a manner causing effects to listed species or critical habitat not previously considered, or a new species is listed or critical habitat designated that may be affected by the action. The incidental take of listed species associated with this action, including behavioral harassment, injury, or mortality, is not anticipated nor exempted; thus, if take occurs as a result of the action, the Navy must immediately contact the NMFS Office of Protected Resources Interagency Cooperation Division to develop and implement mitigation to avoid additional take or initiate formal consultation in accordance with ESA section 7(a)(2). Our point of contact is Ms. Cathy Tortorici at (301) 427-8495 or cathy.tortorici@noaa.gov.

Sincerely,

Donna S. Wieting

Donna S. Wieting
Director
Office of Protected Resources

Attachments:
1. Department of the Navy U.S. Fleet Forces Command request for concurrence, 08 August 2014

Literature Cited:

Fisheries Hydroacoustic Working Group. 2008. Memorandum of agreement in principle for interim criteria for injury to fish from pile driving. California Department of Transportation (CALTRANS) in coordination with the Federal Highway Administration (FHA), the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service.

Halpin, P.N., A.J. Read, E. Fujioka, B.D. Best, B. Donnelly, L.J. Hazen, C. Kot, K. Urian, E. LaBrecque, A. Dimatteo, J. Cleary, C. Good, L.B. Crowder, and K.D. Hyrenbach. 2009. OBIS-SEAMAP: The world data center for marine mammal, sea bird, and sea turtle distributions. Oceanography 22(2):104-115.

Navy. 2014. Marine Species Biological Assessment for the U.S. Navy Joint Logistic Over-The-Shore Ttraining in Virginia and North Carolina. 104 pp.

NMFS. 2005. Notice of public scoping and intent (NOI) to prepare an environmental impact statement (EIS) request for writing comments. 70 FR 1871, 11 January 2005.

NMFS. 2008. Final Rule to Implement Speed Restrictions to Reduce the Threat of Ship Collisions with North Atlantic Right Whales. N. M. F. Service, editor, U.S. Federal Register, 73 FR 60173, 10 October 2008.

NMFS. 2014. Biological opinion for the U.S. Navy's military readiness activities on the Northwest Training Range Complex (NWTRC); and NMFS's promulgation of regulations pursuant to the Marine Mammal Protection Act (MMPA) regarding U.S. Navy's "take" of marine mammals incidental to military readiness activities on the NWTRC for a five-year period (November 2010 to November 2015); and NMFS's issuance of a Letter of Authorization for the U.S. Navy to "take" marine mammals incidental to the military readiness activities on the NWTRC (November 2012 to November 2015).

Vanderlaan, A. S., and C. T. Taggart. 2007. Vessel collisions with whales: The probability of lethal injury based on vessel speed. Marine Mammal Science 23(1):144-156.

Table 3. National Marine Fisheries Service justifications supporting a "may affect, but is not likely to adversely affect" determination for ESA-listed species that may occur in the proposed JLOTs action area.

Factors / Species	Entanglement	Vessel Strike / Injury from Avoidance	Noise	Pile Driving and Extraction	Temporary Habitat Loss	Temporary Water Quality Degradation
Sperm whale (*Physeter macrocephalus*)	Discountable	Discountable/ Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable or Insignificant
Blue whale *(Balaenoptera musculus)*	Discountable	Discountable/ Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable or Insignificant
Fin whale *(Balaenoptera physalus)*	Discountable	Discountable/ Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
Sei whale *(Balaenoptera borealis)*	Discountable	Discountable/ Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable or Insignificant
Humpback whale *(Megaptera novaeangliae)*	Discountable	Discountable/ Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
North Atlantic right whale (*Eubalaena glacialis*)	Discountable	Discountable/ Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
Green sea turtle *(Chelonia mydas)*	Discountable	Discountable/ Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
Hawksbill sea turtle *(Eretmochelys imbricata)*	Discountable	Discountable/ Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable/ Insignificant
Kemp's ridley sea turtle *(Lepidochelys kempii)*	Discountable	Discountable/ Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
Leatherback sea turtle *(Dermochelys coriacea)*	Discountable	Discountable/ Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
Loggerhead sea turtle[3] *(Caretta caretta)*	Discountable	Discountable/ Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
Atlantic sturgeon *(Acipenser oxyrinchus)*	Discountable	Discountable/ Insignificant	Insignificant	Insignificant	Insignificant	Beneficial or Insignificant
Shortnose sturgeon *(Acipenser brevisrostrum)*	Discountable	Discountable/ Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable or Insignificant	Discountable or Insignificant

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A.4 Marine Mammal Protection Act

DEPARTMENT OF THE NAVY
COMMANDER
1562 MITSCHER AVE, SUITE 250
U.S. FLEET FORCES COMMAND
NORFOLK, VA 23551-2487

5090
Ser N46/083
August 8, 2014

Ms. Donna Wieting
Acting Director, Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
1315 East-West Highway, SSMC3, Room 13821
Silver Spring, MD 20910-3282

SUBJECT: REQUEST FOR MARINE MAMMAL PROTECTION ACT INCIDENTAL TAKE AUTHORIZATION AND REGULATIONS FOR U.S. NAVY JOINT LOGISTICS OVER-THE-SHORE TRAINING

In accordance with the Marine Mammal Protection Act, as amended, and 50 C.F.R. Part 216, the U.S. Navy requests a five-year incidental take authorization and regulations for the incidental taking of marine mammals associated with Joint Logistics Over-the-Shore (JLOTS) training activities occurring at Joint Expeditionary Base Little Creek-Fort Story, Virginia Beach, Virginia and Marine Corps Base Camp Lejeune, Jacksonville, North Carolina.

The proposed action may incidentally expose marine mammals that reside within the JLOTS study area to sound and other environmental stressors associated with training activities. The enclosed request further describes the JLOTS activities and study area, and provides the specific information required by the National Marine Fisheries Service (NMFS) for consideration of an incidental take request.

The U.S. Navy requests the above regulations authorize, and NMFS issue, a five-year Letter of Authorization to

Commander, U.S. Fleet Forces Command
Attn: Code N46
1562 Mitscher Avenue, Suite 250
Norfolk, Virginia 23551-2487

5090
Ser N46/083
August 8, 2014

We appreciate your continued support in helping the U.S. Navy to meet its environmental responsibilities. Please direct any questions to Ms. Laura Busch (757-836-8471).

Sincerely,

Joseph Murphy

J. W. MURPHY
Deputy Chief of Staff
for Fleet Installations
and Environmental Readiness

Enclosures:
1. Request for Regulations and Letters of Authorization for the Incidental Taking of Marine Mammals Resulting From U.S. Navy Joint Logistics Over-The-Shore Training in Virginia and North Carolina
2. JLOTS EA

Copy to: Ms. Jolie Harrison, NMFS Office of Protected Resources
Ms. Cathryn Tortorici, NMFS Office of Protected Resources

2

A.5 National Historic Preservation Act

B Air Emission Estimates

This appendix provides detailed information on the calculations of air emissions associated with the Proposed Action. Information from these calculations was incorporated into the analyses in Section 3.1 (Air Quality).

B.1 Emissions Determination

The Proposed Action would result in air emissions from the operation of vessels and craft, amphibious and land vehicles, construction equipment, and generators. The type and amount of emissions would depend on each emission source and the time during which the source is operated. Section B.1.1 (Emission Sources) lists the assumptions underlying the analysis with regard to source types and duration for each proposed training exercise. Section B.1.2 (Methodology) identifies the methodology used to evaluate the emissions for the different types of sources. Tables B-1 through B-5 show the results.

B.1.1 Emission Sources

B.1.1.1 Full JLOTS Exercise (Once per Year)

B.1.1.1.1 ELCAS

Construction and Removal

- Two (2) bulldozers for 12 hours (construction) and 12 hours (removal).
- One (1) active pile driver for 24 hours/day for 20 days.
- One (1) vibratory pile extractor for 24 hours/days for 10 days.
- Two (2) 200-ton cranes and one (1) 75-ton crane for 24 hours/days for 20 days (assembly) and for 24 hours/day for 10 days (removal).
- Two (2) forklifts for 24 hours/day for 4 days.
- One (1) scoop loader for 24 hours/day for 14 days (assembly) and 10 days (removal).

Operations

- Two (2) 200-ton cranes and a 75-ton crane for 12 hours/day for 36 days.
- Six (6) cargo trucks (MTVR trucks or equivalent) for 12 hours/day for 36 days.
- Two (2) 30-kW and 2 100-kW generators for 24 hours/day for 36 days.

B.1.1.1.2 Floating Causeways/Administrative Piers

- Two (2) bulldozers for 24 hours (construction) and 24 hours (removal).
- Two (2) forklifts for 24 hours/day for 4 days.
- One (1) scoop loader for 24 hours/day for 4 days.

B.1.1.1.3 INLS and Watercraft

- Four (4) INLS powered modules (causeway ferries) for 12 hours/day for 60 days.
- Four (4) warping tugs for 12 hours/day for 60 days.
- Eight (8) LCAC, MPFUB and crane ships for 12 hours/day for 60 days.
- Ten (10) small boats for 24 hours/day for 60 days.

B.1.1.1.4 Amphibious and Land Vehicles

- Four (4) LARC for 12 hours/day for 60 days.
- Two (2) truck forklift rough terrain (12,000 pounds) for 12 hours/day for 60 days.
- Six (6) Humvees for 12 hours/day for 60 days.
- Six (6) cargo trucks for 12 hours/day for 60 days.

B.1.1.1.5 Tent Encampment

- Main encampment: 30 generators (ten [10] 30-kW, ten [10] 60-kW, ten [10] 100-kW) for 24 hours day for 60 days.
- Beach tents: Three (3) 60-kW generators for 24 hours/day for 60 days and two (2) 60-kW generators for 24 hours/day for 21 days.
- Lighting: Sixteen (16) 30-kW generators for 12 hours/day for 60 days.

B.1.1.1.6 Liquid Transfer Systems

- Tactical Water Purification System: One (1) pump generator for 12 hours/day for 47 days.
- Amphibious Bulk Liquid Transfer System: One (1) 60-kW generator for 24 hours/day for 4 days.

B.1.1.2 Quarterly Unit-Level Cargo Transfer Event

B.1.1.2.1 INLS and Watercraft

- Up to four (4) powered modules (causeway ferries) for 12 hours/day for 10 days.
- Up to four (4) warping tugs for 12 hours/day for 10 days.
- Three (3) LCAC and MPFUB for 12 hours/day for 10 days.
- Six (6) small boats for 24 hours/day for 10 days.

B.1.1.2.2 Amphibious and Land Vehicles

- Two (2) LARC for 12 hours/day for 8 days.
- Three (3) Humvees for 12 hours/day for 8 days.

- Three (3) cargo trucks for 12 hours/day for 8 days.
- Two (2) truck forklift rough terrain (12,000 pounds) for 12 hours/day for 8 days.

B.1.1.3 Quarterly Unit-Level Tent Encampment – 60 Tents

- Main encampment: Ten (10) generators (three [3] 15-kW, four [4] 40-kW, three [3] 60-kW) for 24 hours/day for 18 days.
- Beach tents: Two (2) 60-kW generators for 24 hours/day for 10 days and three (3) 40-kW generators for 24 hours/day for 18 days.
- Lighting: Five (5) 30-kW generators for 12 hours/day for 18 days.

B.1.1.4 Routine Unit-Level Tent Encampment – 15 Tents (Six Times per Year)

- Three (3) 30-kW generators for 24 hours/day for 4 days.
- Seven (7) 40-kW generators for 24 hours/day for 4 days.

B.1.1.5 Routine Unit-Level Liquid Transfer Exercise – Amphibious Bulk Liquid Transfer System (Ten Times per Year)

- One (1) tanker ship, one (1) powered INLS module, one (1) warping tug, one (1) inflatable-hull boat, one (1) pump generator, two (2) 60-kW generators; four (4) small boats, all for 24 hours once.

B.1.1.6 Quarterly Unit-Level Tactical Water Purification System Exercise

- One (1) pump generator, for 4 hours.

B.1.2 Methodology

B.1.2.1 Equipment Operations and Emissions

The estimates of equipment emissions were developed based on the estimated hours of usage and emission factors for each motorized source. Emission factors for the criteria pollutants and carbon dioxide related to heavy-duty diesel equipment were obtained from NONROAD emission factor model (U.S. Environmental Protection Agency 2008).

The USEPA recommends the following formula to calculate hourly emissions from non-road engine sources:

$M_i = N \times HP \times LF \times EF_i$

where:

M_i = mass of emissions of i^{th} pollutant during inventory period (where "i" is the pollutant being measured);

N = source population (units);

HP = average rated horsepower;

LF = typical load factor; and

EF_i = average emissions of i^{th} pollutant per unit of use (e.g., grams per horsepower-hour).

Typical load factor values were obtained from NONROAD model emission factor worksheet (U.S. Environmental Protection Agency 2008).

B.1.2.2 Marine Vessel Operations and Emissions

USEPA's methodologies and default marine vessel input parameters and emissions factors available in *Current Methodologies in Preparing Mobile Source Port-related Emission Inventories* (April 2009) were used to predict emissions from vessels.

B.1.2.3 Truck Operations and Emissions

USEPA's Motor Vehicle Emission Simulator program was used to predict truck and Humvee running emission factors for the criteria pollutants and carbon dioxide. The national default input parameters applicable for the Hampton Roads area were used in emissions factor modeling.

B.1.2.4 Combined Emissions

The combined emissions of the Proposed Action under the Action Alternative (one full JLOTS event with ELCAS [M]; four unit-level cargo transfer events; 152 routine unit-level cargo transfer events; 10 unit-level liquid transfer events; four unit-level Tactical Water Purification System events; four unit-level tent encampment events; and six routine unit-level tent encampment events at JEB Little Creek-Fort Story, and one full JLOTS event with ELCAS [M] at Camp Lejeune) are shown in Table B-7. The total emissions for the Action Alternative activities associated with JEB Little Creek-Fort Story are presented in Table B-8 and the total emissions for the Action Alternative activities associated with Camp Lejeune are presented in Table B-9.

The total emissions for JEB Little Creek-Fort Story under the No Action Alternative were calculated by subtracting the emissions associated with one ELCAS (M) activity, one floating causeway, and one administrative pier from the total emissions under the Action Alternative for JEB Little Creek-Fort Story. This information is presented in Table B-10.

The total emissions for Camp Lejeune under the No Action Alternative were calculated by subtracting the emissions associated with one ELCAS (M) activity from the total emissions under the Action Alternative for Camp Lejeune. This information is presented in Table B-11.

The increase in emissions associated with the Action Alternative relative to the No Action Alternative (the baseline) is shown in Table B-12.

Table B-1: Full JLOTS Exercises (Not Including Amphibious and Land Vehicle Emissions)

Equipment Type	Number of Units	Days	Total Hours	Horse-power (hp)	Load Factor (%)	Emission Factor (grams/hp-hour) (grams/kW-hour for marine vessels)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM10	SO_2	CO2	VOC	NOx	CO	$PM_{2.5}$	PM10	SO_2	CO2
ELCAS (M)																			
Construction and Removal																			
Bulldozer	2	1	48	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.00	0.04	0.02	0.00	0.00	0.00	5.05
Pile Driver	2	20	720	329	59	0.42	5.60	2.75	0.37	0.39	0.12	537.08	0.06	0.86	0.42	0.06	0.06	0.02	82.56
Vibratory Pile Extractor	1	10	240	171	59	0.32	4.25	1.64	0.28	0.29	0.12	541.49	0.01	0.11	0.04	0.01	0.01	0.00	14.44
Crane (200-Tons)	2	30	1,440	500	58	0.33	4.69	0.94	0.20	0.21	0.11	530.54	0.15	2.16	0.43	0.09	0.10	0.05	244.00
Crane (75-Tons)	1	30	720	200	58	0.33	4.69	0.94	0.20	0.21	0.11	530.54	0.03	0.43	0.09	0.02	0.02	0.01	48.80
Forklifts	2	15	672	94	59	0.37	4.16	2.88	0.36	0.37	0.12	573.48	0.01	0.17	0.12	0.01	0.02	0.01	23.51
Scoop Loader	1	24	576	48	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.01	0.04	0.04	0.01	0.01	0.00	4.23
Operations																			
Crane (200-Tons)	2	36	864	500	58	0.33	4.69	0.94	0.20	0.21	0.11	530.54	0.09	1.29	0.26	0.06	0.06	0.03	146.40
Crane (75-Tons)	1	36	432	200	58	0.33	4.69	0.94	0.20	0.21	0.11	530.54	0.02	0.26	0.05	0.01	0.01	0.01	29.28
Generator – 30 kW	2	36	1,728	40	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.03	0.19	0.11	0.02	0.02	0.00	19.24
Generator – 100 kW	2	36	1,728	134	43	0.61	6.28	2.21	0.42	0.43	0.11	529.72	0.07	0.69	0.24	0.05	0.05	0.01	58.09
TOTAL EMISSIONS ELCAS (M)													**0.49**	**6.25**	**1.83**	**0.33**	**0.34**	**0.15**	**675.60**
FLOATING CAUSEWAY																			
Construction and Removal																			
Bulldozer	2	1	48	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.00	0.04	0.02	0.00	0.00	0.00	5.05
Forklifts	2	2	96	94	59	0.37	4.16	2.88	0.36	0.37	0.12	573.48	0.00	0.02	0.02	0.00	0.00	0.00	3.36
Scoop Loader	1	2	48	48	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.00	0.00	0.00	0.00	0.00	0.00	0.35
ADMINISTRATIVE PIER																			
Construction and Removal																			
Bulldozer	2	1	48	300	59	0.33	4.72	1.93	0.29	0.30	0.12	539.34	0.00	0.04	0.02	0.00	0.00	0.00	5.05
Forklifts	2	2	96	94	59	0.37	4.16	2.88	0.36	0.37	0.12	573.48	0.00	0.02	0.02	0.00	0.00	0.00	3.36
Scoop Loader	1	2	48	48	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.00	0.00	0.00	0.00	0.00	0.00	0.35
TOTAL EMISSIONS FLOATING CAUSEWAY AND ADMINISTRATIVE PIER													**0.01**	**0.14**	**0.08**	**0.01**	**0.01**	**0.00**	**17.52**
INLS																			
INLS powered Modules (Causeway Ferries)	4	60	2,880	858	42	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.31	7.77	5.71	0.32	0.34	1.49	788.20
Warping tugs	4	60	2,880	711	31	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.19	4.76	3.50	0.19	0.21	0.91	482.65
Landing Craft Mechanized, LCAC, MPFUB, Crane Ship	8	60	5,760	276	43	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.20	5.12	3.76	0.21	0.23	0.98	519.29
Small Boats	10	60	14,400	276	43	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.51	12.79	9.41	0.52	0.56	2.45	1,298.21
Truck Forklift	2	60	1,440	94	59	0.37	4.16	2.88	0.36	0.37	0.12	573.48	0.03	0.37	0.25	0.03	0.03	0.01	50.37
GENERATORS																			
Generators – 30 kW	10	60	14,400	40	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.28	1.56	0.92	0.16	0.17	0.03	160.34
Generators – 60 kW	10	60	14,400	80	43	0.80	6.16	3.37	0.62	0.64	0.13	588.51	0.44	3.36	1.84	0.34	0.35	0.07	321.06
Generators – 100 kW	10	60	14,400	134	43	0.61	6.28	2.21	0.42	0.43	0.11	529.72	0.55	5.74	2.02	0.38	0.39	0.10	484.06
Generators – 60 kW	3	60	4,320	80	43	0.80	6.16	3.37	0.62	0.64	0.13	588.51	0.13	1.01	0.55	0.10	0.10	0.02	96.32
Generators – 60 kW	2	21	1,008	80	43	0.80	6.16	3.37	0.62	0.64	0.13	588.51	0.03	0.24	0.13	0.02	0.02	0.00	22.47
Generators – 30 kW	16	60	11,520	40	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.23	1.25	0.73	0.13	0.13	0.03	128.28
Generators - Pump Generator	1	47	564	4	43	1.17	7.39	4.95	0.82	0.85	0.13	587.42	0.00	0.01	0.01	0.00	0.00	0.00	0.63

Equipment Type	Number of Units	Days	Total Hours	Horse-power (hp)	Load Factor (%)	Emission Factor (grams/hp-hour) (grams/kW-hour for marine vessels)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM10	SO_2	CO2	VOC	NOx	CO	$PM_{2.5}$	PM10	SO_2	CO2
LIQUID TRANSFER SYSTEM																			
Generators - Mid Size – 60 kW	1	4	96	80	43	0.80	6.16	3.37	0.62	0.64	0.13	588.51	0.00	0.02	0.01	0.00	0.00	0.00	2.14
TOTAL EMISSIONS FULL JLOTS													**3.41**	**50.38**	**30.75**	**2.75**	**2.91**	**6.24**	**5,047.14**

Table B-2: Quarterly Unit-Level Cargo Transfer Exercises

Equipment Type	Number of Units	Days	Total Hours	Horse-power (hp)	Load Factor (%)	Emission Factor (grams/hp-hour) (grams/kW-hour for marine vessels)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
INLS																			
INLS Powered Modules (Causeway Ferries)	4	10	480	858	42	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.051	1.295	0.952	0.053	0.057	0.2475	131.4
Warping Tugs	4	10	480	711	31	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.031	0.793	0.583	0.032	0.035	0.1516	804
Landing Craft Mechanized, LCAC, MPFUB	3	10	360	276	43	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.013	0.320	0.235	0.013	0.014	0.0611	32.5
Small Boats	6	10	1,440	276	43	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.051	1.279	0.941	0.052	0.056	0.2446	129.8
Truck Forklift	2	8	192	94	59	0.37	4.16	2.88	0.36	0.37	0.12	573.48	0.004	0.049	0.034	0.004	0.004	0.0014	6.7
AMPHIBIOUS AND LAND VEHICLES																			
LARC	4	10	480			0.03	0.23	0.14	0.01	0.02	0.00	45,35	0.01	0.06	0,03	0.00	0,00	0,00	10.88
Truck Forklift	2	10	240			0.37	4.16	2.88	0.36	0.37	0.12	573.48	0.04	0.50	0.35	0.04	0.04	0.01	68.82
Humvees	6	10	720			0.03	0.23	0.14	0.01	0.02	0.00	45.35	0.01	0.08	0.05	0.00	0.01	0.00	16.33
Cargo Trucks	6	10	720			0.03	0.55	0.17	0.04	0.05	0.00	141.33	0.01	0.20	0.06	0.01	0.02	0.00	50.88
TOTAL EMISSIONS QUARTERLY UNIT-LEVEL CARGO TRANSFER													**0.20**	**3.93**	**2.76**	**0.19**	**0.21**	**0.60**	**462.80**

Table B-3: Routine Unit-Level Cargo Transfer Exercises

Equipment Type	Number of Units	Days	Total Hours	Horse-power (hp)	Load Factor (%)	Emission Factor (grams/hp-hour) (grams/kW-hour for marine vessels)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
INLS																			
INLS Powered Modules (Causeway Ferries)	1	1	3	858	42	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.000	0.008	0.006	0.000	0.000	0.0015	0.8
Warping Tugs	1	1	3	711	31	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.000	0.005	0.004	0.000	0.000	0.0009	0.5
Landing Craft Mechanized, LCAC, MPFUB	3	1	9	276	43	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.000	0.008	0.006	0.000	0.000	0.0015	0.8
Small Boats	2	1	6	276	43	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.000	0.005	0.004	0.000	0.000	0.0010	0.5
AMPHIBIOUS AND LAND VEHICLES																			
LARC	1	1	3			0.03	0.23	0.14	0.01	0.02	0.00	45.35	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Truck Forklift	1	1	3			0.37	4.16	2.88	0.36	0.37	0.12	573.48	0.00	0.01	0.00	0.00	0.00	0.00	0.86
Humvees	1	1	3			0.03	0.23	0.14	0.01	0.02	0.00	45.35	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Cargo Trucks	1	1	3			0.03	0.55	0.17	0.04	0.05	0.00	141.33	0.00	0.00	0.00	0.00	0.00	0.00	0.21
TOTAL EMISSIONS QUARTERLY UNIT-LEVEL CARGO TRANSFER													**0.00**	**0.03**	**0.02**	**0.00**	**0.00**	**0.01**	**3.88**

Table B-4: Unit-Level Liquid Transfer Exercises

Equipment Type	Number of Units	Days	Total Hours	Horse-power (hp)	Load Factor (%)	Emission Factor (grams/hp-hour) (grams/kW-hour for marine vessels)							Emission Rate (tons)						
						VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2	VOC	NOx	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
AMPHIBIOUS BULK LIQUID TRANSFER SYSTEM EXERCISE																			
Tanker Ship	1	-	24	1,985	33	0.50	13.20	1.10	0.43	0.47	3.97	646.08	0.01	0.23	0.02	0.01	0.01	0.07	11.19
Powered INLS Module	1	-	24	276	43	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.00	0.02	0.02	0.00	0.00	0.00	2.16
Warping Tug	1	-	24	711	31	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.00	0.04	0.03	0.00	0.00	0.01	4.02
Boat	1	-	24	820	32	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.00	0.05	0.03	0.00	0.00	0.01	4.79
Generators - Pump Generator	1	-	24	4	43	1.17	7.39	4.95	0.82	0.85	0.13	587.42	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Generators – 60 kW	3	-	72	80	43	0.80	6.16	3.37	0.62	0.64	0.13	588.51	0.00	0.02	0.01	0.00	0.00	0.00	1.61
Small Boats	3	-	72	276	43	0.27	6.80	5.00	0.28	0.30	1.30	690.00	0.00	0.06	0.05	0.00	0.00	0.01	6.49
TOTALEMISSIONS AMPHIBIOUS BULK LIQUID TRANSFER SYSTEM													**0.02**	**0.42**	**0.16**	**0.02**	**0.02**	**0.10**	**30.28**
TACTICAL WATER PURIFICATION SYSTEM EXERCISE																			
Generator	1	-	4	80	43	0.80	6.16	3.37	0.62	0.64	0.13	588.51	0.00	0.00	0.00	0.00	0.00	0.00	0.09

Table B-5: Full JLOTS Vehicle Emissions

				Emission Factor (lb./hr.)							Emissions (tons)						
	Number of Units	Days	Total Hours	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
ELCAS (M)																	
Trucks (MTVR Truck)	6	36	2,592	0.03	0.55	0.17	0.04	0.05	0.00	141.33	0.04	0.71	0.22	0.05	0.06	0.00	183.17
AMPHIBIOUS AND LAND VEHICLES																	
LARC	4	60	2,880	0.03	0.23	0.14	0.01	0.02	0.00	45.35	0.04	0.33	0.20	0.02	0.02	0.00	65.31
Humvees	6	60	4,320	0.03	0.23	0.14	0.01	0.02	0.00	45.35	0.07	0.50	0.30	0.03	0.03	0.00	97.96
Cargo Trucks	6	60	4,320	0.03	0.55	0.17	0.04	0.05	0.00	141.33	0.07	1.19	0.37	0.09	0.10	0.00	305.28
TOTAL MOTOR VEHICLE EMISSIONS											**0.22**	**2.73**	**1.09**	**0.18**	**0.22**	**0.00**	**651.71**

Table B-6: Unit-Level Tent Encampment Exercises

				Emission Factor (lb/hr)							Emissions (tons)						
	Number of Units	Days	Total Hours	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
60-TENT QUARTERLY EXERCISES																	
Generator - Berthing	2	18	864	40	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.02	0.09	0.06	0.01	0.01
Generator - BSC Tent	4	18	1728	50	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.04	0.23	0.14	0.02	0.03
Generator - Alt BSC Tent	2	18	864	50	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.02	0.12	0.07	0.01	0.01
Generator - Medical	1	18	432	50	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.01	0.06	0.03	0.01	0.01
Generator - Galley and Scullery	4	18	1728	80	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.07	0.38	0.22	0.04	0.04
Generator - Refrigerator	3	18	1296	20	43	0.91	10.32	2.27	0.60	0.62	0.91	587.83	0.01	0.13	0.03	0.01	0.01
Generator - ADR-300	1	18	432	80	43	0.80	6.16	3.37	0.62	0.64	0.13	588.51	0.01	0.10	0.06	0.01	0.01
Generator - Shower and Laundry	1	18	108	40	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.00	0.01	0.01	0.00	0.00
Generator - SYSCOM	1	18	432	40	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.01	0.05	0.03	0.00	0.01
Generator - Trans Yard	1	18	432	40	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.01	0.05	0.03	0.00	0.01
TOTAL EMISSIONS – 60-TENT QUARTERLY EXERCISE											**0.20**	**1.21**	**0.66**	**0.12**	**0.12**	**0.03**	**117.86**
15-TENT ROUTINE																	
Generator - Ancillary	4	4	384	40	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.01	0.04	0.02	0.00	0.00
Generator - BSC, NSE, CMPF, LCO, OCO, SYSCOM	7	4	672	50	43	1.03	5.74	3.37	0.60	0.62	0.13	587.83	0.02	0.09	0.05	0.01	0.01
TOTAL EMISSIONS – 15-TENT ROUTINE EXERCISES											**0.23**	**1.35**	**0.74**	**0.13**	**0.14**	**0.04**	**131.49**

Table B-7: Total Annual Emissions (Action Alternative)

Exercise[1]	Annual Emissions (tons)						
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
Full JLOTS Exercises (x 2)	7.29	107.06	63.98	5.90	6.29	12.69	11,458.27
Cargo Transfer, Quarterly Unit-Level (x 4)	0.79	15.73	11.06	0.77	0.84	2.40	1,851.20
Cargo Transfer, Routine Unit-Level (x 152)	0.26	5.19	3.71	0.26	0.28	0.79	590.43
Amphibious Bulk Liquid Transfer System (x 10)	0.18	4.18	1.55	0.16	0.18	1.02	302.83
Tactical Water Purification System (x 4)[1]	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Tent Encampment, 60-Tent (x 4)	0.81	4.85	2.65	0.48	0.50	0.14	471.46
Tent Encampment, 15-Tent (x 6)	0.14	0.80	0.47	0.08	0.09	0.02	81.78
Total Emissions	**9.47**	**137.81**	**83.42**	**7.66**	**8.16**	**17.06**	**14,756.31**

1: For the purposes of the air quality analysis, the impacts of the Tactical Water Purification System are considered negligible.

Table B-8: Total Annual Emissions (Action Alternative – JEB Little Creek-Fort Story)

Exercise[1]	Annual Emissions (tons)						
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
Full JLOTS Exercises (x 1)	3.64	53.53	31.99	2.95	3.14	6.35	5,729.14
Cargo Transfer, Quarterly Unit-Level (x 4)	0.79	15.73	11.06	0.77	0.84	2.40	1,851.20
Cargo Transfer, Routine Unit-Level (x 152)	0.26	5.19	3.71	0.26	0.28	0.79	590.43
Amphibious Bulk Liquid Transfer System (x 10)	0.18	4.18	1.55	0.16	0.18	1.02	302.83
Tactical Water Purification System (x 4)[1]	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Tent Encampment, 60-Tent (x 4)	0.81	4.85	2.65	0.48	0.50	0.14	471.46
Tent Encampment, 15-Tent (x 6)	0.14	0.80	0.47	0.08	0.09	0.02	81.78
Total Emissions	**5.83**	**84.28**	**51.43**	**4.71**	**5.02**	**10.72**	**9,027.18**

1: For the purposes of the air quality analysis, the impacts of the Tactical Water Purification System are considered negligible.

Table B-9: Total Annual Emissions (Action Alternative – Camp Lejeune)

Exercise[1]	Annual Emissions (tons)						
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
Full JLOTS Exercises (x 1)	3.64	53.53	31.99	2.95	3.14	6.35	5,729.14

Table B-10: No Action Alternative Emissions – JEB Little Creek-Fort Story

	Annual Emissions (tons)						
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
Action Alternative JEB Little Creek-Fort Story Total Emissions	5.83	84.28	51.43	4.71	5.02	10.72	9,027.18
Reduced by 1 ELCAS (M)	-0.79	-9.98	-3.10	-0.56	-0.59	-0.22	-1,177.06
Reduced by 1 Floating Causeway and 1 Administrative Pier	-0.01	-0.14	-0.08	-0.01	-0.01	0.00	-17.52
Total Emissions for No Action Alternative at JEB Little Creek-Fort Story	**5.0**	**74.2**	**48.3**	**4.1**	**4.4**	**10.5**	**7,832.6**

Table B-11: No Action Alternative Emissions – Camp Lejeune

	Annual Emissions (tons)						
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
Action Alternative Camp Lejeune Total Emissions	3.64	53.53	31.99	2.95	3.14	6.35	5,729.14
Reduced by 1 ELCAS (M)	-0.79	-9.98	-3.10	-0.56	-0.59	-0.22	-1,177.06
Total Emissions for No Action Alternative at Camp Lejeune	**2.9**	**43.6**	**28.9**	**2.4**	**2.5**	**6.1**	**4,552.1**

Table B-12: Action Alternative Emissions by Installation Relative to No Action Alternative

Installation	Difference in Annual Emissions (tons)						
	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
JEB Little Creek-Fort Story	0.83	10.08	3.13	0.31	0.62	0.22	1,194.58
Camp Lejeune	0.79	9.98	3.10	0.56	0.59	0.22	1,177.06
Totals	**1.62**	**20.06**	**6.23**	**0.87**	**1.21**	**0.44**	**2,371.64**
De Minimis Level	*100*	*100*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*

B.2 Clean Air Act Conformity

The 1990 amendments to the Clean Air Act require federal agencies to ensure that their actions conform to the appropriate State Implementation Plan in a nonattainment area. The State Implementation Plan provides for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS); it includes emission limitations and control measures to attain and maintain the NAAQS. Conformity to a State Implementation Plan, as defined in the Clean Air Act, means conformity to the plan's purpose of reducing the severity and number of violations of the NAAQS to achieve the standards. The federal agency responsible for a Proposed Action is required to determine if its Proposed Action conforms to the applicable State Implementation Plan.

The USEPA has developed two sets of conformity regulations; federal actions are differentiated into transportation projects and non-transportation-related projects:

- Transportation projects, which are governed by the “transportation conformity” regulations (40 C.F.R. Parts 51 and 93), effective on December 27, 1993 and revised on August 15, 1997.
- Non-transportation projects which are governed by the “general conformity” regulations (40 C.F.R. Parts 6, 51 and 93) described in the final rule for *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* published in the *Federal Register* on November 30, 1993. The general conformity rule became effective January 31, 1994 and was revised on March 24, 2010.

Since the Proposed Action evaluated in this EA is not a transportation project, the general conformity regulation applies.

B.2.1 Attainment and Nonattainment Areas

The General Conformity Rule applies to federal actions occurring in air basins designated as nonattainment for the NAAQS or in attainment areas subject to maintenance plans (maintenance areas). Federal actions occurring in air basins that are in attainment with the NAAQS are not subject to the conformity rule. The designation of nonattainment is based on the violations of the NAAQS. Maintenance areas are areas that have been re-designated as attainment from a previous nonattainment status and have established a maintenance plan with measures to control emissions to ensure the air quality standards are maintained.

There are six criteria pollutants for which the USEPA has established NAAQS: carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), inhalable particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb).

Under the Action Alternative, a portion of the Proposed Action would take place at JEB Little Creek-Fort Story in Virginia Beach, Virginia, in an area that is currently designated as a maintenance area for 8-hour O_3 and an attainment area for the other criteria pollutants. Under the Action Alternative, a portion of the Proposed Action would take place at Camp Lejeune in Onslow County, North Carolina, an area in attainment for all criteria pollutants.

B.2.2 *De Minimis* Emission Levels

To focus general conformity requirements on those federal actions with the potential to have significant air quality impacts, threshold (*de minimis*) rates of emissions were established in the final rule. A formal conformity determination is required when the annual net total of direct and indirect emissions of a criteria pollutant or its precursors from a federal action occurring in a nonattainment or maintenance area would equal or exceed the applicable annual *de minimis* level for that pollutant. Table B-13 shows the *de minimis* levels for each pollutant.

Table B-13: *De Minimis* Emission Levels for Criteria Air Pollutants

Pollutant	Nonattainment Designation	Tons/Year
Ozone*	Serious	50
	Severe	25
	Extreme	10
	Other nonattainment or maintenance areas outside ozone transport region	100
	Marginal and moderate nonattainment areas inside ozone transport region	50/100**
Carbon Monoxide	All	100
Sulfur Dioxide	All	100
Lead	All	25
Nitrogen Dioxide	All	100
Particulate Matter ≤ 10 microns	Moderate	100
	Serious	70
Particulate Matter ≤ 2.5 microns***	All	100
Notes: * Applies to ozone precursors – volatile organic compounds (VOC) and nitrogen oxides (NO_X); ** VOC/NO_X; *** Applies to $PM_{2.5}$ and its precursors.		

B.2.3 Compliance Analysis

A General Conformity Rule analysis was conducted for the JEB Little Creek-Fort Story activities within the Action Alternative according to the guidance provided by 40 C.F.R. Parts 6, 51, and 93, Determining Conformity of Federal Actions to State or Federal Implementation Plans, (U.S. Environmental Protection Agency 1993 and 2010). The analysis was performed to determine whether a formal conformity analysis would be required. No analysis is required for the Camp Lejeune activities, which would take place in an area in attainment for all criteria pollutants.

Pursuant to the General Conformity Rule, all reasonably foreseeable emissions (both direct and indirect) associated with a federal action must be quantified and compared to the applicable annual *de minimis* levels. The conformity analysis must take into account the direct and indirect net emissions from mobile and stationary sources. Direct emissions are emissions of a criteria pollutant or its precursors that are caused or initiated by the federal action and occur at the same time and place as the action. Indirect emissions occur later in time or farther from the action; they must be included in the analysis if the following conditions are met:

- The federal agency can practicably control the emissions and has continuing program responsibility to maintain control.
- The emissions caused by the federal action are reasonably foreseeable.

The General Conformity Rule requires that the federal action's emissions be compared with baseline emissions on an annual basis. For this Proposed Action, the No Action Alternative, which would amount to a continuation of current levels of JLOTS training, represents the baseline.

The Action Alternative would include all the activities include in the No Action Alternative at JEB Little Creek-Fort Story plus the ELCAS (M), floating causeway, and administrative pier. Therefore, the emissions associated with the Action Alternative for JEB Little Creek-Fort Story for the purposes of the General Conformity Rule analysis are those associated with the ELCAS (M), floating causeway, and administrative pier.

For O_3 maintenance areas, *de minimis* levels have been established for both O_3 precursors: NO_x and VOC, on the presumption that NO_x and VOC reductions will contribute to reductions in O_3 formation. The applicable *de minimis* level is 100 tons per year of NO_x and VOC, respectively.

Table B-14 shows the annual net emissions of NO_x and VOC associated with the Action Alternative at JEB Little Creek-Fort Story, based on the estimates detailed in Section B.1 (Emissions Determination) of this appendix.

Table B-14: Action Alternative (JEB Little Creek-Fort Story) NO_x and VOC Emissions (Net Increase Relative to Baseline)

Exercise	Annual Emissions (tons)	
	VOC	NO_x
ELCAS (M)	0.79	9.98
Floating Causeway/Administrative Pier	0.01	0.14
Total Net Emissions	0.80	10.12
De Minimis Level	*100*	*100*

Based on this analysis of NO_x and VOC emissions performed in conjunction with the Final Rule of *Determining Conformity of Federal Actions to State or Federal Implementation Plans,* (U.S. Environmental Protection Agency 1993, 2010), the Proposed Action would not require a formal conformity determination. The total net emissions under the Action Alternative at JEB Little Creek-Fort Story show no exceedance of the applicable *de minimis* criteria of 100 tons per year for VOC and NO_x. Therefore, the Proposed Action would have minimal air quality impacts and would not require a formal conformity determination.

C Fundamentals of Acoustics

C.1 Introduction

Bioacoustics, or the study of how sound affects living organisms, is a complex and interdisciplinary field that includes the physics of sound production and propagation, the source characteristics of sounds, and the perceptual capabilities of receivers. This appendix is intended to introduce the reader to the basics of sound measurements and sound propagation, as well as the hearing and vocal production abilities of species that may occur in the Joint Logistics Over-the-Shore (JLOTS) study area. The potential for noise from pile driving to cause auditory masking to these species is also considered.

Sound is an oscillation in pressure, particle displacement, or particle velocity, as well as the auditory sensation evoked by these oscillations, although not all sound waves evoke an auditory sensation (i.e., they are outside of an animal's hearing range) (American National Standards Institute 1994). Sound may be described in terms of both physical and subjective attributes. Physical attributes may be directly measured. Subjective (or sensory) attributes cannot be directly measured and require a listener to make a judgment about the sound. Physical attributes of a sound at a particular point are obtained by measuring pressure changes as sound waves pass. The following material provides a short description of some of the basic parameters of sound.

Sound can be characterized by several factors, including frequency, intensity, and pressure (Richardson et al. 1995). Sound frequency (measured in hertz [Hz]) and intensity (amount of energy in a signal [watts per meter^2]) are physical properties of the sound which are related to the subjective qualities of pitch and loudness (Kinsler et al. 1999). Sound intensity and sound pressure (measured in pascals [Pa]) are also related; of the two, sound pressure is easier to measure directly, and is therefore more commonly used to evaluate the amount of disturbance to the medium caused by a sound ("amplitude").

Because of the wide range of pressures and intensities encountered during measurements of sound, a logarithmic scale known as the decibel is used to evaluate these properties; in acoustics, "level" indicates a sound measurement in decibels. The decibel (dB) scale expresses the logarithmic strength of a signal (pressure or intensity) relative to a reference value of the same units. This document reports sound levels with respect to sound pressure only. Each increase of 20 dB reflects a ten-fold increase in signal pressure. In other words, an increase of 20 dB means ten times the pressure, 40 dB means one hundred times the pressure, 60 dB means one thousand times the pressure, and so on.

The sound levels in this document are given as sound pressure levels (SPL). For measurements of underwater sound, the standard reference pressure is 1 micropascal (μPa, or 10^{-6} pascals), and is expressed as "dB re 1μPa." For airborne sounds, the reference value is 20 μPa, expressed as "dB re 20 μPa." Sound levels measured in air and water are not directly comparable, and it is important to note which reference value is associated with a given sound level.

Airborne sounds are commonly referenced to human hearing using a method which weights sound frequencies according to measures of human perception, de-emphasizing very low and very high frequencies which are not perceived well by humans. This is called A-weighting, and the decibel level measured is called the A-weighted sound level (dBA). A similar method has been proposed for evaluating underwater sound levels with respect to marine mammal hearing. While preliminary weighting functions for marine mammal hearing have been developed (Southall et al. 2007), they are not yet applied to sound exposure from pile driving activities. Therefore, underwater sound levels given in this document are not weighted and evaluate all frequencies equally.

Table C-1 summarizes common acoustic terminology. Two of the most common descriptors are the instantaneous peak SPL and the root mean square SPL. The peak SPL is the instantaneous maximum or minimum over- or under-pressure observed during each sound event and is presented in dB re 1 µPa peak. The root mean square level is the square root of the energy divided by a defined time period, given as dB re 1 µPa root mean square.

Table C-1: Definitions of Acoustical Terms

Term	Definition
Decibel [dB]	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure or intensity of the sound measured to the appropriate standard reference value. This document uses only sound pressure measurements to calculate decibel levels. The reference pressure for water is 1 micropascal (µPa) and for air is 20 µPa (approximate threshold of human audibility).
Sound Pressure Level [SPL]	Sound pressure is the force per unit area, usually expressed in micropascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. Sound pressure level is the quantity that is directly measured by a sound level meter, and is expressed in decibels referenced to the appropriate air or water standard.
Frequency, Hz	Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as hertz (Hz). Typical human hearing ranges from 20 Hz to 20,000 Hz; hearing ranges in non-humans are widely variable and species specific.
Peak Sound Pressure (unweighted), dB re 1µPa peak	The maximum absolute value of the instantaneous sound pressure expressed as dB re 1µPa peak.
Root Mean Square [rms], dB re 1µPa	The rms level is the square root of the pressure divided by a defined time period, expressed in decibels. For impulsive sounds, the rms has been defined as the average of the squared pressures over the time that comprise that portion of waveform containing 90 percent of the sound energy for one impact pile driving impulse. For non-impulsive sounds, rms energy represents the average of the squared pressures over the measurement period and is not limited by the 90 percent energy criterion. Expressed as dB re 1µPa.
Sound Exposure Level (SEL), dB re $1µPa^2$ sec	Sound exposure level is a measure of energy. Specifically, it is the dB level of the time integral of the squared-instantaneous sound pressure, normalized to a 1-second period. It can be a useful metric for assessing cumulative exposure because it enables sounds of differing duration to be compared in terms of total energy.
Waveforms, µPa over time	A graphical plot illustrating the time history of positive and negative sound pressure of individual pile strikes shown as a plot of µPa over time (i.e., seconds).
Frequency Spectra, dB over frequency range	A graphical plot illustrating the frequency content over a given frequency range. Bandwidth is generally defined as linear (narrowband) or logarithmic (broadband) and is stated in frequency (Hz).

Term	Definition
A-Weighted Sound Level, dBA	A frequency-weighted measure used for airborne sounds only. A-weighting de-emphasizes the low and high frequency components of a given sound in a manner similar to the frequency response of the human ear and correlates well with subjective human reactions to noise. A-weighted levels are referenced to 20 μPa unless otherwise noted.
Ambient Noise Level	The background noise level, which is a composite of sounds from all sources near and far. The normal or existing level of environmental noise at a given location, given in dB referenced to the appropriate pressure standard.

C.2 Sound vs. Noise

Sound may be purposely created to convey information, communicate, or obtain information about the environment. Examples of such sounds are sonar pings, marine mammal vocalizations/echolocations, tones used in hearing experiments, and small sonobuoy explosions used for submarine detection.

Noise is undesired sound (American National Standards Institute 1994). Whether a sound is noise depends on the receiver (i.e., the animal or system that detects the sound). For example, small explosives and sonar used to locate an enemy submarine produce *sound* that is useful to sailors engaged in anti-submarine warfare, but is likely to be considered undesirable *noise* by marine mammals. Sounds produced by naval aircraft and vessel propulsion are considered noise because they represent possible energy inefficiency and increased detectability, which are undesirable.

Noise also refers to all sound sources that may interfere with detection of a desired sound and the combination of all of the sounds at a particular location (ambient noise).

C.3 Description of Noise Sources

Ambient noise in the vicinity of the JLOTS training exercise is a composite of sounds from natural sources, and typical recreational and enterprise activities such as boating, jet skiing, and military ship traffic. Ambient noise in the waters off Little Creek, Fort Story, and Camp Lejeune is addressed in Section 3.2 (Ambient Noise) of the *Draft Environmental Assessment for Joint Logistics Over-the-Shore Training at Joint Expeditionary Base Little Creek-Fort Story Virginia Beach, Virginia and Marine Corps Base Camp Lejeune, Jacksonville, North Carolina*.

In-water construction activities associated with the JLOTS exercise includes impact pile driving and vibratory extraction. The sounds produced by these activities fall into two sound types: impulsive (impact driving) and non-impulsive (vibratory extraction). Distinguishing between these two general sound types is important because of each sound type may cause different types of physical effects to marine species, particularly with regard to hearing (Ward 1997).

Impulsive sounds (e.g., explosions, seismic airgun pulses, and impact pile driving) are brief, broadband, atonal transient sounds which can occur as isolated events or be 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).

Non-impulsive sounds can be tonal, broadband, or both. They lack the rapid rise time and can have longer durations than impulsive sounds. Non-impulsive sounds can be either intermittent or continuous sounds. Examples of non-impulsive sounds include vessels, aircraft, and machinery operations such as drilling, dredging, and vibratory pile driving (Southall et al. 2007).

In environments with non-porous boundaries (i.e., rock seafloor, rigid sides, etc.), reverberation may extend the duration of both impulsive and non-impulsive sounds.

C.4 Transmission Loss

Transmission loss is defined as the accumulated decrease in acoustic intensity as an acoustic pressure wave propagates outwards from a source. The practical spreading model predicts transmission loss in underwater environments greater than 3 meters (15 feet) deep. It is a combination of spherical and cylindrical spreading loss models (see Urick 1983 for details). The practical spreading model is used to calculate the radius of zones of influence (ZOIs) for noise exposures to marine species.

$$TL = 15 \log_{10} (R_1/10)$$

Where TL is transmission loss in dB, given by the difference between Source Level (SL) and Received Level (RL). For calculating ZOIs, the received level is the threshold value. R1 is the ZOI radius and 10 is the distance at which the source level measurement was taken.

Root Mean Square Values

The root-mean-square (RMS) value is the metric used to define the behavioral zones for fish and marine mammals. For piles that are impact driven, RMS values are generally reported for individual piles over the duration of the driving of a given pile; often the number of strikes is also reported on a per-pile basis.For piles that are vibratory driven, RMS values are typically computed over 10-second or 30-second averaging periods, and represent the most probable typical value over a long event.

Peak Sound Pressure Values

The peak sound pressure level (SPL) metric is used to evaluate the potential for injurious effects to fish. The barotrauma injury to fish due to peak over or under pressurization could result in instantaneous injury with a single strike.

Cumulative Sound Exposure Values

The sound exposure level (SEL) metric for impact driving is used to calculate the area of cumulative exposure potentially resulting in injury to fish over 24 hours (the accumulation of energy received from all pile strikes). To compute the cumulative SEL all single strike SEL energy in a 24-hour period is summed to calculate the overall SEL. However, modeling for the SEL exposure generally involves estimation of a typical single pile value logarithmically added to sum the expected energy over the day. While some strikes may be lower and some higher than the mean SEL value, use of the mean value would result in the best overall estimate of expected cumulative energy over the work day. In practice, the SEL value will vary on any day of active pile driving due to variability in the number of hammer strikes. A deficiency in cumulative sound exposure level criteria is that fish are assumed to remain present in the ensonified area during the entirety of pile driving, which is not likely to occur. Fish are expected to move away from sources of elevated noise, or may leave the area due simply to exposure to other stimuli.

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D Bird Species Potentially Occurring in the JLOTS Study Area

Table D-1: Bird Species Potentially Occurring in the JLOTS Study Area (All Locations)

Common Name	Scientific Name
American bittern	*Botaurus lentiginosus*
American black duck	*Anas rubripes*
American coot	*Fulica americana*
American crow	*Corvus brachyrhynchos*
American goldfinch	*Spinus tristis*
American kestrel	*Falco sparverius*
American oystercatcher	*Haematopus palliatus*
American pipit	*Anthus rubescens*
American robin	*Turdus migratorius*
American widgeon	*Anas americana*
American woodcock	*Scolopax minor*
Bachman's sparrow	*Peucaea aestivalis*
bald eagle	***Haliaeetus leucocephalus***
Baltimore oriole	*Icterus galbula*
barn owl	*Tyto alba*
barred owl	*Strix varia*
belted kingfisher	*Megaceryle alcyon*
black skimmer	*Rynchops niger*
black vulture	*Coragyps atratus*
black-and-white warbler	*Mniotilta varia*
black-capped chickadee	*Poecile atricapillus*
black-crowned night-heron	*Nycticorax nycticorax*
blue jay	*Cyanocitta cristata*
blue-headed vireo	*Vireo solitarius*
Bonaparte's gull	*Chroicocephalus philadelphia*
brant	*Branta bernicla*

Common Name	Scientific Name
brown creeper	*Certhia americana*
brown pelican	*Pelecanus occidentalis*
brown thrasher	*Toxostoma rufum*
brown-headed cowbird	*Molothrus ater*
brown-headed nuthatch	*Sitta pusilla*
bufflehead	*Bucephala albeola*
cackling goose	*Branta hutchinsii*
Canada goose	*Branta canadensis*
canvasback	*Aythya valisineria*
Carolina chickadee	*Poecile carolinensis*
Carolina wren	*Thryothorus ludovicianus*
cattle egret	*Bubulcus ibis*
cedar waxwing	*Bombycilla cedrorum*
chipping sparrow	*Spizella passerina*
clapper rail	*Rallus longirostris*
common goldeneye	*Bucephala clangula*
common grackle	*Quiscalus quiscula*
common loon	*Gavia immer*
common tern	*Sterna hirundo*
Cooper's hawk	*Accipiter cooperii*
dark-eyed junco	*Junco hyemalis*
double-crested cormorant	*Phalacrocorax auritus*
downy woodpecker	*Picoides pubescens*
dunlin	*Calidris alpina*
eastern bluebird	*Sialia sialis*
eastern meadowlark	*Sturnella magna*
eastern phoebe	*Sayornis phoebe*

Common Name	Scientific Name
eastern screech-owl	*Megascops asio*
eastern towhee	*Pipilo erythrophthalmus*
European starling[1]	*Sturnus vulgaris*
field sparrow	*Spizella pusilla*
fish crow	*Corvus ossifragus*
Forster's tern	*Sterna forsteri*
fox sparrow	*Passerella iliaca*
gadwall	*Anas strepera*
golden-crowned kinglet	*Regulus satrapa*
gray catbird	*Dumetella carolinensis*
great black-backed gull	*Larus marinus*
great blue heron	*Ardea herodias*
great egret	*Ardea alba*
great horned owl	*Bubo virginianus*
greater scaup	*Aythya marila*
greater yellowlegs	*Tringa melanoleuca*
green heron	*Butorides virescens*
green-winged teal	*Anas crecca*
hairy woodpecker	*Picoides villosus*
hermit thrush	*Catharus guttatus*
herring gull	*Larus argentatus*
hooded merganser	*Lophodytes cucullatus*
horned grebe	*Podiceps auritus*
house finch	*Haemorhous mexicanus*
house sparrow[1]	*Passer domesticus*
house wren	*Troglodytes aedon*
indigo bunting	*Passerina cyanea*

Common Name	Scientific Name
killdeer	*Charadrius vociferus*
laughing gull	*Leucophaeus atricilla*
least sandpiper	*Calidris minutilla*
least tern	*Sternula antillarum*
lesser black-backed gull	*Larus fuscus*
lesser scaup	*Aythya affinis*
lesser yellowlegs	*Tringa flavipes*
little blue heron	*Egretta caerulea*
mallard	*Anas platyrhynchos*
marsh wren	*Cistothorus palustris*
mourning dove	*Zenaida macroura*
mute swan[1]	*Cygnus olor*
northern bobwhite	*Colinus virginianus*
northern cardinal	*Cardinalis cardinalis*
northern flicker	*Colaptes auratus*
northern harrier	*Circus cyaneus*
northern mockingbird	*Mimus polyglottos*
northern pintail	*Anas acuta*
orange-crowned warbler	*Oreothlypis celata*
osprey	*Pandion haliaetus*
painted bunting	*Passerina ciris*
pied-billed grebe	*Podilymbus podiceps*
pileated woodpecker	*Dryocopus pileatus*
pine warbler	*Setophaga pinus*
piping plover	***Charadrius melodus***
purple finch	*Haemorhous purpureus*
purple martin	*Progne subis*

Common Name	Scientific Name
red knot	***Calidris canutus***
red-bellied woodpecker	*Melanerpes carolinus*
red-breasted merganser	*Mergus serrator*
redhead	*Aythya americana*
red-headed woodpecker	*Melanerpes erythrocephalus*
red-shouldered hawk	*Buteo lineatus*
red-tailed hawk	*Buteo jamaicensis*
red-throated loon	*Gavia stellata*
red-winged blackbird	*Agelaius phoeniceus*
ring-billed gull	*Larus delawarensis*
ring-necked duck	*Aythya collaris*
rock pigeon[1]	*Columba livia*
roseate tern	***Sterna dougallii***
royal tern	*Thalasseus maximus*
ruby-crowned kinglet	*Regulus calendula*
ruddy duck	*Oxyura jamaicensis*
ruddy turnstone	*Arenaria interpres*
rufous hummingbird	*Selasphorus rufus*
rusty blackbird	*Euphagus carolinus*
sanderling	*Calidris alba*
savannah sparrow	*Passerculus sandwichensis*
sharp-shinned hawk	*Accipiter striatus*
snowy egret	*Egretta thula*
song sparrow	*Melospiza melodia*
swamp sparrow	*Melospiza georgiana*
tufted titmouse	*Baeolophus bicolor*
tundra swan	*Cygnus columbianus*

Common Name	Scientific Name
turkey vulture	*Cathartes aura*
whimbrel	*Numenius phaeopus*
white ibis	*Eudocimus albus*
white-breasted nuthatch	*Sitta carolinensis*
white-throated sparrow	*Zonotrichia albicollis*
wild turkey	*Meleagris gallopavo*
willet	*Tringa semipalmata*
Wilson's plover	*Charadrius wilsonia*
Wilson's snipe	*Gallinago delicata*
winter wren	*Troglodytes hiemalis*
wood duck	*Aix sponsa*
yellow-bellied sapsucker	*Sphyrapicus varius*
yellow-crowned night-heron	*Nyctanassa violacea*
yellow-rumped warbler	*Setophaga coronate*
[1.] Species not protected by the Migratory Bird Treaty Act Species in bold have additional federal protection (see Section 3.9.2.1.4 in Terrestrial Wildlife and Birds); Sources: Virginia Beach Audubon Society 2013; Cape Fear Audubon Society 2012; U.S. Marine Corps 2006; U.S. Department of the Navy 2013	

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E Reptiles and Amphibians Potentially Occurring in the JLOTS Study Area

Table E-1: Reptiles and Amphibians Potentially Occurring in the JLOTS Study Area (Little Creek and Fort Story)

Common Name	Scientific Name
Turtles	
eastern painted turtle	*Chrysemys picta*
common snapping turtle	*Chelydra serpentina*
eastern mud turtle	*Kinosternon subrubrum*
northern red-bellied cooter	*Pseudemys rubriventris*
musk turtle	*Sternothorus odoratus*
eastern box turtle	*Terrapene carolina*
yellow-bellied slider	*Trachemys scripta scripta*
red-eared slider	*Trachemys scripta elegans*
Lizards	
southeastern five-lined skink	*Plestidon fasciatus*
fence lizard	*Sceloporus undulatus*
ground/little brown skink	*Scincella lateralis*
eastern six-lined racerunner	*Aspidoscelis sexlineata*
Snakes	
worm snake	*Carphophis amoenus*
black racer	*Coluber constrictor*
ringneck snake	*Diadophis punctatus*
northern banded water snake	*Nerodia sipedon*
eastern rat snake	*Pantherophis alleghaniensis*
garter snake	*Thamnophis sirtalis*
Amphibians	
eastern red-backed salamander	*Plethodon cinerus*
Atlantic coast slimy salamander	*Plethodon chlorobryonis*
Fowler’s toad	*Bufo fowleri*
southern toad	*Bufo terrestris*
squirrel treefrog	*Hyla squirella*
eastern American toad	*Anaxyrus americanus americanus*
northern green frog	*Lithobates clamitans melanota*
spring peeper	*Pseudacris crucifer*
southern chorus frog	*Pseudacris feriarum*

Common Name	Scientific Name
bullfrog	*Rana catesbeiana*
Cope's gray treefrog	*Hyla chrysoscelis*
green treefrog	*Hyla cinerea*
eastern narrowmouth toad	*Gastrophryne carolinensis*
Source: U.S. Department of the Navy 2013	

Table E-2: Reptiles and Amphibians Potentially Occurring in the JLOTS Study Area (Camp Lejeune)

Common Name	Scientific Name
Alligators	
alligator	*Alligator mississippiensis*
Turtles	
loggerhead sea turtle	*Caretta caretta*
green sea turtle	*Chelonia mydas*
snapping turtle	*Chelydra serpentina*
spotted turtle	*Clemmys guttata*
eastern chicken turtle	*Deirochelys reticularia*
leatherback sea turtle	*Dermochelys coriacea*
Atlantic hawksbill	*Eretmochelys imbricata*
striped mud turtle	*Kinosternon baurii*
eastern mud turtle	*Kinosternon subrubrum*
Kemp's Ridley sea turtle	*Lepidochelys kempii*
diamondback terrapin	*Malaclemys terrapin*
river cooter	*Pseudemys concinna*
eastern Musk turtle	*Sternotherus odoratus*
eastern Box turtle	*Terrapene carolina carolina*
red-eared slider	*Trachemys scripta elegans*
yellow-bellied slider	*Trachemys scripta scripta*
Lizards	
green anole	*Anolis carolinensis*
six-lined racerunner	*Cnemidophorus sexlineatus*
five-lined skink	*Eumeces fasciatus*
southeastern five-lined skink	*Eumeces inexpectatus*

Common Name	Scientific Name
broadhead skink	*Eumeces laticeps*
mimic glass lizard	*Ophisaurus mimicus*
eastern glass lizard	*Ophisaurus ventralis*
eastern fence lizard	*Sceloporus undulatus*
ground skink	*Scincella lateralis*
Snakes	
northern copperhead	*Agkistrodon contortrix*
eastern cottonmouth	*Agkistrodon piscivorus*
eastern worm snake	*Carphophis amoenus*
northern scarletsnake	*Cemophora coccinea*
northern black racer	*Coluber constrictor*
eastern diamondback rattlesnake	*Crotalus adamanteus*
canebrake rattlesnake	*Crotalus horridus*
southern ring-necked snake	*Diadophis punctatus*
corn snake	*Elaphe guttata*
rat snake	*Elaphe obsoleta*
mud snake	*Farancia abacura*
rainbow snake	*Farancia erytrogramma*
eastern hognose snake	*Heterodon platirhinos*
southern hognose snake	*Heterodon simus*
mole kingsnake	*Lampropeltis calligaster*
eastern kingsnake	*Lampropeltis getula*
scarlet kingsnake or milksnake	*Lampropeltis triangulum*
coachwhip	*Masticophis flagellum*
eastern coral snake	*Micrurus fulvius*
plainbelly water snake	*Nerodia erythrogaster*
banded water snake	*Nerodia fasciata*
brown water snake	*Nerodia taxispilota*
rough green snake	*Opheodrys aestivus*
glossy crayfish snake	*Regina rigida*
pine woods snake	*Rhadinaea flavilata*
black swamp snake	*Seminatrix pygaea*

Common Name	**Scientific Name**
pygmy rattlesnake	*Sistrurus miliarius*
brown snake	*Storeria dekayi*
redbelly snake	*Storeria occipitomaculata*
southeastern crowned snake	*Tantilla coronata*
ribbon snake	*Thamnophis sauritus*
common garter snake	*Thamnophis sirtalis*
rough earth snake	*Virginia striatula*
eastern earth snake	*Virginia valeriae*
Amphibians	
Southern cricket frog	*Acris gryllus*
Mabee's salamander	*Ambystoma mabeei*
spotted salamander	*Ambystoma maculatum*
marbled salamander	*Ambystoma opacum*
tiger salamander	*Ambystoma tigrinum*
two-toed amphiuma	*Amphiuma means*
Fowler’s toad	*Anaxyrus fowleri*
oak toad	*Anaxyrus quercicus*
southern toad	*Anaxyrus terrestris*
southern dusky salamander	*Desmognathus auriculatus*
Chamberlain's dwarf salamander	*Eurycea chamberlaini*
southern two-lined salamander	*Eurycea cirrigera*
eastern narrow-mouthed toad	*Gastrophryne carolinensis*
four-toed salamander	*Hemidactylium scutatum*
pine barrens tree frog	*Hyla andersonii*
Cope's gray treefrog	*Hyla chrysoscelis*
green treefrog	*Hyla cinerea*
pine woods treefrog	*Hyla femoralis*
barking treefrog	*Hyla gratiosa*
squirrel treefrog	*Hyla squirella*
gopher frog	*Lithobates capito*
American bullfrog	*Lithobates catesbeianus*
northern green frog	*Lithobates clamitans melanota*

Common Name	Scientific Name
pickerel frog	*Lithobates palustris*
southern leopard frog	*Lithobates sphenocephalus utricularius*
carpenter frog	*Lithobates virgatipes*
dwarf waterdog	*Necturus punctatus*
red-spotted newt	*Notophthalmus viridescens*
Atlantic coast slimy salamander	*Plethodon chlorobryonis*
eastern red-backed salamander	*Plethodon cinereus*
Brimley's chorus frog	*Pseudacris brimleyi*
spring peeper	*Pseudacris crucifer*
southern chorus frog	*Pseudacris nigrita*
little grass frog	*Pseudacris ocularis*
ornate chorus frog	*Pseudacris ornata*
eastern mud salamander	*Pseudotriton montanus*
Carolina gopher frog	*Rana capito*
green and bronze frog	*Rana clamitans*
southern leopard frog	*Rana sphenocephala*
carpenter frog	*Rana virgatipes*
eastern spadefoot	*Scaphiopus holbrookii*
eastern lesser siren	*Siren intermedia intermedia*
greater siren	*Siren lacertina*
many-lined salamander	*Stereochilus marginatus*
Adapted from Dorcas 2007; National Park Service n.d.; U.S. Department of Defense in preparation.	

F Essential Fish Habitat Descriptors for the JLOTS Study Area

Table F-1: Essential Fish Habitat Descriptors for Federally Managed Species Potentially Occurring off Little Creek or Fort Story

Management Unit	Species	Life Stage	Waters[1]	Pelagic[2]	Demersal[2]	Soft Bottom	Floating Macroalgae	Attached Macroalgae	Submerged Rooted Vegetation
New England Fisheries Management Council 1998									
Atlantic herring	Atlantic herring	Adult	O/E	S	-	-	-	-	-
Northeast multispecies	Red hake	Adult	O/E	-	S/M	-	-	-	-
		Juv.	O/N/E	-	S/M	-	-	-	-
		Larvae	O/N/E	S/M	-	-	-	-	-
	Windowpane flounder	Adult	O/N/E	-	S/M	-	-	-	-
		Egg	O/N/E	S/M	-	-	-	-	-
		Juv.	O/N/E	-	S/M	-	-	-	-
		Larvae	O/N/E	S/M	-	-	-	-	-
	Witch flounder	Egg	O	S	-	-	-	-	-
	Yellowtail flounder	Larvae	O/E	S	-	-	-	-	-
Northeast skate	Clearnose skate	Adult	O/N/E	-	S/M	-	-	-	-
		Juv.	O/N/E	-	S/M	-	-	-	-
	Little skate	Adult	O/N/E	-	S/M	-	-	-	-
		Juv.	O/N/E	-	S/M	-	-	-	-
	Winter skate	Adult	O/N/E	-	S	-	-	-	-
		Juv.	O/N/E	-	S	-	-	-	-
Mid-Atlantic Fishery Management Council 1998, 2008, 2010									
Atlantic mackerel, squid, and butterfish	Butterfish	Adult	O/E	S/M	-	-	-	-	-
		Egg	O/N/E	S/M	-	-	-	-	-
		Juv.	O/E	S/M	-	-	-	-	-
		Larvae	O/E	S/M	-	-	-	-	-

Management Unit	Species	Life Stage	Waters[1]	Pelagic[2]	Demersal[2]	Soft Bottom	Floating Macroalgae	Attached Macroalgae	Submerged Rooted Vegetation
	Long fin squid	Eggs	O/N/E	-	S	-	-	-	-
Bluefish	Bluefish	Adult	O/N/E	S/M	-	-	-	-	-
		Juv.	O/N/E	S/M	-	-	-	-	-
Summer flounder, scup and black sea bass	Black Sea Bass	Adult	O/N/E	-	S/M	-	-	-	-
		Juv.	O/N/E	-	S/M	-	-	-	-
	Scup	Adult	O/N/E	-	S/M	-	-	-	-
		Juv.	O/N/E	-	S/M	-	-	-	-
	Summer flounder	Adult	O/N/E	-	S/M	-	-	-	-
		Juv.	O/N/E	-	S/M	-	-	X*	X*
		Larvae	O/N/E	S/M	-	-	-	-	-
Surfclam and ocean quahog	Surfclam	Adult	O/N	-	S	-	-	-	-
		Juv.	O/N	-	S	-	-	-	-
South Atlantic Fishery Management Council 1998, 2012									
Coastal migratory pelagics	Cobia	Adult/ Juv.	O/N/E	S/M	-	X	X	-	X
		Larvae	O	S	-	-	-	-	-
National Marine Fisheries Service 2009									
Billfish	Longbill spearfish	Adult/ Juv.	O	-	-	-	-	-	-
Large Coastal Shark	Great hammerhead	All life stages	O/N/E	-	-	-	-	-	-
	Sand tiger shark	Adult	O	-	-	-	-	-	-
		Juv.	O	-	-	-	-	-	-

Management Unit	Species	Life Stage	Waters[1]	Pelagic[2]	Demersal[2]	Soft Bottom	Floating Macroalgae	Attached Macroalgae	Submerged Rooted Vegetation
	Sandbar shark	Adult	O/N/E	-	-	-	-	-	-
		Juv.	O	-	-	-	-	-	-
		Neonate	O/N/E	-	-	-	-	-	-
	Scalloped hammerhead	Juv.	O/N/E	-	-	-	-	-	-
	Spinner shark	Adult	O	-	-	-	-	-	-
	Tiger shark	Adult	O	-	-	-	-	-	-
		Juv.	O	-	-	-	-	-	-
Pelagic Shark	Common thresher shark	All life stages	O	-	-	-	-	-	-
Small Coastal Shark	Angel shark	Adult/ Juv.	O	-	-	-	-	-	-
	Atlantic sharpnose shark	Adult	O/N	-	-	-	-	-	-
Tuna	Albacore tuna	Juv.	O	-	-	-	-	-	-
	Bluefin tuna	Juv.	O	-	-	-	-	-	-
	Skipjack tuna	Juv.	O	-	-	-	-	-	-
	Yellowfin tuna	Juv.	O	-	-	-	-	-	-

1 O=offshore ocean (>4m depth), N=nearshore ocean (<4m depth), E=estuary or bay; 2 S=seawater zone salinities, M=mixing zone salinities; * HAPC.

Table F-2: Essential Fish Habitat Descriptors for Federally Managed Species Occurring off Camp Lejeune

Management Unit	Species	Life Stage	Waters[1]	Pelagic[2]	Demersal[2]	Soft Shores	Soft Bottom	Hard Bottom	Artificial Structures	Floating Macroalgae	Vegetated Shores	Attached Macroalgae	Submerged Rooted Vegetation	Sedentary Invertebrate Beds	Oyster Reefs
MAFMC (Mid-Atlantic Fishery Management Council 1998a, 2008, 2010)															
Bluefish	Bluefish	Adult	O/N/E	S/M	-	-	-	-	-	-	-	-	-	-	-
		Juv.	O/N/E	S/M	-	-	-	-	-	-	-	-	-	-	-
Spiny Dogfish	Spiny Dogfish	Adult	O/N/E	-	S	-	-	-	-	-	-	-	-	-	-
		Juv.	O/N/E	-	S	-	-	-	-	-	-	-	-	-	-
Summer flounder, scup and black sea bass	Summer flounder	Adult	O/N/E	-	S/M	-	-	-	-	-	-	-	-	-	-
		Egg	O/N	S	-	-	-	-	-	-	-	-	-	-	-
		Juv.	O/N/E	-	S/M	X	X	-	-	-	X	-	X	-	-
		Larvae	O/N/E	S/M	-	-	-	-	-	-	-	-	-	-	-
Surfclam and ocean quahog	Surfclam	Adult	O/N	-	S	-	X	-	-	-	-	-	-	-	-
		Juv.	O/N	-	S	-	X	-	-	-	-	-	-	-	-
SAFMC (South Atlantic Fishery Management Council 1998, 2012)															
Coastal migratory pelagics	Forage species	1 or more life stages	O/N/E	S/M	-	-	-	-	-	-	-	-	-	-	-
	Spanish mackerel, king mackerel, and cobia	Adult / Juv.	O/N/E*	S/M	-	-	X	X	-	X	-	-	X*	-	-
		Larvae	O	S	-	-	-	-	-	-	-	-	-	-	-
Dolphin and wahoo	Various species**	All life stages	O	S	-	-	-	-	-	X	-	-	-	-	-
Shrimp	White, pink, and brown shrimp	All life stages	O/N/E	-	S/M	X	X	-	-	-	X	X	X	-	-

Management Unit	Species	Life Stage	Waters[1]	Pelagic[2]	Demersal[2]	Soft Shores	Soft Bottom	Hard Bottom	Artificial Structures	Floating Macroalgae	Vegetated Shores	Attached Macroalgae	Submerged Rooted Vegetation	Sedentary Invertebrate Beds	Oyster Reefs
Snapper-Grouper	Estuarine dependent and nearshore species	Juv.	O/N/E	-	S/M	-	X	X	X	-	X	X	X	X	X
	Various species**	Adult/Juv.	O/N	-	S	-	-	X	X	-	-	-	X	-	X
		Larvae	O	S	-	-	-	-	-	X	-	-	-	-	-
		Spawning	O	S	-	-	-	X	X	X	-	-	X	-	X
NMFS (National Marine Fisheries Service 2009)															
Large Coastal Shark	Blacktip shark	Adult	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
		Juv.	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
	Dusky shark	Adult/Juv.	O	-	-	-	-	-	-	-	-	-	-	-	-
		Neonates	O	-	-	-	-	-	-	-	-	-	-	-	-
	Sandbar shark	Adult	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
		Juv.	O	-	-	-	-	-	-	-	-	-	-	-	-
		Neonate	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
	Spinner shark	Neonates	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
	Tiger shark	Juv.	O	-	-	-	-	-	-	-	-	-	-	-	-
Pelagic Shark	Common thresher shark	All life stages	O	-	-	-	-	-	-	-	-	-	-	-	-

Management Unit	Species	Life Stage	Waters[1]	Pelagic[2]	Demersal[2]	Soft Shores	Soft Bottom	Hard Bottom	Artificial Structures	Floating Macroalgae	Vegetated Shores	Attached Macroalgae	Submerged Rooted Vegetation	Sedentary Invertebrate Beds	Oyster Reefs
Small Coastal Shark	Atlantic sharpnose shark	Adult	O/N	-	-	-	-	-	-	-	-	-	-	-	-
		Juv.	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
		Neonates	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
	Blacknose shark	Adult	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
		Juv.	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
	Bonnethead shark	Adult	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-
	Finetooth shark	Adult/Juv.	O/N/E	-	-	-	-	-	-	-	-	-	-	-	-

1 O=offshore ocean waters (>4m), N=nearshore ocean water (<4m), E=estuarine waters; 2 S=seawater zone salinities, M=mixing zone salinities; * Cobia and Spanish mackerel for some estuarine waters, and cobia only for submerged rooted vegetation; ** Refer to council references for species list.

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G Marine Mammals Potentially Occurring in Waters off Virginia and North Carolina

The Navy reviewed all marine mammal species occurring in the western North Atlantic between Virginia and North Carolina. Of these, a number of species were not brought forward for analysis because their life history, habitat preference, or projected density is indicative of an extremely low likelihood of occurrence in the study area. Table G-1 lists species considered but not analyzed in the EA.

Table G-1: Marine Mammal Species Considered and Eliminated from Further Analysis

Common Name	Scientific Name	Status		Stock	Potential for Occurrence in the Study Area		
		ESA	MMPA		Little Creek	Fort Story	Camp Lejeune
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	--		Western North Atlantic	not expected		
harbor porpoise	*Phocoena phocoena*	--		Gulf of Maine / Bay of Fundy	not expected		
minke whale	*Balaenoptera acutorostrata*	--		Canadian East Coast	not expected		
striped dolphin	*Stenella coeruleoalba*	--		Western North Atlantic	not expected		
Sources: Waring et al. 2013; U.S. Department of the Navy 2012; not expected = species is not expected to occur inside the study area based on unsuitability of habitat or conditions; unprecedented.							

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H Procedures for Reporting Stranded Sea Turtles and Marine Mammals at JEB Little Creek-Fort Story and Marine Corps Base Camp Lejeune

H.1 JEB Little Creek-Fort Story

Shore patrols and other units that may occasionally encounter stranded marine mammals or sea turtles should adhere to the protocol established by the Chief of Naval Operations Environmental Readiness Division (OPNAVINST 3100.6H REF A, Special Incident Reporting), as outlined in the recommendations provided below. These recommendations apply to any stranded marine mammal that appears to be injured, disoriented, or dead:

- The Installation Commander will immediately contact the NMFS Regional Stranding Coordinator in the event of a live or dead marine mammal stranding at the Installation, with notification to CNO Environmental Readiness Division (OPNAV N45) occurring immediately thereafter. The NMFS Regional Stranding Coordinator for the Northeast Region, including Virginia, is Mendy Garron, who can be reached at (978) 282-8478 or Sara McNulty (978) 281-9351.

- In addition to contacting the NMFS Regional Stranding Coordinator and notifying CNO Environmental Readiness Division (OPNAV N45), the Northeast Region Stranding Network Marine Mammal and Sea Turtle Stranding and Entanglement Hotline will be contacted at (866) 755-6622. The members of this network are authorized by federal law to respond to marine mammal and sea turtle strandings. The Virginia Aquarium and Marine Science Center responds to most strandings in the vicinity of JEB Little Creek-Fort Story and should be contacted immediately in the case of a stranding. The Virginia Marine Resources Commission contact information has been provided as an alternate contact, if necessary.

  Virginia Aquarium and Marine Science Center
  Virginia Beach, VA
  (757) 385-7575 (dead)
  (757) 385-7576 (alive)

  Virginia Marine Resources Commission
  Newport News, VA
  (757) 247-2200

- Monitor the animal from a safe distance. Remain a minimum of 100 yards (274 meters) from the stranded animal. Crowding the animal is unsafe for the observer as well as the animal. Do not touch the animal, alive or dead, as wild animals can carry many diseases, parasites, and bacteria, some of which can be transmitted to humans.

Do not attempt to push the animal back into the water and if it goes back into the water on its own, do not attempt to follow after or swim with it.

- Carefully observe the animal. Observe the position of the alive or dead animal and monitor its breathing. Wait for responders from NMFS and or the Northeast Stranding Network to arrive and direct them to the animal. Relay all observations to the responders so that they can provide the best possible care for the stranded mammal or sea turtle.

- The Virginia Institute of Marine Science Sea Turtle Stranding Program, established in 1979, responds to strandings in Chesapeake Bay. Turtles that require rehabilitation are transported to the Virginia Aquarium's Stranding Program Rehabilitation Center in Virginia Beach. The Sea Turtle Stranding Coordinator can be reached at (804) 684-7313.

H.2 Marine Corps Base Camp Lejeune – Sea Turtles

- Staff monitor sea turtle nests and send annual nest reports to USFWS. Onslow Beach is an index nesting site for the State of North Carolina; report tagging activities to NMFS.
- Aerial monitoring of sea turtle nests is done on the northern end of Onslow Beach and Brown's Island twice weekly during the nesting season; vehicular and foot traffic is prohibited in these areas due to the potential of encountering unexploded ordnance.
- All known sea turtle nests are surrounded with wire cages with signs reading: ENDANGERED SPECIES NEST, DO NOT DISTURB.
- Regular training use of Onslow Beach between old Riseley Pier area (Grid 904265) and old Onslow South Tower area (Grid 883251) is authorized. Nests between old Riseley Pier area (no longer there) and old South Tower area (no longer there) will be relocated to other safe locations. Only Environmental Management Division (Environmental Division) personnel shall accomplish the relocation of the nest. The Environmental Division will also move nests from the area extending 750 meters north of old Riseley Pier area (no longer there), and from the ingress/egress area south of the old South Tower area going toward the splash point road. Exercises with more than one unit (Marine Expeditionary Unit onload/offload, Joint, Combined) must be coordinated through Range Control and the Environmental Division. All other areas of Onslow Beach are subject to restrictions during the nesting season of May through October.
- During the nesting season, night landing exercises should be reduced to the minimum level and need to be pre- coordinated with the Base Environmental Division and Range Control. Vehicles and equipment cannot remain on the beach side of the dunes or be left in egress points overnight.
- During the nesting season, night lighting on the beaches should be kept to a minimum or eliminated if possible. All Navy Beachmaster Command Posts along with all

bivouac sites will be located behind the sand dune line with lighting reduced to the minimum required for safety.

- Vehicular traffic on the beaches during nesting season is restricted to the tidal zone (wet sand only) except within the identified operating area.
- The Environmental Division, Installation and Environment, must be notified immediately upon discovery of any sea turtle nest that has not been marked/protected to ensure its successful relocation. Any daytime sightings of turtles on the beach will also be reported.
- The shooting, wounding, capturing, or collection of any sea turtle (all types) or any attempt to engage in such conduct is prohibited.
- The destruction or collection of any sea turtle eggs, the destruction of their nests, or any attempt to engage in such conduct is prohibited.
- Any digging or excavating, including the building of tank traps on the beach is ordinarily prohibited unless specifically requested and authorized.
- Egress from the beach to the road behind the sand dunes shall be via the designated egress routes and sites only. Vehicular traffic is prohibited on the dunes.
- Nests laid below the mean high tide line are also eligible for nest relocation. As the nests near the end of incubation, they are checked each morning for signs of hatching, hatchling emergence or predation.
- Nesting surveys, nest marking, and egg relocations shall only be conducted by personnel with prior experience and training in nesting survey, nest marking, and egg relocation procedures. Surveyors shall have a valid North Carolina Wildlife Resources Commission permit.
- The Environmental Division is notified of exercises scheduled in the modified training areas during the sea turtle nesting season (May 15 through October 31) and monitors training.
- If equipment on beach is placed to prevent entanglement of nesting female turtles and holes are covered with plywood and sandbags to prevent sea turtles from falling into the holes. Personnel are on scene to assist any tangled turtle.
- Sand stabilization fencing to minimize potential to impede sea turtle nesting.
- Measures to minimize obstacles to emerging sea turtle hatchlings are implemented. These primarily consist of tire rut removal, and include the following procedures: 14 days prior to estimated hatch dates, nests are surveyed for extent and depth of ruts between the nest and the surf line; no later than 10 days prior to estimated hatch dates, ruts are removed and the sand is smoothed at those nests where multiple ruts are deeper than 1 inch (2.5 centimeters) and longer than 3 feet (1 meter); holes are filled, and debris is removed at those nests that are due to hatch within a 10-day time period; and nests are reevaluated daily to ascertain that no obstacles exist for emerging hatchlings.

- Dune construction (sand pushing) is done in accordance with guidelines provided by Coastal Area Management Authority and the U.S. Army Corps of Engineers. If practical, dune construction is initiated after sea turtles have finished their egg-laying activities and does not occur within 100 feet (30.5 meters) of an incubating turtle nest. Monitoring is conducted to determine if escarpments are present, and escarpments shall be leveled as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.
- Guidelines for lights use on vehicles at night are in place to minimize turtle disturbance. Personnel are to stay in vehicles if they encounter a sea turtle and encounters with sea turtles shall be reported immediately to Camp Lejeune's Environmental Conservation Branch.
- During the sea turtle nesting and hatching season, Beachmaster Camps set up in association with amphibious landings shall be located off the beach. Lighting associated with the Beachmaster Camps shall be limited to the immediate area of the camp only, and shall be the minimal amount of lighting necessary to comply with safety requirements and training needs. Lighting shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to prevent the glowing portion of any luminaries (including the lamp, globe, or reflector) from being directly visible from anywhere on the beach.
- In its 2002 Biological Opinion USFWS authorized an unspecified level of incidental take of sea turtles at Camp Lejeune within nesting beach habitat on Onslow Beach that has been identified for training activities, dune construction, and recreational activities (U.S. Fish and Wildlife Service 2002).