UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

NOV 22 2013

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act (NEPA), an environmental review has been performed on the following action.

TITLE: Adoption of the U.S. Navy's *Wharf C-2 Recapitalization at Naval Station Mayport, FL Environmental Assessment*

LOCATION: Naval Station Mayport, Florida

SUMMARY: The Navy will conduct a wharf recapitalization project to repair an existing pier that is significantly deteriorated. The project includes the installation of steel pipe piles and plastic piles by vibratory and impact pile driving.

The Navy prepared a comprehensive Environmental Assessment (EA) to evaluate the environmental effects of the action including effects on marine mammals. Based on the low intensity of the action, as well as implementation of appropriate mitigation and monitoring measures documented in the EA and included in the Incidental Harassment Authorization (IHA), the Navy's action, and the National Marine Fisheries Service' issuance of an IHA, will not result in significant impacts to the human environment.

RESPONSIBLE
OFFICIAL: Donna S. Wieting, Director
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Hwy, F/PR
Silver Spring, MD 20910
(301) 427-8400

NOAA reviewed the Navy's EA and determined it adequate to support issuance of the IHA. The environmental review process led us to conclude that this action will not have a significant effect on the human environment. Therefore, an Environmental Impact Statement will not be prepared. A copy of the Finding of No Significant Impact (FONSI) including the supporting EA, prepared by the Navy, is enclosed for your information. Although NOAA is not soliciting comments on this completed EA/FONSI, we will consider any comments submitted that would assist us in preparing future NEPA documents. Please submit any written comments to the responsible official named above.

Sincerely,

Patricia Montanio
NOAA NEPA Coordinator

Enclosure

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FINAL ENVIRONMENTAL ASSESSMENT

WHARF C-2 RECAPITALIZATION
AT NAVAL STATION MAYPORT, JACKSONVILLE, FL

November 2013

Abstract: This environmental assessment identifies and evaluates the potential effects of recapitalizing Wharf Charlie Two at Naval Station Mayport. Recapitalization includes demolishing and replacing the existing concrete pile cap, wharf deck, and utilities and installation of a new steel king pile/sheet pile bulkhead around the existing Wharf Charlie Two.

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EXECUTIVE SUMMARY

The Navy proposes to recapitalize (renovate and modernize) Wharf Charlie Two (C-2) at Naval Station (NAVSTA) Mayport. This recapitalization project includes the demolition and replacement of the existing concrete pile cap, wharf deck, and utilities and installation of a new steel king pile/sheet pile bulkhead around the existing Wharf C-2. The project will result in a wharf footprint increase of approximately 1,322 square meters and installation of downward facing, shielded lighting on and around the wharf surface.

The need for the proposed action is based on the failing functionality and structural integrity of the wharf, which has deteriorated since it was built in 1960. The continued deterioration has caused material voids and failure of wharf deck paving, which have resulted in load restrictions on the wharf.

Two Alternatives have been evaluated in this Environmental Assessment (EA): an Action Alternative and a No Action Alternative. The Action Alternative includes installation of 120 single sheet piles, 119 king piles and 50 polymeric (plastic) fender piles. A maximum of 70 days of in-water pile driving work will take place over a 12-month period. These piles will be driven using both vibratory and impact driving methods. Impact driving will be a contingency employed only if vibratory methods are inadequate; a similar project that has been completed at adjacent Wharf Charlie One required impact pile driving on only seven piles. Therefore, if impact driving is needed, it will be temporary and of a very short duration. Contingency dredging of up to 4,000 cubic yards of sediment may be conducted if needed; a clamshell dredge would be used if dredging were performed.

Under the No Action Alternative, the Wharf C-2 recapitalization project would not occur, resulting in the continued deterioration of the Wharf's infrastructure. This would continue to place the structural integrity of the wharf and the continuation of operational requirements in jeopardy. Any further deterioration could result in a complete loss of the wharf at NAVSTA Mayport.

The anticipated impacts of the Action Alternative are primarily noise- related resulting from pile driving. The analysis in the EA indicated these impacts would be short term in nature (maximum of 70 days). The ambient noise and underwater sound associated with pile driving could have an effect on wildlife (fish, birds, marine mammals, federally listed species, and benthic invertebrates) occurring within the project area. As such, this EA analyzed the impacts to these species as well as marine vegetation and essential fish habitat.

In accordance with the Navy's National Environmental Policy Act (NEPA) policies, all applicable consultations will be obtained as part of this EA.

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TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

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LIST OF ACRONYMS AND ABBREVIATIONS

AICUZ	Air Installation Compatible Use Zone
ATFP	Antiterrorism Force Protection
BMPs	best management practices
C-2	Charlie Two
CZMA	Coastal Zone Management Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CVN	aircraft carrier, nuclear
°C	degrees Celsius
dB	decibels
dBA	A-weighted sound level
DOD	Department of Defense
DON	Department of the Navy
DPS	distinct population segment
°F	degrees Fahrenheit
FR	Federal Regulations
ESA	Endangered Species Act
EA	environmental assessment
EIS	environmental impact statement
EFH	essential fish habitat
ft	feet
FDEP	Florida Department of Environmental Protection
FWC	Florida Fish and Wildlife Conservation Commission
FONSI	Finding of No Significant Impact
HAPC	habitat areas of particular concern
Hz	Hertz

IHA	Incidental Harassment Application
kHz	kilohertz
km^2	square kilometer
m	meter
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
μPa	microPascals
mg/L	milligrams per liter
NMSDD	Navy Marine Species Density Database
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NAVSTA	Naval Station
OPNAVINST	Chief of Naval Operations Instruction
OSHA	Occupational Safety and Health Administration
Pa	Pascals
PTS	permanent threshold shift
rms	root mean squared
SEL	sound exposure level
SPL	sound pressure level
SAFMC	South Atlantic Fishery Management Council
SSP	steel king pile/sheet pile wall system
TTS	temporary threshold shift
U.S.	United States
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

1 Proposed Action, Purpose and Need

1.1 Introduction

The Navy proposes to recapitalize (renovated and modernize) Wharf Charlie Two (C-2) at Naval Station (NAVSTA) Mayport. NAVSTA Mayport is located in northern Florida east of Jacksonville along the St. Johns River and the Atlantic Ocean (Figure 1-1). NAVSTA Mayport maintains and operates facilities which provide support to the operations of deploying home based and transient Navy ships, aviation units, and staff. NAVSTA Mayport also provides logistic support for operating forces, dependent activities, and other commands as assigned. NAVSTA Mayport covers approximately 3,409 acres and supports more than 60 commands, detachments, and private organizations. NAVSTA Mayport is homeport to 16 surface ships and routinely hosts port visits by various deep draft ships including nuclear-powered aircraft carriers.

1.2 Proposed Action

The proposed action is to recapitalize (renovate and modernize) Wharf C-2 at NAVSTA Mayport. This recapitalization project includes the demolition and replacement of the existing concrete pile cap, wharf deck, and utilities and installation of a new steel king pile/sheet pile bulkhead around the existing Wharf C-2. The project will result in a wharf footprint increase of approximately 1,322 square meters and installation of downward facing, shielded lighting on and around the wharf surface.

Construction of the wharf will occur over an 18 month period projected to begin on or after September 30, 2013. The project will include installation of approximately 120 single sheet piles, 119 king piles and 50 polymeric (plastic) fender piles. A maximum of 70 days of in-water pile driving work will take place over a 12-month period. These piles will be driven using both vibratory and impact driving methods. Impact driving will be a contingency employed only if vibratory methods are inadequate; a similar project that has been completed at adjacent Wharf Charlie One required impact pile driving on only seven piles. Therefore, if impact driving is needed, it will be temporary and of a very short duration. Section 2.1.2 describes all the elements of the proposed action in more detail.

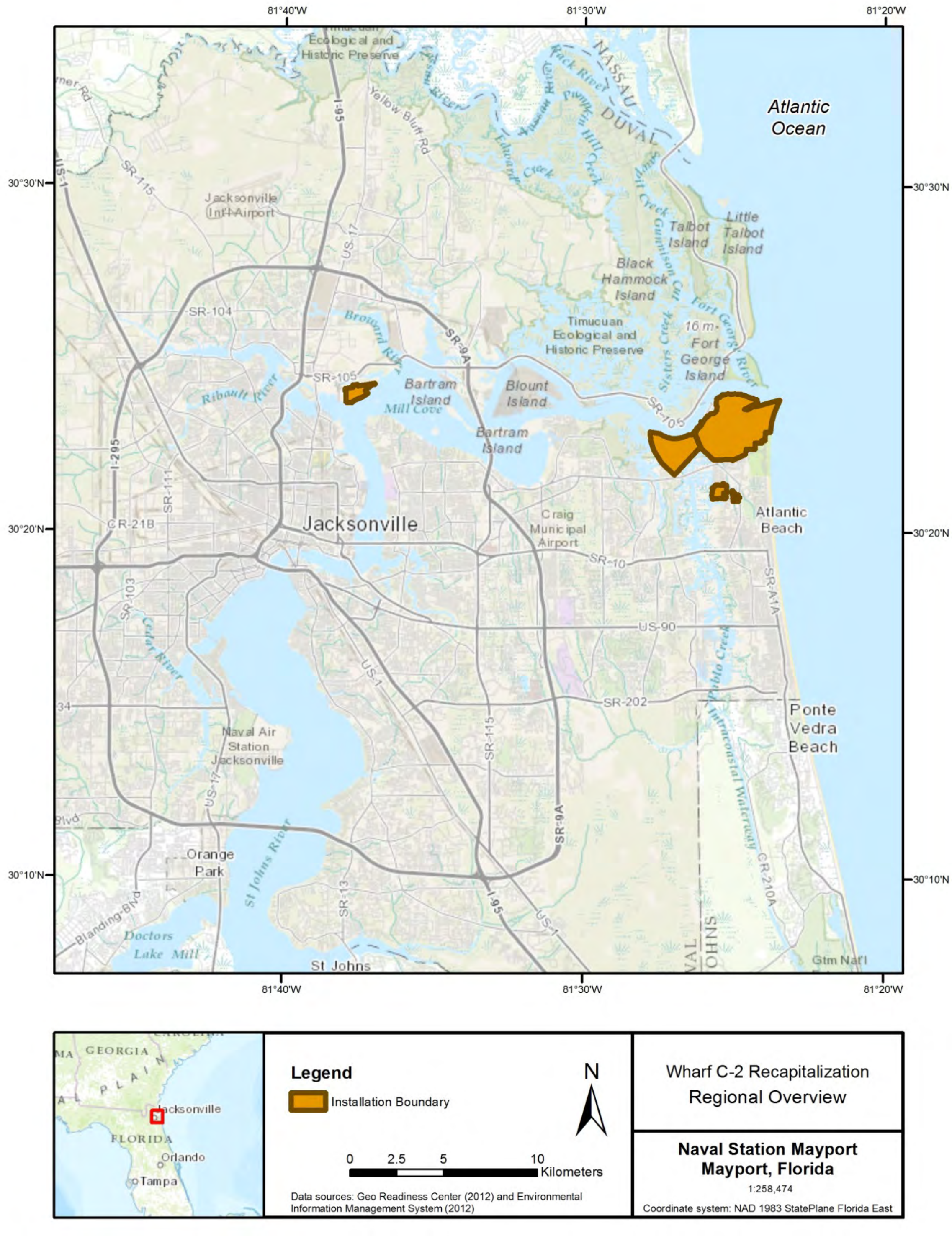

Figure 1-1. NAVSTA Mayport Regional Overview

1.3 Project Area Description

For the purposes of this assessment, the project area includes the NAVSTA Mayport turning basin out to the limit of the most distant of the acoustic thresholds (airborne and in-water) for all protected species being addressed for the Wharf C-2 Recapitalization project. In the absence of official airborne criteria for any protected species, the Navy has adopted a threshold of 65 dBA at any sensitive receptor as the in-air boundary of the project area. For the proposed action, the most distant underwater threshold is the marine mammal behavioral disturbance (120 dB re 1 μPa rms) threshold. The airborne and underwater zones of influence were modeled (see Sections 3.3.4.2.1 and 3.4.3.2.13) and incorporated into a single-boundary layer (Figure 1-2).

NAVSTA Mayport ship berthing facilities are provided at 16 berthing locations along wharves A through F located around the turning basin perimeter. The turning basin is approximately 2,000 by 3,000 feet (ft) in size, and is connected to the St. Johns River by a 500 ft wide entrance channel. A port security barrier has been installed at the mouth of the turning basin and there is a restricted area that prohibits all persons, vessels, and craft, except those vessels operated by the U.S. Navy, visiting foreign navies, and the U.S. Coast Guard, from entering except in cases of extreme emergency (Figure 1-3). NAVSTA Mayport's approximately one mile-long beach is closed to the general public and is patrolled by the NAVSTA Mayport Security Department.

Wharf C-2 lies along the northern edge of the NAVSTA Mayport turning basin. Wharf C-2 is a single level, general purpose berthing wharf that was constructed in 1960. Wharf C-2 is 608 ft long, 125 ft wide, and has a berthing depth of 50 ft mean lower low water. The wharf is one of two primary deep draft berths and is one of the primary ordnance handling wharfs for the Naval Station. The wharf is a diaphragm steel sheet pile cell structure with a concrete apron, partial concrete encasement of the piling and an asphalt paved deck.

Currently, the wharf is in poor condition due to the advanced deterioration of the steel sheeting and lack of corrosion protection. Due to the structural deterioration of the wharf, load restrictions have been instituted that limit loads to a maximum of 4,500 pounds within 60 ft of the face of the wharf.

1.4 Purpose and Need

Adequate and efficiently configured facilities are required to provide general purpose ordnance loading and maintenance berthing for ships homeported at and visiting NAVSTA Mayport. The purpose of the proposed action is to resolve the increasing deterioration of the bulkhead so facilities can provide adequate ship berthing, cold iron support and ordnance handling capability. Cold iron support encompasses providing shore based power and support to vessels during periods of maintenance and long term shutdown of main and auxiliary engines.

The need for the proposed action is based on the failing functionality and structural integrity of the wharf, which has deteriorated since it was built in 1960. The continued deterioration has caused material voids and failure of wharf deck paving, which have resulted in load restrictions on the wharf.

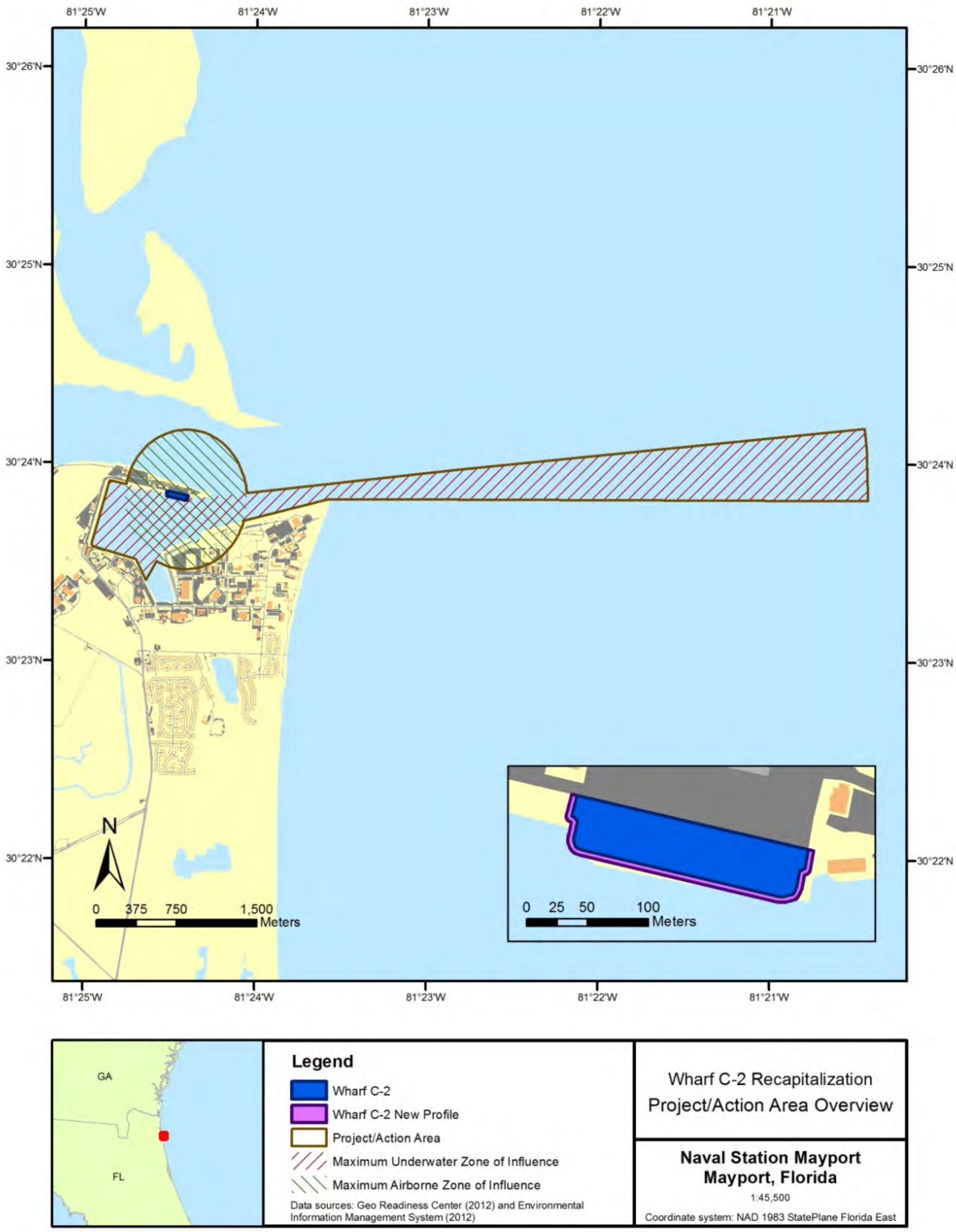

Figure 1-2. Project Area Overview[1]

[1] The project area boundary was defined with a combination of airborne and underwater noise thresholds. Land within the project area (circular portions) is a result of airborne noise thresholds.

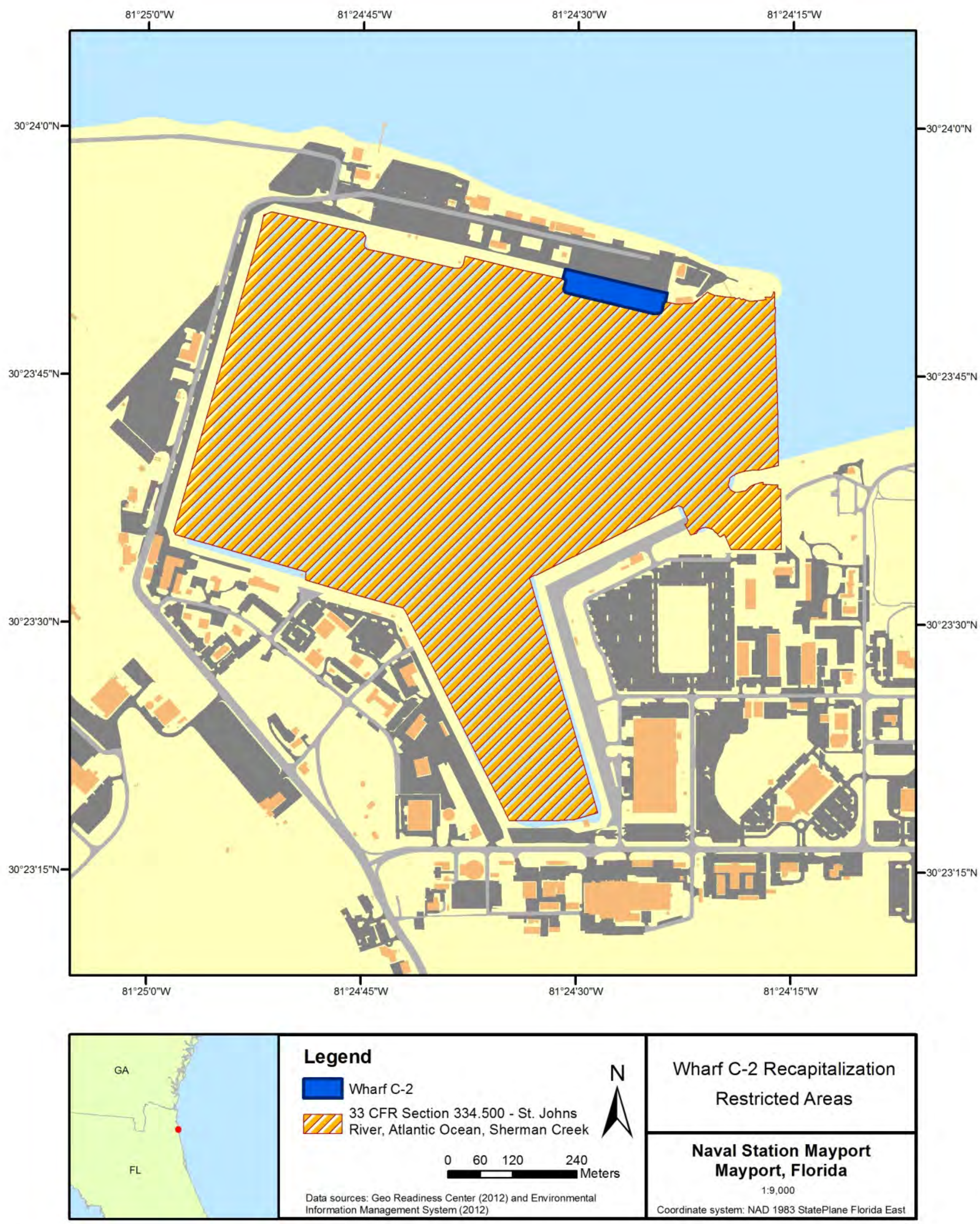

Figure 1-3. Restricted Area

1.5 Environmental Review Process

1.5.1 National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 requires the consideration of potential environmental consequences of federal actions. Regulations for federal agency implementation of the Act were established by the President's Council on Environmental Quality (CEQ). Under NEPA, federal agencies must prepare an environmental assessment (EA) or an environmental impact statement (EIS) for any major federal action, except those actions that are determined to be "categorically excluded" from further analysis.

An EA is a concise public document that provides sufficient analysis for determining whether the potential environmental impacts of a proposed action are significant, resulting in the preparation of an EIS, or not significant, resulting in the preparation of a Finding of No Significant Impact (FONSI). An EIS is prepared for those federal actions that may significantly affect the quality of the human environment. Thus, if the Navy were to determine that the proposed action would have a significant impact on the quality of the human environment, an EIS would be prepared. An EA should include: brief discussions of the purpose and need for the proposal, the proposed action, the alternatives, the affected environment, the environmental impacts of the proposed action and alternatives, a listing of agencies and persons consulted and a discussion of the cumulative impacts associated with the alternatives.

This EA will be reviewed by the lead agency, the Navy, representatives of which will make a determination regarding the proposed action and whether a FONSI or an EIS is appropriate. Should the Navy conclude that a FONSI is appropriate; a FONSI summarizing the issues presented in this EA will be prepared. The FONSI would be signed by the Navy and a notice of availability would be published in local newspapers in Jacksonville, Florida.

The Navy has prepared this EA in accordance with applicable federal and state regulations and instructions, as well as with other applicable laws, rules and policies. These include, but are not limited to, the following:

- NEPA as amended by Public Law 94-52, July 3, 1975 (42 U.S.C. 4321 *et seq.*), which requires environmental analysis for major federal actions significantly affecting the quality of the environment.
- CEQ regulations, as contained in 40 Code of Federal Regulations (CFR) Parts 1500 to 1508, which direct federal agencies on how to implement the provisions of NEPA.
- Navy Regulations for Implementing NEPA 32 CFR Part 775.
- Chief of Naval Operations Instruction (OPNAVINST) 5090.1C CH-1.

1.5.2 Agency Coordination and Permit Requirements

This EA will focus its analysis of impacts based on the appropriate and relevant laws, regulations, permits, and licenses that are applicable to the proposed action, including the following (see Appendix A for agency correspondence):

- Permit from the U.S. Army Corps of Engineers, Jacksonville District in accordance with Section 10 of the Rivers and Harbors Appropriation Act of 1899.

- Federal Coastal Consistency Determination concurrence by the Florida Department of Environmental Protection (FDEP), Coastal Management Program in accordance with the Coastal Zone Management Act (CZMA).
- To comply with the Endangered Species Act (ESA) of 1973, as amended, the Navy is consulting with the U.S. Fish and Wildlife Service (USFWS) North Florida Ecological Services Office and the National Marine Fisheries Service (NMFS) Southeast Regional Office under the ESA for federally threatened and endangered species that may be affected by the project.
- To comply with the Migratory Bird Treaty Act (16 United States Code [U.S.C.] 703-712), as amended, the Navy will avoid or minimize the effects of actions associated with the Wharf C-2 Recapitalization project on migratory birds and take active steps to protect birds and their habitat.
- To comply with the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the Navy is consulting with NMFS on activities that may adversely affect Essential Fish Habitat (EFH).
- To comply with the Marine Mammal Protection Act (MMPA) of 1972, as amended, the Navy is applying for an Incidental Harassment Authorization (IHA) permit with NMFS.

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2 Discussion of Alternatives

2.1 Alternatives

National Environmental Policy Act's (NEPA's) implementing regulations (*e.g.*, 40 Code of Federal Regulations [CFR] 1502.14) provide guidance on the consideration of alternatives to a federally proposed action and require rigorous exploration and objective evaluation of reasonable alternatives. All reasonable alternatives must be considered, however, only those alternatives determined to be reasonable relative to their ability to fulfill the purpose and need for the proposed action will be analyzed in the environmental assessment (EA). Reasonable alternatives include those that are practical and feasible. The criteria the Navy used in development of the alternatives were maintaining operational requirements and enhancing the structural integrity of the wharf. The Action Alternative was developed giving due consideration to the purpose and need. This EA analyzes a No Action Alternative and one Action Alternative to achieve the proposed action.

2.1.1 No Action Alternative

Under the No Action Alternative, the Wharf C-2 recapitalization project would not occur, resulting in the continued deterioration of the Wharf's infrastructure. This would continue to place the structural integrity of the wharf and the continuation of operational requirements in jeopardy. The deterioration of Wharf C-2 has already resulted in weight restrictions and crane standoff restrictions which severely limit the usability of the wharf. Any further deterioration could result in a complete loss of the wharf at NAVSTA Mayport. However, the No Action Alternative represents the baseline condition against which potential consequences of the proposed action can be compared. As required by Council of Environmental Quality (CEQ) regulations, the No-Action Alternative is carried forward for analysis in this EA.

2.1.2 Action Alternative

Under the Action Alternative, the Navy will install a new steel king pile/sheet pile bulkhead at Wharf C-2. The new bulkhead will be designed for a 50-year service life.

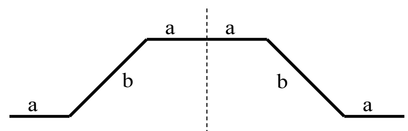
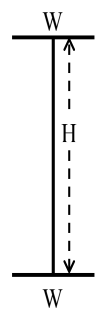
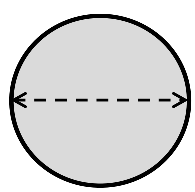
A steel king pile/sheet pile wall system (SSP) consists of large vertical king piles with paired steel sheet piles driven in between and connected to the ends of the king piles. See Table 2-1 for a description of the piles. The wall will be anchored at the top and fill consisting of clean gravel and/or flowable concrete fill is placed behind the wall. A concrete cap will be formed along the top and outside face of the wall to tie the entire structure together and provide a berthing surface for vessels (Figure 2-1).

Overall, the project will include installation of approximately 120 single sheet piles, 119 king piles and 50 polymeric (plastic) fender piles. A maximum of 70 days of in-water pile driving work will take place over a 12-month period. Of the 70 days, 50 days are reserved for vibratory hammer driving and the remaining 20 days are reserved for contingency impact driving. Only two days of impact pile driving occurred during the adjacent Wharf Charlie One project. Impact pile driving, if it were to be necessary, could occur on the same day as vibratory pile driving, but driving rigs would not be operated simultaneously. No net change in the amount of vessel traffic in and around the turning basin is expected as a result of the project.

Contingency dredging may be required within the new wharf footprint. Up to 4,000 cubic yards of sediment would be removed using a clamshell dredge. Dredged sediments would either be utilized as backfill on the project or be disposed of in accordance with applicable laws and regulations at an approved off-site location. Dredging, if needed, would occur outside of the 70 day in-water work window and is expected to take place behind the existing wharf bulkhead. All in-water construction activities shall occur during daylight hours between one hour after sunrise and one hour before sunset.

As part of the recapitalization of the wharf, new lighting fixtures will be installed. Four 50 foot (ft) tall (15 meters [m]) light posts each with two 8,000 watt downward facing, shielded luminaries are currently planned. Luminaries will be of the full cut off type to minimize stray light. This lighting profile is greatly reduced given comparable areas surrounding the basin. The recently recapitalized Wharf C-1 utilized 18,000 watt unshielded luminaries.

Table 2-1. Pile Descriptions

PILE TYPE AND DETAILS	SHAPE AND DIMENSIONS	ESTIMATED DISTURBANCE FOOTPRINT
AZ19-700 SHEET PILE PAIR A pile in the form of a plank driven in close contact or interlocking with others to provide a tight wall to resist the lateral pressure of water, adjacent earth, or other materials. A sheet pile may be tongued and grooved if made of timber or concrete, or interlocking if made of metal. Linear length=4×a+2×b = 70.4 in a = 6.81 in b = 21.6 in		Area = W × H W = 55.12 in H = 16.56 in 55.12 in × 16.56 in = 912 in^2 = 0.59 m^2
HZ1080 MB KING PILE In strutted sheet pile excavation, a long guide pile driven at the strut spacing in the center of the trench before it is excavated. Linear length=2×W+H = 77.2 in W = 7.87 in H = 41.47 in		Area = W × H = 7.87 in × 47.47 in = 326 in^2 = 0.21 m^2
CIRCULAR POLYMERIC FENDER PILE Polymeric piles have been used primarily for corner protection, as secondary fender piles, and as primary fender piles for small craft facilities. Diameter = 12 in Circumference = Diameter × π = 37.7 in		Area = Π × r^2 = Π × 36 = 113 in^2 = 0.07 m^2

Sources: Dictionary of Construction 2013 and Integrated Publishing 2013.

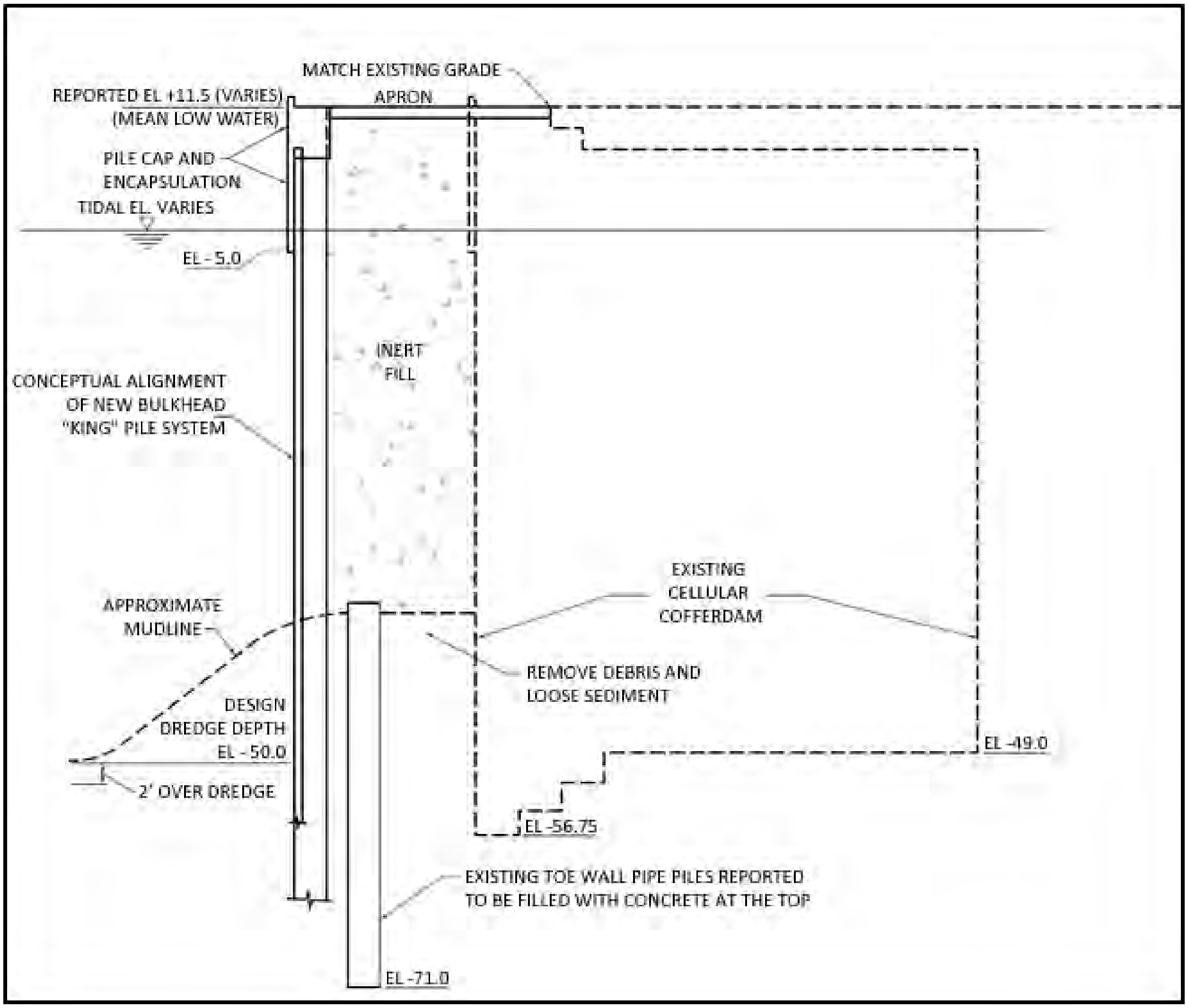


Figure 2-1. Lateral View of Project Plan

The recapitalization construction activities include:

- demolishing existing concrete pile cap, wharf deck and utilities (including lateral supply lines from utilities such as water, fuel, and electrical)
- removing existing timber fender piling
- installing new steel combination wall with tieback anchors
- placing a combination of self-hardening, flowable fill and clean fill between existing and new walls
- installing new concrete cap which partially encases the new steel wall
- installing sacrificial anode cathodic protection system for the new steel wall
- installing new polymeric fender piles
- installing new foam filled fenders

- installing new utilities
- repairing wharf deck by milling and re-paving
- replacing area lighting fixtures on galvanized steel standards
- replacing security fencing
- installing stormwater bioretention basin

The following steps describe the construction sequence for placing the new SSP system in front of the existing deteriorated wall.

1. Preparation and Demolition

   Existing underwater obstructions and debris that may interfere with the installation of the new SSP wall will be removed utilizing divers and cranes. Up to 30 timber piles will be removed from the project area utilizing a crane. The points where the new SSP is to attach to the existing sheet pile wall will be demolished above and below the waterline to expose the existing steel.

   Along the face of the existing wall, the curb and a portion of existing concrete cap will be removed to accommodate the new concrete pavement that will be placed between the new wall and the existing wall. The concrete apron along the waterside perimeter of the wharf and the utilities (including lateral supply lines from utilities such as water, fuel, steam and electrical) will be removed. Utilities include water, fuel, waste, electrical and communications.

2. Installation of New Bulkhead

   Crane barges will be used in lieu of shore-based equipment due to weight bearing and structural integrity issues on the current Wharf C-2. A crane barge with a pile installation suite (pile leads, vibratory hammer and an impact hammer) will mobilize to the project site with a material barge. A pile driving template (approximately 25 ft in length) will be mounted to the crane barge. This allows the crane barge to control the alignment of the piles as they are driven. Once the crane barge is properly aligned, the king piles will be driven to the appropriate depth using the vibratory hammer (Figure 2-2). Sheet piles will be driven in pairs between the king piles to complete the template[2] (Figure 2-3). A total of 120 single sheet piles and 119 king piles will be installed. Installation of up to three templates per pile-driving day is anticipated. Impact driving will be a contingency employed only if vibratory methods are inadequate; a similar project that has been completed at adjacent Wharf Charlie One required impact pile driving on only seven piles. Once all of the piles are driven, closure plates are attached between the existing adjacent sheet pile walls and the new wall end terminations. Typically, these are welded in place using underwater welding techniques.

   In general, the pile-driving process begins by placing a choker cable around a pile and lifting it into vertical position with a crane. The pile is then lowered into position inside the template and set in place at the mudline. During vibratory driving, the pile

[2] Templates are prefabricated or site constructed steel frames into which piles are set to hold piles in the proper position and alignment during driving (Hannigan 2011).

is stabilized by the template while the vibratory driver installs the pile to the required tip elevation.

Impact hammers have guides that hold the hammer in alignment with the pile while a heavy piston moves up and down, striking the top of the pile, driving the pile into the substrate from the downward force of the hammer.

Once piles are in position, installation typically takes 45 seconds to reach the required tip elevation depending on site conditions (i.e., bedrock, loose soils, etc.), driving method, and equipment used.

Figure 2-2. Vibratory Installation of Sheet Piles at NAVSTA Mayport

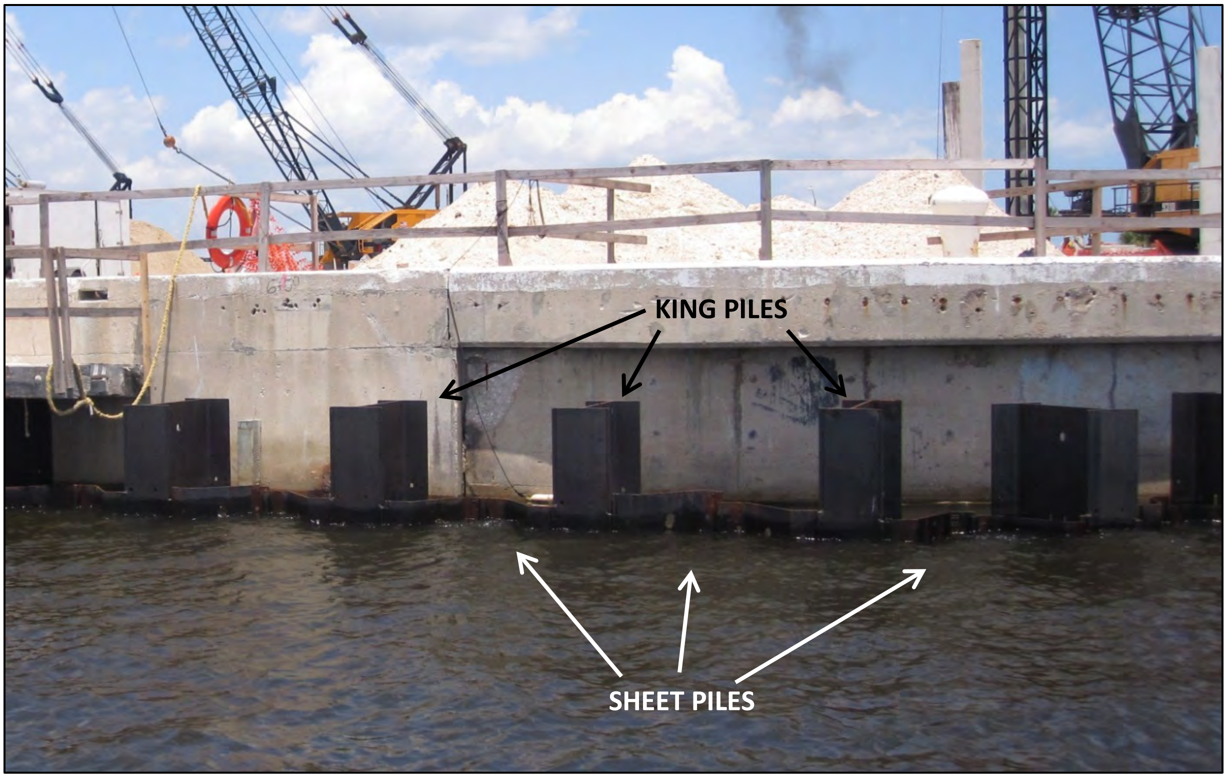


Figure 2-3. Sheet and King Piles at NAVSTA Mayport

Figure 2-4. Polymeric Fender Piles

3. Installation of Anchors

   There are multiple types of anchoring systems that can be utilized for a sheet pile wall. These methods include a grouted soil anchor system and a tie back wall system. Regardless of the method, anchor rods will be installed from the new SSP wall to the anchor system. This will require drilling through the old wall to the anchor location behind the wall. In general, this anchor location may lie 40-60 ft behind (shoreward) the existing wall. After the anchor holes are driven, the anchors will be placed in the holes and either the end of the anchor is grouted into the soil or the end of the anchor is attached to the tie back wall system. The tie back wall system normally consists of sheet piles of shortened lengths that are buried below grade.

4. Placement of Fill Behind Wall

   After the anchors are installed, fill operations will be conducted behind the new wall. This will consist of placement of either gravel fill or concrete flowable fill into the space behind the wall; trapped water behind the wall is displaced.

5. Form and Placement of Pile Cap

   After the fill operation has completed, the concrete pile cap will be formed and placed along the top of the new SSP wall. This will consist of installation of either wood or steel forms along the top of the wall down to some point below mean low water elevation. Water will be removed from the forms, steel reinforcement will be placed in the forms, and concrete will be poured to the required elevations.

   After the concrete has cured sufficiently, the forms will be removed. A total of 50 polymeric (plastic) fender piles will then be installed (Figure 2-4).

6. Deck and Utility Replacement

   After the pile cap is in place, a new reinforced concrete apron will be installed and the wharf deck repaired by milling and paving. A new high mast lighting system, new security fencing, and new utilities will be installed to replace those that were removed.

7. Installation of Stormwater Retention Basin

   Construction will result in an increase to impervious surface of 10,100 square feet (.23 acres) located between the existing bulkhead and the new bulkhead. This would cause a slight decrease in infiltration of precipitation and result in localized impacts to stormwater flow in the basin. However, these minor impacts would be localized at the development site and minimized through adherence to best management practices and the Stormwater Pollution Prevention and Environmental Resource Permit conditions (required if total combined impervious surface associated with the proposed development is greater than 9,000 square feet).

   Post development stormwater treatment will be required for the new impervious areas. The expanded wharf surface area will not provide any practical areas for the treatment of stormwater. Therefore, NAVSTA Mayport is proposing to collect and treat stormwater from an impervious storage and vehicle parking area located several hundred feet north of Wharf C-2. Stormwater will be directed to an adjacent grassy area where it will be treated in a dry retention biobasin prior to release into the St.

Johns River. This location is the closest practical compensatory treatment area to Wharf C-2 and will be capable of treating an area of 16,770 square feet and have a volume of 2,307 cubic feet. The Stormwater Treatment Basin will include four ten foot wide riprap overflows and will be located approximately 50-75 feet from the existing riprap shoreline.

2.2 Alternatives Considered but Eliminated from Detailed Analysis

The development process for this EA considered other alternatives to the recapitalization of Wharf C-2. Two alternatives were considered, but eliminated from further consideration due to location, feasibility, operational and other impacts. A summary of each of the alternatives eliminated from further consideration is discussed below.

2.2.1 Leasing Berthing Space

The Navy considered leasing berthing space as an alternative to recapitalizing Wharf C-2. However, no berthing space is available in proximity to both operational and personnel support facilities at NAVSTA Mayport to make leasing berthing space a feasible option. Therefore, leasing berthing space would not be considered a reasonable alternative to the proposed action.

2.2.2 Constructing a New Wharf

The Navy considered demolishing Wharf C-2 and constructing a new wharf in its place. However, this option would cost more than recapitalization and would require more time to complete. This timeline would result in NAVSTA Mayport losing the ability to utilize the wharf to meet operational requirements for a longer period of time than the proposed action. Therefore, demolition of Wharf C-2 and construction of a new wharf would not be a viable alternative to the proposed action.

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3 Affected Environment and Environmental Consequences

This chapter describes existing environmental conditions of resources potentially affected by the proposed action and the No Action Alternative. This chapter also identifies and assesses the environmental consequences of the proposed action. The affected environment and environmental consequences are described and analyzed according to categories of resources. The categories of resources addressed in this Environmental Assessment (EA) are listed in Table 3-1.

Table 3-1. Resource Areas and Chapter Locations

Resource	Section	Resource	Section
Sediments and Water Quality	3.1	Fish	3.7
Air Quality	3.2	Sea Turtles	3.8
Noise	3.3	Birds	3.9
Marine Mammals	3.4	Environmental Health and Safety	3.10
Marine Vegetation	3.5	Socioeconomics	3.11
Marine Invertebrates	3.6		

A couple of resource areas have been eliminated from further discussion as it was concluded that these resources areas would not be impacted by the proposed action. The resources excluded from the analysis and the reasons for excluding these resources are as follows:

- Cultural Resources – The Navy has determined and the Florida State Historic Preservation Office has concurred that the wharf does not represent a significant cultural resource and the proposed action will not incur effects on historic property structures (Department of Navy 2001). In regard to submerged archaeological resources, the history of dredging within the project area indicates that no significant submerged archaeological resources will be identified in the course of this project. Therefore, the activities described under the proposed action would not have an impact on cultural resources. The Navy has determined that no historic properties will be affected from the proposed action.
- Recreational and Commercial Fishing – Recreational and commercial fishing does not occur in the project area at NAVSTA Mayport. This area is restricted from access by the general public per 33 Code of Federal Regulations (CFR) 334.500. Therefore, the activities described under the proposed action would not have an impact on recreational and commercial fishing.

3.1 Sediments and Water Quality

3.1.1 Regulatory Overview

The waters of the United States are protected under Section 404 of the Clean Water Act of 1972. Waters of the United States are defined by the Clean Water Act as surface waters, rivers, lakes, estuaries, coastal waters, and wetlands. Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. The Clean Water Act established the basic structure for regulating discharges of pollutants into waters of the United States. The Clean Water Act contains the requirements to set water quality standards for all contaminants in surface waters. The United States Environmental Protection Agency (USEPA) is the designated regulatory authority to implement pollution control programs and other requirements of the Clean Water Act.

The Clean Water Act requires that the surface waters of each state be classified according to designated uses. Florida has five surface water classifications (62-302.400 Florida Administrative Code) with specific criteria applicable to each class of water: Class I–Potable Water Supplies; Class II–Shellfish Propagation or Harvesting; Class III–Recreation, Propagation, and Maintenance of a Healthy, Well- Balanced Population of Fish and Wildlife; Class IV–Agricultural Water Supplies; and Class V–Navigation, Utility, and Industrial Use.

Section 303(d) of the Clean Water Act addresses impaired waters, which are those waters that are not meeting their designated uses (e.g., drinking, fishing, swimming, shellfish harvesting, etc.). Based on Section 303(d) of the Clean Water Act and the Florida Watershed Restoration Act, total maximum daily loads must be developed for all impaired waters. One water body may have several total maximum daily loads, one for each pollutant that exceeds the water body’s capacity to absorb it safely. Florida classifies the Lower St. Johns River as a Class III water body, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. The Lower St. Johns River was included on the 1998 303(d) list as impaired for nutrients. The river was verified as impaired by nutrients based on elevated chlorophyll-a levels (i.e., algal organic matter) in both the fresh and estuarine portions of the river, and was included on the verified list of impaired waters for the Lower St. Johns River Basin. The total maximum daily loads for the main stem of the Lower St. Johns River Basin were adopted by the Florida Department of Environmental Protection (FDEP) in June 2008. The Class III dissolved oxygen criterion for freshwaters is a minimum dissolved oxygen of 5 milligrams per liter (mg/L), and the criterion for estuarine zones is a minimum dissolved oxygen of 4 mg/L, with a minimum daily average of 5 mg/L (USEPA 2008).

The water body identification for the mouth of the St. Johns River is 2213A, which includes the NAVSTA Mayport turning basin, entrance channel, beaches, and the federal navigation channel and continues upriver to where the St. Johns River meets the Atlantic Intracoastal Waterway (USEPA 2008). Table 3-2 lists the total maximum daily loads and pollutant load allocations adopted by rule for the estuarine portion of the Lower St. Johns River.

Table 3-2. Total Maximum Daily Loads Components for the Estuarine Portion of the Lower St. Johns River

Parameter	Total Maximum Daily Load (kg/yr)	Wasteload Allocation (kg/yr)	Load Allocation (kg/yr)
Total Nitrogen	1,376,855	1,027,590	349,265

Source: United States Environmental Protection Agency 2008

3.1.2 Affected Environment

3.1.2.1 Marine Sediments

The NAVSTA Mayport turning basin was constructed during the early 1940s by dredging the eastern part of Ribault Bay. Dredge material from the basin was used to fill parts of Ribault Bay and other low-lying areas in order to elevate the land surface. The basin was originally dredged to a depth of −29 feet (ft) mean lower low water and, in 1952, was deepened to a depth of −40 ft mean lower low water to provide access to larger ships. Prior to 1960, the turning basin was dredged to −42 ft mean lower low water. In 2012, the U.S. Army Corps of Engineers completed a project to deepen the NAVSTA Mayport entrance channel and turning basin. The turning basin is currently maintained at an average depth of −50 ft mean lower low water (plus two ft of overdepth), with ship berths ranging in depth from −30 to −50 ft mean lower low water. The basin is a deepwater surface ship berthing facility whose entrance channel meets the main navigation channel at the mouth of the St. Johns River. The NAVSTA Mayport entrance channel is approximately 500 ft wide extending approximately 5,000 ft until it joins with the federal navigation channel. Its depth ranges between −51 to −42 ft mean lower low water (DON 2008).

Sediment sampling and testing conducted in March 2007, in support of the Proposed Homeporting of Additional Surface Ships at NAVSTA Mayport EIS; indicated sediments within the turning basin consist primarily of fine grained materials (e.g., silt and clay). Six sediment samples from existing depths to depths of −56 ft mean lower low water were collected. Water depths in the turning basin ranged from −40 to −45 ft mean lower low water. The sediment that lies on the surface is silt/clay across the basin, ranging in thickness from 3 to 10 ft (DON 2008).

Five of the six March 2007 sediment samples were analyzed for the presence of chemical contaminants. Testing was conducted for bulk chemical parameters including metals, polychlorinated biphenyls, semi-volatile organics or polycyclic aromatic hydrocarbons, pesticides, and inorganics. The majority of these tests did not detect the presence of any contaminants in the dredge profile. The analyses did, however, find low concentrations of metals, some polycyclic aromatic hydrocarbons analytes, and some polychlorinated biphenyls parameters in the samples. Of the substances detected in the turning basin sediments, only one metal (arsenic) and two of the polycyclic aromatic hydrocarbons (acenaphthene and fluorine) had concentrations exceeding National Oceanic and Atmospheric Administration Effects Range Low thresholds in two of the five sediment samples collected. These three incidents of exceedance are only slightly above the Effects Range Low threshold and are well below the Effects Range Medium levels. All of the other detected concentrations of metals, polycyclic aromatic hydrocarbons, and polychlorinated biphenyls are well below the respective Effects Range Low levels (DON 2008).

Overall, the testing results generally reflected a low contamination level for marine sediments in the NAVSTA Mayport turning basin to depths of −56 ft mean lower low water. Additionally, the contaminant levels of the March 2007 results correlate favorably with those found during testing conducted prior to recent maintenance dredging projects at NAVSTA Mayport (DON 2008).

3.1.2.2 Water Quality

Based on available data, the water quality in the NAVSTA Mayport turning basin and entrance channel meets the FDEP Class III Marine Water Quality Standards (DON 2007a). Tides within the NAVSTA Mayport entrance channel are semi-diurnal (two highs and two lows per day). The mean and spring tidal ranges at the NAVSTA Mayport turning basin are 4.5 ft to 5.3 ft respectively. Average salinities in the basin range from 33 parts per thousand during flood flow to 15 to 26 parts per thousand during ebb flow, depending on tidal range and freshwater flow conditions (DON 2000). Water quality measurements taken during March 2007 in the NAVSTA Mayport turning basin yielded a range of surface temperatures from 64.9 to 68.2 degrees Fahrenheit (ºF) and salinity readings from 29.4 to 30.1 parts per thousand. These are normal readings for this season and area (DON 2008).

Due to the close proximity of the Atlantic Ocean, the presence of semi-diurnal tides and other hydrodynamic influences, flushing occurs continually within the turning basin. As part of an elutriate analysis, turning basin surface water samples were collected in March 2000 and analyzed for metals and semivolatile organic compound. No detectable concentrations of these substances were found in the samples, illustrating the relatively high quality of water and sediment in the NAVSTA Mayport turning basin (DON 2000).

There is only limited information readily available of dissolved oxygen levels in the turning basin or entrance channel. Data collected in 1993 revealed no significant stratification from the surface to −40 ft depths. Despite the deep water depths and hot summertime conditions, the maximum dissolved oxygen change from top to bottom was 1.43 parts per million (part per million is equivalent to mg/l) and minimum change was 0.20 parts per million. No values were less than 4.0 parts per million and a number of readings were above 5.0 parts per million suggesting that good mixing is ongoing (DON 2000).

3.1.3 Environmental Consequences

3.1.3.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline conditions for water resources, as described above, would remain unchanged. Therefore, there would be no impacts to water resources from implementation of the No Action Alternative.

3.1.3.2 Proposed Action

3.1.3.2.1 Marine Sediments

Under the proposed action, marine sediment would be disturbed and subsequently suspended in the water column. The use of the vibratory hammer and impact hammer could cause the fine silt and clay layers to be susceptible to liquefaction and subsequent contraction. As a result, the sediments would quickly settle back to the bottom of the project area or be carried out with tidal flow. Such suspension would be localized to the immediate area of the pile being driven.

Construction activities would not result in the discharge of wastes containing metals or otherwise alter the concentrations of trace metals in bottom sediments. Nor would construction activities result in the discharge of high levels of contaminants or otherwise alter the concentrations of organic contaminants in bottom sediments. However, because the magnitude of metal and organic compound concentrations in sediment can vary as a function of grain size (higher concentrations typically are associated with fine-grained sediments due to higher interior surface areas), small changes to grain size associated with construction-related disturbances to bottom sediments could result in minor changes in metal and organic compound concentrations. However, due to the small scale of temporary operations and the general lack of sediment contaminants in the project area, there would be no significant impacts to sediments from implementation of the proposed action.

3.1.3.2.2 Water Quality

The proposed action would not result in direct discharges of waste into the marine environment. Construction-related impacts to water quality would be limited to short term, temporary and localized changes associated with re-suspension of bottom sediments from pile installation and barge and tug operations, such as anchoring and propeller wash, as well as accidental spills of fuel into the turning basin. These changes would be spatially limited to the construction corridor, including areas potentially impacted by anchor drag and areas immediately adjacent to the driving sites that could be impacted by plumes of resuspended bottom sediments that are not expected to violate water quality standards. Fuel spills are unlikely as boats, barges, and equipment would be fueled offsite.

Best management practices would be used during all activities to reduce the likelihood of deleterious materials entering the waterway. As a result, accidental spills or discharges of deleterious materials would not be expected to adversely impact marine water quality at the project area.

The proposed action would not discharge any wastes containing materials with an oxygen demand into the turning basin. However, pile installation would resuspend bottom sediments, which may contain chemically reduced organic materials. Subsequent oxidation of sulfides, reduced iron, and organic matter associated with the suspended sediments would consume some dissolved oxygen in the water column. The amount of oxygen consumed would depend on the magnitude of the oxygen demand associated with suspended sediments (Jabusch et al. 2008). The impacts of sediment re-suspension from pile installation on dissolved oxygen concentrations would be minimal.

Contingency clamshell dredging may result in removal of up to 4,000 cubic yards of sediments within the new wharf footprint. The water column near the proposed dredging would experience temporary physical impairment due to an increase in total suspended solids during dredging operations. Sediment is suspended in the surrounding water during dredging with a clamshell type dredge in the following ways: (1) the clamshell strikes the seabed, closes and is withdrawn; (2) sediment escapes into the water column from inside the bucket, and; (3) sediment that has adhered to the sides of the bucket falls away as it is lifted from the water. Dredging activities would result in sediment disturbance and a temporary increase of suspended sediments in the project area. Disturbance of the sediment may also result in the release of dissolved hydrogen sulfides into the water column resulting in a concurrent decrease in dissolved oxygen. However, it is unlikely that dredging activities would release enough nutrients or dissolved hydrogen sulfide to produce low dissolved oxygen levels in the St. Johns River estuary. The temporary impacts to the water column associated with the increase in turbidity from dredging would cease following completion of the clamshell dredging activities. The Navy will apply for necessary dredging permits, and adhere to all requirements, including any mitigation measures. As a result, impacts of dredging to water quality are short term and temporary in nature and are not considered significant.

Installation of piles would resuspend bottom sediments within the immediate construction area, resulting in short-term and localized increases in suspended sediment concentrations that, in turn, would cause increases in turbidity levels. Barge and tug operations could also resuspend bottom sediments. The suspended sediment/turbidity plumes would be generated periodically, in relation to the level of in-water construction activities. The disturbed sediments would be a mix of fine grained silt and clay. The majority of these sediments would resettle within minutes of disturbance. Construction activities would not result in persistent increases in turbidity levels or cause changes that would violate water quality standards because processes that generate suspended sediments, which result in turbid conditions, would be short-term and localized and suspended sediments would disperse and/or settle rapidly.

Construction activities would not result in persistent increases in turbidity levels or cause changes that would violate water quality standards because they are limited in temporal and spatial scope and suspended sediments would disperse and/or settle rapidly.

Installation of a Stormwater Treatment Basin in an adjacent area immediately north of Wharf C-2 will mitigate potential impacts to water quality from the increase in impervious surfaces. The riprap overflows and riprap shoreline would diffuse the freshwater overflow into the St. Johns River resulting in a minor improvement in water quality in the project area.

In accordance with the Coastal Zone Management Act (CZMA), a Federal Consistency Determination was submitted to the FDEP. The Navy concluded that the Proposed Action is consistent with the enforceable policies of the Florida Coastal Management Program. The FDEP concurred with Navy's determination on July 30, 2013. The Federal Consistency Determination and agency correspondence can be found in Appendix A.

In conclusion, there would be no significant impacts to water quality from implementation of the proposed action.

3.2 Air Quality

3.2.1 Regulatory Overview

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. A region's air quality is influenced by many factors including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The significance of the pollutant concentration is determined by comparing it to the federal and state ambient air quality standards. The Clean Air Act and its subsequent amendments established the National Ambient Air Quality Standards for seven "criteria" pollutants:

- carbon monoxide (CO)

- nitrogen dioxide (NO_2)
- sulfur dioxide (SO_2)
- ozone (O_3)
- particulate matter (PM) less than 10 microns (PM_{10})
- PM less than 2.5 microns ($PM_{2.5}$)
- lead (Pb).

These standards represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare, with a reasonable margin of safety. Short-term standards (1-, 8-, and 24-hour periods) are established for pollutants contributing to acute health effects, while long-term standards (quarterly and annual averages) are established for pollutants contributing to chronic health effects. The FDEP, Division of Air Resource Management has adopted the National Ambient Air Quality Standards, with some exceptions and additions. In particular, the Florida sulfur dioxide standards are more stringent than the National Ambient Air Quality Standards. The state and national ambient air quality standards are presented in Table 3-3.

Table 3-3. National and Florida State Ambient Air Quality Standards

Air Pollutant	Averaging Time	Florida Standard	National Ambient Air Quality Standards	
			Primary	Secondary
Carbon Monoxide (CO)	8-hour 1-hour	9 ppm[a] 35 ppm	9 ppm 35 ppm	-- --
Lead (Pb)	Calendar Quarter Rolling 3 month average[b]	1.5 μg/m^3 --	-- 0.15 μg/m^3	-- 0.15 μg/m^3 (1)
Nitrogen Dioxide (NO_2)	Annual[c] 1-hour	100 μg/m^3 (0.05 ppm) --	0.053 ppm 0.1 ppm	100 μg/m^3 --
Ozone (O_3)	8-hour[d]	--	0.075 ppm	0.075 ppm
Particulate Matter (PM_{10})	Annual 24-hour	50 μg/m^3 150 μg/m^3	-- 150 μg/m^3	-- 150 μg/m^3
Particulate Matter ($PM_{2.5}$)	Annual 24-hour	-- --	15 μg/m^3 35 μg/m^3	15 μg/m^3 35 μg/m^3
Sulfur Dioxide (SO_2)	Annual 24-hour 3-hour 1-hour[e]	60 μg/m^3 (0.02 ppm) 260 μg/m^3 (0.10 ppm) 1300 μg/m^3(0.5 ppm) --	-- -- -- 75 ppb (4)	-- -- 0.5 ppm --

Notes:

a. ppm= parts per million; μg/m3= micrograms per cubic meter.

b. Final rule signed October 15, 2008. The 1978 lead standard (1.5 μg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

c. The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

d. Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, USEPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

e. Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Sources: USEPA 2012a, as of October 2011

A locality's air quality status and the stringency of air pollution standards and regulations depend on whether monitored pollutant concentrations attain the levels defined in the National Ambient Air Quality Standards. Ambient air quality concentrations are expressed in parts per million or micrograms per cubic meter, but the standard used for describing existing and proposed air emissions is expressed in tons of pollutant per year. To ensure the National Ambient Air Quality Standards are achieved and/or maintained, the Clean Air Act requires each state to develop a State Implementation Plan. According to the plans outlined in the State Implementation Plan, designated state and local agencies implement regulations to control sources of criteria pollutants.

The Clean Air Act provides that federal actions occurring in nonattainment and maintenance areas shall not hinder future attainment with the National Ambient Air Quality Standards and will conform to the applicable State Implementation Plan (i.e., Florida's State Implementation Plan). Duval County is considered by the USEPA to be in attainment for all criteria pollutants. Because Duval County is in attainment with all criteria pollutants, the General Conformity rule does not apply, nor are there any requirements posed by the FDEP for a conformity analysis of the proposed action.

Pollutants considered in this EA are SO_2 and other compounds (i.e., oxides of sulfur or SOx); volatile organic compounds, which are precursors to O_3; nitrogen oxides (NOx), which are also precursors to O_3, and include NO_2 and other compounds; CO; PM_{10}; and $PM_{2.5}$. These criteria pollutants are generated by the types of activities (e.g., construction and mobile source operations) associated with the proposed action. Airborne emissions of lead (Pb) are not included because there are no known significant lead emissions sources in the region or associated with the proposed action.

3.2.2 Affected Environment

Jacksonville has a humid subtropical climate, with mild weather during winters and hot weather during summers. High temperatures average 64 to 91 degrees Fahrenheit (°F) (18-33 degrees Celsius [°C]) throughout the year. High heat indices are not uncommon for the summer months in the Jacksonville area. High temperatures can reach mid to high 90s with heat index ranges of 105 to 115 °F. Rainfall averages around 52 inches a year, with the wettest months being June through September. During winter, the area can experience hard freezes during the night. Such cold weather is usually short lived. Jacksonville has suffered less damage from hurricanes than other East Coast cities. The city has only received one direct hit from a hurricane since 1871, although Jacksonville has experienced hurricane or near-hurricane conditions more than a dozen times due to storms passing through the state from the Gulf of Mexico to the Atlantic Ocean (ClimateZone 2012).

The air quality affected environment for NAVSTA Mayport is Duval County, including the City of Jacksonville. Duval County is currently in attainment with all criteria pollutant standards.

While not regulated by the FDEP like other conventional air pollutants, greenhouse gases are reportable in certain scenarios to USEPA. Greenhouse gases include: carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), and fluorinated gases such as Chlorofluorocarbons: compounds consisting of chlorine, fluorine, and carbon and Hydrochlorofluorocarbons: compounds consisting of hydrogen and sulfur hexafluoride (SF_6) (USEPA 2012b).

3.2.3 Environmental Consequences

3.2.3.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline air quality conditions, as described above, would remain unchanged. Therefore, there would be no impacts to air quality from implementation of the No Action Alternative.

3.2.3.2 Proposed Action

As stated above, Duval County is presently in attainment of all National Ambient Air Quality Standards criteria pollutants.

The following assumptions were made in calculating total estimated emissions:

Table 3-4. Emissions Anticipated Associated with the Proposed Action

Construction Activities and Emission Sources	Emissions of Criteria Pollutants, tons/year				
	VOC	CO	NOx	SO_2	PM
Direct Emissions					
Construction Vehicles/Equipment Exhausts	3.5	10.9	47.5	3.1	3.1
Indirect Emissions					
Construction Vehicles – On-Road	1.2	7.8	10.0	0.44	0.018
Total Emissions (Direct and Indirect, Combined)	**4.7**	**18.7**	**57.5**	**3.5**	**3.1**
Applicable Conformity de minimis Thresholds, tons/yr	100		100	100	

As illustrated in the Table 3-4, the potential air emissions associated with the proposed action would not be anticipated to exceed the Florida State or National Ambient Air Quality Standards thresholds or greenhouse gas reporting thresholds established by the USEPA. The activities proposed would be anticipated to be minimal and temporary in nature and no permanent emissions would be anticipated. Therefore, there would be no significant impacts to air quality from implementation of the proposed action.

3.3 Noise

3.3.1 Fundamentals of Acoustics

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) (ANSI S1.1-1994). 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 is generated by both natural (e.g., wind, waves, animals, etc.) and artificial (e.g., machinery, engines, etc.) sources, and can be characterized by the physical properties of frequency (number of sound-wave cycles per second, measured in Hertz [Hz]) and amplitude (the magnitude of the variations in pressure within the medium, measured in Pascals [Pa]) (Kinsler et al. 1999). 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 within a receiver’s hearing range are louder.

Within this EA, measurements of sound will be given as sound pressure levels (SPL) in units called decibels (dB). The dB scale provides a simplified relationship between sound pressure and the way it is perceived by the mammalian ear, 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.

3.3.1.1 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.

3.3.1.2 Noise

Noise is undesired sound (ANSI S1.1-1994), which can interfere with normal activities or diminish the quality of the environment (USACHPPM 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.

Excessive noise exposure may cause hearing damage, physiological stress responses, and changes to behavior, which may affect the health and quality of life for receivers (Richardson et al. 1995). Human exposure to noise is regulated by ordinances at local, state, and federal levels (see Section 3.3.1). Noise in natural environments is less strictly regulated, and controlled mostly by agencies managing the relevant species (addressed in Sections 3.4, 3.7, 3.8 and 3.9).

3.3.2 Regulatory Overview

3.3.2.1 Airborne Noise

Occupational Health and Safety Regulations

Navy regulations regarding noise are found in the 2001 Navy Occupational Safety and Health Program Manual (Chief of Naval Operations Instruction [OPNAVINST] 5100-19D), which is directed at preventing occupational hearing loss and assuring auditory fitness for all Navy personnel. The Navy's Occupational Exposure Level over an 8-hour time-weighted average in any 24-hour period is 84 dBA. When noise exposures are likely to exceed 84 dBA, hearing-protective devices are required.

3.3.2.2 Underwater Noise

Underwater noise is regulated only with respect to noise exposure by some marine mammal and fish species, and is addressed in Sections 3.4 and 3.7.

3.3.3 Affected Environment

For the purposes of this assessment, the project area includes the NAVSTA Mayport turning basin out to the limit of the most distant of the acoustic thresholds (airborne and in-water) for all protected species being addressed for the Wharf C-2 Recapitalization project. In the absence of official airborne criteria for any protected non-human species, the Navy has adopted a threshold of 65 dBA at any sensitive receptor as the in-air boundary of the project area. For the proposed action, the most distant underwater threshold is the marine mammal behavioral disturbance (120 dB re 1 µPa rms) threshold. While some aspects of the project (e.g., contingency-only impact pile driving) will have a much smaller zone of influence, this zone represents the furthest extent of project influence. Under certain conditions, areas in and outside of the turning basin may have average ambient noise levels exceeding the 120 dB re 1 µPa threshold. However, given the lack of actual underwater ambient sound recording data for this location, the Navy has assumed underwater ambient noise levels are below 120 dB re 1 µPa rms. The distance to the 120 dB threshold is therefore the maximum range at which the Navy expects to exert an environmental impact underwater, and represents a reasonable boundary for the project area. The airborne and underwater zones of influence were modeled (see Sections 3.3.4.2.1 and 3.4.3.2.13) and incorporated into a single-boundary layer (Figure 1-2). Most of the affected area is industrialized, with multiple sources of noise contributing to the ambient acoustic environment in air and underwater. The following sections describe the current ambient noise conditions in air and underwater.

3.3.3.1 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. Sound levels from these sources are typically low, but can be pronounced during violent weather events. Sounds from natural sources are generally not considered undesirable. 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 (USEPA 1974). In and around NAVSTA Mayport, airborne noise levels are highest during overflights from military aircraft.

In industrialized areas such as the NAVSTA Mayport waterfront, noise sources may include common construction equipment, such as trucks, cranes, compressors, generators, pumps, and other equipment that might typically be employed along industrial waterfronts (WSDOT 2010a). Typical source levels for common industrial noise sources are given in Table 3-5. Maximum noise levels may reach 112 dBA when two identical sources (i.e. two impact pile drivers; see Table 3-5) of noise are operating simultaneously, assuming an increase of 3 dB per doubling of sound intensity (WSDOT 2010a). These maximum noise levels are intermittent in nature, may occur sporadically on any given day with construction or other waterfront activity.

Table 3-5. Maximum Noise Levels at 50 feet for Common Construction Equipment

Equipment Type	Maximum Noise Level
Impact pile driver	109
Vibratory pile driver	96
Scraper	90
Backhoe	90
Crane	81
Pumps	81
Generator	81
Front loader	79
Air Compressor	78
Note: Maximum Sound Pressure Levels in dBA	

Sources: WSDOT 2008; Illingworth & Rodkin 2012

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 (DON 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. Additional noise sources at NAVSTA Mayport include overflights from military aircraft. The Air Installations Compatible Use Zone Report (AICUZ) document for NAVSTA Mayport indicates that over part of the basin, noise from aircraft would be expected to range from 60 – 75 DNL (DON 2007). This area does not include the airspace over Wharf C-2, which would be expected to have a DNL below 60 dB. Given the level of activity at NAVSTA Mayport and the measured sound levels in a similar area, the Navy estimates that ambient airborne noise levels near Wharf C-2 in the NAVSTA Mayport turning basin currently average between 60 and 65 dBA.

3.3.3.1.1 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 (USEPA 1971). Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, libraries, and parks or other outdoor recreational areas.

Most off-Station sensitive noise receptors are located at least 1.5 miles from the Wharf C-2, though Huguenot Park is located 0.5 miles across the St. Johns River from the wharf. On NAVSTA Mayport, sensitive receptors include Pelican's Point Recreational Vehicle Park, Bachelor Quarters (including transient quarters), Navy Lodge, Gateway Inn and Suites, Medical and Dental Clinic, Chapel, Child Development Center, and NAVSTA Mayport Family Housing.

3.3.3.2 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 both 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). At NAVSTA Mayport, vessel wakes in the St. Johns River 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 port 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 NAVSTA Mayport turning basin is likely to be dominated by noise from day-to-day port and vessel activities. The basin is sheltered from most wave noise, but is a high-use area for naval ships, tugboats, and security vessels. 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 (rms) (Table 3-6). During the proposed action, normal port operations, including transits, docking and maintenance of multiple tugboats and ships would continue, and noise contributions from these sources would remain at current levels.

Dredging may be necessary as part of the proposed action. If so, a clamshell dredge would be used to remove up to 4,000 cubic yards of sediment from the increased footprint area of Wharf C-2. Dredging is likely to temporarily increase noise levels in the turning basin during operations; previously recorded sound levels from clamshell dredges ranged from 136 to 165 dB re 1 µPa at ranges of 12 to 25 meters. Dredging would only be used as a contingency, and any increases in noise level will be short-term and temporary.

Table 3-6. Representative Levels of Underwater Noise from Anthropogenic Sources

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	Blackwell and Greene 2002
Vibratory driving of 24-inch steel pipe pile	50–1,500	159 dB rms at 10 m	Illingworth & Rodkin 2012
Impact driving of 24-inch steel pipe pile	50–1,500	186 dB rms at 10 m	WSDOT 2010b

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

3.3.4 Environmental Consequences

3.3.4.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline ambient noise conditions, as described above, would remain unchanged. Therefore, there would be no impacts to ambient noise from implementation of the No Action Alternative.

3.3.4.2 Proposed Action

The proposed recapitalization of Wharf C-2 would result in a temporary increase in airborne and underwater noise in the project area. Noise would be generated by a variety of sources, including pile driving, barges, trucks, cranes, and other construction equipment. As shown in Tables 3-5 and 3-6, pile driving is expected to generate the highest noise levels in both air and water. In the absence of pile driving noise, the maximum construction noise from equipment such as the crane, generator, etc. running simultaneously would be less than that of the vibratory pile driver (WSDOT 2008). Pile driving would occur during regular work hours (between one hour post-sunrise and one hour prior to sunset). Impact and vibratory hammers would never operate simultaneously.

3.3.4.2.1 Airborne Noise

The proposed action would result in a temporary increase in airborne noise levels in the project area. Estimated source levels for airborne noise from pile driving are given in Table 3-7; source levels were selected from published literature. Because there are no available airborne sound pressure level measurements from steel sheet and king piles, data from 24 inch diameter steel pipe piles were used to estimate the airborne sound source levels (see Table 2-1).

Table 3-7. Estimated Source Levels for Airborne Pile Driving Noise

Driving method	Source Level
Vibratory[1]	96 dBA at 15 m (50 ft)
Impact[2]	100 dBA at 11 m (36 ft)
Note: m=meter dBA= A-weighted decibel scale ft=feet	

Sources: [1] Illingworth & Rodkin 2012; [2] WSDOT 2010b

The source level selected for impact driving does not represent the maximum measured level for a 24 inch pipe pile (109 dBA; Illingworth & Rodkin 2012), which was obtained during short-term driving of a single pile in rocky sediment during the Navy Test Pile Program in Bangor, Washington in 2011. The selected source level shown in Table 3-7 was obtained during driving of a 24 inch pipe pile for a bridge replacement in Washington (WSDOT 2010b). Because softer sediments (such as those found in the NAVSTA Mayport turning basin; see Section 3.1.2.1) reduce the amount of force needed to drive a pile to desired depth, in turn reducing noise from pile reverberation (Kinsler et al. 1999), the non-maximal source level estimate selected is a reasonable assumption for airborne noise levels from pile driving at NAVSTA Mayport.

Estimates of airborne noise propagation from pile driving were based on the assumption that airborne construction noise behaves as a point-source, propagating in a spherical manner, with a 6 dB decrease in sound pressure level per doubling of distance (WSDOT 2008)[3]. The hard-site conditions proposed by WSDOT (2008) apply to both the over-water and over-land (mostly paved or hard surfaces) portions of the in-air project area.

Noise associated with vibratory pile driving is expected to attenuate to 65 dBA within 0.34 miles (550 m) of the source; impact pile driving noise is expected to attenuate to 65 dBA at 0.40 miles (650 m). During both impact and vibratory pile driving, airborne noise levels are expected to exceed 84 dBA (the threshold for hearing protection) within 246 ft (75 m) of the incident pile. These estimates assume a free flowing medium (e.g. over water) without obstructions, which is a reasonable assumption for the majority of the project area. Vegetation and buildings within the land areas of the proposed action may obstruct sound transmission in the project area; however, this model did not include possible attenuation from land-based obstructions (e.g. vegetation and buildings). The ranges given are therefore a conservative estimate of the affected area.

The following sections address the potential impacts of noise on the human environment within and around NAVSTA Mayport. Short term effects of a slight increase in ambient noise levels on sensitive bird species are discussed in Section 3.9.

3.3.4.2.2 Human Environment

The following analysis of the effects of noise on the human environment within the project area considers the intensity and the duration of airborne noise that would be generated by the proposed action and whether this noise would be harmful to humans or disrupt human activities. Activities within the project area include NAVSTA Mayport operations (i.e. vessel traffic, security patrols, loading and maintenance of vessels), routine operations of non-waterfront activities at NAVSTA Mayport, and recreational activities outside of base property.

Routine operations at the NAVSTA Mayport waterfront include loading, maintenance, and transits of large vessels and security operations. Current ambient noise levels are assumed to be consistent with other industrialized waterfront areas, with maximum noise levels ranging to approximately 100 dBA for short periods (seconds – minutes). During both impact and vibratory pile driving, sound levels may exceed 84 dBA up to 246 ft (75 m) from the incident pile; personnel within this range will be required to wear hearing protection (OPNAVINST 5100-19D). Noise levels at ranges greater than 246 ft (75 m) are unlikely to adversely affect personnel accustomed to working in an industrial environment; therefore, no significant impacts to daily operations or personnel are expected.

[3] RL=SL-TL
Where: RL is the Received Level of sound, SL is the Source Level of sound and TL is the Transmission Loss.

$TL=20\times\log_{10}(R_1/R_2)$ (R_1 is the distance from the source in meters, and R_2 is the distance in meters at which the SL measurement was taken).

$RL=210-20\times\log_{10}(10/R_2)$	$RL=210-20\times\log_{10}(20/R_2)$
RL=210-20	RL=210-26
RL=190 dB	RL=184 dB

**A doubling in distance from 10 meters to 20 meters results in a 6dB reduction in the sound pressure.

Recreational activities such as boating, kayaking, and fishing occur on the St. Johns River adjacent to NAVSTA Mayport. Recreational users could be exposed to noise levels exceeding 65 dBA in an area that includes a portion of the St. Johns River (Figure 3-1). Exposure to noise within this zone would not be injurious. Increases in noise levels in public areas adjacent to NAVSTA Mayport would be temporary and intermittent, occurring on a maximum of 70 days over a 12 month span, and are not expected to significantly impact recreational users of the St. Johns River.

3.3.4.2.2.1 Sensitive noise receptors

Generally, noise impacts are considered adverse if they expose sensitive receptors to noise levels in excess of applicable standards established in the noise ordinance. The only sensitive noise receptor that may be exposed to noise levels exceeding 65 dBA due to the proposed action is the Navy's Pelican's Roost RV Park, located on base at NAVSTA Mayport (Figure 3-1). Noise levels of 65 dBA are only expected to reach this locations in the unlikely event that impact pile driving is needed. If impact driving is necessary, there will be no more than 20 strikes per day, with a total estimated duration of 45 minutes per day. Because of the low likelihood of impact driving during the proposed action and the minimal duration of increased noise should impact driving become necessary, the Navy expects no significant impacts to sensitive noise receptors.

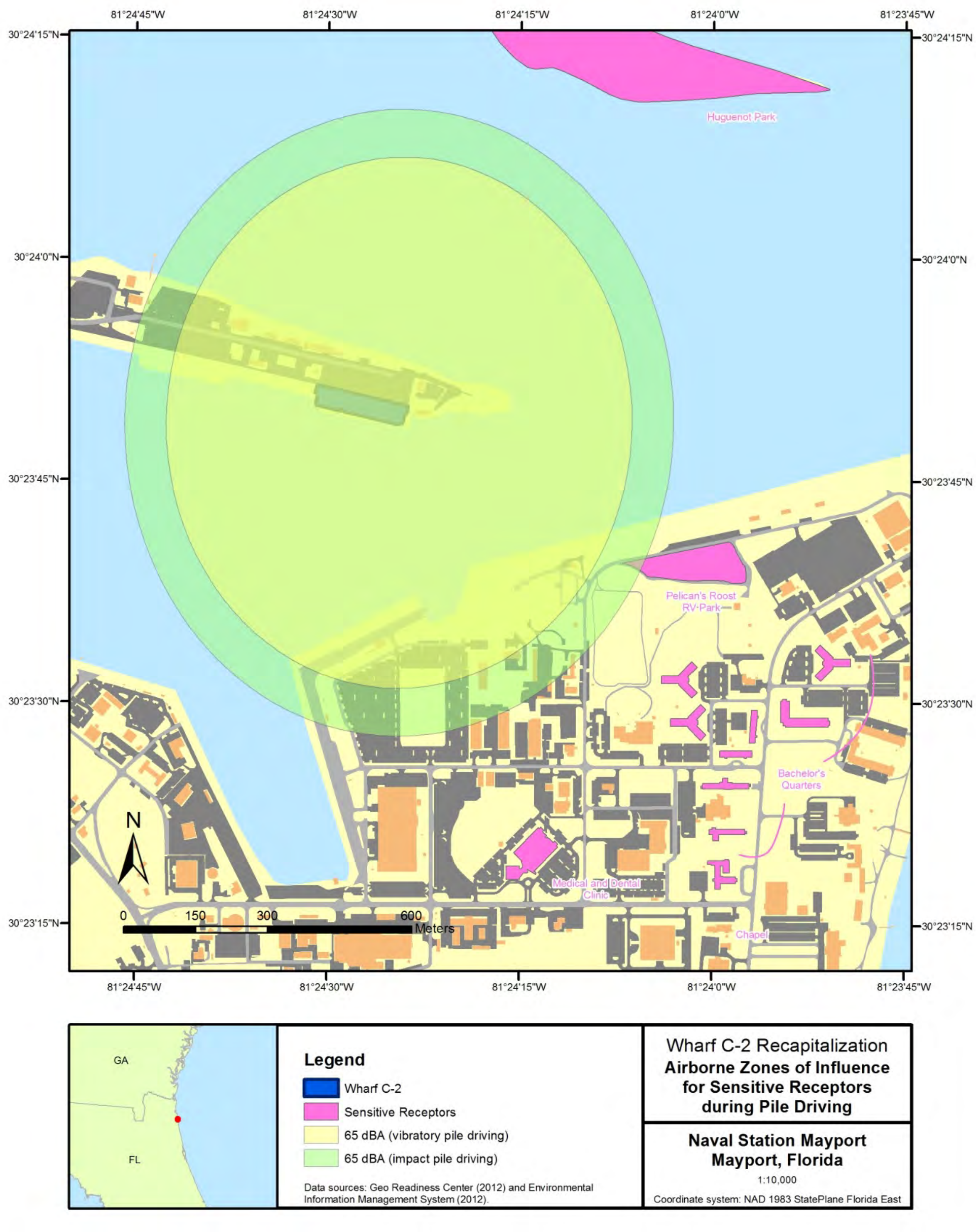

Figure 3-1. Naval Station Mayport Airborne Zones of Influence for Sensitive Receptors During Pile Driving

3.3.4.2.3 Underwater Noise

This section addresses potential effects of noise from pile driving associated with the proposed action on the existing underwater noise environment. A detailed analysis of the underwater noise propagation from both types of pile driving and the effects of noise on marine species are addressed in Sections 3.4 (Marine Mammals) and 3.7 (Fish).

At present, underwater ambient noise in the project area is likely to be dominated by sounds from normal port operations, which can exceed 180 dB re 1 μPa close to the source and will continue during and after the proposed action. These sounds are non-impulsive and intermittent, occurring sporadically during normal port activities. Noise from vibratory pile driving associated with the proposed action is unlikely to alter the existing ambient noise within the project area because of its relatively low source level (approximately 157 dB re 1 μPa rms at 10 m) and non-impulsive nature. Noise from impact pile driving has higher source levels (approximately 186 dB re 1 μPa at 10m) and is impulsive in nature, with a fast rise time and multiple short-duration (50–100 millisecond; Illingworth & Rodkin 2001) events. Introduction of high-amplitude impulsive sound may temporarily alter the ambient noise environment in the basin; however, the use of impact driving during the proposed project is limited to instances when vibratory driving fails, and will include a maximum of 20 strikes per day (estimated total net duration of 45 minutes of driving of any type per day). Because of the very limited use of impact pile driving during the proposed action, the Navy expects no change in the average ambient noise environment in the NAVSTA Mayport turning basin as a result of impact pile driving.

The recapitalization of Wharf C-2 includes a maximum of 70 days of pile driving, distributed over a period of 12 months. Given the current level of anthropogenic activity in the basin and high noise levels from normal port operations, noise from pile driving associated with the proposed action is not expected to significantly affect the existing ambient acoustic environment in the NAVSTA Mayport turning basin during the 12 month in-water work window. The proposed action will not introduce any new long-term noise sources and will not significantly impact the long-term underwater ambient noise environment in the project area.

3.4 Marine Mammals

3.4.1 Regulatory Overview

The Endangered Species Act (ESA) of 1973 (16 United States Code [U.S.C.] Section [§] 1531 et seq.) established protection over 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 near 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 jurisdiction (50 CFR 402.14[a]).

The Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. § 1361 et seq.) established, with limited exceptions, a moratorium on the "taking" of marine mammals in waters or on lands under United States (U.S.) jurisdiction. The act further regulates "takes" of marine mammals in the global commons (that is, the high seas) by vessels or persons under U.S. jurisdiction. The term "take," as defined in Section 3 (16 U.S.C. § 1362 [13]) of the MMPA, means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." "Harassment" was further defined in the 1994 amendments to the MMPA, which provided two levels of harassment: Level A (potential injury) and Level B (potential behavioral disturbance).

The Marine Mammal Protection Act directs the Secretary of Commerce (Secretary) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if NMFS finds that the taking will have a negligible impact on the species or stock(s), and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). The authorization must set forth the permissible methods of taking, other means of affecting the least practicable adverse impact on the species or stock and its habitat, and requirements pertaining to the mitigation, monitoring and reporting of such taking.

3.4.2 Affected Environment

3.4.2.1 North Atlantic Right Whale

3.4.2.1.1 Status and Management

The North Atlantic right whale was listed as endangered in 1970 (35 Federal Register [FR] 18319) under the Endangered Species Conservation Act of 1969; its listing was revised in 2008 (73 FR 12024). A five year review was completed in August 2012 with a recommendation to maintain the species' classification as endangered (NMFS 2012). North Atlantic right whales are designated as depleted under the MMPA.

3.4.2.1.2 Habitat and Geographic Range

North Atlantic right whales are most often seen as individuals or pairs (Jefferson et al. 1993). They migrate annually between the north and south Atlantic coasts of the United States. They can generally be found in calving grounds off Georgia and Florida from mid-November to mid-April; and then move to feeding grounds in the Gulf of Maine and Cape Cod in the summer (though sightings may occur year-round in this area) (National Marine Fisheries Service n.d.). North Atlantic right whale calves are born during December through March after 12 to 13 months of gestation (Kraus et al. 2001).

Based on annual surveys from conducted from December through March between 1985-2007, North Atlantic right whales are relatively common visitors to waters offshore from NAVSTA Mayport and the federal navigation channel (New England Aquarium 2013; Loop pers. comm. 2012). Incidental sightings of North Atlantic right whales are an infrequent, occurrence in the St. Johns River and NAVSTA Mayport turning basin, with the most recent sighting of two individuals occurring at the mouth of the St. Johns River in December 2012 (Gibbons 2011, Loop pers. comm. 2012).

3.4.2.1.3 Population and Abundance

The western North Atlantic minimum stock size is based on a census of individual whales identified using photo-identification techniques. A review of the photo-ID recapture database as it existed on 21 October 2011 indicated that 425 individually recognized whales in the catalog were known to be alive during 2009. Whales catalogued by this date included 20 of the 39 calves born during that year. Thus adding the 19 calves not yet catalogued brings the minimum number alive in 2009 to 444. This number represents a minimum population size assumed in the most recent stock assessment report. This count has no associated coefficient of variation (Waring et al. 2013).

3.4.2.1.4 Predator / Prey Interaction and Foraging

Dives of 5 to 15 min or longer have been reported (Cetacean and Turtle Assessment Program 1982; Baumgartner and Mate 2003), but can be much shorter when feeding (Winn et al. 1995). Longer surface intervals have been observed for reproductively-active females and their calves (Baumgartner and Mate 2003).

3.4.2.1.5 Critical Habitat

Three critical habitats areas - Cape Cod Bay/Massachusetts Bay/Stellwagen Bank, Great South Channel, and the coastal waters of Georgia and Florida in the southeastern United States—were designated by NMFS in 1994 (59 FR 28805). The southeastern U.S. critical habitat area covers waters from the coast to five miles offshore; the eastern portion of the federal navigation channel is within this critical habitat area. Two additional critical habitat areas in Canadian waters, Grand Manan Basin and Roseway Basin, were identified in Canada's final recovery strategy for the North Atlantic right whale (Brown et al. 2009). A 12-month finding from NMFS on a 2002 petition to revise right whale critical habitat stated "a review of scientific information suggests that physical and biological features essential to the conservation of right whales may include, but are not necessarily limited to, the occurrence of copepods and the features that concentrate them in the water off of the northeast United States, as well as sea surface temperature and possibly bathymetry in the waters off of the southeast United States. In a more recent 12-month finding on a 2009 petition, NMFS stated they agree that revision of critical habitat is appropriate and that they would continue the ongoing rulemaking process (75 FR 61690). Therefore, determination of primary constituent elements for North Atlantic right whale critical habitat in the Atlantic Ocean is still pending.

3.4.2.2 Humpback Whale

3.4.2.2.1 Status and Management

As with the North Atlantic right whale, humpback whales were also listed as endangered in 1970 (35 FR 18319) under the Endangered Species Conservation Act of 1969. A status review was initiated in 2009 (74 FR 40568). Humpback whale abundance is increasing through much of the species' range. Individuals that occur in the Wharf C-2 activity area are from the Gulf of Maine stock. Humpback whales are designated as depleted under the MMPA

3.4.2.2.2 Habitat and Geographic Range

During the winter, most of the North Atlantic population of humpback whales is believed to migrate south to calving grounds in the West Indies region (Whitehead and Moore 1982; Smith et al. 1999; Stevick et al. 2003), over shallow banks and along continental coasts, where calving occurs. Calving peaks from January through March, with some animals arriving as early as December and a few not leaving until June. The mean sighting dates in the West Indies for individuals from the United States and Canada are February 16 and 15, respectively (Stevick et al. 2003). Since humpback whales migrate south to calving grounds during the fall and make return migrations to the northern feeding grounds in spring, they are not expected off the coast of Florida during summer. There has been an increasing occurrence of humpbacks, which appear to be primarily juveniles, during the winter along the U.S. Atlantic coast from Florida north to Virginia (Clapham et al. 1993; Swingle et al. 1993; Wiley et al. 1995; Laerm et al. 1997).

The coastal region of Florida is not designated as an area of concentrated occurrence for humpback whales (DON 2002). Examination of whaling catches revealed that both northward and southward migrations are characterized by a staggering of sexual and maturational classes; lactating females are among the first to leave summer feeding grounds in the fall, followed by subadult males, mature males, non-pregnant females, and pregnant females (Clapham 1996). On the northward migration, this order is broadly reversed, with newly pregnant females among the first to begin the return migration to high latitudes.

Based on sightings, strandings, and life history, humpbacks would be expected to occur in waters off NAVSTA Mayport during fall, winter, and spring. The likelihood of occurrence is low, however, and even lower for the turning basin and Wharf C-2 activity area.

3.4.2.2.3 Population and Abundance

The most recent line-transect survey, which did not include the Scotian Shelf portion of the stock, produced an estimate of abundance for Gulf of Maine humpback whales of 331 animals (CV=0.48) with a resultant minimum population estimate for this stock of 228 animals. The line-transect based minimum estimate is unrealistic because at least 500 uniquely identifiable individual whales from the Gulf of Mexico stock were seen during the calendar year of that survey and the actual population would have been larger because re-sighting rates have historically been <1. Using the minimum count from at least 2 years prior to the year of a stock assessment report has allowed NMFS time to resight whales known to be alive prior to and after the focal year. Thus the minimum population estimate is set to the 2008 mark-recapture based count of 823. Current data suggest the Gulf of Maine stock is steadily increasing in numbers (Waring et al. 2013)

3.4.2.2.4 Predator / Prey Interaction and Foraging

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).

3.4.2.2.5 Critical Habitat

Critical habitat has not been designated for humpback whales.

3.4.2.3 Atlantic Spotted Dolphin

3.4.2.3.1 Status and Management

Atlantic spotted dolphins occurring in the Wharf C-2 activity area belong to the Western North Atlantic Stock. The species is protected under the MMPA.

3.4.2.3.2 Habitat and Geographic Range

The Atlantic spotted dolphin is found in nearshore tropical to warm-temperate waters, predominantly over the continental shelf and upper slope. 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).

3.4.2.3.3 Population and Abundance

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. The best recent abundance estimate for Atlantic spotted dolphins is the result of a 2011 survey - 26,798 (CV= 0.66) individuals (Waring et al. 2013).

3.4.2.3.4 Predator / Prey Interaction and Foraging

Atlantic spotted dolphins feed on small cephalopods, fishes, and benthic invertebrates (Perrin et al. 1994). Atlantic spotted dolphins in the Gulf of Mexico were observed feeding cooperatively on clupeid fishes and are known to feed in association with shrimp trawlers (Fertl and Leatherwood 1997; Fertl and Wursig 1995). In the Bahamas, this species was observed to chase and catch flying fish (MacLeod et al. 2004). The diet of the Atlantic spotted dolphin varies depending on its location (Jefferson et al. 2008; Perrin et al. 1994).

3.4.2.3.5 Critical Habitat

This species is not listed under the ESA; as such, no critical habitat has been designated.

3.4.2.4 Bottlenose Dolphins

3.4.2.4.1 Status and Management

Bottlenose dolphins occurring in the Wharf C-2 activity area may be individuals belonging to any of the following stocks: the Western North Atlantic Offshore Stock, Jacksonville Estuarine System Stock; the Western North Atlantic Northern Florida Coastal Stock; and the Western North Atlantic Southern Migratory Coastal Stock. The species is protected under the MMPA.

3.4.2.4.2 Habitat and Geographic Range

Along the Atlantic coast of the United States, where the majority of detailed work on bottlenose dolphins has been conducted, male and female bottlenose dolphins reach physical maturity at 13 years, with females reaching sexual maturity as early as seven years (Mead and Potter 1990). Bottlenose dolphins are flexible in their timing of reproduction. Seasons of birth for bottlenose dolphin populations are likely responses to seasonal patterns of availability of local resources (Urian et al. 1996). Thayer et al. (2003) found bottlenose dolphins in North Carolina to exhibit a strong calving peak in spring, particularly May and June, and a diffuse peak from late spring to early fall. There is a gestation period of one year (Caldwell and Caldwell 1972). Calves are weaned as early as one and a half years of age (Reynolds III et al. 2000), and typically remain with their mothers for a period of three to eight years (Wells et al. 1987), although longer periods are documented (Reynolds III et al. 2000). There are no specific breeding locations for this species.

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 larger forms, as water depth appears to be a significant influence on group size (Shane et al. 1986). Shallow, confined water areas typically support smaller group sizes, some degree of regional site fidelity, and limited movement patterns (Shane et al. 1986; Wells et al. 1987). Based on incidental sightings in the turning basin as well as initial results from a current survey taking place there, bottlenose dolphins are expected to be frequent visitors to the Wharf C-2 activity area (DON *In prep*).

3.4.2.4.3 Population and Abundance

Table 3-8 details distribution, population and abundance information on bottlenose dolphins.

Table 3-8. Bottlenose Dolphin Stocks that May Occur in the Wharf C-2 Project Area

SPECIES and ESTIMATED DENSITY	STOCK	OCCURRENCE[1] and ABUNDANCE BEST (CV) / MIN	STATUS	
			MMPA	ESA
bottlenose dolphin 2.53 / km²	Western North Atlantic Offshore	Rare 81,588 (0.17) / 70,775	n/a	n/a
	Western North Atlantic Northern Florida Coastal	Likely – year round 3,064 (0.24) / 2,511[2]		
	Jacksonville Estuarine System	Likely - year round, numbers may be slightly lower in winter 412 (0.06) / unknown[3]		
	Western North Atlantic Southern Migratory Coastal	Seasonal - January to March 12,482 (0.32) / 9,591[4]		

Sources: U. S. Department of the Navy 2012; U.S. Department of the Navy Turning Basin Bottlenose Dolphin Surveys (*in progress*); [1]Extralimital: there may be a small number of sighting or stranding records, but the activity area is outside the species' range of normal occurrence; Rare: there may be a few confirmed sightings, or the distribution of the species is near enough to the area of concern that the species could occur there; the species may occur but only infrequently or in small numbers; Likely: confirmed and regular sightings of the species occur year-round; [2]Waring et al. 2013; [3]National Marine Fisheries Service 2009; this is an overestimate of the stock abundance in the area covered by the study because it includes non-resident and seasonally resident dolphins; [4]National Marine Fisheries Service 2010a

Based on preliminary results of surveys being conducted in the NAVSTA Mayport turning basin in 2012 / 2013, a density of 2.53 individuals per square kilometer has been estimated for the project area.

3.4.2.4.4 Predator / Prey Interaction and Foraging

Bottlenose dolphins are opportunistic feeders, taking a variety of fishes, cephalopods, and crustaceans (Wells and Scott 1999) and using a variety of feeding strategies (Shane et al. 1986). In addition to using echolocation, a process for locating prey by emitting sound waves that reflect back, bottlenose dolphins likely detect and orient to fish prey by listening for the sounds they produce, so-called passive listening (Barros and Myrberg 1987; Barros and Wells 1998). Nearshore bottlenose dolphins prey predominantly on coastal fishes and cephalopods, while offshore individuals prey on open ocean cephalopods and a large variety of near-surface and mid-water fishes (Mead and Potter 1995).

Dive durations as long as 15 minutes have been recorded for trained bottlenose dolphins (Ridgway et al. 1969). Typical dives, however, are shallower and have a much shorter duration. Mean dive durations of Atlantic bottlenose dolphins typically range from 20 to 40 seconds at shallow depths (Mate et al. 1995)

3.4.2.4.5 Critical Habitat

This species is not listed under the ESA; therefore, no critical habitat has been designated.

3.4.2.5 West Indian Manatee

3.4.2.5.1 Status and Management

The West Indian manatee was listed as endangered in 1967 (32 FR 4001). West Indian manatees are classified as depleted under the MMPA. Only individuals from the Florida subspecies may occur in the project area (Deutsch et al. 2003). The Florida subspecies is closely monitored and managed by the USFWS and the Florida Fish and Wildlife Conservation Commission (FWC). The Florida manatee population is divided into four management units, one of which (the Atlantic Coast unit) overlaps the Wharf C-2 project area (FWC 2007). Data indicate that the Atlantic Coast management unit is stable.

3.4.2.5.2 Habitat and Geographic Range

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); they occur along both the Atlantic and gulf coasts of Florida. Florida manatees are found throughout the southeastern United States. Because manatees are a sub-tropical species with little tolerance for cold, they are generally restricted to the inland and coastal waters of peninsular Florida during the winter, when they shelter in or near warm-water springs, industrial effluents, and other warm water sites (Hartman 1979; Lefebvre et al. 2001; Stith et al. 2006). In warmer months, manatees leave these sites and can disperse great distances. Individuals have been sighted as far north as Massachusetts, as far west as Texas, and in all states in between (Fertl et al. 2005; Rathbun 1988; Schwartz 1995; USFWS Jacksonville Field Office 2008).

Two groups of manatees reside in the Jacksonville area. One group remains in the area all winter while the other group moves south during the winter (DON 2007a). Individual manatees are observed regularly in the vicinity of NAVSTA Mayport and inside the turning basin (Loop and Allen per. comm. 2013). They venture from the St. Johns River to the springs in November and reside there until March (USFWS 2001a, 2007a). 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).

West Indian manatees are not gregarious and are most often observed alone (Hartman 1979). However, in Florida they occasionally aggregate in large, unorganized groups around warm-water sources during the cooler months (Hartman 1979). The only significant social bonds are between mother and calf during the first one to two years of the calf's life (Reeves et al. 1992). There is no defined breeding season; calves are born year-round after an 11-month gestation (O'Shea et al.1995). West Indian manatees do not reproduce in consecutive years, except in rare instances (Kendall et al. 2004).

3.4.2.5.3 Population and Abundance

The exact population for the West Indian manatee is unknown, but the minimum population of Florida manatees is estimated at 4,840, based on a January 2011 survey (USFWS 2010a).

3.4.2.5.4 Predator / Prey Interaction and Foraging

West Indian manatees are herbivorous and are known to consume more than 60 species of plants. They typically feed on bottom vegetation, plants in the water column, and shoreline vegetation, such as hyacinths and marine sea grasses (Reynolds et al. 2009). In some areas, they are known to feed on algae and parts of mangrove trees (Jefferson et al. 2008; Mignucci-Giannoni and Beck 1998).

3.4.2.5.5 Critical Habitat

Critical habitat was designated for the Florida manatee in 1976 (41 FR 41914) and reorganized in 1977. It encompasses multiple inland rivers and coastal waterways throughout Florida; however, the designation does not define any primary constituent elements. The St. Johns River and federal navigation channel to the northeast of the project area are included in this designation. A petition to revise manatee critical habitat was submitted in 2009, and a 12-month finding on that petition by U.S. Fish and Wildlife Service stated that revisions should be made including definition of primary constituent elements, but sufficient funding is not currently available (U.S. Department of the Interior 2010).

3.4.3 Environmental Consequences

3.4.3.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline conditions for marine mammals, as described above, would remain unchanged. Therefore, there would be no impacts to marine mammals from implementation of the No Action Alternative.

3.4.3.2 Proposed Action

The evaluation of impacts to marine mammals considers the importance of the resource (i.e., legal, recreational, ecological, or scientific); the proportion of the resource affected relative to its occurrence in the region; the particular sensitivity of the resource to project activities; and the duration of environmental impacts or disruption. Impacts to resources are critical if:

- Habitats of high concern are adversely affected over relatively large areas;
- Disturbances to small, essential habitats would lead to regional impacts to a protected species; or
- Disturbances harass or impact the ability of species to acquire resources and ultimately impact the abundance or distribution of federally listed threatened or endangered species.

It is estimated that a maximum of 1,421 m^2 of benthic habitat could be disturbed or displaced in the action area over the 18 month (1,322 m^2 by the potential maximum expansion of the wharf footprint, and 99 m^2 by the piles themselves).

In particular, underwater pile driving noise during the construction period has the potential to temporarily disrupt marine mammal foraging, resting, and transiting in the vicinity of Wharf C-2 and the NAVSTA Mayport turning basin during in-water work. The zone of influence due to pile driving noise is described in following sections. Other impacts to marine mammals such as changes in prey availability are anticipated to be highly localized to the construction area.

Any direct impacts to marine mammals resulting from the Wharf C-2 Recapitalization project primarily would arise from underwater noise generated by pile driving. This noise would exceed the threshold for behavioral disturbance to marine mammals and, if unmitigated (e.g., if the best management practices and minimization measures described in Chapter 4 were not adhered to), would also cause hearing-related injuries.

Table 3-9. Expected Seasonal Occurrence of Marine Mammals in the Vicinity of the Wharf C-2 Project

Species	Predicted Seasonal Occurrence
North Atlantic right whale	More likely during winter months
humpback whale	More likely during winter months
bottlenose dolphin	Year-round
Atlantic spotted dolphin	More likely during summer months
West Indian manatee	More likely during summer months

The primary impacts to marine mammals from the Wharf C-2 Recapitalization project would be associated with water quality changes (turbidity) in nearshore habitat, noise associated with vibratory and (contingency) impact pile driving, other construction equipment/vessel traffic; and changes in prey availability. Seasonal occurrence of marine mammal species that may occur in the vicinity of the Wharf C-2 project is summarized in Table 3-9. Marine mammals are likely to avoid (indicating behavioral disturbance) the immediate vicinity of pile driving. The likelihood of adverse impacts to these species would be minimized through application of minimization measures described in Chapter 5.

The following sections describe how each of these factors may impact abundance and distribution of marine mammals present or potentially present in the vicinity of the Wharf C-2 Recapitalization project during in-water work.

3.4.3.2.1 Water Quality Impacts

Water quality would be impacted during construction vessel operations, installation of new piles, and contingency dredging because bottom sediments would be temporarily resuspended. Resuspended sediments would increase turbidity and reduce dissolved oxygen periodically during in-water construction activities, as discussed for water quality impacts in Section 3.1.3.2.2. The overall level of sediment disturbance associated with the Wharf C-2 Recapitalization project will be significantly lower than that of maintenance dredging in the turning basin, and resuspended sediments are expected to dissipate within a few hours (NMFS 2009). Thus marine mammals exposed to resuspended sediments are not likely to be impacted by contaminants. The activities that generate suspended sediments would be short-term and localized and suspended sediments are expected to disperse and/or settle rapidly. Moreover, marine mammals are expected to avoid the immediate construction area due to increased construction vessel traffic, noise and human activity, increased turbidity, and possible temporary disruptions in prey availability. Therefore, no direct impacts to marine mammals are expected due to changes in water quality during construction.

3.4.3.2.2 Construction Vessel Traffic

Vessel movements have the potential to affect marine mammals directly by accidentally striking or disturbing individual animals. For example, several studies have linked vessels with behavioral changes in killer whales in Pacific Northwest inland waters (Kruse 1991; Williams et al. 2011; Bain et al. 2006), although it is not well understood whether the presence and activity of the vessel, the vessel noise, or a combination of these factors produces the changes. It seems likely that both noise and visual presence of vessels play a role in prompting reactions from these animals. The probability and significance of vessel and marine mammal interactions is dependent on several factors including numbers, types, and speeds of vessels; the regularity, duration, and spatial extent of activities; and the presence/absence and density of marine mammals.

Behavioral changes in response to vessel presence include avoidance reactions, alarm/startle responses, and other behavioral and stress-related changes (such as altered swimming speed, direction of travel, resting behavior, vocalizations, diving activity, and respiration rate) (Watkins 1986; Würsig et al 1998; Terhune and Verboom 1999; Ng and Leung 2003; Foote et al. 2004). Some dolphin species approach vessels and are observed bow riding or jumping in the wake of a vessel (Norris and Prescott 1961; Shane et al 1986; Würsig et al. 1998). In other cases neutral behavior (i.e., no obvious avoidance or attraction) has been reported (review in Nowacek et al. 2007). Little is known about the biological importance of changes in marine mammal behavior under prolonged or repeated exposure to high levels of vessel traffic, such as increased energetic expenditure or chronic stress, which can produce adverse hormonal or nervous system effects (Reeder and Kramer 2005).

Marine mammals in the NAVSTA Mayport turning basin and navigation channel encounter vessel traffic associated with daily operations, maintenance, and security monitoring along the waterfront, and it is assumed that individuals that frequent the waterfront have habituated to existing levels of vessel activity. Construction vessels will operate at low speeds within the relatively limited project area. Construction vessel traffic would potentially pass near marine mammals on an incidental basis, but short-term behavioral reactions to vessels are not expected to result in long-term impacts to individuals (such as chronic stress), or to marine mammal populations in waters surrounding the project area.

Collisions of construction vessels and marine mammals, primarily cetaceans, are not expected during construction activities because vessel speeds would be low. All of the species that may occur in the Wharf C-2 project area tend to surface at relatively short, regular intervals allowing for increased detectability and avoidance. Further, marine mammal observers will be deployed to observe the injury zone of influence and shutdown zones, and alert the contractor to shut down in-water work if an individual or group of marine mammals should be encountered.

3.4.3.2.3 Prey Availability

The greatest potential impacts to prey species during construction would result from benthic habitat displacement, resuspension of sediments, and behavioral disturbance due to pile driving noise. Injury and behavioral disturbance of fishes, should they occur due to underwater pile driving noise, would directly affect the prey base for marine mammals. Fish behavior would potentially be affected by pile driving noise resulting from concurrent operation of vibratory and impact rigs within 2,500 m (8,300 ft) of the source of pile driving noise (Section 3.7). Thus, prey availability within the injury and behavioral zones may be reduced during in-water pile driving activities. Minimization measures designed to reduce this effect are described in Chapter 4.

Anchoring of construction barges, propeller wash, and pile driving would locally displace or disturb benthic habitats and increase turbidity. All of these actions would indirectly affect marine mammals by degrading foraging and refuge habitat quality for prey species and reducing their invertebrate and forage fish prey base. However, due to regular disturbance resulting from dredging and high levels of construction vessel activity, the habitat in the turning basin is not considered high quality. As discussed in Section 3.5, project impacts may remove or disturb up to 1,322 m^2 of benthic habitat.

3.4.3.2.4 Acoustic Impacts

Underwater Noise

An introduction to acoustics and the decibel (dB) unit can be found in Section 3.3.1; for additional detail, see Appendix B. Noise level (dB) and frequency (Hz) can affect the susceptibility of marine mammals to noise impacts. Functional hearing ranges and peak sensitivity ranges vary by species, as described below. Peak sensitivity of most marine mammal species that may occur in the vicinity of the Wharf C-2 Recapitalization project is higher than the frequency range containing the greatest energy produced by impact pile driving. However, pile driving noise is well within the functional hearing ranges of these marine mammals, and all of these species would be susceptible to auditory effects of underwater pile driving noise.

The methods for estimating the number and types of exposure are described in the sections below beginning with presentation of the threshold criteria, followed by the method for quantifying exposures of marine mammals to sources of energy exceeding those threshold values. Exposure of each was determined by:

- The potential of each species to be impacted by the acoustic sources as determined by the acoustic criterion for marine mammals.
- The potential presence of each species and their estimated density in the zone of influence for the C-2 Wharf Recapitalization project.
- The area of impact for each pile driving sound source was estimated by taking into account the source levels, propagation loss and thresholds at which each acoustic criterion are met.

Potential exposures were calculated by multiplying the density of each marine mammal species potentially present by the total impacted area for each threshold value by the potential number of days of pile driving.

Assessing whether a sound may disturb or injure a marine mammal involves understanding the characteristics of the acoustic source and the potential effects that sound may have on the animal's physiology and behavior. Although it is known that sound is important for marine mammal communication, navigation, and foraging (National Research Council 2003, 2005), there are many unknowns in assessing impacts such as the potential interaction of different effects and the biological significance of responses by marine mammals to sound exposures (Nowacek et al. 2007; Southall et al. 2007). Furthermore, many factors other than the received level of sound may affect an animal's reaction, such as the animal's physical condition, prior experience with the sound, and proximity to the source of the sound (Nowacek et al. 2007). Sound becomes noise in cases when it is produced incidental to a human activity (including during pile driving), or when it interferes with an animal's natural behaviors or diminishes the quality of the environment (USACHPPM 2006).

Hearing and Acoustics for North Atlantic Right Whales

North Atlantic right whales produce a variety of sounds, including moans, screams, gunshots, blows, upcalls, downcalls, and warbles that are often linked to specific behaviors (Matthews et al. 2001; Laurinolli et al. 2003; Vanderlaan et al. 2003; Parks et al. 2005; Parks and Tyack 2005). Sounds can be divided into three main categories: (1) blow sounds; (2) broadband impulsive sounds; and (3) tonal call types (Parks and Clark 2007). Blow sounds are those coinciding with an exhalation; it is not known whether these are intentional communication signals or are just produced incidentally (Parks and Clark 2007). Broadband sounds include non-vocal slaps (when the whale strikes the surface of the water with parts of its body) and the "gunshot" sound; data suggests that the latter serves a communicative purpose (Parks and Clark 2007; Parks & Hotchkin et al. 2012). Tonal calls can be divided into simple, low-frequency, stereo-typed calls and more complex, frequency-modulated, higher frequency calls (Parks and Clark 2007). Most of these sounds range in frequency from 0.02 to 15 kHz (dominant frequency range from 0.02 to less than 2 kHz; durations typically range from 0.01 to multiple seconds) with some sounds having multiple harmonics (Parks and Tyack 2005). Source levels for some of these sounds have been measured as ranging from 137 to 192 dB root-mean-square (rms) re: 1 μPa-m (decibels at the reference level of one micro Pascal at one meter) (Parks et al. 2005; Parks and Tyack 2005). In certain regions (i.e., northeast Atlantic), preliminary results indicate that right whales vocalize more from dusk to dawn than during the daytime (Leaper and Gillespie 2006; Mussoline et al. 2012; Parks & Warren et al. 2012). Vocalization rates of North Atlantic right whales are also highly variable, and individuals have been known to remain silent for hours (Gillespie and Leaper 2001). Baumgartner et al.

(2005) noted that downsweep calls by North Atlantic right whales in the 16 to 160 Hz frequency band exhibited a diel pattern (fewer calls at night) that corresponded strongly to the diel vertical migration of zooplankton.

Recent morphometric analyses of North Atlantic right whale inner ears estimates a hearing range of approximately 0.01 to 22 kHz based on established marine mammal models (Parks et al. 2004; Parks and Tyack 2005; Parks et al. 2007).

Hearing and Acoustics for Humpback Whales

Humpback whales are known to produce three classes of vocalizations: (1) “songs” in the late fall, winter, and spring by solitary males; (2) sounds made within groups on the wintering (calving) grounds; and (3) social sounds made on the feeding grounds (Richardson et al. 1995).The best-known types of sounds produced by humpback whales are songs, which are thought to be breeding displays used only by adult males (Helweg et al. 1992). Singing is most common on breeding grounds during the winter and spring months but is occasionally heard outside breeding areas and out of season (Mattila et al. 1987; Gabriele et al. 2001; Gabriele and Frankel 2002; Clark and Clapham 2004). Humpback song is an elaborate series of patterned vocalizations which are hierarchical in nature (Payne and McVay 1971). There is geographical variation in humpback whale song, with different populations singing different songs and all members of a population using the same basic song. However, the song evolves over the course of a breeding season but remains nearly unchanged from the end of one season to the start of the next (Payne et al. 1983). Components of the song range from under 20 Hz to 4 kHz and occasionally 8 kHz, with source levels measured between 151 and 189 dB re 1 μPa-m and high-frequency harmonics extending beyond 24 kHz (Au et al. 2001; Au et al. 2006).

Social calls range in frequency from 50 Hz to over 10 kHz, with dominant frequencies below 3 kHz (Silber 1986). Female vocalizations appear to be simple; Simão and Moreira (2005) noted little complexity. “Feeding” calls, unlike song and social sounds, are highly stereotyped series of narrow-band trumpeting calls. They are 20 Hz to 2 kHz, less than 1 sec in duration, and have source levels of 162 to 192 dB re 1 μPa-m. The fundamental frequency of feeding calls is approximately 500 Hz (D'Vincent et al. 1985; Thompson et al. 1986).

While no measured data on hearing ability is available for this species, Ketten (1997) hypothesized that mysticetes have acute infrasonic hearing. Houser et al. (2001) produced the first humpback whale audiogram (using a mathematical model), which was u-shaped and conformed to the typical mammalian presentation. The area of best hearing, or sensitivity, was estimate to lie between 700 Hz and 10 kHz but the maximum range of hearing was identified between 200 Hz to 14 kHz. Au et al. (2006) noted that if the popular notion that animals generally hear the totality of the sounds they produce is applied to humpback whales, this suggests that its upper frequency limit of hearing is as high as 24 kHz.

Hearing and Acoustics for Atlantic Spotted Dolphin

A variety of sounds including whistles, echolocation clicks, squawks, barks, growls, and chirps have been recorded for the Atlantic spotted dolphin (Thomson and Richardson 1995). Whistles have dominant frequencies below 20 kHz (range: 7.1 to 14.5 kHz) but multiple harmonics extend above 100 kHz, while burst pulses consist of frequencies above 20 kHz (dominant frequency of approximately 40 kHz) (Lammers et al. 2003). Other sounds, such as squawks, barks, growls, and chirps, typically range in frequency from 100 Hz to 8 kHz (Thomson and Richardson 1995). Recently recorded echolocation clicks have two dominant frequency ranges at 40 to 50 kHz and 110 to 130 kHz, depending on source level (i.e., lower source levels typically correspond to lower frequencies and higher frequencies to higher source levels (Au and Herzing 2003).

Echolocation click source levels as high as 210 dB re 1 μPa-m peak-to-peak have been recorded (Au and Herzing 2003). Spotted dolphins in The Bahamas were frequently recorded during agonistic / aggressive interactions with bottlenose dolphins (and their own species) to produce squawks (200 Hz to 12 kHz broad band burst pulses; males and females), screams (5.8 to 9.4 kHz whistles; males only), barks (200 Hz to 20 kHz burst pulses; males only), and synchronized squawks (100 Hz - 15 kHz burst pulses; males only in a coordinated group) (Herzing 1996).

There have been no data collected on Atlantic spotted dolphin hearing abilities. However, odontocetes are generally adapted to hear high-frequencies (Ketten 1997) and it can be assumed that vocalization frequencies are generally within the hearing range of a species.

Hearing and Acoustics for Bottlenose Dolphins

Sounds emitted by bottlenose dolphins have been classified into two broad categories: pulsed sounds (including clicks and burst-pulses) and narrow-band continuous wave sounds (whistles), which usually are frequency modulated. Clicks and whistles have dominant frequency ranges of 110 to 130 kHz and source levels of 218 to 228 dB re 1 μPa-m (Au 1993) and 3.4 to 14.5 kHz and 125 to 173 dB re 1 μPa-m, respectively (Ketten 1998a). Whistles are primarily associated with communication and can serve to identify specific individuals (i.e., signature whistles) (Caldwell and Caldwell 1965; Janik et al. 2006). Up to 52% of whistles produced by bottlenose dolphin groups with mother-calf pairs have been classified as signature whistles (Cook et al. 2004).

Sound production is also influenced by group type (single or multiple individuals), habitat, and behavior (Nowacek 2005). Bray calls (low-frequency vocalizations; majority of energy below 4 kHz), for example, are used when capturing fishes, specifically sea trout (*Salmo trutta*) and Atlantic salmon (*Salmo salar*), in some regions (i.e., Moray Firth, Scotland) (Janik 2000). Additionally, whistle production has been observed to increase while feeding (Acevedo-Gutiérrez and Stienessen 2004; Cook et al. 2004). Both whistles and clicks have been demonstrated to vary geographically in terms of overall vocal activity, group size, and specific context (e.g., feeding, milling, traveling, and socializing) (Jones and Sayigh 2002; Zaretsky et al. 2005; Baron 2006). For example, preliminary research indicates that characteristics of whistles from populations in the northern Gulf of Mexico significantly differ (i.e., in frequency and duration) from those in the western north Atlantic (Zaretsky et al. 2005; Baron 2006).

Bottlenose dolphins can typically hear within a broad frequency range of 200 Hz to 160 kHz (Au 1993; Turl 1993), though with exposure during testing some dolphins might receive information as low as 50 Hz (Turl 1993). Electrophysiological experiments suggest that the bottlenose dolphin brain has a dual analysis system: one specialized for ultrasonic clicks and another for lower-frequency sounds, such as whistles (Ridgway 2000). Scientists have reported a range of highest sensitivity between 25 and 70 kHz, with peaks in sensitivity at 25 and 50 kHz (Nachtigall et al. 2000). Recent research on the same individuals indicates that auditory thresholds obtained by electrophysiological methods correlate well with those obtained in behavior studies, except at the some lower (10 kHz) and higher (80 and 100 kHz) frequencies (Finneran and Houser 2006).

Hearing and Acoustics for West Indian Manatees

West Indian manatees produce a variety of squeak-like sounds that have a typical frequency range of 0.6 to 12 kHz (dominant frequency range from 2 to 5 kHz), and last 0.25 to 0.5 s (Steel and Morris 1982; Thomson and Richardson 1995; Niezrecki et al. 2003). Recently, vocalizations below 0.1 kHz have also been recorded (Frisch and Frisch 2003; Frisch 2006). Overall, West Indian manatee vocalizations are considered relatively stereotypic, with little variation between isolated populations examined (i.e., Florida and Belize; Nowacek et al. 2003). However, vocalizations have been newly shown to possess nonlinear dynamic characteristics (e.g., subharmonics or abrupt, unpredictable transitions between frequencies), which could aid in individual recognition and mother/calf communication (Mann et al. 2006). Average source levels for vocalizations have been calculated to range from 90 to 138 dB re: 1 μPa (average: 100 to 112 dB re: 1 μPa) (Nowacek et al. 2003; Phillips et al. 2004). Behavioral data on two animals indicate an underwater hearing range of approximately 0.4 to 46 kHz, with best sensitivity between 16 and 18 kHz (Gerstein et al. 1999), while earlier electrophysiological studies indicated best sensitivity from 1 to 1.5 kHz (Bullock et al. 1982).

Sound Exposure Criteria and Thresholds

Under the MMPA, NMFS has defined levels of harassment for marine mammals. Level A harassment is defined as “any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild.” Level B harassment is defined as “Any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to migration, breathing, nursing, breeding, feeding or sheltering.”

Since 1997, NMFS has used generic noise exposure thresholds to determine when an activity in the ocean that produces sound might result in impacts to 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 noise is that cetaceans exposed to impulsive sounds at or above180 re 1 μPa rms 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 noise produced by vibratory pile driving, but to conservatively estimate injurious takes as a result of exposure to non-impulsive noise, the Navy has applied the threshold values for impulsive sounds to vibratory pile driving noise in this analysis (Table 3-10).

Behavioral harassment (Level B) is considered to have occurred when marine mammals are exposed to impulsive noise from impact pile driving at or above 160 dB re 1 μPa rms and non-impulsive noise from vibratory pile driving at or above120 dB re 1 μPa rms but below injurious thresholds.

Table 3-10. Injury and disturbance thresholds for cetaceans

Marine Mammals	Vibratory driving criteria (dB re 1 μPA rms)		Impact driving criteria (dB re 1 μPA rms)	
	Level A injury threshold	Level B disturbance threshold	Level A injury threshold	Level B disturbance threshold
Cetaceans	180	120	180	160

Limitations of Existing Noise Criteria

The application of the 120 dB rms re 1μPa threshold can sometimes be problematic because this threshold level can be either at or below the ambient noise level of certain locations (Washington State Department of Transportation 2008). As a result, this 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 (Southall et al. 2007). The 120 dB re 1 μPa rms 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: The 120 dB re 1 μPa rms *non-impulsive* sound threshold should not be confused with the 120 dB re 1 μPa rms *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). 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 rms threshold.

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 both 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 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). At Mayport, vessel wakes in the St. Johns River 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 port 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 produced by mechanized equipment on wharves or adjacent shorelines may propagate underwater and contribute to underwater ambient noise levels.

The underwater acoustic environment in the Mayport turning basin and the bottom of the St. Johns River is likely to be dominated by noise from day-to-day port and vessel activities. The basin is sheltered from most wave noise, but is a high-use area for naval ships, tugboats, and security vessels. 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 rms (Table 3-11). During the proposed action, normal port operations, including transits, docking, and maintenance by multiple tugboats and ships would continue and noise contributions from these sources would remain at current levels.

Dredging may be necessary as part of the proposed action. If so, a clamshell dredge would be used to remove up to 4,000 cubic yards of sediment from the increased footprint area of Wharf C-2. , but since dredging would only be used as a contingency any increases in noise level will be short-term and temporary.

The existing sources of anthropogenic noise in the Mayport turning basin are generally non-impulsive (see Appendix B), intermittent sources such as vessel engines. Impact pile driving noise differs from these sources in that it is impulsive, with a fast rise time and multiple short-duration (50–100 millisecond; Illingworth and Rodkin 2001) events. The use of impact driving during the proposed project is limited to instances when vibratory driving fails, and will include a maximum of 20 strikes per day. Because of the very limited use of impact pile driving during the proposed action, the Navy expects no change in the average ambient noise environment in the Mayport during basin as a result of impact pile driving.

Table 3-11. Representative Levels of Noise from Anthropogenic Sources

Noise Source	Frequency Range (Hz)	Underwater Noise Level (dB re 1 µPa)
Small vessels[1]	250–6,000	151 dB rms at 1 m
Large vessels[2]	20–1,500	170–180 dB rms at 1 m
Tug docking barge[3]	200–1,000	149 dB rms at 100 m
Vibratory driving of 24-inch steel pipe pile[4]	50–1,500	159 dB rms at 10 m
Impact driving of 24-inch steel pipe pile[5]	50–1,500	186 dB rms at 10 m
m=meter		

Sources: 1 Lesage et al. 1999; 2 Richardson et al. 1995; 3 Blackwell and Greene 2002;; 4 Illingworth & Rodkin 2012; 5 WSDOT 2010b

Airborne ambient noise in industrial areas such as the Mayport Turning Basin is comprised of sounds from trucks, cranes, compressors, generators, pumps, ship engines, and other equipment. While there are no current measurements of airborne ambient noise in the basin or wharf areas, expected noise levels range from a daytime minimum of 55 dBA to a maximum of 99 dBA, assuming that multiple sources will be operating simultaneously (WSDOT 2007).

Underwater Noise from Pile Driving

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. A number of studies have examined sound pressure levels recorded from underwater pile driving projects in California and Washington, creating a large body of data for impact and vibratory driving of steel pipe piles, concrete piles, and some timber piles. Data for vibratory pile driving is concentrated on steel pipe piles of a range of diameters, and on single 24-inch wide sheet piles at a project in California (CALTRANS 2009). There have been no measurements of sound pressure levels produced by the types of piles (paired steel sheet piles and king piles) that will be installed in the Mayport turning basin, or in the soft sediments found in the basin, and it was therefore necessary to extrapolate from available data to estimate reasonable source levels for this project.

Because of the differences between the proposed action (driving of steel king piles, paired 27-inch wide steel sheet piles, and 12-inch diameter polymeric piles) and available measured sound pressure levels, the Navy evaluated potential source levels for modeling of steel piles based on two methods. The first method examined measured sound pressure levels for single 24-inch wide sheet piles; the second was a comparison of the linear length of piles with the circumference of steel pipe piles for which source levels have been measured. Linear length was calculated as the sum of the lengths of all sides of each pile type (Table 2-1). Both the king and paired sheet pile linear lengths were comparable to the circumference of a 24-inch diameter pipe pile.

Source levels for polymeric piles were estimated based on a comparison of the material properties of timber, concrete, and steel piles. Data from timber piles were selected to model driving of HDPE polymer piles; there will be no impact driving of polymeric piles.

Measured sound pressure levels for 24 in. diameter steel sheet piles and 24-inch diameter steel pipe piles are available for both vibratory and impact driving methods. 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: steel pipe piles (24” diameter), steel sheet piles (24 in. wide), and/or timber piles
- Installation method: vibratory and/or impact hammer
- Physical environment: water depth 15 ft (4.5 m) or greater, sediment similar to sandy bottom in NAVSTA Mayport turning basin.

The tables below detail representative pile driving sound pressure levels measured from 24” steel pipe piles, 24 in. wide steel sheet piles and 12” timber piles. Comparison of measured sound pressure levels from the 24-inch steel pipe piles and 24-inch steel sheet piles revealed that levels from sheet pile driving were higher than those from pipe pile driving; the Navy has therefore used the more conservative sound pressure levels from 24-inch steel sheet piles to model both king and sheet pile pairs for the proposed action. The selected sound pressure levels used for modeling the effects of noise on marine mammals were 163 dB re 1 µPa rms for vibratory driving and 189 dB re 1µPa rms for impact driving; sources are indicated by footnotes in the relevant tables.

Table 3-12. Underwater Sound Pressure Levels Expected During Vibratory Installation Based on Similar In-situ Monitored Construction Activities

Project and Location	Pile Size and Type	Water Depth	Range to Pile	RMS	Peak	Sediment
Portage Bay, WA[b]	24 inch steel pipe	3 – 7 m	10 m	157	170	Unknown
Berth 23 Port of Oakland, CA[c, 1]	24 inch steel sheet pile	6.1 m	10 m	163	177	Unknown
Berth 30 Port of Oakland, CA[c]	24 inch steel sheet pile	4.9 m	10 m	162	175	Unknown
Berth 35/37 Port of Oakland, CA[c]	24 inch steel sheet pile	6.1 m	10 m	163	177	Unknown
Port Townsend Ferry, WA[c]	12 inch timber pile	10 m	10 m	153[2]	167	Unknown

m=meter

Sound levels expressed as dB re 1 μPa rms and dB re 1 μPa peak for RMS and Peak SPL measurements, respectively. Average and Max values for Test Pile Program data are based on 10-second rms measurements over the 10 minute driving time for the pile. 1- This data point was selected for use in acoustic modeling based on similarity to physical environment at NAVSTA Mayport and measurement location in mid-water column; 2- Data selected for use in modeling polymeric fender piles based on similarity of material properties between timber and polymeric piles; there are no existing measurements for polymeric piles of any size and shape.

Sources: a – Illingworth & Rodkin 2012; b- Washington Department of Transportation 2010; c- California Department of Transportation 2009 ; d – Washington Department of Transportation 2011

Table 3-13. Underwater Sound Pressure Levels Expected During Impact Installation Based on Similar In-situ Monitored Construction Activities

Project and Location	Pile Size and Type	Water Depth	RMS	Peak	SEL	Sediment
Friday Harbor Ferry Terminal, WA[a]	24-inch steel sheet pile	12.8 m	170	183	180	Sandy silt / clay
		13.4 m	186	205	179	
		14.3 m	186	204	179	
		10 m	194	210	185	Sandy silt / rock
		10 m	195	215	187	
		10 m	193	212	184	
Typical values, CALTRANS compendium summary table[b]	24-inch steel sheet pile	15 m	194	207	178	unknown
Berth 23 Port of Oakland[b,1]	24-inch steel sheet pile	12 to 14 m	189	205	179	unknown

Sound levels expressed as dB re 1 μPa rms and dB re 1 μPa peak for RMS and Peak SPL measurements, respectively; 1- Data point was selected for use in acoustic modeling based on similarity to physical environment at NAVSTA Mayport and measurement location in mid-water column; 2- Data selected for use in modeling polymeric fender piles based on similarity of material properties between timber and polymeric piles

Sources: [a]WSDOT 2005; [b]CALTRANS 2009

Underwater Sound Propagation

Pile driving can generate underwater noise that may result in disturbance to marine mammals within the project area. Modeling sound propagation is useful in evaluating noise levels to determine which marine mammals may be exposed at a given distance from the pile driving activity. The decrease in acoustic intensity as a sound wave propagates outward from a source is known as transmission loss (TL).

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)

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:

$$TL = 15\log_{10}\frac{R_1}{10}$$

Calculated Zones of Influence

The practical spreading loss model discussed above was used to calculate the propagation of pile driving sound in and around the NAVSTA Mayport turning basin. A total of 70 days of pile driving were modeled; 50 days of vibratory driving (45 days for steel piles, 5 days for polymeric fender piles), and 20 days of contingency impact driving (steel piles only). No sound mitigation methods (bubble curtains, cofferdams, etc.) are proposed and therefore no attenuation was included in the acoustic model.

For vibratory driving, the acoustic analysis used the assumption that a maximum of three templates (each consisting of five king piles and four sheet pile pairs) would be driven each day, for a maximum total length of approximately 75 ft. Modeling therefore estimated that noise would be produced at each point of a 75 ft length of wall in a given day.

For impact driving, modeling assumed a maximum of 20 strikes of the impact hammer per day, which is expected to take no more than 45 seconds to complete. This assumption was used to calculate cumulative SEL values for all relevant species.

The calculations presented in Table 3-14 assume a field free of obstruction, which is unrealistic, because the NAVSTA Mayport turning basin does not represent open water conditions (free field) and sounds will attenuate as they encounter land or other solid obstacles. As a result, the distances calculated cannot actually be attained at the project area.

The actual distances to the behavioral disturbance thresholds for impact and vibratory pile driving will generally be shorter than those calculated due to the irregular contour of the waterfront and the maximum fetch (furthest distance sound waves travel without obstruction [i.e. line of sight]) at the project area. Table 3-14 depicts the actual areas encompassed by the marine mammal thresholds during the project. Figures 3-2, 3-3, and 3-4 depict the areas of each marine mammal sound threshold exceedance that may to occur in the project area due to pile driving. The zones of influence calculated for the Proposed Action differ from other Navy pile-driving projects (including those covered under the Atlantic Fleet Testing and Training EIS) based on the types and sizes of piles to be used and the source levels used to model each pile type.

Table 3-14. Calculated Distance(s) To and the Area(s) Encompassed By the Underwater Marine Mammal Noise Thresholds During Installation of Steel Piles

Pile type	Driving method	Threshold (dB re 1μPa rms)	Distance (m)[1]	Area in (km^2)
Steel (sheet and king piles)	Vibratory	Level A (injury): 180	0.74	0
		Level B (behavioral): 120	7,356	2.9
	Impact (contingency)	Level A (injury): 180	39.8	0.004
		Level B (behavioral): 160	858	0.67
Polymeric Fender Piles	Vibratory	Level A (injury): 180	0.16	0
		Level B (behavioral): 120	1,585	0.88

All sound levels expressed in dB re 1 μPa rms. dB=decibel; rms=root-mean-square; μPa=microPascal
Practical spreading loss (15 log, or 4.5 dB per doubling of distance) used for calculations.
[1]Sound pressure levels used for calculations are given in Table 3-12

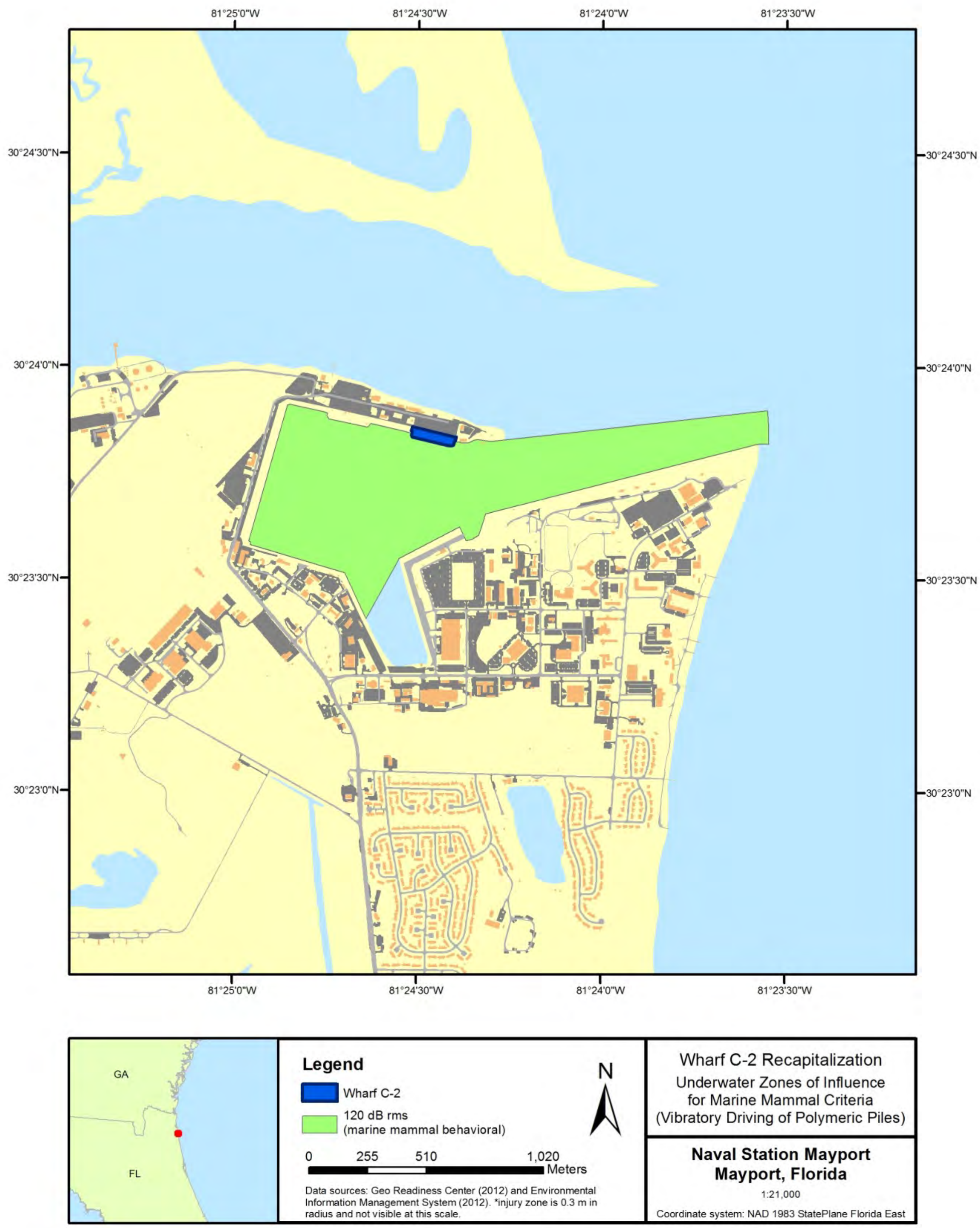

Figure 3-2. Underwater Zones of Influence for Marine Mammal[4] Criteria for Vibratory Pile Driving of Polymeric Piles

[4] Official criteria have not been established for West Indian manatees

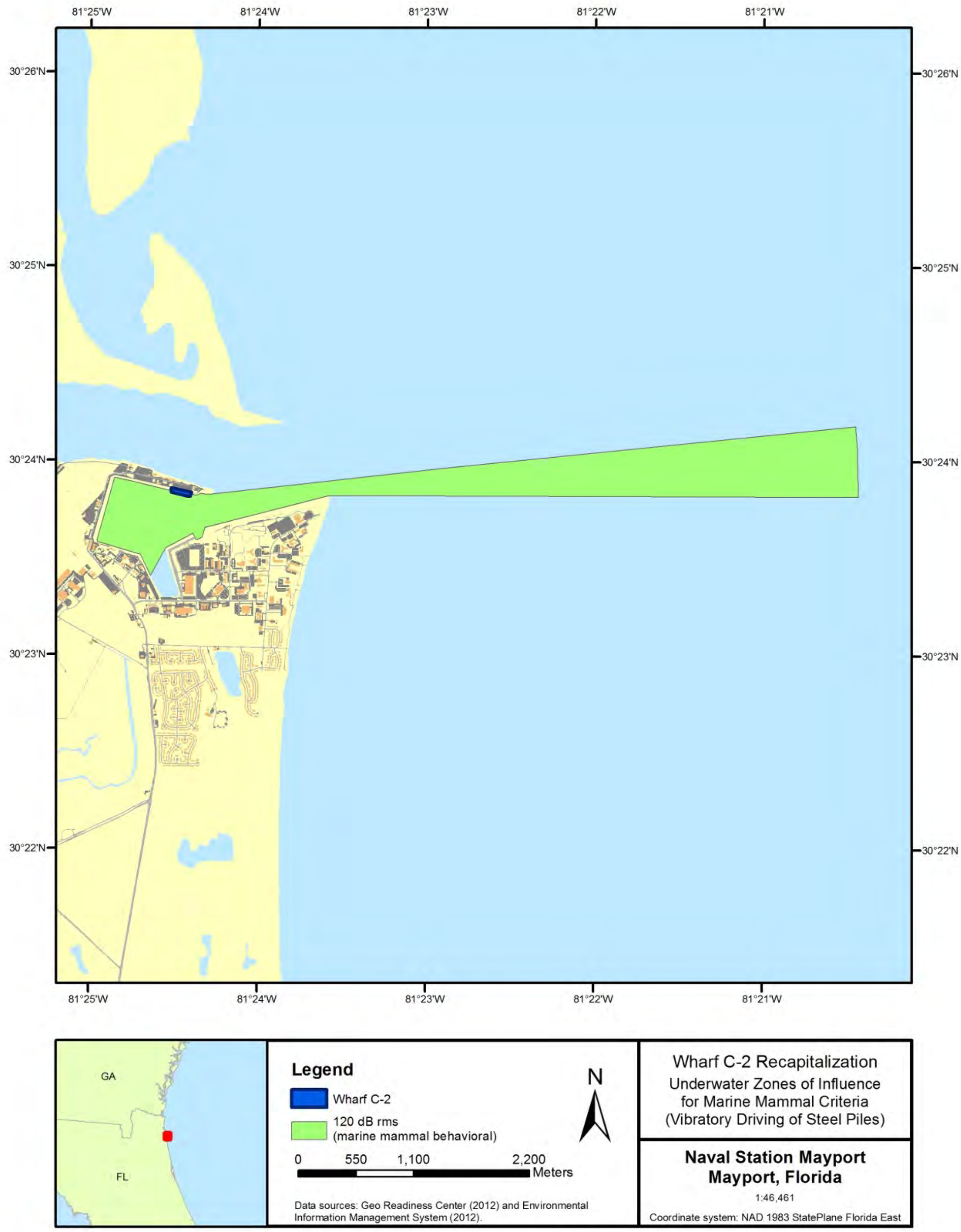

Figure 3-3. Underwater Zones of Influence for Marine Mammal[5] Criteria for Vibratory Pile Driving of Steel Piles

[5] Official criteria have not been established for West Indian manatees

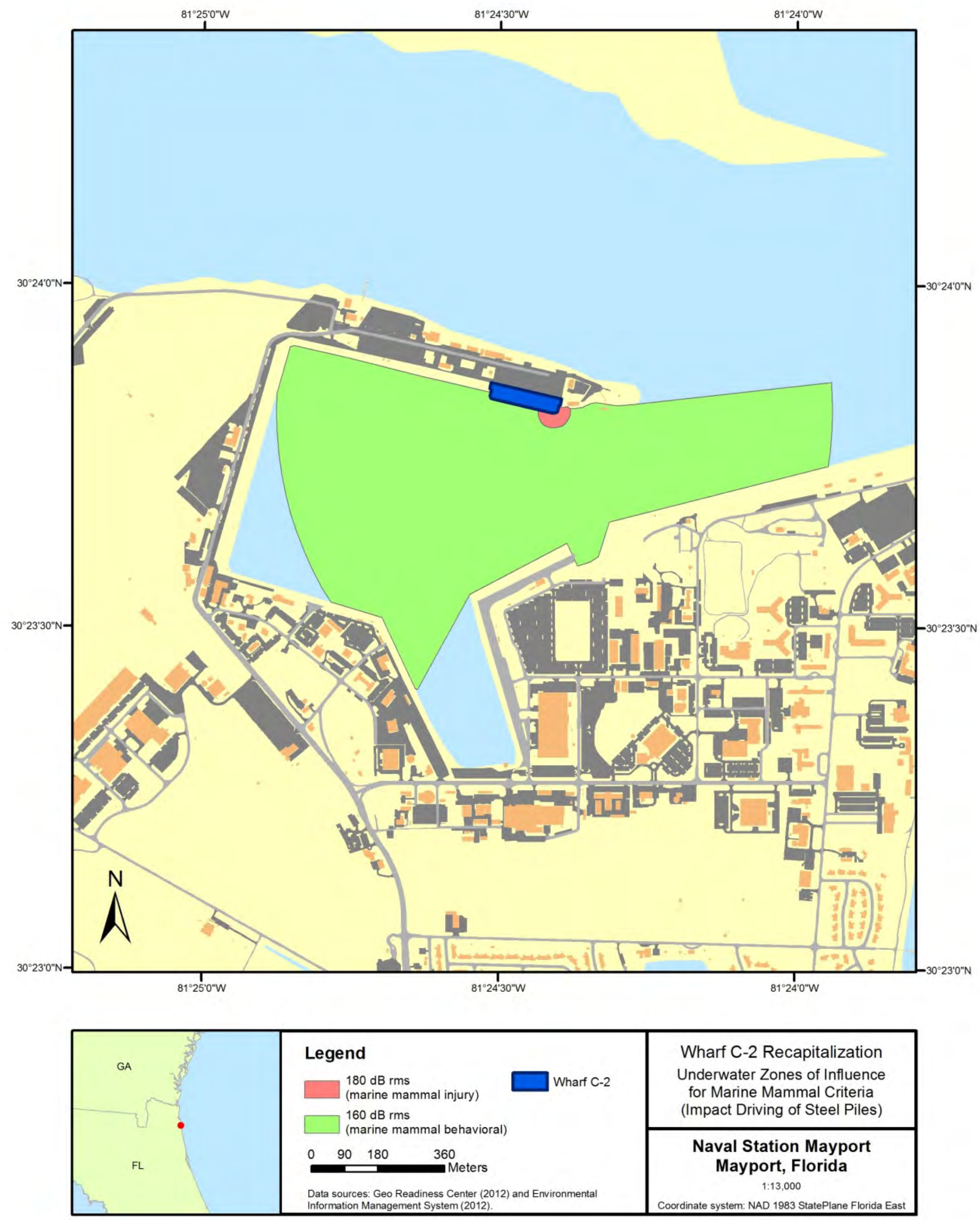

Figure 3-4. Underwater Zones of Influence for Marine Mammal[6] Criteria for Contingency Impact Driving of Steel Piles

[6] Official criteria have not been established for West Indian manatees.

The effects of pile driving on marine mammals are dependent on several factors, including the species, size of the animal, and proximity to the source; the depth, intensity, and duration of the pile driving noise; the depth of the water column; the substrate of the habitat; the distance between the pile and the animal; and the propagation properties of the environment. Impacts to marine mammals from pile driving activities, if any, are expected to result primarily from acoustic pathways. As such, the degree of effect would be intrinsically related to the received level and duration of the noise exposure, which would be influenced by the distance between the animal and the source. The farther away from the source, the less intense the exposure should 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, soft substrates in the basin (i.e., sand) will absorb or attenuate the noise more rapidly than suggested by the practical spreading model. Soft substrates will also require less time to drive the pile, and possibly less forceful equipment, which would ultimately decrease the source level of the noise.

Impacts to marine species are expected to be the result of physiological responses to both the type and strength of the acoustic signature (Viada et al. 2008). Only behavioral impacts would be expected, but the type and severity of these effects are difficult to define due to limited number of studies addressing the behavioral effects of impulsive sounds on marine mammals. Potential effects from impulsive sound sources can include behavioral disturbance, and slight injury of the auditory system (DON 2001).

Physiological Responses

No Level A exposures are expected because of the standard operating procedures and minimization measures outlined in Chapter 4 and the conservative modeling assumptions discussed earlier in this section.

Behavioral Responses

Behavioral responses to sound can be highly variable. For each potential behavioral change, the magnitude of the change ultimately determines the severity of the response. A number of factors may influence an animal’s response to noise, including its previous experience, its auditory sensitivity, its biological and social status (including age and sex), and its behavioral state and activity at the time of exposure. Habituation occurs when an animal’s response to a stimulus such as pile driving noise 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 swimming speed, increased surfacing time, and cessation of foraging in the affected area would indicate disturbance or discomfort.

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway et al. 1997; Finneran et al. 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices and including pile driving) have been varied, but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds 2002; also see reviews in Gordon et al. 2004; Wartzok et al. 2003; and Nowacek et al. 2007). Some studies of acoustic harassment and acoustic deterrence devices have found habituation in resident populations of seals and harbor porpoises (see review in Southall et al. 2007). Blackwell et al. (2004) found that ringed seals exposed to underwater pile driving sounds in the 153–160 dB rms range tolerated this noise level and did not seem unwilling to dive. One individual was as close as 63 meters from the pile driving. Responses of two pinniped species to impact pile driving at the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project were mixed (Caltrans 2001; Thorson & Reyff 2006; Thorson 2010). Harbor seals were observed in the water at distances of approximately 400–500 meters from the pile driving activity and exhibited no alarm responses, although several showed alert reactions, and none of the seals appeared to remain in the area. One of these harbor seals was even seen to swim to within 150 meters of the pile driving barge during pile driving. Several sea lions, however, were observed at distances of 500–1,000 meters swimming rapidly and porpoising away from pile driving activities. The reasons for these differences are not known, although Kastak and Schusterman (1998) reported that sea lions are more sensitive than harbor seals to underwater noise at low frequencies.

Studies of marine mammal responses to non-impulsive noise, such as vibratory pile installation, 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). 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. Background noise levels at this port are typically at 125 dB.

A comprehensive review of acoustic and behavioral responses to noise exposure by Nowacek et al. (2007) concluded that one of the most common behavioral responses is displacement. To assess the significance of displacements, it is necessary to know the areas to which the animals relocate, the quality of that habitat, and the duration of the displacement in the event that they return to the pre-disturbance area. Short-term displacement may not be of great concern unless the disturbance happens repeatedly. Similarly, long-term displacement may not be of concern if adequate replacement habitat is available.

Marine mammals encountering pile driving operations over the Wharf C-2 in-water work period may avoid affected areas in which they experience noise-related discomfort, limiting their ability to forage or rest there. As described in the section above, individual responses to pile driving noise are expected to be variable. Some individuals may occupy the activity area during pile driving without apparent discomfort, but others may be displaced with undetermined long-term effects. Avoidance of the affected area during pile driving operations would reduce the likelihood of injury impacts, but would also reduce access to foraging areas. Noise-related disturbance may also inhibit some marine mammals from transiting the area. Given the duration of the project there is a potential for displacement of marine mammals from the affected area due to these behavioral disturbances during the in-water work period. However, habituation may occur resulting in a decrease in the severity of response. Since pile driving will only occur during daylight hours, marine mammals transiting the activity area, foraging or resting in the project area at night will not be affected. Effects of pile driving activities will be experienced by individual marine mammals, but will not cause population-level impacts or affect the continued survival of the species.

3.4.3.2.5 Conclusions

Individual marine mammals may be exposed to high sound pressure levels during pile removal and installation, which may result in Level B behavioral harassment. Any marine mammals that are exposed may change their normal behavior patterns (e.g. foraging). Any exposures will 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. While some exposures are unavoidable, minimization measures are expected to reduce or avoid most potential adverse underwater impacts to marine mammals from pile driving. Therefore, no significant impacts to marine mammals are anticipated as a result of the Wharf C-2 Recapitalization project.

3.4.3.2.5.1 Marine Mammal Protection Act

The proposed action is not anticipated to have any adverse impact to North Atlantic right whales', humpback whales', Atlantic spotted dolphins', bottlenose dolphins', or West Indian manatees' population recruitment, survival, or recovery.

The Navy applied for an Incidental Harassment Authorization (IHA) for the first year of in-water work associated with the Wharf C-2 Recapitalization project on April 1, 2013. NMFS published a notice for the proposed IHA in the Federal Register on August 22, 2013. The proposed action will not proceed before receipt of the approved IHA. Should work need to continue after the initial 12-month period, a second IHA may be developed. See Appendix A for agency correspondence and Appendix F for the Draft Final IHA.

3.4.3.2.5.2 Endangered Species Act

The proposed action may affect, but is not likely to adversely affect North Atlantic right whales, humpback whales, and West Indian manatees because effects from temporary water quality depletion, resuspended sediments, and noise are expected to be highly localized and discountable. A no effect determination was made for North Atlantic right whale critical habitat and West Indian manatee critical habitat because of the highly localized, temporary nature of potential water quality depletion and sediment resuspension; any effects are expected to be discountable.

The Navy submitted biological evaluations to USFWS and NMFS for the Wharf C-2 Recapitalization project on May 30, 2013. USFWS concurred with the Navy's finding for the West Indian manatee on October 31, 2013. NMFS concurred with the Navy's determination on November 12, 2013. See Appendix A for agency correspondence and Appendices G and H for biological evaluations.

3.5 Marine Vegetation

This section analyzes potential impacts of the proposed action on marine vegetation found in the project area. The taxonomic groups that may occur in local estuaries include phytoplankton (e.g., microalgae), benthic microalgae (e.g., diatoms), floating macroalgae (e.g., seaweed), attached macroalgae, submerged rooted plants (e.g., seagrass), and rooted emergent plants (e.g., saltmarsh cordgrass). The regulatory requirements for considering impacts to marine vegetation are covered in Section 3.5.1. The affected environment section (3.5.2) describes the occurrence of taxonomic groups for population-level impacts and regulated species (if they occur) for individual impacts.

3.5.1 Regulatory Overview

Marine vegetation species may receive protection via the ESA, Clean Water Act (Section 404 permits), or Magnuson-Stevens Fishery Conservation and Management Act (MSA) status. There are few species of endangered marine vegetation, and none that occur in the project area. There are also no wetlands in or near the construction area to consider requiring a Section 404 permit. The only regulated species that may occur in the project area are *Sargassum fluitans* and *Sargassum natans* (brown algae) which are federally managed by the South Atlantic Fishery Management Council (SAFMC) (NMFS 2003). However, designated Essential Fish Habitat (EFH) for *Sargassum* is defined as the top 33 ft (10 m) of the water column in the South Atlantic Exclusive Economic Zone bounded by the Gulf Stream (50 CFR 622), which does not include estuarine waters of the project area. Given the absence of regulated plant species, the affected environment and environmental consequences sections will focus on taxonomic groups and population-level impacts.

3.5.2 Affected Environment

Features that influence the distribution and abundance of marine vegetation in the project area are the availability of light, water quality, water clarity, salinity level, seafloor type (important for rooted or attached vegetation), currents, tidal schedule, and temperature (Green and Short 2003). Marine ecosystems depend almost entirely on the energy produced by marine vegetation through photosynthesis (Castro and Huber 2000). In the lighted surface waters of coastal waters, marine algae and flowering plants provide oxygen and habitat for many organisms in addition to forming the base of the marine food web (Dawes 1998). The project area habitats include hardened shorelines grading steeply to depths of over 12 m (40 ft) (NOAA 2011a) in sheltered, high salinity estuarine waters (NOAA 2012). Substrate on the bottom is dredged, unconsolidated material (USGS 2000).

As a general rule, algae can grow down to bottom areas receiving one percent or more of surface light intensity (Wetzel 2001). Microalgae, including phytoplankton, are widespread and abundant in the estuarine water column where light is sufficient for growth. The dominant genus of floating macroalgae, *Sargassum,* is widely distributed in offshore waters of the North Atlantic Ocean (Gower and King 2008; South Atlantic Fishery Management Council 2002), but may find its way to nearshore water and estuaries on the winds and tides. Attached macroalgae (i.e., kelp, seaweed) form “meadows” or “beds” where they dominate intertidal shores or subtidal bottoms. Whereas kelp do not occur in the project area (Mathieson et al. 2009; Steneck et al. 2002), other species of seaweeds grow attached to hard bottom substrate (Nybakken 1993) in the project area. Green seaweed species (e.g., *Enteramorpha, Ulva, Codium*) may also grow on mudflats in sheltered estuarine waters (Gosner 1978). Attached macroalgae inhabit the hardened shoreline and shallower depths of the project area.

There are no seagrass beds mapped in this area of Florida, despite comprehensive mapping efforts (FWC–Fish and Wildlife Research Institute 2011).

3.5.3 Environmental Consequences

3.5.3.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline conditions for marine vegetation, as described above, would remain unchanged. Therefore, there would be no impacts to marine vegetation from implementation of the No Action Alternative.

3.5.3.2 Proposed Action

3.5.3.2.1 Physical impacts

Among the taxonomic groups of marine vegetation that could occur in the project area, only phytoplankton, benthic microalgae, and attached macroalgae are likely to occur (refer to Affected Environment section for more information). The proposed action is not expected to impact phytoplankton or benthic microalgae populations in the local ecosystem; demolition and reconstruction activities would have no lasting impact on these prolific and resilient plant species.

Algae species, in general, are more able to colonize disturbed environments than seagrass due to higher growth rates and lower light requirements (Levinton 2009). Attached macroalgae are also resilient to high levels of wave action (Mach et al. 2007), which aid in their ability to withstand disturbances that occur near them. As long as suitable substrate is maintained, any impacts on attached macroalgae should be considered temporary due to rapid regrowth of plants. The demolition and reconstruction activities of the proposed action would result in no net loss of suitable habitat for attached macroalgae.

3.5.3.2.2 Water quality impacts

Water quality would be impacted during construction vessel operations, installation of new piles, and contingency dredging because bottom sediments would be temporarily resuspended. Resuspended sediments would increase turbidity and reduce dissolved oxygen periodically during in-water construction activities, as discussed for water quality impacts in Section 3.1.3.2.2. The overall level of sediment disturbance associated with the Wharf C-2 Recapitalization project will be significantly lower than that of maintenance dredging in the turning basin, and resuspended sediments are expected to dissipate within a few hours (NMFS 2009). Thus marine vegetation exposed to resuspended sediments are not likely to be impacted by contaminants or chronic reduction in light availability needed for growth. Frequent tidal flushing will also dilute the concentration of contaminants in the basin water column. The activities that generate suspended sediments would be short-term and localized and suspended sediments are expected to disperse and/or settle rapidly. Therefore, no direct impacts to marine vegetation are expected due to changes in water quality during construction.

3.5.3.2.3 Acoustic impacts

Two studies have suggested that noise may affect growth rates in terrestrial plants, but the results of these studies were contradictory and there are no studies of the effects of noise on marine vegetation (Collins & Foreman, 2001; Woodlief, Royster, & Huang, 1969).

3.5.3.2.4 Conclusion

The proposed action is expected to have no significant impact on unregulated marine vegetation in the project area.

3.6 Marine Invertebrates

This section analyzes potential impacts of the proposed action on marine invertebrates found in the project area. The taxonomic groups that may occur in local estuaries include bed or reef-forming (e.g., sponges, barnacles, oysters, corals), drifting (e.g., zooplankton, jellyfish), slow-moving (e.g., worms, sea urchins, clams, snails), and highly mobile (e.g., crabs, shrimp, squid). The regulatory requirements for considering impacts to marine invertebrates are covered in Section 3.6.1. The affected environment section (3.6.2) describes the occurrence of taxonomic groups for population-level impacts and regulated species (if they occur) for individual impacts.

Sedentary invertebrate beds are characterized by aggregations of unattached oysters, clams, mussels, soft corals, and other stationary invertebrates inhabiting soft or hard bottom substrate. Such aggregations do not form ridge-like or mound-like structures on hard bottom substrate; they form “meadows” or “beds” where they dominate shore or bottom areas. Reefs are ridge-like or mound-like structures formed by the colonization and layered growth of sedentary invertebrates (Cowardin et al. 1979). Reefs are characterized by their three-dimensional structure, elevation above the surrounding substrate, and interference with normal wave flow; they are primarily subtidal, but parts of some reefs may be intertidal as well.

3.6.1 Regulatory Overview

Marine invertebrate species may receive protection via the ESA, or MSA status. There are few species of endangered marine invertebrates, and none that occur in the project area. The only regulated species that could occur in the project area are commercial shrimps (brown, pink, and white), which are all federally managed by the South Atlantic Fishery Management Council (refer to subsequent sections on Essential Fish Habitat for background and supporting details). Spiny lobsters and coral species on live hard bottoms are not expected to occur in shallow waters north of southern Florida (SAFMC 1998). The affected environment and environmental consequences sections will focus on taxonomic groups and population-level impacts and adverse impacts on commercial shrimps.

3.6.1.1 Essential Fish Habitat

In 1996, the MSA was reauthorized and amended by the Sustainable Fisheries Act (Public Law 104-267). The reauthorized MSA mandated numerous changes to the existing legislation designed to prevent overfishing, rebuild depleted fish stocks, minimize bycatch, enhance research, improve monitoring, and protect fish habitat. One of the most significant mandates in the MSA that came out of the reauthorization was the EFH provision, which provides the means to conserve fish habitat.

The EFH mandate requires that the regional Fishery Management Councils, through federal fishery management plans, describe and identify EFH for each federally managed species; minimize, to the extent practicable, adverse effects on such habitat caused by fishing; and identify other actions to encourage the conservation and enhancement of such habitats.

Congress defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. § 1802(10)). The term "fish" is defined in the MSA as "finfish, mollusks, crustaceans, and all other forms of marine animals and plant life other than marine mammals and birds" (16 U.S.C. § 1802(12)). The regulations for implementing EFH provide the following: "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities (50 CFR § 600.10). Habitats used at any time during a species' life cycle (i.e., during at least one of its life stages) must be accounted for when describing and identifying EFH (NMFS 2002).

Authority to implement the MSA is given to the Secretary of Commerce and has been delegated to NMFS. The MSA requires that EFH be identified and described for each federally managed species. The MSA also requires federal agencies to consult with the NMFS on activities that may adversely affect EFH or when the NMFS independently learns of a federal activity that may adversely affect EFH. The MSA's implementing regulations define an adverse effect as "any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 CFR 600.810).

In addition to EFH designations, areas called Habitat Areas of Particular Concern (HAPC) are also designated by the regional Fishery Management Councils. Designated HAPC are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation (50 CFR 600.805-600.815). Regional Fishery Management Councils may designate a specific habitat area as a HAPC based on one or more of the following reasons (NMFS 2002):

- Importance of the ecological function provided by the habitat
- The extent to which the habitat is sensitive to human-induced environmental degradation
- Whether, and to what extent, development activities are, or will be, stressing the habitat type
- Rarity of the habitat type.

Categorization of an area as a HAPC does not confer additional protection or restriction to the designated area.

The area encompassed by the proposed action (project area) extends through the jurisdiction of the South Atlantic Fishery Management Council (SAFMC). In addition, the project area also extends through areas where the NMFS has designated EFH for highly migratory species (e.g., tuna, billfish, swordfish, and sharks). As a result, the proposed action may occur within areas designated as EFH by SAFMC and the NMFS and will be analyzed for potential adverse effects.

3.6.2 Affected Environment

The project area habitats include hardened shorelines grading steeply to depths of over 40 ft (12 m) (NOAA 2011a) in sheltered, high salinity estuarine waters (NOAA 2012). Substrate on the bottom is dredged, unconsolidated material (USGS 2000).

The hardened structures along the shoreline provide habitat for sedentary invertebrate beds and associated mobile invertebrates. There may also be slow-moving invertebrates inhabiting the sediment around the base of the pier footprint, and highly-mobile species in overlying water column. An extensive list of species that may occur from these taxonomic groups can be assembled from Gosner (1978). National Oceanic Administration Association's Estuarine Living Marine Resources Program has developed a consistent database on the distribution, relative abundance, and life history characteristics of ecologically and economically important fishes and invertebrates in the Nation's estuaries (NOAA 2011b). This database includes the St. Johns River estuary and >25 parts per thousand salinity zone where the project area resides. This database documents the seasonal occurrence of blue crabs, commercial shrimps (brown, pink, and white), grass shrimp, quahog clams, and eastern oysters in the high salinity portion of the estuary (Table 3-15).

Eastern oysters grow attached to hard substrate, including pier structures, whereas quahogs clams inhabit the sediment around the base of the pier footprint. The shrimp species occupy the estuary as juveniles and larvae in the water column surrounding the pier, with seasonal peaks in abundance during the warmer months.

Table 3-15. Estuarine Living Marine Resources Database records for invertebrates in the>25 parts per thousand salinity zone of the St. Johns River

Common Name	Life Stage	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
BED or REEF FORMING													
EASTERN OYSTER	ADULTS	4	4	4	4	4	4	4	4	4	4	4	4
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	SPAWNING	0	0	0	4	4	4	4	4	4	4	4	0
DRIFTING													
BLUE CRAB	EGGS	0	3	4	4	4	4	4	4	4	3	0	0
	LARVAE	0	0	0	3	4	4	4	4	4	3	0	0
BROWN SHRIMP	LARVAE	0	3	4	4	4	4	4	3	3	0	0	0
EASTERN OYSTER	EGGS	0	0	0	4	4	4	4	4	4	4	4	0
	LARVAE	0	0	0	4	4	4	4	4	4	4	4	0
PINK SHRIMP	LARVAE	2	2	3	3	3	3	3	3	3	3	3	2
GRASS SHRIMP	LARVAE	0	0	3	3	3	3	3	3	3	3	0	0
	EGGS	0	0	3	3	3	3	3	3	3	3	0	0
QUAHOG CLAM	EGGS	0	0	3	3	3	2	2	2	3	3	3	0
	LARVAE	0	0	3	3	3	2	2	2	3	3	3	0

Common Name	Life Stage	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
WHITE SHRIMP	LARVAE	0	0	0	0	4	5	5	5	4	4	4	0
SLOW-MOVING													
QUAHOG CLAM	ADULTS	3	3	3	3	3	3	3	3	3	3	3	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	SPAWNING	0	0	3	3	3	2	2	2	3	3	3	0
HIGHLY MOBILE													
BLUE CRAB	ADULTS	5	5	5	5	5	5	5	5	5	5	5	5
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	MATING	2	2	3	3	3	3	3	3	3	3	3	3
BROWN SHRIMP	JUVENILES	0	0	3	3	4	4	4	4	4	3	3	3
GRASS SHRIMP	ADULT	5	5	5	5	5	5	5	5	5	5	5	5
	JUVENILE	3	3	3	3	3	3	3	3	3	3	3	3
PINK SHRIMP	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
WHITE SHRIMP	JUVENILES	4	4	4	3	3	3	5	5	5	4	4	4
Note: 0=absent, 2=rare; 3=common; 4=abundant; 5=high abundant													

Source: NOAA 2011b

3.6.2.1 Essential Fish Habitat

The SAFMC established a panel of experts to identify physical habitats, both inshore (estuarine) and offshore (marine), present within the South Atlantic region that are essential to the various federally managed fish (including invertebrate) species and to determine the availability of information to adequately determine the distribution and spatial extent of the habitats identified (SAFMC 1998). While maps depicting the EFH for each species or management unit were not provided along with the original EFH designations, the SAFMC has since developed a website to graphically depict the distribution and geographic extent of habitats designated as EFH by species or management unit. While not all of the EFH designations have a spatial coverage at this time, the website is continually updated as more information becomes available and all data are also available for download for use in geographic information system software applications.

The EFH for brown, pink, and white shrimp is defined as:

> "Inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies as described in the Habitat Plan. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine submerged aquatic vegetation (e.g., seagrass); and subtidal and intertidal non-vegetated flats. This applies from North Carolina through the Florida Keys."
> Shrimp HAPCs include: "…all coastal inlets, all state-designated nursery habitats of particular importance to shrimp (for example, in North Carolina this

would include all Primary Nursery Areas and all Secondary Nursery Areas), and state identified overwintering areas." (SAFMC 1998)

The project area includes EFH for brown, pink, or white shrimp in the form of subtidal flats. The project area is also included in the HAPC designation for these commercial shrimp species. Wetlands and seagrass are not expected to occur in the project area (refer to Section 3.5 Marine Vegetation for supporting details).

3.6.3 Environmental Consequences

In addition to NEPA and ESA evaluation criteria, this section evaluates how and to what degree the activities described in Chapter 2 (Discussion of Alternatives) could impact EFH and HAPC in the project area. A stressor is evaluated for impacts on a designated habitat if it has the potential to alter the quality or quantity of that habitat (e.g., water column, seagrass beds, shallow coral reefs). The stressors applicable to one or more descriptors of EFH and HAPC in the project area include demolition of wharf structures and associated sound propagation.

If there is a reasonable likelihood of co-occurrence between the proposed stressors and sensitive EFH or HAPC, then a conclusion of adverse impact is made. The conclusion is further described in terms of intensity and duration of effects. Intensity is described in terms of type (e.g., minimal, substantial) and area of impact. The duration of effects is based on either duration of stressor or recovery of the habitat (NOAA 2004), whichever is greater:

- Temporary – stressor duration or recovery in hours, days, or weeks
- Short Term – stressor duration or recovery in less than 3 years
- Long Term – stressor duration or recovery in more than 3 years but less than 20 years
- Permanent – stressor duration or recovery in more than 20 years

3.6.3.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline conditions for marine invertebrates, as described above, would remain unchanged. Therefore, there would be no impacts to marine invertebrates from implementation of the No Action Alternative.

3.6.3.2 Proposed Action

3.6.3.2.1 Physical impacts

The proposed action includes some demolition and reconstruction of the old wharf structures and associated disturbance of the water column and bottom substrate (e.g., clamshell dredging). Eastern oysters and other sedentary invertebrates inhabiting the replaced structures will definitely be harmed, and slow-moving species may be killed in the demolition process. Highly mobile species (e.g., blue crabs, shrimps) should be able to move quickly away from the disturbance. However, no population-level impacts are anticipated given the relatively small area of impacts; resident invertebrates will recolonize the renovated structures. The small area of subtidal flat EFH in the affected area will be minimally disturbed in the replacement of the wharf structures, but highly disturbed by the dredging. However, the dredging impact on subtidal bottom would be very temporary in duration (e.g., altering depth of sand bottom).

3.6.3.2.2 Water quality impacts

Water quality would be impacted during construction vessel operations, installation of new piles, and contingency dredging because bottom sediments would be temporarily resuspended. Resuspended sediments would increase turbidity and reduce dissolved oxygen periodically during in-water construction activities, as discussed for water quality impacts in Section 3.1.3.2.2. The overall level of sediment disturbance associated with the Wharf C-2 Recapitalization project will be significantly lower than that of maintenance dredging in the turning basin, and resuspended sediments are expected to dissipate within a few hours (NMFS 2009). Frequent tidal flushing will also dilute the concentration of contaminants in the basin water column. Thus marine invertebrates exposed to resuspended sediments are not likely to be impacted by contaminants. The activities that generate suspended sediments would be short-term and localized and suspended sediments are expected to disperse and/or settle rapidly. Therefore, no direct impacts to marine invertebrates are expected due to changes in water quality during construction.

3.6.3.2.3 Acoustic impacts

Invertebrate species near the piling replacement work may also experience sound intensities that could affect their behavior or damage their hearing ability. There is an in-depth discussion of underwater noise from pile driving and the modeling methodology in the marine mammals section. However, very little is known about sound detection and use of sound by aquatic invertebrates (Budelmann 1992a, b; Montgomery et al. 2006; Popper et al. 2001) and there are no established criteria for behavioral disturbance or injury from intense sounds (FHWG 2008). Whereas invertebrates lacking a swim bladder are more resilient to impulsive stressors than fish, the thresholds for fish suggest very limited mortality and only very close to the pilings (refer to Section 3.7.3.2 for supporting details). There are no population-level impacts on unregulated invertebrates anticipated from sound intensities modeled and only minimum and temporary impacts on the EFH and HAPC for commercial shrimp species.

3.6.3.2.4 Conclusions

The proposed action is expected to have no significant impacts on unregulated marine invertebrates.

3.6.3.2.4.1 Magnuson-Stevens Fishery Conservation and Management Act

The proposed action will have minimum and temporary adverse impacts on the EFH and HAPC for commercial shrimp species. The Navy submitted an EFH assessment to NMFS for the Wharf C-2 Recapitalization project on May 30, 2013. On July 22, 2013 NMFS responded to the ACOE Jacksonville District’s public notice for the Wharf C-2 recapitalization project that present staffing levels preclude further analysis and no further action is planned. An email from NMFS to the Navy on September 16, 2013, confirmed that the EFH consultation for the project has been completed. See Appendix A for agency correspondence.

3.7 Fish

This section analyzes potential impacts of the proposed action on fish inhabiting the project area. The life history strategies of fish that may occur in local estuaries include:

- Anadromous – spawn in freshwater and mature downstream to reach adult habitat in nearshore ocean waters;
- Estuarine spawning and nursery;
- Catadromous – spawn in ocean waters and mature upstream to reach adult habitat in coastal rivers;
- Ocean spawning/estuarine nursery; and
- Ocean spawning/high salinity nursery – includes both nearshore ocean and high salinity zone of estuaries.

The regulatory requirements for considering impacts to fish are covered in Section 3.7.1. The affected environment section (3.7.2) describes the occurrence of species groups for population-level impacts and regulated species (if they occur) for individual impacts. The groups are based on life history strategies and life stages to capture spatial and temporal occurrence patterns in the project area.

3.7.1 Regulatory Overview

Fish species may receive protection via the ESA or MSA status. There are numerous species of endangered fish, and three that may occur in the project area: Atlantic sturgeon, shortnose sturgeon, and smalltooth sawfish (refer to subsequent sections on ESA species for supporting details). Candidate species (e.g., American eel, river herring) are included for information purposes only. Other regulated species groups that could occur in the project area include highly migratory, coastal migratory pelagics, and snapper-grouper, which are managed by the SAFMC; and juvenile summer flounder managed by the Mid-Atlantic Fishery Management Council (refer to subsequent section on Essential Fish Habitat for supporting details). Background on EFH regulations is provided in Section 3.6.1.1. The affected environment and environmental consequences sections will focus on life history groups and population-level impacts, individual impacts on endangered species, and adverse impacts on EFH.

3.7.2 Affected Environment

The project area habitats include hardened shorelines grading steeply to depths of over 12 m (40 ft) (NOAA 2011a) in sheltered, high salinity estuarine waters (NOAA 2012). Substrate on the bottom is dredged, unconsolidated material (USGS 2000).

Most juvenile estuarine fish managed by the SAFMC accumulate and thrive in shallow tidal creeks and flats (Ross 2003), which would suggest a lack of juvenile habitat in the steep-sided basin of the project area. The seasonal abundance patterns of selected fish species in high salinity portions of the St. Johns River estuary are included in Table 3-16, including but not limited to SAFMC managed species. Adults of the selected species are more likely to occur in the project area; abundant species (adult life stage) in the lower St. Johns River estuary include bay anchovies, silversides, sheepshead, striped mullet, weakfish, Atlantic croaker, southern flounder, and pinfish; all except pinfish have either estuarine spawning/estuarine nursery or ocean spawning/estuarine nursery life histories. The ocean spawning adults are generally less abundant in January and February (Table 3-16). Estuarine spawning adults may be abundant year-round. The anadromous Atlantic sturgeon, an ESA species, was considered rare in the project area (refer to subsequent ESA sections for supporting details). Sharks and other highly migratory fish occurring in coastal waters were not included in the Estuarine Living Marine Resources database (refer to subsequent EFH section for supporting details).

Table 3-16. Estuarine Living Marine Resources present in high salinity portion of the St. Johns River, including but not limited to SAFMC managed species

Common Name	Life Stage	January	February	March	April	May	June	July	August	September	October	November	December
ANADROMOUS FISH													
AMERICAN SHAD	ADULTS	3	3	3	3	3	0	0	0	0	0	3	3
	JUVENILES	3	0	0	0	0	0	0	0	0	3	3	3
ATLANTIC STURGEON	ADULTS	0	0	2	2	2	0	0	0	2	2	2	0
	JUVENILES	0	0	0	0	0	0	0	0	2	2	2	0
BLUEBACK HERRING	ADULTS	3	3	3	3	0	0	0	0	0	0	0	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
ESTUARINE SPAWNING AND NURSERY													
BAY ANCHOVY	ADULTS	5	5	5	5	5	5	5	5	5	5	5	5
	JUVENILES	5	5	5	5	5	5	5	5	5	5	5	5
	SPAWNING	0	0	0	4	5	5	5	5	4	0	0	0
	EGGS	0	0	0	4	5	5	5	5	4	0	0	0
	LARVAE	0	0	0	4	4	5	5	5	5	4	0	0
BLACK DRUM	ADULTS	3	3	3	3	3	3	3	3	3	3	3	3
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	SPAWNING	3	3	3	3	3	0	0	0	0	0	0	0
	EGGS	3	3	3	3	3	0	0	0	0	0	0	0
	LARVAE	4	4	4	4	4	4	0	0	0	0	0	0
COBIA	ADULTS	3	3	3	3	3	3	3	3	3	3	3	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
MUMMICHOG	ADULTS	4	4	4	4	4	4	4	4	4	4	4	4
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	SPAWNING	0	0	0	4	4	4	4	4	0	0	0	0
	EGGS	0	0	0	4	4	4	4	4	0	0	0	0
	LARVAE	0	0	0	4	4	4	4	4	4	0	0	0
RED DRUM	ADULTS	3	3	3	3	3	3	3	3	3	3	3	3
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	SPAWNING	4	0	0	0	0	0	0	0	4	4	4	4

Common Name	Life Stage	January	February	March	April	May	June	July	August	September	October	November	December
	EGGS	4	0	0	0	0	0	0	0	4	4	4	4
	LARVAE	4	4	0	0	0	0	0	0	4	4	4	4
SHEEPSHEAD	ADULTS	4	4	4	4	4	4	4	4	4	4	4	4
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	SPAWNING	0	3	3	3	3	0	0	0	0	0	0	0
	EGGS	0	3	3	3	3	0	0	0	0	0	0	0
	LARVAE	0	3	3	3	3	0	0	0	0	0	0	0
SHEEPSHEAD MINNOW	ADULTS	3	3	3	3	3	3	3	3	3	3	3	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	SPAWNING	0	3	3	3	3	3	0	0	0	0	0	0
	EGGS	0	3	3	3	3	3	0	0	0	0	0	0
	LARVAE	0	3	3	3	3	3	3	0	0	0	0	0
SILVERSIDES	ADULTS	4	4	5	5	5	5	5	5	5	5	4	4
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	SPAWNING	2	3	5	5	5	5	5	5	5	5	3	2
	EGGS	2	3	4	4	4	4	4	4	4	4	3	2
	LARVAE	2	3	4	4	4	4	4	4	4	4	3	2
SPOTTED SEATROUT	ADULTS	3	3	3	3	3	3	3	3	3	3	3	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	SPAWNING	0	0	0	3	3	3	3	0	0	0	0	0
	EGGS	0	0	0	3	3	3	3	0	0	0	0	0
	LARVAE	0	0	0	3	3	3	3	3	0	0	0	0
WEAKFISH	ADULTS	4	4	4	4	4	4	4	4	4	4	4	4
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	SPAWNING	0	0	4	4	4	4	4	4	0	0	0	0
	EGGS	0	0	4	4	4	4	4	4	0	0	0	0
	LARVAE	0	0	4	4	4	4	4	4	4	0	0	0
CATADROMOUS													
AMERICAN EEL	ADULTS	3	3	3	0	0	0	0	0	0	0	3	3
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	LARVAE	4	5	5	5	4	0	0	0	0	0	0	0

Common Name	Life Stage	January	February	March	April	May	June	July	August	September	October	November	December
OCEAN SPAWNING/ESTUARINE NURSERY													
ATLANTIC CROAKER	ADULTS	3	3	3	3	3	4	4	4	4	4	4	4
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	LARVAE	4	4	4	4	0	0	0	0	0	0	0	4
ATLANTIC MENHADEN	ADULTS	2	2	2	2	2	4	4	4	4	4	3	2
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	LARVAE	3	3	3	3	3	0	0	0	0	0	0	0
SOUTHERN FLOUNDER	ADULTS	0	0	3	4	4	4	4	4	4	3	3	3
	JUVENILES	3	3	4	4	4	4	4	4	4	4	3	3
	LARVAE	4	4	3	3	3	0	0	0	0	3	4	4
SPOT	ADULTS	0	0	0	0	3	3	3	3	3	0	0	0
	JUVENILES	3	3	3	4	4	4	4	4	4	4	3	3
	LARVAE	3	3	3	3	0	0	0	0	0	0	0	0
STRIPED MULLET	ADULTS	3	3	3	5	5	5	5	5	5	3	3	3
	JUVENILES	4	4	4	5	5	5	5	5	5	5	5	5
	LARVAE	5	5	4	4	0	0	0	0	0	4	5	5
OCEAN SPAWNING/HIGH SALINITY NURSERY													
BLUEFISH	ADULTS	3	3	3	3	3	0	0	0	0	3	3	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
GRAY SNAPPER	ADULTS	3	3	3	3	3	3	3	3	3	3	3	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	LARVAE	0	0	0	3	3	3	3	3	0	0	0	0
GULF FLOUNDER	ADULTS	0	0	3	3	3	3	3	3	3	3	0	0
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	LARVAE	3	3	3	3	0	0	0	0	0	0	3	3
LADYFISH	ADULTS	3	3	3	3	3	3	3	3	3	3	3	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	LARVAE	3	3	3	3	0	0	0	0	0	0	0	0
PINFISH	ADULTS	3	3	3	4	4	4	4	4	4	3	3	3
	JUVENILES	4	4	4	4	4	4	4	4	4	4	4	4
	LARVAE	4	4	4	3	0	0	0	0	0	0	0	3

Common Name	Life Stage	January	February	March	April	May	June	July	August	September	October	November	December
SOUTHERN KINGFISH	ADULTS	3	3	3	3	3	3	3	3	3	3	3	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	LARVAE	0	0	0	3	3	3	3	3	0	0	0	0
SPANISH MACKEREL	ADULTS	3	3	3	0	0	0	0	0	0	3	3	3
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	LARVAE	0	0	0	0	0	0	3	3	3	0	0	0
SUMMER FLOUNDER	ADULTS	0	0	3	3	3	3	3	3	3	0	0	0
	JUVENILES	3	3	3	3	3	3	3	3	3	3	3	3
	LARVAE	3	3	3	0	0	0	0	0	0	0	0	3

Documentation for the occurrence of ESA and EFH species in the project area are provided in the following sections.

3.7.2.1 Atlantic Sturgeon

3.7.2.1.1 Status and Management

In January 2010, NMFS found a petition to list presented substantial scientific and commercial information indicating that listing may be warranted (NMFS 2010c). After completing an ESA status review of the species, NMFS issued two final rules in February 2012 – one for the southeast region, listing the Carolina and South Atlantic distinct population segments (DPS) as endangered (77 FR 5914); the other for the northeast region, listing the Gulf of Maine population segment as threatened and the Chesapeake Bay and New York Bight distinct population segments as endangered (77 FR 5880).

3.7.2.1.2 Habitat and Geographic Range

Spawning adults migrate upriver in spring, beginning in February in the south, April in Mid-Atlantic, and May in Canadian waters (Dadswell 2006). After spawning in freshwater, the adults migrate back into estuarine and marine waters. Tagging data indicate that juvenile Atlantic sturgeons 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; NMFS 2010c). During non-spawning years, adults remain in marine waters either year-round or seasonally (Bain 1997). Although the species occurs as far south as St. Johns River, it is strongly associated with specific coastal areas, including the mouth of Chesapeake Bay in a narrow range of depths (30-160 ft [10-50 m] over gravel and sand, and to a lesser extent, silt and clay (Stein et al. 2004). There is no Critical Habitat designated for Atlantic sturgeon.

3.7.2.1.3 Population and Abundance

The status of the Atlantic sturgeon populations varies widely, from the large but possibly declining population in the Hudson River, to small groups of survivors of a once robust population that has undergone considerable decline (Delaware River), to apparently locally extent (Maryland tributaries of Chesapeake Bay and St. Johns River, Florida) (National Marine Fisheries Service 2007, Waldman and Wirgin 1998). However, the Estuarine Living Marine Resources database indicates a rare occurrence of Atlantic sturgeon in the St. Johns River estuary (refer to Section 3.7.2 for supporting details).

3.7.2.1.4 Predator / Prey Interaction and Foraging

Like all sturgeon, the Atlantic sturgeon feeds along the bottom on invertebrates such as isopods, crustaceans, worms, and mollusks (NMFS 2010f). It has also been documented to feed on fish (Bain 1997). Evidence of predation on sturgeon is scarce, but some researchers believe they are taken by the American alligator (*Alligator mississippiensis*), alligator gar (*Atractosteus spatula*), and striped bass (*Morone saxatilis*) (Dadswell 2006). Sharks likely prey on all species of sturgeon in the marine environment (National Marine Fisheries Service 1998).

3.7.2.1.5 Critical Habitat

No critical habitat has been designated for this species.

3.7.2.2 Shortnose Sturgeon

3.7.2.2.1 Status and Management

In 1967, the species was listed as endangered under the Endangered Species Preservation Action of 1966, which predated the ESA; this species remains on the list as endangered throughout its range along the Atlantic coast (NMFS 1998). NMFS manages 19 distinct population segments on the anadromous shortnose sturgeon; the St. Johns River population is included in the DPS.

3.7.2.2.2 Habitat and Geographic Range

The species primarily occurs in freshwater rivers and coastal estuaries of the northeastern and southeastern United States and into the nearshore coastal waters NMFS 1998). Adults are found in deep water (35-100 ft [10-30 m]) in winter and shallow water (7-35 ft) in summer (Welsh et al. 2002). There is no Critical Habitat designated for shortnose sturgeon.

3.7.2.2.3 Population and Abundance

Although a DPS has been designated for shortnose sturgeon in the St. Johns River, there is no evidence suggesting their abundance in the estuary. The Estuarine Living Marine Resources database does not include shortnose sturgeon in the list of species for the St. Johns River.

3.7.2.2.4 Predator / Prey Interaction and Foraging

In southern rivers, feeding has been observed during winter at or just downstream of where saltwater and freshwater meet (Kynard 1997). Shortnose sturgeon in the southeastern United States Continental Shelf Large Marine Ecosystem reduce their feeding activity during summer months (NMFS 1998; Sulak and Randall 2002).

The shortnose sturgeon feeds by suctioning polychaetes (marine worms), crustaceans, mollusks, and small fish from the bottom (NMFS 1998; Stein et al. 2004). Young-of-the-year sturgeon (individuals less than a year old) have been found in the stomachs of yellow perch

(NMFS 1998); predation on older sturgeon is not well-documented, although sharks likely prey on them in the marine environment (NMFS 1998).

3.7.2.3 Smalltooth Sawfish

3.7.2.3.1 Status and Management

The DPS of smalltooth sawfish, a species of shark (elasmobranch), between Florida and Cape Hatteras, North Carolina, was listed as endangered under the ESA by NMFS in 2003 and by USFWS in 2005; it is co-managed by both agencies (NMFS 2010d).

3.7.2.3.2 Habitat and Geographic Range

The species was once common in the Gulf of Mexico and along the east coast of the United States in shallow estuarine and marine waters. Today, the severely depleted population is restricted mostly to southern Florida (Poulakis and Seitz 2004; Simpfendorfer 2002; Simpfendorfer and Wiley 2005, 2006). In 2009, NMFS designated critical habitat for smalltooth sawfish at two locations; the Charlotte Harbor estuary and the Ten Thousand Islands portion of the Everglades (50 CFR 226.218—Critical habitat for the U.S. DPS of smalltooth sawfish). Both critical habitat areas are on the Gulf of Mexico coast, far from the project area.

3.7.2.3.3 Population and Abundance

The species is not expected to occur in the study area, though the area resides in the historic range of the smalltooth sawfish.

3.7.2.3.4 Predator / Prey Interaction and Foraging

The smalltooth sawfish feeds primarily at night (NMFS 2009e) and uses its saw while feeding to stir the substrate to expose crustaceans or to stun and slash schooling fish (NMFS 2009c). Smalltooth sawfish, particularly juveniles, are preyed upon by bull sharks and other sharks occurring in shallow coastal waters.

3.7.2.3.5 Critical Habitat

There is no smalltooth sawfish critical habitat in the vicinity of the Project.

3.7.2.4 American Eel

3.7.2.4.1 Status and Management

American eel are currently under petition as a candidate for listing under the ESA by the U.S. Fish and Wildlife Service because they have undergone substantial declines throughout their range (76 FR 60431).

3.7.2.4.2 Habitat and Geographic Range

The American eel ranges from Greenland south along the Atlantic Coast and into the Caribbean (U.S. Fish and Wildlife Service 2011). The American eel is catadromous, meaning it is born in saltwater and migrates into freshwater to mature (Jessop et al. 2002). Spawning of the U.S. population of American eel is believed to occur in the Sargasso Sea of the Atlantic Ocean. As juveniles, or "glass eels," they enter coastal waters where they further mature into ''elvers'' and then a late juvenile stage known as ''yellow eels" (U.S. Fish and Wildlife Service 2011). Older juveniles and adults occupy estuarine and freshwater habitats, often swimming far upriver into lakes, ponds, and headwater streams, where they may spend up to

30 years as adults. Mature adults, or "silver eels," migrate to the Sargasso Sea to spawn and die (U.S. Fish and Wildlife Service 2011). Peak migration in the St. Johns River takes place between January and February (Florida Fish and Wildlife Conservation Commission n.d.[A]).

3.7.2.4.3 Population and Abundance

The American eel exists as a single population that disperses widely from its spawning grounds in the Sargasso Sea, making abundance difficult to determine (Haro et al. 2000). Demographic structure is difficult to determine because nonbreeding individuals are spread over an extremely large geographic range (U.S. Fish and Wildlife Service 2011). There is a small commercial fishery for American eels in Florida, which operates almost exclusively in the St. Johns River system. Annual landings of American eels have been reported since the early 1980s. However, commercial eel harvest has been declining since the early 1990s (Florida Fish and Wildlife Conservation Commission n.d.[A]).

3.7.2.4.4 Predator / Prey Interaction and Foraging

The American eel feeds on a wide variety of prey items including benthic invertebrates, insects, crustaceans, mollusks, worms, and finfish. It is preyed upon by a wide variety of species including fish, seabirds, sharks, and rays (Dalton et al. 2009; U.S. Fish and Wildlife Service 2011).

3.7.2.4.5 Critical Habitat

This species is not listed under the ESA; as such, no critical habitat has been designated.

3.7.2.5 Blueback Herring

3.7.2.5.1 Status and Management

The blueback herring was classified as a candidate species under the ESA in 2011 (76 FR 67652). Blueback herring and alewife are evaluated jointly as "river herring" by NMFS. Coastal ranges of the two species overlap with blueback herring found in a greater and more southerly distribution ranging from Nova Scotia down to the St. Johns River (76 FR 67652). Therefore, only blueback herring is addressed in this document.

3.7.2.5.2 Habitat and Geographic Range

The blueback herring ranges from Nova Scotia to the St. Johns River (McBride et al. 2010). Blueback herring and alewife exhibit very similar life histories, and herring are often harvested and managed together because of the difficulty in distinguishing between the two species; they are currently managed by the Atlantic States Marine Fisheries Commission. Several states north of Florida have enacted harvest moratoria and management plans for this species.

3.7.2.5.3 Population and Abundance

River herring have undergone substantial declines throughout most of their range. Smaller sizes being harvested in the St. Johns River suggests that the population is experiencing higher mortality than in the past (McBride et al. 2010).

3.7.2.5.4 Predator / Prey Interaction and Foraging

All life stages of river herring feed primarily on phytoplankton and zooplankton, but adults also eat mysids, small finfish, and benthic crustaceans (National Marine Fisheries Service

2009). River herring are preyed on by a number of marine species, including striped bass, bluefish, tunas, cod, haddock, halibut, American eel, seabirds, and marine mammals.

3.7.2.5.5 Critical Habitat

This species is not listed under the ESA; as such, no critical habitat has been designated.

3.7.2.6 Dwarf Seahorse

3.7.2.6.1 Status and Management

In April 2011, NMFS received a petition to list the dwarf seahorse as threatened or endangered under the ESA and to designate critical habitat concurrently with the listing (77 FR 26478). In its 90-day review, NMFS concluded that the species may warrant listing under the ESA, resulting in the initiation of a formal status review (77 FR 26478).

Dwarf seahorses are harvested in Florida's commercial seahorse fishery, primarily in the southeast portion of the state through diving, seining, or dredging (Bruckner 2005; 77 FR 26478). The state imposes a commercial bag limit of 400 dwarf seahorses per person or per vessel per day, whichever is less; and a recreational bag limit of five dwarf seahorses per person, per day. There are no seasonal restrictions or closures for this fishery (77 FR 26478).

3.7.2.6.2 Habitat and Geographic Range

The dwarf seahorse inhabits tropical and subtropical / warm-temperate waters of Florida, the Gulf of Mexico, and the Caribbean (Masonjones and Lewis 1996). The species primarily occurs in south Florida estuaries and in the Florida Keys, preferring protected bays/lagoons with low water flow, high organic content, mid- to high-salinities and depths less than 6 ft (2 m) (Bruckner 2005; Foster and Vincent 2004). Dwarf seahorses are almost exclusively associated with seagrass beds, particularly eelgrass (Zostera spp.) (Bruckner 2005). Other habitats used by the dwarf seahorse include mangrove areas, unattached algae, and inshore drifting vegetation (Center for Biological Diversity 2011; Hoese and Moore 1998; Tabb and Manning 1961).

While most seahorse species exhibit strong site-fidelity, in terms of home ranges and spawning habitat (Curtis and Vincent 2006; Masonjones and Lewis 1996), Masonjones et al. (2010) suggests that further seahorse dispersal outside of home ranges may occur. Dispersal may be enhanced by clinging to drifting Sargassum or floating debris within inshore habitats (Foster and Vincent 2004; Masonjones and Lewis 1996). Dwarf seahorse spawning occurs between February and November (Foster and Vincent 2004). Based on habitat requirements (particularly seagrass and subtropical water temperatures, dwarf seahorses are not expected to occur in the action area.

3.7.2.6.3 Population and Abundance

There are no published data on current global population trends or total numbers of mature dwarf seahorses; however, some population data exist in Florida based on numbers derived from the commercial seahorse fishery. The NMFS reported a five-fold increase in seahorse landings between 1991 and 1992 (from 14,000 harvested in 1991 to 83,700 harvested in 1992) (77 FR 26478), with the increased landings primarily attributed to dwarf seahorses. Over a longer period, the number of dwarf seahorses landed during 1990–2003 ranged from 2,142 to 98,779 individuals per year (Bruckner 2005). Additional density data are from ichthyoplankton tows conducted in portions of southern Florida and range from 0 to 6 seahorses per 100 cubic meters in subtidal pools, seagrass beds, in channels, and along restored marsh edges (Masonjones et al. 2010; Powell et al. 2002; Thayer et al. 1999).

3.7.2.6.4 Predator/Prey Interaction and Foraging

Seahorses are ambush predators, consuming primarily live, mobile nekton, such as small amphipods and other invertebrates (Bruckner 2005).

3.7.2.6.5 Critical Habitat

This species is not listed under the ESA; as such, no critical habitat has been designated.

3.7.2.7 Essential Fish Habitat

Refer to Section 3.6.2.2 for background on the designation process for the SAFMC.

3.7.2.7.1 Coastal Migratory Pelagics

The fish species in this management unit include Spanish mackerel, king mackerel, and cobia. Of these species, Spanish mackerel and cobia are considered common in the lower St. Johns River estuary (Table 3-16). The EFH for coastal migratory pelagic species is defined as:

> "Sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf stream shoreward, including Sargassum. In addition, all coastal inlets, all state-designated nursery habitats of particular importance to coastal migratory pelagics (for example, in North Carolina this would include all Primary Nursery Areas and all Secondary Nursery Areas). In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse coastal migratory pelagic larvae. For king and Spanish mackerel and cobia essential fish habitat occurs in the South Atlantic and Mid-Atlantic Bights. For Cobia essential fish habitat also includes high salinity bays, estuaries, and seagrass habitat." (SAFMC 1998)

The project area includes EFH for coastal migratory pelagics in the form of open estuarine waters in close proximity to an inlet and within a high salinity bay. There are no state-designated nursery areas and no documented seagrass beds occurring in the project area (refer to Section 3.5 Marine Vegetation for supporting details).

3.7.2.7.2 Snapper-grouper

There are numerous fish species in this management unit, with gray snapper the only common representative in the project area (Table 3-16). The EFH for snapper-grouper species is defined as:

> "Coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 ft (but to at least 2,000 ft for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including Sargassum, required for larval survival and growth up to and including settlement. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse snapper

> grouper larvae. For specific life stages of estuarine dependent and nearshore snapper-grouper species, essential fish habitat includes areas inshore of the 100-foot contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom." (SAFMC 1998)

The project area includes EFH for snapper-grouper in the form of attached macroalgae, oyster reefs and unconsolidated bottom. The artificial structures along the shoreline do not qualify as EFH because they were not designed as fish habitats. Estuarine emergent wetlands, mangrove fringes, tidal creeks, coral reefs, and live hard bottom (with coral species) are not expected to occur in the project area (refer to Section 3.5 Marine Vegetation and 3.6 Marine Invertebrates for supporting details).

3.7.2.7.3 Highly Migratory Species

The NMFS has assumed the responsibility of designating EFH and HAPC for federally managed highly migratory species (e.g., tunas, billfish, swordfish, and sharks) in the U.S. waters of the Atlantic Ocean and the Gulf of Mexico, as these species are not restricted to the waters under the jurisdiction of any single Fishery Management Council. The NMFS adopted amendments to the fishery management plans of each of the six primary fisheries that they manage as a means of designating EFH and HAPC for each of the species (NMFS 2009b). Of the primary fisheries, only coastal sharks (large and small) are expected to occur in the project area (Table 3-17). No HAPCs designated for these species intersect the project area.

Table 3-17. Highly Migratory Species inhabiting coastal waters of the South Atlantic Fishery Management Council region

Species	Scientific name
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*
Blacknose shark	*Carcharhinus acronotus*
Blacktip shark	*Carcharhinus limbatus*
Bonnethead shark	*Sphyrna tiburo*
Bull shark	*Carcharhinus leucas*
Finetooth shark	*Carcharhinus isodon*
Great hammerhead	*Sphyrna mokarran*
Lemon shark	*Negaprion brevirostris*
Nurse shark	*Ginglymostoma cirratum*
Sandbar shark	*Carcharhinus plumbeus*
Scalloped hammerhead	*Sphyrna lewini*
Spinner shark	*Carcharhinus brevipinna*

3.7.2.7.4 Summer flounder

The MAFMC has designated all submerged aquatic vegetation and macroalgae beds from Maine to Indian River (Florida) as HAPC for summer flounder (Mid-Atlantic Fishery Management Council and Atlantic States Marine Fisheries Commission 1998). The Project Area includes both macroalgae habitat (Section 3.5) and an abundance of juvenile summer flounder (Table 3.16).

3.7.3 Environmental Consequences

Refer to Section 3.6.3 for EFH evaluation criteria.

3.7.3.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline conditions for fish, as described above, would remain unchanged. Therefore, there would be no impacts to fish from implementation of the No Action Alternative.

3.7.3.2 Proposed Action

3.7.3.2.1 Physical Impacts

The proposed action includes some demolition and reconstruction of the old wharf structures and associated disturbance of the water column and bottom substrate (e.g., clamshell dredging). Highly mobile juvenile or adult fish would be able to move quickly away from the disturbance. However, fish associated with attached macroalgae and sedentary invertebrate beds on the demolished pier structures may be displaced until the community is re-established on the new structures; attached macroalgae EFH will quickly recolonize the wharf structures (<1 year), while the oyster reef EFH will take several years to fully mature (Bahr and Lanier 1981, Coen et al. 1999). The small area of unconsolidated substrate EFH (e.g., subtidal flats) in the affected area will be minimally disturbed in the replacement of the vertical structures, but highly disturbed by the dredging. However, the dredging impact on subtidal bottom would be very temporary in duration (e.g., altering depth of sand bottom).

The estimated area of vertical oyster reefs impacted depends on the surface area of subtidal structures removed and the density-at-depth distribution of oysters. The perimeter of the concrete curtain is 280m x approximately 1m (visible width of oyster reefs; Figure 3-5), which equals an area of 280 m^2 (0.07 acres). This area assumes equal width of oyster reef along the entire length, and no growth on the support pilings and submerged debris removed from the area (approximately 30 pilings). It would be difficult to determine an entire surface area impacted without a comprehensive survey of the submerged structures. However, regrowth of oysters on the new structures is anticipated to compensate for the long term impact on oysters.

Figure 3-5. Vertical oyster reefs visible on photograph of the Wharf C-2 curtain

3.7.3.2.2 Water quality impacts

Water quality would be impacted during construction vessel operations, installation of new piles, and contingency dredging because bottom sediments would be temporarily resuspended. Resuspended sediments would increase turbidity and reduce dissolved oxygen periodically during in-water construction activities, as discussed for water quality impacts in Section 3.1.3.2.2. The overall level of sediment disturbance associated with the Wharf C-2 Recapitalization project will be significantly lower than that of maintenance dredging in the turning basin, and resuspended sediments are expected to dissipate within a few hours (NMFS 2009). Frequent tidal flushing will also dilute the concentration of contaminants in the basin water column. Thus fish exposed to resuspended sediments are not likely to be impacted by contaminants. The activities that generate suspended sediments would be short-term and localized and suspended sediments are expected to disperse and/or settle rapidly. Therefore, no direct impacts to fish are expected due to changes in water quality during construction.

3.7.3.2.3 Acoustic impacts

Individual fish near the piling replacement work may also experience sound intensities that could affect their behavior or damage their hearing ability. There is an in-depth discussion of underwater noise from pile driving and the modeling methodology in the marine mammals section (Section 3.4.3.2.13). Since many fish use their swim bladders for buoyancy, they are susceptible to rapid expansion/decompression due to peak pressure waves from underwater noises (Hastings and Popper 2005). The onset of injury threshold resulting from this rapid expansion/decompression is supported by data presented on selected species in FHWG (2008). Whereas behavioral disturbance criteria for fish are not supported with data, the NMFS and USFWS generally use 150 dB rms as the threshold for ESA-listed species. Criteria for behavioral impacts and onset of injury are provided in Table 3-18.

The criteria and resulting areas (Figure 3-6) suggest only the most limited mortality of fish, and only when they are very close to an intense sound source (FHWG 2008). There is no population-level impact on unregulated fish anticipated from the sound intensities modeled and only minimum and temporary adverse impacts on water column EFH for all managed species inhabiting the water column. The ESA listed sturgeon species and smalltooth sawfish may be affected by the sound intensities, but are not likely to be adversely impacted by them.

Table 3-18. Criteria for fish behavioral disturbance and onset of injury from the sound produced by vibratory and impact hammers

Pile Type	Driving Method	Threshold	Distance (m)[1]	Area (km^2)
Steel (sheet and king piles)	Vibratory	Behavioral (all):150 dB re 1 μPa rms	73.6	0.011
	Impact (contingency)	Injury (all): 206 dB re 1 μPa rms	8.6	0.00058
		Injury (≥ 2g): 187 dB re 1 μPa^2sec SEL	21.6	0.0019
		Injury (< 2g): 183 dB re 1 μPa^2sec SEL	39.9	0.0045
		Behavioral (all):150 dB re 1 μPa rms	3,981	1.37
Polymeric fender piles	Vibratory	Behavioral (all): 150 dB re 1 μPa rms	15.8	0.001

Note: no injury criteria for fish for vibratory driving; all sound levels expressed in dB re 1 μPa rms. dB=decibel; rms=root-mean-square; μPa=microPascal; Practical spreading loss (15 log, or 4.5 dB per doubling of distance) used for calculations; [1]Sound pressure levels used for calculations are given in Tables 3-12 and 3-13.

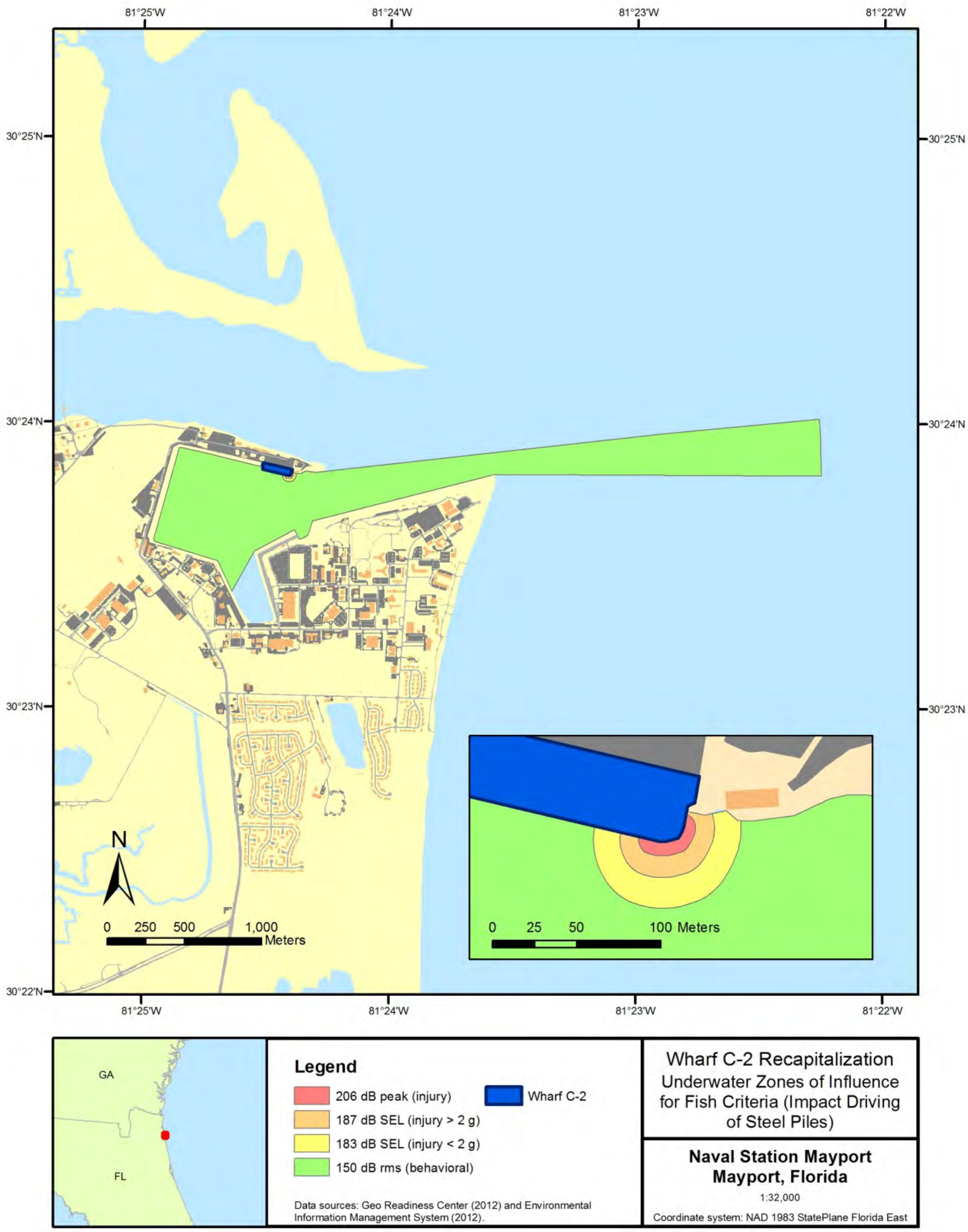

Figure 3-6. Underwater Zones of Influence for Fish Criteria Impact Pile Driving

3.7.3.2.4 Conclusions

The proposed action is not expected to have any significant impacts on unregulated fish species.

3.7.3.2.4.1 Magnuson-Stevens Fishery Conservation and Management Act

The attached macroalgae (summer flounder EFH) will experience a temporary adverse impact, whereas oyster reefs (snapper-grouper EFH) will experience long-term adverse impact before regrowth of oysters on the new structures is established. Water column habitats (EFH for all managed species inhabiting the water column) will experience only temporary impacts of minimum intensity. The EFH consultation has been completed as described in Section 3.6.3.2.4.1. See Appendix A for agency correspondence.

3.7.3.2.4.2 Endangered Species Act

The proposed action may affect, but is not likely to adversely affect ESA-listed sturgeon and smalltooth sawfish species. The Navy submitted a biological evaluation to NMFS for the Wharf C-2 Recapitalization project on May 30, 2013. NMFS concurred with the Navy's determination on November 12, 2013. See Appendix A for agency correspondence and Appendix G for biological evaluation.

3.8 Sea Turtles

This section provides a brief introduction to sea turtles that occur within the boundaries of the project area and whose distribution may overlap with stressors associated with the proposed action. There are five species of sea turtles which may occur within the project area: the green turtle (*Chelonia mydas*), the hawksbill turtle (*Eretmochelys imbricata*), the Kemp's ridley turtle (*Lepidochelys kempii*), the loggerhead turtle (*Caretta caretta*), and the leatherback turtle (*Dermochelys coriacea*). Each of these species is discussed below in Section 3.8.2 (Affected Environment).

The olive ridley sea turtle (*Lepidochelys olivacea*) was considered for inclusion in this document, but because its occurrence in the project area is extralimital (outside the species' normal range), the species will not be analyzed. Currently, there are no olive ridley nesting beaches in the eastern United States, and there are no known feeding, breeding, or migration areas within the vicinity of the project area.

No other marine reptiles (e.g. the American alligator, *Alligator mississippiensis*) occur in the project area, and are not considered here.

3.8.1 Regulatory Overview

As shown in Table 3-19, all sea turtle species that occur in the project area are listed under the ESA as either threatened or endangered. The NMFS and the USFWS share jurisdictional responsibility for sea turtles under the ESA. The USFWS has responsibility in the terrestrial environment (e.g., nesting beaches), while the NMFS has responsibility in the marine environment. Two species, the green turtle and loggerhead turtle are listed by population and DPS respectively. For more background on the ESA, see Section 3.4.1 Marine Mammal Regulatory Overview.

Table 3-19. Regulatory Status of ESA-Listed Sea turtles in the Project Area

Species	Relevant Population/DPS	ESA Status
Green turtle (*Chelonia mydas*)	Florida nesting population[1]	Endangered
Hawksbill turtle (*Eretmochelys imbricata*)	Entire population	Endangered
Kemp's ridley turtle (*Lepidochelys kempii*)	Entire population	Endangered
Loggerhead turtle (*Caretta caretta*)	Northwest Atlantic Ocean	Threatened
Leatherback turtle (*Dermochelys coriacea*)	Entire population	Endangered

[1] As a species, the green turtle is listed as threatened, but the Florida and Mexican Pacific coast nesting populations are listed as endangered. Note that green turtles found in the project area might not all be from the Florida population.

DPS: Distinct Population Segment; ESA: Endangered Species Act

3.8.2 Affected Environment

Sea turtles are highly migratory, long-lived reptiles that occur throughout the open ocean and coastal regions of the world, generally within tropical to subtropical latitudes. Habitat and distribution vary depending on species and life stages and are discussed further in the species profiles.

Sea turtles begin their life on land, and crawl into the ocean after hatching. Little information is available regarding a sea turtle's life after hatching. Open-ocean juveniles spend an estimated 2 to 14 years drifting, foraging, and developing. Due to the general lack of knowledge of this period, it has been described as "the lost years." After this period, juvenile hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), loggerhead (*Caretta caretta*), and green (*Chelonia mydas*) turtles settle into coastal habitat (Bjorndal and Bolten 1988; NMFS and USFWS 1991). Leatherback turtles remain primarily in the open ocean throughout their lives, except for mating in coastal waters and nesting on beaches.

In general, only adult females come ashore, and then only for the purpose of nesting, returning to the ocean once their eggs have been laid. All species have the ability to migrate long distances across large expanses of the open ocean, primarily between nesting and feeding grounds (NMFS and USFWS 2009).

Foraging habitats for several species occur in the project area and nesting habitat for loggerhead turtles, green turtles, and leatherback turtles occur adjacent to the project area. Additionally, because the project area extends into open water, migratory pathways for non-nesting species or individuals may be impacted.

Because acoustic impacts are one of the possible effects of the proposed action, a brief discussion of sea turtle hearing is merited. Investigations suggest that sea turtle hearing is limited to low-frequency sounds, such as the sounds of waves breaking on a beach and the lower range of the broad band sounds produced by pile driving. For more detail on sounds produced by the proposed action, see Section 3.4.3 Marine Mammal Environmental Consequences.

The role of underwater low-frequency hearing in sea turtles is unclear. Sea turtles may use acoustic signals from their environment as guideposts during migration and as cues to identify their natal beaches (Lenhardt et al. 1983). Sea turtles are low-frequency hearing specialists, typically hearing frequencies from 30 to 2,000 Hertz (Hz), with a range of maximum sensitivity between 100 and 800 Hz (Bartol and Ketten 2006; Bartol et al. 1999; Lenhardt 2002; Lenhardt 1994; Ridgway et al. 1969).

The sections that follow contain specific details on the five species of sea turtles and their occurrence in the project area. General threats to sea turtles populations are covered in Chapter 5 (Cumulative Impacts).

3.8.2.1 Green Sea Turtle

3.8.2.1.1 Status and Management

Green sea turtle populations are listed separately under the ESA: the Florida and Mexico Pacific coast breeding colonies, and sea turtles from all other populations. The Florida and Mexico Pacific coast breeding colonies are designated as endangered and all other colonies are designated as threatened (NMFS 1978). Individuals from both threatened and endangered populations may be present in the project area. As of the 2007 status report, NMFS and the USFWS determined that the current population listing remains valid (NMFS and USFWS 2007a). Critical habitat for the green turtle has been designated, but does not occur in or near the project area.

3.8.2.1.2 Habitat and Geographic Range

The green sea turtle is distributed worldwide across tropical and subtropical coastal waters between 45° N and 40° S (The State of the World's Sea Turtles Team 2011). After emerging from the nest, green turtle hatchlings swim to offshore areas where they float passively in major current systems. At the juvenile stage (estimated at 5 to 6 years) they leave the open-ocean habitat and retreat to protected lagoons and open coastal areas that are rich in seagrass or marine algae (Bresette et al. 2006), where they will spend most of their lives (Bjorndal and Bolten 1988).

Along Florida’s Atlantic coast, juvenile green turtles occur in high-wave-energy, nearshore reef environments less than 2 m deep that support an abundance of macroalgae and submerged aquatic vegetation (Holloway-Adkins 2006). Adult green turtles can also utilize these habitats in between migrations for mating and nesting.

Occasional green turtle nesting occurs in Duval County, on beaches adjacent to the project area. Nesting season varies with locality; in the project area, the season is roughly June to September (NMFS and USFWS 2007a).

3.8.2.1.3 Population and Abundance

An annual average of 8,927 green sea turtles nested in Florida from 2006 to 2010, making this the second largest green sea turtle nesting population in the wider Caribbean FWC Fish and Wildlife Research Institute 2011b; Meylan et al. 2006). In 2012, only one green turtle nest was laid in Duval County. This is comparable to the past five years of nesting data available

(FWC Fish and Wildlife Research Institute 2012). The nest was not on a NAVSTA Mayport beach, however green turtles have nested there as recently as 2011.

Generally, nesting trends in the Western Atlantic Ocean are stable to increasing and are increasing in Florida (NMFS and USFWS 2007a). Green turtles have been recorded in the turning basin (USACE 2001), though in-water abundance for the region and along the Atlantic coast remains unavailable (NMFS and USFWS 2007a). In addition to individuals from the Florida nesting population, adult and juvenile males and females from nesting colonies in the wider Caribbean could occur in the waters of the project area.

3.8.2.1.4 Predator / Prey Interaction and Foraging

The green sea turtle is the only species of sea turtle that, as a subadult and adult, primarily consumes plants and other types of vegetation (Mortimer 1995). Very young green sea turtles are omnivorous (Bjorndal 1997). Salmon et al. (2004) reported that post-hatchling green sea turtles were found to feed near the surface on seagrasses or at shallow depths on small jellyfish and fish eggs. Pelagic juveniles eat worms, young crustaceans, aquatic insects, grasses, and algae (Bjorndal 1997).

The loss of eggs to land-based predators such as mammals, snakes, crabs, and ants occurs on some nesting beaches globally, though this is less of an issue in Florida due to intense nest protection efforts. As with other sea turtles, hatchlings may be preyed on by birds and fish. Sharks are the primary nonhuman predators of juvenile and adult green sea turtles at sea (NMFS and USFWS 1991).

3.8.2.1.5 Critical Habitat

Critical habitat for the green turtle was designated in 1998 (63 FR 46693), but does not occur in or near the action area.

3.8.2.2 Hawksbill Sea Turtle

3.8.2.2.1 Status and Management

The hawksbill turtle is listed as endangered under the ESA (Bureau of Sport Fisheries and Wildlife 1970). While the current listing as a single global population remains valid, data may support separating populations at least by ocean basin under the distinct population segment policy (NMFS and USFWS 2007b). Critical habitat has been designated for hawksbill turtles, but does not occur in or adjacent to the project area.

3.8.2.2.2 Habitat and Geographic Range

The hawksbill is the most tropical of the world’s sea turtles, rarely occurring above 35° N or below 30° S (The State of the World's Sea Turtles Team 2008; Witzell 1983). Hatchlings are believed to occupy open-ocean waters, associating themselves with surface algal mats in the Atlantic Ocean (Parker 1995; Witherington and Hirama 2006; Witzell 1983). Juveniles leave the open-ocean habitat after 3 to 4 years and settle in coastal foraging areas, typically coral reefs (Mortimer and Donnelly 2008). Juveniles and adults share the same foraging areas, including tropical nearshore waters associated with coral reefs, hardbottoms, or estuaries with mangroves (Musick and Limpus 1997).

Hawksbill turtles occur regularly in the nearshore waters of southern Florida NMFS and USFWS 2007b). Sightings north of Florida are rare, and Texas is the only other state where hawksbills are sighted with any regularity (Keinath et al. 1991; Lee and Palmer 1981; Parker 1995; Plotkin 1995). Extremely rare nesting may occur in Duval County where the project area is located but has not been documented.

3.8.2.2.3 Population and Abundance

The 2007 five-year review (NMFS and USFWS 2007b) assessed nesting abundance and nesting trends in all regions inhabited by hawksbill turtles. An analysis of 25 index sites around the world indicated that hawksbill nesting has declined globally by at least 80 percent over the last three hawksbill generations (Meylan and Donnelly 1999). In the wider Caribbean, population trends vary, and trends are not known for many locations (NMFS and USFWS 2007b).

Nesting data for Duval County or Florida are not available, as hawksbill turtles nest rarely or not at all in Florida. Hawksbill turtles are cryptic nesters (Bjorndal et al. 1985), and the rare hawksbill nest could be missed in areas with high number of other species nesting, or where beach coverage is incomplete. Because of its location north of the species' normal nesting range, and its lack of suitable juvenile and adult habitat, it is very unlikely that any hawksbill turtles will occur in the project area.

3.8.2.2.4 Predator / Prey Interaction and Foraging

Older juvenile and adult hawksbill turtles fill a unique ecological niche in marine and coastal ecosystems, feeding on sponges helps to control populations of sponges that may otherwise compete for space with reef-building corals (Hill 1998; Leon and Bjorndal 2002). Post-hatchling hawksbills feed on floating *Sargassum* in the open ocean (Plotkin and Amos 1998). During the juvenile stage, hawksbills are considered omnivorous, feeding on sponges, sea squirts, algae, molluscs, crustaceans, jellyfish, and other aquatic invertebrates (Bjorndal 1997).

As with other sea turtles, hatchlings may be preyed on by terrestrial predators upon emergence from the nest, and birds and fish at sea. Sharks are the primary nonhuman predators of juvenile and adult hawksbills at sea (Witzell 1983).

3.8.2.2.5 Critical Habitat

Critical habitat was designated for hawksbill terrestrial nesting areas in Puerto Rico in 1982 (47 FR 27295), but it does not occur in or near the action area.

3.8.2.3 Kemp's Ridley Sea Turtle

3.8.2.3.1 Status and Management

The Kemp's ridley sea turtle is listed as a single population and is classified as endangered under the ESA (Bureau of Sport Fisheries and Wildlife 1970). The NMFS and the USFWS are currently reviewing a petition to designate critical habitat for Kemp's ridley sea turtles for nesting beaches along the Texas coast and marine habitats in the Gulf of Mexico and Atlantic Ocean (WildEarth Guardians 2010); however, there is no critical habitat currently designated for this species.

3.8.2.3.2 Habitat and Geographic Range

The Kemp's ridley sea turtle is found only in the Gulf of Mexico and North Atlantic Ocean, north of the Caribbean Sea. Habitats frequently used by juvenile and adult Kemp's ridley sea turtles are warm-temperate to subtropical sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters, where their preferred food, the blue crab, is abundant (Lutcavage and Musick 1985; Seney and Musick 2005). Juveniles migrate to habitats along the U.S. Atlantic continental shelf from Florida to New England (Morreale and Standora 1998; Peña 2006) at around 2 years of age.

Adult female Kemp's ridley sea turtles take part in mass synchronized nesting emergences known as "arribadas" on only a few nesting beaches; this nesting strategy is unique to *Lepidochelys* spp. Kemp's ridley turtles may also be solitary nesters, but this is less common and generally occurs outside of the main nesting areas in Mexico. Only rare nesting is known to occur on the east coast of Florida, and has not been documented in Duval County in the last 25 years (FWRI 2012). Nesting is not expected to occur near the project area.

3.8.2.3.3 Population and Abundance

An estimated 5,500 females nest each season in the Gulf of Mexico (NMFS and USFWS 2011a). Given the current population growth rate, the population could increase to 10,000 nesting females by 2015 (Heppell et al. 2005). In 2009, a record 127 nests were recorded in Texas, 73 of which were documented at Padre Island National Seashore (National Park Service 2011).

Kemp's ridley turtles have been recorded in nearby Kings Bay, Georgia and therefore may be present in the NAVSTA Mayport turning basin (USACE 2006). Occurrences within the turning basin are expected to be seasonal, uncommon, rare, and correlated with presence of preferred prey species.

3.8.2.3.4 Predator / Prey Interaction and Foraging

Kemp's ridley sea turtles feed primarily on crabs but are also known to prey on molluscs, shrimp, fish, jellyfish, and plant material (Frick et al. 1999; Marquez-M. 1994). Blue crabs and spider crabs are important prey species for the Kemp's ridley (Keinath et al. 1987; Lutcavage and Musick 1985; Seney and Musick 2005).

Major predators of Kemp's ridley sea turtle eggs and hatchlings on nesting beaches include raccoons, dogs, pigs, skunks, badgers, and fire ants. Predatory fishes such as jackfish and redfish may feed on hatchlings at sea. Sharks are the primary predator of juvenile and adult Kemp's ridley sea turtles (NMFS and USFWS 2011a).

3.8.2.3.5 Critical Habitat

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.

3.8.2.4 Loggerhead Sea Turtle

3.8.2.4.1 Status and Management

In 2009, a status review conducted for the loggerhead identified nine distinct population segments within the global population (Conant et al. 2009). In a September 2011 rulemaking, the NMFS and USFWS listed five of these distinct population segments as endangered and kept four as threatened under the ESA (NMFS 2011b). The Northwest Atlantic Ocean distinct population segment, listed as threatened, is the only one that occurs within the project area. No critical habitat is currently listed for the loggerhead, but the petitions that were submitted to NMFS requesting to list the distinct population segments also requested that critical habitat be designated after any listing revision (NOAA 2010).

3.8.2.4.2 Habitat and Geographic Range

Loggerhead sea turtles occur in U.S. waters in habitats ranging from coastal estuaries to waters far beyond the continental shelf (Dodd 1988). At emergence, hatchlings swim to offshore currents and remain in the open ocean, often associating with floating mats of *Sargassum* (Carr 1986, 1987; Witherington and Hirama 2006). Migration between oceanic and nearshore habitats occurs during the juvenile stage as turtles move seasonally from open-ocean current systems to nearshore foraging areas where they will settle as adults (Bolten 2003; Mansfield 2006).

In the southeastern United States, nesting season for loggerheads takes place from May to October (FWC 2007a). Large nesting colonies exist in Florida, with more limited nesting along the Gulf Coast and north through Virginia. Duval County hosts a moderate amount of nesting on beaches throughout the county. NAVSTA Mayport itself has several suitable nesting beaches that see regular, small amounts of nesting each season (Allen and Loop pers. comm. 2013).

Limited foraging habitat for juveniles and adults exists in the project area. In the turning basin and navigation channel, the muddy bottom provides habitat for invertebrates which are a major food source for loggerhead turtles.

3.8.2.4.3 Population and Abundance

Annual nesting totals of loggerheads on the U.S. Atlantic and gulf coasts fluctuated between 47,000 and 90,000 nests, with an average of 70,880 nests from 1989 to 2007 (NMFS and USFWS 2009). Annual totals for the Peninsular Florida Recovery Unit averaged 64,513 nests from 1989-2007. Analysis of index nesting beach survey data has shown a decline in nesting. Results indicated that there has been a decrease of 26 percent over the 20-year period from 1989 - 2008 and a 41 percent decline since 1998. The mean annual rate of decline for the 20-year period was 1.6 percent.

Surveys conducted in 2012 identified 187 loggerhead nests along Duval County beaches, a six year maximum (FWC 2013). Loggerheads have historically nested on NAVSTA Mayport beaches and continue to do so each year. In 2012, 11 nests were documented at the installation (Allen and Loop pers. comm. 2013). In-water abundances of loggerhead turtles in the action area are unknown. However, given presence of nesting and foraging habitat nearby, loggerhead turtles can be expected to occur regularly in the action area.

3.8.2.4.4 Predator / Prey Interaction and Foraging

Juvenile and subadult loggerhead turtles are omnivorous, foraging on crabs, molluscs, jellyfish, and vegetation captured at or near the surface (Dodd 1988). Adult loggerhead sea turtles are generalized carnivores that forage on nearshore bottom-dwelling invertebrates (molluscs, crustaceans, and anemones) and sometimes fish (Dodd 1988).

Globally, common predators of eggs and hatchlings on nesting beaches are ghost crabs, raccoons, feral pigs, foxes, coyotes, armadillos, and fire ants (Dodd 1988), though this is less of an issue in Florida due to intense nest protection efforts. In the water, hatchlings are susceptible to predation by birds and fish. Sharks are the primary predator of juvenile and adult loggerhead sea turtles (Fergusson et al. 2000; Simpfendorfer et al. 2001).

3.8.2.4.5 Critical Habitat

No critical habitat is listed for the loggerhead, but the petitions that were submitted to NMFS requesting to list the distinct population segments also requested that critical habitat be designated after any listing revision (National Oceanic and Atmospheric Administration 2010).

3.8.2.5 Leatherback Sea Turtle

3.8.2.5.1 Status and Management

The leatherback sea turtle is listed as a single population and is classified as endangered under the ESA (Bureau of Sport Fisheries and Wildlife 1970). Although the USFWS and NMFS believe the current listing is valid, preliminary information indicates an analysis and review of the species should be conducted under the distinct population segment policy (NMFS and USFWS 2007d). Critical habitat has been designated for this species, but does not occur in or near the vicinity of the project area.

3.8.2.5.2 Habitat and Geographic Range

Upwelling areas serve as nursery grounds for post-hatchling and early juvenile leatherback sea turtles because these areas provide a high level of prey (Musick and Limpus 1997). 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 (Frazier 2001).

In Florida, nesting begins around March and continues through July or August. Suitable nesting habitat occurs throughout Duval County and on the beaches of NAVSTA Mayport. The waters of the project area exterior to the turning basin may serve as nearshore foraging habitat when their preferred prey is nearby. Leatherback turtles may also occur in the project area while migrating between nesting habitat south of the project area on their way to more productive foraging habitat in the North Atlantic.

3.8.2.5.3 Population and Abundance

Since 1989, there has been a substantial increase in the nesting population along the east coast of Florida (Turtle Expert Working Group 2007). This increase has coincided with an upsurge in the wider Caribbean population.

Nesting peaked for the Florida stock in the year 2001 with 935 nests. Leatherbacks typically nest along the beaches from Brevard County south to Broward County, south of the project area. However, they do nest in low numbers along the beaches of Duval County; six leatherback nests were documented in Duval County in 2012, a typical amount over the last five years (FWC, 2012). Single leatherback nests occurred at NAVSTA Mayport in 2009, 2011, and 2012 (Allen and Loop pers. comm. 2013).

In-water abundances for the project area are unknown. Leatherbacks from the Florida stock may occur in the nearshore waters of the project area during the nesting season. Migrating individuals from other stocks may pass through or forage in project area waters, though it is unlikely that individuals from any stock would utilize the turning basin for foraging habitat.

3.8.2.5.4 Predator / Prey Interaction and Foraging

Leatherbacks have pointed tooth-like cusps and sharp-edged jaws that are adapted for a diet of soft-bodied open-ocean prey such as jellyfish, which are their main food source (Aki et al. 1994; Bjorndal 1997; James and Herman 2001; Salmon et al. 2004). Leatherback sea turtles feed throughout the water column (Davenport 1988; Eckert et al. 1989; Eisenberg and Frazier 1983; Grant and Ferrell 1993; James et al. 2005; Salmon et al. 2004).

Globally, predators of leatherback sea turtles eggs and hatchlings include feral pigs, dogs, raccoons, ghost crabs, and fire ants, though this is less of an issue in Florida due to intense nest protection efforts. As with other sea turtle species, leatherback hatchlings are preyed on by birds and large fish such as tarpon and snapper. Sharks and killer whales are predators of adult leatherbacks (NMFS and USFWS 2007d).

3.8.2.5.5 Critical Habitat

Critical habitat was designated for the leatherback's terrestrial environment on St. Croix in 1978. Revision to the critical habitat designation is currently underway. There is no critical habitat in the vicinity of the Wharf C-2 project.

3.8.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 (Discussion of Alternatives) could potentially impact sea turtles known or suspected to occur within the project area. Refer to Section 2.1.2 Action Alternative for a general description of the proposed action, including duration, location, and construction practices.

Impacts to sea turtles can be broadly classified into two categories: direct and indirect. Direct impacts affect individuals in the form of behavioral disturbances, physical injury, or even death, and occur at the time of the action. Indirect impacts affect through pathways such as habitat destruction and loss of prey and only affect individuals after the action has occurred.

Direct impacts to sea turtles associated with the Proposed Action are possible behavioral disturbances or physical injuries caused by pile driving noise and physical strikes during dredging activities. Possible indirect impacts may include loss or degradation of benthic and migratory habitat, decreased water quality, lighting, and reduced prey availability. No loss of nesting substrate is anticipated. Because acoustic effects are anticipated it is important to understand how sea turtles react to sounds in the water.

3.8.3.1 Sea Turtle Acoustic Threshold Criteria

The Navy considers two primary categories of sound sources in its analyses of sound impacts on sea turtles: impulsive sources (e.g., impact pile driving) and non-impulsive sources (e.g., vibratory pile driving). For a general description of underwater sound, the sound produced by the proposed action, and the assumptions used to generate source levels, see Section 3.4.3 Marine Mammal Environmental Consequences. Possible effects of sound from pile driving range from behavioral effects such as startle reactions and behavioral changes (e.g. ceasing foraging) to injurious effects such as temporary or permanent loss of hearing and damage to internal organs.

Acoustic impacts criteria and thresholds were developed in cooperation with NMFS for sea turtle exposures to various sound sources. Only one criteria 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 criteria was developed in cooperation with the NMFS and is not based on experimental evidence of injuries caused to sea turtles by pile driving sound but was adopted from pinniped thresholds as a precautionary measure when addressing impacts from pile driving to sea turtles. In the absence of reliable in-water density data for sea turtles, this criteria is useful for qualitatively assessing activities that impart sound to water.

Sound levels from pile driving will not reach the 190 dB re 1 μPa sound pressure level root mean square threshold (Section 3.4.3 Marine Mammal Environmental Consequences); therefore no injuries to sea turtles from sound associated with pile driving are anticipated.

There is limited data available on sea turtle behavioral reactions to sound. As such, no behavioral criterion has been adopted by the NMFS for sea turtles for pile driving sound and as such 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; and McCauley et al. 2000). As such it can be conservatively assumed that pile driving has the potential to cause startle responses, and behavioral impacts to sea turtles will be assessed qualitatively. 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.

3.8.3.2 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline conditions for marine turtles, as described above, would remain unchanged. Therefore, there would be no impacts to marine turtles from implementation of the No Action Alternative.

3.8.3.3 Proposed Action

Under the proposed action, pile driving and construction activities associated with the recapitalization of Wharf C-2 will commence. Direct and indirect impacts to sea turtles from the proposed action are discussed below, and NEPA, ESA and critical habitat conclusions are given. A detailed description of the activities associated with the proposed action is presented in Chapter2 (Discussion of Alternatives).

3.8.3.3.1 Acoustic Impacts

Anticipated sound source levels relevant to sea turtles are presented in Table 3-20. These source levels were developed using the assumptions presented in Section 3.4. Note that impact pile driving, and its associated higher source levels, will only be used when necessary. It is anticipated that impact pile driving will be used rarely, if at all. If used, no more than 20 strikes per day will occur. The overall use and duration of impact pile driving will be extremely limited.

Table 3-20. Source Levels from Pile Driving

Hammer	Pile type	RMS [dB re 1µPa at 10m]	SEL [dB re 1µPa^{2}s at 10m]
Vibratory	24" steel pipe	163	-
	12" timber	153	-
Impact	24" steel pipe	189	179
	12" timber	170	160

None of the anticipated pile driving scenarios result in the production of sound above the 190 dB re 1 µPa sound pressure level root mean square sea turtle injury criteria. Because of this, no injuries associated with sound produced by pile driving are anticipated for any species of sea turtle. However this does not preclude behavioral effects. As a precautionary measure against possible behavioral effects, a sea turtle and manatee shutdown zone of 50 ft (15 m) will be observed. If a sea turtle approaches or enters the shutdown zone, pile driving will cease and will not resume until the animal has moved out of the area. See Chapter 4 Minimization and Monitoring for more detail on best management practices and mitigation measures.

No behavior criteria for sea turtles exist but it is understood that behavioral impacts could still occur over the course of the project. In general, the distances over which behavioral disturbances can occur from sound are substantially larger than the distances at which injury can occur. See Section 3.4.3 Marine Mammal Environmental Consequences for an example of how these distances vary. In the absence of established criteria and quantitative density data, impacts can only be assessed qualitatively, based on the relative abundance of a given species and the knowledge that turtles can react to underwater sound.

Hawksbill turtles are expected to be in the project area only rarely, if at all, due to the lack of nesting, reef, and hardbottom foraging habitat. Because of this, and the limited duration of construction, no acoustic effects to hawksbill turtles are anticipated.

Green and leatherback turtles may occasionally occur in the project area while migrating to nest on nearby beaches. No waters directly off of nesting beaches will be impacted by the sound produced during the project. Green, Kemp’s ridley and leatherback turtles may pass through the project area while migrating to foraging habitats. Kemp’s ridley turtles may forage in the turning basin and navigation channel when their preferred prey, blue crabs and invertebrates, are present. Leatherback turtles may forage in the offshore portions of the project area. Presence of these species in the project area is possible, though at limited times of the year and in low numbers. Because of this, and the limited duration of construction, behavioral effects from sound produced by the proposed action are possible, but not likely.

Loggerhead turtles nest regularly in Duval County and have been found nesting on NAVSTA Mayport beaches. No waters directly off of nesting beaches will be impacted by the sound produced during the project. The turning basin and offshore portions of the project area contain their preferred prey of benthic invertebrates. They are expected to be in the project area regularly during the nesting season, and could be found foraging during other seasons. Despite the limited duration of construction activities, the number of loggerhead turtles found in the area makes it likely that some behavioral reactions, such as startle responses, from sound produced by the proposed action may occur. Given the limited duration of pile driving activities and the fact the loggerhead turtles regularly experience stimuli that cause startle responses in their natural environment, these induced behavioral reactions should not significantly disrupt an individual turtle's normal behavioral patterns or constitute harassment.

3.8.3.3.2 Physical Strikes

Dredging

Contingency clamshell dredging may occur during the preconstruction phase of the proposed action. When the clamshell is dropped, there is small chance a foraging turtle may be struck, possibly resulting in injury or death.

Previous assessments concur that clamshell dredges are the least likely to adversely affect sea turtles because they are stationary and impact very small areas at a given time. Any sea turtle injured or killed by a clamshell dredge would have to be directly beneath the bucket when it is dropped. The chances of such an occurrence are extremely low because of the limited area to be dredged and the short interval in which an impact could occur, despite the regular presence of turtles in the basin. Because this dredge type is relatively stationary and sea turtles are mobile, NMFS believes that sea turtles are capable of avoiding interactions with the aforementioned types of dredge equipment. NMFS is not aware of any information that contradicts these judgments (NMFS 2009).

Construction Vessel Strikes

Vessel movements have the potential to affect sea turtles directly by accidentally striking or disturbing individual animals. 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 collision with a boat hull or propeller (Hazel et al. 2007; Lutcavage et al. 1997). Behavioral changes in response to vessel presence include avoidance reactions, alarm/startle responses, and other behavioral and stress-related changes (such as altered swimming speed, direction of travel, resting behavior, diving activity, and respiration rate). It is not well understood whether the presence and activity of the vessel, the vessel noise, or a combination of these factors produces behavioral reactions. It seems likely that both noise and visual presence of vessels play a role in prompting reactions from these animals. The probability and significance of vessel and sea turtle interactions is dependent on several factors including numbers, types, and speeds of vessels; the regularity, duration, and spatial extent of activities; and the presence/absence and density of sea turtles.

Sea turtles in the NAVSTA Mayport turning basin and navigation channel encounter vessel traffic associated with daily operations, maintenance, and security monitoring along the waterfront, and it is assumed that individuals that frequent the waterfront have habituated to existing levels of vessel activity. Construction vessels would operate at low speeds within the relatively limited project area. Construction vessel traffic would potentially pass near sea turtles on an incidental basis, but short-term behavioral reactions to vessels are not expected to result in long-term impacts to individuals in the area (such as chronic stress), or to sea turtle populations in waters surrounding the project area.

Collisions of construction vessels and sea turtles are not expected during construction activities because vessel speeds would be low. All of the species that may occur in the Wharf C-2 project area tend to surface at regular intervals allowing for increased detectability and avoidance. Further, marine species observers will be deployed to observe sea turtle shutdown zones, and alert the contractor to shut down in-water work if sea turtles are sighted in the shutdown zone.

3.8.3.3.3 Impacts to Sea Turtle Habitat

No nesting habitat for any species will be lost due to construction activities associated with the proposed action. Wharf C-2 will have an expanded profile, however the wharf exists along an already armored shoreline and no beaches will be affected. Construction will occur during daytime hours, and no additional lighting will occur at night during the construction period.

As part of the recapitalization of the wharf, new lighting fixtures will be installed. Hatchling sea turtles use lighting cues to navigate from the beach to the ocean upon emergence from the nest. Following re-nourishment of the beach at NAVSTA Mayport in summer 2013 resulting in a raised beach profile, installation personnel became aware that light from proposed Wharf C-2 would be visible to nesting sea turtles and hatchlings at the northern end of the beach. Evidence was gathered on the night of September 20, 2013 that clearly demonstrates direct light visible from existing Wharf C-2. It is assumed that direct light from the proposed recapitalized Wharf C-2 would also be visible unless mitigation was enacted.

The Navy was able to modify its lighting plan for Wharf C-2 to eliminate direct light on the beach at NAVSTA Mayport and Hugenot Park. Four 50 ft tall (15 m) light posts each with two 8,000 watt downward facing, shielded luminaries will be installed at Wharf C-2. Luminaires will be of the full cut off type to minimize stray light. This lighting profile is greatly reduced given comparable areas surrounding the basin. The recently recapitalized Wharf C-1 utilized 18,000 watt unshielded luminaries. The new lights attempt to balance turtle safe recommendations without violating Antiterrorism Force Protection (ATFP) and Occupational Safety and Health Administration (OSHA) requirements and are a significant improvement over lighting currently emplaced at comparable locations (Wharf C-1).

The Mayport basin is already a highly industrialized area. The nearest nesting beach is in Huguenot Memorial Park across the St. Johns River 3,000 ft (1,000 m) with the NAVSTA Mayport beach the second closest. Direct light from the new luminaries would not be visible on any beaches in the project area, including Huguenot Memorial Park, NAVSTA Mayport, and the mouth of the St. Johns River. It is not anticipated that the change in the overall lighting profile will adversely affect any nearby emerging hatchlings, and will represent an improvement over existing conditions.

Foraging habitat in the water column for the Kemp's ridley, loggerhead, and leatherback turtle may be temporarily degraded by the presence of increased sound in the water (three hours per day maximum). The effects of sound in the water will be minimal and temporary, and will not permanently degrade nearby foraging habitat for sea turtles. Dredging activities as well as the increased wharf profile (approximately 15 ft [5 m]) will result in some loss of benthic foraging habitat for loggerhead turtles. However, this habitat is not of high quality, and is extremely small in proportion to the total amount of habitat available in the project area and the wider region.

Turbidity from dredging and pile driving may temporarily decrease water quality and the foraging efficacy of sea turtles, which are visual predators. The increased turbidity is expected to dissipate over a matter of hours and will not permanently degrade water quality or sea turtles' ability to forage.

NAVSTA Mayport has an approved spill prevention and control plan. As such, runoff or pollution in the water column is not expected. Pile driving activities will cause increased sediment in the water column, however this sediment will quickly settle back to the bottom of the turning basin and no more than minor, temporary effects are anticipated. For a more detailed description of effects to water quality, see Section 3.1 Sediments and Water Quality.

Because effects from the proposed action will be temporary and minor, no permanent effect to sea turtle habitat is anticipated. No designated critical habitat for any sea turtle species occurs in or near the project area and will not be affected.

3.8.3.3.4 Impacts to Sea Turtle Prey

No suitable prey for hawksbill turtles occurs in the project area and will not be affected by the proposed action.

Benthic invertebrates and blue crabs, the favored prey of loggerheads and Kemp's ridley turtles respectively, occur in the turning basin and navigation channel. Jellyfish, the favored prey of leatherback turtles may occur in the water column when conditions favor their growth. Some benthic invertebrates that live in the substrate directly adjacent to pile driving activities may be injured or killed by the physical act of piles being placed into the substrate of the turning basin or removed during dredging activities. Sound produced by pile driving may affect invertebrates both on the bottom and in the water column. However, effects of sound on invertebrates are not clearly understood. See Section 3.6 Marine Invertebrates for more detail on the effects of the proposed action to invertebrates. In general, effects to and removals of invertebrate prey species will not appreciably alter the amount of prey available in the area for loggerhead, Kemp's ridley and leatherback sea turtles.

Seagrasses, which are consumed by green turtles, are not present in or near the project area. Macroalgae, which are sometimes consumed by green turtles, could be present on the piles and armored shoreline of the project area. Macroalgae on old piles which are being removed will not be available for sea turtles to graze on. It is anticipated that macroalgae will quickly recolonize new piles and no overall loss of prey for green turtles will occur. See 3.5 Marine Vegetation for more detail on the effects to marine vegetation.

3.8.3.3.5 Conclusions

No significant amount of nesting, foraging, or migratory habitat for sea turtles will be lost or degraded from the proposed action. Additionally, few individuals will be behaviorally impacted by the proposed action and no injuries are anticipated. As such, no significant impacts to sea turtles will occur as a result of the proposed action.

3.8.3.3.5.1 Endangered Species Act

No effects to individual ESA-listed hawksbill turtles, their habitat, or their prey from the proposed action are anticipated. A no effect determination was made for hawksbill turtles.

No significant effects from pile driving activities to ESA-listed green, Kemp's ridley, or leatherback turtle habitat or prey are anticipated. No significant impacts are anticipated from dredging because of these species' limited occurrence in the turning basin. However, there is a small chance that individuals of these species may be present during in-water construction and exposed to levels of sound that could cause behavioral disturbances. As such, a may affect, not likely to adversely affect determination was made for green turtles, Kemp's ridley turtles, and leatherback turtles.

No significant effects to ESA-listed loggerhead turtle habitat or prey are anticipated. Despite the regular occurrence of loggerheads in the basin, direct impacts from dredging are not anticipated because of the very small likelihood of a loggerhead turtle and the dropping of the dredge bucket co-occurring in space and time, with the animal unable to avoid a strike. Due to the number of loggerhead turtles nesting near and foraging in the project area, it is likely that some individuals of this species may become behaviorally disturbed by sound produced by the proposed action. These behavioral disturbances are not expected to significantly change the turtle's normal behavior and rise to the level of harassment. As such, a may affect, not likely to adversely affect, determination was made for the loggerhead turtle.

Due to the wharf lightning modifications described in Section 3.8.3.3.3, the proposed action may affect, but is not likely to adversely affect, nesting and hatchling sea turtles.

No critical habitat for any ESA-listed turtle species is present in or near the project area so the proposed action will have no effect on sea turtle critical habitat.

The Navy submitted biological evaluations to the USFWS and NMFS for the Wharf C-2 Recapitalization project on May 30, 2013. USFWS concurred with the Navy's determination for nesting and hatchling sea turtles on October 31, 2013. NMFS concurred with the Navy's determination on November 12, 2013. See Appendix A for agency correspondence and Appendices G and H for biological evaluations. Appendix I contains the supplemental biological evaluation regarding lighting effects on nesting sea turtles and hatchlings.

3.9 Birds

3.9.1 Regulatory Overview

3.9.1.1 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 U.S.C. 703-712), as amended, makes it a prohibited act, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention…for the protection of migratory birds…or any part, nest, or egg of any such bird" (16 U.S.C. 703). Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, requires that all federal agencies avoid or minimize the effects of their actions on migratory birds and take active steps to protect birds and their habitat. While the proposed action is not expected to affect migratory birds, should the Navy's environmental analysis indicate a potential for the proposed action to affect migratory birds, the Navy will consult with the USFWS under the Migratory Bird Treaty Act.

3.9.1.2 Endangered Species Act

The ESA of 1973, as amended, requires that an 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.

3.9.2 Affected Environment

A variety of bird species could occur in the vicinity of the Wharf C-2 Recapitalization project area (Table 3-21); most are protected under the Migratory Bird Treaty Act (USFWS 2010a). The Migratory Bird Treaty Act established federal responsibilities for protecting nearly all migratory species of birds, 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 species listed in Table 3-21, two ESA-listed birds, and one ESA-candidate bird, are known to occur in and around NAVSTA Mayport: piping plovers and wood storks, and red knots, respectively.

Table 3-21. Potential Bird Species Occurring in the Wharf C-2 Recapitalization Project Area

Common Name	Taxonomic Group	Description
Geese, swans, dabbling and diving ducks	Anseriformes	Diverse group of geese, swans, and ducks that inhabit shallow waters, coastal areas, and deeper waters. Feed at the surface by dabbling or by diving in deeper water. Often occur in large flocks.
Loons	Gaviiformes	Superficially duck-like, fish-eating birds that capture prey by diving and underwater pursuit.
Grebes	Podicipediformes	Small diving birds, superficially duck-like. May occur in small groups.
Albatrosses, fulmars, petrels, shearwaters, and storm-petrels	Procellariiformes	Group of largely pelagic seabirds. Fly nearly continuously when at sea. Soar low over the water surface to find prey. Some species dive below the surface.
Tropicbirds, boobies, gannets, pelicans, cormorants, and frigatebirds	Pelecaniformes	Diverse group of large, fish-eating seabirds with four toes joined by webbing. Often occur in large flocks near high concentrations of bait fish.
Herons, egrets, ibis, spoonbill	Ciconiiformes	Small to medium-sized wading birds with dagger-like, down-curved, or spoon-shaped bills used to capture prey in water or mud.
Osprey, bald eagles, peregrine falcons	Accipitriformes, and Falconiformes	Large raptors that inhabit habitats with open water, including coastal areas. Feed on fish, waterfowl, or other mammals. Migrate and forage over open water.
Shorebirds, phalaropes, gulls, noddies, terns,	Charadriiformes	Diverse group of small- to medium-sized shorebirds, seabirds, and allies inhabiting coastal, nearshore,

Common Name	Taxonomic Group	Description
skimmer, skuas, jaegers, and alcids		and open-ocean waters.
Neotropical migrant songbirds, warblers, thrushes, and allies	Passeriformes Cuculiformes, Strigiformes, and Apodiformes	Largest and most diverse group of birds in North America, primarily occur in coastal, and inland areas, but often occur in large numbers over the open ocean (particularly over the Gulf of Mexico) during annual spring and fall migration periods.

3.9.2.1 Piping Plover

3.9.2.1.1 Status and Management

The piping plover (*Charadrius melodus*) is divided into two subspecies of plovers. Those that breed on the Atlantic coast of the United States and Canada belong to the Atlantic subspecies *Charadrius melodus melodus* (USFWS 2009a). The USFWS listed the Atlantic Coast piping plover population as threatened in 1985 (50 FR 50726) and has instituted a recovery plan for this shorebird species (USFWS 1996).

3.9.2.1.2 Habitat and Geographic Range

The Atlantic breeding population of piping plovers nest and breed on coastal beaches from southern Maine to North Carolina and are primarily an inhabitant of sandy shorelines in the northeastern and southeastern United States (Haig and Elliott-Smith 2004; O'Brien et al. 2006). Piping plovers nest above the high tide line on coastal beaches, sand flats at the ends of sandpits and barrier islands, gently sloping foredunes (dunes parallel to the shoreline), blowout areas behind primary dunes, and washover areas cut into or between dunes (USFWS 1996).

Individuals migrate through and winter in coastal areas of the United States from North Carolina to Texas and portions of Yucatan in Mexico and the Caribbean (USFWS 2009b). In winter, the species is only found in coastal areas using a wide variety of habitats, including mudflats and dredge spoil areas and, most commonly, sandflats (O'Brien et al. 2006). Plovers appear to prefer sandflats adjacent to inlets or passes, sandy mudflats along spits (beaches formed by currents), and overwash areas as foraging habitats. Piping plover migration routes and habitats overlap breeding and wintering habitats.

3.9.2.1.3 Population and Abundance

The 1991 international census documented 5,482 total piping plover (Haig and Elliott-Smith 2004). The 2001 total population estimate was 5,945 total birds (Haig and Elliott-Smith 2004). Coastal Atlantic United States populations have trended upward since listing, though some areas' breeding populations are remaining at depressed levels and showing little or no increase in size. Since its 1985 listing, the Atlantic Coast population estimate has increased from 790 pairs to an estimated 1,849 pairs in 2008, and the United States portion of the population has almost tripled, from approximately 550 pairs to an estimated 1,596 pairs (USFWS 2009b). Results of the 2006 international piping plover winter census showed a total of 3,355 piping plovers in the United States, with the highest counts occurring in Texas. Though the increased abundance of the Atlantic Coast plovers has reduced near-term extinction threats, geographic variation in population growth and sensitivity to survival and productivity are cause for continuing conservation concern (USFWS 2009a).

Although piping plovers do not breed in Florida, individuals from the three breeding populations winter there (USFWS 1999). The Atlantic Coast birds use Florida's Atlantic and Gulf of Mexico coastlines in the winter, including beaches in Duval County (Stevenson and Anderson 1994, Nicholls 1996). A previous winter census stated that approximately 20-30 piping plovers occur along the Atlantic coast from Duval County south to Brevard, St. Lucie, and Miami-Dade counties (Florida Natural Areas Inventory 2001). Piping plovers are infrequent visitors to NAVSTA Mayport and Duval County beaches, but were observed at NAVSTA Mayport as recently as 2007. Otherwise, they are not expected to occur routinely in the vicinity of the Wharf C-2 Recapitalization project (Labella pers. comm. 2007).

3.9.2.1.4 Predator / Prey Interaction and Foraging

Feeding habitats of breeding piping plovers include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines (line of deposited seaweed on the beach), shorelines of coastal ponds, lagoons, and salt marshes (USFWS 1996). They hunt visually using a start-and-stop running method, gleaning and probing prey from the substrate for a variety of small invertebrates (marine worms, crustaceans, mollusks, insects, and the eggs and larvae of many marine invertebrates) (USFWS 1996). Foraging occurs throughout the day and at night.

Piping plovers are preyed upon by various species. These predators, such as raccoons, foxes, skunks, and domestic and feral cats, are often associated with developed beaches and have been identified as a significant source of mortality for piping plover eggs and chicks (USFWS 2009a; Winter and Wallace 2006).

3.9.2.1.5 Critical Habitat

In 2000 and 2001, critical habitat was designated for the Great Lakes breeding population, Northern Great Plains breeding population, and wintering population of piping plovers. Designated critical habitat for wintering piping plovers is found to the north of NAVSTA Mayport, and includes a portion of the St. Johns River on Fort George Island within Huguenot Memorial Park (USFWS 2001a). The project area overlaps a small portion of piping plover critical habitat over the St. Johns River. The primary constituent elements of wintering piping plover habitats are those essential to foraging, sheltering, and roosting and are found in coastal areas containing intertidal beaches and flats and dunes above the annual high tide (66 FR 36038).

3.9.2.2 Wood Stork

3.9.2.2.1 Status and Management

Wood storks were classified as endangered by the USFWS in 1984 (49 FR 7332). A five year review was conducted in 2007 resulting in a recommendation to reclassify the species from endangered to threatened and expand their range. A DPS evaluation of the species was also recommended during this review.

3.9.2.2.2 Habitat and Geographic Range

Wood storks nest in tall trees in swamps and islands; sites protected from land-based predators are characterized as those surrounded by large expanses of open water or where the nest trees are inundated at the onset of nesting and remain inundated throughout most of the breeding cycle (USACE 2008). The breeding range for wood storks includes peninsular

Florida, the coastal plain and large river systems of Georgia and South Carolina, extending north into southern North Carolina and west to south central Georgia and the panhandle of Florida to the Ochlockonee River system. There are approximately 50 documented wood stork nesting colonies in north Florida. They are typically seen in North Florida during the nesting season from March through August. Wood storks have been observed along the entrance channel, east of the turning basin (DON 2007a). The closest wood stork nesting colony to the project site is at Cedar Point Road, approximately 4.8 miles (7.7 km) to the northwest (USFWS 2010c).

3.9.2.2.3 Population and Abundance

Surveys conducted in 2006 documented 11,279 pairs of wood storks (USFWS 2007d).

3.9.2.2.4 Predator / Prey Interaction and Foraging

Wood storks are generalists in the selection of foraging habitat and may adjust locations based on seasonal factors such as hydroperiod (Rodgers et al. 2012). Typical forage areas include freshwater marshes, narrow tidal creeks, shallow tidal pools, agricultural or roadside drainage ditches, and managed impoundments. Most foraging occurs within 13 miles from nesting colonies, although wood storks have been observed to travel up to 60 miles from nest sites to forage (USFWS 1997).Wood storks are tactile feeders, hunting by feeling for fish, crustaceans, and other prey. This strategy requires high concentrations of prey in water that is shallow enough for storks to wade (South Carolina Department of Natural Resources 2012).

3.9.2.2.5 Critical Habitat

No critical habitat has been designated for this species.

3.9.2.3 Red Knot

3.9.2.3.1 Status and Management

Red knots (*Calidris canutus*) found on the Atlantic coast of the United States and Canada belong to the subspecies *C. canutus rufa* (Harrington 2001). This subspecies of red knot was designated as a candidate species for listing under the ESA in 2006 (Niles et al. 2008).

Four petitions to emergency list the red knot have been submitted since 2004; however, the species currently remains listed as a candidate for protection under the ESA (USFWS 2010d). Candidates for listing are species that the USFWS understands to be threatened, but listing of the species is precluded by other, higher-priority listing activities. The five year goal highlighted in the species action plan is to stabilize and improve the conservation status of the species through increasing habitat protection, reducing disturbance, and protecting key resources at migration and wintering sites (Harrington 2001; USFWS 2010d). The Western Hemisphere Shorebird Reserve Network has established an international network of wetlands in an effort to protect important sites used by shorebirds, including the red knot (Tsipoura and Burger 1999).

3.9.2.3.2 Habitat and Geographic Range

The species breeds on the central Canadian arctic tundra but migrates down and winters along the Atlantic and Gulf coasts from southern New England to Florida, and as far south as South America (Harrington 2001). They would be more likely to occur in the vicinity of the Wharf C-2 project during the late summer and fall.

3.9.2.3.3 Population and Abundance

The red knot population was previously estimated at 100,000 to 150,000 individuals (Niles et al. 2008). However, population surveys during the stopover period in the spring of 1998 at Delaware Bay estimated 50,000 red knots. In 2004, the same survey was repeated and the estimated population was substantially lower at 18,000 (Niles et al. 2008). Surveys of red knots at both migration stopover sites and wintering grounds continually show substantial population declines in recent decades (USFWS 2006). Surveys of wintering red knot populations in Florida during the 2005-2006 season revealed a statewide abundance of approximately 4,000 individuals. Studies from 1994 to 2002 also show decreased annual adult survival rates related to these population declines (Niles et al. 2008). No dedicated surveys have been conducted for this species aboard NAVSTA Mayport to date; no incidental sightings have been reported.

3.9.2.3.4 Predator / Prey Interaction and Foraging

Red knots forage by surface pecking and probing for intertidal invertebrates and various species of mussels and other mollusks (Harrington 2001). 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 the second half of May (Botton et al. 1994). Red knot migration coincides with the horseshoe crabs laying their eggs, allowing birds to restore their fat reserves to continue their northward migration to their breeding grounds in the arctic (Harrington 2001; Tsipoura and Burger 1999).

3.9.2.3.5 Critical Habitat

This species is currently a candidate for listing under the ESA; as such, no critical habitat is designated.

3.9.3 Environmental Consequences

3.9.3.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline conditions for birds, as described above, would remain unchanged. Therefore, there would be no impacts to birds from implementation of the No Action Alternative.

3.9.3.2 Proposed Action

Effects to birds would result primarily from airborne pile driving noise, as described below. Airborne noise from pile driving will vary depending on the installation method, but is expected to attenuate to 65 dBA within 0.34 miles (550 m) or 0.4 miles (650 m) of the incident pile for vibratory and impact driving methods, respectively. Additional construction-related noise would result from use of heavy equipment and vehicle traffic, but these noise levels would be lower than pile driving noise levels (see Section 3.3 for noise level details). There are no established thresholds for airborne pile driving noise-related injury or disturbance impacts to terrestrial wildlife species with the exception of marbled murrelets in the Pacific Northwest.

3.9.3.2.1 Bird Acoustics and Hearing

The majority of the published literature on bird hearing focuses on terrestrial birds and their ability to hear in air. A review of 32 terrestrial and marine species reveals that birds generally have greatest hearing sensitivity between 1 and 4 kHz (Beason 2004; Dooling 2002). Very few can hear below 20 Hz, most have an upper frequency hearing limit of 10 kHz, and none exhibit hearing at frequencies higher than 15 kHz (Dooling 2002; Dooling et al. 2000). In comparison to humans, birds typically hear less well over a narrower frequency bandwidth (Dooling and Popper 2007).

Behavioral responses of birds to pile driving are not well known. Temporary threshold shift (hearing loss) (TTS) resulting from exposure to elevated sound pressure levels is typically not considered an injury effect (Popper et al. 2006), but can result in behavioral disorientation (USFWS 2008). Results of disorientation may include increased vulnerability to predators, inability to communicate with mates, or inability to identify potential prey. Other adverse behavioral effects could include flushing, aborted feeding attempts, cessation of feeding, interrupted resting attempts, and avoidance of the zone of disturbance. 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. However, observations of seabirds suggest that if fish are killed or injured as a result of pile driving, foraging birds may be attracted to the work area to feed on the fish 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 Wharf C-2 project area and be exposed to noise-related injuries or disturbance. For example, monitoring work at the Hood Canal Bridge in Washington demonstrated that marbled murrelets would continue to dive and forage within 984 ft of active pile driving operations (Entranco and Hamer Environmental 2005), well within the zone of potential behavioral disturbance anticipated by USFWS (2006), indicating that foraging birds may habituate to pile driving.

Expected airborne noise levels from the proposed action are not expected to be injurious to birds within the project area. The source levels for airborne noise from pile driving (vibratory: 96 dBA at 15m; impact: 100 dBA at 11m) are well below those known to cause injury to birds in laboratory situations. Studies of TTS in captive birds indicate that long-term exposure to high levels (≥ 93 dBA) of non-impulsive noise (i.e. vibratory pile driving) or to multiple impulses over 125 dBA can cause TTS (Dooling and Popper 2007). Behavioral reactions could occur at levels below 93 dBA out to the range at which noise from the proposed action falls below ambient noise levels (Dooling and Popper 2007). Airborne ambient noise in the project area is discussed in Section 3.3.2.1, and daytime ambient noise at the Mayport waterfront is expected to average around 65 dBA. While there are no available data on noise levels in nearby natural areas (i.e. Huguenot Park), the Navy expects that these areas will have lower ambient noise levels than the industrialized waterfront at the NAVSTA Mayport turning basin.

Within the project area, birds will not be exposed to injurious noise levels, and are unlikely to experience TTS due to a lack of foraging habitat or other attractants of Wharf C-2. Based on analysis of the propagation of airborne noise from pile driving (Section 3.3.3.2.1.1) the Navy expects that noise levels from the proposed action will attenuate to ≤ 65 dBA within 0.4 miles (650 m) of Wharf C-2. Birds exposed to pile driving noise that exceeds ambient sound levels may exhibit startle responses, avoidance, or other behavioral reactions.

Modeling for sensitive noise receptors (Section 3.3.3.2.1.1) indicated that during pile driving at Wharf C-2 sound levels above 65 dBA may overlap with over-water critical habitat for piping plovers. However, this will not affect the primary constituent elements associated with the critical habitat, and no impacts associated with temporary reductions in water quality, increases in turbidity, or shifts in prey availability are anticipated. Potential noise exposure is likely to be limited to birds transiting the area in flight, and be at levels well below what would be disruptive to their behavior.

3.9.3.2.2 Conclusions

No significant impacts to bird populations are expected to result from the Wharf C-2 Recapitalization project.

3.9.3.2.2.1 Endangered Species Act

The proposed action may affect, but is not likely to adversely affect the wood stork,piping plover, and red knot. A no effect determination was made for piping plover critical habitat. The Navy submitted a biological evaluation to USFWS for the Wharf C-2 Recapitalization project on May 30, 2013. USFWS concurred with the Navy's determination on October 31, 2013. See Appendix A for agency correspondence and Appendix H for biological evaluation.

3.10 Environmental Health and Safety

3.10.1 Affected Environment

The NAVSTA Mayport turning basin is restricted from public access. Figure 1-3 indicates the restricted areas and danger zones in and around the turning basin. The restricted area and danger zone was established by the CFR, Title 33, Chapter 11, Part 334.500. This restriction is in place 24 hours a day, seven days a week. NAVSTA Mayport's approximately one mile-long beach is closed to the general public and is patrolled by the NAVSTA Mayport Security Department. As a result, recreational access, commercial fishing and other public activities, are restricted from the NAVSTA Mayport turning basin and entrance channel.

3.10.2 Environmental Consequences

3.10.2.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline conditions for environmental health and safety, as described above, would remain unchanged. Therefore, there would be no impacts to environmental health and safety from implementation of the No Action Alternative.

3.10.2.2 Proposed Action

Construction activities associated with the proposed action conducted by Navy and contractor personnel are governed by regulations established under the Navy Safety and Occupational Health Program and Occupational Safety and Health Administration. NAVSTA Mayport implements the Navy Safety and Occupational Health Program in accordance with OPNAVINST 5100.8G.

The proposed action would result in construction activities occurring within the turning basin at NAVSTA Mayport for an 18-month period beginning on or after September 30, 2013. Work would occur between one hour post-sunrise and one hour prior to sunset. The proposed action would not be expected to result in any impacts related to public environmental health and safety. Activities would not be likely to release hazardous materials to the environment. Section 3.3.3.2.1.1 provides an analysis of the effects of noise on the human environment within the project area. Adverse effects from noise would be limited to behavioral disturbance, and would not be expected to significantly impact recreational users of the St. Johns River.

A floating security barrier prevents recreational and commercial boater access to the waterfront area of the base. Boaters are allowed to pass by the security fencing but must be outside the restricted area. Since no public recreational uses occur within the project area, the proposed action would have no direct impact to recreational uses or access in the surrounding community. Therefore, there would be no significant impacts to environmental health and safety from implementation of the proposed action.

3.11 Socioeconomics

Socioeconomics is defined as the basic attributes and resources associated with the human environment, generally including factors associated with regional demographics and economic activity. This section also describes issues of environmental justice (minority and low income populations) and the protection of children. NAVSTA Mayport is bordered by the Village of Mayport to the northeast, the City of Jacksonville to the south and southwest, and Kathryn Abbey Hannah Park to the southeast. The area described includes Duval County and the City of Jacksonville, with an emphasis on NAVSTA Mayport.

3.11.1 Regulatory Overview

3.11.1.1 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was signed into law on February 11, 1994. This Executive Order requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental impacts of its programs, policies, and activities on minority and low-income populations including Native American populations. USEPA and CEQ emphasize the importance of incorporating environmental justice review in the analyses conducted by federal agencies under NEPA and of developing protective measures that avoid disproportionate environmental impacts on minority and low-income populations.

3.11.1.2 Protection of Children

The President issued Executive Order 13045, *Environmental Health Risks and Safety Risk to Children*, on April 21, 1997. This order requires each federal agency to "…make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and shall…ensure that its policies, programs, activities, and standards address disproportionate risks to children…" This order was issued because a growing body of scientific knowledge demonstrates that children may suffer disproportionately from environmental health risks and safety risks.

3.11.1.3 Navy Supplemental Environmental Planning Policy

Executive Order 12898 and Executive Order 13045 require each federal agency to identify and address impacts of their programs, policies, and activities. The Navy implemented

Executive Order 12898 and Executive Order 13045 through the Chief of Naval Operations Supplemental Environmental Planning Policy signed on September 23, 2004 which is incorporated in to the OPNAVINST 5090.1C, the current policy. This policy provides instructions for naval personnel to identify and assess stressors to, and disproportionately high and adverse impacts upon, minorities, low-income populations, and children. A component of this policy institutes processes that result in consistent and efficient consideration of environmental impacts on Navy decision-making.

3.11.2 Affected Environment

NAVSTA Mayport is located in northern Florida along the St. Johns River and the Atlantic Ocean. The base is located approximately 18 miles (29 km) east of Jacksonville, also in Duval County. According to the 2010 census, Duval County had a total population of 864,263 and the estimated 2011 population totaled 870,709. The demographic characteristics of the area are provided in Table 3-22.

Duval County is approximately 56.4 percent Caucasian with the remainder of the population (minority populations) consisting of 29.8 percent African American; 7.9 percent Hispanic origin; 4.3 percent Asian; 0.4 percent American Indian or Alaska Native; and 0.1 percent Native Hawaiian and Other Pacific Islander (United States Census Bureau 2012a). The median family income in Duval County is $60,712 and approximately 11 percent of the families are low income. Individuals living below the poverty level account for 23.8 percent of the population in Duval County (U.S. Census Bureau 2012b).

Table 3-22. Demographic Characteristics

Location	2010 Population	Estimated 2011 Population	Percent Minority	Percent Youth	Percent Low Income
City of Jacksonville	821,784	827,908	43.2 (2010)	23.9 (2010)	15.2 (2007-2011)
Duval County	864,263	870,709	42.5 (2011)	23.3 (2011)	14.2 (2006-2010)

Source: U.S. Census Bureau 2012 a, c

NAVSTA Mayport employs approximately 8,374 military personnel, 1,247 civilian personnel, and 45 contractor personnel. The estimated economic impact NAVSTA Mayport has on the surrounding community (includes Duval, Nassau, Clay, and St. John Counties) is $5.28 billion dollars and 53,721 jobs.

There are no residences in the immediate vicinity of the project area. The nearest off-base residence is approximately 1 mile west of Wharf C-2 and the closest on-base residence is approximately 1 mile southeast of Wharf C-2.

Employment characteristics for the Duval County are presented in Table 3-23. For 2007-2011, the civilian labor force in Duval County was estimated at 451,644 persons, of which an estimated 406,350 were employed. The unemployment rate was 10 percent. The armed forces accounted for 1.6 percent of total employment in Duval County overall (U.S. Census Bureau 2012b).

Table 3-23. Estimated Employment Characteristics 2007-2011

Location	Civilian Labor Force	Employment	Percent Unemployed
City of Jacksonville	427,453	383,689	10.2
Duval County	451,644	406,350	10

Source: U.S. Census Bureau 2012 b, d

Average annual employment by industry is depicted in Table 3-24. The military, specifically the Navy, is the largest employer in Duval County. As of 2011, the Navy employed 37,910 jobs, of which 12,670 directly supported NAVSTA Mayport (Jacksonville Partnership for Regional Economic Development 2012).

Table 3-24. Average Annual Employment by Industry

Employment Category	Percent by Category	
	Duval County	Florida
Natural Resource & Mining	0.1	1.2
Construction	4.6	4.6
Manufacturing	5.1	4.3
Trade, Transportation and Utilities	20.9	20.7
Information	1.8	1.9
Financial Activities	11.3	6.6
Professional & Business Services	16.7	14.6
Education & Health Services	15.1	14.9
Leisure and Hospitality	9.9	13.3
Other Services	2.6	3.3
Government	11.9	14.5

Source: Office of Economic and Demographic Research 2012

3.11.3 Environmental Consequences

3.11.3.1 No Action Alternative

Under the No Action Alternative the recapitalization of Wharf C-2 would not occur. Baseline conditions for demographics, the local community, environmental justice and the protection of children, as described above, would remain unchanged. Therefore, there would be no impacts to socioeconomics from implementation of the No Action Alternative. The No Action Alternative would not result in a finding of any disproportional impacts to minorities, low income populations, or children.

3.11.3.2 Proposed Action

The socioeconomic impacts related to construction employment would occur only for the 18-month duration of the recapitalization of Wharf C-2. The proposed action would generate very few temporary jobs and would contribute minimally to local earnings spending. This is because construction employment associated with this project would likely be accommodated by labor resources already in the region (Table 3-24). The additional population would not create undue demand on housing, schools, or other social services. As such, no permanent or long lasting socioeconomic impacts are anticipated as a result of the construction associated with the proposed action. Therefore, the proposed action would not result in a significant impact to socioeconomics.

Environmental justice concerns related to construction activity typically include: exposure to noise, safety hazards, pollutants, and other hazardous materials. Although low income and minority populations are present in the surrounding areas (see Table 3-22), none reside near the project area and, thus, would not be subject to any disproportionate impacts. Therefore, the proposed action would not result in a finding of any disproportional impacts to minorities, low-income populations, or children.

4 Minimization and Monitoring

The Navy will employ the measures listed in this section to avoid and minimize impacts to marine mammals, fish, and sea turtles; their habitats; and forage species. Best Management Practices (BMPs) are intended to avoid and minimize potential environmental impacts. BMPs and minimization measures are included in the construction contract plans and specifications and must be agreed upon by the contractor prior to any construction activities. Upon signing the contract, it becomes a legal agreement between the contractor and the Navy. Failure to follow the prescribed BMPs and minimization measures is a contract violation.

4.1 General Construction Best Management Practices

- All work will adhere to performance requirements of the Clean Water Act, Section 404 permit and Section 401 Water Quality Certification. No in-water work will begin until after issuance of regulatory authorizations.
- The construction contractor is responsible for preparation of an Environmental Protection Plan. The plan will be submitted and implemented prior to the commencement of any construction activities and is a binding component of the overall contract. The plan shall identify construction elements and recognize spill sources at the site. The plan shall outline BMPs, responsive actions in the event of a spill or release, and notification and reporting procedures. The plan shall also outline contractor management elements such as personnel responsibilities, project site security, site inspections, and training.
- No petroleum products, lime, chemicals, or other toxic or harmful materials shall be allowed to enter surface waters. Washwater resulting from washdown of equipment or work areas shall be contained for proper disposal, and shall not be discharged unless authorized.
- Equipment that enters surface waters shall be maintained to prevent any visible sheen from petroleum products.
- No oil, fuels, or chemicals shall be discharged to surface waters, or onto land where there is a potential for re-entry into surface waters will occur. Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. shall be checked regularly for leaks and will be maintained and stored properly to prevent spills.
- No cleaning solvents or chemicals used for tools or equipment cleaning shall be discharged to ground or surface waters.
- Construction materials will not be stored where high tides, wave action, or upland runoff could cause materials to enter surface waters.
- Barge operations will be restricted to tidal elevations adequate to prevent grounding of a barge.

4.2 Pile Removal and Installation Best Management Practices

- A containment boom surrounding the work area shall be used during creosote-treated pile removal to contain and collect any floating debris and sheen. In some cases, the boom may be lined with oil-absorbing material to absorbed released creosote.
- Oil-absorbent materials shall be used in the event of a spill if any oil product is observed in the water.
- All creosote-treated material and associated sediments shall be disposed of in a landfill that meets Florida environmental standards.
- Removed piles and associated sediments (if any) shall be contained on a barge. If a barge is not utilized, piles and sediments may be stored in a containment area near the construction site.
- Piles that break or are already broken below the waterline may be removed by wrapping the piles with a cable or chain and pulling them directly from the sediment with a crane. If this is not possible, they shall be removed with a clamshell bucket. To minimize disturbance to bottom sediments and splintering of piles, the contractor shall use the minimum size bucket required to pull out piles based on pile depth and substrate. The clam shell bucket shall be emptied of piles and debris on a contained barge before it is lowered into the water. If the bucket contains only sediment, the bucket shall remain closed and be lowered to the mud line and opened to redeposit the sediment. In some cases (depending on access, location, etc.), piles may be cut below the mud line and the resulting hole backfilled with clean sediment.
- Any floating debris generated during installation shall be retrieved. Any debris in a containment boom shall be removed by the end of the work day or when the boom is removed, whichever occurs first. Retrieved debris shall be disposed of at an upland disposal site.
- Whenever activities that generate sawdust, drill tailings, or wood chips from treated timbers are conducted, tarps or other containment material shall be used to prevent debris from entering the water.
- If excavation around piles to be replaced is necessary, hand tools or a siphon dredge shall be used to excavate around piles to be replaced.

4.2.1 Timing Restrictions

All in-water construction activities shall occur during daylight hours (sunrise to sunset[7]). Non in-water construction activities could occur between 6:00 a.m. and 10:00 p.m. during any time of the year.

4.3 Additional Minimization Measures for Marine Species

The following minimization measures shall be implemented during pile driving to avoid marine mammal exposure to Level A injurious noise levels generated from impact pile driving and to reduce to the lowest extent practicable exposure to Level B disturbance noise levels.

[7] Sunrise and sunset are to be determined based on the National Oceanic and Atmospheric Administration data which can be found at: http://www.srrb.noaa.gov/highlights/sunrise/sunrise.html.

4.3.1 Coordination

The Navy shall conduct a pre-construction briefing with the contractor. During the briefing, all personnel working in the Project area will watch the Navy's Marine Species Awareness Training video. Information will also be provided on how to identify piping plovers, wood storks, and red knots.

4.3.2 Acoustic Minimization Measures

Vibratory installation shall be used to the extent possible to drive steel piles to minimize higher sound pressure levels associated with impact pile driving.

4.3.3 Soft Start

The objective of a soft-start is to provide a warning and/or give animals in close proximity to pile driving a chance to leave the area prior to a vibratory or impact driver operating at full capacity; thereby, exposing fewer animals to loud underwater and airborne sounds. Should the brief use of impact pile driving be necessary, a soft start procedure shall be used.

For impact pile driving, the contractor shall provide an initial set of strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, then two subsequent sets. (The reduced energy of an individual hammer cannot be quantified because they vary by individual drivers. Also, the number of strikes will vary at reduced energy because raising the hammer at less than full power and then releasing it results in the hammer "bouncing" as it strikes the pile resulting in multiple "strikes").

4.3.4 Standard Conditions

The contractor shall adhere to all requirements of the following:

- U.S. Fish and Wildlife Services (USFWS) 2005 Standard Manatee Conditions for In-Water Work (Appendix C)
- National Marine Fisheries Services (NMFS) 2006 Sea Turtle and Smalltooth Sawfish Construction Conditions (Appendix D)
- NMFS 2012 Southeast Region Marine Mammal and Sea Turtle Viewing Guidelines (Appendix E)

- *Sea Turtle Lighting Conditions*
    - Lighting on construction equipment shall be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the nearby marine turtle nesting beach while still being consistent with human safety requirements.
    - All permanent exterior lighting fixtures associated with the wharf redevelopment should be assessed by NAVSTA Mayport Environmental Department and designed according to the NAVSTA Mayport Light Management Plan to minimize light contribution to urban sky glow which could be visible from the marine turtle nesting beach.

4.3.5 Visual Monitoring and Shutdown Procedures

A separate Marine Species Monitoring Plan is being submitted to NMFS and USFWS; it includes all details for Project monitoring efforts. Major components of the monitoring plan are summarized below.

Observers and Procedures

The Navy shall conduct a pre-construction briefing with the contractor. During the briefing, all contractor personnel working in the Project area will watch the Navy's Marine Species Awareness Training video. An informal guide (Marine Species Monitoring Plan Attachment 1) has been included with the Monitoring Plan to aid in identifying species should they be observed in the vicinity of the Project.

Marine species observers ("observers") designated by the contractor will be placed at the best vantage point(s) practicable to monitor for protected species and implement shutdown/delay procedures when applicable by calling for the shutdown to equipment operators. The observers shall have no other construction related tasks while conducting monitoring.

The contractor will adhere to all requirements of the following:

- U.S. Fish and Wildlife Service 2005 Standard Manatee Conditions for In-Water Work (Marine Species Monitoring Plan, Appendix C)
- National Marine Fisheries Service 2006 Sea Turtle and Smalltooth Sawfish Construction Conditions (Marine Species Monitoring Plan, Appendix D)
- National Marine Fisheries Service 2012 Southeast Region Marine Mammal and Sea Turtle Viewing Guidelines (Marine Species Monitoring Plan, Appendix E)

Methods

The observer(s) will monitor the shutdown zone (Figure 4-1) before, during, and after pile driving and removal.

The observer(s) will be placed at the best vantage point practicable (e.g. from a small boat, construction barges, on shore, or any other suitable location) to monitor for marine species and implement shutdown/delay procedures when applicable by calling for the shutdown to the equipment operator(s). Elevated positions are preferable; it shall be the contractor's responsibility to ensure that appropriate safety measures are implemented to protect observers on elevated observation points. If a boat is used for monitoring, the boat will maintain minimum distances from all species (should they occur) as described in National Marine Fisheries Services' 2012 Southeast Region Marine Mammal and Sea Turtle Viewing Guidelines (Marine Species Monitoring Plan Attachment 4).

During all observation periods, observers would use binoculars and the naked eye to search continuously for marine mammals;

If the shutdown zone is obscured by fog or poor lighting conditions, pile driving will not be initiated until the entire shutdown zone is visible.

The shutdown zone will be monitored for the presence of protected species before, during, and after any pile driving or removal activity.

Pre-Activity Monitoring

The shutdown zone will be monitored for 15 minutes prior to in-water construction/demolition activities. If a protected species is observed in or approaching the shutdown zone, the activity shall be delayed until the animal(s) leave the shutdown zone. Activity would resume only after the observer has determined, through re-sighting or by waiting approximately 15 minutes that the animal(s) has moved outside the shutdown zone. The observer(s) will notify the monitoring coordinator/construction foreman / point of contact (POC) when construction activities can commence.

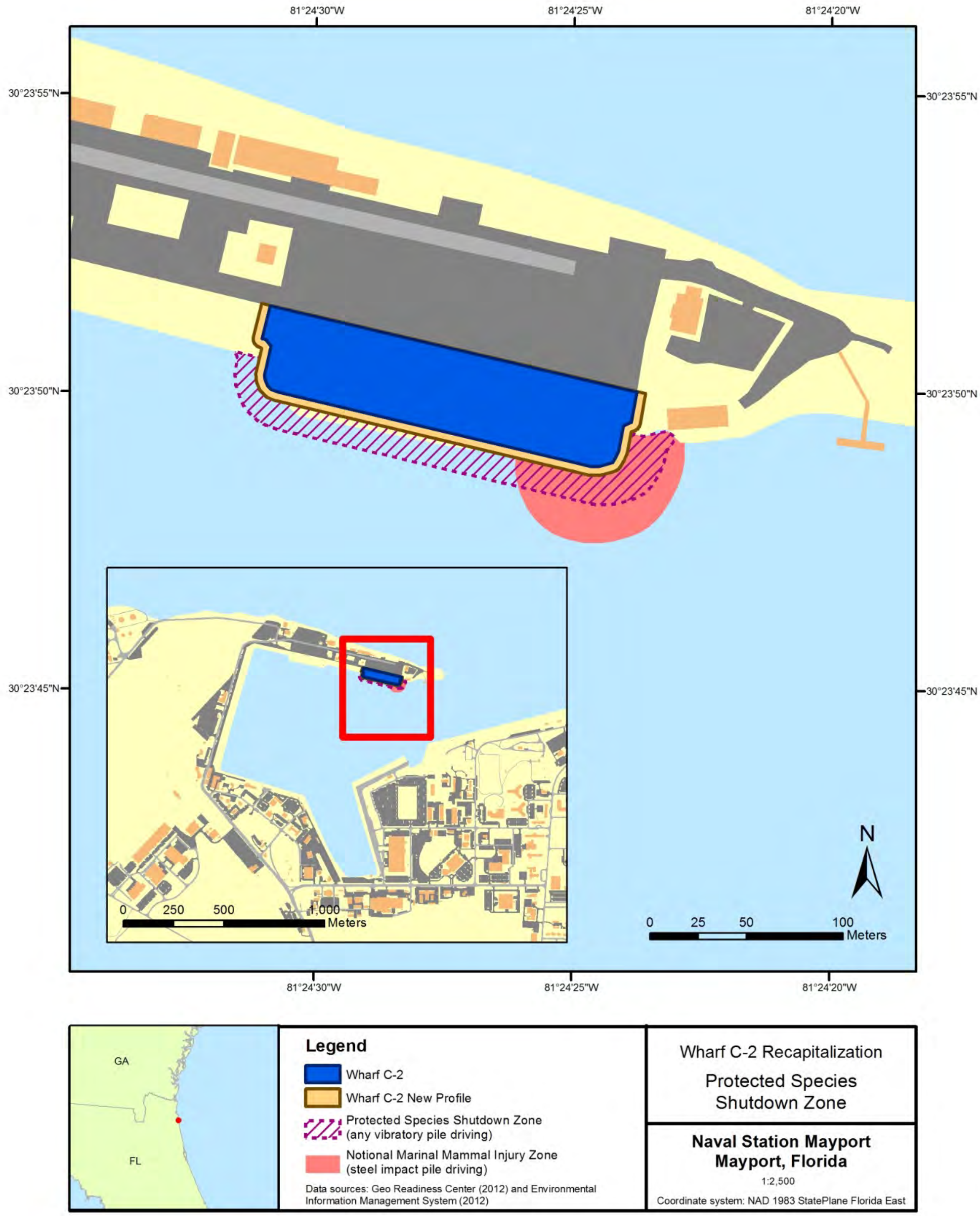

Figure 4-1. Shutdown Zones for Vibratory and (Contingency Only) Impact Pile Driving Activities

Activity Monitoring

The shutdown zone will always be a minimum of 15 m (50 ft) to prevent injury from physical interaction of protected species with construction equipment (Figure 4-1). For contingency impact pile driving, the larger 40 m (130 ft) shutdown zone (Figure 4-1) shall be implemented for marine mammals only; the standard shutdown zone will continue to be applied for all other protected species.

If a protected species approaches or enters a shutdown zone during any in-water work, activity will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without re-detection of the animal.

Bulkhead sheet pile installation shall be completed only after confirmation that no manatees or marine turtles will be trapped in the area to be filled between the existing and new bulkheads.

Post-Activity Monitoring

Monitoring of the shutdown zone will continue for 15 minutes following the completion of the activity.

4.3.6 Data Collection

The following information will be collected on sighting forms used by observers:

- Date and time that pile driving or removal begins or ends
- Construction activities occurring during each observation period
- Weather parameters identified in the acoustic monitoring (e.g., wind, temperature, percent cloud cover, and visibility)
- Tide and sea state (Marine Species Monitoring Plan Attachments 5 and 6)

If a protected species approaches or enters the shutdown zone, the following information will be recorded once shutdown procedures have been implemented:

- Species, numbers, and if possible sex and age class of the species
- Behavior patterns observed, including bearing and direction of travel
- Location of the observer and distance from the animal(s) to the observer

If possible, photographs of the animal(s) will be taken and forwarded to the Naval Facilities Engineering Command Southeast Environmental point of contact.

Data collection forms shall be furnished to the Environmental point of contact within a mutually agreeable timeframe.

4.3.7 Interagency Notification and Reporting

If the Navy encounters an injured, sick, or dead marine mammal, NMFS will be notified immediately. Such sightings will be called into the NMFS Stranding Coordinator for the Southeast:

Erin Fougeres, Ph.D.
Marine Mammal Stranding Program Administrator
NOAA Fisheries

Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
e-mail: erin.fougeres@noaa.gov
office: 727-824-5323
fax: 727-824-5309

The Navy will provide NMFS with the species or description of the animal(s), the condition of the animal (including carcass condition if the animal is dead), location, the date and time of first discovery, observed behaviors (if alive), and photo or video (if available).

Care should be taken in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In preservation of biological materials from a dead animal, the finder (i.e. marine mammal observer) has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed.

A draft report of any incidents of marine mammals entering the shutdown zone will be forwarded to NMFS / USFWS no later than 17 January 2015. A final report would be prepared and submitted to NMFS within 30 days following receipt of comments on the draft report from NMFS.

5 Cumulative Impacts

5.1 Introduction

Council of Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis within an Environmental Assessment (EA) should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). Recent CEQ guidance in considering cumulative effects involves defining the scope of the other actions and their interrelationship with the Proposed Action. The scope must consider geographical and temporal overlaps among the Proposed Action and other actions. It must also evaluate the nature of interactions among these actions.

Cumulative effects are most likely to arise when a relationship or synergy exists between the Proposed Action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in proximity to the Proposed Action would be expected to have more potential for a relationship than those more geographically separated.

To identify cumulative effects, three fundamental questions need to be addressed:

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

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the timeframe in which the effects could be expected to occur. It is possible that analysis of cumulative impacts may go beyond the scope of the project-specific direct and indirect impacts to include expanded geographic and time boundaries and a focus on broad resource sustainability. This "big picture" approach is becoming increasingly important as growing evidence suggest that the most significant impacts result not from the direct impact of a particular action, but from the combination of individual, often minor, impacts of multiple actions over time. The underlying issue is whether or not a resource can adequately recover from the impact of an action before the environment is exposed to a subsequent action or actions.

The proposed action analyzed in this EA would not make radical changes to the environment in and around the NAVSTA Mayport turning basin. Rather the proposed action would result in temporary impacts to the environment. As such, there is limited potential for the affected resources of the proposed action to interact with the affected resources of past, present, or reasonably foreseeable actions. As discussed in Chapter 3 of this EA, environmental impacts of the recapitalization of Wharf C-2 at NAVSTA Mayport result in temporary changes to the noise environment and sediment and water quality. Potential interactions with other past, present, or reasonably foreseeable actions would generally be those actions that also may have effects on the noise environment, sediment and water quality of the NAVSTA Mayport turning basin.

5.2 Past, Present, and Reasonable Foreseeable Actions

Various types of past, present, and reasonably foreseeable actions not related to the Proposed Action have the potential to affect the resources identified in Chapter 3 of the EA. The overview of these actions in this section emphasizes components of the activities that are relevant to the impact analysis in Chapter 3. Geographic distribution, intensity, duration, and historical effects of similar activities are considered when determining whether a particular activity may contribute cumulatively and significantly to the impacts of the proposed action on the resource areas identified in Chapter 3.

Based on a review of past, present, and reasonably foreseeable actions at NAVSTA Mayport and the region (Duval County), it was determined that several actions be considered when analyzing the potential cumulative impacts of the actions. The projects listed in this section are those that have the greatest potential to cumulatively impact the resources assessed in this EA. These projects are described below, and the impacts of these projects, in combination with the impacts of the proposed action, are described in Section 5.3.

5.2.1 Federal Actions

5.2.1.1 Nuclear-Powered Aircraft Carrier Homeporting at NAVSTA Mayport

In a Record of Decision dated 14 January 2009, the Navy announced it wants to establish a second Atlantic Fleet nuclear-powered aircraft carrier (CVN) home port by homeporting a CVN at NAVSTA Mayport. Later that month, following the change in administrations, Obama Administrations officials testified they would review the proposal. On 10 April 2009, the Department of Defense (DOD) announced it had decided to delay a final decision on whether to propose transferring a CVN to Mayport until it reviewed the issues as part of its 2010 Quadrennial Defense Review. The DOD's final report on the 2010 Quadrennial Defense Review, released 1 February 2010, endorsed the Navy's desire to establish a second Atlantic Fleet CVN homeport by homeporting a CVN at NAVSTA Mayport.

The proposal requires certain facility upgrades to make NAVSTA Mayport capable of homeporting a CVN, including construction of nuclear propulsion plant maintenance facilities. Dredging with the Mayport turning basin in support of the CVN homeporting has been completed.

Original Navy plans called for having NAVSTA Mayport ready to homeport a CVN in 2019. However, the current schedule is uncertain because the Navy's proposed fiscal year 2014 and out budgets defer the Navy's plan to homeport a CVN at NAVSTA Mayport. The Navy's proposed fiscal year 2016-2020 Future Years Defense Plan contain no funding for Military Construction projects required to homeport a CVN at Mayport.

5.2.1.2 Homeporting of U.S. Coast Guard National Security Cutter and Other Ships at NAVSTA Mayport

The Coast Guard is proposing to homeport the U.S. Coast Guard Cutter VALIANT at NAVSTA Mayport, possibly starting in summer 2013. VALIANT is a multi-mission, medium endurance cutter currently homeported in Miami Beach, Florida. VALIANT operates in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico for Commander, Coast Guard Atlantic Area. In November 2011, the Coast Guard also requested assistance from the Navy in determining the feasibility of homeporting several ship classes at NAVSTA Mayport, including all or some of the following:

two National Security Cutters and four additional medium endurance cutters. Potential cumulative impact issues associated with these possible actions include a slight increase in vessel traffic.

5.2.1.3 Wharf C-1 Repair at NAVSTA Mayport

A Categorical Exclusion was prepared for the repair of Wharf C-1 at NAVSTA Mayport. The Wharf C-1 was repaired by installing a new sheet pile bulkhead in front of the existing bulkhead and tying back into the existing sheet pile bulkhead. A second deck was constructed over top of the existing wharf deck.

5.2.1.4 NAVSTA Mayport Basin Dredging

The Navy currently removes approximately 900,000 cy of sediment from the NAVSTA Mayport turning basin and entrance channel every two years as part of its maintenance dredging program. Most of this material has been disposed of in the Jacksonville Ocean Dredged Material Disposal Site. Jacksonville Ocean Dredged Material Disposal Site has been in use since 1952 and NAVSTA Mayport has used the Ocean Dredged Material Disposal Site regularly since 1954.

5.2.1.5 Draft Environmental Assessment for Amphibious Assault Vehicle Training Exercises for Five Marine Force Reserve Centers

The purpose of the proposed action is to conduct Amphibious Assault Vehicle training operations at five separate Marine Corps Reserve Centers on the Gulf and East Coasts of the United States; Tampa, FL, Jacksonville, FL, Gulfport, MS, Galveston, TX, and Norfolk, VA. Marine reservists need to conduct Amphibious Assault Vehicle training in close proximity to the Marine Corps Reserve Centers in order to effectively and efficiently meet and sustain a combat ready force. The preferred alternative is to acquire the necessary real estate agreements to continue Amphibious Assault Vehicle training at all sites. In Jacksonville, FL, Mud Island is directly across from the Marine Corps splash point. This is considered the primary site for amphibious training in the St. Johns River. The Marine Corps is negotiating with the Port Authority and Corps of Engineers to use Bartram Island for one of their training sites. The island is owned by the Port Authority but portions of Bartram Island are going to be used by the Corps of Engineers for spoil disposal. The Marine Corps has made an official request to the Commanding Officer at NAVSTA Mayport to allow Amphibious Assault Vehicle training on the north end of the beach. Alternative 2, the no action alternative is the continuation of the current operations, status quo (formal agreements are not in place at all sites). Potential cumulative impact issues associated with these possible actions include a slight increase in vessel traffic in the St. Johns River inlet channel.

5.2.1.6 Atlantic Fleet Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement

The Navy is proposing to conduct training and testing activities – that may include the use of active sonar and explosives – within existing range complexes and testing ranges located along the east coast of the U.S, including the Jacksonville Range Complex. The proposed action also includes Navy surface ship and submarine sonar maintenance and testing that will take place at Navy ports and naval shipyards located along the east coast of the United States, including NAVSTA Mayport.

5.2.1.7 Construction of the Undersea Warfare Training Range

On 5 August 2009, the Navy published its Record of Decision regarding the construction of an undersea warfare training range in the Jacksonville Operating Area. Construction is anticipated to start in fiscal year 2014, and initial operational capability is anticipated in fiscal year 2019.

5.2.1.8 NAVSTA Mayport Planned Development

NAVSTA Mayport has plans for an addition to the physical fitness center, additional parking, recapitalization of Wharfs B and C, an addition to the Southeast Regional Maintenance Center facility, and aircraft refueling facilities. The NAVSTA Mayport master plan establishes a plan for continued orderly growth and development of NAVSTA Mayport. When land use constraints are taken into account, the installation is nearly completely built-out. Therefore, the master plan focuses on recapitalization efforts. Future mission activities at NAVSTA Mayport could include the homeporting of the new littoral combat ship. The HSV2, a Navy-leased ship that may serve as a potential platform for the littoral combat ship, has recently been used by U.S. Navy Southern Command operations out of NAVSTA Mayport (Clark 2007).

5.2.2 Non-Federal Actions

5.2.2.1 Jacksonville Port Authority Dames Point Marine Terminal Intermodal Container Transfer Facility Draft Environmental Assessment

The original Jacksonville Port Authority, now known as JAXPORT, was created by a special act of the Florida Legislature in 1963 to develop, maintain and market Jacksonville's port facilities. Since the creation of JAXPORT, marine port operations in Jacksonville have continued to grow. The purpose of the Intermodal Container Transfer Facility is to provide access to rail transportation for in-bound container ships, overseas shipments and shippers who use highway semi-trailers and containers, and by attracting new distribution, manufacturing, and warehousing development to its vicinity, significantly decreasing the economic and environmental cost for draying trailers and containers between the Dames Point Marine Terminal and shippers' and receivers' facilities. The Intermodal Container Transfer Facility is needed to 1) add new rail access to support operations on Dames Point and the continued growth of JAXPORT; 2) stay economically competitive in the global marketplace; and 3) stimulate economic growth and provide jobs to a depressed local economy. The proposed action would involve a five track rail yard extending from the existing CSX line, two to six rubber tired gantry cranes, a paved area for containers, and several support uses including a road and gate for truck movement of cargo, a parking area, and stormwater retention facilities (Port of Jacksonville 2012).

5.2.2.2 Village of Mayport Community and Economic Development

The Village of Mayport is the oldest, continually occupied community in Duval County. The Mayport Waterfront Partnership was created by the cities of Atlantic Beach and Jacksonville in 1997 to bring economic revitalizing to the eastern shore of Duval County. The Partnership's zone of interest includes the North Jacksonville barrier islands, the Village of Mayport, and Ft. George and Fanning Islands. In 1998, the State of Florida designated the Village of Mayport as one of the first three waterfront communities in need of revitalization. In recent years, the Partnership oversaw the installation of a $4.2 million sanitary sewer line and the upgrading of water lines in the commercial section of the Village of Mayport. Also, the Waterfront Partnership wrote and sponsored the Mayport Village Overlay Zone Regulations, which provide protection for characteristics unique to the village (City of Jacksonville 2012).

5.2.2.3 Commercial Fishing

Commercial fishing can adversely affect fish populations, other species, and habitats. Potential impacts of commercial fishing include overfishing of targeted species and bycatch, both of which negatively affect fish stocks and other marine resources. Bycatch is the capture of fish, marine mammals, sea turtles, seabirds, and other nontargeted species that occurs incidental to normal fishing operations. Commercial and recreational fishing have, by far, the greatest impact on fish and shellfish populations across the globe (Jackson et al. 2001, Halperin et al. 2008, Crain et al. 2009). Commercial and recreational fishing do not occur within the NAVSTA Mayport turning basin.

5.2.2.4 Marine Vessel Traffic

The nearshore areas of NAVSTA Mayport, near the Jacksonville commercial port in particular, are heavily traveled by commercial, recreational, and government marine vessels. Recreational activities in the area consist primarily of motorboating, game and sport fishing, jetskiing, waterskiing, shellfishing, shrimping, sailing, sport diving, and bird and whale watching. Recreational boats range throughout the coastal waters, depending on season and weather conditions. A commercial ferry crosses the St. Johns River between Mayport, Florida, and Fort George Island, Florida. Primary concerns for the cumulative impacts analysis include vessels striking marine mammals and sea turtles and underwater sound from ships and other vessels.

5.3 Potential Cumulative Impacts

The following analysis examines the impact on the environment that would result from the incremental impact of the proposed action in addition to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. This analysis assesses the potential for an overlap of impacts with respect to project schedules and/or affected areas. Specific information on all of the projects listed in Section 5.2 is not available, so the cumulative impacts of these actions cannot yet be quantified. Therefore, this section presents a qualitative analysis of the cumulative impacts, based on significant activities anticipated for each project (e.g., underwater noise activities).

Two resource areas (archaeological resources, and commercial and recreational fishing) have been eliminated from consideration in this EA; therefore, no disturbance to any of these resources is anticipated, and the cumulative impacts of these resources are not considered in this section.

To determine the significance of each of the cumulative impacts of the proposed action and other actions, significance was determined according to Section 1508.27 of the Environmental Quality Improvement Act of 1970, as amended [43 CFR 56003, Nov. 29, 1978]. The primary factors considered for each resource area in determining significance as used in NEPA requires considerations of both context and intensity.

8. Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

9. Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:
    a. Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
    b. The degree to which the proposed action affects public health or safety.
    c. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
    d. The degree to which the effects on the quality of the human environment are likely to be highly controversial.
    e. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
    f. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
    g. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
    h. The degree to which the action may adversely affect districts, sites, buildings, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
    i. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the ESA of 1973.
    j. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Based on the assessment of ongoing and reasonably foreseeable actions at NAVSTA Mayport, the proposed action would result in some less than significant cumulative impacts as a result of the various projects that would not be considered significant, as described below.

5.3.1 Sediments and Water Quality

Sediment impacts include changes in the transport and distribution of sediments (sedimentation) as well as changes in sediment quality or characteristics. Past, present, and future actions involving in-water construction (i.e., pile driving and dredging) in the NAVSTA Mayport turning basin have caused or will cause short-term disturbances to sediment. The periodic maintenance dredging events, similar to the deepening project, have and will create short-term suspended sediment and turbidity within the NAVSTA Mayport turning basin. However, as with the impacts to sediments resulting from the proposed action, the impacts associated with maintenance dredging will be temporary and localized. The proposed action, in combination with Navy and non-Navy past, present, and reasonably foreseeable future events would not have a significant cumulative impact on sediments.

5.3.2 Air Quality

The geographic study area for evaluating cumulative impacts to air quality is Duval County. Duval County is in attainment with all National Ambient Air Quality Standards. The emissions generated during the implementation the proposed action would be additive to other emissions generated coincidentally within the region. Compliance with the Florida State Implementation Plan will ensure that implementation of the proposed action, in combination with past, present, and future actions, would not result in a new violation of existing National Ambient Air Quality Standards, nor contribute to an increase in the frequency or severity of violations of existing National Ambient Air Quality Standards, or delay the timely attainment of any National Ambient Air Quality Standards, interim milestones, or other milestones to achieve attainment.

Emissions from the proposed action are not expected to significantly add to the cumulative impacts to existing air quality of all past, present, and reasonably foreseeable actions. This is because existing levels of criteria pollutants and greenhouse gas emissions are low, emissions from the proposed action would be localized, future point sources would be required to control emissions and the level and the type of development that would occur in the reasonably foreseeable future would not produce substantial emissions.

5.3.3 Noise

Most past, present, and future actions have generated, are generating, or would generate some type of noise, either from a facility itself, from vehicles traveling to and from a site, or from humans. Noise is typically a nuisance factor for sensitive receptors such as residences, hospitals, or parks, where quiet conditions are important, and may also affect acoustically dependent non-human species. Close proximity to high sound levels can result in physiological problems or hearing damage. Over time the trend has been for noise levels to increase as development has occurred, particularly during daytime hours when activity levels are highest.

Human actions can produce noise that is either temporary (generally associated with construction or other short-term actions) or permanent. Permanent increase in noise may result from increased activity due to new facilities and other improvements (road size, etc.). Past actions resulting in temporary noise increases in and around NAVSTA Mayport have included recapitalization of existing wharves and buildings and new construction by the Navy, the Port of Jacksonville, and the Village of Mayport. The noise contributions from these actions were temporary and ceased upon completion of the relevant projects. Cumulative effects of permanent increases in noise from past actions and temporary and permanent increases from current and future actions are addressed below, with separate discussions of airborne and underwater ambient noise environments. The cumulative impacts of underwater noise on marine mammals, fish, and birds are discussed in Sections 5.3.4, 5.3.5, and 5.3.7, respectively.

5.3.3.1 Airborne Noise

Past, present, and future actions at and around NAVSTA Mayport may cumulatively affect airborne ambient noise. Permanent increases in airborne noise from past actions have resulted from increases in aircraft, vessel and vehicle traffic and waterfront activities, and noise from these sources dominates the current daytime ambient noise environment; other noise is generated by wind, waves, and natural sources (e.g. songbirds). Current actions which may affect airborne ambient noise in the project area include existing aircraft, vehicle and vessel traffic from commercial, recreational, and military activities, day-to-day port and waterfront activities, routine biennial maintenance dredging, and training operations.

The proposed action would generate noise from equipment, industrial activities, construction vessel movement, and pile driving. All actions would occur from one hour after sunrise to one hour before sunset. The proposed action would result in a temporary increase in noise in the vicinity of the project area. The impact pile driver (which is contingency only) is expected to produce a maximum peak level of 100 dBA re 20µPa at a distance of 36 ft (11 m) from the pile (WSDOT, 2010b). The vibratory hammer would be estimated to produce noise levels of 96 dBA re 20µPa at 50 ft (15 m) (Illingworth and Rodkin 2012). Impact and vibratory hammers would never operate simultaneously. The impact and vibratory hammer would be used intermittently and would produce sound levels at or below 65 dBA around the nearest sensitive receptor at NAVSTA Mayport (the Navy's Pelican's Roost RV Park; see Section 3.3.3). Any impacts from the proposed action would be temporary and would not have a significant impact on ambient noise along the NAVSTA Mayport turning basin nor violate existing noise limits.

Future Navy and non-Navy actions will also generate airborne noise. For example, proposed homeporting of a nuclear-powered aircraft carrier (CVN) would increase airborne noise from temporary construction of maintenance facilities and increased traffic at NAVSTA Mayport. Other actions include land-based construction and recapitalization of existing facilities. The type of noise and noise levels produced by these actions would be dependent on the specific project, and the impact of these noise sources would depend on their location relative to sensitive receptors. It is likely that some of these future actions would produce nuisance noise. There are requirements to limit the level of noise produced by residential, commercial, or industrial land uses. Thus, some future development would have requirements to provide soundproofing measures.

5.3.3.2 Underwater Noise

The current underwater ambient noise environment in the NAVSTA Mayport turning basin and St. Johns River is likely to be dominated by noise from commercial, recreational, and military vessel traffic. Past Navy and non-Navy activities have increased noise levels via commercial shipping at the Port of Jacksonville, homeporting of military vessels at NAVSTA Mayport, routine biennial dredging of the turning basin, and day-to-day port activities, among other actions. Current activities which produce underwater noise include vessel traffic, port operations, and training for surface ships and submarines at NAVSTA Mayport (including pierside sonar activities).

The proposed action would have a temporary effect on underwater ambient noise levels in the project area. Pile driving would take place between one hour after sunrise and one hour prior to sunset; the primary installation method would be vibratory driving, with impact driving reserved for contingencies. Vibratory pile driving would be expected to produce noise levels up to 163 dB re 1µPa rms at 33 ft (10 m) (Illingworth & Rodkin 2012); maximum noise levels associated with impact driving would reach 189 dB re 1µPa rms at 33 ft (10 m) (WSDOT 2005). Impact and vibratory hammers would never operate simultaneously. Contingency clamshell dredging of the increased footprint area may also contribute short-term noise at significantly lower levels than impact pile driving. Any impacts from the proposed action would be temporary and would not have a significant impact on underwater ambient noise in the NAVSTA Mayport turning basin or St. Johns River.

Expected Navy and non-Navy future activities may also increase underwater noise levels in the project area. Construction associated with vessel transits, docking activities, maintenance, and training activities will temporarily impact noise levels in and around the NAVSTA Mayport turning basin. Timing of these future activities is uncertain, but increases in vessel traffic may begin as soon as the summer of 2013 with the arrival of additional Coast Guard ships at NAVSTA Mayport and may overlap with the temporary increase in noise due to the proposed action. However, because the current ambient noise environment within the project area is already dominated by anthropogenic noise from vessels, the Navy does not anticipate that there will be any significant cumulative impacts on underwater ambient noise environments due to the proposed action.

5.3.4 Marine Mammals

Operations and maintenance at the NAVSTA Mayport waterfront, such as the Wharf C-1 Recapitalization project and biennial dredging in the turning basin have likely resulted in temporary impacts such as displacement of marine mammals and their prey (forage fish and invertebrates), and temporary localized degradation of water quality. Over time, work at the NAVSTA Mayport waterfront has resulted in increased human presence, underwater and airborne noise, boat movement, and other activities, which has likely impacted some water-dependent wildlife such as marine mammals in the area. 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 anthropogenic activities suggests that cumulative effects have not been detrimental. Based on NMFS stock assessment reports, with the exception of North Atlantic right whales, population trend data for the marine mammal species that may occur in the project area are either stable or increasing in recent years (NMFS 2009a, 2010a, 2010b, 2011a, 2011b, Gubbins et al. 2003; Smith et al. 1999; FWC 2007). Because marine mammals are highly mobile, the noise impacts of the proposed action could be cumulative with underwater and airborne noise impacts to marine mammals from other actions and activities in and around Mayport. However, because the expected impacts of the proposed action on marine mammals in general would be temporary, cumulative impacts associated with pile driving noise are considered unlikely. Continued research into acoustic effects, combined with stock assessments and documentation of mortality causes, ensure that cumulative effects would be minimized. The regulatory process also ensures that each project proposing take of marine mammals is assessed in light of the status of the species and other actions affecting it in the same region. No long term, permanent impacts to populations of marine species, however, are expected, either as a result of each project or cumulatively when combined with other past, present, and reasonably foreseeable actions. Therefore, no cumulative adverse effects to marine mammals are expected.

Future Navy and non-Navy projects may have similar impacts to past and present actions including increased anthropogenic sound (both airborne and underwater), increased human presence, increased vessel traffic and other associated activities. These actions could result in behavioral impacts to local populations of marine mammals such as temporary avoidance of habitat and decreased foraging effort. Most impacts would likely be temporary and short term in nature, and are unlikely to affect the overall fitness of the animals. However, some projects such as the homeporting of the aircraft carrier and/or Coast Guard national security cutter and other ships at NAVSTA Mayport may result in more significant impacts due to longer construction timelines. Impacts to marine mammals are still expected to primarily result from behavioral disturbance from underwater sound pressure levels; however, indirect impacts to marine mammals may occur as a result of disruption of their prey base during construction and operation of the new ships' support facilities. Potential impacts to the forage fish and invertebrate prey base could include habitat disturbance or elimination, and overwater shading from new structures. Overwater shading would be long-term, but due to the existing degraded condition of the project area, further reduction in quality of habitat not expected to result in as dramatic an effect compared to similar consequences in high quality habitat. Overall reductions in habitat are expected to be minimal in comparison to the total habitat available in the waters off NAVSTA Mayport. Further, marine mammals in the area can be expected to have habituated to higher anthropogenic noise and activity levels.

With BMPs and minimization measures such as visual monitoring and use of shutdown zones implemented (Chapter 4 and Appendices B-D), cumulative impacts will not significantly affect marine mammal populations in the Wharf C-2 project area. Nevertheless, the proposed action and other future actions would contribute incrementally to cumulative marine mammal disturbance impacts at the NAVSTA Mayport waterfront. Continued adherence to the requirements of the ESA and MMPA by NAVSTA Mayport would limit disturbance to marine mammals. Further, existing regulatory mechanisms and mitigation measures would protect marine mammals and further decrease the likelihood of potential cumulative impacts to these species.

5.3.5 Marine Vegetation, Invertebrates, and Fish

In order to conduct an adequate assessment of cumulative impacts, there must first be a threshold for elevating one individually minor impact to a cumulatively large impact. The stressors of the proposed action include the demolition and reconstruction of an artificial structure and association noise impact on the water column. Given the lack of comprehensive/comparable data collection and established thresholds for these stressors, there can only be a comparison of activities with similar impacts in the local area. Other demolition and reconstruction or noise producing activities may be associated with all the current and future action noted in Sections 5.2.1 and 5.2.2., except on land and offshore areas (e.g., Construction of the Undersea Warfare Training Range).

The area of Mayport already has a highly developed shoreline in a tidally flushed ecosystem, which is a mitigating factor with regard to cumulative impacts on the local ecosystem. In other words, the threshold for cumulative physical impacts from shoreline development have probably been surpassed already; many of the shallow, nursery habitats for estuarine species have been lost to shoreline development in the lower St. Johns River estuary (NOAA Office of Response and Restoration 1997). In April 1939, the Navy Department initiated plans for this area, which included a site along the south jetties for the development of an aircraft carrier basin. In December of that year, Ribault Bay was selected as the location for such a basin. The basin was dredged to 29 ft and used by patrol craft, target and rescue boats and jeep carriers during World War II. The loss of Ribault Bay as a nursery habitat overshadows any further impacts on the area. The highly altered basin now serves as a default sanctuary for adult fishery species that find it suitable habitat (e.g., southern flounder, cobia).

The recapitalization of artificial structures around the shoreline will yield no lasting alteration of habitat for vegetation, invertebrates and fish inhabiting the area. However, the growing level of noise in the water column could be having a significant impact in terms of auditory masking of fish vocalizations, such as those of red drum and other sciaenids (i.e., drums) who spawn around inlets and estuarine waters. Based on the assessment of ongoing and reasonably foreseeable actions at NAVSTA Mayport, the proposed action may or may not result in significant cumulative impacts, in terms of noise, as a result of the various projects that would not be considered significant, as described in Section 5.2.

5.3.6 Sea Turtles

In addition to the Proposed Action and projects listed above, global and regional threats to sea turtles must be taken into account when considering cumulative impacts to sea turtles. 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 collision with a boat hull or propeller (Hazel et al. 2007; Lutcavage et al. 1997). Marine debris can also be a problem for sea turtles through entanglement or ingestion (Lazar and Gracan 2011; Macedo et al. 2011). Sea turtles can mistake debris for prey; one study found 37 percent of dead leatherback turtles to have 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.

Global climate change, with predictions of increased ocean and air temperatures as well as sea level rise, may also negatively affect turtles in all life stages from egg to adult (Griffin et al. 2007; Poloczanska et al. 2009; Santidrián Tomillo et al. 2012; Witt et al. 2007). Potential impacts include embryo death caused by high nest temperatures, skewed sex ratios because of increased sand temperature, loss of nesting habitat due to beach erosion, coastal habitat degradation (e.g., coral bleaching and disease), and spatial shifts in suitable habitat.

The above listed impacts to sea turtles are multiple orders of magnitude higher than any the Proposed Action would cause, which in general are minor and temporary. No significant cumulative impacts from the Proposed Action to any ESA-listed sea turtle species are anticipated.

5.3.7 Birds

Operations and maintenance at the NAVSTA Mayport waterfront, such as the Wharf C-1 Recapitalization project and biennial dredging in the turning basin have not likely resulted in significant impacts to piping plovers, wood storks, or red knots due to a lack of nesting and foraging habitat in the vicinity. Some impacts to non-listed diving birds may include displacement, temporary changes to pretty availability (forage fish and invertebrates), and temporary degradation of water quality. Over time, work at the NAVSTA Mayport waterfront has resulted in increased human presence, underwater and airborne noise, boat movement, and other activities, which has likely impacted some water-dependent wildlife such as some species of diving birds in the area. Marine birds typically avoid areas with continuous activity or that produce periodic impacts such as loud noises. Often, birds will return to these areas when human presence is lower or there is less activity. Increased anthropogenic noise in the underwater and in-air environment has the potential to cause behavioral reactions in birds including avoidance of certain areas. However, the abundance and coexistence of these species with existing anthropogenic activities suggests that cumulative effects have not been significant. Trend data for piping plovers and wood storks indicate that the species' population are stable or trending upward (USFWS 2007d, 2009b). Because birds are highly mobile, the noise impacts of the proposed action could be cumulative with underwater and airborne noise impacts from other actions and activities in and around Mayport. However, because the expected impacts of the proposed action on birds in general would be temporary, cumulative impacts associated with pile driving noise are considered unlikely. Continued regulation of impacts to birds under the MBTA and ESA (in the case of piping plovers, wood storks, and red knots [candidate]) to anthropogenic disturbance, combined with population monitoring, documentation of mortality causes, and research into acoustic effects, ensure that cumulative effects would be minimized. However, no long term, permanent impacts to populations of birds of any species are expected, either as a result of each project or cumulatively when combined with other past, present, and reasonably foreseeable actions. Therefore, no cumulative adverse effects to birds are expected.

Future Navy and non-Navy projects may have similar impacts to past and present actions including increased anthropogenic sound (both airborne and underwater), increased human presence, increased vessel traffic and other associated activities. These actions could result in behavioral impacts to local populations of birds such as temporary avoidance of habitat and decreased foraging effort. Most impacts would likely be temporary and short term in nature, and unlikely to affect the overall fitness of the animals. However, some projects such as the homeporting of the aircraft carrier and/or Coast Guard national security cutter and other ships at NAVSTA Mayport may result in more significant impacts due to longer construction timelines. Impacts to birds are still expected to primarily result from behavioral disturbance from underwater (in the case of diving birds) and airborne sound pressure levels. However, indirect impacts to birds may occur as a result of disruption of their prey base during construction and operation of the new ships' support facilities. Potential impacts to the forage fish and invertebrate prey base could include habitat disturbance or elimination, and overwater shading from new structures. Overwater shading would be permanent, but due to the existing degraded ecological condition of the project area, further reduction in quality of habitat not expected to result in as dramatic an effect compared to similar consequences in high quality habitat. Overall reductions in habitat are expected to be minimal in comparison to the total habitat in the areas surrounding NAVSTA Mayport. Further, birds in the area can be expected to have habituated to higher anthropogenic noise and activity levels.

With BMPs and minimization measures (Chapter 4), cumulative impacts will not significantly affect bird in the Wharf C-2 project area. Nevertheless, the proposed action and other future actions would contribute incrementally to cumulative bird disturbance impacts at the NAVSTA Mayport waterfront. Continued adherence to the requirements of the ESA and MBTA by NAVSTA Mayport would limit disturbance to birds. Further, existing regulatory mechanisms and mitigation measures would protect birds and further decrease the likelihood of potential cumulative impacts to these species.

5.3.8 Environmental Health and Safety

The geographic study area for evaluating cumulative impacts to environmental health and safety is defined as the NAVSTA Mayport turning basin and the immediate surrounding area, including portions of the St. Johns River. Environmental health and safety has the potential to be affected by activities along the St. Johns River, such as the construction of piers, docks, marinas, and other in-water and shoreline construction. These actions produce ambient and underwater noise, have the potential to stir up contaminants in the sediments, and have the potential to contaminate the water with toxins and chemicals from fuel spills and other accidental discharges.

Future Navy and non-Navy actions have the potential to affect the environmental health and safety of St. Johns River residents. Sediment contaminants, toxins and other pollutants, noise and other impacts result from in-water and shoreline construction. Although Navy actions occur in restricted areas where the public access is restricted, non-Navy actions can occur in public areas where more precautionary measures must be taken (due to increased risk to the public).

The proposed action would occur within the restricted area of the NAVSTA Mayport turning basin. As a result, there would not be any impacts to public safety or access because the public is restricted from the area. For the safety of Navy and contractor personnel, the Navy Safety and Occupational Health Program will be implemented.

Off-base residences are located approximately two miles west of the NAVSTA Mayport turning basin. The lack of adverse cumulative impacts of ambient noise is discussed in Section 5.3.3.1. Boat traffic along the St. Johns River could increase as a result of Jacksonville Port Authority Dames Point Marine Terminal Intermodal Container Transfer Facility. However, the noise impact to the NAVSTA Mayport turning basin would be expected to remain similar to existing conditions since the area is restricted from access from the public. Therefore, implementation of the proposed action in conjunction with other past, present, and future actions would not result in significant cumulative impacts to environmental health and safety.

5.3.9 Socioeconomics

The impacts associated with the proposed action would be associated with a small increase in contractor activity at NAVSTA Mayport. The proposed action would have a temporary and localized impact to employment, income, and the demand for public services. The population of Duval County would not be significantly impacted as a result of the proposed action. In addition to the proposed action, other future projects are proposed for the St. Johns River and the NAVSTA Mayport turning basin. These projects are transient and temporary in nature and would not contribute to a significant cumulative impact. The proposed action would not contribute to cumulative impacts when considered with other past, present, and future actions. This is because the small increase in staff and dependents would only have a localized impact to employment, income, and demand for public services.

The proposed action would have no impact to minority or low income populations, because there are no low income or minority populations located within the range of impacts from the project. There would be no disproportionately high and adverse environmental, human health and socioeconomic affects upon minority and low income populations, or children. Therefore, there would be no cumulative impact to environmental justice populations or the protection of children as a result the proposed action in combination with other past, present, and future actions.

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Appendix A

Agency Correspondence

DEPARTMENT OF THE NAVY
NAVAL STATION
P. O. BOX 280112
JACKSONVILLE, FLORIDA 32228-0112

5090.2
Ser N4E/0385
April 1, 2013

Certified Mail - Return Receipt Requested

Ms. Helen M. Golde
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

Dear Ms. Golde:

SUBJECT: REQUEST FOR INCIDENTAL HARASSMENT AUTHORIZATION, CHARLIE 2 WHARF RECAPITALIZATION, NAVAL STATION MAYPORT

In accordance with the Marine Mammal Protection Act (MMPA), as amended and 50 Code of Federal Regulations Part 216.106, the United States Navy requests subject Incidental Harassment Authorization (IHA) for the take of marine mammals associated with the Navy's Charlie 2 (C-2) Wharf Recapitalization Project at Naval Station (NAVSTA) Mayport, Florida, from September 30, 2013 through September 29, 2014.

The proposed action would expose marine mammals that are National Marine Fisheries Service (NMFS) trust species to sound from pile driving as needed to complete recapitalization of the wharf. Exposure would be confined to the NAVSTA Mayport turning basin and an adjacent minor portion of the St. Johns River. Enclosures (1) and (2) focus on the specific information required by NMFS for consideration of the incidental harassment request. Enclosure (3) contains electronic versions of both the IHA application and the Draft C-2 Wharf Recapitalization Environmental Assessment.

We appreciate your continued support in helping the Navy to meet its environmental responsibilities and are requesting comments be returned to our POC by May 29, 2013. The Navy's point of contact is NAVSTA Mayport Environmental Director, Ms. Cheryl Mitchell, who can be reached at E-mail cheryl.mitchell@navy.mil, or (904) 270-6070.

Sincerely,

D. F. COCHRANE
Captain, U.S. Navy
Commanding Officer

5090.2
Ser N4E/0385
April 1, 2013

Enclosures: 1. IHA application
2. Draft Environmental Assessment, Wharf C-2 Recapitalization at Naval Station Mayport, FL
3. CD-ROM with IHA application and Draft EA

Copy to:
NMFS Southeast Fisheries Science Center (Dr. Jim Bohnsack)
Chief of Naval Operations (Mr. Ron Carmichael, N45)
Commander, Navy Region Southeast (Ms. Camille Destafney, w/o encl)

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FLORIDA 32212-0030

5090
Ser EV22/0210
May 30, 2013

Mr. David Bernhart
National Marine Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701-5511

Dear Mr. Bernhart:

SUBJECT: ENDANGERED SPECIES ACT CONSULTATION FOR THE RECAPITALIZATION OF WHARF CHARLIE TWO AT NAVAL STATION MAYPORT, FLORIDA

The purpose of this consultation is to review the proposed recapitalization of Wharf Charlie Two (C-2) by the U.S. Navy (Navy) inside the turning basin at Naval Station Mayport, Florida (NAVSTA Mayport), and the potential effects on species listed under the Endangered Species Act (ESA). The review is summarized in the attached Biological Evaluation (BE) entitled: *Biological Evaluation for the Wharf C-2 Recapitalization Project at Naval Station Mayport, Florida*. NAVSTA Mayport is located in Duval County, Florida, along the south side of the mouth of the St Johns River.

A concurrent consultation is ongoing with the National Marine Fisheries Service's (NMFS) Habitat Conservation Division to review potential effects to essential fish habitat. Consultation is also ongoing with the NMFS Protected Resources Division to acquire an incidental harassment authorization for Level B harassment of bottlenose dolphins (*Tursiops truncatus*) and Atlantic spotted dolphins (*Stenella frontalis*), as the result of in-water pile driving. The U.S. Fish and Wildlife Service is also being consulted to review potential effects to ESA-listed species under its purview.

The proposed action is fully described in the May 2013 Draft Environmental Assessment (EA) entitled: *Draft Environmental Assessment, Wharf C-2 Recapitalization at Naval Station Mayport, FL*, which is an attachment to this letter. The primary potential effects to species under NMFS purview would be associated with the in-water vibratory pile driving (and contingency impact pile driving) of up to 120 steel sheet pile pairs, 119 king piles, and 50 polymeric (plastic) piles. The time required to drive each pile with a vibratory driver would be less than 60 seconds. The maximum in-water action area includes the NAVSTA Mayport turning basin and extends in a narrow band almost 7 kilometers into the Atlantic Ocean, but does not extend into the primary migration corridor of the St. Johns River (see Figure 6.1 in the attached BE for a depiction of the maximum in-water action area).

5090
Ser EV22/0210
May 30, 2013

Species under NMFS purview that are considered in the attached BE and EA include the endangered North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), shortnose sturgeon (*Acipenser brevirostrum*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), smalltooth sawfish (*Pristis pectinata*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricate*), Kemp's ridley sea turtle (*Lepidochelys kempii*) and leatherback sea turtle (*Dermochelys coriacea*), the threatened loggerhead sea turtle (*Caretta caretta*), and federal candidate species, including blueback herring (*Alosa aestivalis*), American eel (*Anguilla rostrata*), and dwarf seahorse (*Hippocampus zosterae*). There is no critical habitat in the action area.

The Navy has concluded that the proposed action will have no effect on the hawksbill sea turtle and dwarf seahorse and may affect but is not likely to adversely affect the other listed species.

Pursuant to section 7 of the ESA, we request your concurrence with these findings.

The Navy and the NMFS Protected Resources Division have a history of effective partnering and we look forward to continuing that relationship with this project.

If you have any questions or need further information, please feel free to contact Mr. Jered Jackson at commercial (904)542-6308 or by email: jered.jackson@navy.mil.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosures: 1. Biological Evaluation for the Wharf C-2 Recapitalization Project at Naval Station Mayport, FL
2. Draft Environmental Assessment, Wharf C-2 Recapitalization at Naval Station Mayport, FL

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FLORIDA 32212-0030

5090
Ser EV22/0211
May 30, 2013

Ms. Dawn Jennings
Acting Field Supervisor
U.S. Fish and Wildlife Service
7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256-7517

Dear Ms. Jennings:

SUBJECT: ENDANGERED SPECIES ACT CONSULTATION FOR THE RECAPITALIZATION OF WHARF CHARLIE TWO AT NAVAL STATION MAYPORT, FLORIDA

The purpose of this consultation is to review the proposed recapitalization of Wharf Charlie Two (C-2) by the U.S. Navy (Navy) inside the turning basin at Naval Station Mayport, Florida (NAVSTA Mayport), and the potential effects on species listed under the Endangered Species Act (ESA). The review is summarized in the attached Biological Evaluation (BE) entitled: *Biological Evaluation for the Wharf C-2 Recapitalization Project at Naval Station Mayport, Florida*. NAVSTA Mayport is located in Duval County, Florida, along the south side of the mouth of the St Johns River.

A concurrent consultation is ongoing with the National Marine Fisheries Service (NMFS) Protected Resources Division to review potential effects to ESA-listed species under its purview. The NMFS Habitat Conservation Division is also being consulted to review potential effects to essential fish habitat.

The proposed action is fully described in the May 2013 Draft Environmental Assessment (EA) entitled: *Draft Environmental Assessment, Wharf C-2 Recapitalization at Naval Station Mayport, FL*, which is an attachment to this letter. The primary potential effects to species under NMFS purview would be associated with the in-water vibratory pile driving (and contingency impact pile driving) of up to 120 steel sheet pile pairs, 119 king piles, and 50 polymeric (plastic) piles. The time required to drive each pile with a vibratory driver would be less than 60 seconds. The maximum in-water action area includes the NAVSTA Mayport turning basin and extends in a narrow band almost 7 kilometers into the Atlantic Ocean, but does not extend into the primary migration corridor of the

St. Johns River. The airborne action area extends approximately 750 meters in radius around the pile driving activity, extending nearly three quarters of the way across the surface of the St. Johns River (see Figure 5.1 in the attached BE for a depiction of the maximum in-water and airborne action areas).

Species under U.S. Fish and Wildlife Service (USFWS) purview that are considered in the attached BE and EA include the endangered West Indian manatee (*Trichechus manatus*) and wood stork (*Mycteria americana*), the threatened piping plover (*Charadrius melodus*), and the federal candidate species, red knot (*Calidris canutus* ssp. *rufa*. Critical habitat has been designated for the West Indian manatee in the action area and was also analyzed.

The Navy has concluded that the proposed action may affect but is not likely to adversely affect the listed species and will have no effect on West Indian manatee critical habitat.

Pursuant to section 7 of the ESA, we request your concurrence with these findings.

The Navy and the USFWS have a history of effective partnering and we look forward to continuing that relationship with this project.

If you have any questions or need further information, please feel free to contact Mr. Jered Jackson at commercial (904)542-6308 or by email: jered.jackson@navy.mil.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line Coordinator
By direction of the Commanding Officer

Enclosures:
1. Biological Evaluation for the Wharf C-2 Recapitalization Project at Naval Station Mayport, FL
2. Draft Environmental Assessment, Wharf C-2 Recapitalization at Naval Station Mayport, FL

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FLORIDA 32212-0030

5090
Ser EV22/0209
May 30, 2013

Mr. George Getsinger
9741 Ocean Shore Blvd.
St. Augustine, FL 32080-8618

Dear Mr. Getsinger:

SUBJECT: ESSENTIAL FISH HABITAT CONSULTATION FOR THE RECAPITALIZATION OF WHARF CHARLIE TWO AT NAVAL STATION MAYPORT, FLORIDA

The purpose of this consultation is to review the proposed recapitalization of Wharf Charlie Two (C-2) by the U.S. Navy (Navy) inside the turning basin at Naval Station Mayport, Florida (NAVSTA Mayport), and the potential effects on essential fish habitat (EFH).

A concurrent consultation is ongoing with the National Marine Fisheries Service's (NMFS) Protected Resources Division for federally-protected fish species including the endangered shortnose sturgeon (*Acipenser brevirostrum*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), and smalltooth sawfish (*Pristis pectinata*), and federal candidate blueback herring (*Alosa aestivalis*), American eel (*Anguilla rostrata*), and dwarf seahorse (*Hippocampus zosterae*); there is no designated critical habitat within the action area. Consultation is also ongoing with the NMFS Protected Resources Division to acquire an incidental harassment authorization for Level B harassment of bottlenose dolphins (*Tursiops truncatus*) and Atlantic spotted dolphins (*Stenella frontalis*) as the result of in-water pile driving.

The proposed action is fully described in the May 2013 Draft Environmental Assessment (EA) entitled: *Draft Environmental Assessment, Wharf C-2 Recapitalization at Naval Station Mayport, FL*, which is an enclosure with this letter and includes the EFH Assessment. Specifically, potential effects to EFH are assessed in sections 3.5, 3.6, and 3.7 of the enclosed Draft EA. The Navy will employ the measures described in Section 4 of the enclosed Draft EA to avoid and minimize impacts to marine mammals, fish and sea turtles, their habitats, and forage species.

Pursuant to NEPA requirements, the proposed action is not expected to have any significant impacts on unregulated fish species. Pursuant to EFH requirements of the Magnuson-Stevens Act and implementing regulations, the attached macroalgae (summer flounder EFH) will experience a temporary adverse impact. Oyster reefs (snapper-grouper EFH) will experience long-term adverse impact before regrowth of oysters on the new structures is established. Water column habitats (EFH for all managed species inhabiting the water column) will experience temporary impacts of minimum intensity.

The Navy is providing this EFH Assessment pursuant to 50 CFR 600.920(e) and requests NMFS' Conservation Recommendations to avoid and minimize adverse effects to EFH, pursuant to MSA § 305(b)(4)(A).

The Navy and the NMFS Habitat Conservation Division have a history of effective partnering and we look forward to continuing that relationship with this project that is vital to our country's national security.

If you have any questions or need further information, please feel free to contact Mr. Jered Jackson at commercial (904)542-6308 or by email: jered.jackson@navy.mil.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosure: Draft Environmental Assessment, Wharf C-2 Recapitalization at Naval Station Mayport, FL

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/244
June 14, 2013

Florida State Clearinghouse
Florida Department of Environmental Protection
Attn: Lauren P. Milligan
3900 Commonwealth Boulevard, MS 47
Tallahassee, FL 32399

Dear Ms Milligan:

SUBJECT: ENVIRONMENTAL ASSESSMENT FOR THE WHARF C-2 RECAPITALIZATION AT NAVAL STATION MAYPORT, FL

The Department of the Navy (DON) is preparing an Environmental Assessment (EA) for the Wharf C-2 recapitalization at Naval Station (NAVSTA) Mayport, Florida. The purpose of this letter is to seek comments that will assist the DON in project planning and analysis in accordance with the National Environmental Policy Act (NEPA) of 1969.

The EA will assess the potential effects of the proposed action and project alternatives. Please find enclosed seven copies of the Draft EA, as requested. Based on the information presented, the DON respectfully requests that your agency identify any specific information, issues, or concerns that should be included in the EA and would facilitate the decision-making process. We would appreciate receiving your comments no later than July 30, 2013.

If you have any questions about this project, please contact Ms. Nancy Allen, Project Manager at (904) 542-6302 or email: nancy.p.allen@navy.mil. Written comments may be sent to: Commanding Officer, Naval Facilities Engineering Command Southeast; ATTN: Ms. Nancy Allen, NEPA Compliance Section (EV21); Box 30A, Building 903; Jacksonville, FL 32212-0030. Your assistance in this project is greatly appreciated.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line Coordinator
By direction of the Commanding Officer

Enclosure: Wharf C-2 Recapitalization Draft EA

Copy to:
Commanding Officer, Naval Station Mayport

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
JACKSONVILLE, FL 32212-0030

5090
Ser EV21/0245
June 14, 2013

Florida Coastal Management Program
Department of Environmental Protection
Attn: Ms. Kelly Samek
3900 Commonwealth Boulevard
Douglas Building, Mail Station 47
Tallahassee, FL 32399-3000

Dear Ms. Samek:

SUBJECT: COASTAL CONSISTENCY DETERMINATION FOR THE PROPOSED WHARF C-2 RECAPITALIZATION AT NAVAL STATION MAYPORT, FLORIDA

The Navy has prepared a Draft Environmental Assessment (EA) to assess the potential environmental impacts that may result from the proposed Wharf C-2 Recapitalization at Naval Station Mayport, FL. In accordance with the Coastal Zone Management Act (16 United States Code [U.S.C.] § 1456(c) and 15 Code of Federal Regulations [CFR] Part 930 Subpart C), the United States Department of the Navy (Navy) requests concurrence with its Federal Consistency Determination.

The Draft EA contains detailed information and analysis of potential impacts. The Navy has reviewed Florida's Coastal Management Program in order to prepare this consistency determination. Based on the analysis, the Navy has determined the Proposed Action is consistent with Florida's Coastal Management Program. A copy of the Draft EA on compact disc has been provided for your reference as enclosure (1).

In accordance with 15 CFR 930.36, the Navy requests concurrence with this determination. The Navy consistency review is provided as enclosure (2). Please provide your response within 60 days of receiving this letter.

We look forward to your timely review of, and concurrence with, the Navy's determination. If you need additional information or have questions regarding this letter, please feel free to contact Ms. Nancy Allen at (904) 542-6302, or by email: nancy.p.allen@navy.mil.

Thank you for your time, consideration and assistance regarding this matter.

Sincerely,

C. R. DESTAFNEY, PE
Environmental Business Line
Coordinator
By direction of the
Commanding Officer

Enclosures: 1. Wharf C-2 Recapitalization Draft EA (CD)
2. Federal Consistency Review

Copy to:
Commanding Officer, Naval Station Mayport

Florida Coastal Management Program Consistency Review

Statute (Florida Statute)	Consistency	Scope
Chapter 161 *Beach and Shore Preservation*	The Proposed Action would not adversely affect beach and shore management, specifically as it pertains to: • The Coastal Construction Permit Program. • The CCCCL Permit Program. • The Coastal Zone Protection Program. The Proposed Action would not occur seaward of the CCCL and would occur within the NAVSTA Mayport turning basin property.	Authorizes the Bureau of Beaches and Coastal Systems within the FDEP to regulate construction on or seaward of the state's beaches.
Chapter 163, Part II *Growth Policy; County and Municipal Planning; Land Development Regulation*	The Proposed Action would not affect local government comprehensive plans.	Requires local governments to prepare, adopt, and implement comprehensive plans that encourage the most appropriate use of land and natural resources in a manner consistent with the public interest.
Chapter 186 *State and Regional Planning*	The Proposed Action would not affect state-level planning requirements.	Details state-level planning requirements. Requires the development of special statewide plans governing water use, land development, and transportation.
Chapter 252 *Emergency Management*	The Proposed Action would not have an effect on the ability of the state to respond to or recover from natural or man-made disasters.	Provides for planning and implementation of the state's response to, efforts to recover from, and the mitigation of natural and manmade disasters.
Chapter 253 *State Lands*	The Proposed Action would occur entirely within NAVSTA Mayport property. No state lands would be disturbed during the recapitalization of the Wharf C-2 and therefore, would not be affected.	Addresses the state's administration of public lands and property of this state and provides direction regarding the acquisition, disposal, and management of all state lands.
Chapter 258 *State Parks and Preserves*	The Proposed Action would not impact the administration or management of state parks and preserves.	Addresses administration and management of state parks and preserves.
Chapter 259 *Land Acquisition for Conservation or Recreation*	The Proposed Action would not have an effect on the acquisition of environmentally endangered and outdoor recreation lands.	Authorizes acquisition of environmentally endangered lands and outdoor recreation lands.
Chapter 260 *Florida Greenways and Trails Act*	The Proposed Action would not have an effect on the acquisition of land to create a recreational trails system.	Authorizes acquisition of land to create a recreational trails system and to facilitate management of the system.

Statute (Florida Statute)	Consistency	Scope
Chapter 267 *Historical Resources*	The Proposed Action would not affect cultural resources of the state of Florida as no known sites have been identified within the construction footprint. However, should any cultural resources be discovered during construction the activity would cease and the discovery would be immediately reported to the NAVSTA Mayport Environmental Director and the Florida State Historic Preservation Officer.	Addresses management and preservation of the state's archaeological and historical resources.
Chapter 288 *Commercial Development and Capital Improvements*	The Proposed Action would not have an effect on commercial development or capital improvements.	Provides the framework for promoting and developing the general business, trade, and tourism components of the state economy.
Chapter 334 *Transportation Administration*	The Proposed Action would not have an effect on the state's policy concerning transportation administration.	Addresses the state's policy concerning transportation administration.
Chapter 339 *Transportation Finance and Planning*	The Proposed Action would not have an effect on the finance and planning needs of the state's transportation system.	Addresses the finance and planning needs of the state's transportation system.
Chapter 373 *Water Resources*	The Proposed Action would have no effect on wetlands as none are located within or adjacent to the study area. Potential impacts to nearby surface waters from sedimentation associated with construction activities would be minimized by the use of appropriate BMPs and all applicable regulatory requirements and storm water permits would be obtained prior to any construction activities.	Addresses the state's policy concerning water resources.
Chapter 375 *Outdoor Recreation and Conservation*	The Proposed Action would not impact the state's development or evaluation of multipurpose outdoor recreation plans.	Develops comprehensive multipurpose outdoor recreation plan to document recreational supply and demand, describe current recreational opportunities, estimate need for additional recreational opportunities, and propose means to meet the identified needs (Chapter 375).
Chapter 376 *Pollutant Discharge Prevention and Removal*	All required permits would be procured and established procedures for transport, storage, and handling of hazardous materials would be followed. The Navy does not anticipate the discharge of any pollutants in the marine environment or upon surface or ground waters. In the event of a spill, a written Spill Prevention, control, and Countermeasure Plan would be followed. BMPs will be incorporated to minimize impacts to water quality.	Regulates transfer, storage, and transportation of pollutants, and cleanup of pollutant discharges.
Chapter 377	The Proposed Action would not have an	Addresses regulation, planning,

Statute (Florida Statute)	Consistency	Scope
Energy Resources	affect on the development of energy resources of the state. The Proposed Action includes demolishing existing utilities at Wharf C-2 on Navy property including lateral supply lines from utilities such as water, fuel and electric and the installation of new utilities.	and development of energy resources of the state.
Chapter 379 *Fish and Wildlife Conservation*	Individual marine mammals may be exposed to high sound pressure levels during pile removal and installation, which may result in Level B behavioral harassment. Any exposures will 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. Minimization measures are expected to reduce or avoid most potential adverse underwater impacts to marine mammals from pile driving. Nevertheless, some exposure is unavoidable. These exposures are not anticipated to have any adverse impact to North Atlantic right whales', humpback whale', Atlantic spotted dolphins', bottlenose dolphins', or West Indian manatees' population recruitment, survival, or recovery. Therefore, no significant impact to marine mammals is anticipated as a result of the Wharf C-2 Recapitalization project. A may affect, not likely to adversely affect determination was made for the North Atlantic right whales, humpback whales, and West Indian manatees because effects from temporary water quality depletion, resuspended sediments and noise are expected to be highly localized and discountable. The Navy is applying for an Incidental harassment Authorization for the first year of in-water work associated with Wharf C-2 Recapitalization project for the incidental taking of bottlenose dolphins and Atlantic spotted dolphins during pile driving activities as part of the Wharf C-2 Recapitalization project between October 2013 and September 2014. Takes would be in the form of non-lethal, temporary harassment and are expected to have a negligible impact on these species. In addition, takes would not have an unmitigable adverse impact on the availability of these species for subsistence use. The Navy also submitted a biological	Addresses the management of the wildlife resources of the state.

Statute (Florida Statute)	Consistency	Scope
	evaluation for the project in June of 2013. The Proposed Action is not expected to have any significant impacts on unregulated fish species. No significant effects from pile driving or dredging to ESA-listed loggerhead, green, Kemp's ridley or leather back turtle habitat or prey are anticipated. However, there is a small chance that individuals of these species may be present during in-water construction and exposed to levels of sound that could cause behavioral disturbances. As such, a may affect, not likely to adversely affect determination was made for green turtles, Kemp's ridley turtles and leather back turtles. No significant impacts to bird populations or unregulated fish species. The Proposed Action may affect, but is not likely to adversely affect ESA-listed sturgeon and smalltooth sawfish species. Attached macroalgae will experience temporary adverse impact, whereas oyster reefs will experience long-term adverse impact before regrowth on the new structures (pilings) is established.	
Chapter 380 *Land and Water Management*	The Proposed Action would not have an effect on land and water management policies.	Establishes land and water management policies to guide and coordinate local decisions relating to growth and development.
Chapter 381 *Public Health, General Provisions*	Construction activities associated with the proposed action are governed by regulations established in the Navy Safely and Occupation health Program and Occupation safety and Health Administration. The NAVSTA Mayport turning basin and entrance channel is restricted from public access.	Establishes public policy concerning the state's public health system.
Chapter 388 *Mosquito Control*	The Proposed Action would not affect mosquito control efforts of the state of Florida.	Addresses mosquito control efforts in the state.
Chapter 403 *Environmental Control*	The Proposed Action would comply with applicable state regulations for air and water quality, solid and hazardous waste management, pollution prevention and ecosystem management. The Navy would coordinate for all applicable permits as	Establishes public policy concerning environmental control in the state.

Statute (Florida Statute)	Consistency	Scope
	required by law.	
Chapter 553 *Building Construction Standards*	The Proposed Action would not affect the Building Construction Standards of the state of Florida. The Navy would coordinate for all applicable permits as required by law.	The purpose and intent of this act is to provide a mechanism for the uniform adoption, updating, amendment, interpretation, and enforcement of a single, unified state building code, to be called the Florida Building Code. Obtain a permit from the appropriate enforcing agency.
Chapter 582 *Soil and Water Conservation*	The NAVSTA Mayport Erosion and Sediment Control Plan and a Storm Water Pollution Prevention Plan would be followed and BMPs addressing erosion and sediment controls implement to minimize impact to soils and water quality. The Proposed Action would be consistent with the current characteristic features of the area and landscape and would not result in any changes to land use.	Provides for the control and prevention of soil erosion.
Chapter 597 Aquaculture	The Proposed Action would not have an effect on aquaculture.	It is the intent of the Legislature to enhance the growth of aquaculture in this state, while protecting Florida's environment.

CCCL = Coastal Construction Control Line; FDEP = Florida Department of Environmental Protection; ESA=Endangered Species Act

From: Jackson, Jered CIV NAVFAC SE
Sent: Thursday, July 18, 2013 8:16 AM
To: Koussis, Christine M CIV NAVFAC LANT, EV
Subject: FW: Naval Station Mayport Wharf C-2 Renovation, 16-307845-001-ES, Duval County
Signed By: jered.jackson@navy.mil

-----Original Message-----
From: John Milio [mailto:john_milio@fws.gov]
Sent: Wednesday, July 10, 2013 11:32
To: Jackson, Jered CIV NAVFAC SE
Subject: FW: Naval Station Mayport Wharf C-2 Renovation, 16-307845-001-ES, Duval County

Jered:

With the exception of the in-water sea turtle recommendations, this is where we will be going with our section 7 consultation on this project.

John

****

John F. Milio
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
E-mail: john_milio@fws.gov
http:/www.fws.gov/northflorida
7915 Baymeadows Way, Suite 200
Jacksonville, Florida 32256-7517
904.731.3098 (direct)
904.731.3336 (main)
904.731.3045 (fax)

From: Youmans, Kellie [mailto:Kellie.Youmans@MyFWC.com]
Sent: Tuesday, July 09, 2013 5:26 PM
To: Sarchet, Aaron
Cc: (Stuart.L.Santos@usace.army.mil); John Milio
Subject: Naval Station Mayport Wharf C-2 Renovation, 16-307845-001-ES, Duval County

Naval Station Mayport Wharf C-2 Renovation, 16-307845-001-ES, Duval County

Dear Aaron:

The Florida Fish and Wildlife Conservation Commission (FWC) has reviewed the referenced application and provides the following comments. The U.S. Army Corps of Engineers, Jacksonville District, has been copied on this email in compliance with the Fish and Wildlife Coordination Act.

The applicant proposes replacement of Wharf C-2 at the northeast corner of the

Mayport basin. The project is to include the construction of a new bulkhead and wharf cap waterside of the existing bulkhead, relocate and update landside utilities, reconstruction of the existing deck and a new security fence. The project won't change the existing use of Wharf C-2 for docking and servicing Naval ships or alter the number of ships that use the wharf. A new steel sheet pile bulkhead is to be installed 15.5 feet waterside of the existing bulkhead along the 629 foot wharf face. A new reinforced concrete cap and front face encasement will be constructed and the space between the existing and new bulkhead filled. New foam fenders approximately 7 feet in diameter will be installed on the bulkhead. Approximately 250 cubic yards of accumulated debris and silt buildup along the base of the existing bulkhead will be excavated from on-shore.

The Florida Manatee inhabits the waters of Duval County year round. The inshore and nearshore marine habitat of Duval County provides important foraging habitat for the Federally threatened loggerhead turtle (Caretta caretta) and the Federally endangered green turtle (Chelonia mydas), and marine turtles nest of Duval County beaches. Because this area supports vital nesting habitat during the period of May 1 through October 31, additional conservation measures associated with temporary construction and permanent exterior lighting associated with proposed facilities and structures are recommended to minimize potential impacts. It is our understanding that Trish Loop, with the NAVSTA Mayport Environmental Department, currently works to manage exterior lighting that is directly visible from the beach and is currently developing a Light Management Plan (LMP) for the base. FWC recommends that any project involving new exterior lighting or changes to existing exterior lighting be assessed by NAVSTA Mayport Environmental Department and included in or designed according to the LMP as a more comprehensive approach to light management and marine turtle protection and conservation.

It is our recommendation that the following measures, if they are made conditions to the permit, will satisfy the requirements of 373.414(1)(a)2 Florida Statutes:

1) The permittee shall comply with the following conditions intended to protect manatees and marine turtles from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of marine turtles, manatees and manatee speed zones, and the need to avoid collisions with (and injury to) these protected marine species. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees and marine turtles cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee or marine turtle movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of marine turtles and manatee(s). All in-water operations, including vessels, must be shutdown if a marine turtle or manatee comes within 50 feet of the operation. Activities will not resume until the animal(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the animal(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a marine turtle or manatee shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1-888-404-3922, and to FWC at ImperiledSpecies@myFWC.com. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service, Jacksonville 1-904-731-3336.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads Caution: Boaters must be posted. A second sign measuring at least 8 ½" by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities. These signs can be viewed at MyFWC.com/manatee. Questions concerning these signs can be sent to the email address listed above.

2) The permittee shall comply with the following conditions intended to minimize impacts to marine turtle nesting beaches:

a. Lighting on construction equipment shall be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the nearby marine turtle nesting beach while still being consistent with human safety requirements.

b. All permanent exterior lighting fixtures associated with the wharf redevelopment should be assessed by NAVSTA Mayport Environmental Department and designed according to the NAVSTA Mayport Light Management Plan to minimize light contribution to urban sky glow which could be visible from the marine turtle nesting beach.

3) To reduce the risk of a vessel crushing a manatee, the permittee shall install wharf fenders with appropriate materials to provide sufficient standoff space of at least three feet under maximum designed compression. Fenders or buoys providing a minimum standoff space of at least three feet under maximum designed compression shall also be utilized between two vessels that are moored together.

4) Bulkhead sheet pile installation shall be completed only after the permittee confirms that no manatees or marine turtles will be trapped in the area to be filled between the existing and new bulkheads.

This email is an alternative to a hard copy being sent by mail. Please contact me if you have any questions.

Kellie Youmans
Fisheries and Wildlife Biological Scientist IV
Florida Fish and Wildlife Conservation Commission
Imperiled Species Management Section
620 South Meridian Street - 6A, Tallahassee, Florida 32399-1600
Telephone: 850-922-4330
Facsimile: 850-922-4338
Kellie.Youmans@myfwc.com

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

July 22, 2013

(Sent Via Electronic email)

Colonel Alan M. Dodd
District Engineer, Jacksonville District
Regulatory Division, North Permits Branch
Department of the Army, Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Colonel Dodd:

NOAA's National Marine Fisheries Service (NMFS) reviewed the projects described in the public notice(s) listed below.

Based on the information in the public notice(s), it appears the proposed project(s) would occur in the vicinity of essential fish habitat (EFH) designated by the South Atlantic Fishery Management Council or NMFS. Present staffing levels preclude further analysis of the proposed activities and no further action is planned. This position is neither supportive of nor in opposition to authorization of the proposed work.

NOTICE NO.	APPLICANT	NOTICE DATE	DUE DATE
2002-02464 (SP-BAL)	Navy	July 11, 2013	August 1, 2013

Please note these comments do not satisfy your consultation responsibilities under section 7 of the Endangered Species Act of 1973, as amended. If the activity "may effect" listed species or critical habitat that are under the purview of NMFS, consultation should be initiated with our Protected Resources Division at the letterhead address.

Sincerely,

Pace Wilber (for)

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

MARJORY STONEMAN DOUGLAS BUILDING
3900 COMMONWEALTH BOULEVARD
TALLAHASSEE, FLORIDA 32399-3000

RICK SCOTT
GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

July 30, 2013

Ms. Nancy P. Allen, NEPA Compliance Manager
NEPA Compliance Section (Code EV21)
Naval Facilities Engineering Command Southeast
Box 30A, Building 903
Jacksonville, FL 32212-0030

RE: Department of the Navy – Draft Environmental Assessment for the Wharf C-2 Recapitalization Project at Naval Station Mayport – Jacksonville, Duval County, Florida.
SAI # FL201306196632C

Dear Ms. Allen:

The Florida State Clearinghouse has coordinated a review of the subject Draft Environmental Assessment (EA) under the following authorities: Presidential Executive Order 12372; Section 403.061(42), *Florida Statutes*; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

The Florida Department of Environmental Protection's (DEP) Northeast District Office in Jacksonville advises that Environmental Resources Permitting Section staff issued Environmental Resource Permit No. 16-307845-001-ES to the Navy on July 18, 2013, for the Naval Station Mayport, Wharf C-2 Renovation project.

In addition, DEP's Division of Waste Management, Waste Cleanup Program staff also notes the following:

- When at all possible and practicable, please coordinate with the following groups during the demolition and construction project:

  1) Cheryl L. Mitchell, Environmental Director, NAVSTA Mayport Environmental Division, Public Works Office;

  2) Robbie Darby, P.E., Environmental Restoration Program Head, NAVFAC Southeast; and

  3) The NAVSTA Mayport Partnering Team (NAVSTA Mayport facility representative Paul Malewicki, NAVFAC Southeast representative Dana Hayworth, the DEP's representative John Winters and associated consultants). Communication and coordination will be important during and throughout the recapitalization project.

Florida State Clearinghouse

- If any monitoring wells need to be abandoned during facilities construction, a permit will be required from the St. Johns River Water Management District. Please also coordinate with the NAVSTA Mayport Environmental Division and/or the NAVSTA Mayport Partnering Team prior to abandonment of any monitoring or injection well, in case it is still in use.
- In the event of a spill, there may be reporting required under the hazardous waste operating permit. Please note that this permit must be renewed in November 2013, therefore, specific requirements of that permit are not available at this time.

For further information and assistance, please contact Mr. John Winters, P.G., Remedial Project Manager for NAVSTA Mayport in the DEP Bureau of Waste Cleanup, Federal Programs Section at (850) 245-8999 or John.Winters@dep.state.fl.us.

Based on the information contained in the Draft EA and issuance of the state environmental resource permit, the state concurs with the Navy's determination that the activities proposed are consistent with the enforceable policies of the Florida Coastal Management Program (FCMP). The state's continued concurrence will be based on the activities' continued compliance with FCMP authorities, including federal and state monitoring to ensure said sustained compliance. The state's final concurrence of the project's consistency with the FCMP was determined during the environmental permitting process under Section 373.428, *Florida Statutes*.

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

cc: Sheena Chin-Greene, DEP, Northeast District
John Winters, DEP, DWM

Florida State Clearinghouse

Project Information	
Project:	FL201306196632C
Comments Due:	07/18/2013
Letter Due:	07/30/2013
Description:	DEPARTMENT OF THE NAVY - DRAFT ENVIRONMENTAL ASSESSMENT FOR THE WHARF C-2 RECAPITALIZATION PROJECT AT NAVAL STATION MAYPORT - JACKSONVILLE, DUVAL COUNTY, FLORIDA.
Keywords:	NAVY - DEA, WHARF C-2 RECAPITALIZATION, NAVAL STATION MAYPORT - DUVAL CO.
CFDA #:	99.300

Agency Comments:

FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

No Comment per the FWC Imperiled Species Management Section.

ST. JOHNS RIVER WMD - ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

SJRWMD does not have any comments.

ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

The DEP Northeast District Office in Jacksonville advises that Environmental Resources Permitting Section staff issued Environmental Resource Permit No. 16-307845-001-ES to the Navy on July 18, 2013, for the Naval Station Mayport, Wharf C-2 Renovation project. In addition, DEP's Division of Waste Management, Waste Cleanup Program staff also notes the following: -- When at all possible and practicable, please coordinate with the following groups during the demolition and construction project: 1) Cheryl L. Mitchell, Environmental Director, NAVSTA Mayport Environmental Division, Public Works Office; 2) Robbie Darby, P.E., Environmental Restoration Program Head, NAVFAC Southeast; and 3) The NAVSTA Mayport Partnering Team (NAVSTA Mayport facility representative Paul Malewicki, NAVFAC Southeast representative Dana Hayworth, the DEP¿s representative John Winters and associated consultants). Communication and coordination will be important during and throughout the recapitalization project. -- If any monitoring wells need to be abandoned during facilities construction, a permit will be required from the St. Johns River Water Management District. Please also coordinate with the NAVSTA Mayport Environmental Division and/or the NAVSTA Mayport Partnering Team prior to abandonment of any monitoring or injection well, in case it is still in use. -- In the event of a spill, there may be reporting required under the hazardous waste operating permit. Please note that this permit must be renewed in November 2013, therefore, specific requirements of that permit are not available at this time. For further information and assistance, please contact Mr. John Winters, P.G., Remedial Project Manager for NAVSTA Mayport in the DEP Bureau of Waste Cleanup, Federal Programs Section at (850) 245-8999 or John.Winters@dep.state.fl.us.

STATE - FLORIDA DEPARTMENT OF STATE

No Comment/Consistent

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

Visit the Clearinghouse Home Page to query other projects.

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DUVAL
SAI - 106 - DON
2013 - 2954

COUNTY: DUVAL

DATE: 6/19/2013
COMMENTS DUE DATE: 7/18/2013
CLEARANCE DUE DATE: 7/30/2013
SAI#: FL201306196632C

MESSAGE:

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNIT	RPCS & LOC GOVS
ENVIRONMENTAL PROTECTION	ST. JOHNS RIVER WMD		
FISH and WILDLIFE COMMISSION			
X STATE			

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- _ **Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.**
- X **Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.**
- _ **Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.**
- _ **Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.**

Project Description:

DEPARTMENT OF THE NAVY - DRAFT ENVIRONMENTAL ASSESSMENT FOR THE WHARF C-2 RECAPITALIZATION PROJECT AT NAVAL STATION MAYPORT - JACKSONVILLE, DUVAL COUNTY, FLORIDA.

To: Florida State Clearinghouse

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

EO. 12372/NEPA

- [x] No Comment
- [ ] Comment Attached
- [ ] Not Applicable

Federal Consistency

- [x] No Comment/Consistent
- [ ] Consistent/Comments Attached
- [ ] Inconsistent/Comments Attached
- [ ] Not Applicable

From:

Division/Bureau: Historical Resources

Reviewer: Michael Hart [signature]

Date: 7/24/13

RECEIVED
BUREAU OF
HISTORIC PRESERVATION
2013 JUN 20 P 4: 12

RECEIVED
JUL 29 2013
DEP Office of
Intergovt'l Programs

-----Original Message-----
From: George Getsinger - NOAA Federal [mailto:george.getsinger@noaa.gov]
Sent: Monday, September 16, 2013 17:07
To: Jackson, Jered CIV NAVFAC SE
Subject: Re: EFH Consultation at NS Mayport

Hi Jered, The ACOE should pass along our EFH Conservation Recommendations or in this case no action, no staffing. Unless there are revisions to the project as proposed NMFS has concluded EFH consultation with the ACOE and they should issue the permit for the work. If there are other projects you need to consult on please feel free to contact me even in the preliminary design stage. Thanks, George

On Mon, Sep 16, 2013 at 8:14 AM, Jackson, Jered CIV NAVFAC SE <jered.jackson@navy.mil> wrote:

George,

Naval Facilities Engineering Command (NAVFAC SE) sent the attached letter in May requesting EFH conservation recommendations for recapitalization of Wharf C2 at Naval Station Mayport.

In July, the ACOE sent us a letter they received from NMFS which stated that staffing levels precluded further analysis of this activity (this letter is also attached). We took this to mean our EFH consultations were complete. However, that assumption has recently been called into question since no letter was received by the Navy itself. Does the letter to ACOE conclude the Navy's EFH consultation with NMFS for this activity?

Thank you,
Jered

Jered Jackson
Natural Resources Specialist
Naval Facilities Engineering Command, SE
PO Box 30, Bldg 903
Jacksonville, FL 32212
904-542-6308

United States Department of the Interior

U. S. FISH AND WILDLIFE SERVICE

7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:
FWS Log Nos. 41910-2014-I-0008

October 31, 2013

Mr. C.R. Destafney, PE
Department of the Navy
Naval Facilities Engineering Command Southeast
Jacksonville, Florida 32212-0030
(Attn: Jered Jackson)

Re: Endangered Species Act Consultation for Recapitalization of Wharf Charlie Two (C-2) at Naval Station Mayport (NAVTA Mayport), Florida

Dear Mr. Destafney:

Our office has reviewed your correspondence dated May 30th, 2013 and its accompanying Draft Environmental Assessment and Biological Evaluation (BE) for subject project at NAVSTA Mayport. The Navy proposes to demolish and replace the existing concrete pile cap, wharf deck, and all utilities associated with Wharf C-2, and install 120 steel sheet pile pairs, 119 king piles, and 50, polymeric fender piles for attaching 7-foot foam fenders using primarily vibratory driving methods, and impact driving when necessary. The project will result in an increase in wharf footprint of approximately 1.322 square meters. Contingency dredging of up to 4,000 cubic yards of sediment may be conducted by clamshell dredge behind the existing wharf bulkhead. The material will be disposed of within the Offshore Dredge Material Management Area located within the Atlantic Ocean approximately 4.5 miles southeast of the mouth of the St. Johns River. In-water activities are limited to a maximum of 70 days. The project is located within the NAVSTA Mayport semi-enclosed turning basin at the mouth of the St. Johns River along its southern shoreline in Section 28, Township 1 South, Range 29 East, Jacksonville, Duval County, Florida.

The following is provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.).

The Navy determined that the project occurs within the range of the endangered West Indian (Florida) manatee (*Trichechus manatus latirostris*) and wood stork (*Mycteria americana*), the threatened piping plover (*Charadrius melodus*) and its designated critical wintering habitat (FL Unit-34), and the red knot (*Calidris canutus rufa*), federally proposed for listing as endangered. In addition, the endangered leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles and the threatened loggerhead (*Caretta caretta)* sea turtle do and have the potential to nest on ocean beaches immediately north and south of the project area.

The Navy in the BE dated June 2013 determined that the proposed project is not likely to adversely affect the wood stork, piping plover, and red knot. We concur with that determination. The Navy also will include the most recent (2012) Standard Manatee Conditions for In-Water Work, the Southeast Regional Marine Mammal and Sea Turtle Viewing Guidelines during vibratory and impact pile driving, and a requirement for multiple, dedicated and trained marine species observers, within the project plans and specifications. As a result, the Navy determined that the proposed project is not likely to adversely affect the manatee. In addition to the preceding, we recommend, and the Navy has agreed, to include the following conditions in its project plans and specifications

- To reduce the risk of a vessel crushing a manatee, the Navy shall install wharf fenders with appropriate materials to provide sufficient standoff space of at least three feet under maximum designed compression. Fenders or buoys providing a minimum standoff space of at least three feet under maximum designed compression shall also be utilized between two vessels that are moored together.
- Bulkhead sheet pile installation shall be completed only after the Navy confirms that no manatees or marine turtles will be trapped in the area to be filled between the existing and new bulkheads.

Based on the above, we concur with the Navy's determination of effect on the manatee.

The initial BE did not include an assessment of effects on nesting and hatchling sea turtles from the new wharf lighting. A revised BE, dated August 2013, addressed this deficiency and concluded that the proposed lighting would not be directly visible from the beach, and would not add to any existing effects to nesting and hatchling sea turtles from sky glow. The Navy as a result determined that the proposed project is not likely to adversely affect sea turtles.

A beach re-nourishment project that included the NAVSTA Mayport beach, and completed during the first quarter of 2013, elevated the beach profile sufficiently to make the flood lights present at Wharves C-1 and C-2 directly visible from the northern section of that beach. As a result, our office did not concur with the Navy's determination of effect for sea turtles. Following multiple conversation between our offices as to how the Navy might address this issue, the Navy developed a supplement to the BE in which it proposed to undertake the following measures to eliminate direct lighting associated with this project.

- the new lighting will not be floodlights, but will be full-cutoff luminaries facing downward and shielded above and 360 degrees around the lights to eliminate direct lighting, and greatly reduce upward lighting
- the actual lighting will be set at 8,000 watts per light, which represents a reduction of 10,000 watts per light over the existing lighting at wharf C-1
- the luminaries would be mounted on four, 50-foot light posts with two luminaries per post and strategically placed to maximize wharf illumination and minimize off-site lighting

Based on the above lighting modifications to the original project plans and specifications, the Navy has determined that the proposed project may affect, but is not likely to adversely affect, nesting and hatchling sea turtles within the action area. We concur.

Although this does not represent a biological opinion as described in section 7 of the Act, it does fulfill the requirements of the Act and no further action is required. If the Navy modifies the project; it fails to implement the special measures mentioned above and described more specifically in its accompanying documentation; if additional information involving potential effects to the above or other listed species potentially affected by the action becomes available; or if unauthorized take of the above species occurs during the activities identified and considered previously, the Navy should immediately contact our office to discuss the issue(s). If you have any questions regarding this response, please contact Mr. John Milio of my staff at the address on the letterhead, by e-mail at john_milio@fws.gov, or by calling 904-731-3098.

Sincerely,

Mike Jennings
Acting Field Supervisor

cc:
Carol Knox /Robbin Trindell
Fish and Wildlife Conservation Commission
Division of Habitat and Species Conservation
Imperiled Species Management Section
620 South Meridian Street
Tallahassee, Florida 32399

-----Original Message-----
From: Karla Reece - NOAA Federal [mailto:karla.reece@noaa.gov]
Sent: Tuesday, September 24, 2013 1:31 PM
To: Jackson, Jered CIV NAVFAC SE
Subject: Re: Mayport Wharf C2

I will say that unless the review drastically changes something we are concurring with your determination.

Does that help?

On Tue, Sep 24, 2013 at 1:26 PM, Jackson, Jered CIV NAVFAC SE <jered.jackson@navy.mil> wrote:

In that case, just the final, please.

-----Original Message-----
From: Karla Reece - NOAA Federal [mailto:karla.reece@noaa.gov]

Sent: Tuesday, September 24, 2013 13:24
To: Jackson, Jered CIV NAVFAC SE
Subject: Re: Mayport Wharf C2

The draft and the final will come out the same day. Do you really want the draft?

On Tue, Sep 24, 2013 at 1:15 PM, Jackson, Jered CIV NAVFAC SE <jered.jackson@navy.mil> wrote:

Thank you, Karla.

I thought that would be the answer. Yes, please send me a draft as soon as it is possible. Also, please send me a pdf of the final when you get it.

Thanks again,
Jered

-----Original Message-----
From: Karla Reece - NOAA Federal [mailto:karla.reece@noaa.gov]
Sent: Tuesday, September 24, 2013 13:12
To: Jackson, Jered CIV NAVFAC SE
Subject: Re: Mayport Wharf C2

Hi Jered,

Unfortunately, our policy on releasing draft documents prohibits us from doing so until it's ready for clearance which is also at the end of the review process. If you want me to send you a draft at that point, I'd be happy to.

~Karla

On Tue, Sep 24, 2013 at 8:16 AM, Jackson, Jered CIV NAVFAC SE <jered.jackson@navy.mil> wrote:

Karla,

I've been asked if it would be possible for us to see an advanced copy of the Mayport Wharf C2 letter for the purpose of preparing consultation language in our EA. This is a rather unusual request, I know, but our team here is trying to shave off whatever time we can. We understand the language and conclusions of the letter could change during the internal editing process.

Thank you,
Jered

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Karla Reece
SERO Section 6 Coordinator - ESA Biologist Section 7 biologist for Deepwater Horizon Incident National Marine Fisheries Service Southeast Regional Office Protected Resources
263 13th Ave. S.
St. Petersburg, FL 33701

phone: 727/824-5348 <tel:727%2F824-5348> <tel:727%2F824-5348>
fax: 727/824-5309 <tel:727%2F824-5309> <tel:727%2F824-5309>

email: karla.reece@noaa.gov
web: http://www.nmfs.noaa.gov/pr/conservation/states/

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

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NOV 12 2013

C. R. Destafney, PE
Environmental Business Line Coordinator
Department of the Navy
Naval Facilities Engineering Command Southeast
Jacksonville, Florida 32212

Ref.: Ser EV22/0210 - Recapitalization of Wharf Charlie Two at Naval Station Mayport, Duval County, Florida

Dear Mr. Destafney:

This responds to your letter dated May 30, 2013, requesting National Marine Fisheries Service (NMFS) concurrence with your project-effects determinations submitted under Section 7 of the Endangered Species Act (ESA) for the referenced project located in Duval County, Florida. You determined the project may affect but is not likely to adversely affect (NLAA) smalltooth sawfish, sturgeon (Atlantic and shortnose), swimming sea turtles (leatherback, loggerhead, green, hawksbill, and Kemp's ridley), and whales (North Atlantic right and humpback). We requested additional information from the United States Navy (USN) on July 30, 2013, and received a response to that request on August 8, 2013. Our findings on the project's potential effects are based on the project description in this response. Changes to the proposed action may negate our findings and may require reinitiating consultation.

The project will take place inside the semi-enclosed turning basin at Naval Station Mayport, located in Jacksonville, Duval County, Florida, along the St. Johns River and the Atlantic Ocean (Figure 1). The USN is proposing to recapitalize (renovate and modernize) Wharf Charlie Two (C-2). This recapitalization project includes the demolition and replacement of the existing concrete pile cap, wharf deck, and utilities and installation of a new steel king pile/sheet pile bulkhead around the existing wharf. The project will result in a wharf footprint increase of approximately 1,322 square meters and a minor increase in lighting on and around the wharf surface. The purpose of the proposed action is to improve the functionality and structural integrity of the wharf, which has deteriorated since it was built in 1960. The continued deterioration has caused material voids and failure of wharf deck paving, which have resulted in load restrictions on the wharf. According to sediment sampling and testing conducted in March 2007, benthos in the Mayport basin is comprised primarily of fine grained materials (silt and clay). There are neither mangroves nor seagrasses in the project vicinity. No net change in the amount of vessel traffic in and around the turning basin is expected as a result of the project.

The USN will comply with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* dated March 23, 2006 (enclosed).

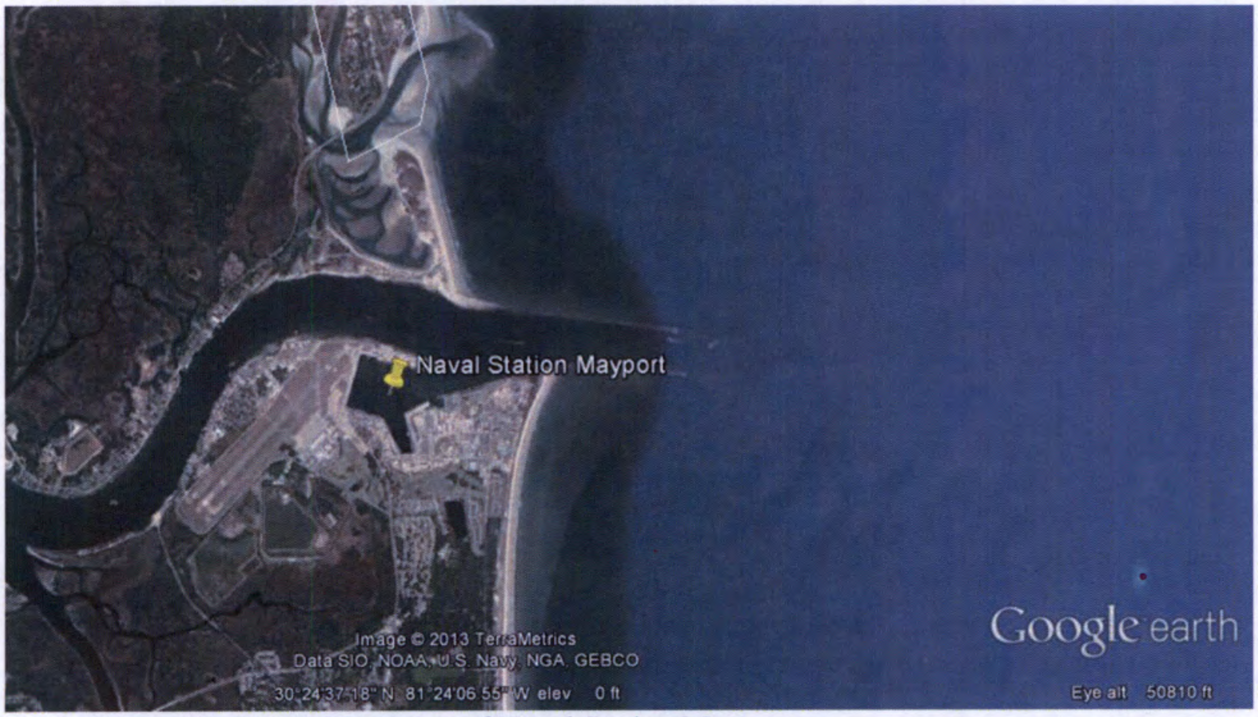


Figure 1: General Location of Naval Station Mayport.

Existing underwater obstructions and debris that may interfere with the installation of the new steel king pile/sheet pile wall system (SSP) will be removed utilizing divers and cranes. Up to 30 timber piles will be removed from the action area utilizing a crane. The locations at which the new SSP will attach to the existing sheet pile wall will be demolished above and below the waterline to expose the existing steel. Along the face of the existing wall, the curb, a portion of existing concrete cap, and the concrete apron along the waterside perimeter of the wharf and the utilities (including lateral supply lines from utilities such as water, fuel, steam and electrical) will be removed.

Overall, the project will include installation of approximately 120 single sheet piles, 119 king piles, and 50 polymeric (plastic) fender piles. A maximum of 70 days of in-water pile driving work will take place over a 12-month period. Of the 70 days, 50 days are reserved for vibratory hammer driving and the remaining 20 days are reserved for contingency impact driving. Only two days of impact pile driving occurred during the adjacent Wharf Charlie One project. Impact pile driving, if it were to be necessary, could occur on the same day as vibratory pile driving, but driving rigs would not be operated simultaneously. Should the brief use of impact pile driving be necessary, a soft start procedure will be used. The objective of a soft start is to provide a warning and/or give animals in close proximity to pile driving a chance to leave the area prior to an impact driver operating at full capacity, thereby exposing fewer animals to loud underwater and airborne sounds. As well, USN observer(s) will monitor the shutdown zone (Figure 2) before, during, and after pile driving and removal. The shutdown zone for vibratory driving is 50 ft (15 m) off Wharf C-2 in all directions. The shutdown zone for contingency- only impact pile driving was calculated based on acoustic modeling at a notional pile location on the wharf; the zone to be monitored is 130 ft (40 m) in each direction from the pile being driven.

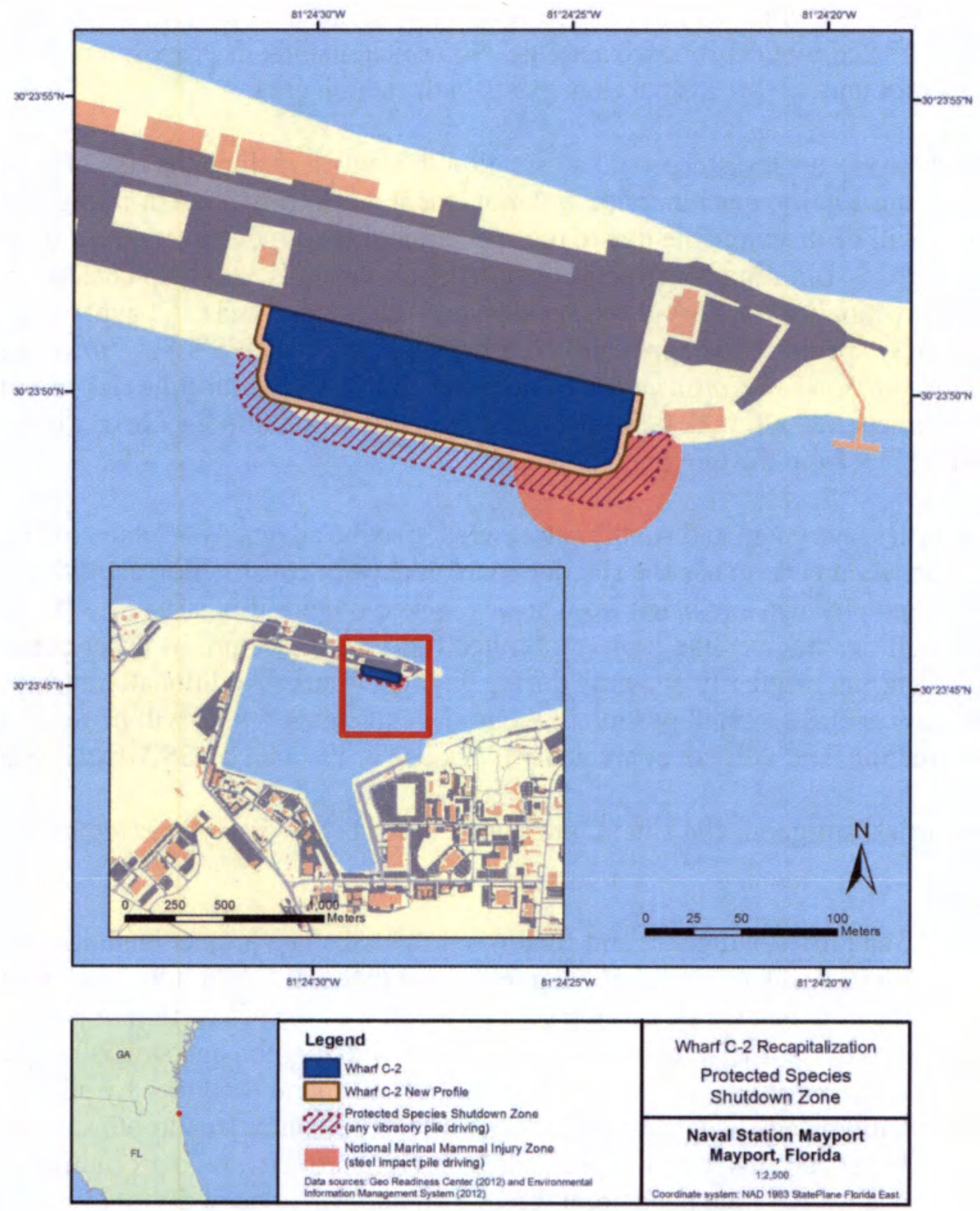


Figure 2. The pile driving shutdown zone.

Contingency dredging may be required within the new wharf footprint. Up to 4,000 cubic yards of sediment could be removed using a clamshell dredge. Dredged sediments would be disposed of in accordance with applicable laws and regulations. Dredging, if needed, would occur outside of the 70 days of in-water work and is expected to take place behind the existing wharf bulkhead. All in-water construction activities shall occur during daylight hours between one hour after sunrise and one hour before sunset.

The smalltooth sawfish, sturgeon (Atlantic and shortnose), swimming sea turtles (leatherback, loggerhead, green, hawksbill, and Kemp's ridley), and whales (North Atlantic right and humpback) can be found in or near the action area and may be affected by the project. NMFS has identified the following potential effects to these species, and concluded they are not likely to be adversely affected by the proposed actions. No critical habitat or proposed critical habitat for any listed species under NMFS's purview exists in the action area.

1. Effects to sea turtles, sturgeon, and smalltooth sawfish include the risk of injury from in-water construction machinery (barge movement, anchoring, etc.) or piling installation, which will be discountable due to the species' ability to move away from the project site if disturbed. Limiting construction to daylight hours only will help construction workers regularly monitor for ESA-listed species near the project areas and avoid interactions with these species. The applicant's implementation of NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* will further reduce the risk of injury with the requirement that all work be stopped if a sea turtle or smalltooth sawfish is observed less than 50 feet from the moving equipment.

2. Sea turtles, sturgeon, and smalltooth sawfish may be adversely affected by being temporarily unable to use the site due to avoidance of construction activities, related noise, and physical exclusion from areas blocked by turbidity curtains. These effects will be insignificant, given the project's limited footprint and short, in-water construction time that occur intermittently and only during daylight hours. Additionally, turbidity controls will only enclose a small portion of the project site at any time, will be removed after construction, and will not appreciably block use of the area by ESA-listed species.

3. Sea turtles, sturgeon, and smalltooth sawfish may be adversely affected by pile driving noise.

   a. Sea turtles, sturgeon, and smalltooth sawfish: The project includes steel and plastic piling types and two pile driving methods—vibratory and impact. None of the anticipated pile driving scenarios result in the production of sound above the 190 dB re 1 μPa rms SEL sea turtle or fish (sturgeon and sawfish) injury criteria. Because of this, no injuries associated with sound produced by pile driving are anticipated for any species of sea turtle, sturgeon or smalltooth sawfish. However, this does not preclude behavioral effects. As a precautionary measure against possible behavioral effects, a shutdown zone of 50 ft (15 m) will be implemented for vibratory pile driving. If a sea turtle, sturgeon, or smalltooth sawfish is observed approaching or entering the shutdown zone, pile driving will cease and will not resume until the animal has moved out of the area of its own volition.

      No behavior criteria for sea turtles, sturgeon, or smalltooth sawfish exist but it is understood that behavioral impacts could still occur over the course of the project outside the shutdown zone. With the implementation of the 15-m shutdown zone for vibratory pile driving (40 m for contingency-only impact pile driving), the very limited amount of impact pile driving (and its associated higher sound source levels) that may be performed, and the overall short construction duration (70 days of pile driving, not projected to exceed more than 45 net minutes per day), little opportunity exists for behavioral effects to occur, and we believe the risk of these effects occurring is discountable. For vibratory pile driving, we conclude that noise effects will be insignificant.

b. Whales: No physiological effects to North Atlantic right whales or humpback whales are expected from pile driving activities because we believe that the possibility of either of these species occurring in the turning basin is so remote as to be considered discountable.

This concludes the USN's consultation responsibilities under the ESA for species under NMFS's purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the actions not previously considered; or the identified actions are subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified actions.

We look forward to further cooperation with you on other projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Karla Reece, consultation biologist, by e-mail at karla.reece@noaa.gov or (727) 824-5312.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enc.: 1. *Sea Turtle and Smalltooth Sawfish Construction Conditions* (Revised March 23, 2006)
2. *PCTS Access and Additional Considerations for ESA Section 7 Consultations* (Revised June 11, 2013)

File: 1514-22.F.4

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

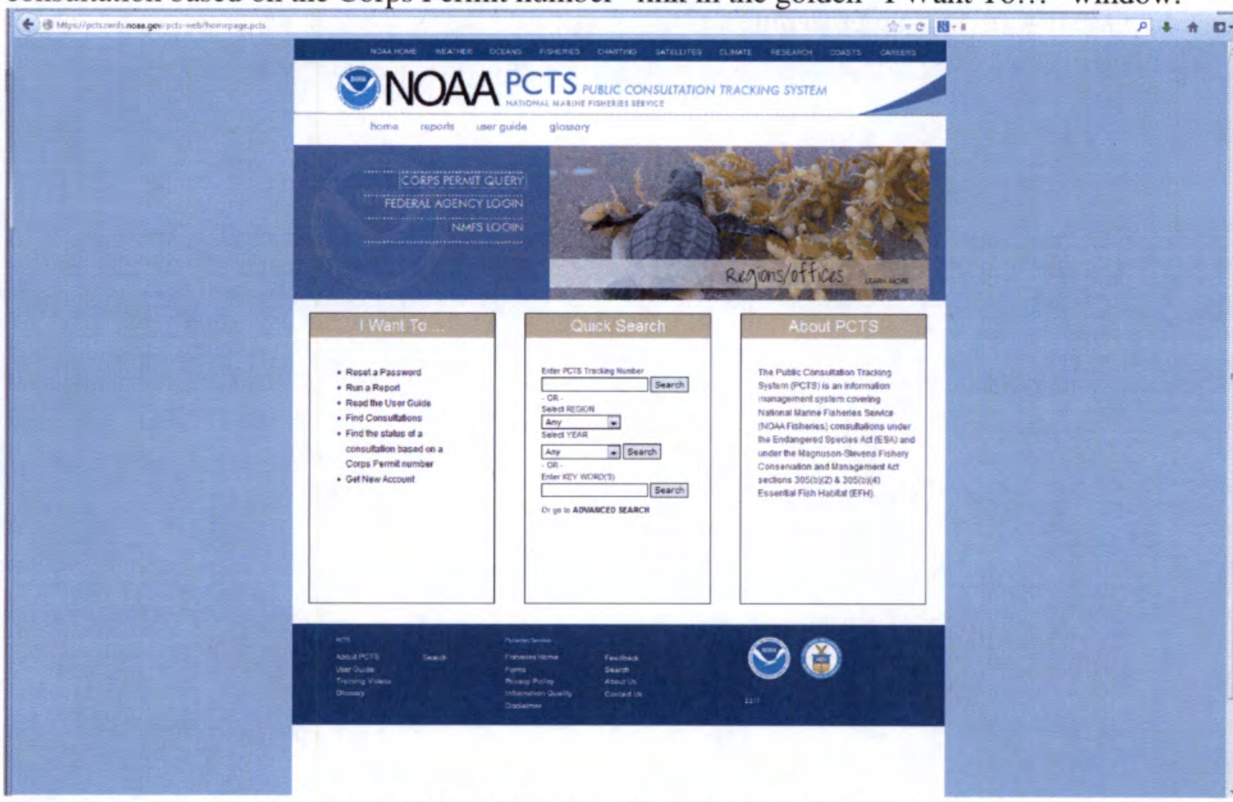
g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006

PCTS Access and Additional Considerations for ESA Section 7 Consultations (Revised 6-11-2013)

Public Consultation Tracking System (PCTS) Guidance: PCTS is a Web-based query system at **https://pcts.nmfs.noaa.gov/** that allows all federal agencies (e.g., U.S. Army Corps of Engineers - USACE), project managers, permit applicants, consultants, and the general public to find the current status of NMFS's Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations which are being conducted (or have been completed) pursuant to ESA Section 7 and the Magnuson-Stevens Fishery Conservation and Management Act's (MSA) Sections 305(b)2 and 305(b)(4). Basic information including access to documents is available to all.

The PCTS Home Page is shown below. For USACE-permitted projects, the easiest and quickest way to look up a project's status, or review completed ESA/EFH consultations, is to click on either the "Corps Permit Query" link (top left); or, below it, click the "Find the status of a consultation based on the Corps Permit number" link in the golden "I Want To…" window.



Then, from the "Corps District Office" list pick the appropriate USACE district. In the "Corps Permit #" box, type in the 9-digit USACE permit number identifier, with no hyphens or letters. Simply enter the year and the permit number, joined together, using preceding zeros if necessary after the year to obtain the necessary 9-digit (no more, no less) number. For example, the USACE Jacksonville District's issued permit number SAJ-2013-0235 (LP-CMW) must be typed in as 201300235 for PCTS to run a proper search and provide complete and accurate results. For querying permit applications submitted for ESA/EFH consultation by other USACE districts, the procedure is the same. For example, an inquiry on Mobile District's permit MVN201301412 is entered as 201301412 after selecting the Mobile District from the "Corps District Office" list. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov or (727) 551-5773.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to Section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA Section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA Section 101 (a)(5) is necessary. Please contact NMFS' Permits, Conservation, and Education Division at (301) 713-2322 for more information regarding MMPA permitting procedures.

Appendix B
Fundamentals of Acoustics

Appendix: Acoustics Primer

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 project area. The potential for noise from pile driving to cause auditory masking for marine mammals within the project area is also considered.

B.1 Fundamentals of Acoustics

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) (ANSI S1.1-1994). 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, 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 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 A-1 summarizes common acoustic terminology. Two of the most common descriptors are the instantaneous peak SPL and the root-mean-square [rms] SPL. The peak SPL is the instantaneous maximum or minimum over- or underpressure observed during each sound event and is presented in dB re 1 µPa peak. The rms level is the square root of the energy divided by a defined time period, given as dB re 1 µPa rms.

Table B-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 an extremely 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).
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.

Term	Definition
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.

Adapted and derived from URS Corporation (2007)

B.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 (ANSI S1.1-1994). 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).

B.3 Description of Noise Sources

Ambient noise in the project area is a composite of sounds from natural sources, normal port activities, and temporary projects such as maintenance dredging or pile driving. Ambient noise in the Mayport turning basin is addressed in Chapter 5 of the IHA Application.

In-water construction activities associated with this project include vibratory and impact pile driving. The sounds produced by these activities fall into two sound types: impulsive (impact driving) and non-impulsive (vibratory driving). Distinguishing between these two general sound types is important because of each sound type may cause different types of physical effects, particularly with regard to hearing (Ward 1997).

Impulsive sounds (e.g., explosions, seismic airgun pulses, and impact pile driving) are referred to as pulsed sounds in Southall et al. (2007), and 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 (“non-pulsed” in Southall et al. 2007) 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.

B.4 Vocalization and Hearing of Marine Mammals

All marine mammals that have been studied can produce sounds and use sounds to forage, orient, detect and respond to predators, and facilitate social interactions (Richardson et al., 1995). Measurements of marine mammal sound production and hearing capabilities provide some basis for assessing whether exposure to a particular sound source may affect a marine mammal behaviorally or physiologically. Marine mammal hearing abilities are quantified using live animals either via behavioral audiometry or electrophysiology (see Schusterman 1981; Au 1993; Wartzok and Ketten 1999; Nachtigall et al. 2007). Behavioral audiograms, which are plots of animals' exhibited hearing threshold versus frequency, are obtained from captive, trained live animals using standard testing procedures with appropriate controls, and are considered to be a more accurate representation of a subject's hearing abilities. Behavioral audiograms of marine mammals are difficult to obtain because many species are too large, too rare, and too difficult to acquire and maintain for experiments in captivity. Consequently, our understanding of a species' hearing ability may be based on the behavioral audiogram of a single individual or small group of animals. In addition, captive animals may be exposed to local ambient sounds and other environmental factors that may impact their hearing abilities and may not accurately reflect the hearing abilities of free-swimming animals. For animals not available in captive or stranded settings (including large whales and rare species), estimates of hearing capabilities are made based on anatomical and physiological structures, the frequency range of the species' vocalizations, and extrapolations from related species.

Electrophysiological audiometry measures small electrical voltages produced by neural activity when the auditory system is stimulated by sound. The technique is relatively fast, does not require a conscious response, and is routinely used to assess the hearing of newborn humans. It has recently been adapted for use on non-humans, including marine mammals (Dolphin, 2000). For both methods of evaluating hearing ability, hearing response in relation to frequency is a generalized U-shaped curve or audiogram showing the frequency range of best sensitivity (lowest hearing threshold) and frequencies above and below with higher threshold values.

Direct measurement of hearing sensitivity exists for approximately 25 of the nearly 130 species of marine mammals. Table provides a summary of sound production and hearing capabilities for marine mammal species in the Project Area. For purposes of this analysis, marine mammals are arranged into the following functional hearing groups based on their generalized hearing sensitivities: high-frequency cetaceans, mid-frequency cetaceans, low-frequency cetaceans (mysticetes), phocid pinnipeds (true seals), otariid pinnipeds (sea lions and fur seals); of these, only mid- and low-frequency cetaceans occur in the Project Area.

Table B-2. Hearing and Vocalization Ranges for Marine Mammal Functional Hearing Groups and Species Potentially Occurring within the Project Area

Functional Hearing Group	Species	Sound Production		General Hearing Ability Frequency Range
		Frequency Range	Source Level (dB re 1 µPa @ 1 m)	
Mid-Frequency Cetaceans	Bottlenose dolphin	100 Hz to 100kHz	137 to 236	150 Hz to 160 kHz
Low-Frequency Cetaceans	North Atlantic right whale; humpback whale	10 Hz to 20 kHz	137 to 192	7 Hz to 22 kHz

Adapted and derived from Southall et al. (2007) and Richardson et al. (1995)
dB re 1 µPa @ 1 m: decibels (dB) referenced to (re) 1 micro (µ) Pascal (Pa) at 1 meter; Hz: Hertz; kHz: kilohertz

B.4.1 Auditory Masking

Natural and artificial sounds can disrupt behavior by auditory masking, or interfering with a marine mammal's ability to detect and interpret other relevant sounds, such as communication and echolocation signals (Wartzok et al. 2004). 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 is very likely to 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). Noise within the critical band of a marine mammal signal will show increased interference with detection of the signal as the level of the noise increases (Wartzok et al. 2004). In delphinid subjects, for example, relevant signals needed to be 17 to 20 dB louder than masking noise at frequencies below 1 kHz in order to be detected and 40 dB greater at approximately 100 kHz (Richardson et al. 1995). Noise at frequencies outside of a signal's critical bandwidth will have little to no effect on the detection of that signal (Wartzok et al. 2004).

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). The behavioral function of a vocalization (e.g. contact call, group cohesion vocalization, echolocation click, etc.) and the acoustic environment at the time of signaling may both influence call source level (Miksis-Olds and Tyack, 2009; Holt et al. 2011), which directly affects the chances that a signal will be masked (Nemeth and Brumm, 2010).

Noise from anthropogenic sources could cause masking of vocalizations which may rise to the level of behavioral harassment (as defined by the MMPA) if it disrupts communication, echolocation, or other hearing-dependent behaviors. Impact pile driving produces high-amplitude low-frequency noise (10 – 2,000 Hz), which is likely to be audible to all three marine mammal species considered, and is likely to overlap the vocalizations of low-frequency cetaceans (North Atlantic right and humpback whales; Table A-2). While the amplitude of impact pile driving noise may exceed marine mammal vocalization amplitudes within an unknown range of the driven pile, impact pile driving noise is unlikely to entirely mask social (non-echolocation) signals due to the intermittent nature impact pile driving noise and the limited duration of impact pile driving associated with this project. Impact pile driving will be conducted only in the rare event that an obstruction is encountered during vibratory pile driving, and will be limited to a maximum of 20 strikes per day. We therefore estimate that the likelihood of noise from impact pile driving masking signals important to the behavior and survival of any of the three marine mammal species in the project area is negligible.

Vibratory pile driving produces frequencies from 10 Hz to 2 kHz, which would be within the range of audible sound and vocal production (see Table A-2) for all marine mammal species that may occur in the project area. Given the source levels (151 – 180 dB rms re 1 µPa at 10m) and frequency range (10 – 2,000 Hz) of vibratory pile driving noise (Illingworth & Rodkin 2012), we estimate that any masking event that could rise to Level B harassment under the MMPA would occur within the zones of behavioral harassment estimated for vibratory pile driving (see Chapter 5 in the IHA Application) (Parks et al. 2011). Therefore, potential masking effects are not considered separately in this IHA application.

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Appendix C

Standard Manatee Construction Conditions for In-Water Work

July 2005

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

July 2005

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the FWC Hotline at 1-888-404-FWCC. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-232-2580) for north Florida or Vero Beach (1-561-562-3909) for south Florida.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Awareness signs that have already been approved for this use by the Florida Fish and Wildlife Conservation Commission (FWC) must be used. One sign measuring at least 3 ft. by 4 ft. which reads *Caution: Manatee Area* must be posted. A second sign measuring at least 81/2" by 11" explaining the requirements for “Idle Speed/No Wake” and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

FWC Approved Manatee Educational Sign Suppliers

ASAP Signs & Designs
624-B Pinellas Street
Clearwater, FL 33756
Phone: (727) 443-4878
Fax: (727) 442-7573

Vital Signs
104615 Overseas Highway
Key Largo, FL 33037
Phone: (305) 451-5133
Fax: (305) 451-5163

Wilderness Graphics, Inc.
P.O. Box 1635
Tallahassee, FL 32302
Phone: (850) 224-6414
Fax: (850) 561-3943
www.wildernessgraphics.com

Universal Signs & Accessories
2912 Orange Avenue
Ft. Pierce, FL 34947
Phone: (800) 432-0331
or (772) 461-0665
Fax: (772) 461-0669

Cape Coral Signs & Designs
1311 Del Prado Boulevard
Cape Coral, FL 33990
Phone: (239) 772-9992
Fax: (239) 772-3848

New City Signs
1829 28th Street North
St. Petersburg, FL 33713
Phone: (727) 323-7897
Fax: (727) 323-1897

Municipal Supply & Sign Co.
1095 Fifth Avenue, North
P.O. Box 1765
Naples, FL 33939-1765
Phone: (800) 329-5366
or (239) 262-4639
Fax: (239) 262-4645
www.municipalsigns.com

United Rentals Highway Technologies
309 Angle Road
Ft. Pierce, FL 34947
Phone: (772) 489-8772
or (800) 489-8758 (FL only)
Fax: (772) 489-8757

CAUTION: MANATEE HABITAT

All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

Report any collision or injury to:

1-888-404-FWCC (1-888-404-3922)

Florida Fish and Wildlife Conservation Commission

Appendix D

Sea Turtle and Smalltooth Sawfish Construction Conditions

March 2006

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
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Appendix E

Marine Mammal and Sea Turtle Viewing Guidelines

Adapted from Southeast Region Marine Mammal & Sea Turtle Viewing Guidelines available at http://www.nmfs.noaa.gov/pr/education/southeast/guidelines.htm

Viewing "Code of Conduct"

These guidelines are intended to inform the public about protection of marine mammals and sea turtles. They are not a replacement for Federal legal requirements.

1. Remain a respectful distance from marine mammals and sea turtles. The minimum recommended distances are:
   - dolphins, porpoises, seals = 50 yards
   - sea turtles = 50 yards
   - whales = 100 yards*
     Federal law prohibits all approaches to North Atlantic right whales within 500 yards.
2. Marine mammals and sea turtles should not be encircled or trapped between watercraft, or watercraft and shore.
3. If approached by a marine mammal or sea turtle, put your watercraft's engine in neutral and allow the animal to pass. Any vessel movement should be from the rear of the animal.*
   Pursuit of marine mammals and sea turtles is prohibited by Federal law.
4. Never feed or attempt to feed marine mammals or sea turtles.*
   Federal law prohibits feeding or attempting to feed marine mammals.

Detailed Guidelines

Limit your viewing time.

- Prolonged exposure to one or more vessels increases the likelihood that marine mammals will be disturbed.
- Since individual animals' reactions will vary, carefully observe all animals and leave the vicinity if you see signs of disturbance.
- Your vessel may not be the only vessel in the day that approaches the same animal(s); please be aware of cumulative impacts.

Travel in a predictable manner.

- Marine mammals appear to be less disturbed by vessels that are traveling in a predictable manner.
- The departure from a viewing area has as much potential to disturb animals as the approach.

- If a marine mammal or sea turtle approaches, put your engine in neutral and allow the animal to pass.
- Never pursue or follow marine wildlife.
- Never attempt to herd, chase, or separate groups of marine mammals or females from their young.
- Avoid excessive speed or sudden changes in speed or direction in the vicinity of animals.

If you need to move around marine wildlife, do so from behind (i.e., never approach head-on).

- Vessels that wish to position themselves so that the animals would pass them, should do so in a manner that stays fully clear of the animal's path.

Be aware that marine mammals may surface in unpredictable locations.

- Breaching and flipper slapping whales may endanger people and/or vessels.

Marine mammals are more likely to be disturbed when more than one boat is near them.

- Avoid approaching the animals when another vessel is near.
- Always leave marine mammals an "escape route."
- When several vessels are in an area, communication between operators will help ensure that you do not cause disturbance.

Marine mammals have sensitive hearing and many species communicate by vocalizing underwater.

- Underwater sound produced by a vessel's engines and propellers can disturb these animals.

Cautiously move away from the animals if you observe any of the following behaviors:

- Rapid changes in direction or swimming speed.
- Erratic swimming patterns.
- Escape tactics such as prolonged diving, underwater exhalation, underwater course changes, or rapid swimming at the surface.
- Tail slapping or lateral tail swishing at the surface.
- Female attempting to shield a calf with her body or by her movements.

Even if approached by a marine mammal or sea turtle:

- Do not touch or swim with the animals.

Never feed or attempt to feed marine mammals or sea turtles.

- It can alter their natural behavior, make them dependent on handouts, and can be harmful to their health.
- Marine mammals, like all wild animals, may bite and inflict injuries to people who try to feed them.

Note: NMFS regulations at 50 CFR § 216.3 strictly prohibit feeding or attempting to feed a marine mammal in the wild.

Close approaches by humans to marine mammals may cause them to lose their natural wariness and become aggressive towards people. They are also vulnerable to injury or death from entanglement in fishing gear or boat strikes. NMFS strongly encourages people to follow the guidelines presented here while spending time on or near the water.

Appendix F
Draft Final Incidental Harassment Authorization

INCIDENTAL HARASSMENT AUTHORIZATION

The U.S. Navy (Navy), Naval Station Mayport, Florida, is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(D)), to harass marine mammals incidental to the Wharf C-2 Recapitalization Project at Mayport, FL.

1. This Incidental Harassment Authorization (IHA) is valid from December 1, 2013 through November 30, 2014.

2. This IHA is valid only for pile driving activities associated with the Wharf C-2 Recapitalization Project at Naval Station Mayport, Florida.

3. General Conditions

   (a) A copy of this IHA must be in the possession of the Navy, its designees, and work crew personnel operating under the authority of this IHA.

   (b) The species authorized for taking are the bottlenose dolphin (*Tursiops truncatus truncatus*) and the Atlantic spotted dolphin (*Stenella frontalis*).

   (c) The taking, by Level B harassment only, is limited to the species listed in condition 3(b). See Table 1 (attached) for numbers of take authorized.

   (d) The taking by injury (Level A harassment), serious injury, or death of any of the species listed in item 3(b) of the Authorization or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA.

   (e) The Navy shall conduct briefings between construction supervisors and crews, marine mammal monitoring team, acoustical monitoring team, and Navy staff prior to the start of all pile driving activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

4. Mitigation Measures

   In order to ensure the least practicable impact on the species listed in condition 3(b), the holder of this Authorization is required to implement the following mitigation measures:

   (a) The Navy shall implement shutdown zones sufficient to encompass the estimated distances to the 180 dB rms (re 1 μPa) threshold for cetaceans, in order to prevent unauthorized Level A harassment. The minimum shutdown zone for all pile driving shall be of 15 m radius. If a marine mammal comes within these zones, operations shall cease. For impact driving, the minimum shutdown zone shall be of 40 m radius.

   (b) The Navy shall establish monitoring locations as described below. Please also refer to the Marine Mammal Monitoring Plan (Monitoring Plan; attached).

(i) For all pile driving activities, a minimum of two observers shall be deployed, with one positioned to achieve optimal monitoring of the shutdown zone and the second positioned to achieve optimal monitoring of surrounding waters of the turning basin, the entrance to that basin, and portions of the Atlantic Ocean. If practicable, the second observer should be deployed to an elevated position, preferably opposite Wharf C-2 and with clear sight lines to the wharf and out the entrance channel.

(ii) For three of the days on which vibratory pile driving activities are conducted, a third observer shall be positioned for visual observation of waters outside the turning basin, including the entrance to that basin and portions of the Atlantic Ocean that are within the predicted area of ensonification and are visible with binoculars and the naked eye.

(iii) These observers shall record all observations of marine mammals, regardless of distance from the pile being driven, as well as behavior and potential behavioral reactions of the animals. Observations within the turning basin shall be distinguished from those in the entrance channel and nearshore waters of the Atlantic Ocean.

(iv) All observers shall be equipped for communication of marine mammal observations amongst themselves and to other relevant personnel (e.g., those necessary to effect activity delay or shutdown).

(c) Monitoring shall take place from 15 minutes prior to initiation of pile driving activity through 30 minutes post-completion of pile driving activity. Pre-activity monitoring shall be conducted for 15 minutes to ensure that the shutdown zone is clear of marine mammals, and pile driving may commence when observers have declared the shutdown zone clear of marine mammals. In the event of a delay or shutdown of activity resulting from marine mammals in the shutdown zone, animals shall be allowed to remain in the shutdown zone (i.e., must leave of their own volition) and their behavior shall be monitored and documented. Monitoring shall occur throughout the time required to drive a pile. The shutdown zone must be determined to be clear during periods of good visibility (i.e., the entire shutdown zone and surrounding waters must be visible to the naked eye).

(d) If a marine mammal approaches or enters the shutdown zone, all pile driving activities at that location shall be halted. If pile driving is halted or delayed due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without re-detection of the animal.

(e) Monitoring shall be conducted by qualified observers, as described in the Monitoring Plan. Trained observers shall be placed from the best vantage point(s) practicable to monitor for marine mammals and implement shutdown or delay procedures when applicable through communication with the equipment operator. Observer training must be provided prior to project start and in accordance with the monitoring plan, and shall include instruction on species identification (sufficient to distinguish the species listed in 3(b)), description and categorization of observed behaviors and interpretation of behaviors that may be construed as being reactions to the specified activity, proper completion of data forms, and other basic components of biological monitoring, including tracking of observed animals or groups of animals such that repeat sound exposures may be attributed to individuals (to the extent possible).

(f) The Navy shall use soft start techniques recommended by NMFS for impact pile driving. The soft start requires contractors to provide an initial set of strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, then two subsequent reduced energy strike sets. Soft start shall be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer.

(g) Pile driving shall only be conducted during daylight hours.

5. Monitoring

The holder of this Authorization is required to conduct acoustic and marine mammal monitoring during pile driving activity. Monitoring and reporting shall be conducted in accordance with the Monitoring Plan.

(a) The Navy shall collect sighting data and behavioral responses to pile driving for marine mammal species observed in the region of activity during the period of activity. All observers shall be trained in marine mammal identification and behaviors, and shall have no other construction related tasks while conducting monitoring.

(b) For all marine mammal monitoring, the information shall be recorded as described in the Monitoring Plan.

(c) The Navy shall conduct acoustic monitoring for representative scenarios of pile driving activity. Minimum requirements are described in Section 5 of the Monitoring Plan.

6. Reporting

The holder of this Authorization is required to:

(a) Submit a draft report on all monitoring conducted under the IHA within 90 days of the completion of marine mammal monitoring. A final report shall be prepared and submitted within 30 days following resolution of comments on the draft report from NMFS. This report must contain the informational elements described in the Monitoring Plan, at minimum (see attached), and shall also include:

(i) Detailed information about any implementation of shutdowns, including the distance of animals to the pile and description of specific actions that ensued and resulting behavior of the animal, if any.

(ii) Description of attempts to distinguish between the number of individual animals taken and the number of incidences of take, such as ability to track groups within turning basin.

(iii) A refined take estimate based on the number of marine mammals observed during the course of construction activities.

(b) Reporting injured or dead marine mammals:

(i) In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this IHA, such as an injury (Level A harassment), serious injury, or mortality, Navy shall immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division (301-427-8425), Office of Protected Resources, NMFS, and the Southeast Regional Stranding Coordinator (305-361-4586), NMFS. The report must include the following information:

1. Time and date of the incident;

2. Description of the incident;

3. Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);

4. Description of all marine mammal observations in the 24 hours preceding the incident;

5. Species identification or description of the animal(s) involved;

6. Fate of the animal(s); and

7. Photographs or video footage of the animal(s).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with Navy to determine what measures are necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Navy may not resume their activities until notified by NMFS.

(ii) In the event that Navy discovers an injured or dead marine mammal, and the lead observer determines that the cause of the injury or death is unknown and the death is relatively recent (e.g., in less than a moderate state of decomposition), Navy shall immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the Southeast Regional Stranding Coordinator, NMFS.

The report must include the same information identified in 6(b)(i) of this IHA. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with Navy to determine whether additional mitigation measures or modifications to the activities are appropriate.

(iii) In the event that Navy discovers an injured or dead marine mammal, and the lead observer determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), Navy shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the Southeast Regional Stranding Coordinator, NMFS, within 24 hours of the discovery. Navy shall provide photographs or video footage or other documentation of the stranded animal sighting to NMFS.

7. This Authorization may be modified, suspended or withdrawn if the holder fails to abide by the conditions prescribed herein, or if the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

______________________________ ________________

Donna S. Wieting, Date
Director, Office of Protected Resources,
National Marine Fisheries Service.

Table 1. Authorized take numbers, by species

Species	Authorized Take
Bottlenose dolphin (*Tursiops truncatus*)	365
Atlantic spotted dolphin (*Stenella frontalis*)	95

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Appendix G

Biological Evaluation submitted to National Marine Fisheries Service

BIOLOGICAL EVALUATION FOR THE WHARF C-2 RECAPITALIZATION PROJECT AT NAVAL STATION MAYPORT, FLORIDA NAVY REGION SOUTHEAST

Submitted to:

Office of Protected Resources,
National Marine Fisheries Service,
National Oceanographic and Atmospheric Administration

Prepared by:

Naval Facilities Engineering Command Southeast
and
Naval Facilities Engineering Command Atlantic

August 2013

Table of Contents

List of Figures

List of Tables

List of Appendices and Attachments

Acronyms and Abbreviations

BE	Biological Evaluation
BMP	best management practice
ºC	degrees Celsius
C-2	Charlie 2
cm	centimeter
CV	coefficient of variation
dB	decibel
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ºF	degrees Fahrenheit
FR	Federal Register
ft.	foot / feet
H	height
HAPC	Habitat Areas of Particular Concern
Hz	Hertz
in.	inch
$in.^2$	square inch
kHz	kiloHertz
km^2	square kilometer
m	meter
m^2	square meter
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
µPa	microPascal
N	north
NAVSTA	Naval Station
NMFS	National Marine Fisheries Service
NMSDD	Navy Marine Species Density Database
NOAA	National Oceanic and Atmospheric Administration
POC	point of contact
ppm	parts per million
Project	Wharf C-2 Recapitalization project
PSU	practical salinity unit
PTS	permanent threshold shift
r	radius
rms	root mean square
S	south
SAFMC	South Atlantic Fishery Management Council
SSP	steel king pile / sheet pile system
St.	Saint (e.g. Saint Johns River, Saint Andrews Bay)
U.S.	United States
USFWS	United States Fish and Wildlife Service
W	width

Executive Summary

The United States Navy is proposing to recapitalize (renovate and modernize) Wharf Charlie Two (C-2) at Naval Station Mayport, Florida. This recapitalization project includes the demolition and replacement of the existing concrete pile cap, wharf deck, and utilities and installation of a new steel king pile/sheet pile bulkhead around the existing wharf. The project will result in a wharf footprint increase of approximately 1,322 square meters and a minor increase in lighting on and around the wharf surface. The purpose of the proposed action is to improve the functionality and structural integrity of the wharf, which has deteriorated since it was built in 1960. The continued deterioration has caused material voids and failure of wharf deck paving, which have resulted in load restrictions on the wharf.

The project is planned to take place for approximately 18 months, beginning at the end of September 2013. The major in-water components of this project include installation of approximately 120 steel sheet pile pairs, 119 king piles and 50 polymeric (plastic) fender piles as a part of the overall recapitalization project. The project may require up to 18 months for completion; in-water activities are limited to a maximum of 70 days. All piles will be driven with a vibratory hammer. Impact driving will be a contingency employed only if vibratory methods are inadequate. Contingency dredging of up to 4,000 cubic yards of sediment may be conducted if needed; a clamshell dredge will be used if dredging is performed. Dredging would take place outside of the 70 day pile driving work window, and is expected to be performed behind the existing wharf bulkhead, virtually eliminating the likelihood of negative effects to ESA-listed and candidate species, and their habitat.

Pile driving activities may result in temporary reduction in water quality in the immediate vicinity of the project. They will also generate noise that may result in behavioral disturbance of species listed under the Endangered Species Act, including the endangered North Atlantic right whale, the endangered humpback whale, the endangered Atlantic sturgeon, the endangered shortnose sturgeon, the endangered smalltooth sawfish, the endangered green turtle, the endangered hawksbill turtle, the endangered Kemp's ridley turtle, the threatened loggerhead turtle, and the endangered leatherback turtle. No injury or mortality to these species is anticipated based on sound modeling results, and minimization measures and best management practices that will be implemented for the duration of the in-water component of the project.

An increase to impervious surface area would cause a slight decrease in infiltration of precipitation and result in localized impacts to stormwater flow in the basin. These minor impacts would be localized at the development site and minimized through adherence to best management practices and the Stormwater Pollution Prevention and Environmental Resource Permit conditions.

Pursuant to the Endangered Species Act, the Navy has concluded that the Wharf C-2 recapitalization project:

- **may affect but is not likely to adversely affect** the ESA-listed North Atlantic right whale, the humpback whale, the Atlantic sturgeon, the shortnose sturgeon, the smalltooth

sawfish, the green turtle, the Kemp’s ridley turtle, the loggerhead turtle, and the leatherback turtle;

- will have **no effect** on the hawksbill turtle;
- will have **no effect** on critical habitat for the North Atlantic right whale, the smalltooth sawfish, the green turtle, the hawksbill turtle, and the leatherback turtle.

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1. Project Overview

1.1 Lead Agency and Federal Nexus

This Biological Evaluation (BE), prepared by the Department of the Navy, Commander, Navy Region Southeast, addresses the proposed action in compliance with Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. Section 7 of the ESA requires that, through consultation with the National Marine Fisheries Service (NMFS), federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species or result in the destruction or adverse modification of critical habitat. This BE evaluates the potential effects of the proposed Wharf (C-2) Recapitalization project (Project) at Naval Station (NAVSTA) Mayport on species that are federally listed under the ESA and fall under NMFS' jurisdiction. Specific project design elements are identified in Chapter 4 that will aid in avoidance and minimization of adverse effects of the Project on listed species and / or critical habitat.

1.2 Project Description

The proposed action is the recapitalization, or renovation, of Wharf C-2 at NAVSTA Mayport. This recapitalization project includes the demolition and replacement of the existing concrete pile cap, wharf deck and utilities. The project will include installation of approximately 120 steel sheet pile pairs, 119 king piles and 50 polymeric (plastic) fender piles. Construction of the wharf will occur over an 18-month period projected to begin on or after 30 September 2013. A maximum of 70 days of in-water pile driving work will take place over the course of the Project. Piles will be driven using both vibratory and impact driving methods. Impact driving methods will only be used for areas with obstructions when vibratory methods are inadequate. Contingency dredging of up to 4,000 cubic yards of sediment may be performed using a clamshell rig. Chapter 4 describes the elements of the proposed action in more detail.

There are no interrelated or interdependent projects associated with the Project. Because activities are for the repair of existing facilities only, no increase in level of use or operation is expected. No net change in the amount of vessel traffic in and around the turning basin is expected as a result of the project.

1.3 Project Area and Setting

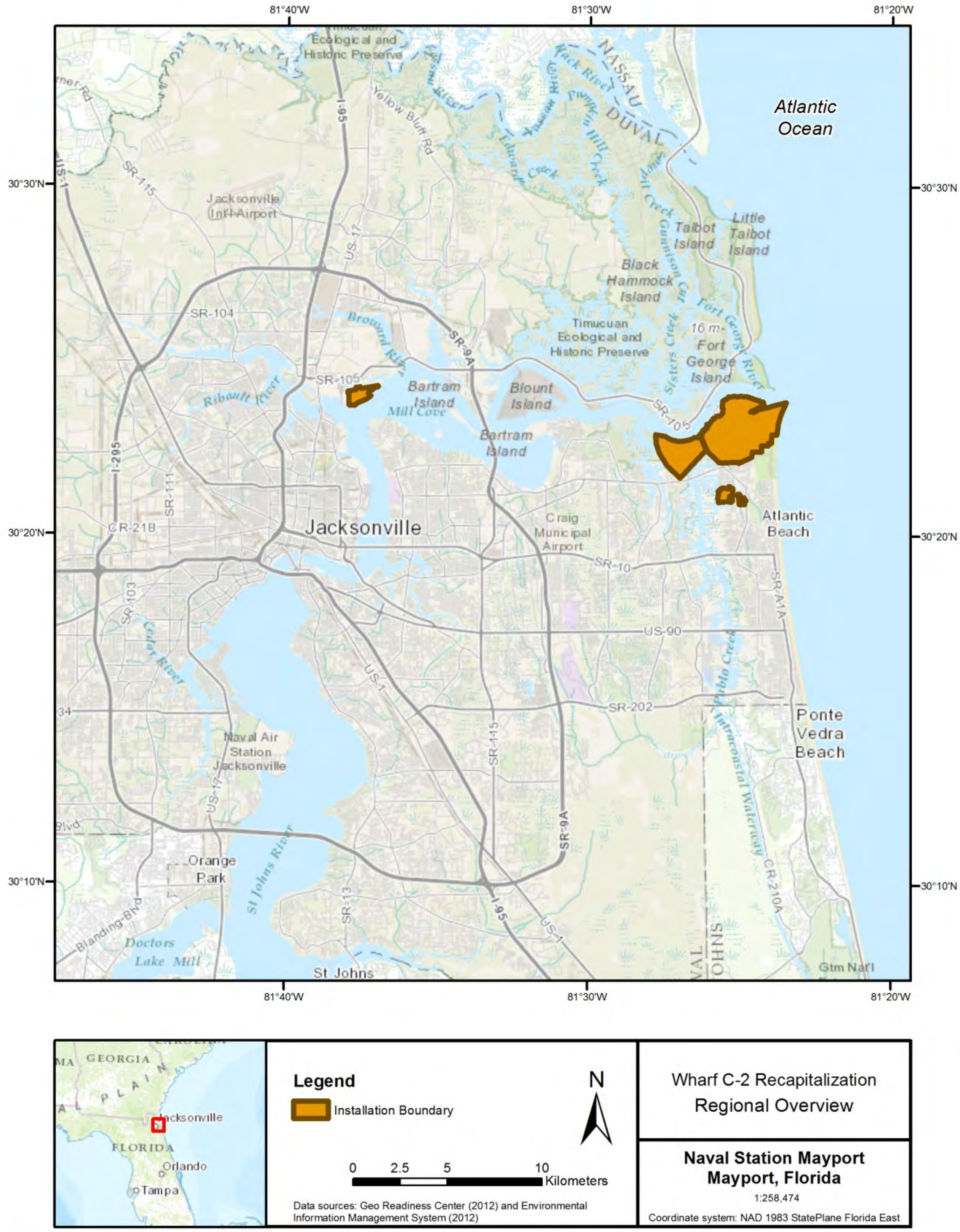
The Project will take place inside the semi-enclosed turning basin at NAVSTA Mayport. The installation is located in northern Florida east of Jacksonville along the St. Johns River and the Atlantic Ocean (Figure 1-1). NAVSTA Mayport maintains and operates facilities which provide support to the operations of deploying home based and transient Navy ships, aviation units, and staff. NAVSTA Mayport also provides logistic support for operating forces, dependent activities, and other commands as assigned. The installation covers approximately 3,409 acres and supports more than 60 commands, detachments, and private organizations; it is homeport to 16 surface ships and routinely hosts port visits by various deep draft ships including nuclear-powered aircraft carriers.

NAVSTA Mayport ship berthing facilities are provided at 16 locations along wharves A through F located around the turning basin perimeter. The turning basin is approximately 2,000 by 3,000 feet (ft.) in size, and is connected to the St. Johns River by a 500 ft. wide entrance channel. A port security barrier has been installed at the mouth of the turning basin and there is a restricted area that prohibits all persons, vessels, and craft, except those vessels operated by the U.S. Navy, visiting foreign navies, and the U.S. Coast Guard, from entering except in cases of extreme emergency. NAVSTA Mayport's approximately one mile-long beach is closed to the general public and is patrolled by the installation's Security Department.

Wharf C-2 lies along the northern edge of the NAVSTA Mayport turning basin. It is a single level, general purpose berthing wharf that was constructed in 1960. Currently, the wharf is 608 ft. long, 125 ft. wide, and has a berthing depth of approximately 50 ft. mean lower low water (MLLW). The wharf is one of two primary deep draft berths at the installation, and is used for ordnance handling. The wharf is a diaphragm steel sheet pile cell structure with a concrete apron, partial concrete encasement of the piling and an asphalt paved deck (Figure 4-1 illustrates the planned structure).

Currently, the wharf is in poor condition due to the advanced deterioration of the steel sheeting and lack of corrosion protection. Due to the structural deterioration of the wharf, load restrictions have been instituted that limit loads to a maximum of 4,500 pounds within 60 ft. of the face of the wharf. Appendix A contains photos of existing damage and deterioration at the wharf, and Appendix B is a contractor schematic of the Project plan.

FIGURE 1-1. NAVSTA MAYPORT REGIONAL OVERVIEW



2. Federally Proposed and Listed Species and Designated Critical Habitat

ESA-listed and candidate species under NMFS' jurisdiction that may be found in the vicinity of the Project are included in Table 2-1.

TABLE 2-1. SPECIES AND CRITICAL HABITAT

Species	Subspecies / Distinct Population Segment	Status	Critical Habitat in Vicinity?
North Atlantic right whale	n/a	E	yes
humpback whale	n/a	E	none designated
Atlantic sturgeon	Carolina / South Atlantic DPS	E	none designated
shortnose sturgeon	n/a	E	none designated
smalltooth sawfish	U.S.	E	no
American eel	n/a	C	n/a
dwarf seahorse	n/a	C	n/a
blueback herring	n/a	C	n/a
green turtle	Florida nesting population	E[1]	no
hawksbill turtle	n/a	E	no
Kemp's ridley turtle	n/a	E	none designated
loggerhead turtle	Northwest Atlantic Ocean DPS	T	none designated
leatherback turtle	n/a	E	no

T = threatened, E = endangered; C= candidate [1]The green turtle is listed as threatened, but the Florida and Mexican Pacific Coast nesting populations are listed as endangered. Green turtles that could occur in the action area may not all be from the Florida population.

2.1 North Atlantic Right Whale

Status and Management

The North Atlantic right whale was listed as endangered in 1970 (35 Federal Register [FR] 18319) under the Endangered Species Conservation Act of 1969; its listing was revised in 2008 (73 FR 12024). A five year review was completed in August 2012 with a recommendation to maintain the species' classification as endangered (National Marine Fisheries Service 2012). North Atlantic right whales are designated as depleted under the Marine Mammal Protection Act (MMPA).

Habitat and Geographic Range

North Atlantic right whales are most often seen as individuals or pairs (Jefferson et al. 1993). They migrate annually between the north and south Atlantic coasts of the United States. They can generally be found in calving grounds off Georgia and Florida from mid-November to mid-April; and then move to feeding grounds in the Gulf of Maine, Bay of Fundy, and Cape Cod in the summer (though sightings may occur year-round in this area) (National Marine Fisheries Service n.d.). North Atlantic right whale calves are born during December through March after 12 to 13 months of gestation (Kraus et al. 2001).

Based on annual surveys conducted from December through March between 1985-2007, North Atlantic right whales are relatively common visitors to waters offshore from NAVSTA Mayport and the federal navigation channel (Slay et al. 2002; Zani et al. 2003, 2004, 2005, 2006; U.S. Department of the Navy 2007; North Atlantic Right Whale Consortium 2007). Incidental sightings of North Atlantic right whales are a relatively uncommon, seasonal occurrence in the St. Johns River and NAVSTA Mayport turning basin, with the most recent sightings occurring in January 2011 and December 2012 (Gibbons 2011, Loop pers. comm. 2012).

Population and Abundance

The western North Atlantic minimum stock size is based on a census of individual whales identified using photo-identification techniques. A review of the photo-ID recapture database as it existed on 21 October 2011 indicated that 425 individually recognized whales in the catalog were known to be alive during 2009. Whales catalogued by this date included 20 of the 39 calves born during that year. Thus adding the 19 calves not yet catalogued brings the minimum number alive in 2009 to 444. This number represents a minimum population size. This count has no associated coefficient of variation (Waring et al. 2013). Based on data in the Navy's Marine Species Density Database (NMSDD), a density of 0.00005 individuals per square kilometer (km^2) has been estimated for the activity area (U.S. Department of the Navy 2012).

Predator/Prey Interactions and Foraging

Dives of 5 to 15 minutes or longer have been reported (Cetacean and Turtle Assessment Program 1982; Baumgartner and Mate 2003), but can be much shorter when feeding (Winn et al. 1995). Surface and shallow sub-surface foraging behaviors are also common in spring and summer foraging habitats (Parks et al. 2012). Longer surface intervals have been observed for reproductively-active females and their calves (Baumgartner and Mate 2003).

Critical Habitat

Three critical habitat areas - Cape Cod Bay/Massachusetts Bay/Stellwagen Bank, Great South Channel, and the coastal waters of Georgia and Florida in the southeastern United States—were designated by NMFS in 1994 (59 FR 28805). The southeastern United States critical habitat area covers waters from the coast to five miles offshore; the eastern portion of the federal navigation channel is within this critical habitat area. Two additional critical habitat areas in Canadian waters, Grand Manan Basin and Roseway Basin, were identified in Canada's final recovery strategy for the North Atlantic right whale (Brown et al. 2009). A 12-month finding from NMFS on a 2002 petition to revise right whale critical habitat stated a review of scientific information suggests that physical and biological features essential to the conservation of right whales may include, but are not necessarily limited to, the occurrence of copepods and the features that concentrate them in the water off of the northeast United States, as well as sea surface temperature and possibly bathymetry in the waters off of the southeast United States. In a more recent 12-month finding on a 2009 petition, NMFS stated they agree that revision of critical habitat is appropriate and that they would continue the ongoing rulemaking process (75 FR 61690). Therefore, determination of primary constituent elements for North Atlantic right whale critical habitat in the Atlantic Ocean is still pending.

2.2 Humpback Whale

Status and Management

Humpback whales were listed as endangered in 1970 (35 FR 18319) under the Endangered Species Conservation Act of 1969. Based on overall evidence of population recovery in many areas, the species is being considered by NMFS for removal or down-listing from the ESA (74 FR 40568). Humpback whale abundance is increasing through much of the species' range. Individuals that occur in the Wharf C-2 activity area are from the Gulf of Maine stock. Humpback whales are designated as depleted under the MMPA.

Habitat and Geographic Range

During the winter, most of the North Atlantic population of humpback whales is believed to migrate south to calving grounds in the West Indies region (Whitehead and Moore 1982; Smith et al. 1999; Stevick et al. 2003), over shallow banks and along continental coasts, where calving occurs. Calving peaks from January through March, with some animals arriving as early as December and a few not leaving until June. The coastal region of Florida is not designated as an area of concentrated occurrence for humpback whales (U.S. Department of the Navy 2002). Since humpback whales migrate south to calving grounds during the fall and make return migrations to the northern feeding grounds in spring, they are not expected off the coast of Florida during summer. There has been an increasing occurrence of humpbacks, which appear to be primarily juveniles, during the winter along the U.S. Atlantic coast from Florida north to Virginia (Clapham et al. 1993; Swingle et al. 1993; Wiley et al. 1995; Laerm et al. 1997).

Females with calves are among the first to leave northern feeding grounds in the fall, followed by subadult males, mature males, non-pregnant females, and pregnant females (Clapham 1996). On the northward migration from the Caribbean, this order is broadly reversed, with newly pregnant females among the first to begin the return migration to high latitudes.

Based on sightings, strandings, and life history, humpbacks would be expected to occur in waters off NAVSTA Mayport during fall, winter, and spring. An incidental sighting of a humpback whale in nearshore waters was reported off Jacksonville, North Carolina in December 2012 (Jacksonville Daily News 2012) and it is possible that the same type of occurrence could occur off Mayport. The likelihood of occurrence is low, however, and even lower for the turning basin and Wharf C-2 action area.

Population and Abundance

The most recent line-transect survey, which did not include the Scotian Shelf portion of the stock, produced an estimate of abundance for Gulf of Maine humpback whales of 331 animals (CV=0.48) with a resultant minimum population estimate for this stock of 228 animals. The line-transect based minimum estimate is unrealistic because at least 500 uniquely identifiable individual whales from the Gulf of Mexico stock were seen during the calendar year of that survey and the actual population would have been larger because re-sighting rates have historically been <1. Using the minimum count from at least 2 years prior to the year of a stock assessment report has allowed NMFS time to resight whales known to be alive prior to and after the focal year. Thus the minimum population estimate is set to the 2008 mark-recapture based count of 823.Current data suggest the Gulf of Maine stock is steadily increasing in numbers (Waring et al. 2013). Based on data in the NMSDD, a density of 0.000113 individuals per square kilometer has been estimated for the activity area (U.S. Department of the Navy 2012).

Predator/Prey Interaction and Foraging

Humpback whales feed on a variety of invertebrates and small schooling fishes in cold, productive waters of the north Atlantic. 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).

Critical Habitat

Critical habitat has not been designated for humpback whales.

2.3 Atlantic Sturgeon

Status and Management

In the year 2009, NMFS was petitioned to list the Atlantic sturgeon under the ESA. In 2010, NMFS found that the petition presented substantial scientific or commercial information indicating that listing may be warranted (75 FR 838). After completing an ESA status review of the Atlantic sturgeon, NMFS issued two final rules in 2012; one listed the Carolina and South Atlantic distinct population segments (DPS) as endangered (77 FR 5914). The South Atlantic DPS could occur in the action area.

The Atlantic sturgeon is also managed under a fishery management plan implemented by the Atlantic States Marine Fisheries Commission, but a coast-wide moratorium on its harvest has been in effect since the end of 1997 (Greene et al. 2009). The NMFS augmented the Atlantic States Marine Fisheries Commission moratorium with a similar moratorium for federal waters in 1999. Amendment 1 to Atlantic States Marine Fisheries Commission's Atlantic Sturgeon Fishery Management Plan also includes measures for preservation of existing habitat, habitat restoration and improvement, monitoring of bycatch and stock recovery, and breeding and stocking protocols (75 FR 838).

Habitat and Geographic Range

As an 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 spring, beginning in February in the south, April in the mid-Atlantic, and May in Canadian waters (Dadswell 2006). After spawning in freshwater in the spring and early summer, adults migrate back into estuarine and marine waters. 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; 75 FR 838).

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. Atlantic sturgeon 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). Subadults and adults live in coastal waters and estuaries when not spawning, generally in shallow (35–165 ft. [10–50 m]) inshore areas of the continental shelf where they feed (75 FR 838). 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 (30–160 ft. [10–50 m]) over gravel and sand, and to lesser extent, silt and clay (Stein et al. 2004).

Population and Abundance

Numbers of Atlantic sturgeon in the South Atlantic DPS are low compared to historic levels. Currently there are several hundred to a few thousand adult Atlantic sturgeon spawning annually in the Altahama River – the closest major breeding territory, approximately 70 miles from NAVSTA Mayport (Wilcox pers. comm. 2013). Documented occurrences of Atlantic sturgeon in the vicinity of the Project have been limited to recreational catches, all prior to the species listing under the ESA. The most recent documented occurrence was in 2011. It is assumed that the St. Johns River spawning population has been completely eliminated (National Marine Fisheries Service n.d. [A]).

Predator/Prey Interactions and Foraging

Like all sturgeon, the Atlantic sturgeon feeds along the bottom on invertebrates such as isopods, crustaceans, worms, and mollusks (National Marine Fisheries Service 2010). It has also been documented to feed on fish (Bain 1997). Evidence of predation on sturgeon is scarce, but some researchers believe they are taken by the American alligator (*Alligator mississippiensis*), alligator gar (*Atractosteus spatula*), and striped bass (*Morone saxatilis*) (Dadswell 2006). Sharks likely prey on all species of sturgeon in the marine environment (National Marine Fisheries Service 1998).

Critical Habitat

No critical habitat has been designated for this species.

2.4 Shortnose Sturgeon

Status and Management

The shortnose sturgeon was listed as endangered under the Endangered Species Preservation Act of 1966, which predated the ESA; this species remains on the list as endangered throughout its range along the Atlantic coast (National Marine Fisheries Service 1998). The NMFS manages 19 DPSs of anadromous shortnose sturgeon (National Marine Fisheries Service 1998). Of these, the St. Johns DPS may occur in the action area.

Habitat and Geographic Range

The historical range of shortnose sturgeon extended from New Brunswick, Canada to as far south as the St. Johns River in Florida. More recently, the species has been observed only as far south as the Altamaha River in Georgia. Generally, shortnose sturgeon are more abundant in northern and mid-Atlantic populations as compared to southern populations, due to characteristics of watersheds or anthropogenic disturbances (Wirgin et al. 2009; Collins et al. 2000). After hatching in 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 and foraging at night along the bottom (Richmond and Kynard 1995). 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 (35–100 ft. [10 –30 m]) in winter and in shallow water (7–35 ft. [2–10 m]) 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).

Population and Abundance

No data analysis for the St. Johns River population size has been conducted. Extensive sampling was conducted in 2002 / 2003 and only one specimen was captured during that effort. Further, in the 1980s and early 1990s, other survey efforts were performed with no incidental captures (Wilcox pers. comm. 2013). Therefore, it is unlikely that any sizable population of shortnose sturgeon currently exists in the St. Johns River. This species' reproduction generally requires rocky or gravel substrate or limestone outcroppings - habitat rarely found in the St. Johns River or its tributaries. No reproduction of sturgeon in the St. Johns River has ever been documented, and no large adults have been positively identified (all known specimens have been less than ten pounds). The last recorded shortnose sturgeon observed in the St. Johns River was in 2002 (South Atlantic Fisheries Management Council 2004; Wilcox pers. comm. 2013). In other southern rivers, the species uses thermal refuges, such as springs, but no sturgeon have been observed in the numerous springs in the St. Johns River. Given the low-quality habitat it is possible that shortnose sturgeon have not actively spawned in the St. Johns River system, and that individuals that have been documented were transients from other river systems (Florida Fish and Wildlife Conservation Commission n.d.).

Predator/Prey Interactions and Foraging

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, mollusks, and small fish from the bottom (National Marine Fisheries Service 1998; Stein et al. 2004). Young-of-the-year sturgeon (individuals less than a year old) have been found in the stomachs of yellow perch (National Marine Fisheries Service 1998); predation on adult sturgeon is not well-documented, although sharks, lampreys and pinnipeds may prey on them in the marine environment (National Marine Fisheries Service 1998, Massachusetts Division of Fisheries and Wildlife 2012, Mierzykowski 2012).

Critical Habitat

No critical habitat has been designated for this species.

2.5 Smalltooth Sawfish

Status and Management

NMFS designated the smalltooth sawfish as a candidate species under the ESA in 1999 (64 FR 33467). That same year, a petition was filed requesting the North American populations of smalltooth sawfish (along with largetooth sawfish) be listed as endangered. The United States DPS historically inhabited waters off New York south to Florida, and around the Florida peninsula to Texas; it was listed as endangered under the ESA in 2003 (68 FR 15674). The smalltooth sawfish was once common in the Gulf of Mexico and along the east coast of the United States. Today, the severely depleted population is restricted mostly to southern Florida (Poulakis and Seitz 2004; Simpfendorfer 2002; Simpfendorfer and Wiley 2005, 2006).

Habitat and Geographic Range

The smalltooth sawfish typically inhabits shallow subtropical or tropical estuarine and marine waters. It remains close to the bottom, in deep holes of sand or muddy sand, or over limestone hard bottom, coral reefs, and live bottoms (Poulakis and Seitz 2004). Nursery areas are in shallow nearshore regions and estuaries, especially in mangrove habitat (National Marine Fisheries Service 2010a; Seitz and Poulakis 2006; Simpfendorfer and Wiley 2005). Mangrove prop roots provide refuge from predators, and the sawfish's compressed body allows it to navigate very shallow waters (3 ft. [1 m]) that typically exclude large sharks (National Marine Fisheries Service 2009). Young-of-the-year sawfish (less than 39 inches [in.] or 100 centimeters [cm]) have been observed swimming in only a few inches of water (National Marine Fisheries Service 2009e). Juvenile smalltooth sawfish exhibit a high site fidelity to nearshore areas, often residing in one area between 15 and 55 days (Simpfendorfer 2006). Larger individuals may occur down to 400 ft. (120 m) (Poulakis and Seitz 2004; Simpfendorfer 2006), although tagging studies indicate that adults spend more time in shallow water than previously suspected, and are only occasionally found in deeper waters (Simpfendorfer and Wiley 2005). The smalltooth sawfish may also be associated with sea fans, artificial reefs, and offshore drilling platforms (Poulakis and Seitz 2004).

Population and Abundance

No estimates of the size of the smalltooth sawfish population are available. The best available data suggest that the current population is a small fraction of its historical size (National Marine Fisheries Service 2010a; Simpfendorfer 2006). Limited scientific survey data are available for this species, but dockside surveys of recreational anglers in Everglades National Park beginning in 1972 suggest that the population there has at least stabilized, and may be increasing. Between 1989 and 2004, the population increased by approximately five percent per year (Carlson et al. 2007). While historical records indicate that the St. Johns River once had high numbers of smalltooth sawfish (National Marine Fisheries Service 2000), there have been no incidental reports in the past few years.

Predator/Prey Interactions and Foraging

The smalltooth sawfish feeds primarily at night (National Marine Fisheries Service 2009) and uses its saw while feeding to stir the substrate to expose crustaceans or to stun and slash schooling fish (74 FR 45353). Smalltooth sawfish, particularly juveniles, are preyed upon by bull sharks and other sharks occurring in shallow coastal waters.

Critical Habitat

In 2009, NMFS designated critical habitat for smalltooth sawfish at two locations; the Charlotte Harbor Estuary and the Ten Thousand Islands portion of the Everglades (74 FR 45353). Most of this designated critical habitat lies in the boundaries of the federally managed Everglades National Park, Rookery Bay Aquatic Preserve, and Cape Romano-Ten Thousand Islands Aquatic Preserve (National Marine Fisheries Service 2009). The primary constituent elements of smalltooth sawfish critical habitat are designated as red mangroves and shallow habitats characterized by variable salinities with water depths between the mean high water line and 3 ft. (0.9 m) measured at mean lower low water (74 FR 45353). There is no smalltooth sawfish critical habitat in the vicinity of the Project.

2.6 American Eel

Status and Management

American eel are currently under petition as a candidate for listing under the ESA by the U.S. Fish and Wildlife Service because they have undergone substantial declines throughout their range (76 FR 60431). Determining status trends is challenging because the available data are limited to a few locations that may not represent the entire range for this species (76 FR 60431; Wirth and Bernatchez 2003). In 2007, NMFS and USFWS determined that the American eel population appeared stable for the long-term and listing was not warranted (72 FR 4967). However, new information in the 2011 petition prompted the USFWS to begin a new status review. The Atlantic States Marine Fisheries Commission has had a fishery management plan for the American eel since 1999 (Atlantic States Marine Fisheries Commission 2000).

Habitat and Geographic Range

The American eel ranges from Greenland south along the Atlantic Coast and into the Caribbean (U.S. Fish and Wildlife Service 2011). The American eel is catadromous, meaning it is born in saltwater and migrates into freshwater to mature (Jessop et al. 2002). Spawning of the U.S. population of American eel is believed to occur in the Sargasso Sea of the Atlantic Ocean. From there, eggs, larvae, and juveniles are dispersed largely via the Gulf Stream and other oceanic currents as they feed at the surface of the ocean. As juveniles, or "glass eels," they enter coastal waters where they further mature into ''elvers'' and then a late juvenile stage known as ''yellow eels" (U.S. Fish and Wildlife Service 2011). Older juveniles and adults occupy estuarine and freshwater habitats, often swimming far upriver into lakes, ponds, and headwater streams, where they may spend up to 30 years as adults. Mature adults, or "silver eels," migrate to the Sargasso Sea to spawn and die (U.S. Fish and Wildlife Service 2011). Peak migration in the St. Johns River takes place between January and February (Florida Fish and Wildlife Conservation Commission n.d.[A]).

Population and Abundance

The American eel exists as a single population that disperses widely from its spawning grounds in the Sargasso Sea, making abundance difficult to determine (Haro et al. 2000). Demographic structure is difficult to determine because nonbreeding individuals are spread over an extremely large geographic range (U.S. Fish and Wildlife Service 2011). There is a small commercial fishery for American eels in Florida, which operates almost exclusively in the St. Johns River system. Annual landings of American eels have been reported since the early 1980s. However, commercial eel harvest has been declining since the early 1990s (Florida Fish and Wildlife Conservation Commission n.d.[A]).

Predator/Prey Interaction and Foraging

The American eel feeds on a wide variety of prey items including benthic invertebrates, insects, crustaceans, mollusks, worms, and finfish. It is preyed upon by a wide variety of species including fish, seabirds, sharks, and rays (Dalton et al. 2009; U.S. Fish and Wildlife Service 2011).

Critical Habitat

This species is not listed under the ESA; as such, no critical habitat has been designated.

2.7 Dwarf Seahorse

Status and Management

In April 2011, NMFS received a petition to list the dwarf seahorse as threatened or endangered under the ESA and to designate critical habitat concurrently with the listing (77 FR 26478). In its 90-day review, NMFS concluded that the species may warrant listing under the ESA, resulting in the initiation of a formal status review (77 FR 26478).

Dwarf seahorses are harvested in Florida's commercial seahorse fishery, primarily in the southeast portion of the state through diving, seining, or dredging (Bruckner 2005; 77 FR 26478). The state imposes a commercial bag limit of 400 dwarf seahorses per person or per vessel per day, whichever is less; and a recreational bag limit of five dwarf seahorses per person, per day. There are no seasonal restrictions or closures for this fishery (77 FR 26478).

Habitat and Geographic Range

The dwarf seahorse inhabits tropical and subtropical / warm-temperate waters of Florida, the Gulf of Mexico, and the Caribbean (Masonjones and Lewis 1996). The species primarily occurs in south Florida estuaries and in the Florida Keys, preferring protected bays/lagoons with low water flow, high organic content, mid- to high-salinities and depths less than 6 ft. (2 m) (Bruckner 2005; Foster and Vincent 2004). Dwarf seahorses are almost exclusively associated with seagrass beds, particularly eelgrass (*Zoster*a spp.) (Bruckner 2005). Other habitats used by the dwarf seahorse include mangrove areas, unattached algae, and inshore drifting vegetation (Center for Biological Diversity 2011; Hoese and Moore 1998; Tabb and Manning 1961).

While most seahorse species exhibit strong site-fidelity, in terms of home ranges and spawning habitat (Curtis and Vincent 2006; Masonjones and Lewis 1996), Masonjones et al. (2010) suggests that further seahorse dispersal outside of home ranges may occur. Dispersal may be enhanced by clinging to drifting *Sargassum* or floating debris within inshore habitats (Foster and Vincent 2004; Masonjones and Lewis 1996). Dwarf seahorse spawning occurs between February and November (Foster and Vincent 2004). Based on habitat requirements (particularly seagrass and subtropical water temperatures, dwarf seahorses are not expected to occur in the action area.

Population and Abundance

There are no published data on current global population trends or total numbers of mature dwarf seahorses; however, some population data exist in Florida based on numbers derived from the commercial seahorse fishery. The NMFS reported a five-fold increase in seahorse landings between 1991 and 1992 (from 14,000 harvested in 1991 to 83,700 harvested in 1992) (77 FR 26478), with the increased landings primarily attributed to dwarf seahorses. Over a longer period, the number of dwarf seahorses landed during 1990–2003 ranged from 2,142 to 98,779 individuals per year (Bruckner 2005). Additional density data are from ichthyoplankton tows conducted in portions of southern Florida and range from 0 to 6 seahorses per 100 cubic meters in subtidal pools, seagrass beds, in channels, and along restored marsh edges (Masonjones et al. 2010; Powell et al. 2002; Thayer et al. 1999).

Predator/Prey Interaction and Foraging

Seahorses are ambush predators, consuming primarily live, mobile nekton, such as small amphipods and other invertebrates (Bruckner 2005).

Critical Habitat

This species is not listed under the ESA; as such, no critical habitat has been designated.

2.8 Blueback Herring

The blueback herring was classified as a candidate species under the ESA in 2011 (76 FR 67652). Blueback herring and alewife are evaluated jointly as "river herring" by NMFS. Coastal ranges of the two species overlap with blueback herring found in a greater and more southerly distribution ranging from Nova Scotia down to the St. Johns River (76 FR 67652). Therefore, only blueback herring is addressed in this document.

Status and Management

Blueback herring and alewife exhibit very similar life histories, and herring are often harvested and managed together because of the difficulty in distinguishing between the two species; they are currently managed by the Atlantic States Marine Fisheries Commission. Several states north of Florida have enacted harvest moratoria and management plans for this species.

Habitat and Geographic Range

The blueback herring ranges from Nova Scotia to the St. Johns River (McBride et al. 2010). The species is anadromous, migrating during the spring months to spawn in their natal rivers on the U.S. east coast then returning to coastal waters in the summer. Juveniles mature for several years in coastal waters before making their first spawning run. They are highly migratory, travelling in large schools near the surface (National Marine Fisheries Service 2009a). Blueback herring spawn in a variety of habitats , ranging from swift moving rivers to small tributaries above the tidal zone (National Marine Fisheries Service 2009a); overall they typically occur over the continental shelf in waters less than 100 m (328 ft.) (National Marine Fisheries Service 2009a; Neves 1981). Blueback herring spawn in the St. Johns River during winter and spring, peaking in January and February; and juveniles migrate out of the estuary during the following fall (Trippel et al. 2007).

Population and Abundance

River herring have undergone substantial declines throughout most of their range. Smaller sizes being harvested in the St. Johns River suggests that the population is experiencing higher mortality than in the past (McBride et al. 2010).

Predator/Prey Interaction and Foraging

All life stages of river herring feed primarily on phytoplankton and zooplankton, but adults also eat mysids, small finfish, and benthic crustaceans (National Marine Fisheries Service 2009a). River herring are preyed on by a number of marine species, including striped bass, bluefish, tunas, cod, haddock, halibut, American eel, seabirds, and marine mammals.

Critical Habitat

This species is not listed under the ESA; as such, no critical habitat has been designated.

2.9 Green Turtle

Status and Management

Breeding populations of green turtles in Florida and Mexico's Pacific coast were listed as endangered under the ESA in 1978 (43 FR 32800). All other populations of this species are listed as threatened. Individuals with either type of regulatory protection could occur in the action area. NMFS and the U.S. Fish and Wildlife Service (USFWS) determined that the current population listing remains valid and green turtles will not undergo a distinct population segment analysis (National Marine Fisheries Service and U.S. Fish and Wildlife Service2007).

Habitat and Geographic Range

The green sea turtle is distributed worldwide across tropical and subtropical coastal waters between 45° N and 40° S (The State of the World's Sea Turtles Team 2011). After emerging from the nest, green turtle hatchlings swim to offshore areas where they are carried in major current systems. At the juvenile stage (estimated at 5 to 6 years) they leave the open-ocean habitat and retreat to protected lagoons and open coastal areas that are rich in seagrass or marine algae (Bresette et al. 2006), where they will spend most of their lives (Bjorndal and Bolten 1988).

Along Florida's Atlantic coast, green turtles occur in high-wave-energy, nearshore reef environments less than 2 m deep that support an abundance of macroalgae and submerged aquatic vegetation (Holloway-Adkins 2006). Occasional green turtle nesting occurs in Duval County, on beaches adjacent to the action area. Nesting season varies with locality; in the vicinity of the Project, the season is roughly June to September (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2007).

Population and Abundance

An annual average of 8,927 green sea turtles nested in Florida from 2006 to 2010, making this the second largest green sea turtle nesting population in the wider Caribbean (Meylan et al. 2006). In 2012, only one green turtle nest was recorded for Duval County, but it was not located at NAVSTA Mayport (Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute 2013). A single green turtle nest was observed at NAVSTA Mayport in 2011 (Loop pers. comm. 2013).

Generally, nesting trends in the western Atlantic Ocean are stable to increasing and are increasing in Florida (National Marine Fisheries Service and U.S. Fish and Wildlife 2007). Green turtles have been recorded in the turning basin (U.S. Army Corps of Engineers 2001), though in-water abundance for the region and along the Atlantic coast remains unavailable (National Marine Fisheries Service and U.S. Fish and Wildlife 2007). In addition to individuals from the Florida nesting population, adult and juvenile males and females from nesting colonies in the wider Caribbean could occur in the waters of the action area.

Predator/Prey Interactions and Foraging

The green sea turtle is the only species of sea turtle that, as an adult, primarily consumes plants and other types of vegetation (Mortimer 1995). They have a finely serrated jaw that assists with tearing vegetation, and the esophagus is lined with papillae (spiny projections) that trap food before swallowing. While primarily herbivorous, a green sea turtle's diet changes substantially throughout its life. Very young green sea turtles are omnivorous (Bjorndal 1997). Salmon et al. (2004) reported that post-hatchling green sea turtles were found to feed near the surface on seagrasses or at shallow depths on comb jellies and unidentified gelatinous eggs off the coast of southeastern Florida. Pelagic juveniles smaller than 8–10 in. (20.3–25.4 cm) in length eat worms, young crustaceans, aquatic insects, grasses, and algae (Bjorndal 1997). After settling in coastal juvenile developmental habitat at 8–10 in. (20.3–25.4 cm) in length, they eat mostly seagrass and algae (Balazs et al. 1994). Recent research indicates that green sea turtles in the open-ocean environment, and even in coastal waters, also consume jellyfish, sponges, and sea pens (Godley et al. 1998; Hatase et al. 2006; Heithaus et al. 2002; National Marine Fisheries Service and U.S. Fish and Wildlife 2007; Parker and Balazs 2008).

The loss of eggs to land-based predators such as mammals, snakes, crabs, and ants occurs on some nesting beaches. As with other sea turtles, hatchlings may be predated on by birds and fish. Sharks are the primary nonhuman predators of juvenile and adult green sea turtles at sea (National Marine Fisheries Service and U.S. Fish and Wildlife 1991).

Critical Habitat

Critical habitat for the green turtle was designated in 1998 (63 FR 46693), but does not occur in or near the action area.

2.10 Hawksbill Turtle

Status and Management

The hawksbill turtle was listed as endangered under the ESA in 1970 (35 FR 8491). While the current listing as a single global population remains valid, data may support separating populations at least by ocean basin under the distinct population segment policy (National Marine Fisheries Service and U.S. Fish and Wildlife 2007a).

Habitat and Geographic Range

The hawksbill is the most tropical of the world's sea turtles, rarely occurring above 35° N or below 30° S (The State of the World's Sea Turtles Team 2008; Witzell 1983). Hatchlings are believed to occupy open-ocean waters, associating themselves with surface algal mats in the Atlantic Ocean (Parker 1995; Witherington and Hirama 2006; Witzell 1983). Juveniles leave the open-ocean habitat after 3 to 4 years and settle in coastal foraging areas, typically coral reefs but occasionally seagrass beds, algal beds, mangrove bays, and creeks (Mortimer and Donnelly 2008). Juveniles and adults share the same foraging areas, including tropical nearshore waters associated with coral reefs, hardbottoms, or estuaries with mangroves (Musick and Limpus 1997). In nearshore habitats, resting areas for late juvenile and adult hawksbills are typically in deeper waters, such as sandy bottoms at the base of a reef flat (Houghton et al. 2003). As they mature into adults, hawksbills move to deeper habitats and may forage to depths greater than 90 m. During this stage, hawksbills are seldom found in waters beyond the continental or insular shelf unless they are in transit between distant foraging and nesting grounds (Renaud et al. 1996; Shaver and Rubio 2008; Shaver et al. 2005). Ledges and caves of coral reefs provide shelter for resting hawksbills during both day and night, where an individual often inhabits the same resting spot. Hawksbills are also found around rocky outcrops and high-energy shoals, where sponges are abundant, and in mangrove-fringed bays and estuaries (National Marine Fisheries Service and U.S. Fish and Wildlife 2007a). Female hawksbills return to their natal beach every two to three years to nest at night, every 14 to 16 days during the nesting season. Only two occurences of hawksbill turtles were documented during a study between 1980 and 2002 in Duval County (Meylan and Redlow 2006); both were live strandings. Nesting of hawksbills in the vicinity of the action area is extremely unlikely.

Population and Abundance

The 2007 five-year review (National Marine Fisheries Service and U.S. Fish and Wildlife 2007a) assessed nesting abundance and nesting trends in all regions inhabited by hawksbill turtles. An estimated 3,072 to 5,603 nesting turtles occur in the Atlantic Ocean. An analysis of 25 index sites around the world indicated that hawksbill nesting has declined globally by at least 80 percent over the last three hawksbill generations (105 years in the Atlantic Ocean) (Meylan and Donnelly 1999). Comprehensive nesting data for Duval County or Florida are not available, as hawksbill turtles rarely – if at all – nest in Florida. This species is a cryptic nester (Bjorndal et al. 1985), and nests could be missed in areas with high number of other species nesting, or where beach coverage is incomplete. Because of its location north of the species' normal nesting range, and its lack of suitable juvenile and adult habitat, it is very unlikely that any hawksbill turtles will occur in the action area.

Predator/Prey Interactions and Foraging

Hawksbill turtles fill a unique ecological niche in marine and coastal ecosystems, supporting the natural functions of coral reefs by keeping sponge populations in check (Hill 1998; Leon and Bjorndal 2002). Feeding on sponges helps to control populations of sponges that may otherwise compete for space with reef-building corals (Hill 1998; Leon and Bjorndal 2002). Post-hatchling hawksbills feed on floating *Sargassum* in the open ocean (Plotkin and Amos 1998). During the later juvenile stage, hawksbills are considered omnivorous, feeding on sponges, sea squirts, algae, molluscs, crustaceans, jellyfish, and other aquatic invertebrates (Bjorndal 1997). Older juveniles and adults are more specialized, feeding primarily on sponges, which compose as much as 95 percent of their diet in some locations (Meylan 1988; Witzell 1983). In the Caribbean, as hawksbills grow, they begin feeding exclusively on only a few types of sponges (Hill 1998; Leon and Bjorndal 2002). Their beak-like mouth allows the hawksbill turtle to reach into holes and crevices of coral reefs to find sponges as well as other invertebrates. As with other sea turtle species, the hawksbill's esophagus is lined with papillae (spiny projections) that trap food before swallowing.

The loss of hawksbill eggs to predators such as feral pigs, mongoose, rats, snakes, crabs, and ants is a severe problem on some nesting beaches. As with other sea turtles, hatchlings may be predated on by birds and fish. Sharks are the primary nonhuman predators of juvenile and adult hawksbills at sea (Witzell 1983).

Critical Habitat

Critical habitat was designated for hawksbill terrestrial nesting areas in Puerto Rico in 1982 (47 FR 27295), but it does not occur in or near the action area.

2.11 Kemp's Ridley Turtle

Status and Management

The Kemp's ridley sea turtle was listed as endangered in 1970 (35 FR 18319). This species has also received protection in Mexico since the 1960s. Harvesting of eggs and turtles, and death from trawl fisheries in the Gulf of Mexico, resulted in a worldwide population decline (Turtle Expert Working Group 2000). The dramatic decline in this population led to intensive management efforts by both Mexican and American environmental agencies. Efforts included protecting nesting beaches from human and animal predators, hatchery programs, and fishing regulations, particularly the requirement of the shrimp industry to use turtle excluder devices.

Habitat and Geographic Range

Habitats frequently used by Kemp's ridley sea turtles in U.S. waters are warm-temperate to subtropical sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters, where their preferred food, the blue crab, is abundant (Lutcavage and Musick 1985; Seney and Musick 2005). Adult female Kemp's ridley sea turtles take part in mass synchronized nesting emergences known as "arribadas" on only a few nesting beaches. Kemp's ridley turtle may also be solitary nesters, but this is less common.

Unlike other species, Kemp's ridley turtles nest primarily during daylight hours (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2011). The nesting season on the east coast of the U.S. occurs from April through July, and is largely limited to the Gulf of Mexico. Evidence suggests that post-hatchling and small juvenile Kemp's ridley sea turtles, similar to loggerhead and green sea turtles of the same region, forage and develop in floating *Sargassum* habitats of the north Atlantic Ocean. Juveniles migrate to habitats along the U.S. Atlantic continental shelf from Florida to New England (Morreale and Standora 1998; Peña 2006) at around 2 years of age. Migrating juvenile Kemp's ridleys travel along coastal corridors generally shallower than 164 ft. (50 m) in bottom depth (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2011). Suitable developmental habitats are seagrass beds and mud bottoms in waters of less than 33 ft. (10 m) bottom depth and with sea surface temperatures between 72°F and 90°F (22°C and 32°C) (Coyne et al. 2000).

Satellite telemetry data suggest that turtles migrate south in October and November from Georgia and northern Florida to the waters south of Cape Canaveral - and return to their summer foraging grounds in March and April. Therefore, higher densities of Kemp's ridleys in Florida are likely found in winter. The offshore waters south of Cape Canaveral are identified as an important overwintering area for turtles foraging in Atlantic coastal waters (Henwood and Ogren 1987; Schmid 1995). Waters off central North Carolina, which are relatively warm because of the nearby Gulf Stream, are a potentially important overwintering area (Morreale and Standora 1998).

Population and Abundance

The main nesting beach of Kemp's ridley sea turtles is at Rancho Nuevo, Mexico. Based on the number of nests monitored between the years 2005 and 2009, an estimated 5,500 females nest each season in the Gulf of Mexico (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2011). Given the current population growth rate, the population could increase to 10,000 nesting females by 2015 (Heppell et al. 2005). Kemp's ridley turtles have been recorded in nearby Kings Bay, Georgia and therefore may be present in the NAVSTA Mayport turning basin (U.S. Army Corps of Engineers 2006). Occurrences in the vicinity of the action area are expected to be seasonal, rare, and correlated with presence of preferred prey species.

Predator/Prey Interactions and Foraging

Kemp's ridley sea turtles feed primarily on crabs but are also known to prey on molluscs, shrimp, fish, jellyfish, and plant material (Frick et al. 1999; Marquez-M. 1994). Blue crabs and spider crabs are important prey species for the Kemp's ridley (Keinath et al. 1987; Lutcavage and Musick 1985; Seney and Musick 2005). They may also feed on shrimp fishery bycatch (National Marine Fisheries Service and U.S. Fish and Wildlife 1993). As with other sea turtle species, the Kemps ridley's esophagus is lined with papillae (spiny projections) that trap food before swallowing.

Major predators of Kemp's ridley sea turtle eggs and hatchlings on nesting beaches include raccoons, dogs, pigs, skunks, badgers, and fire ants. Predatory fishes such as jackfish and redfish may feed on hatchlings at sea. Sharks are the primary predator of juvenile and adult Kemp's ridley sea turtles (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2011).

Critical Habitat

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.

2.12 Loggerhead Turtle

Status and Management

The loggerhead turtle was listed under the ESA in 1978 (43 FR 32800). A status review was initiated in 2009 for the loggerhead (the first turtle species subjected to a complete stock analysis) identified nine distinct population segments within the global population (Conant et al. 2009). In a September 2011 final rule (76 FR 58950), NMFS and USFWS listed five of these distinct population segments as endangered and kept four as threatened under the ESA, effective as of 24 October 2011. Individual loggerheads occurring in the action area would most likely belong to the Northwest Atlantic Ocean DPS, which is currently classified as threatened under the ESA. This DPS is projected to decline in the foreseeable future, primarily as a result of fishery bycatch (Conant et al. 2009). Within the DPS there are at least five demographically independent loggerhead sea turtle nesting groups or subpopulations of the Northwest Atlantic Ocean. The Peninsular Florida Recovery Unit, along Florida's Atlantic coast to Key West (National Marine Fisheries Service and U.S. Fish and Wildlife 2009) falls within the region of NAVSTA Mayport.

Habitat and Geographic Range

Loggerhead sea turtles occur in U.S. waters in habitats ranging from coastal estuaries to waters far beyond the continental shelf (Dodd 1988). Loggerheads typically nest on beaches close to reef formations and next to warm currents (Dodd 1988), preferring beaches facing the ocean or along narrow bays (National Marine Fisheries Service and U.S. Fish and Wildlife 1998). In the southeastern United States, nesting season for loggerheads takes place from May through October (Florida Fish and Wildlife Conservation Commission 2007). Large nesting colonies exist in Florida, with more limited nesting along the Gulf Coast and north through Virginia. Duval County hosts a moderate amount of nesting on beaches throughout the county. NAVSTA Mayport itself has a suitable nesting beach that supports small numbers of nests each season (Allen and Loop pers. comm. 2013). Thirteen loggerhead nests were observed in 2012.

At emergence, hatchlings swim to offshore currents and remain in the open ocean, often associating with floating mats of *Sargassum* (Carr 1986, 1987; Witherington and Hirama 2006). Migration between oceanic and nearshore habitats occurs during the juvenile stage as turtles move seasonally from open-ocean current systems to nearshore foraging areas (Bolten 2003; Mansfield 2006). Once adults, loggerheads continue to migrate seasonally from feeding areas to mating and, for females, nesting areas (Bolten 2003). After reaching sexual maturity, adult turtles settle in nearshore foraging habitats (Godley et al. 2003; Musick and Limpus 1997). In the turning basin and navigation channel, the muddy bottom provides habitat for invertebrates which are a major food source for loggerhead turtles. However, regular dredging limits the quality of this habitat somewhat.

Population and Abundance

Annual nesting totals of loggerheads on the U.S. Atlantic and gulf coasts fluctuated between 47,000 and 90,000 nests, with an average of 70,880 nests from 1989 to 2007 (National Marine Fisheries Service and U.S. Fish and Wildlife 2009). Annual totals for the Peninsular Florida Recovery Unit averaged 64,513 nests from 1989-2007. An analysis of index nesting beach survey data has shown a decline in nesting. Results of the analysis indicated that there has been a decrease of 26 percent over the 20-year period from 1989 - 2008 and a 41 percent decline since 1998. The mean annual rate of decline for the 20-year period was 1.6 percent.

Surveys conducted in 2012 identified 187 loggerhead nests along Duval County beaches, a six year maximum (Florida Fish and Wildlife Conservation Commission 2013). Loggerheads have historically nested on NAVSTA Mayport beaches and continue to do so each year. In 2012, 11 nests were documented at the installation (Allen and Loop pers. comm. 2013). In-water abundances of loggerhead turtles in the action area are unknown. However, given presence of nesting and foraging habitat nearby, loggerhead turtles can be expected to occur regularly in the action area.

Predator/Prey Interactions and Foraging

The diet of a loggerhead sea turtle varies by age class (Godley et al. 1998). The gut contents of post-hatchlings found in masses of *Sargassum* contained parts of zooplankton, jellyfish, larval shrimp and crabs, and gastropods (Carr and Meylan 1980; Richardson and McGillivary 1991; Witherington 1994). Juvenile and subadult loggerhead turtles are omnivorous, foraging on crabs, molluscs, jellyfish, and vegetation captured at or near the surface (Dodd 1988). Adult loggerhead sea turtles are generalized carnivores that forage on nearshore bottom-dwelling invertebrates (molluscs, crustaceans, and anemones) and sometimes fish (Dodd 1988). During migration through the open sea, they eat jellyfish, sea slugs, floating molluscs, floating egg clusters, fish, and squid. As with other sea turtle species, the loggerhead's esophagus is lined with papillae (spiny projections) that trap food before swallowing.

Common predators of eggs and hatchlings on nesting beaches are ghost crabs, raccoons, feral pigs, foxes, coyotes, armadillos, and fire ants (Dodd 1988). In the water, hatchlings are susceptible to predation by birds and fish. Sharks are the primary predator of juvenile and adult loggerhead sea turtles (Fergusson et al. 2000; Simpfendorfer et al. 2001).

Critical Habitat

No critical habitat is listed for the loggerhead, but the petitions that were submitted to NMFS requesting to list the distinct population segments also requested that critical habitat be designated after any listing revision (National Oceanic and Atmospheric Administration 2010).

2.13 Leatherback Turtle

Status and Management

The leatherback sea turtle is listed as a single population and is classified as endangered under the ESA (35 FR 8491). Although the USFWS and NMFS believe the current listing is valid, preliminary information indicates an analysis and review of the species should be conducted under the distinct population segment policy (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2007b). Recent information on population structure (through genetic studies) and distribution (through telemetry, tagging, and genetic studies) have led to an increased understanding and refinement of the global stock structure. Based on this research, the Turtle Expert Working Group (under the National Oceanic and Atmospheric Administration's Southeast Fisheries Science Center) (Turtle Expert Working Group 2007) recommends that seven Atlantic Ocean stocks be considered. Individuals from the Florida stock would be most likely to occur in the action area; however, other stocks could also be present.

Habitat and Geographic Range

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 of their early life is spent in the tropics (Eckert 2002). They are not considered to associate with *Sargassum* or other flotsam, as is the case for all other sea turtle species (Horrocks 1987; Johnson 1989). Upwelling areas, such as equatorial convergence zones, serve as nursery grounds for post-hatchling and early juvenile leatherback sea turtles because these areas provide a high biomass of prey (Musick and Limpus 1997).

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). Leatherback sea turtles mate in waters adjacent to nesting beaches and along migratory corridors. They prefer adjacent waters to be deep, clean, and high energy, with either a deep-water oceanic approach or a shallow-water approach (Turtle Expert Working Group 2007). In Florida, nesting begins around March and continues through July or August. Suitable nesting habitat occurs throughout Duval County and on the beaches of NAVSTA Mayport (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2007b). Females remain in the general vicinity of the nesting habitat between nestings, with total residence in the nesting and inter-nesting habitat lasting up to 4 months (Eckert et al. 1989a; Keinath 1993). After nesting, female leatherbacks migrate from tropical waters to more temperate latitudes, which support high densities of jellyfish prey in the summer.

Aerial surveys off the southeastern U.S. coast indicate that leatherback sea turtles occur in these waters throughout the year, with peak abundance in summer (Turtle Expert Working Group 2007). In spring, leatherback sea turtles appear to be concentrated near the coast, while other times of the year they are spread out as far as the Gulf Stream. Aerial surveys were conducted by the Navy between 2009 and 2010 off Jacksonville, Florida, to assess population abundance within their ranges as part of Atlantic Fleet Active Sonar Training monitoring requirements and to collect baseline data in support of the Undersea Warfare Training Range EIS. These surveys sighted 48 leatherback sea turtles, while simultaneous vessel surveys sighted four leatherback sea turtles (U.S. Department of the Navy 2010).

Population and Abundance

Worldwide estimates of leatherback sea turtle populations have varied dramatically over the years as a result of both significant declines in the population and the discovery of new nesting colonies, particularly a colony in Gabon, Africa. Pritchard (1982) estimated 115,000 females worldwide with 60 percent nesting along the Pacific coast of Mexico. However, in 1995, a revised estimate incorporating information from 28 nesting beaches throughout the world yielded about 34,500 females, with a lower limit of about 26,200 and an upper limit of about 42,900 (Spotila et al. 1996). According to the International Union for Conservation of Nature, analysis of published estimates of global population sizes (Pritchard 1982; Spotila et al. 1996) suggest a reduction of greater than 70 percent of the global population of adult females in less than one generation. The most recent population estimate for the North Atlantic alone is a range of 34,000 to 94,000 adult leatherbacks (Turtle Expert Working Group 2007). This wide range indicates the uncertainties in nest numbers and their extrapolation to adult population numbers.

Since 1989, there has been a substantial increase in the nesting population along the east coast of Florida (Turtle Expert Working Group 2007). This increase has coincided with an upsurge in the Caribbean population. Nesting peaked for the Florida stock in the year 2001 with 935 nests (Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute 2013). Leatherbacks typically nest along the beaches from Brevard County south to Broward County, south of the action area. However, they do nest in low numbers along the beaches of Duval County; six leatherback nests were documented in Duval County in 2012, a typical amount over the last five years (Florida Fish and Wildlife Conservation Commission 2013). Single leatherback nests occurred at NAVSTA Mayport in 2009, 2011, and 2012 (Allen and Loop pers. comm. 2013).

In-water abundances for the action area are unknown. Leatherbacks from the Florida stock may occur in the nearshore waters of the action area during the nesting season. Migrating individuals from other stocks may pass through or forage in action area waters, though it is unlikely that individuals from any stock would utilize the turning basin for foraging habitat.

Predator/Prey Interactions and Foraging

Leatherbacks lack the crushing chewing plates in their jaws characteristic of hard-shelled sea turtles that feed on hard-bodied prey (National Marine Fisheries Service 2010b). Instead, leatherback turtles' jaws have pointed tooth-like cusps and sharp-edges 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 sea turtles feed throughout the water column (Davenport 1988; Eckert et al. 1989b; Eisenberg and Frazier 1983; Grant and Ferrell 1993; James et al. 2005b; Salmon et al. 2004). Leatherback prey is predominantly jellyfish (Aki et al. 1994; Bjorndal 1997; James and Herman 2001; Salmon et al. 2004). In Atlantic Canada, leatherbacks feed on jellyfish of *Cyanea* spp. and *Aurelia* spp. (James and Herman 2001). Research in the feeding grounds of Georgia (Frick et al. 1999), North Carolina (Grant and Ferrell 1993), and Atlantic Canada (James and Herman 2001) has documented leatherbacks foraging on jellyfish at the surface.

Predators of leatherback sea turtles eggs include feral pigs, dogs, raccoons, ghost crabs, and fire ants. As with other sea turtle species, leatherback hatchlings are predated on by birds and large fish such as tarpon and snapper. Sharks and killer whales are predators of adult leatherbacks (National Marine Fisheries Service and U.S. Fish and Wildlife 2007b).

Critical Habitat

Critical habitat was designated for the leatherback's terrestrial environment on St. Croix in 1978. The essential physical and biological feature of this critical habitat is its function as an important nesting beach (43 FR 43688). In 1979, critical habitat was designated for the waters next to Sandy Point, St. Croix, up to and including the waters from the 100 fathom curve shoreward to the mean high tide line. The essential physical and biological feature of this critical habitat is its function as an important courtship and mating area adjacent to the nesting beach (44 FR 17710).

NMFS and USFWS were petitioned in 2010 by the Sierra Club to revise the critical habitat designated for Atlantic leatherbacks to include the coastline and offshore waters of the Northeast Ecological Corridor of Puerto Rico, extending at least to the 100 fathom contour, or 9 nautical miles offshore, whichever is farther (The Sierra Club 2010). On 5 May 2011, NMFS announced their 90-day finding on the petition, which stated that the petition presented substantial scientific information indicating that the requested revision may be warranted (76 FR 25660). USFWS issued a similar 90-day finding and 12-month determination on the petition in 2011, which stated their intent to assess critical habitat during the future planned status review for the leatherback sea turtle (76 FR 47133).

3.0 Environmental Baseline

3.1 Exclusions

Activities associated with the Project would have no effect on terrestrial wildlife. Project activities will occur entirely within the water and immediate vicinity of the wharf structure. Construction activities would not adversely impact terrestrial habitats and airborne sound associated with construction would not harm native terrestrial wildlife[1]. Any land-based construction equipment and material staging or support activities, if required, will take place in previously disturbed and built areas. Therefore, the activities associated with the Project would have no effect on terrestrial wildlife.

3.2 Marine Invertebrates

No ESA-listed or candidate marine invertebrate species occur in the action area. The Project may impact benthic invertebrates through burial or replacement of existing substrate foundations, disruption of the sediment surface and subsurface during the installation and removal of each pile, or from anchor and spud placement for the barges, if placement is required. Depending upon the species, impacts to individual benthic invertebrates could range from temporary disturbance to mortality. Some slow-moving or sessile invertebrates would be physically crushed and lost within the footprint of the piles, as well as from barge anchors and spuds.

Indirect impacts to habitat and benthic organisms could result from turbidity caused by driving and removing barge anchors, spuds, and piles. The area near the pile footprint is expected to have higher levels of turbidity while in-water work is being performed. Disturbed sediments are expected to eventually redeposit upon the existing benthic community. Impacts from increased turbidity levels during the summer months may result in a short-term decrease in reproductive success of oysters (Davis and Hidu 1969; Seaman et al. 1991).

Affected areas may experience some temporary reduction in diversity and abundance of benthic invertebrates. However, these species - particularly annelids - are very resilient to habitat disturbance and are likely to recover to pre-disturbance levels within a relatively short amount of time (CH2M Hill 1995; Parametrix 1994, 1999; Anchor Environmental 2002; Romberg 2005). Therefore, the Project is not expected to have any population-level impacts on marine invertebrates, and no impacts to listed benthic invertebrates.

[1] Terrestrial wildlife does not include birds for the purposes of this evaluation

3.3 Forage Fish in the Action Area

There are no anticipated population-level impacts to any species of fish from Project noise. The St. Johns River provides nursery and refuge areas for a number of euryhaline forage fish species including shads, herrings, anchovies, and some species of juvenile pan fish (National Oceanic and Atmospheric Administration 1998). As a result, these species may also occur within the action area. Small, schooling fishes form a critical link between the marine zooplankton community and larger predatory fish, seabirds, and marine mammals in the marine food web (Penttila 2007). They feed mainly on zooplankton and smaller fish, and reside in the upper levels of the water column and nearshore areas. It is expected that forage fish would be present in the action area year round. All species would most likely be present in larger abundances during peak spawning time; generally late winter and early spring (Florida Fish and Wildlife Conservation Commission 2013a).

Individual fish near the vicinity of in-water Project activities may experience sound intensities that could affect their behavior or damage their hearing ability. Since many fish use their swim bladders for buoyancy, they are susceptible to rapid expansion/decompression due to peak pressure waves from underwater noises (Hastings and Popper 2005). The onset of injury threshold resulting from this rapid expansion/decompression is supported by data presented on selected species by the Fisheries Hydroacoustic Working Group (2008). Analyses performed for ESA-listed and candidate fish species (Section 6.1.2 and Fundamentals of Acoustics and Analysis Addendum) suggest low likelihood of negative effects to fish, and only when they are very close to an intense sound source.

3.4 Estuarine Habitat

Project activities taking place in at NAVSTA Mayport would not directly or indirectly affect inland freshwater habitats. The St. Johns River's highest flows occur at the mouth, at times exceeding 150,000 cubic feet per second (Bourgerie 1999). It is tidally influenced by the ocean, producing an estuarine environmental with the generally constant 36 parts per thousand salinity of the Atlantic Ocean (U.S. Army Corps of Engineers 1994). The area of the St. Johns River where NAVSTA Mayport is located is on the southern side of the ocean inlet. Water movement characteristic of inlets on the east coast of Florida typically includes extreme inflow and outflow of the area where the inlet meets the ocean. It would be assumed that this extreme movement of water during a flood tide would result in water from the area near NAVSTA Mayport potentially affecting (by temporarily increased sediment suspension) areas west of the inlet that are brackish, and eventually freshwater. But unlike the majority of the rivers in the United States, the St. Johns River's flow is from south to north, and then east out the inlet to the ocean (St. Johns River Water Management District 2007).

3.5 Sediments

The Project is expected to disturb and temporarily suspend marine sediment in the water column. The use of the vibratory hammer and (contingency only) impact hammer could cause the fine silt and clay layers to be susceptible to liquefaction and subsequent contraction. Suspended sediments would be localized to the immediate area of the pile being driven, and are expected to quickly settle back to the bottom of the action area.

The NAVSTA Mayport turning basin was constructed during the early 1940s by dredging the eastern part of Ribault Bay. Dredge material from the basin was used to fill parts of Ribault Bay and other low-lying areas in order to elevate the land surface. The basin was originally dredged to a depth of −29 ft. MLLW and, in 1952, was deepened to a depth of −40 ft. MLLW to provide access to larger ships. Prior to 1960, the turning basin was dredged to −42 ft. MLLW. The turning basin is currently maintained at an average depth of −42 ft. MLLW, with ship berths ranging in depth from −30 to −50 ft. MLLW. The basin is a deepwater surface ship berthing facility whose entrance channel meets the main navigation channel at the mouth of the St. Johns River. The NAVSTA Mayport entrance channel is approximately 500 ft. wide extending approximately 5,000 ft. until it joins with the federal navigation channel. Its depth ranges between −51 to −42 ft. MLLW (U.S. Department of the Navy 2008).

Sediment sampling and testing conducted in March 2007, in support of the Proposed Homeporting of Additional Surface Ships at NAVSTA Mayport Environmental Impact Statement; indicated sediments within the turning basin consist primarily of fine grained materials (e.g., silt and clay). Six sediment samples were collected. Water depths in the turning basin ranged from −40 to −45 ft. MLLW. The sediment that lies on the surface is silt/clay across the basin, ranging in thickness from 3 to 10 ft. (U.S. Department of the Navy 2008).

Five of the six March 2007 sediment samples were analyzed for the presence of chemical contaminants. Testing was conducted for bulk chemical parameters including metals, polychlorinated biphenyls, semi-volatile organics or polycyclic aromatic hydrocarbons, pesticides, and inorganics. The majority of these tests did not detect the presence of any contaminants in the dredge profile. The analyses did, however, find low concentrations of metals, some polycyclic aromatic hydrocarbons analytes, and some polychlorinated biphenyls in the samples. Of the substances detected in the turning basin sediments, only one metal (arsenic) and two of the polycyclic aromatic hydrocarbons (acenaphthene and fluorine) had concentrations exceeding National Oceanic and Atmospheric Administration Effects Range Low thresholds in two of the five sediment samples collected. These three incidents of exceedance are only slightly above the Effects Range Low threshold and are well below the Effects Range Medium levels. All of the other detected concentrations of metals, polycyclic aromatic hydrocarbons, and polychlorinated biphenyls are well below the respective Effects Range Low levels (U.S. Department of the Navy 2008).

Overall, the testing results generally reflected a low contamination level for marine sediments in the NAVSTA Mayport turning basin to depths of −56 ft. MLLW. Additionally, the contaminant levels of the March 2007 results correlate favorably with those found during testing conducted prior to recent maintenance dredging projects at NAVSTA Mayport (U.S. Department of the Navy 2008).

Construction activities would not result in the discharge of wastes containing metals or otherwise alter the concentrations of trace metals in bottom sediments. Nor would construction activities result in the discharge of high levels of contaminants or otherwise alter the concentrations of organic contaminants in bottom sediments. However, because the magnitude of metal and organic compound concentrations in sediment can vary as a function of grain size (higher concentrations typically are associated with fine-grained sediments due to higher interior surface areas), small changes to grain size associated with construction-related disturbances to bottom sediments could result in minor changes in metal and organic compound concentrations. However, due to the small scale of temporary operations and the general lack of sediment contaminants in the action area, there would be no long-term impacts to sediments are anticipated.

3.6 Water Quality

Salinity and temperature data for the action area are summarized in Table 3-1 and Figure 3-1, respectively. Based on available data, the water quality in the NAVSTA Mayport turning basin and entrance channel meets the Florida Department of Environmental Protection Class III Marine Water Quality Standards (U.S. Department of the Navy 2007). Tides within the NAVSTA Mayport entrance channel are semi-diurnal (two highs and two lows per day). The mean and spring tidal ranges at the NAVSTA Mayport turning basin are 4.5 ft. to 5.3 ft. respectively.

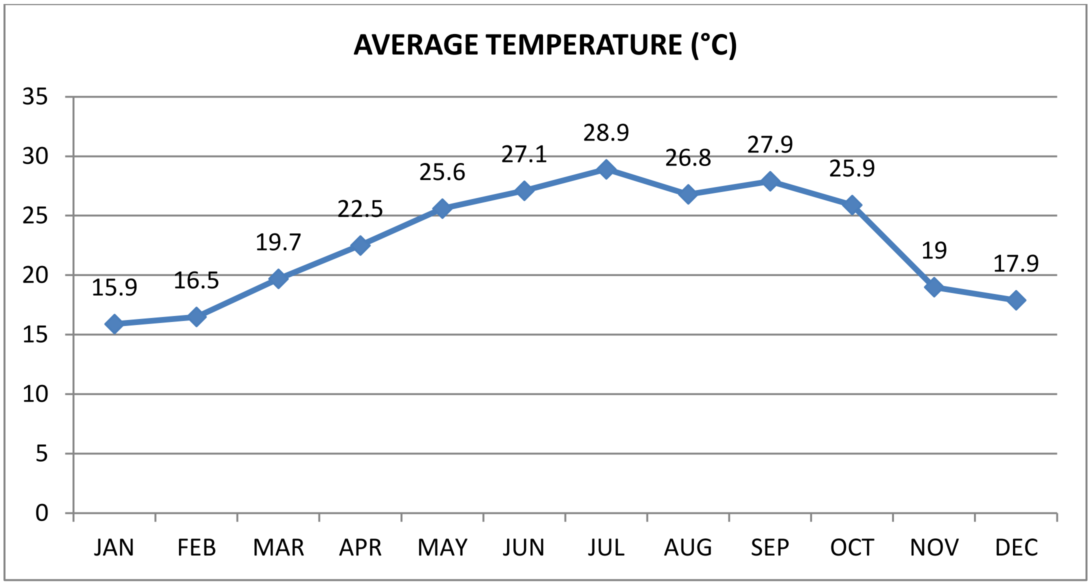
TABLE 3-1. MINIMUM AND MAXIMUM SURFACE AND BOTTOM SALINITIES

LOCATION	TIDE	WATER COLUMN	SALINITY (PSU)
NAVSTA Mayport Turning Basin	ebb	surface	30.6
		bottom	33.8
	flood	surface	30.2
		bottom	33.6
NAVSTA Mayport Entrance Channel	ebb	surface	30.0
		bottom	32.4
	flood	surface	33.4
		bottom	34.7
Federal Navigation Channel	ebb	surface	32.5
		bottom	33.8
	flood	surface	33.3
		bottom	35.2

Source: U.S. Department of the Navy 2008

While water temperatures for the action area are not regularly recorded, average monthly temperatures at the closest station (Bar Pilot's Dock) ranged from 60.6 °F (15.9 °C) in January to 84°F (28.9 °C) in August (Figure 3-1).

FIGURE 3-1. 2012 MONTHLY WATER TEMPERATURES AT BAR PILOT'S DOCK, FLORIDA



Source: National Oceanic and Atmospheric Administration 2012a

Due to the close proximity of the Atlantic Ocean, the presence of semi-diurnal tides and other hydrodynamic influences, flushing occurs continually within the turning basin and entrance channel. As part of an elutriate analysis, turning basin surface water samples were collected in March 2000 and analyzed for metals and semivolatile organic compound. No detectable concentrations of these substances were found in the samples, illustrating the relatively high quality of water and sediment in the NAVSTA Mayport turning basin (U.S. Department of the Navy 2000).

There is only limited information readily available of dissolved oxygen levels in the turning basin or entrance channel. Data collected in 1993 revealed no significant stratification from the surface to −40 ft. depths. Despite the deep water depths and hot summertime conditions, the maximum dissolved oxygen change from top to bottom was 1.43 parts per million (ppm) (ppm is equivalent to milligrams/liter) and minimum change was 0.20 ppm. No values were less than 4.0 ppm and a number of readings were above 5.0 ppm, suggesting that mixing is ongoing (U.S. Department of the Navy 2000).

3.7 Marine Vegetation

Features that influence the distribution and abundance of marine vegetation in the action area are the availability of light, water quality, water clarity, salinity level, seafloor type (important for rooted or attached vegetation), currents, tidal schedule, and temperature (Green and Short 2003). Marine ecosystems depend almost entirely on the energy produced by marine vegetation through photosynthesis (Castro and Huber 2000). In the lighted surface waters of coastal waters, marine algae and flowering plants provide oxygen and habitat for many organisms in addition to forming the base of the marine food web (Dawes 1998). The action area habitats include hardened shorelines grading steeply to depths of over 12 m (40 ft.) (National Oceanographic and Atmospheric Administration 2011) in sheltered, high salinity estuarine waters (National Oceanographic and Atmospheric Administration 2012). Substrate on the bottom is dredged, unconsolidated material (U.S. Geological Survey 2000).

As a general rule, algae can grow down to bottom areas receiving one percent or more of surface light intensity (Wetzel 2001). Microalgae, including phytoplankton, are widespread and abundant in the estuarine water column where light is sufficient for growth. The dominant genus of floating macroalgae, *Sargassum,* is widely distributed in offshore waters of the North Atlantic Ocean (Gower and King 2008; South Atlantic Fishery Management Council 2002), but may find its way to nearshore water and estuaries on the winds and tides. Attached macroalgae (i.e., kelp, seaweed) form "meadows" or "beds" where they dominate intertidal shores or subtidal bottoms. Whereas kelp do not occur in the action area (Mathieson et al. 2009; Steneck et al. 2002), other species of seaweeds grow attached to hard bottom substrate (Nybakken 1993) in the action area. Green seaweed species (e.g., *Enteramorpha, Ulva, Codium*) may also grow on mudflats in sheltered estuarine waters (Gosner 1978). Attached macroalgae inhabit the hardened shoreline and shallower depths of the action area.

There are no seagrass beds mapped in this area of Florida, despite comprehensive mapping efforts (Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute 2011).

4. Project Details

The general project description can be found in Chapter 1.

Project Schedule

Construction of the wharf will occur over an 18-month period projected to begin on or after 30 September 2013. In-water pile drivingwork will be conducted year-round as needed, for no more than 70 days total.

Access and Staging

Any land-based construction equipment and material staging or support activities, if required, would take place in previously disturbed areas. No clearing or excavation would be required. A barge-mounted crane operates from the water adjacent to the pile during extraction activities. Removed piles and associated sediments (if any) shall be contained on a barge. If a barge is not utilized, piles and sediments may be stored in a containment area near the project location. The level of vehicular and marine traffic will not differ significantly from that of current conditions at NAVSTA Mayport. Pile delivery and disposal would generally be conducted via barge. Barge operations may be restricted to tide elevations adequate to prevent grounding of a barge.

Project Components

The steel king pile/sheet pile wall system (SSP) consists of large vertical king piles with paired steel sheet piles driven in between and connected to the ends of the king piles. Table TABLE 4-1 provides details for the types of piles that will be used. The wall will be anchored at the top and fill consisting of clean gravel and/or flowable concrete fill will be placed behind it. A concrete cap will be formed along the top and outside face of the wall to tie the entire structure together and provide a berthing surface for vessels (Figure 4-1).

Overall, the project will include installation of approximately 120 steel sheet pile pairs, 119 king piles and 50 polymeric (plastic) fender piles. A maximum of 70 days of in-water pile driving work will take place over a 12-month period. Of the 70 days, 50 days are reserved for vibratory driving and the remaining 20 days are reserved for contingency impact driving (if impact driving is needed).

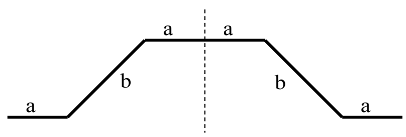
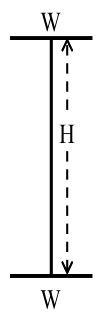
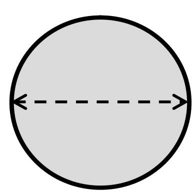
Contingency dredging of up to 4,000 cubic yards of substrate may be conducted to create space for the newly extended Wharf C-2 footprint if needed. Should dredging take place, it will be performed using a clamshell rig. If dredging is performed, it will be outside of the 70 day pile driving window, and activity is expected to take place behind the existing bulkhead which will reduce or eliminate the likelihood of negative impacts to ESA-listed and / ESA-candidate species and their habitat. There will be no direct discharges of waste to the marine environment. Construction-related impacts to water quality would be limited to short term, temporary and localized changes associated with resuspension of bottom sediments from pile installation and barge and tug operations, such as anchoring and propeller wash, as well as accidental spills of fuel into the turning basin. These changes would be spatially limited to the construction corridor, including areas potentially impacted by anchor drag and areas immediately adjacent to the driving sites that could be impacted by plumes of resuspended bottom sediments that are not expected to violate water quality standards. Fuel spills are unlikely as boats, barges, and equipment would be fueled offsite.

As part of the recapitalization of the wharf, new lighting fixtures will be installed. Four 50 ft. tall (15 m.) concrete posts each with two 1,000 watt metal halide luminaires are currently planned. Luminaires will be of the full cut off type to minimize stray light. This lighting profile may slightly increase the total amount of light over current conditions on Wharf C-2, but will be comparable to other areas surrounding the basin.

Construction will result in an increase to impervious surface of 10,100 square feet (.23 acres) located between the existing bulkhead and the new bulkhead. This would cause a slight decrease in infiltration of precipitation and result in localized impacts to stormwater flow in the basin. However, these minor impacts would be localized at the development site and minimized through adherence to best management practices and the Stormwater Pollution Prevention and Environmental Resource Permit conditions (required if total combined impervious surface associated with the proposed development is greater than 9,000 square feet).

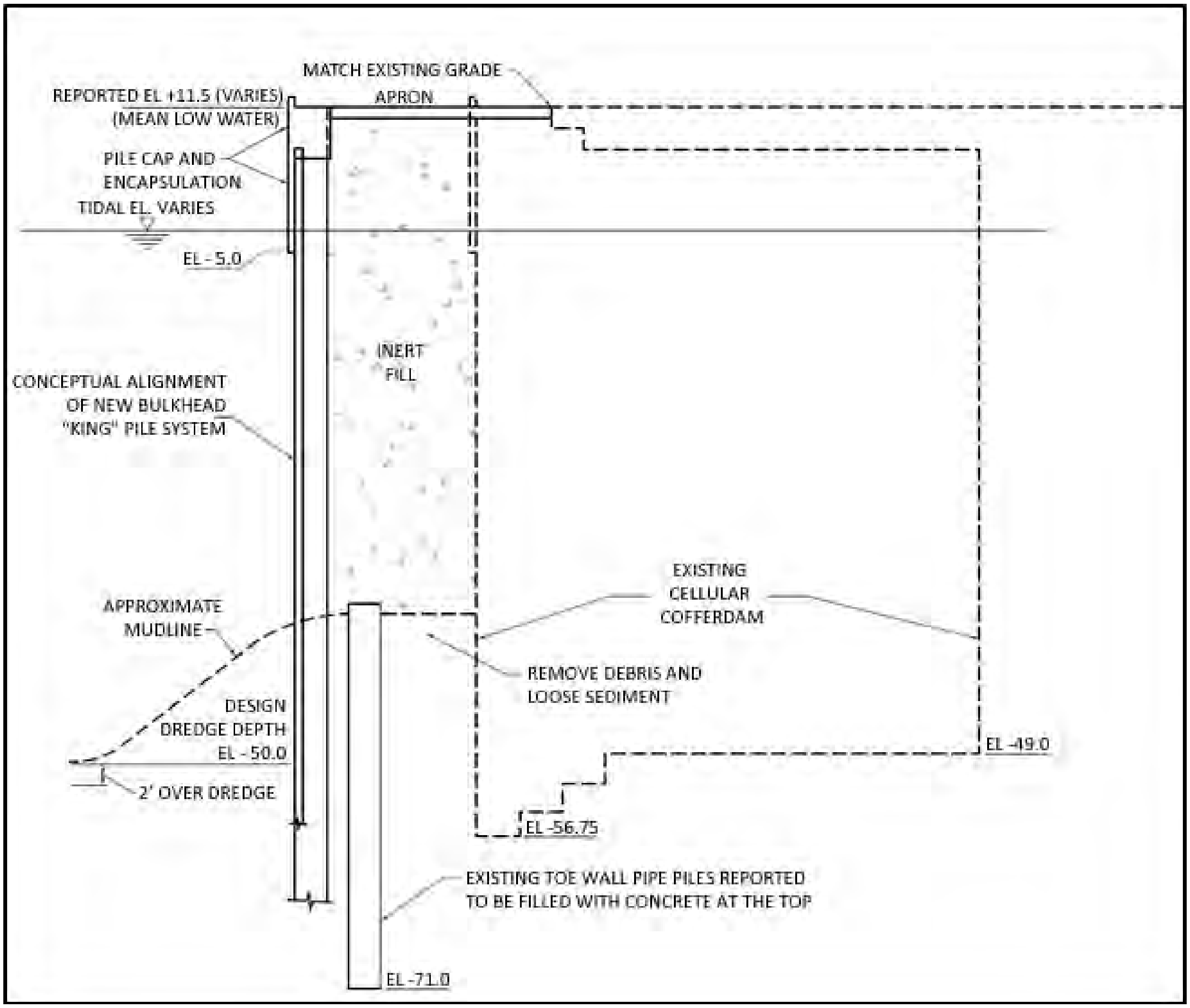
Post development stormwater treatment will be required for the new impervious areas. The expanded wharf surface area will not provide any practical areas for the treatment of stormwater. Therefore, NAVSTA Mayport is proposing to collect and treat stormwater from an impervious storage and vehicle parking area located several hundred feet north of Wharf C-2. Stormwater will be directed to an adjacent grassy area where it will be treated in a dry retention biobasin prior to release into the St. Johns River. This location is the closest practical compensatory treatment area to Wharf C-2 and will be capable of treating an area of 16,770 square feet and have a volume of 2,307 cubic feet. The Stormwater Treatment Basin will include four ten foot wide riprap overflows and will be located approximately 50-75 feet from the existing riprap shoreline.

TABLE 4-1. PILE DESCRIPTIONS

PILE TYPE AND DETAILS	SHAPE AND DIMENSIONS	ESTIMATED DISTURBANCE FOOTPRINT
AZ19-700 SHEET PILE PAIR A pile in the form of a plank driven in close contact or interlocking with others to provide a tight wall to resist the lateral pressure of water, adjacent earth, or other materials. A sheet pile may be tongued and grooved if made of timber or concrete, or interlocking if made of metal. Linear length=4×a+2×b = 70.4 in. a = 6.81 in. b = 21.6 in.		Area = W × H W = 55.12 in. H = 16.56 in. 55.12 in × 16.56 in = 912 in.^{2} = 0.59 m^2
HZ1080 MB KING PILE In strutted sheet pile excavation, a long guide pile driven at the strut spacing in the center of the trench before it is excavated. Linear length=2×W+H = 77.2 in. W = 7.87 in. H = 41.47 in.		Area = W × H = 7.87 in × 47.47 in. = 326 in.^{2} = 0.21 m^2
CIRCULAR POLYMERIC FENDER PILE Polymeric piles have been used primarily for corner protection, as secondary fender piles, and as primary fender piles for small craft facilities. Diameter = 12 in. Circumference = Diameter × π = 37.7 in.		Area = π × r^2 = π × 36 = 113 in.^{2} = 0.07 m^2

Sources: Dictionary of Construction 2013 and Integrated Publishing 2013; m^2 = square meters; in. = inch; in.^{2} = square inch

FIGURE 4-1. LATERAL VIEW OF PROJECT PLAN



The recapitalization construction activities include:

- demolishing existing concrete pile cap, wharf deck and utilities (including lateral supply lines from utilities such as water, fuel, and electrical)
- removing existing timber fender piling
- installing new steel combination wall with tieback anchors
- placing a combination of self-hardening, flowable fill and clean fill between existing and new walls
- installing new concrete cap which partially encases the new steel wall
- installing sacrificial anode cathodic protection system for the new steel wall
- installing new polymeric fender piles
- installing new foam filled fenders
- installing new utilities (*continued on following page*)

- repairing wharf deck by milling and re-paving
- replacing area lighting fixtures on galvanized steel standards
- replacing security fencing
- installing stormwater mitigation basin.

The following steps describe the construction sequence for placing the new SSP system in front of the existing deteriorated wall.

Preparation and Demolition

Existing underwater obstructions and debris that may interfere with the installation of the new SSP wall will be removed utilizing divers and cranes. Up to 30 timber piles will be removed from the action area utilizing a crane. The locations at which the new SSP will attach to the existing sheet pile wall will be demolished above and below the waterline to expose the existing steel.

Along the face of the existing wall, the curb and a portion of existing concrete cap will be removed to accommodate the new concrete pavement that will be placed between the new wall and the existing wall. The concrete apron along the waterside perimeter of the wharf and the utilities (including lateral supply lines from utilities such as water, fuel, steam and electrical) will be removed. Utilities include water, fuel, waste, electrical and communications.

Installation of New Bulkhead

Crane barges will be used in lieu of shore-based equipment due to weight bearing and structural integrity issues on the existing structure. A crane barge with a pile installation suite (pile leads, vibratory hammer and an impact hammer) will mobilize to the project site with a material barge. A pile driving template (approximately 25 ft. in length) will be mounted to the crane barge. This allows the crane barge to control the alignment of the piles as they are driven. Once the crane barge is properly aligned, the king piles will be driven to the appropriate depth using the vibratory hammer (Figure 4-2). Sheet piles will be driven in pairs between the king piles to complete the template[2] (Figure 4-3). Approximately 120 steel sheet pile pairs and 119 king piles will be installed. Installation of up to three templates per pile-driving day is anticipated. Impact pile driving would only be used as a contingency in cases when vibratory driving is insufficient. A similar project that has been completed at adjacent Wharf Charlie One required impact pile driving on only seven piles. Once all of the piles are driven, closure plates are attached between the existing adjacent sheet pile walls and the new wall end terminations. Typically, these are welded in place using underwater welding techniques.

In general, the pile-driving process begins by placing a choker cable around a pile and lifting it into vertical position with a crane. The pile is then lowered into position inside the template and set in place at the mud line. During vibratory driving, the pile is stabilized by the template while the vibratory driver installs the pile to the required tip elevation.

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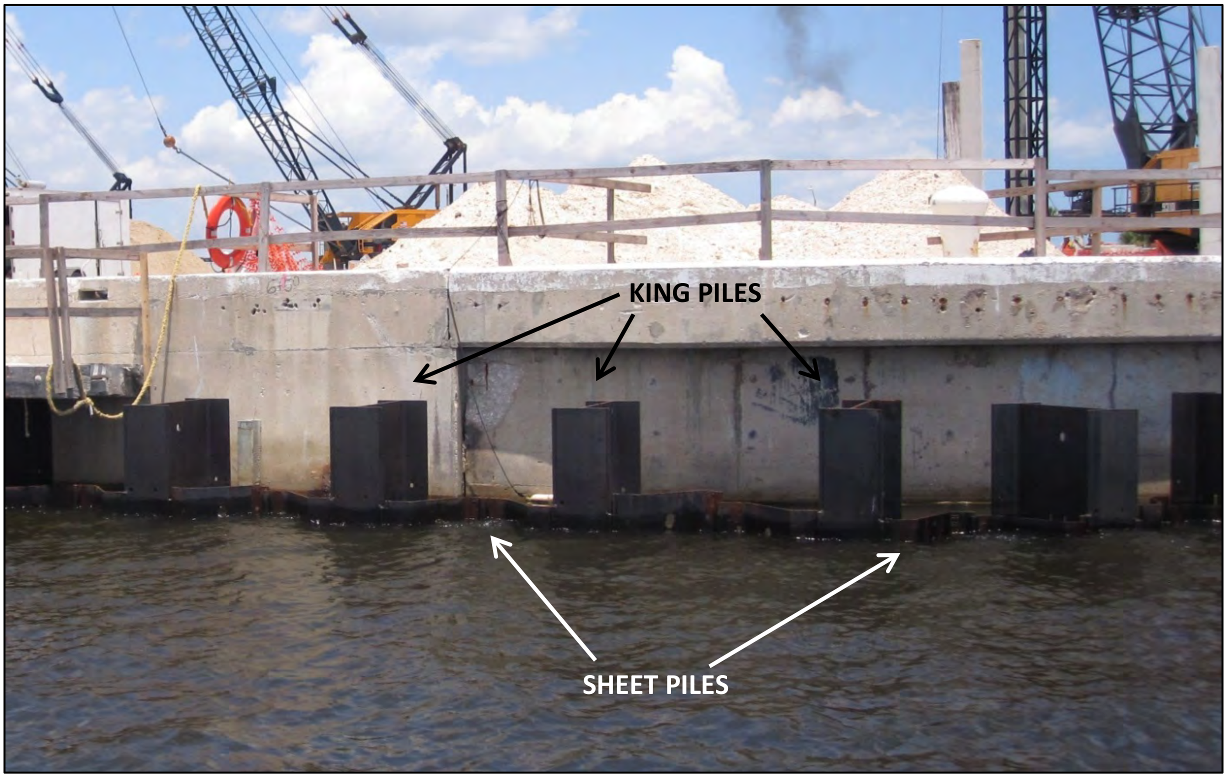
[2] Templates prefabricated are or site constructed steel frames into which piles are set to hold piles in the proper position and alignment during driving (Hannigan 2011).

FIGURE 4-2. VIBRATORY INSTALLATION OF SHEET PILES AT NAVSTA MAYPORT

Impact hammers have guides that hold the hammer in alignment with the pile while a heavy piston moves up and down, striking the top of the pile, driving the pile into the substrate from the downward force of the hammer.

Once piles are in position, installation typically takes less than 45 seconds to reach the required tip elevation depending on site conditions (i.e., bedrock, loose soils, etc.), driving method, and equipment used.

FIGURE 4-3. SHEET AND KING PILES AT NAVSTA MAYPORT



Installation of Anchors

There are multiple types of anchoring systems that can be utilized for a sheet pile wall. These methods include a grouted soil anchor system and a tie back wall system. Regardless of the method, anchor rods will be installed from the new SSP wall to the anchor system. This will require drilling through the old wall to the anchor location behind the wall. In general, this anchor location may lie 40-60 ft behind (shoreward) the existing wall. After the anchor holes are driven, the anchors will be placed in the holes and either the end of the anchor is grouted into the soil or the end of the anchor is attached to the tie back wall system. The tie back wall system normally consists of sheet piles of shortened lengths that are buried below grade.

Placement of Fill Behind Wall

After the anchors are installed, fill operations will be conducted behind the new wall. This will consist of placement of either gravel fill or concrete flowable fill into the space behind the wall; trapped water behind the wall is displaced.

Form and Placement of Pile Cap

After the fill operation has completed, the concrete pile cap will be formed and placed along the top of the new SSP wall. This will consist of installation of either wood or steel forms along the top of the wall down to some point below mean low water elevation. Water will be removed from the forms, steel reinforcement will be placed in the forms, and concrete will be poured to the required elevations.

After the concrete has cured sufficiently, the forms will be removed. A total of 50 polymeric (plastic) fender piles will then be installed (Figure 4-4).

Deck and Utility Replacement

After the pile cap is in place, a new reinforced concrete apron will be installed and the wharf deck repaired by milling and paving. A new high mast lighting system, new security fencing, and new utilities will be installed to replace those that were removed.

FIGURE 4-4. POLYMERIC FENDER PILES

As part of the recapitalization of the wharf, new lighting fixtures will be installed. Four 50 ft. tall (15 m.) concrete posts each with two 1,000 watt metal halide luminaires are currently planned. Luminaires will be of the full cut off type to minimize stray light. This lighting profile may slightly increase the total amount of light over current conditions on Wharf C-2, but will be comparable to other areas surrounding the basin.

Stormwater Bioretention Basin

Construction will result in an increase to impervious surface of 10,100 square feet (.23 acres) located between the existing bulkhead and the new bulkhead. This would cause a slight decrease in infiltration of precipitation and result in localized impacts to stormwater flow in the basin. However, these minor impacts would be localized at the development site and minimized through adherence to best management practices and the Stormwater Pollution Prevention and Environmental Resource Permit conditions (required if total combined impervious surface associated with the proposed development is greater than 9,000 square feet).

Post development stormwater treatment will be required for the new impervious areas. The expanded wharf surface area will not provide any practical areas for the treatment of stormwater. Therefore, NAVSTA Mayport is proposing to collect and treat stormwater from an impervious storage and vehicle parking area located several hundred feet north of Wharf C-2. Stormwater will be directed to an adjacent grassy area where it will be treated in a dry retention biobasin prior to release into the St. Johns River. This location is the closest practical compensatory treatment area to Wharf C-2 and will be capable of treating an area of 16,770 square feet and have a volume of 2,307 cubic feet. The Stormwater Treatment Basin will include four ten foot wide riprap overflows and will be located approximately 50-75 feet from the existing riprap shoreline.

Post-Project Site Restoration

Activities associated with the Project are limited to repair and replacement of existing infrastructure and installation of a stormwater treatment basin in a previously disturbed area. After installation of the stormwater basin, the grassy area will be re-seeded. No other restoration will be performed.

Operations and Maintenance

No change in the type or level of operations and maintenance in the action area is anticipated as a result of the Project.

Summary

The Project will entail installation of approximately 120 single sheet piles and 119 king piles, requiring a maximum of 50 days of in-water vibratory pile driving work over a 12-month period. Fifty polymeric (plastic) fender piles will also be installed, requiring an additional five days of vibratory driving. The acoustic analysis for vibratory pile driving used the assumption that a maximum of three templates (each consisting of five king piles and four sheet pile pairs) would be driven each day, for a maximum linear distance of approximately 75 ft. Polymeric fender piles to be installed later in the project will be vibratory driven individually, at a rate of approximately 10 piles per day. Impact pile driving would only be used as a contingency in cases when vibratory driving is insufficient. A similar project that was completed at adjacent Wharf Charlie One required impact pile driving on only seven piles. Twenty days have been conservatively allotted for contingency impact driving even though only 2 days of impact pile driving occurred during the adjacent Wharf Charlie One project. Impact pile driving, if it were to be necessary, could occur on the same day as vibratory pile driving, but driving rigs would not be operated simultaneously.

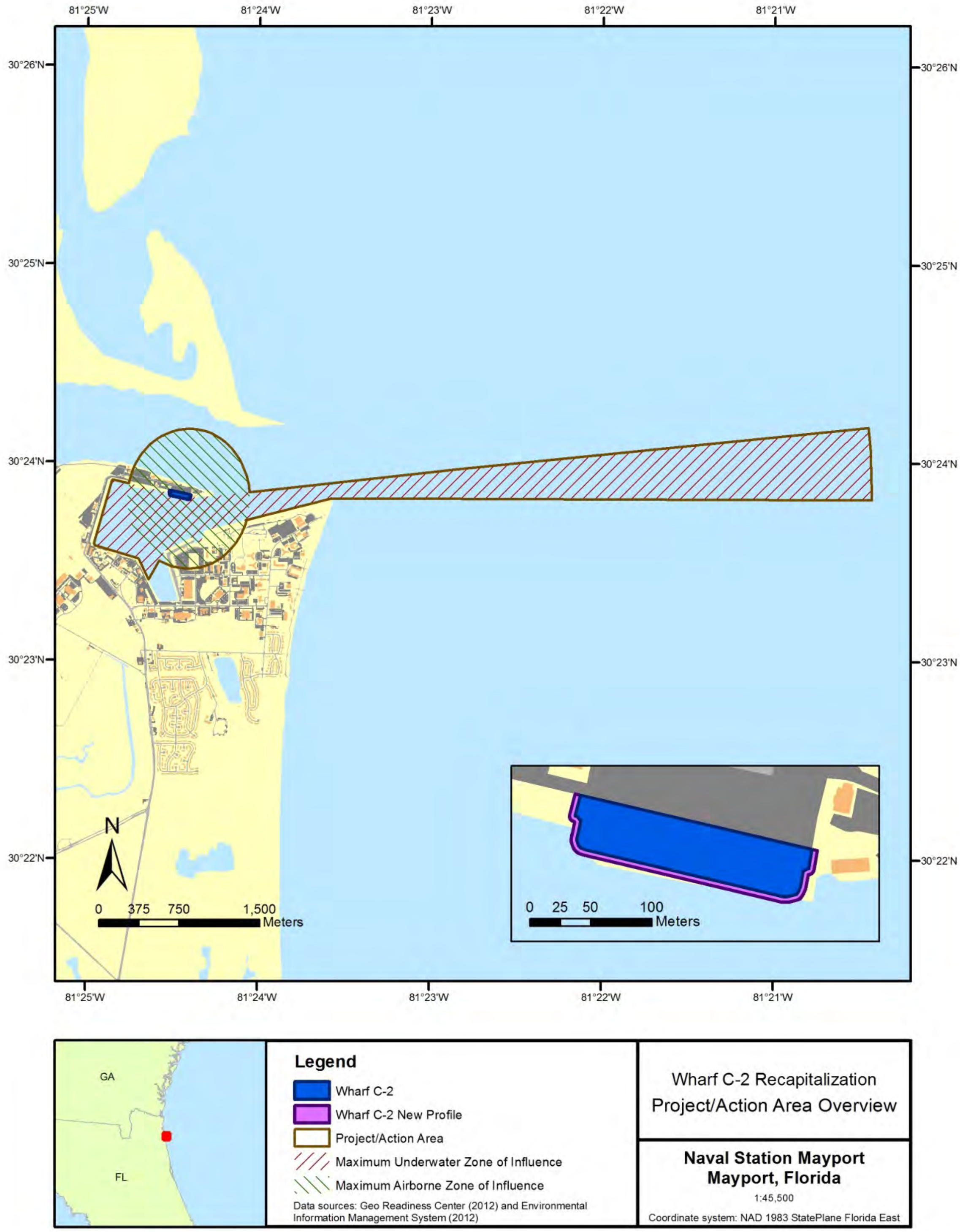
Contingency dredging may be required within the new wharf footprint. If so, a clamshell dredge would be used to remove no more than 4,000 cubic yards. Dredged sediments would be disposed of in accordance with applicable laws and regulations. Direct impacts to marine mammals from dredging typically result from vessel collisions rather than the dredging equipment itself. Indirect effects may include loss or reduction in the quality of foraging sites / resources and possible behavioral effects if the dredging is being performed in aggregation sites (Florida Fish and Wildlife Conservation Commission n.d.). Because the habitat in the turning basin is not considered high quality for any marine mammal species, they are not expected to aggregate in the vicinity of dredging operations. Further, dredging – if conducted at all - may take place behind the bulkhead wall, essentially shielding marine mammals from much of the sound and exposure to equipment. Contingency dredging is not expected to result in any physiological or behavioral effects that would meet the Level A or Level B definitions. Therefore, dredging is not addressed further in this BE.

No net change in the amount of vessel traffic in and around the turning basin is expected as a result of the Project, resulting in no change to the risk of ship strikes for marine mammals and sea turtles in and around the Project Area.

5. Project Action Area

The action area is defined as the immediate vicinity of Wharf C-2 out to the limit of the most distant of the underwater and in-air acoustic thresholds for all protected species being addressed. In the absence of official airborne criteria for any protected species being addressed, the Navy has adopted the City of Jacksonville's airborne noise limit of 64 dBA at any sensitive receptor as the in-air boundary of the action area (Jacksonville Environmental Protection Board 1995). The most distant underwater threshold is the marine mammal behavioral disturbance (120 dB re 1 µPa rms) threshold. Under certain conditions, areas in and outside of the turning basin may have average ambient noise levels exceeding the 120 dB threshold. However, given the lack of actual ambient sound recording data for this location, the Navy has assumed ambient noise levels are below 120 dB re 1 µPa rms. The distance to the 120 dB threshold is therefore the maximum range at which the Navy expects to exert an environmental impact under water, and represents a reasonable boundary for the action area. The airborne and underwater zones of influence were modeled (refer to the Fundamentals of Acoustics and Analysis Addendum for full description of modeling methodologies) and incorporated into a single-boundary layer (Figure 5-1).

FIGURE 5-1. PROJECT ACTION AREA



6.0 Effects Analysis

Effects to all ESA-listed and ESA-candidate species addressed in this assessment are expected to be of such a scale or duration that they will be discountable with the exception of in-water noise. The analyses for in-water noise effects to each species and its critical habitat (if applicable) are summarized in Sections 6.1.1 through 6.1.3. Details on the methods employed to determine zones of influence for birds (which are addressed in a separate BE) and marine mammals are described in the Fundamentals of Acoustics and Analysis Addendum.

6.1 Direct Effects

Direct effects are defined as the direct or immediate effects of the project on the species or its habitat. They include those resulting from interdependent or interrelated actions (National Marine Fisheries Service 2009b). Effects on existing bathymetric, sediment, water quality and marine vegetation conditions are expected to be similar throughout the action area. Therefore, they are discussed collectively below, and summarized in Table 6-1.

Bathymetry

The Project is expected to result in only very localized, temporary degradation of the existing bathymetric conditions. The interaction of construction equipment, mooring ground tackle, vessel propeller wash, and anchor and spud placement would result in bottom scour and disturbance to the seafloor, such as mounding and displacement or movement of sediments. Changes to bathymetry would be limited to a highly localized area and would range between 0.5 and 3 ft. near each pile location. The greatest localized change in bathymetry would occur from pile driving and anchor or spud placement. The maximum sediment displacement is likely to result from deployment of a typical vessel or barge anchor (width of up to 3 ft.).

These impacts would be temporary because natural processes that would occur following completion of the Project activities would return the seafloor to near its original profile over time without intervention. A period of six to twelve months would allow for a full seasonal cycle of storm and wind events, tides, etc., and resumption of ambient sediment transport patterns to reshape the seabed to the surrounding environment.

Sediments

The Project is expected to result in only very localized, temporary degradation of the existing sediment conditions. There would be no direct discharge of wastes to the marine environment during construction. Effects to sediment quality would be limited to localized changes associated with disturbances of bottom sediments from pile removal and installation over the 18-month period. Setting spuds and anchors for the barges, as required, and propeller wash from tugs represent other sources for disturbance of bottom sediments. Standard operating procedures, discussed in Section 6.5, will be employed to prevent accidental losses or spills of construction debris into waters at each installation.

Some degree of localized changes in sediment composition may occur as a result of in-water construction activities. In particular, sediments that are re-suspended would be dispersed by currents and eventually re-deposited on the bottom. The distance over which suspended sediments are dispersed would depend on a number of factors, such as the sediment characteristics, currents, and height above the bottom. Project-related construction activities would not create sediment contamination concentrations or physical changes that violate state standards or interfere with beneficial uses of waters in the action area.

Water Quality

The Project is expected to result in only very localized, temporary degradation of the existing water quality. Direct discharges of waste to the marine environment will not occur. Impacts to water quality would be limited to short-term and localized changes associated with re-suspension of bottom sediments from pile removal and installation and barge and tug operations, such as anchoring and propeller wash. These changes would be spatially limited to the immediate vicinity of the wharf. Construction-related impacts would not violate applicable state or federal water quality standards. Standard operating procedures, discussed in Section 6.5, will be employed to prevent accidental losses or spills of construction debris or hazardous materials into the waters at each installation.

The installation of a stormwater treatment basin near the project site will mitigate potential impacts to water quality from an increase in impervious surface area. The riprap overflows and riprap shoreline would diffuse the freshwater overflow into the St. Johns River resulting in a minor improvement in water quality in the project area.

Marine Vegetation

The Project is expected to result in only very localized, temporary degradation of the existing marine vegetation conditions in the action area. Any debris from pile removal would be collected and disposed of and would not impact marine vegetation. Based on the disturbance regime in the turning basin (regular dredging, high level of vessel traffic and propeller wash disturbance, the overall quality of marine vegetation is considered degraded and will not improve or decrease. Because the Project may result in an expansion of the Wharf C-2 deck by a maximum of 15 ft. from its current footprint, displacement of up to of 1,322 m^2 of existing vegetation may occur. Any shading that occurs from barges will be temporary in nature, and is not expected to have an effect on marine vegetation.

Decreased water and sediment quality can impede the growth of marine vegetation important to fish and other animals, and promote the growth of harmful algae. Impacts to water quality from the Project would be limited to temporary and localized changes associated with re-suspension of bottom sediments. Similarly, pile driving activities would not discharge contaminants or otherwise appreciably alter the concentrations of trace metal or organic contaminants in bottom sediments.

The Project would not result in a permanent decrease in water quality. Direct removal of marine vegetation during the Project could occur through anchor and spud placement, as required, and removal of deteriorating piles. However, conditions in the action area are not conducive to the growth of large macroalgae communities. It is estimated that a maximum of 1,421 m^2 of benthic habitat could be disturbed or displaced in the action area over the 18-month period (1,322 m^2 by the potential maximum expansion of the wharf footprint, and 99 m^2 by the piles themselves). Any vegetative growth found on existing piles would be removed when those piles are extracted from the water but because piles would be replaced, ultimately the same amount of surface area on which marine organisms could colonize would exist. Because marine vegetation does not occur densely in the area immediately surrounding Wharf C-2, direct removals should be minimal.

TABLE 6-1. POTENTIAL IMPACTS TO BATHYMETRY, SEDIMENTS, WATER QUALITY, AND MARINE VEGETATION RESULTING FROM PROJECT ACTIVITIES

Aspect	Determination
Timing	May take place for up to 70 days[1] over the course of the project, year-round.
Proximity[2]	May occur only in the immediate vicinity of Wharf C-2
Duration	18 months (September 2013 – March 2015); intermittently with pile driving
Frequency	May occur on any day that pile driving / extraction or contingency dredging is taking place, or that barges / vessels are repositioned
Distribution	Immediate vicinity of Wharf C-2
Expected recurrence	Will not occur once repair activities are complete

[1]contingency clamshell dredging, if needed, may be conducted outside of the 70 day pile driving timeframe**;** [2]Some sediment deposition may occur a distance from the individual piles or location of anchor deployment depending on currents and sediment characteristics; however, no sediment deposition / disturbance is expected to occur outside the action area.

6.1.1 Marine Mammals – North Atlantic Right Whale and Humpback Whale

Determination

The proposed action may affect, but is not likely to adversely affect North Atlantic right whales and humpback whales, and will have no effect on right whale critical habitat.

Effects from Changes to Water Quality

No direct impacts to marine mammals are expected due to changes in water quality during construction. Water quality would be impacted during vessel operations, installation of new piles, and contingency dredging because bottom sediments would be temporarily resuspended. Resuspended sediments would increase turbidity and reduce dissolved oxygen periodically during in-water construction activities, as discussed above. The overall level of sediment disturbance associated with the Project will be significantly lower than that of maintenance dredging in the turning basin, and resuspended sediments are expected to dissipate within a few hours (National Marine Fisheries Service 2009c). Thus marine mammals exposed to resuspended sediments are not likely to be impacted by contaminants. The activities that generate suspended sediments would be short-term and localized and suspended sediments are expected to disperse and/or settle rapidly. Moreover, marine mammals are expected to avoid the immediate construction area due to increased vessel traffic, noise and human activity.

Effects from Pile Driving Noise

The effects of pile driving noise on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. Impacts to marine mammals from pile driving activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The farther away from the source, the less intense the exposure should 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 which are soft (i.e. sand) will absorb or 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 forceful equipment, which would ultimately decrease the intensity of the acoustic source.

Since 1997, NMFS has used generic sound exposure thresholds to determine when an activity in the ocean that produces sound might result in impacts to marine mammals such that an incidental injurious or behavioral take might occur (70 FR 1871). To date, no studies have been conducted that examine impacts to marine mammals from pile driving sounds from which empirical noise thresholds have been established. Current NMFS practice regarding exposure of marine mammals to high underwater level sounds is that cetaceans exposed to impulsive sounds $\geq$180 re 1 μPa rms 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 applied the threshold values for impulsive sounds to vibratory sound in the analysis for the Incidental Harassment Authorization application that was submitted to NMFS in April 2013.

Behavioral harassment (Level B) is considered to have occurred when marine mammals (excluding West Indian manatees) are exposed to underwater sounds $\geq$ 160 dB rms re 1 μPa for impulsive sound from impact pile driving and 120 dB rms re 1 μPa for non-impulsive sound produced by vibratory pile driving, but below injurious thresholds. The anticipated harassment resulting from the proposed action, however, is unlikely to result in significant alterations to behaviors such as feeding, breeding, and migration.

The Level A (injury) and Level B (disturbance) thresholds were used for calculating zones of influence for marine mammals. The Fundamentals of Acoustics and Analysis Addendum provides full details on the Navy's approach for sound modeling. The zones of influence for potential effects of vibratory and contingency-only impact pile driving noise are illustrated in Figures 6-1 through 6-3. The potential exposure time for pile driving noise on any given day is limited to less than an hour (Table 6-2).

TABLE 6-2. CONSERVATIVE ESTIMATE OF DAILY EXPOSURE TO PILE DRIVING NOISE

Pile Type	Notional Duration to Drive Pile	Max Piles per Day[1]	Max Total Time in a 24-hour Period
Steel King	1 minute[3]	15	30 minutes
Paired Steel Sheet		12	
Polymeric		10	10 minutes[2]

[1]Assumes three templates (a template is a set of five king piles and four sheet piles); daily average number of templates is expected to be closer to two; these numbers are estimates for calculation purposes only and do not constitute work performance limits; [2]polymeric piles will not be driven on the same day as the king and paired sheet piles; total times are conservative estimates only and do not represent limits for daily pile driving work; [3]each pile is expected to take 45 seconds to a minute to install based on measurements on a similar project at NAVSTA Mayport.

The time required to drive each pile and the number of piles to be driven each day were determined using very conservative guidelines. Further, driving will be intermittent throughout the day, and no species is expected to remain static in the vicinity of the action area.

FIGURE 6-1. ESTIMATED MARINE MAMMAL ZONE OF INFLUENCE FOR VIBRATORY DRIVING OF STEEL PILES

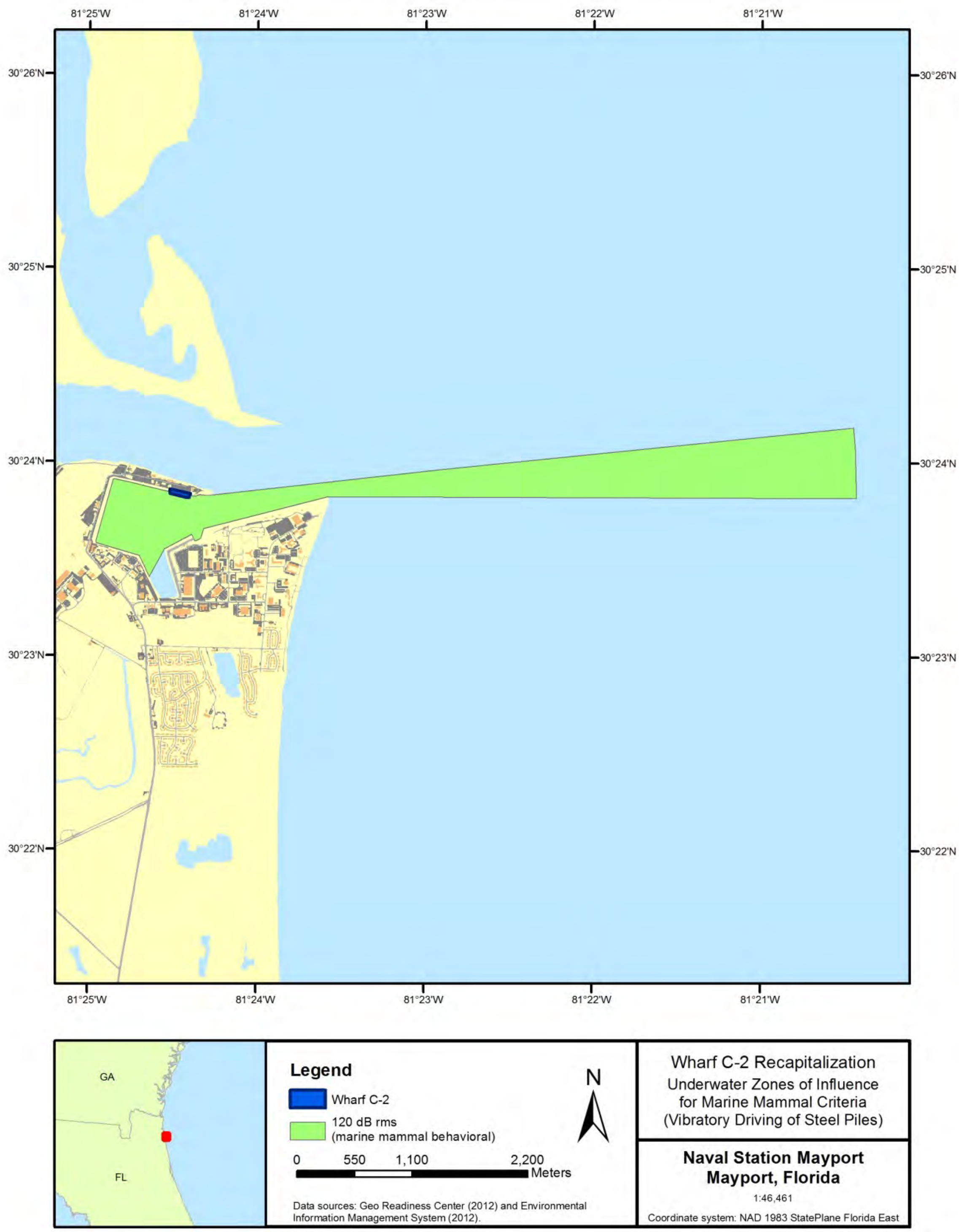


FIGURE 6-2. ESTIMATED MARINE MAMMAL ZONE OF INFLUENCE FOR (CONTINGENCY ONLY) IMPACT DRIVING OF STEEL PILES

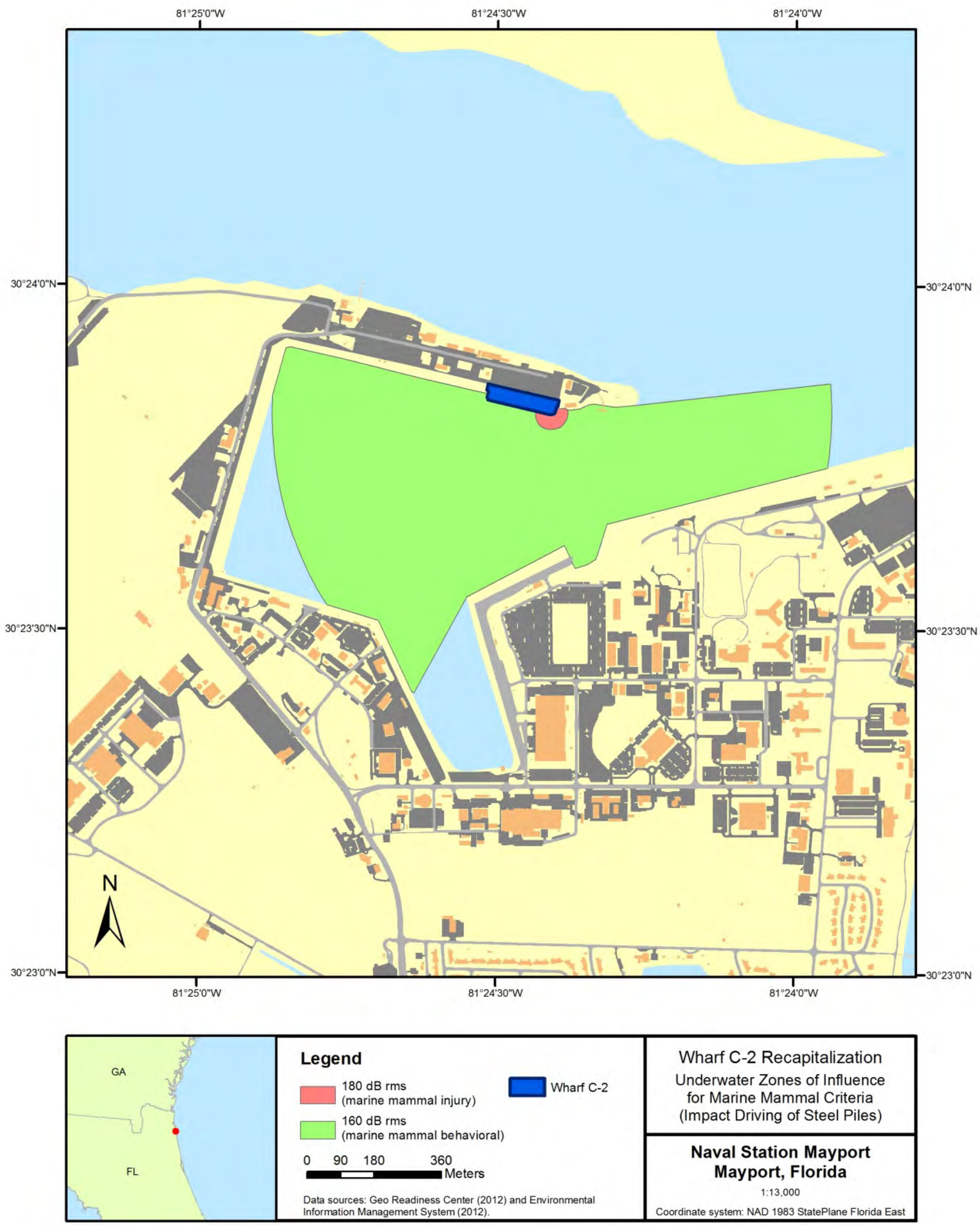
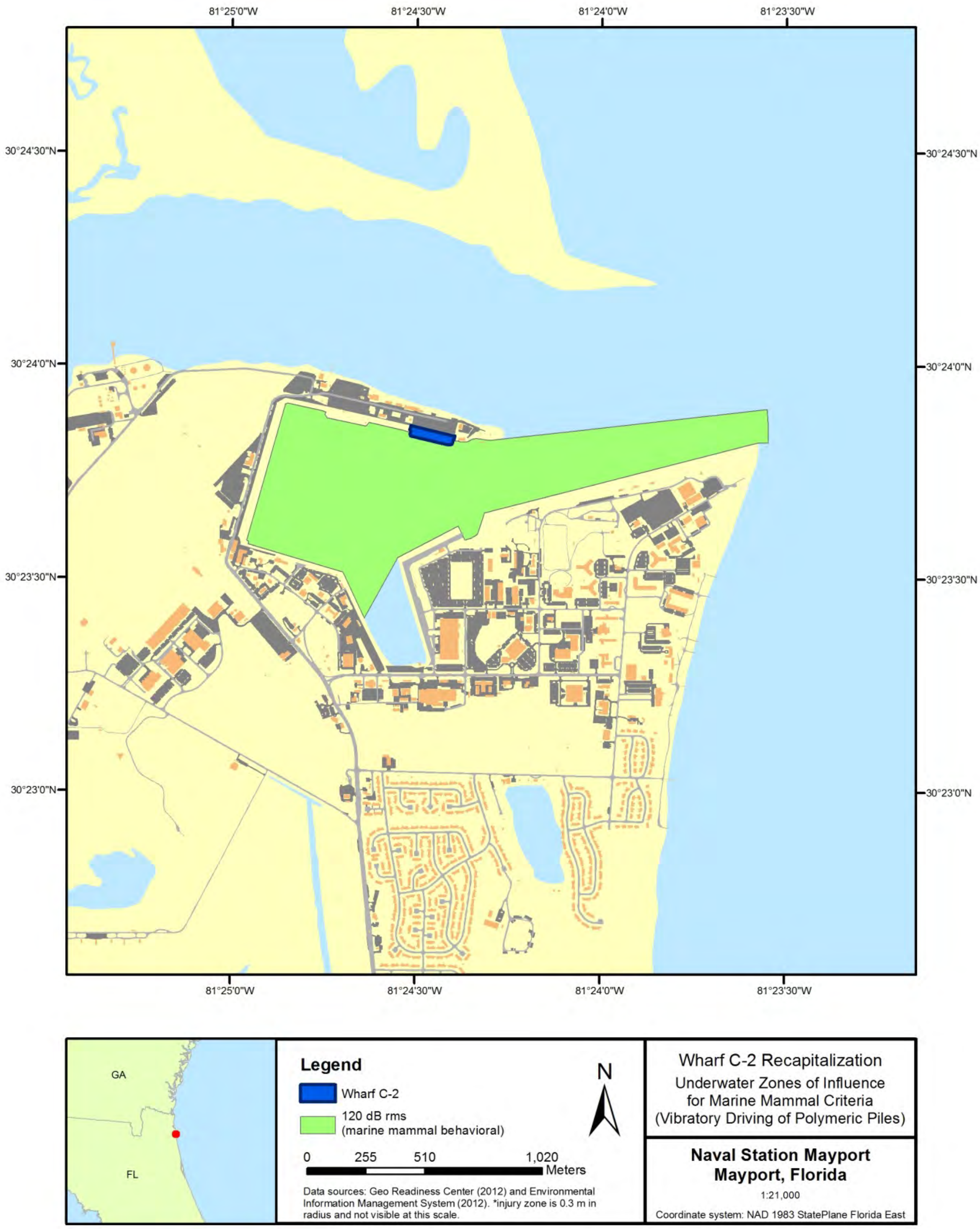


FIGURE 6-3. ESTIMATED MARINE MAMMAL ZONE OF INFLUENCE FOR VIBRATORY DRIVING OF POLYMERIC PILES



Impacts to marine species are expected to be the result of physiological responses to both the type and strength of the acoustic signature (Viada et al. 2008). Behavioral impacts are also expected, though the type and severity of these effects are more difficult to define due to limited studies addressing the behavioral effects of impulsive sounds on marine mammals. Potential effects from impulsive sound sources can range from brief acoustic effects such as behavioral disturbance, tactile perception, physical discomfort, slight injury of the internal organs and the auditory system, to death of the animal (Yelverton et al. 1973; O'Keeffe and Young 1984).

Behavioral Effects from Pile Driving Noise

Behavioral responses to sound can be highly variable. For each potential behavioral change, the magnitude of the change ultimately determines the severity of the response. A number of factors may influence an animal's response to noise, including its previous experience, its auditory sensitivity, its biological and social status (including age and sex), and its behavioral state and activity at the time of exposure. Habituation occurs when an animal's response to a stimulus such as pile driving noise 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 swimming speed, increased surfacing time, and cessation of foraging in the affected area would indicate disturbance or discomfort.

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway et al. 1997; Finneran et al. 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices and including pile driving) have been varied, but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds 2002; also see reviews in Gordon et al. 2004; Wartzok et al. 2003; and Nowacek et al. 2007).

A comprehensive review of acoustic and behavioral responses to noise exposure by Nowacek et al. (2007) concluded that one of the most common behavioral responses is displacement. To assess the significance of displacements, it is necessary to know the areas to which the animals relocate, the quality of that habitat, and the duration of the displacement in the event that they return to the pre-disturbance area. Short-term displacement may not be of great concern unless the disturbance happens repeatedly. Similarly, long-term displacement may not be of concern if adequate replacement habitat is available.

Discussion

No physiological effects to North Atlantic right whales or humpback whales are expected from activities associated with the Project for several reasons. First, vibratory pile driving which is being utilized as the primary installation method does not generate high enough peak sound pressure levels that are commonly associated with physiological damage. Impact pile driving – if performed at all - will only occur for a short period of time (estimated to be no more than 45 seconds to a minute per pile – see Table 6-2 above) and only if an obstruction such as a broken timber pile or broken segment of a ship rail is encountered in the sediment. Additionally, the minimization measures which the Navy will be employing (Section 6.5) will greatly reduce the chance that North Atlantic right whales or humpback whales may be exposed to sound pressure levels that could cause physical harm. Furthermore, the Navy will have observers monitoring a shutdown zone of no less than 50 ft. from any pile being driven to ensure no marine mammals are injured.

In the unlikely event that a North Atlantic right whales or humpback whale enters the Project vicinity, the individual(s) may avoid affected areas in which they experience noise-related discomfort, limiting their ability to forage or rest there. As described in the section above, individual responses to pile driving noise are expected to be variable. Some individuals may occupy the action area during pile driving without apparent discomfort, but others may be displaced with undetermined long-term effects.

Noise-related disturbance may also inhibit some individuals' transiting of the area. Given the duration of the project there is a potential for displacement of North Atlantic right whales or humpback whales that could occur in the action area due to these behavioral disturbances during the in-water work period. Habituation may occur resulting in a decrease in the severity of response; however, because of the low likelihood of individual North Atlantic right whales or humpback whales occurring in the action area, it is considered unlikely. Since pile driving will only occur during daylight hours, marine mammals transiting through, or foraging or resting in, the action area at night will not be affected. Effects of pile driving activities may be experienced by individual marine mammals that enter the zones of influence described above, but they would not cause population-level impacts or affect the continued survival of the species. These effects would be considered insignificant for individual North Atlantic right whales and humpback whales, and discountable for the species as a whole. Table 6-3 summarizes the analysis of potential noise effects to North Atlantic right whales and humpback whales.

TABLE 6-3. ANALYSIS OF POTENTIAL NOISE EFFECTS TO NORTH ATLANTIC RIGHT WHALES AND HUMPBACK WHALES

Species	North Atlantic Right Whale	Humpback Whale
Presence / Occurrence in Action Area	Mid-November to mid-April, occasional[1]	Winter, extralimital[1]
Timing of Potential Effects	Year-round	
Proximity of Effects	Based on criteria used for modeling, effects to North Atlantic right whales and humpback whales from pile driving noise could occur up to 7,356 m (24,134 ft.) from Wharf C-2 (Figure 6-1), exclusive of land shadowing. Potential effects can be expected to correlate positively with proximity to Wharf C-2 when pile driving is taking place. However, use of vibratory driving as the primary methodology is expected to reduce the zone of influence and minimize the likelihood of injurious and behavioral effects from Project noise.	
Duration of Effects	70 days, not projected to exceed more than 45 net minutes per day	
Frequency / Distribution of Effects	Intermittent; may occur on any day that pile driving is taking place	
Expected Recurrence of Effects	Will not occur once Project activities are complete	
Conclusion	Based on the low likelihood of occurrence in the action area, a **may affect, not likely to adversely affect** determination was made for North Atlantic right whales and humpback whales.	

[1]Occasional - irregular either during the seasons indicated or in annual frequency; present in low densities and records infrequent; Extralimital: extremely rare; not expected to occur in the action area

No effects to critical habitat for the North Atlantic right whale are expected to result from in-water noise generated by the Project. Other effects such as short term reductions in water quality may occur, but are expected to be temporary and highly localized to the immediate vicinity of Wharf C-2. Therefore, a **no effect** determination was made for North Atlantic right whale critical habitat.

6.1.2 Fish – Atlantic Sturgeon, Shortnose Sturgeon, Smalltooth Sawfish, American Eel, Dwarf Seahorse, and Blueback Herring

Determination

The proposed action may affect, but is not likely to adversely affect, Atlantic sturgeon, shortnose sturgeon, smalltooth sawfish, American eels, and blueback herring; and will have no effect on dwarf seahorses. The proposed action will have no effect on smalltooth sawfish critical habitat.

Effects from Changes to Water Quality

Water quality would be impacted during vessel operations, installation of new piles, and contingency dredging because bottom sediments would be temporarily resuspended. Resuspended sediments would increase turbidity and reduce dissolved oxygen periodically during in-water construction activities, as discussed for effects to water quality in Section 6.3 above. The overall level of sediment disturbance associated with the Project will be significantly lower than that of maintenance dredging in the turning basin, and resuspended sediments are expected to dissipate within a few hours (National Marine Fisheries Service 2009c). Frequent tidal flushing will also dilute the concentration of contaminants in the basin water column. Thus fish exposed to resuspended sediments are not likely to be impacted by contaminants. The activities that generate suspended sediments would be short-term and highly localized to the area immediately around Wharf C-2, and suspended sediments are expected to disperse and/or settle rapidly. Therefore, direct effects to fish from changes in water quality are expected to be minimal.

Effects from Pile Driving Noise

The underwater zone of influence for pile driving extends out of the mouth of the St. Johns River but does not reach the north side of the river (Figure 6-1) due to land shadowing. Therefore, almost the entire breadth of the St. Johns River will remain available for the unaffected migration of marine fishes.

The degree to which an individual fish exposed to underwater sound will be affected depends on a number of variables, including species, size, and physical condition of the fish; presence of a swim bladder; 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; size and number of waves on the water surface; bottom substrate composition and texture; effectiveness of bubble curtain sound/pressure attenuation technology (if used); currents; and presence of predators (National Marine Fisheries Service 2005). Depending on these factors, effects on fish can range from changes in behavior to immediate mortality. There is no documented injury or mortality with the use of vibratory hammers. Fish injury and mortality has been documented during pile driving with impact hammers, however impact driving will be used only as a contingency.

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 during the summer and fall that year (Fisheries Hydroacoustic Working Group 2008); they are now referred to as the "Interim Criteria" (Table 6-4). The criteria were used for calculating zones of influence for ESA-listed fish.

TABLE 6-4. INJURY AND BEHAVIORAL THRESHOLDS FOR FISH

<table>
<tr><th rowspan="2">Functional Hearing Group</th><th colspan="2">Impact Pile Driving (re 1µPa)</th><th colspan="2">Vibratory Pile Driving (re 1µPa)</th></tr>
<tr><th>Injury Threshold</th><th>Behavioral Threshold</th><th>Injury Threshold</th><th>Behavioral Threshold</th></tr>
<tr><td>Fish (≥ 2 grams)</td><td>187 dB (re: $1\mu Pa^2$*sec) cumulative SEL</td><td rowspan="3">150 dB rms</td><td rowspan="3">n/a</td><td rowspan="3">150 dB rms</td></tr>
<tr><td>Fish (< 2 grams)</td><td>183 dB (re: $1\mu Pa^2$*sec) cumulative SEL</td></tr>
<tr><td>Fish (all sizes)</td><td>206 dB peak</td></tr>
</table>

The Fundamentals of Acoustics and Analysis Addendum provides full details on the Navy's approach for sound modeling. The zones of influence for potential effects of vibratory and contingency-only impact pile driving noise are illustrated in Figures 6-4 through 6-6. As with marine mammals, the net potential exposure time for pile driving noise on fish on any given day is expected to be limited to less than an hour (Table 6-2 in Section 6.1.1).

FIGURE 6-4. ESTIMATED FISH ZONE OF INFLUENCE FOR VIBRATORY DRIVING OF STEEL PILES

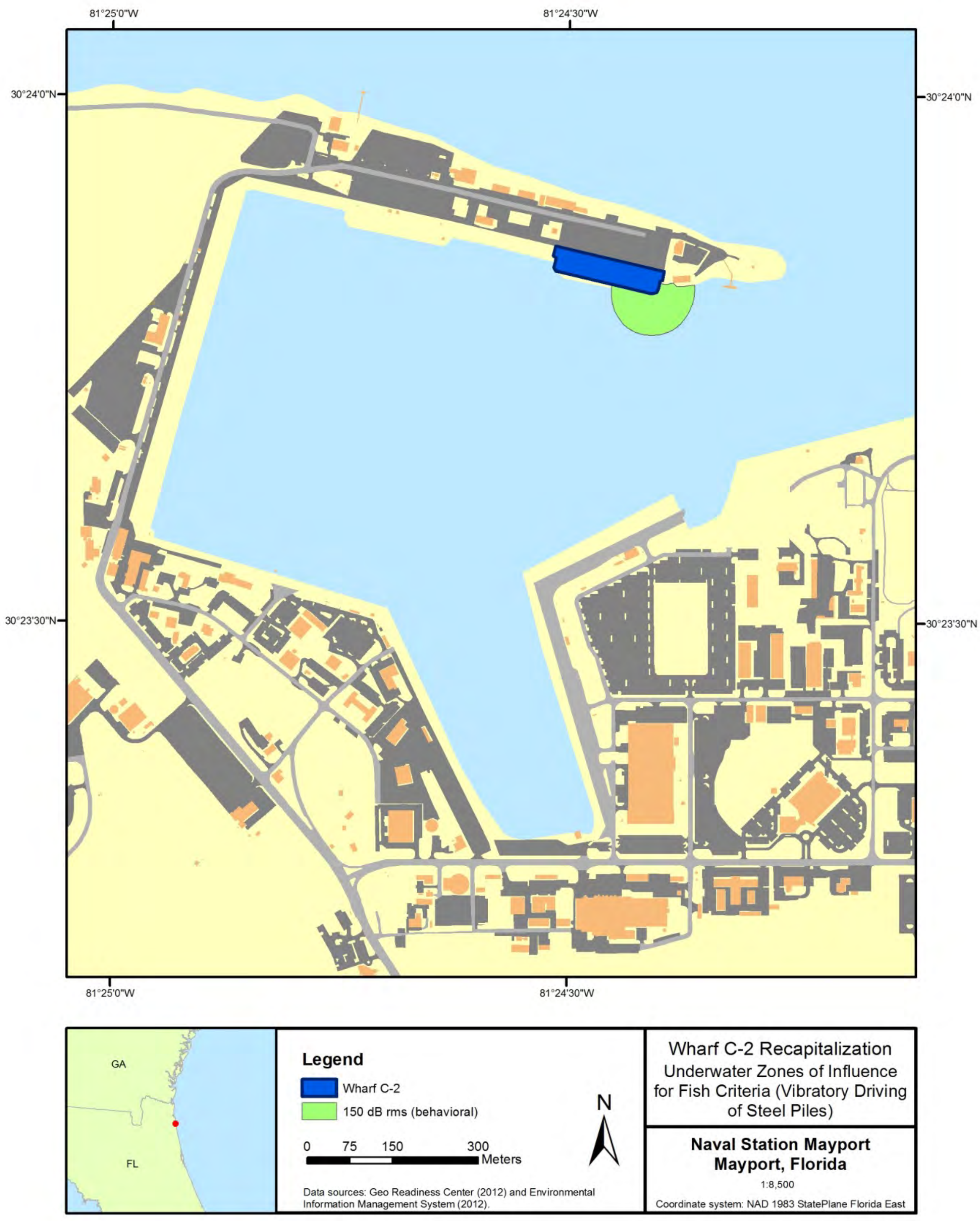


FIGURE 6-5. ESTIMATED FISH ZONE OF INFLUENCE FOR (CONTINGENCY ONLY) IMPACT DRIVING OF STEEL PILES

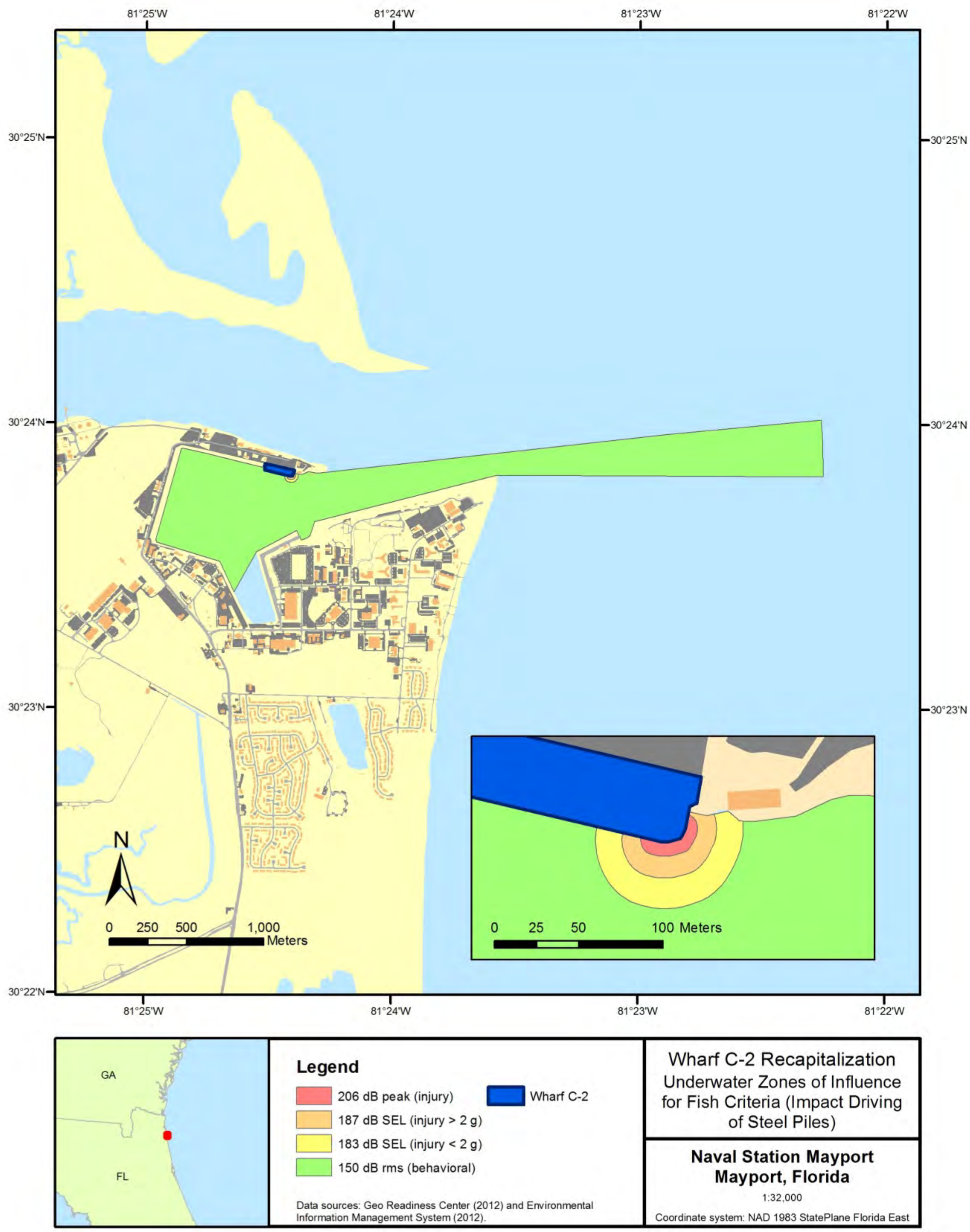
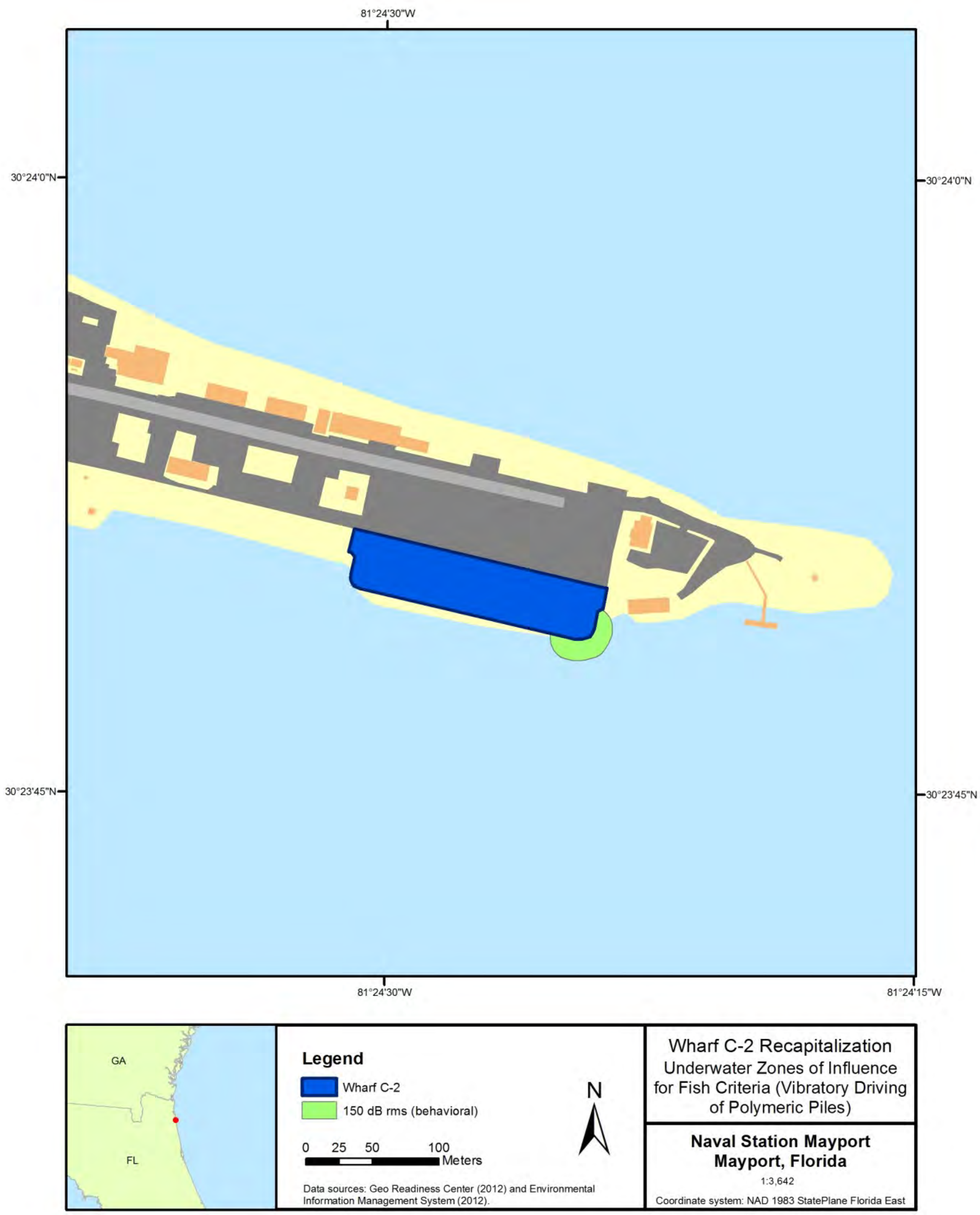


FIGURE 6-6. ESTIMATED FISH ZONE OF INFLUENCE FOR VIBRATORY DRIVING OF POLYMERIC PILES



Physiological Effects from Pile Driving Noise

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 air gun 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).

Fish with swim bladders - all ESA-listed fish species addressed in this document except the smalltooth sawfish - 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 causes demonstrable injury, in the form of ruptured capillaries, internal bleeding, and maceration of highly vascular organs (California Department of Transportation 2002).

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 minutes, hours or even days after exposure.

In the absence of mortality, elevated noise levels can cause sublethal injuries affecting survival, and fitness. Similarly, if injury does not occur, noise may modify fish behavior that 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). 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 far 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 mm fork length), while swim bladders in the largest fish (170 mm 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 Effects from Pile Driving Noise

The sound pressure levels measured in previous vibratory pile driving projects fell far short of those discussed in the literature as resulting in fish mortality, injury, permanent hearing loss, or other physiological stress. The vibratory driver does produce particle motions that are 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. It is problematic to consider such short-term avoidance behavior an adverse impact; as this same behavior is executed numerous times each day by fish avoiding objects and predators while navigating along the shorelines guided by differential flow patterns. Pile driving creates a broad spectrum of frequencies and both high and low frequencies attenuate quickly in shallow water. Because low-frequency propagation is affected strongly by depth, fish in shallow habitats probably detect lower-frequency sounds only from sources that are extremely close to them. This provides ample opportunity for the fish to move out of the area of disturbance. However, fish will not necessarily move out of the area (Visconti pers. comm. 2002). Also, the response of fish to water flow may take precedence over responses to other stimuli (Carlson 1994). Burgess et al. (2005) found that not only does underwater sound from vibratory pile driving propagate through the water, but also through the substrate.

Discussion

Most fish would be expected to leave the immediate vicinity of the pile being driven due to the disturbance from in-water activity and noise. Figure 6-5 represents the zone of influence for contingency-only impact pile driving; essentially a "worst case scenario". The area illustrated depicts the calculated range to which injurious and behavioral effects to fish could occur, based on the criteria described in Table 6-5. If impact pile driving is required (i.e. in the event that an obstruction of some type is encountered and vibratory driving is insufficient), it is expected that the duration of the driving event will last only minutes (Table 6-2). Therefore, the zone of influence will be effective for a very short duration of time.

The more likely scenario is illustrated in Figure 6-4, where the behavioral zone of influence around a notional pile extends approximately 75 meters if not impeded by land or another object that would cause attenuation. This zone of influence will be effective for under an hour (Table 6-2), with interruptions as the vibratory hammer is repositioned and other activities take place. The criteria for injury to fish are not expected to be met by vibratory pile driving noise.

Regardless of the pile driving method being implemented, fish passage in and out of the St. Johns River will not be impacted by the calculated zone of influence, except for individual fish approaching the river from the south, close to shore.

Given that impact pile driving is the only method that could be expected to produce injury to fish, and that if used at all it would only take place for a very limited amount of time, the overall likelihood of injury to any listed fish species is low enough as to be discountable.

In the unlikely event that an ESA-listed or candidate fish species enters the Project vicinity, the individual(s) may avoid affected areas in which they experience noise-related discomfort, limiting their ability to forage or rest there. As described in the section above, individual responses to pile driving noise are expected to be variable. Some individuals may occupy the action area during pile driving without apparent discomfort, but others may be displaced with undetermined long-term effects.

Effects of pile driving activities may be experienced by individual fish that enter the zones of influence described above, but they would not cause population-level impacts or affect the continued survival of the species. These effects would be considered insignificant for individual Atlantic sturgeon, shortnose sturgeon, smalltooth sawfish, American eel, and blueback herring; and discountable for the species as a whole. Dwarf seahorses are not expected to experience effects from Project noise because they are extremely unlikely to occur in the action area. Table 6-5 summarizes the analysis of potential effects to the three ESA-listed fish species; and Table 6-6 summarizes potential effects to the three ESA-candidate fish species.

TABLE 6-5. ANALYSIS OF POTENTIAL NOISE EFFECTS TO THE ATLANTIC STURGEON, SHORTNOSE STURGEON, AND SMALLTOOTH SAWFISH

Species Presence / Occurrence in Action Area	Year-round, very rare[1]
Timing of Potential Effects	Year-round
Proximity of Effects	Based on criteria used for modeling, effects to Atlantic sturgeon, shortnose sturgeon, and smalltooth sawfish from pile driving noise could occur up to 3,981 m (13,061 ft.) from Wharf C-2 (Figure 6-5), exclusive of land shadowing if impact pile driving takes place. The more likely range, estimated for vibratory pile driving, from each pile being driving is approximately 75 m (246 ft.). Potential effects can be expected to correlate positively with proximity to Wharf C-2 when pile driving is taking place. However, use of vibratory driving as the primary methodology is expected to reduce the zone of influence and minimize the likelihood of injurious and behavioral effects from Project noise.
Duration of Effects	70 days, not projected to exceed more than 45 net minutes per day
Frequency / Distribution of Effects	Intermittent; may occur on any day that pile driving is taking place
Expected Recurrence of Effects	Will not occur once Project activities are complete
Conclusion	Based on the low likelihood of occurrence in the action area, a **may affect, not likely to adversely affect** determination was made for Atlantic sturgeon, shortnose sturgeon, and smalltooth sawfish.

[1]Rare: few records, erratic in occurrence due either to very little suitable habitat or very low population densities.

While there is critical habitat for the smalltooth sawfish in Florida waters, none is found in the vicinity of the Project. Therefore, a **no effect** determination was made for smalltooth sawfish critical habitat.

TABLE 6-6. ANALYSIS OF POTENTIAL NOISE EFFECTS TO THE AMERICAN EEL, DWARF SEAHORSE, AND BLUEBACK HERRING

Species	American Eel	Dwarf Seahorse	Blueback Herring
Presence / Occurrence in Action Area	Late winter / early spring, rare[1]	Extralimital[1]	Late winter / early spring, occasional[1]
Timing of Potential Effects	Year-round		
Proximity of Effects	Based on criteria used for modeling, effects to American eels, dwarf seahorses and blueback herring from pile driving noise could occur up to 3,981 m (13,061 ft.) from Wharf C-2 (Figure 6-5), exclusive of land shadowing if impact pile driving takes place. The more likely range, estimated for vibratory pile driving, from each pile being driving is approximately 75 m (246 ft.). Potential effects can be expected to correlate positively with proximity to Wharf C-2 when pile driving is taking place. However, use of vibratory driving as the primary methodology is expected to reduce the zone of influence and minimize the likelihood of injurious and behavioral effects from Project noise.		
Duration of Effects	70 days, not projected to exceed more than 45 net minutes per day		
Frequency / Distribution of Effects	Intermittent; may occur on any day that pile driving is taking place		
Expected Recurrence of Effects	Will not occur once Project activities are complete		
Conclusion	Based on the low likelihood of occurrence in the action area, a **may affect, not likely to adversely affect** determination was made for American eel and blueback herring. Based on lack of seagrass habitat and relatively cool water temperatures, dwarf seahorses are not expected to occur in the action area. Therefore, a **no effect** determination was made for dwarf seahorses.		

[1]Rare: few records, erratic in occurrence due either to very little suitable habitat or very low population densities; Occasional - irregular either during the seasons indicated or in annual frequency; present in low densities and records infrequent; Extralimital: extremely rare; not expected to occur in the action area

6.1.3 Sea Turtles – Green Turtle, Hawksbill Turtle, Kemp's Ridley Turtle, Loggerhead Turtle, and Leatherback Turtle

Determination

The proposed action may affect, but is not likely to adversely affect, green turtles, Kemp's ridley turtles, loggerhead turtles and leatherback turtles; and will have no effect on hawksbill turtles. A no effect determination was made for green turtle, hawksbill turtle, and leatherback turtle critical habitat, based on distance from the action area.

Effects from Changes to Water Quality

Resuspended sediments would increase turbidity and could affect foraging success for sea turtles, which are visual predators. The overall level of sediment disturbance associated with the Project will be significantly lower than that of maintenance dredging in the turning basin, and resuspended sediments are expected to dissipate within a few hours (National Marine Fisheries Service 2009c). Frequent tidal flushing will also dilute the concentration of contaminants in the basin water column. Thus fish exposed to resuspended sediments are not likely to be impacted by contaminants. The activities that generate suspended sediments would be short-term and highly localized to the area immediately around Wharf C-2, and suspended sediments are expected to disperse and/or settle rapidly. Therefore, direct effects to sea turtles from changes in water quality are expected to be minimal.

Physiological Effects from Pile Driving Noise

The effects of pile driving noise on sea turtles are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. Impacts to sea turtles from pile driving activities are expected to result primarily from acoustic pathways, rather than turbidity or habitat loss due to pile driving. As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The farther away from the source, the less intense the exposure is expected to be. The substrate and depth of the habitat affect the sound propagation properties of the environment. Shallow environments (such as the action area) are typically more structurally complex which leads to rapid sound attenuation. In addition, substrates which are soft (i.e. sand) will absorb or attenuate the sound more readily than hard substrates (rock) which may reflect the acoustic wave. Soft porous substrates (such as those found in the action area) would also likely require less time to drive the pile, and possibly less forceful equipment, which would ultimately decrease the intensity of the acoustic source.

Possible effects of sound from pile driving range from behavioral effects such as startle reactions and behavioral changes (e.g. ceasing foraging) to injurious effects such as temporary or permanent loss of hearing and damage to internal organs. The threshold value used by the Navy 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 criteria was developed in cooperation with the NMFS and is not based on experimental evidence of injuries caused to sea turtles by pile driving sound but was adopted from pinniped thresholds as a precautionary measure when addressing impacts from pile driving to sea turtles. No behavioral criterion has been adopted by the NMFS for sea turtles for pile driving sound and as such behavioral effects must be assessed qualitatively. As detailed in the Fundamentals of Acoustics and Analysis Addendum, sound levels from pile driving will not reach the threshold above; therefore no injuries to sea turtles from sound associated with pile driving are anticipated and a zone of influence map is not necessary. However, potential for behavioral effects to sea turtles from pile driving noise remain and are assessed qualitatively below.

Behavioral Effects from Pile Driving Noise

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. Sea turtles 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. Anthropogenic activities have the potential to provide additional stressors above and beyond those that occur in the absence of human activity. 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.

The response of a sea turtle to an anthropogenic sound will 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., the animal's activity 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 way a sea turtle responds to a sound. 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.

There are limited studies of sea turtle responses to sounds. A few studies examined sea turtle reactions to airguns, which produce broadband impulsive sound. For the purposes of comparison, effects from impulsive sound would be applicable only to contingency impact pile driving during the Project. 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 ft. x 148 ft. (300 m x 45 m) enclosure in a 10 m deep canal maintained a standoff range of 98 ft. (30 m) from airguns fired simultaneously at intervals of 15 seconds (s) 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 rms.

Moein Bartol et al. (1995) investigated the use of air guns 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 24 m), 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 air gun to gauge behavioral responses. The trials showed that above a received level of 166 dB re 1 µPa rms, the turtles noticeably increased their swimming activity compared to nonoperational periods, with swimming time increasing as air gun levels increased during approach.

Above 175 dB re 1 µPa rms, 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. More recently, DeRuiter and Doukara (2012) noted several possible startle or avoidance reactions to a seismic airgun array in the Mediterranean by basking loggerhead turtles.

Discussion

None of the anticipated pile driving scenarios result in the production of sound above the 190 dB re 1 µPa rms SPL sea turtle injury criteria. Because of this, no injuries associated with sound produced by pile driving are anticipated for any species of sea turtle. However this does not preclude behavioral effects. As a precautionary measure against possible behavioral effects, a shutdown zone of 50 ft. (15 m) will be observed. If a sea turtle approaches or enters the shutdown zone, pile driving will cease and will not resume until the animal has moved out of the area.

No behavior criteria for sea turtles exist but it is understood that behavioral impacts could still occur over the course of the project outside the shutdown zone. In the absence of established criteria and quantitative density data, impacts can only be assessed qualitatively, based on the relative abundance of a given species, our general knowledge of sea turtle reactions to sound in the water, and the mitigation measures and best management practices in place. With the implementation of the shutdown zone, the very limited amount of impact pile driving (and its associated higher sound source levels) that may be performed, and the overall short construction duration, little opportunity exists for behavioral effects to occur.

Hawksbill turtles are expected to be in the action area only rarely, if at all, due to the lack of nesting, reef, and hardbottom foraging habitat in or near the action area. Because of this, and the limited duration of construction, no acoustic effects to hawksbill turtles are anticipated.

Green and leatherback turtles may occasionally occur in the action area while migrating to nest on nearby beaches. No waters directly off of nesting beaches will be impacted by the sound produced during the project. Green, Kemp's ridley, and leatherback turtles may pass through the action area while migrating to foraging habitats. Kemp's ridley turtles may forage in the turning basin and navigation channel when their preferred prey, blue crabs and invertebrates, are present. Leatherback turtles may forage in the offshore portions of the action area. Presence of these species in the action area is possible, though at limited times of the year and in low numbers. Because of this, and the limited duration of construction, behavioral effects from sound produced by the proposed action are possible, but not likely.

Loggerhead turtles nest regularly in Duval County and have been found nesting on NAVSTA Mayport beaches. No waters directly off of nesting beaches will be impacted by the sound produced during the project. The turning basin and offshore portions of the action area contain their preferred prey of benthic invertebrates. They are expected to be in the action area regularly during the nesting season, and could be found foraging in the other seasons. Despite the limited duration of construction activities, the number of loggerhead turtles found in the area makes it likely that some behavioral reactions, such as startle responses, from sound produced by the proposed action may occur. Given the limited duration of pile driving activities, and the fact the loggerhead turtles regularly experience stimuli that cause startle responses in their natural environment, these induced behavioral reactions should not significantly disrupt an individual turtle's normal behavioral patterns or constitute harassment. Table 6-7 summarizes the in-water noise effects analysis for sea turtles.

TABLE 6-7. ANALYSIS OF POTENTIAL NOISE EFFECTS TO SEA TURTLES

Species	Green Turtle	Hawksbill Turtle	Kemp's Ridley Turtle	Loggerhead Turtle	Leatherback Turtle
Species Presence / Occurrence in Action Area	Occasional year round with a peak during nesting season. Nesting: June - September	Extralimital; No recorded nesting.	Occasional year round, potentially higher in spring / summer. No recorded nesting.	Common year round with a peak during nesting season. Nesting: May - August	Occasional year round with a peak during nesting season. Nesting: March - August
Timing of Potential Effects	Year-round				
Proximity of Effects	Potential effects can be expected to correlate positively with proximity to Wharf C-2 when pile driving is taking place. However, implementation of shutdown measures is expected to minimize the likelihood of injurious and behavioral effects from Project noise.				
Duration of Effects	70 days, not projected to exceed more than 45 net minutes per day				
Frequency / Distribution of Effects	Intermittent; may occur on any day that pile driving is taking place				
Expected Recurrence of Effects	Will not occur once Project activities are complete				
Conclusion	Based on the low likelihood of occurrence in the action area, as well as the Navy's commitment to monitor the zone around the project location and shut down pile driving activities should an individual be observed (Section 6.5.4), **a may affect, not likely to adversely affect** determination was made for green turtles, Kemp's ridley turtles, loggerhead turtles, and leatherback turtles. Because the action area is located at the extreme north of the hawksbill turtles' nesting range, and contains no suitable juvenile or adult habitat, a **no effect** determination was made for hawksbill turtles.				

[1]Rare: few records, erratic in occurrence due either to very little suitable habitat or very low population densities; Occasional - irregular either during the seasons indicated or in annual frequency; present in low densities and records infrequent; Extralimital: extremely rare; not expected to occur in the action area

A **no effect** determination was made for green turtle, hawksbill turtle, and leatherback turtle critical habitat, based on distance from the action area.

6.2 Indirect Effects

Indirect effects are caused by the action and occur later in time after the action is completed. Effects for the duration of the Project have been addressed in this BE. Upon completion of the in-water work, conditions are expected to return to their previous state within a relatively short amount of time. Sound in the water will return to normal ambient levels immediately upon completion of in-water activities. As discussed in Section 6, baseline conditions such as bathymetry, sediment, water quality and marine vegetation are expected to return to prior states within hours (in the case of sediments and water quality) to a few months (in the case of bathymetry and marine vegetation) under normal deposition and succession regimes. With the exception of a slight projected increase in the Wharf C-2 footprint (up to 15 feet beyond existing dimensions – see Marine Vegetation under Section 6, no permanent alteration of predator / prey relationships, habitat, or existing facility use is anticipated, and no new negative effects to species or their habitat are expected to begin once the Project is complete.

6.3 Interrelated and Interdependent Actions and Activities

Actions and activities that are related to the Project include routine docking and transits by vessels entering and leaving the turning basin. The Project would not result in a net change to the number of vessels approaching or leaving the turning basin, and would therefore result in no change to current risk of ships strikes for marine mammals (including North Atlantic right whales) or sea turtles.

6.4 Cumulative Effects

Cumulative effects include state, tribal, local, and private activities that are reasonably certain to occur within the action area and are likely to affect the ESA-listed and candidate species considered in this BE. Cumulative effects do not include any federal actions.

Identified below are several nonfederal actions that occur or could occur in the vicinity of the action area. Other non-federal projects may be taking place in the action area, and it can be expected that they will undergo ESA Section 7 consultation through the Army Corps of Engineers' permitting process; therefore, they are not discussed here.

Village of Mayport Community and Economic Development

The Village of Mayport is the oldest, continually occupied community in Duval County. The Mayport Waterfront Partnership was created by the cities of Atlantic Beach and Jacksonville in 1997 to bring economic revitalizing to the eastern shore of Duval County. The Partnership's zone of interest includes the North Jacksonville barrier islands, the Village of Mayport, and Ft. George and Fanning Islands. In 1998, the State of Florida designated the Village of Mayport as one of the first three waterfront communities in need of revitalization. In recent years, the Partnership oversaw the installation of a $4.2 million sanitary sewer line and the upgrading of water lines in the commercial section of the Village of Mayport. Also, the Waterfront Partnership wrote and sponsored the Mayport Village Overlay Zone Regulations, which provide protection for characteristics unique to the village (City of Jacksonville 2012).

Continued residential and commercial development along the shorelines and in the nearshore waters off Mayport would result in increased airborne and underwater noise, pollution, and human presence.

Marine Vessel Traffic

The nearshore areas of NAVSTA Mayport, near the Jacksonville commercial port in particular, are heavily traveled by commercial, recreational, and government marine vessels. Recreational activities in the area consist primarily of motorboating, sport fishing, jetskiing, waterskiing, shellfishing, shrimping, sailing, sport diving, and bird and whale watching. Recreational boats range throughout the coastal waters, depending on season and weather conditions. A commercial ferry crosses the St. Johns River between Mayport, Florida, and Fort George Island, Florida.

The effects of high density boat and ship traffic on the environment and listed species include, but are not limited to, reduced water quality, increased turbidity and sediment suspension, increased risk of collisions, and elevated underwater and airborne noise levels (Bassett et al. 2012). Studies have suggested that vessel traffic may negatively impact foraging effort in other marine mammals (Lusseau et al. 2009); the same effects could occur in other listed marine species such as West Indian manatees and fish (Bracciali et al. 2012). However, it is not possible to quantify the number of individuals of any species that could be affected or the scope or timing of such effects.

Climate Change

Climate change will likely cause alterations to hydrologic conditions within the action area. The southeastern U.S. has experienced a two degree increase in average temperatures since the 1970s (U.S. House of Representatives 2013). Changes to local hydrology could affect all marine species as fresh- and saltwater mixing regimes change as a result of climate impacts to hydrology.

Summary

Based on the geographic and temporal distribution of the projects and activities described above, cumulative effects to fish and marine mammals are expected to be minimal. Other projects and activities, such as commercial and recreational fishing and boating, and shellfish harvest, may be considered a part of the environmental baseline because they are ongoing actions.

Overall, ESA-listed marine mammals, fish, and sea turtles exposed to underwater noise or reduced water quality would most likely experience temporary, noninjurious effects. Effects would be magnified only if the non-federal activities were to occur simultaneously with Project activities.

6.5 Standard Operating Procedures

The Navy will employ the measures listed in this section to avoid and minimize impacts to marine mammals, fish, and sea turtles; their habitats; and forage species. BMPs are intended to avoid and minimize potential environmental impacts. BMPs and standard operating procedures (SOPs) are included in the construction contract plans and specifications and must be agreed upon by the contractor prior to any construction activities. Upon signing the contract, it becomes a legal agreement between the contractor and the Navy. Failure to follow the prescribed BMPs and SOPs is a contract violation.

6.5.1 General Construction Best Management Practices

- All work will adhere to performance requirements of the Clean Water Act, Section 404 permit and Section 401 Water Quality Certification. No in-water work will begin until after issuance of regulatory authorizations.
- The construction contractor is responsible for preparation of an Environmental Protection Plan. The plan will be submitted and implemented prior to the commencement of any construction activities and is a binding component of the overall contract. The plan shall identify construction elements and recognize spill sources at the site. The plan shall outline BMPs, responsive actions in the event of a spill or release, and notification and reporting procedures. The plan shall also outline contractor management elements such as personnel responsibilities, project site security, site inspections, and training.
- No petroleum products, lime, chemicals, or other toxic or harmful materials shall be allowed to enter surface waters.
- Washwater resulting from washdown of equipment or work areas shall be contained for proper disposal.
- Equipment that enters surface waters shall be maintained to prevent any visible sheen from petroleum products.
- No oil, fuels, or chemicals shall be discharged to surface waters, or onto land where there is a potential for re-entry into surface waters will occur. Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. shall be checked regularly for leaks and will be maintained and stored properly to prevent spills.
- No cleaning solvents or chemicals used for tools or equipment cleaning shall be discharged to ground or surface waters.
- Construction materials will not be stored where high tides, wave action, or upland runoff could cause materials to enter surface waters.
- Barge operations will be restricted to tidal elevations adequate to prevent grounding of a barge.

6.5.2 Pile Removal and Installation Best Management Practices

- A containment boom surrounding the work area shall be used during creosote-treated pile removal to contain and collect any floating debris and sheen. In some cases, the boom may be lined with oil-absorbing material to absorbed released creosote.
- Oil-absorbent materials shall be used in the event of a spill if any oil product is observed in the water.
- All creosote-treated material and associated sediments shall be disposed of in a landfill that meets Florida environmental standards.
- Removed piles and associated sediments (if any) shall be contained on a barge. If a barge is not utilized, piles and sediments may be stored in a containment area near the construction site.
- Piles that break or are already broken below the waterline may be removed by wrapping the piles with a cable or chain and pulling them directly from the sediment with a crane. If this is not possible, they shall be removed with a clamshell bucket. To minimize disturbance to bottom sediments and splintering of piles, the contractor shall use the minimum size bucket required to pull out piles based on pile depth and substrate. The clam shell bucket shall be emptied of piles and debris on a contained barge before it is lowered into the water. If the bucket contains only sediment, the bucket shall remain closed and be lowered to the mud line and opened to redeposit the sediment. In some cases (depending on access, location, etc.), piles may be cut below the mud line and the resulting hole backfilled with clean sediment.
- Any floating debris generated during installation shall be retrieved. Any debris in a containment boom shall be removed by the end of the work day or when the boom is removed, whichever occurs first. Retrieved debris shall be disposed of at an upland disposal site.
- Whenever activities that generate sawdust, drill tailings, or wood chips from treated timbers are conducted, tarps or other containment material shall be used to prevent debris from entering the water.
- If excavation around piles to be replaced is necessary, hand tools or a siphon dredge shall be used to excavate around piles to be replaced.

6.5.3 Timing Restrictions

All in-water construction activities will occur during daylight hours (sunrise to sunset[3]). Non in-water construction activities could occur between 6:00 a.m. and 10:00 p.m. during any time of the year.

6.5.4 Additional Procedures for Marine Species

[3] Sunrise and sunset are to be determined based on the National Oceanic and Atmospheric Administration data which can be found at: http://www.srrb.noaa.gov/highlights/sunrise/sunrise.html.

Potential effects to listed species from Project activities are discussed above in Sections 6.1.1 through 6.1.3. The following measures will be implemented during pile driving to avoid and minimize exposure to noise levels that could cause injury or behavioral disturbance for all ESA-listed and candidate species.

Coordination

The Navy shall conduct a pre-construction briefing with the contractor. During the briefing, all personnel working in the Project area will watch the Navy's Marine Species Awareness Training video.

Acoustic Minimization Measures

Vibratory installation will be used to the maximum extent practicable to drive steel piles to minimize higher sound pressure levels associated with impact pile driving.

Soft Start

The objective of a soft-start is to provide a warning and/or give animals in close proximity to pile driving a chance to leave the area prior to an impact driver operating at full capacity; thereby exposing fewer animals to loud underwater and airborne sounds. Should the brief use of impact pile driving be necessary, a soft start procedure will be used.

The contractor will provide an initial set of strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, then two subsequent sets. (The reduced energy of an individual hammer cannot be quantified because they vary by individual drivers. Also, the number of strikes will vary at reduced energy because raising the hammer at less than full power and then releasing it results in the hammer "bouncing" as it strikes the pile resulting in multiple "strikes").

Standard Conditions

Conditions in this section include those that will be followed for the protection of all listed species, not only those being addressed in this evaluation. The contractor will adhere to all requirements of the following:

- 2009 Standard Manatee Conditions for In-Water Work (Appendix C)
- Sea Turtle and Smalltooth Sawfish Construction Conditions (Appendix D)
- Southeast Regional Marine Mammal and Sea Turtle Viewing Guidelines (Appendix E)

Sea Turtle Lighting Conditions

- Lighting on construction equipment shall be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the nearby marine turtle nesting beach while still being consistent with human safety requirements.

- All permanent exterior lighting fixtures associated with the wharf redevelopment should be assessed by NAVSTA Mayport Environmental Department and designed according to the NAVSTA Mayport Light Management Plan to minimize light contribution to urban sky glow which could be visible from the marine turtle nesting beach.

Visual Monitoring and Shutdown Procedures

A separate Marine Species Monitoring Plan will be submitted to NMFS and USFWS; it includes all details for Project monitoring efforts. Major components of the monitoring plan are summarized below.

Observers and Procedures

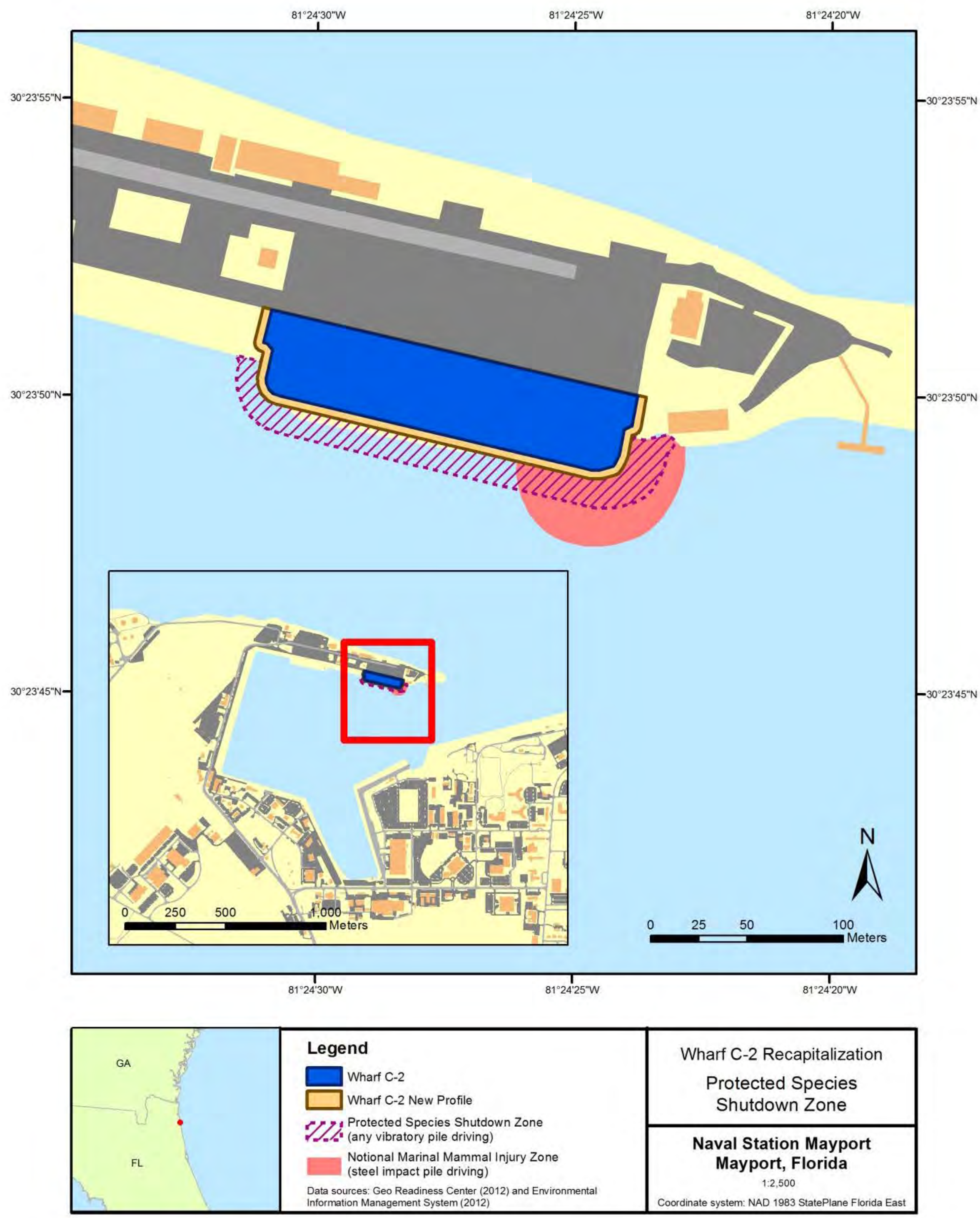
The Navy shall conduct a pre-construction briefing with the contractor. During the briefing, all contractor personnel working in the Project area will watch the Navy's Marine Species Awareness Training video. An informal guide will be included with the Monitoring Plan to aid in identifying species should they be observed in the vicinity of the Project.

Marine species observers ("observers") designated by the contractor will be placed at the best vantage point(s) practicable to monitor for protected species and implement shutdown/delay procedures when applicable by calling for the shutdown to equipment operators. The observers shall have no other construction related tasks while conducting monitoring.

Methods

The observer(s) will monitor the shutdown zone (Figure 6-7) before, during, and after pile driving and removal. The shutdown zone for vibratory driving is 50 ft. (15 m) off Wharf C-2 in all directions. The shutdown zone for contingency only impact pile driving was calculated based on acoustic modeling at a notional pile location on the wharf; the zone to be monitored is 130 ft. (40 m) in each direction from the pile being driven.

FIGURE 6-7. SHUTDOWN ZONES FOR VIBRATORY AND (CONTINGENCY ONLY) IMPACT PILE DRIVING



The observer(s) will be placed at the best vantage point practicable (e.g. from a small boat, construction barges, on shore, or any other suitable location) to monitor for marine species and implement shutdown/delay procedures when applicable by calling for the shutdown to the equipment operator(s). Elevated positions are preferable; it shall be the contractor's responsibility to ensure that appropriate safety measures are implemented to protect observers on elevated observation points. If a boat is used for monitoring, the boat will maintain minimum distances from all species (should they occur) as described in the Southeast Region Marine Mammal and Sea Turtle Viewing Guidelines (Appendix E).

During all observation periods, observers would use binoculars and the naked eye to search continuously for ESA-listed and ESA-candidate species (with the exception of fish, which are not likely to be visible from the surface). If the shutdown zone is obscured by fog or poor lighting conditions, pile driving will not be initiated until the entire shutdown zone is visible.

Pre-Activity Monitoring

The shutdown zone will be monitored for 15 minutes prior to in-water construction/demolition activities. If a protected species is observed in or approaching the shutdown zone, the activity shall be delayed until the animal(s) leave the shutdown zone. Activity would resume only after the observer has determined, through re-sighting or by waiting approximately 15 minutes that the animal(s) has moved outside the shutdown zone. The observer(s) will notify the monitoring coordinator/construction foreman / point of contact (POC) when construction activities can commence.

Activity Monitoring

The shutdown zone will always be a minimum of 15 m (50 ft.) to prevent injury from physical interaction of protected species with construction equipment (Figure 6-7)). For contingency impact pile driving, the larger 40 m (130 ft.) shutdown zone (indicated by red polygon in Figure 6-7 for a notional pile location) shall be implemented; the standard shutdown zone will continue to be applied for all other protected species.

If a protected species approaches or enters a shutdown zone during any in-water work, activity will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without re-detection of the animal. Note: protected fish species will not likely be visible to observers at the surface.

Bulkhead sheet pile installation shall be completed only after confirmation that no manatees or marine turtles will be trapped in the area to be filled between the existing and new bulkheads.

Post-Activity Monitoring

Monitoring of the shutdown zone will continue for 15 minutes following the completion of the activity.

Data Collection

The following information will be collected on sighting forms used by observers:

- Date and time that pile driving or removal begins or ends
- Construction activities occurring during each observation period
- Weather parameters identified in the acoustic monitoring (e.g., wind, temperature, percent cloud cover, and visibility)
- Tide and sea state

If a protected species approaches or enters the shutdown zone, the following information will be recorded once shutdown procedures have been implemented:

- Species, numbers, and if possible sex and age class of the species
- Behavior patterns observed, including bearing and direction of travel
- Location of the observer and distance from the animal(s) to the observer

If possible, photographs of the animal(s) will be taken and forwarded to the Naval Facilities Engineering Command Southeast Environmental point of contact.

Data collection forms shall be furnished to the Environmental point of contact within a mutually agreeable timeframe.

Interagency Notification

If the Navy encounters an injured, sick, or dead marine mammal, NMFS will be notified immediately. Such sightings will be called into the NMFS Stranding Coordinator for the Southeast:

Erin Fougeres, Ph.D.
Marine Mammal Stranding Program Administrator
NOAA Fisheries
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
e-mail: erin.fougeres@noaa.gov
office: 727-824-5323
fax: 727-824-5309

The Navy will provide NMFS with the species or description of the animal(s), the condition of the animal (including carcass condition if the animal is dead), location, the date and time of first discovery, observed behaviors (if alive), and photo or video (if available).

In preservation of biological materials from a dead animal, the finder (i.e. marine mammal observer) has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. Observers should not handle dead animals.

Reporting

A draft report of any incidents of marine mammals entering the shutdown zone will be forwarded to NMFS / USFWS no later than 17 January 2015. A final report would be prepared and submitted to NMFS within 30 days following receipt of comments on the draft report from NMFS.

7. Effect Determinations

A summary of the Navy's determinations for effects to ESA-listed and candidate species and their critical habitat is listed in Table 7-1.

TABLE 7-1. EFFECTS DETERMINATIONS FOR ALL ESA-LISTED AND CANDIDATE SPECIES

Species	Subspecies / DPS	Navy Determination	
		Species	Critical Habitat
North Atlantic right whale	n/a	may affect, not likely to adversely affect	no effect
humpback whale	n/a	may affect, not likely to adversely affect	n/a
Atlantic sturgeon	Carolina / South Atlantic DPS	may affect, not likely to adversely affect	n/a
shortnose sturgeon	n/a	may affect, not likely to adversely affect	n/a
smalltooth sawfish	U.S.	may affect, not likely to adversely affect	no effect
American eel	n/a	may affect, not likely to adversely affect	n/a
dwarf seahorse	n/a	no effect	n/a
blueback herring	n/a	may affect, not likely to adversely affect	n/a
green turtle	Florida nesting population	may affect, not likely to adversely affect	no effect
hawksbill turtle	n/a	no effect	no effect
Kemp's ridley turtle	n/a	may affect, not likely to adversely affect	n/a
loggerhead turtle	Northwest Atlantic Ocean DPS	may affect, not likely to adversely affect	n/a
leatherback turtle	n/a	may affect, not likely to adversely affect	no effect

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Appendix A

Sample Photos of Wharf C-2 Deterioration

FIGURE A-1. VIEW OF A MINOR AREA OF CONCRETE DETERIORATION IN THE CONCRETE CAP ALONG THE CONSTRUCTION JOINT NEAR STATION 5+50, LOOKING NORTH

FIGURE A-2. VIEW OF THE TYPICAL SECTION LOSS ALONG THE EDGES OF THE PRECAST CONCRETE PANELS OF THE WHARF CAP NEAR STATION 0+90, LOOKING NORTHEAST

FIGURE A-3. VIEW OF THE SPALL ALONG THE CONCRETE CURB AT STATION 4+40 THAT WAS 3 FT LONG BY 12 IN. WIDE BY 8 IN. HIGH WITH EXPOSED AND CORRODED REINFORCING STEEL, LOOKING SOUTH

FIGURE A-4. VIEW OF SOUTHEASTERN CORNER OF DECK – NOTE DISLOCATION OF THE BULL RAIL

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Appendix B

Contractor's Project Schematic

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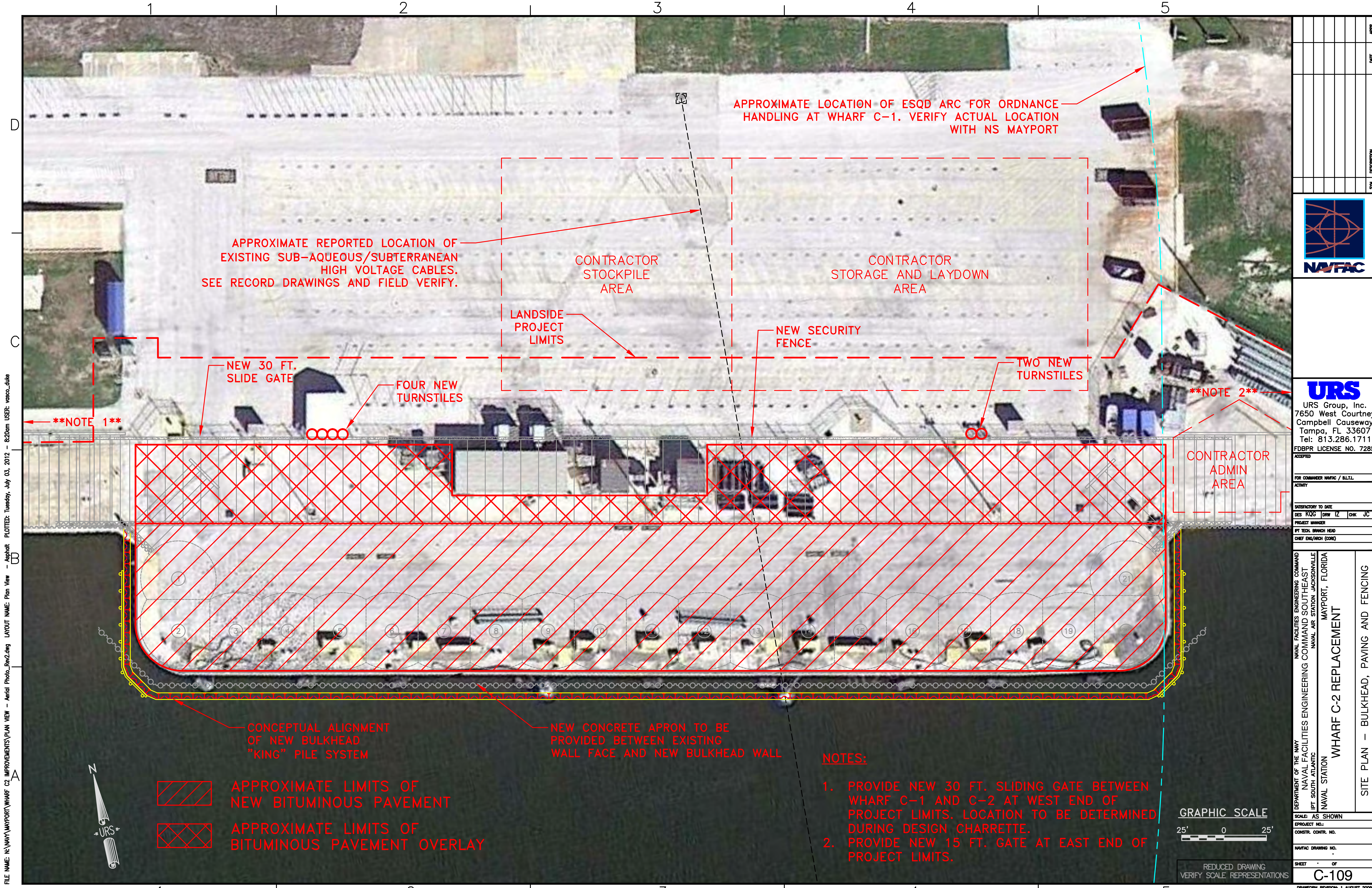
APPROXIMATE LOCATION OF ESQD ARC FOR ORDNANCE HANDLING AT WHARF C-1. VERIFY ACTUAL LOCATION WITH NS MAYPORT
APPROXIMATE REPORTED LOCATION OF EXISTING SUB-AQUEOUS/SUBTERRANEAN HIGH VOLTAGE CABLES. SEE RECORD DRAWINGS AND FIELD VERIFY.
CONTRACTOR STOCKPILE AREA
CONTRACTOR STORAGE AND LAYDOWN AREA
LANDSIDE PROJECT LIMITS
NEW SECURITY FENCE
NEW 30 FT. SLIDE GATE
FOUR NEW TURNSTILES
TWO NEW TURNSTILES
NOTE 1
NOTE 2
CONTRACTOR ADMIN AREA
CONCEPTUAL ALIGNMENT OF NEW BULKHEAD "KING" PILE SYSTEM
NEW CONCRETE APRON TO BE PROVIDED BETWEEN EXISTING WALL FACE AND NEW BULKHEAD WALL
APPROXIMATE LIMITS OF NEW BITUMINOUS PAVEMENT
APPROXIMATE LIMITS OF BITUMINOUS PAVEMENT OVERLAY
NOTES:
1. PROVIDE NEW 30 FT. SLIDING GATE BETWEEN WHARF C-1 AND C-2 AT WEST END OF PROJECT LIMITS. LOCATION TO BE DETERMINED DURING DESIGN CHARRETTE.
2. PROVIDE NEW 15 FT. GATE AT EAST END OF PROJECT LIMITS.
GRAPHIC SCALE
25' 0 25'
REDUCED DRAWING VERIFY SCALE REPRESENTATIONS
N
URS
URS Group, Inc.
7650 West Courtney Campbell Causeway
Tampa, FL 33607
Tel: 813.286.1711
FDBPR LICENSE NO. 7285
ACCEPTED
FOR COMMANDER NAVFAC / B.L.T.L.
ACTIVITY
SATISFACTORY TO DATE
DES KQG DRW IZ CHK JC
PROJECT MANAGER
IPT TECH. BRANCH HEAD
CHIEF ENG/ARCH (CORE)
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
IPT SOUTH ATLANTIC NAVAL AIR STATION JACKSONVILLE
NAVAL STATION MAYPORT, FLORIDA
WHARF C-2 REPLACEMENT
SITE PLAN - BULKHEAD, PAVING AND FENCING
SCALE: AS SHOWN
EPROJECT NO.:
CONSTR. CONTR. NO.
NAVFAC DRAWING NO.
SHEET OF
C-109
DRAWFORM REVISION: 1 AUGUST 2009
FILE NAME: N:\NAVY\MAYPORT\WHARF C2 IMPROVEMENTS\PLAN VIEW - Aerial Photo_Rev2.dwg LAYOUT NAME: Plan View - Asphalt PLOTTED: Tuesday, July 03, 2012 - 8:20am USER: vasco_duke

Appendix C

Standard Manatee Conditions for In-Water Work

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

2009

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the FWC Hotline at 1-888-404-FWCC. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or Vero Beach (1-772-562-3909) for south Florida.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Awareness signs that have already been approved for this use by the Florida Fish and Wildlife Conservation Commission (FWC) must be used (see MyFWC.com). One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 81/2" by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

CAUTION: MANATEE HABITAT

All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

Report any collision with or injury to a manatee:

Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC

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Appendix D

Sea Turtle and Smalltooth Sawfish Construction Conditions

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
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Appendix E

Marine Mammal and Sea Turtle Viewing Guidelines

Adapted from Southeast Region Marine Mammal & Sea Turtle Viewing Guidelines available at http://www.nmfs.noaa.gov/pr/education/southeast/guidelines.htm

Viewing "Code of Conduct"

These guidelines are intended to inform the public about protection of marine mammals and sea turtles. They are not a replacement for Federal legal requirements.

1. Remain a respectful distance from marine mammals and sea turtles. The minimum recommended distances are:
   - dolphins, porpoises, seals = 50 yards
   - sea turtles = 50 yards
   - whales = 100 yards*
     Federal law prohibits all approaches to North Atlantic right whales within 500 yards.
2. Marine mammals and sea turtles should not be encircled or trapped between watercraft, or watercraft and shore.
3. If approached by a marine mammal or sea turtle, put your watercraft's engine in neutral and allow the animal to pass. Any vessel movement should be from the rear of the animal.*
   Pursuit of marine mammals and sea turtles is prohibited by Federal law.
4. Never feed or attempt to feed marine mammals or sea turtles.*
   Federal law prohibits feeding or attempting to feed marine mammals.

Detailed Guidelines

Limit your viewing time.

- Prolonged exposure to one or more vessels increases the likelihood that marine mammals will be disturbed.
- Since individual animals' reactions will vary, carefully observe all animals and leave the vicinity if you see signs of disturbance.
- Your vessel may not be the only vessel in the day that approaches the same animal(s); please be aware of cumulative impacts.

Travel in a predictable manner.

- Marine mammals appear to be less disturbed by vessels that are traveling in a predictable manner.
- The departure from a viewing area has as much potential to disturb animals as the approach.

- If a marine mammal or sea turtle approaches, put your engine in neutral and allow the animal to pass.
- Never pursue of follow marine wildlife.
- Never attempt to herd, chase, or separate groups of marine mammals or females from their young.
- Avoid excessive speed or sudden changes in speed or direction in the vicinity of animals.

If you need to move around marine wildlife, do so from behind (i.e., never approach head-on).

- Vessels that wish to position themselves so that the animals would pass them, should do so in a manner that stays fully clear of the animal's path.

Be aware that marine mammals may surface in unpredictable locations.

- Breaching and flipper slapping whales may endanger people and/or vessels.

Marine mammals are more likely to be disturbed when more than one boat is near them.

- Avoid approaching the animals when another vessel is near.
- Always leave marine mammals an "escape route."
- When several vessels are in an area, communication between operators will help ensure that you do not cause disturbance.

Marine mammals have sensitive hearing and many species communicate by vocalizing underwater.

- Underwater sound produced by a vessel's engines and propellers can disturb these animals.

Cautiously move away from the animals if you observe any of the following behaviors:

- Rapid changes in direction or swimming speed.
- Erratic swimming patterns.
- Escape tactics such as prolonged diving, underwater exhalation, underwater course changes, or rapid swimming at the surface.
- Tail slapping or lateral tail swishing at the surface.
- Female attempting to shield a calf with her body or by her movements.

Even if approached by a marine mammal or sea turtle:

- Do not touch or swim with the animals.

Never feed or attempt to feed marine mammals or sea turtles.

- It can alter their natural behavior, make them dependent on handouts, and can be harmful to their health.

- Marine mammals, like all wild animals, may bite and inflict injuries to people who try to feed them.

Note: NMFS regulations at 50 CFR § 216.3 strictly prohibit feeding or attempting to feed a marine mammal in the wild.

Close approaches by humans to marine mammals may cause them to lose their natural wariness and become aggressive towards people. They are also vulnerable to injury or death from entanglement in fishing gear or boat strikes. NMFS strongly encourages people to follow the guidelines presented here while spending time on or near the water.

Appendix F
Fundamentals of Acoustics and Analysis Addendum

Fundamentals of Acoustics

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) (ANSI S1.1-1994). 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 physical attributes, 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, 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 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 1 μPa". 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 1 (adapted from URS Consultants Inc. 2007) summarizes common acoustic terminology. Two of the most common descriptors are the instantaneous peak SPL and the root-mean-square [rms] SPL. The peak SPL is the instantaneous maximum or minimum over- or underpressure observed during each sound event and is presented in dB re 1 μPa peak. The rms level is the square root of the energy divided by a defined time period, given as dB re 1 μPa rms.

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 (ANSI S1.1-1994). 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).

TABLE 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 an extremely 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).
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.

Vocalization and Hearing in Marine Mammals

All marine mammals that have been studied can produce sounds and use sounds to forage, orient, detect and respond to predators, and facilitate social interactions (Richardson et al., 1995). Measurements of marine mammal sound production and hearing capabilities provide some basis for assessing whether exposure to a particular sound source may affect a marine mammal behaviorally or physiologically. Marine mammal hearing abilities are quantified using live animals either via behavioral audiometry or electrophysiology (see Schusterman 1981; Au 1993; Wartzok and Ketten 1999; Nachtigall et al. 2007). Behavioral audiograms, which are plots of animals' exhibited hearing threshold versus frequency, are obtained from captive, trained live animals using standard testing procedures with appropriate controls, and are considered to be a more accurate representation of a subject's hearing abilities. Behavioral audiograms of marine mammals are difficult to obtain because many species are too large, too rare, and too difficult to acquire and maintain for experiments in captivity. Consequently, our understanding of a species' hearing ability may be based on the behavioral audiogram of a single individual or small group of animals. In addition, captive animals may be exposed to local ambient sounds and other environmental factors that may impact their hearing abilities and may not accurately reflect the hearing abilities of free-swimming animals. For animals not available in controlled settings (including large whales and rare species), estimates of hearing capabilities are made based on anatomical and physiological structures, the frequency range of the species' vocalizations, and extrapolations from related species.

Table 2 provides a summary of sound production and hearing capabilities for ESA-listed marine mammal species that may occur in the action area. For purposes of this analysis, marine mammals are arranged into functional hearing groups based on their generalized hearing sensitivities.

TABLE 2. HEARING AND VOCALIZATION RANGES FOR MARINE MAMMAL FUNCTIONAL HEARING GROUPS POTENTIALLY OCCURRING IN THE ACTION AREA

Functional Hearing Group	Species	Sound Production		General Hearing Ability Frequency Range
		Frequency Range	Source Level (dB re 1 µPa @ 1 m)	
Low-Frequency Cetaceans	North Atlantic right whale; humpback whale	10 Hz to 20 kHz	137 to 192	7 Hz to 22 kHz
Sirenians	West Indian manatee	500 Hz to 16 kHz	91 to 150	75 Hz to 75 kHz

Adapted and derived from Southall et al. (2007) and Richardson et al. (1995)

Vocalization and Hearing in Birds

Although hearing range and sensitivity has been measured for many terrestrial bird species, little is known of seabird hearing. A review of in-air hearing in 32 avian species reveals that both seabirds and terrestrial birds generally have greatest hearing sensitivity between 1 and 4 kHz (Beuter et al. 1986; Thiessen 1958; Wever et al. 1969; Beason 2004; Dooling 2002). Very few are sensitive to sounds below 20 Hz, most have an upper frequency hearing limit of 10 kHz, and none exhibit hearing at frequencies higher than 15 kHz (Dooling 2002; Dooling et al. 2000).

Vocal production in birds varies widely across species, with some passerines producing elaborately structured songs and other species restricted to relatively simple sounds (Kroodsma, D.E. and E.H. Miller 1996). The three ESA-listed species found in and around the action area do not sing, but do produce other types of vocalizations, which contain energy from around 800 Hz to 9 kHz, with peak frequencies between 1.5 and 3.0 kHz (Cornell Laboratory of Ornithology 2013).

Vocalization and Hearing in Sea Turtles

The auditory system of the sea turtle appears to work via water and bone conduction, with lower frequency sound conducted through to skull and shell, and does not appear to function well for hearing in air (Lenhardt 1982; Lenhardt et al. 1983). Investigations suggest that these species' auditory sensitivity is limited to low-frequency bandwidths, but the behavioral use of underwater low-frequency hearing in sea turtles is unclear. Sea turtles may use acoustic signals from their environment as guideposts during migration and as cues to identify their natal beaches (Lenhardt et al. 1983). Sea turtles are low-frequency hearing specialists, typically hearing frequencies from 30 to 2,000 Hertz (Hz), with a range of maximum sensitivity between 100 and 800 Hz (Bartol and Ketten 2006; Bartol et al. 1999; Lenhardt 2002; Lenhardt 1994; Ridgway et al. 1969). Hearing below 80 Hz is less sensitive but still potentially usable (Lenhardt 1994). Greatest sensitivities vary with species and possibly age; data for green turtles indicate that best hearing sensitivity ranges from 300 to 400 Hz for the green turtle (Ridgway et al. 1969) and around 250 Hz or below for juvenile loggerheads (Bartol et al. 1999). Bartol et al. (1999) reported that the range of effective hearing for juvenile loggerhead turtles is from at least 250 to 750 Hz using the auditory brainstem response technique. Juvenile and sub-adult green turtles detect sounds from 100 to 500 Hz, with maximum sensitivity at 200 and 400 Hz (Bartol and Ketten 2006). Auditory brainstem response recordings on green turtles showed peak response at 300 Hz (Yudhana et al. 2010). Juvenile Kemp‘s Ridley turtles were found to detect underwater sounds from 100 to 500 Hz, with a maximum sensitivity between 100 and 200 Hz (Bartol and Ketten 2006). There is a lack of audiometric information for leatherback turtles; however, their anatomy suggests they would hear similarly to other sea turtles.

Very little is known about sound production in sea turtles. However, nesting leatherback turtles were recorded producing sounds (sighs or belch-like sounds) up to 1,200 Hz with most energy ranging from 300 to 500 Hz (Mrosovsky 1972).

Vocalization and Hearing in Fish

Many researchers have investigated hearing and vocalizations in fish species. Although hearing capability data only exist for fewer than 100 of the 32,000 fish species, current data suggest that most species of fish detect sounds from 50 to 1,000 Hz, with few fish hearing sounds above 4 kHz (Popper 2008). It is believed that most fish have their best hearing sensitivity from 100 – 400 Hz (Popper 2003).

The inner ears of fish are directly sensitive to acoustic particle motion rather than acoustic pressure. Although a propagating sound wave contains both pressure and particle motion components, particle motion is most significant at low frequencies (less than a few hundred Hertz) and closer to the sound source. However, a fish's gas-filled swim bladder can enhance sound detection by converting acoustic pressure into localized particle motion, which may then be detected by the inner ear. Atlantic and shortnose sturgeon have swim bladders; smalltooth sawfish do not. Fish with swim bladders generally have better sensitivity and better high-frequency hearing than fish without swim bladders (Popper and Fay 2010). In reality many fish species possess a continuum of anatomical specializations that may enhance their sensitivity to pressure (versus particle motion), and thus higher frequencies and lower intensities (Popper and Fay 2010).

Bony fish can produce sounds in a number of ways and use them for a number of behavioral functions (Ladich 2008). Over 30 families of fish are known to use vocalizations in aggressive interactions, whereas over 20 families known to use vocalizations in mating (Ladich 2008). Sound generated by fish as a means of communication is generally below 500 Hz (Slabbekoorn et al. 2010). The air in the swim bladder is vibrated by the sound producing structures (often muscles that are integral to the swim bladder wall) and radiates sound into the water (Zelick et al. 1999).

Auditory Masking

Auditory masking occurs when the perception of a given signal is negatively influenced by the presence of another sound (Popper and Hawkins 2011). Behavioral, physiological, and anatomical changes may occur as a result of noise exposure. For example, many animals communicate via some sort of vocalization; if an ambient noise source is introduced into their environment, the animals' ability to detect communications from other members of their species may be reduced.

Factors influencing masking include 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). The behavioral function of a vocalization (e.g. contact call, group cohesion vocalization, echolocation click, etc.) and the acoustic environment at the time of signaling may both influence call source level (Hotchkin and Parks 2013; Miksis-Olds and Tyack 2009; Holt et al. 2011), which directly affects the chances that a signal will be masked (Nemeth and Brumm 2010).

Description of Noise Sources

Ambient noise in the action area is a composite of sounds from natural sources, normal port activities, and temporary projects such as maintenance dredging or pile driving. Ambient noise in the Mayport turning basin is addressed below.

In-water construction activities associated with this project include vibratory and impact pile driving. The sounds produced by these activities fall into two sound types: impulsive (impact driving) and non-impulsive (vibratory driving). Distinguishing between these two general sound types is important because of each sound type may cause different types of physical effects, particularly with regard to hearing (Ward 1997).

Impulsive sounds (e.g., explosions, seismic airgun pulses, and impact pile driving) are referred to as pulsed sounds in Southall et al. (2007), and 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 (“non-pulsed” in Southall et al. 2007) 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. Examples 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.

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. Sound levels from these sources are typically low, but can be pronounced during violent weather events. Sounds from natural sources are generally not considered undesirable. Ambient airborne 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 industrialized areas such as the NAVSTA Mayport waterfront, noise sources may include common construction equipment, such as trucks, cranes, compressors, generators, pumps, and other equipment that might typically be employed along industrial waterfronts (Washington State Department of Transportation 2010). Typical source levels for common industrial noise sources are given in Table 3. Maximum noise levels reach 99 dBA when multiple sources of noise are operating simultaneously, assuming an increase of 6 dB per doubling of sound pressure (Washington State Department of Transportation 2010). These maximum noise levels are intermittent in nature, may occur sporadically on any given day with construction or other waterfront activity.

TABLE 3. MAXIMUM NOISE LEVELS FOR COMMON CONSTRUCTION EQUIPMENT

Equipment Type	Maximum Noise Level (at 50 ft.)
impact pile driver	109
vibratory pile driver	96
scraper	90
backhoe	90
crane	81
pumps	81
generator	81
front loader	79
air compressor	78
Note: Maximum Sound Pressure Levels in dBA	

Sources: Washington State Department of Transportation 2008; Illingworth & Rodkin 2012

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 NAVSTA Mayport and the measured sound levels in a similar area, the Navy estimates that ambient airborne noise levels at the NAVSTA Mayport turning basin currently average between 60 and 65 dBA.

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 both 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 near shore 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). At NAVSTA Mayport, vessel wakes in the St. Johns River 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 port 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 NAVSTA Mayport turning basin is likely to be dominated by noise from day-to-day port and vessel activities. The basin is sheltered from most wave noise, but is a high-use area for naval ships, tugboats, and security vessels. 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 (rms) (Table 4). During the proposed action, normal port operations, including transits, docking and maintenance of multiple tugboats and ships would continue, and noise contributions from these sources would remain at current levels.

Dredging may be necessary as part of the proposed action. If so, a clamshell dredge would be used to remove up to 4,000 cubic yards of sediment from the increased footprint area of Wharf C-2. Dredging is likely to temporarily increase noise levels in the turning basin during operations; previously recorded sound levels from clamshell dredges ranged from 136 to 165 dB re 1 µPa at ranges of 12 to 25 meters. Dredging would only be used as a contingency, and any increases in noise level will be short-term and temporary.

TABLE 4. REPRESENTATIVE LEVELS OF UNDERWATER NOISE FROM ANTHROPOGENIC SOURCES

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	Blackwell and Greene 2002
vibratory driving of 24-inch steel pipe pile	50–1,500	159 dB rms at 10 m	Illingworth & Rodkin 2012
impact driving of 24-inch steel pipe pile	50–1,500	186 dB rms at 10 m	Washington State Department of Transportation 2010a

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

Underwater Noise from Pile Driving

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. A number of studies have examined sound pressure levels recorded from underwater pile driving projects in California and Washington, creating a large body of data for impact driving of steel pipe piles, concrete piles, and some timber piles. Data for vibratory pile driving is similarly concentrated on steel pipe piles of a range of diameters and on single 24-inch wide sheet piles at a project in California (California Department of Transportation 2009). There have been no measurements of sound pressure levels produced by the types of piles (paired steel sheet piles and king piles) that will be installed in the Mayport turning basin, and it was therefore necessary to extrapolate from available data to determine reasonable source levels for this project.

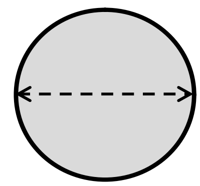
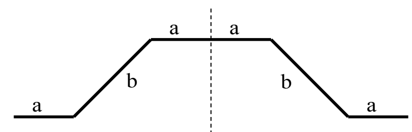
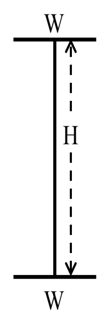
Because of the differences between the proposed action (driving of steel king piles, paired 27-inch wide steel sheet piles, and 12-inch diameter polymeric piles) and available measured sound pressure levels, the Navy evaluated potential source levels for modeling of steel piles based on two methods. The first method examined measured sound pressure levels for single 24-inch wide sheet piles; the second was a comparison of the linear length of piles with the circumference of steel pipe piles for which source levels have been measured. The second method was discussed with National Marine Fisheries Service Southeast Region in September 2012. Linear length was calculated as the sum of the lengths of all sides of each pile type (Table 5). Both the king and sheet pile linear lengths were comparable to the circumference of a 24-inch diameter pipe pile.

Source levels for polymeric piles were estimated based on a comparison of the material properties of timber, concrete, and steel piles. Data from timber piles were selected to model driving of HDPE polymer piles.

Measured sound pressure levels for 24 in. diameter steel sheet piles, 24 in. diameter steel pipe piles, and timber piles are available for both vibratory and impact driving methods. 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: steel pipe piles (24 in. diameter) steel sheet piles (24 in. wide), and/or timber piles
- Installation method: vibratory and/or impact hammer
- Physical environment - water depth 15 ft. (4.5 m) or greater, sediment similar to sandy bottom in Mayport turning basin.

TABLE 5. COMPARISON OF PILE SIZES AND SHAPES FOR DETERMINATION OF ESTIMATED SOURCE SOUND PRESSURE LEVELS

Pile Type	Shape and Dimensions
CIRCULAR STEEL PIPE PILE Diameter = 24 in. Circumference = Diameter*π = 75.4 in.	
AZ19-700 SHEET PILE PAIR Linear length = 4*a+2*b =70.4 in. a = 6.81 in. b= 21.6 in.	
HZ1080 MB KING PILE Linear length = 2*W +H = 77.2 in. W = 17.87 in. H= 41.47 in.	

The tables below detail representative pile driving sound pressure levels measured from 24 in. steel pipe piles and 12 in. timber piles. Comparison of measured sound pressure levels from the 24-inch steel pipe piles and 24-inch steel sheet piles revealed that levels from sheet pile driving were higher than those from pipe pile driving; the Navy has therefore used the more conservative sound pressure levels from 24-inch steel sheet piles to model both king and sheet pile pairs for the proposed action. The selected sound pressure levels used for modeling in this application are detailed in Tables 6 and 7.

TABLE 6. VIBRATORY INSTALLATION UNDERWATER SOUND PRESSURE LEVELS EXPECTED BASED ON SIMILAR IN-SITU MONITORED CONSTRUCTION ACTIVITIES

Project and Location	Pile Size and Type	Water Depth	RMS	Peak	Sediment
Bangor, WA; U.S. Navy Test Pile Program[a]	24 inch steel pipe	4.6 m (measured near seafloor)	Avg: 159 Max: 168	NA	Sand and gravel
Portage Bay, WA[b]	24 inch steel pipe	3 – 7 m	157	170	Unknown
Berth 23 Port of Oakland, CA[c, 1]	**24 inch steel sheet pile**	**6.1 m**	**163**	**177**	**Unknown**
Berth 30 Port of Oakland, CA[c]	24 inch steel sheet pile	4.9 m	162	175	Unknown
Berth 35/37 Port of Oakland, CA[c]	24 inch steel sheet pile	6.1 m	163	177	Unknown
Port Townsend Ferry, WA[c, 2]	**12 inch timber pile**	**10 m**	**153**	**167**	**Unknown**

Sound levels expressed as dB re 1 µPa rms and dB re 1 µPa peak for RMS and Peak SPL measurements, respectively. Average and Max values for Test Pile Program data are based on 10-second rms measurements over the 10 minute driving time for the pile. 1- This data point was selected for use in acoustic modeling based on similarity to physical environment at NAVSTA Mayport and measurement location in mid-water column; 2- Data selected for use in modeling polymeric fender piles based on similarity of material properties between timber and polymeric piles; there are no existing measurements for polymeric piles of any size and shape. Sources: a – Illingworth & Rodkin 2012; b- Washington Department of Transportation 2010; c- California Department of Transportation 2009

TABLE 7. IMPACT INSTALLATION UNDERWATER SOUND PRESSURE LEVELS EXPECTED BASED ON SIMILAR IN-SITU MONITORED CONSTRUCTION ACTIVITIES

Project and Location	Pile Size and Type	Water Depth	RMS	Peak	SEL	Sediment
Friday Harbor Ferry Terminal, WA[a]	24 inch steel pipe	12.8 m	170	183	180	Sandy silt/clay
		13.4 m	186	205	179	
		14.3 m	186	204	179	
		10 m	194	210	185	Sandy silt/rock
		10 m	195	215	187	
		10 m	193	212	184	
Typical values, Caltrans compendium summary table[b]	24 inch steel pipe	15	194	207	178	Unknown
Berth 23 Port of Oakland[b, 1]	**24 inch steel sheet pile**	**12 – 14 m**	**189**	**205**	**179**	**Unknown**
Ballena Bay, WA[b]	12 inch timber pile	2 - 4 m	170[2]	180	160	Unknown

Sound levels expressed as dB re 1 µPa rms and dB re 1 µPa peak for RMS and Peak SPL measurements, respectively; 1- This data point was selected for use in acoustic modeling based on similarity to physical environment at NAVSTA Mayport and measurement location in mid-water column; 2- Data selected for use in modeling polymeric fender piles based on similarity of material properties between timber and polymeric piles; there are no existing measurements for polymeric piles of any size and shape. Sources: [a]Washington State Department of Transportation 2005; [b]California Department of Transportation 2009

Underwater Sound Propagation

Pile driving can generate underwater noise that may result in disturbance to marine mammals within the project area. Modeling sound propagation is useful in evaluating noise levels to determine which marine mammals may be exposed at a given distance from the pile driving activity. The decrease in acoustic intensity as a sound wave propagates outward from a source is known as transmission loss (TL).

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)

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 $TL = 15 \log_{10} (R_1/10)$.

Airborne Sound Propagation

Airborne sound propagation was modeled using a variation of the model presented above, known as spherical spreading. In the spherical spreading model, the spreading loss coefficient B = 20, giving the formula $TL = 20 \log_{10} (R_1/10)$.

Because there are no available airborne sound pressure level measurements from steel sheet and king piles, data from 24 inch diameter steel pipe piles were used to estimate the airborne sound source levels (see Table 5).

TABLE 8. ESTIMATED SOURCE LEVELS FOR AIRBORNE PILE DRIVING NOISE

Driving method	Source Level
Vibratory[1]	96 dBA at 15 m (50 ft)
Impact[2]	100 dBA at 11 m (36 ft)
Note: m=meter; dBA= A-weighted decibel scale ft=feet	

Sources: [1] Illingworth & Rodkin 2012; [2] WSDOT 2010b

The source level selected for impact driving does not represent the maximum measured level for a 24 inch pipe pile (109 dBA; Illingworth & Rodkin 2012), which was obtained during short-term driving of a single pile in rocky sediment during the Navy Test Pile Program in Bangor, Washington in 2011. The selected source level shown in Table 8 was obtained during driving of a 24 inch pipe pile for a bridge replacement in Washington (Washington State Department of Transportation 2010a). Because softer sediments (such as those found in the NAVSTA Mayport turning basin) reduce the amount of force needed to drive a pile to desired depth, in turn reducing noise from pile reverberation (Kinsler et al. 1999), the non-maximal source level estimate selected is a reasonable assumption for airborne noise levels from pile driving at NAVSTA Mayport.

Noise associated with vibratory pile driving is expected to attenuate to 65 dBA within 0.34 miles (550 m) of the source; impact pile driving noise is expected to attenuate to 65 dBA at 0.40 miles (650 m). During both impact and vibratory pile driving, airborne noise levels are expected to exceed 84 dBA (the threshold for hearing protection) within 246 ft (75 m) of the incident pile. These estimates assume a free flowing medium (e.g. over water) without obstructions, which is a reasonable assumption for the majority of the project area. Vegetation and buildings within the land areas of the proposed action may obstruct sound transmission in the project area; however, this model did not include possible attenuation from land-based obstructions (e.g. vegetation and buildings). The ranges given are therefore a conservative estimate of the affected area.

Calculated Zones of Influence

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 Mayport turning basin. A total of 70 days of pile driving were modeled; 50 days of vibratory driving (45 days for steel piles, 5 days for polymeric fender piles), and 20 days of contingency impact driving (steel piles only). No sound mitigation methods (bubble curtains, cofferdams, etc.) are proposed and therefore no attenuation was included in the acoustic model.

For vibratory driving, the acoustic analysis used the assumption that a maximum of three templates (each consisting of five king piles and four sheet pile pairs) would be driven each day, for a maximum total length of approximately 75 ft.

For impact driving, modeling assumed a maximum of 20 strikes of the impact hammer per day, which is expected to take no more than five to ten minutes to complete.

The calculations presented in Tables 9 and 10 assume a field free of obstruction, which is unrealistic because the Mayport turning basin does not represent open water conditions (free field) and sounds will attenuate as they encounter land or other solid obstacles. As a result, the distances calculated may not actually be attained at the project area. The actual distances to the behavioral disturbance thresholds for impact and vibratory pile driving are likely to be shorter than those calculated due to the irregular contour of the waterfront and the maximum fetch (farthest distance sound waves travel without obstruction [i.e. line of sight]) at the project area. These tables also depict the actual areas encompassed by the thresholds during the project.

TABLE 9. CALCULATED DISTANCES AND ZONES OF INFLUENCE FOR MARINE MAMMALS DURING PILE DRIVING

Pile type	Driving method	Threshold (dB re 1µPa rms)	Distance (m)[1]	Area in (km²)
Steel (sheet and king piles)	**Vibratory**	Level A (injury): 180	0.74	0
		Level B (behavioral): 120	7,356	2.9
	Impact (contingency)	Level A (injury): 180	39.8	0.004
		Level B (behavioral): 160	858	0.67
Polymeric Fender Piles	Vibratory	Level A (injury): 180	0.16	0
		Level B (behavioral): 120	1,585	0.88
	Impact (contingency)	Level A (injury): 180	10	0
		Level B (behavioral): 160	46.4	0.007

All sound levels expressed in dB re 1 µPa rms. dB=decibel; rms=root-mean-square; µPa=microPascal; Practical spreading loss (15 log, or 4.5 dB per doubling of distance) used for calculations; [1]Sound pressure levels used for calculations are given in Table 6 and 7

TABLE 10. CALCULATED DISTANCES AND ZONES OF INFLUENCE FOR FISH DURING PILE DRIVING

Pile Type	Driving Method	Threshold	Distance (m)[1]	Area (km²)
Steel (sheet and king piles)	Vibratory	Behavioral (all):150 dB re 1 µPa rms	73.6	0.011
	Impact (contingency)	Injury (all): 206 dB re 1 µPa rms	8.6	0.00058
		Injury (≥ 2g): 187 dB re 1 µPa²sec SEL	21.6	0.0019
		Injury (< 2g): 183 dB re 1 µPa²sec SEL	39.9	0.0045
		Behavioral (all):150 dB re 1 µPa rms	3,981	1.37
Polymeric fender piles	Vibratory	Behavioral (all): 150 dB re 1 µPa rms	15.8	0.001

Note: no injury criteria for fish for vibratory driving; all sound levels expressed in dB re 1 µPa rms. dB=decibel; rms=root-mean-square; µPa=microPascal; Practical spreading loss (15 log, or 4.5 dB per doubling of distance) used for calculations; [1]Sound pressure levels used for calculations are given in Tables 6 and 7 3.4-4

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Appendix H

Biological Evaluation submitted to U.S. Fish and Wildlife Service

BIOLOGICAL EVALUATION FOR THE WHARF C-2 RECAPITALIZATION PROJECT AT NAVAL STATION MAYPORT, FLORIDA NAVY REGION SOUTHEAST

Submitted to:

United States Fish and Wildlife Service

Prepared by:

Naval Facilities Engineering Command Southeast
and
Naval Facilities Engineering Command Atlantic

August 2013

Table of Contents

List of Figures

List of Tables

List of Appendices and Attachments

Acronyms and Abbreviations

BE	Biological Evaluation
BMP	best management practice
ºC	degrees Celsius
C-2	Charlie 2
dB	decibel
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ºF	degrees Fahrenheit
FR	Federal Register
ft.	foot / feet
H	height
HAPC	Habitat Areas of Particular Concern
Hz	Hertz
in.	inch
$in.^2$	square inch
JAXPORT	Jacksonville Port Authority
kHz	kiloHertz
m	meter
m^2	square meter
MLLW	mean lower low water
µPa	microPascal
NAVSTA	Naval Station
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
POC	point of contact
ppm	parts per million
Project	Wharf C-2 Recapitalization project
PSU	practical salinity unit
PTS	permanent threshold shift
r	radius
rms	root mean square
SAFMC	South Atlantic Fishery Management Council
SSP	steel king pile / sheet pile system
St.	Saint (e.g. Saint Johns River, Saint Andrews Bay)
U.S.	United States
USFWS	United States Fish and Wildlife Service
W	width

Executive Summary

The United States Navy is proposing to recapitalize (renovate and modernize) Wharf Charlie Two (C-2) at Naval Station Mayport, Florida. This recapitalization project includes the demolition and replacement of the existing concrete pile cap, wharf deck, and utilities and installation of a new steel king pile/sheet pile bulkhead around the existing wharf. The project will result in a wharf footprint increase of approximately 1,322 square meters and a minor increase in lighting on and around the wharf surface. The purpose of the proposed action is to improve the functionality and structural integrity of the wharf, which has deteriorated since it was built in 1960. The continued deterioration has caused material voids and failure of wharf deck paving, which have resulted in load restrictions on the wharf.

The project is planned to take place for approximately 18 months, beginning at the end of September 2013. The major in-water components of this project include installation of approximately 120 steel sheet pile pairs, 119 king piles and 50 polymeric (plastic) fender piles as a part of the overall recapitalization project. The project may require up to 18 months for completion; in-water activities are limited to a maximum of 70 days. All piles will be driven with a vibratory hammer. Impact driving will be a contingency employed only if vibratory methods are inadequate. Contingency dredging of up to 4,000 cubic yards of sediment may be conducted if needed; a clamshell dredge will be used if dredging is performed. Dredging would take place outside of the 70 day pile driving work window, and is expected to be performed behind the existing wharf bulkhead, virtually eliminating the likelihood of negative effects to ESA-listed marine species, and their habitat.

Pile driving activities may result in temporary reduction in water quality in the immediate vicinity of the project. They will also generate noise that may result in behavioral disturbance of species listed under the Endangered Species Act, including the endangered West Indian manatee and wood stork, the threatened piping plover, and the candidate red knot. No injury or mortality to these species is anticipated, and minimization measures and best management practices that will be implemented for the duration of the in-water component of the project.

Construction will result in an increase to impervious surface of 10,100 square feet (.23 acres) located between the existing bulkhead and the new bulkhead. This would cause a slight decrease in infiltration of precipitation and result in localized impacts to stormwater flow in the basin. These minor impacts would be localized at the development site and minimized through adherence to best management practices and the Stormwater Pollution Prevention and Environmental Resource Permit conditions.

Increases in lighting may impact habitat quality for hatchling sea turtles in the action area. However, given the highly industrialized and brightly lit conditions that already exist in and around the turning basin, a minor increase in lighting is not expected to adversely affect the three species of sea turtles that are known to nest in the region.

Pursuant to the Endangered Species Act, the Navy has concluded that the Wharf Charlie Two recapitalization project:

- **may affect but is not likely to adversely affect** the ESA-listed West Indian manatee, piping plover, wood stork, green turtle, leatherback turtle, and loggerhead turtle;

- **may affect but is not likely to adversely affect** the ESA candidate red knot;

- will have **no effect** on critical habitat for the West Indian manatee, piping plover, green turtle, and leatherback turtle.

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1. Project Overview

1.1 Lead Agency and Federal Nexus

This Biological Evaluation (BE), prepared by the Department of the Navy, Commander, Navy Region Southeast, addresses the proposed action in compliance with Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. Section 7 of the ESA requires that, through consultation with the United States (U.S.) Fish and Wildlife Service (USFWS), federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species or result in the destruction or adverse modification of critical habitat. This BE evaluates the potential effects of the proposed Wharf C-2 Recapitalization project (Project) at Naval Station (NAVSTA) Mayport on species that are federally listed under the ESA and fall under the USFWS' jurisdiction. Specific project design elements are identified in Chapter 4 that will aid in avoidance and minimization of adverse effects of the Project on listed species and / or critical habitat.

1.2 Project Description

The proposed action is the recapitalization, or renovation, of Wharf C-2 at NAVSTA Mayport. This recapitalization project includes the demolition and replacement of the existing concrete pile cap, wharf deck and utilities. The project will include installation of approximately 120 steel sheet pile pairs, 119 king piles and 50 polymeric (plastic) fender piles. Construction of the wharf will occur over an 18 month period projected to begin on or after 30 September 2013. A maximum of 70 days of in-water pile driving work will take place over the course of the Project. Piles will be driven using both vibratory and impact driving methods. Impact driving methods will only be used for areas with obstructions when vibratory methods are inadequate. Contingency dredging of up to 4,000 cubic yards of sediment may be performed using a clamshell rig. Chapter 4 describes the elements of the proposed action in more detail.

There are no interrelated or interdependent projects associated with the Project. Because activities are for the repair of existing facilities only, no increase in level of use or operation is expected. No net change in the amount of vessel traffic in and around the turning basin is expected as a result of the project.

1.3 Project Area and Setting

The Project will take place inside the semi-enclosed turning basin at NAVSTA Mayport. NAVSTA Mayport is located in northeast Florida east of Jacksonville along the St. Johns River and the Atlantic Ocean (Figure 1-1). NAVSTA Mayport maintains and operates facilities which provide support to the operations of deploying home based and transient Navy ships, aviation units, and staff. NAVSTA Mayport also provides logistic support for operating forces, dependent activities, and other commands as assigned. The installation covers approximately 3,409 acres and supports more than 60 commands, detachments, and private organizations; it is homeport to

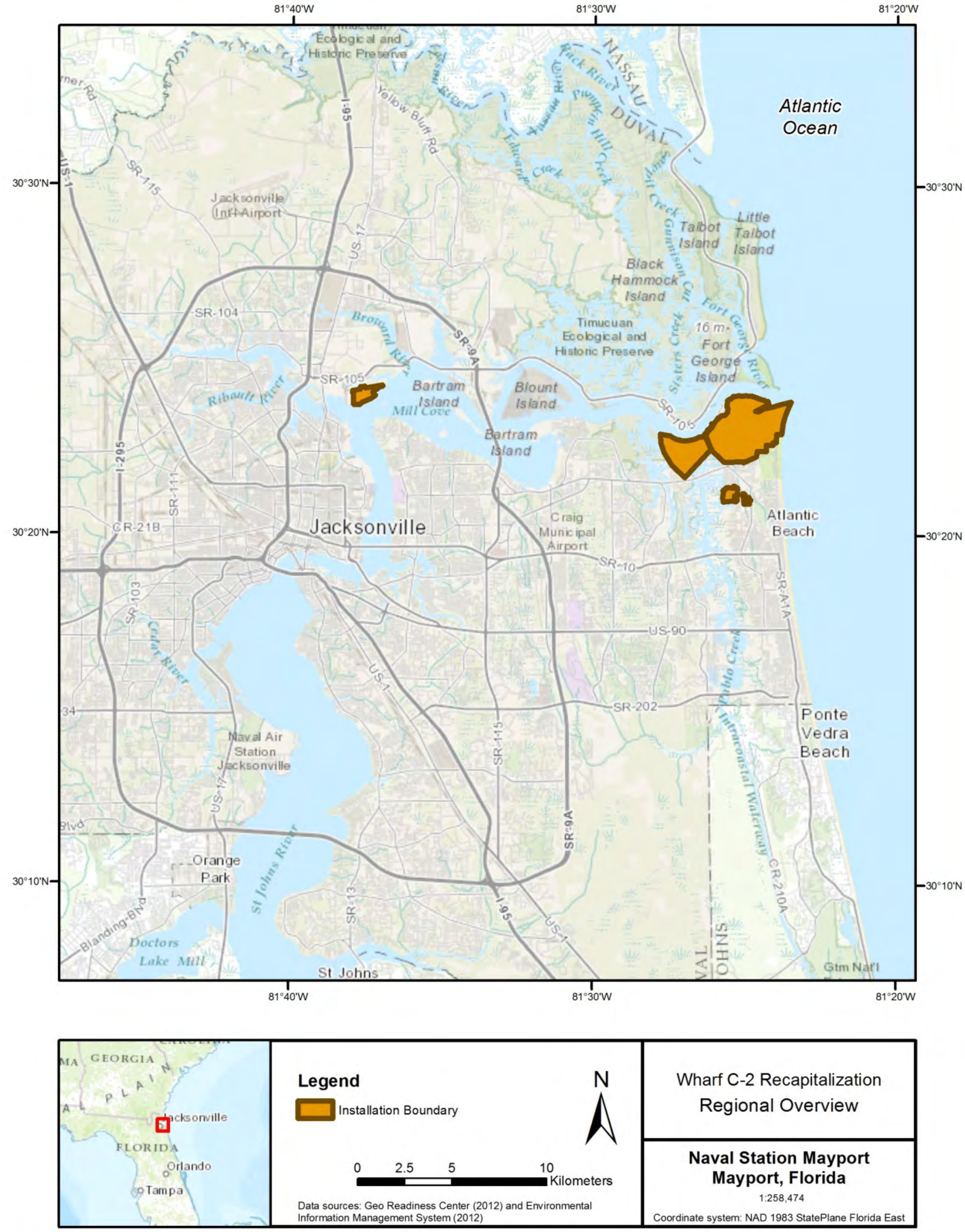
16 surface ships and routinely hosts port visits by various deep draft ships including nuclear-powered aircraft carriers.

NAVSTA Mayport ship berthing facilities are provided at 16 locations along wharves A through F located around the turning basin perimeter. The turning basin is approximately 2,000 by 3,000 feet (ft.) in size, and is connected to the St. Johns River by a 500 ft. wide entrance channel. A port security barrier has been installed at the mouth of the turning basin and there is a restricted area that prohibits all persons, vessels, and craft, except those vessels operated by the U.S. Navy, visiting foreign navies, and the U.S. Coast Guard, from entering except in cases of extreme emergency. NAVSTA Mayport's approximately one mile-long beach is closed to the general public and is patrolled by the installation's Security Department.

Wharf C-2 lies along the northern edge of the NAVSTA Mayport turning basin. It is a single level, general purpose berthing wharf that was constructed in 1960. Currently, the wharf is 608 ft. long, 125 ft. wide, and has a berthing depth of approximately 50 ft. mean lower low water (MLLW) (Figure 4-1 illustrates the planned structure). The wharf is one of two primary deep draft berths at the installation, and is used for ordnance handling. The wharf is a diaphragm steel sheet pile cell structure with a concrete apron, partial concrete encasement of the piling and an asphalt paved deck.

Currently, the wharf is in poor condition due to the advanced deterioration of the steel sheeting and lack of corrosion protection. Due to the structural deterioration of the wharf, load restrictions have been instituted that limit loads to a maximum of 4,500 pounds within 60 ft. of the face of the wharf. Appendix A contains photos of existing damage and deterioration at the wharf, and Appendix B is a contractor schematic of the Project plan.

FIGURE 1-1. NAVSTA MAYPORT REGIONAL OVERVIEW



2. Federally Proposed and Listed Species and Designated Critical Habitat

Species and critical habitat under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that may be found in the vicinity of the Project are included in Table 2-1. Terrestrial species (excluding birds) are not analyzed in this document (see Chapter 3). Sea turtles that do not have a reasonable likelihood of nesting in the vicinity of the Project (e.g. hawksbill and Kemp's ridley sea turtles) are likewise excluded from this analysis.

TABLE 2-1. ESA-LISTED AND CANDIDATE SPECIES AND CRITICAL HABITAT

Species	Subspecies	Status	Critical Habitat in Vicinity?
West Indian manatee	Florida	E	yes
piping plover	Atlantic	T	yes
wood stork	n/a	E	none designated
red knot	*C. canutus rufa*	candidate	n/a
green turtle	Florida nesting population	E[1]	no
loggerhead turtle	Northwest Atlantic Ocean DPS	T	none designated
leatherback turtle	n/a	E	no

T = threatened, E = endangered. [1]The green turtle is listed as threatened, but the Florida and Mexican Pacific Coast nesting populations are listed as endangered. Green turtles that could occur in the action area may not all be from the Florida population.

2.1 West Indian Manatee

Status and Management

The West Indian manatee was listed as endangered in 1967 (32 FR 4001). West Indian manatees are classified as depleted under the MMPA. Only individuals from the Florida subspecies may occur in the action area (Deutsch et al. 2003). The Florida subspecies is closely monitored and managed by the USFWS and the Florida Fish and Wildlife Conservation Commission. The Florida manatee population is divided into four management units, one of which (the Atlantic Coast unit) overlaps the Wharf C-2 action area (Florida Fish and Wildlife Conservation Commission 2007). Data indicate that the Atlantic Coast management unit is stable.

Habitat and Geographic Range

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); they occur along both the Atlantic and gulf coasts of Florida. Florida manatees are found throughout the southeastern United States. Because manatees are a sub-tropical species with little tolerance for cold, they are generally restricted to the inland and coastal waters of peninsular Florida during the winter, when they shelter in or near warm-water springs, industrial effluents, and other warm water sites (Hartman 1979; Lefebvre et al. 2001; Stith et al. 2006). In warmer months, manatees leave these sites and can disperse great distances. Individuals have been sighted as far north as Massachusetts, as far west as Texas, and in all states in between (Fertl et al. 2005; Rathbun 1988; Schwartz 1995; USFWS Jacksonville Field Office 2008).

Two groups of manatees reside in the Jacksonville area. One group remains in the area all winter while the other group moves south during the winter (U.S. Department of the Navy 2007). They typically venture from the St. Johns River to warm waters of Blue Spring, Indian River Lagoon, Titusville, and farther south in November and reside there until March (U.S. Fish and Wildlife Service 2001, 2007). 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). Individual manatees are observed throughout the year in the NAVSTA Mayport turning basin though incidental sighting reports seem to indicate they may occur more frequently during summer months (Loop and Allen pers. comm. 2013).

West Indian manatees are not gregarious and are most often observed alone (Hartman 1979). However, in Florida they occasionally aggregate in large, unorganized groups around warm-water sources during the cooler months (Hartman 1979). The only significant social bonds are between mother and calf during the first one to two years of the calf's life (Reeves et al. 1992). There is no defined breeding season; calves are born year-round after an 11-month gestation (O'Shea et al.1995). West Indian manatees do not reproduce in consecutive years, except in rare instances (Kendall et al. 2004).

Population and Abundance

The exact population for the West Indian manatee is unknown; however the highest minimum count of 5,076 Florida manatees was recorded based on a January 2010 synoptic survey (Florida Fish and Wildlife Conservation Commission 2011).

Predator/Prey Interactions and Foraging

West Indian manatees are herbivorous and are known to consume more than 60 species of plants. They typically feed on bottom vegetation, plants in the water column, and shoreline vegetation, such as hyacinths and marine sea grasses (Reynolds et al. 2009). In some areas, they are known to feed on algae and parts of mangrove trees (Jefferson et al. 2008; Mignucci-Giannoni and Beck 1998).

Critical Habitat

Critical habitat for the West Indian manatee was established in 1976 (41 FR 41914); this was reorganized in 1977 (42 FR 47840 and 47845). Critical habitat is designated in multiple inland rivers and coastal waterways throughout Florida, including the St. Johns River; however, no primary constituent elements are defined for these areas. A petition to revise manatee critical habitat was submitted in 2009, and a 12-month finding on that petition by USFWS stated that revisions should be made, including defining primary constituent elements, but sufficient funding is not currently available (75 FR 1574).

2.2 Piping Plover

Status and Management

The piping plover (*Charadrius melodus*) is divided into two subspecies of plovers. Those that breed on the Atlantic coast of the United States and Canada belong to the Atlantic subspecies *Charadrius melodus melodus* (U.S. Fish and Wildlife Service 2009). The USFWS listed the Atlantic Coast piping plover population as threatened in 1985 (50 FR 50726) and has instituted a recovery plan for this shorebird species (U.S. Fish and Wildlife Service 1996).

Habitat and Geographic Range

The Atlantic breeding population of piping plovers nest and breed on coastal beaches from southern Maine to North Carolina and are primarily an inhabitant of sandy shorelines in the northeastern and southeastern United States (Haig and Elliott-Smith 2004; O'Brien et al. 2006). Piping plovers nest above the high tide line on coastal beaches, sand flats at the ends of sandpits and barrier islands, gently sloping foredunes (dunes parallel to the shoreline), blowout areas behind primary dunes, and washover areas cut into or between dunes (U.S. Fish and Wildlife Service 1996). Individuals migrate through and winter in coastal areas of the United States from North Carolina to Texas and portions of Yucatan in Mexico and the Caribbean (U.S. Fish and Wildlife Service 2009a). In winter, the species is only found in coastal areas using a wide variety of habitats, including mudflats and dredge spoil areas and, most commonly, sandflats (O'Brien et al. 2006). Plovers appear to prefer sandflats adjacent to inlets or passes, sandy mudflats along spits (beaches formed by currents), and overwash areas as foraging habitats. The species' migration routes overlap breeding and wintering habitats.

Population and Abundance

The 1991 international census documented 5,482 total piping plover (Haig and Elliott-Smith 2004). The 2001 total population estimate was 5,945 total birds (Haig and Elliott-Smith 2004). Coastal Atlantic United States populations have trended upward since listing, though some areas' breeding populations are remaining at depressed levels and showing little or no increase in size. Since its 1985 listing, the Atlantic Coast population estimate has increased from 790 pairs to an estimated 1,849 pairs in 2008, and the United States portion of the population has almost tripled, from approximately 550 pairs to an estimated 1,596 pairs (U.S. Fish and Wildlife Service 2009a). Results of the 2006 international piping plover winter census showed a total of 3,355 piping plovers in the United States, with the highest counts occurring in Texas. Though the increased abundance of the Atlantic Coast plovers has reduced near-term extinction threats, geographic variation in population growth and sensitivity to survival and productivity are cause for continuing conservation concern (U.S. Fish and Wildlife Service 2009a).

Although piping plovers do not breed in Florida, individuals from the three breeding populations winter there (U.S. Fish and Wildlife Service 1999). The Atlantic Coast birds use Florida's Atlantic and Gulf of Mexico coastlines in the winter, including beaches in Duval County (Stevenson and Anderson 1994, Nicholls 1996). A previous winter census stated that approximately 20-30 piping plovers occur along the Atlantic coast from Duval County south to Brevard, St. Lucie, and Miami-Dade counties (Florida Natural Areas Inventory 2001). Piping plovers are infrequent visitors to NAVSTA Mayport and Duval County beaches, but have been observed as recently as 2007. They are not expected to occur routinely in the immediate vicinity of the Project due to lack of foraging habitat.

Predator/Prey Interaction and Foraging

Feeding habitats of breeding piping plovers include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines (line of deposited seaweed on the beach), shorelines of coastal ponds, lagoons, and salt marshes (U.S. Fish and Wildlife Service 1996). They hunt visually using a start-and-stop running method, gleaning and probing prey from the substrate for a variety of small invertebrates (marine worms, crustaceans, mollusks, insects, and the eggs and larvae of many marine invertebrates) (U.S. Fish and Wildlife Service 1996). Foraging occurs throughout the day and at night.

Piping plovers are preyed upon by various species. These predators, such as raccoons, foxes, skunks, and domestic and feral cats, are often associated with developed beaches and have been identified as a significant source of mortality for piping plover eggs and chicks (U.S. Fish and Wildlife Service 2009a; Winter and Wallace 2006).

Critical Habitat

In 2000 and 2001, critical habitat was designated for the Great Lakes breeding population, Northern Great Plains breeding population, and wintering population of piping plovers. Designated critical habitat for wintering piping plovers is found to the north of NAVSTA Mayport and the St. Johns River on Fort George Island within Huguenot Memorial Park (U.S. Fish and Wildlife Service 2013). The primary constituent elements of wintering piping plover habitats are those essential to foraging, sheltering, and roosting and are found in coastal areas containing intertidal beaches and flats and dunes above the annual high tide (66 FR 36038).

2.3 Wood Stork

Status and Management

Wood storks were classified as endangered by the USFWS in 1984 (49 FR 7332). A five year review was conducted in 2007 resulting in a recommendation to reclassify the species from endangered to threatened and expand their range. A Distinct Population Segment (DPS) evaluation of the species was also recommended during this review.

Habitat and Geographic Range

Wood storks nest in tall trees in swamps and islands; sites protected from land-based predators are characterized as those surrounded by large expanses of open water or where the nest trees are inundated at the onset of nesting and remain inundated throughout most of the breeding cycle (U.S. Army Corps of Engineers 2008). The breeding range for wood storks includes peninsular Florida, the coastal plain and large river systems of Georgia and South Carolina, extending north into southern North Carolina and west to south central Georgia and the panhandle of Florida to the Ochlockonee River system. There are approximately 50 documented wood stork nesting colonies in north Florida. They are typically seen in North Florida during the nesting season from March through August. Wood storks have been observed along the entrance channel, east of the turning basin (U.S. Department of the Navy 2007). The closest wood stork nesting colony to the project site is at Cedar Point Road, approximately 4.8 miles (7.7 kilometers) to the northwest (U.S. Fish and Wildlife Service 2010).

Population and Abundance

Surveys conducted in 2006 documented 11,279 pairs of wood storks (U.S. Fish and Wildlife Service 2007a).

Predator/Prey Interactions and Foraging

Wood storks are generalists in the selection of foraging habitat and may adjust locations based on seasonal factors such as hydroperiod (the number of days per year that a terrestrial or coastal area maintains standing water) (Rodgers et al. 2012). Typical forage areas include freshwater marshes, narrow tidal creeks, shallow tidal pools, agricultural or roadside drainage ditches, and managed impoundments. Most foraging occurs within 30 miles of nesting colonies (U.S. Fish and Wildlife Service 1996a).Wood storks are tactile feeders, hunting by feeling for fish, crustaceans, and other prey. This strategy requires high concentrations of prey in water that is shallow enough for storks to wade (South Carolina Department of Natural Resources 2012).

Critical Habitat

No critical habitat has been designated for this species.

2.4 Red Knot

Status and Management

Red knots (*Calidris canutus*) found on the Atlantic coast of the United States and Canada belong to the subspecies *C. canutus rufa* (Harrington 2001). This subspecies of red knot was designated as a candidate species for listing under the ESA in 2006 (Niles et al. 2008). Four petitions to emergency list the red knot have been submitted since 2004; however, the species currently remains listed as a candidate for protection under the ESA (U.S. Fish and Wildlife Service 2010a). Candidates for listing are species that the USFWS understands to be threatened, but listing of the species is precluded by other, higher-priority listing activities. Although candidate species do not receive statutory protection under the ESA, conservation partnerships are encouraged because the species may be listed in the future (U.S. Fish and Wildlife Service 2002). The five year goal highlighted in the species action plan is to stabilize and improve the conservation status of the species through increasing habitat protection, reducing disturbance, and protecting key resources at migration and wintering sites (Harrington 2001; U.S. Fish and Wildlife Service 2010a). The Western Hemisphere Shorebird Reserve Network has established an international network of wetlands in an effort to protect important sites used by shorebirds, including the red knot (Tsipoura and Burger 1999).

Habitat and Geographic Range

The species breeds on the central Canadian arctic tundra but migrates down and winters along the Atlantic and Gulf coasts from southern New England to Florida, and as far south as South America (Harrington 2001). They would be more likely to occur in the Project vicinity from November to May. Nassau Sound and Fort George Inlet, just north of the action area, are important stopover sites for red knots. One confirmed sighting of a red knot at NAVSTA Mayport was reported in 2003 (New Jersey Department of Environmental Protection 2007); there are currently no active surveys for this species at the installation.

Population and Abundance

The red knot population was previously estimated at 100,000 to 150,000 individuals (Niles et al. 2008). However, population surveys during the stopover period in the spring of 1998 at Delaware Bay estimated 50,000 red knots. In 2004, the same survey was repeated and the estimated population was substantially lower at 18,000 (Niles et al. 2008). Surveys of red knots at both migration stopover sites and wintering grounds continually show substantial population declines in recent decades (73 FR 75176). An estimated 7,500 red knots winter in Florida (New Jersey Department of Environmental Protection 2007),

Predator/Prey Interactions and Foraging

Red knots forage by surface pecking and probing for intertidal invertebrates and various species of mussels and other mollusks (Harrington 2001). 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 the second half of May (Botton et al. 1994). Red knot migration coincides with the horseshoe crabs laying their eggs, allowing birds to restore their fat reserves to continue their northward migration to their breeding grounds in the arctic (Harrington 2001; Tsipoura and Burger 1999).

Critical Habitat

This species is currently a candidate for listing under the ESA; as such, no critical habitat is designated.

2.5 Green Turtle

Status and Management

Breeding populations of green turtles in Florida and Mexico's Pacific coast were listed as endangered under the ESA in 1978 (43 FR 32800). All other populations of this species are listed as threatened. Individuals with either type of regulatory protection could occur in the action area. NMFS and the U.S. Fish and Wildlife Service (USFWS) determined that the current population listing remains valid and green turtles will not undergo a distinct population segment analysis (National Marine Fisheries Service and U.S. Fish and Wildlife Service2007).

Habitat and Geographic Range

The green sea turtle is distributed worldwide across tropical and subtropical coastal waters between 45° N and 40° S (The State of the World's Sea Turtles Team 2011). After emerging from the nest, green turtle hatchlings swim to offshore areas where they are carried in major current systems. At the juvenile stage (estimated at 5 to 6 years) they leave the open-ocean habitat and retreat to protected lagoons and open coastal areas that are rich in seagrass or marine algae (Bresette et al. 2006), where they will spend most of their lives (Bjorndal and Bolten 1988).

Along Florida's Atlantic coast, green turtles occur in high-wave-energy, nearshore reef environments less than 2 m deep that support an abundance of macroalgae and submerged aquatic vegetation (Holloway-Adkins 2006). Occasional green turtle nesting occurs in Duval County, on beaches adjacent to the action area. Nesting season varies with locality; in the vicinity of the Project, the season is roughly June to September (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2007).

Population and Abundance

An annual average of 8,927 green sea turtles nested in Florida from 2006 to 2010, making this the second largest green sea turtle nesting population in the wider Caribbean (Meylan et al. 2006). In 2012, only one green turtle nest was recorded for Duval County, but it was not located at NAVSTA Mayport (Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute 2013). A single green turtle nest was observed at NAVSTA Mayport in 2011 (Loop pers. comm. 2013).

Generally, nesting trends in the western Atlantic Ocean are stable to increasing and are increasing in Florida (National Marine Fisheries Service and U.S. Fish and Wildlife 2007). Green turtles have been recorded in the turning basin (U.S. Army Corps of Engineers 2001), though in-water abundance for the region and along the Atlantic coast remains unavailable (National Marine Fisheries Service and U.S. Fish and Wildlife 2007). In addition to individuals from the Florida nesting population, adult and juvenile males and females from nesting colonies in the wider Caribbean could occur in the waters of the action area.

Predator/Prey Interactions and Foraging

The green sea turtle is the only species of sea turtle that, as an adult, primarily consumes plants and other types of vegetation (Mortimer 1995). They have a finely serrated jaw that assists with tearing vegetation, and the esophagus is lined with papillae (spiny projections) that trap food before swallowing. While primarily herbivorous, a green sea turtle's diet changes substantially throughout its life. Very young green sea turtles are omnivorous (Bjorndal 1997). Salmon et al. (2004) reported that post-hatchling green sea turtles were found to feed near the surface on seagrasses or at shallow depths on comb jellies and unidentified gelatinous eggs off the coast of southeastern Florida. Pelagic juveniles smaller than 8–10 in. (20.3–25.4 cm) in length eat worms, young crustaceans, aquatic insects, grasses, and algae (Bjorndal 1997). After settling in coastal juvenile developmental habitat at 8–10 in. (20.3–25.4 cm) in length, they eat mostly seagrass and algae (Balazs et al. 1994). Recent research indicates that green sea turtles in the open-ocean environment, and even in coastal waters, also consume jellyfish, sponges, and sea pens (Godley et al. 1998; Hatase et al. 2006; Heithaus et al. 2002; National Marine Fisheries Service and U.S. Fish and Wildlife 2007; Parker and Balazs 2008).

The loss of eggs to land-based predators such as mammals, snakes, crabs, and ants occurs on some nesting beaches. As with other sea turtles, hatchlings may be predated on by birds and fish. Sharks are the primary nonhuman predators of juvenile and adult green sea turtles at sea (National Marine Fisheries Service and U.S. Fish and Wildlife 1991).

Critical Habitat

Critical habitat for the green turtle was designated in 1998 (63 FR 46693), but does not occur in or near the action area.

2.6 Loggerhead Turtle

Status and Management

The loggerhead turtle was listed under the ESA in 1978 (43 FR 32800). A status review was initiated in 2009 for the loggerhead (the first turtle species subjected to a complete stock analysis) identified nine distinct population segments within the global population (Conant et al. 2009). In a September 2011 final rule (76 FR 58950), NMFS and USFWS listed five of these distinct population segments as endangered and kept four as threatened under the ESA, effective as of 24 October 2011. Individual loggerheads occurring in the action area would most likely belong to the Northwest Atlantic Ocean DPS, which is currently classified as threatened under the ESA. This DPS is projected to decline in the foreseeable future, primarily as a result of fishery bycatch (Conant et al. 2009). Within the DPS there are at least five demographically independent loggerhead sea turtle nesting groups or subpopulations of the Northwest Atlantic Ocean. The Peninsular Florida Recovery Unit, along Florida's Atlantic coast to Key West (National Marine Fisheries Service and U.S. Fish and Wildlife 2009) falls within the region of NAVSTA Mayport.

Habitat and Geographic Range

Loggerhead sea turtles occur in U.S. waters in habitats ranging from coastal estuaries to waters far beyond the continental shelf (Dodd 1988). Loggerheads typically nest on beaches close to reef formations and next to warm currents (Dodd 1988), preferring beaches facing the ocean or along narrow bays (National Marine Fisheries Service and U.S. Fish and Wildlife 1998). In the southeastern United States, nesting season for loggerheads takes place from May through October (Florida Fish and Wildlife Conservation Commission 2007). Large nesting colonies exist in Florida, with more limited nesting along the Gulf Coast and north through Virginia. Duval County hosts a moderate amount of nesting on beaches throughout the county. NAVSTA Mayport itself has a suitable nesting beach that supports small numbers of nests each season (Allen and Loop pers. comm. 2013). Thirteen loggerhead nests were observed in 2012.

At emergence, hatchlings swim to offshore currents and remain in the open ocean, often associating with floating mats of *Sargassum* (Carr 1986, 1987; Witherington and Hirama 2006). Migration between oceanic and nearshore habitats occurs during the juvenile stage as turtles move seasonally from open-ocean current systems to nearshore foraging areas (Bolten 2003; Mansfield 2006). Once adults, loggerheads continue to migrate seasonally from feeding areas to mating and, for females, nesting areas (Bolten 2003). After reaching sexual maturity, adult turtles settle in nearshore foraging habitats (Godley et al. 2003; Musick and Limpus 1997). In the turning basin and navigation channel, the muddy bottom provides habitat for invertebrates which are a major food source for loggerhead turtles. However, regular dredging limits the quality of this habitat somewhat.

Population and Abundance

Annual nesting totals of loggerheads on the U.S. Atlantic and gulf coasts fluctuated between 47,000 and 90,000 nests, with an average of 70,880 nests from 1989 to 2007 (National Marine Fisheries Service and U.S. Fish and Wildlife 2009). Annual totals for the Peninsular Florida Recovery Unit averaged 64,513 nests from 1989-2007. An analysis of index nesting beach survey data has shown a decline in nesting. Results of the analysis indicated that there has been a decrease of 26 percent over the 20-year period from 1989 - 2008 and a 41 percent decline since 1998. The mean annual rate of decline for the 20-year period was 1.6 percent.

Surveys conducted in 2012 identified 187 loggerhead nests along Duval County beaches, a six year maximum (Florida Fish and Wildlife Conservation Commission 2013). Loggerheads have historically nested on NAVSTA Mayport beaches and continue to do so each year. In 2012, 11 nests were documented at the installation (Allen and Loop pers. comm. 2013). In-water abundances of loggerhead turtles in the action area are unknown. However, given presence of nesting and foraging habitat nearby, loggerhead turtles can be expected to occur regularly in the action area.

Predator/Prey Interactions and Foraging

The diet of a loggerhead sea turtle varies by age class (Godley et al. 1998). The gut contents of post-hatchlings found in masses of *Sargassum* contained parts of zooplankton, jellyfish, larval shrimp and crabs, and gastropods (Carr and Meylan 1980; Richardson and McGillivary 1991;

Witherington 1994). Juvenile and subadult loggerhead turtles are omnivorous, foraging on crabs, molluscs, jellyfish, and vegetation captured at or near the surface (Dodd 1988). Adult loggerhead sea turtles are generalized carnivores that forage on nearshore bottom-dwelling invertebrates (molluscs, crustaceans, and anemones) and sometimes fish (Dodd 1988). During migration through the open sea, they eat jellyfish, sea slugs, floating molluscs, floating egg clusters, fish, and squid. As with other sea turtle species, the loggerhead's esophagus is lined with papillae (spiny projections) that trap food before swallowing.

Common predators of eggs and hatchlings on nesting beaches are ghost crabs, raccoons, feral pigs, foxes, coyotes, armadillos, and fire ants (Dodd 1988). In the water, hatchlings are susceptible to predation by birds and fish. Sharks are the primary predator of juvenile and adult loggerhead sea turtles (Fergusson et al. 2000; Simpfendorfer et al. 2001).

Critical Habitat

No critical habitat has been designated for the loggerhead, but the petitions that were submitted to NMFS requesting to list the distinct population segments also requested that critical habitat be designated after any listing revision (National Oceanic and Atmospheric Administration 2010).

2.7 Leatherback Turtle

Status and Management

The leatherback sea turtle is listed as a single population and is classified as endangered under the ESA (35 FR 8491). Although the USFWS and NMFS believe the current listing is valid, preliminary information indicates an analysis and review of the species should be conducted under the distinct population segment policy (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2007b). Recent information on population structure (through genetic studies) and distribution (through telemetry, tagging, and genetic studies) have led to an increased understanding and refinement of the global stock structure. Based on this research, the Turtle Expert Working Group (under the National Oceanic and Atmospheric Administration's Southeast Fisheries Science Center) (Turtle Expert Working Group 2007) recommends that seven Atlantic Ocean stocks be considered. Individuals from the Florida stock would be most likely to occur in the action area; however, other stocks could also be present.

Habitat and Geographic Range

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 of their early life is spent in the tropics (Eckert 2002). They are not considered to associate with *Sargassum* or other flotsam, as is the case for all other sea turtle species (Horrocks 1987; Johnson 1989). Upwelling areas, such as equatorial convergence zones, serve as nursery grounds for post-hatchling and early juvenile leatherback sea turtles because these areas provide a high biomass of prey (Musick and Limpus 1997).

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). Leatherback sea turtles mate in waters adjacent to nesting beaches and along migratory corridors. They prefer adjacent waters to be deep, clean, and high energy, with either a deep-water oceanic approach or a shallow-water approach (Turtle Expert Working Group 2007). In Florida, nesting begins around March and continues through July or August. Suitable nesting habitat occurs throughout Duval County and on the beaches of NAVSTA Mayport (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2007b). Females remain in the general vicinity of the nesting habitat between nestings, with total residence in the nesting and inter-nesting habitat lasting up to 4 months (Eckert et al. 1989a; Keinath 1993). After nesting, female leatherbacks migrate from tropical waters to more temperate latitudes, which support high densities of jellyfish prey in the summer.

Aerial surveys off the southeastern U.S. coast indicate that leatherback sea turtles occur in these waters throughout the year, with peak abundance in summer (Turtle Expert Working Group 2007). In spring, leatherback sea turtles appear to be concentrated near the coast, while other times of the year they are spread out as far as the Gulf Stream. Aerial surveys were conducted by the Navy between 2009 and 2010 off Jacksonville, Florida, to assess population abundance within their ranges as part of Atlantic Fleet Active Sonar Training monitoring requirements and to collect baseline data in support of the Undersea Warfare Training Range EIS. These surveys sighted 48 leatherback sea turtles, while simultaneous vessel surveys sighted four leatherback sea turtles (U.S. Department of the Navy 2010).

Population and Abundance

Worldwide estimates of leatherback sea turtle populations have varied dramatically over the years as a result of both significant declines in the population and the discovery of new nesting colonies, particularly a colony in Gabon, Africa. Pritchard (1982) estimated 115,000 females worldwide with 60 percent nesting along the Pacific coast of Mexico. However, in 1995, a revised estimate incorporating information from 28 nesting beaches throughout the world yielded about 34,500 females, with a lower limit of about 26,200 and an upper limit of about 42,900 (Spotila et al. 1996). According to the International Union for Conservation of Nature, analysis of published estimates of global population sizes (Pritchard 1982; Spotila et al. 1996) suggest a reduction of greater than 70 percent of the global population of adult females in less than one generation. The most recent population estimate for the North Atlantic alone is a range of 34,000 to 94,000 adult leatherbacks (Turtle Expert Working Group 2007). This wide range indicates the uncertainties in nest numbers and their extrapolation to adult population numbers.

3. Environmental Baseline

3.1 Exclusions

Project activities will occur entirely within the water and immediate vicinity of the wharf structure. Construction activities would not adversely impact terrestrial habitats and airborne sound associated with construction would not harm native terrestrial wildlife[1]. Any land-based construction equipment and material staging or support activities, if required, will take place in previously disturbed and built areas. Therefore, the activities associated with the Project would have no effect on terrestrial wildlife.

3.2 Marine Invertebrates

No ESA-listed or candidate marine invertebrates occur in the action area. The Project may impact benthic invertebrates through burial or replacement of existing substrate foundations, disruption of the sediment surface and subsurface during the installation and removal of each pile, or from anchor and spud placement for the barges, if placement is required. Depending upon the species, impacts to individual benthic invertebrates could range from temporary disturbance to mortality. Some slow-moving or sessile invertebrates would be physically crushed and lost within the footprint of the piles, as well as from barge anchors and spuds.

Indirect impacts to habitat and benthic organisms could result from turbidity caused by driving and removing barge anchors, spuds, and piles. The area near the pile footprint is expected to have higher levels of turbidity while in-water work is being performed. Disturbed sediments are expected to eventually redeposit upon the existing benthic community. Impacts from increased turbidity levels during the summer months may result in a short-term decrease in reproductive success of oysters (Davis and Hidu 1969; Seaman et al. 1991).

Affected areas may experience some temporary reduction in diversity and abundance of benthic invertebrates. However, these species - particularly annelids - are very resilient to habitat disturbance and are likely to recover to pre-disturbance levels within a relatively short amount of time (CH2M Hill 1995; Parametrix 1994, 1999; Anchor Environmental 2002; Romberg 2005). Therefore, the Project is not expected to have any population-level impacts on marine invertebrates, and no impacts to ESA-listed benthic invertebrates.

3.3 Forage Fish in the Action Area

There are no anticipated population-level impacts to any species of fish from Project noise.
The St. Johns River provides nursery and refuge areas for a number of euryhaline forage fish species including shads, herrings, anchovies, and some species of juvenile pan fish (National Oceanic and Atmospheric Administration 1998). As a result, these species may also occur within the action area. Small, schooling fishes form a critical link between the marine zooplankton

[1] Terrestrial wildlife does not include shore birds for the purposes of this BE

community and larger predatory fish, seabirds, and marine mammals in the marine food web (Penttila 2007). They feed mainly on zooplankton and smaller fish, and reside in the upper levels of the water column and nearshore areas. It is expected that forage fish would be present in the action area year round. All species would most likely be present in larger abundances during peak spawning time – generally late winter and early spring (Florida Fish and Wildlife Conservation Commission 2013).

Individual fish near the vicinity of in-water Project may experience sound intensities that could affect their behavior or damage their hearing ability. Since many fish use their swim bladders for buoyancy, they are susceptible to rapid expansion/decompression due to peak pressure waves from underwater noises (Hastings and Popper 2005). The onset of injury threshold resulting from this rapid expansion/decompression is supported by data presented on selected species by the Fisheries Hydroacoustic Working Group (2008). Analyses performed for ESA-listed and candidate fish species in a separate BE for submittal to the National Marine Fisheries Service (NMFS) indicate low likelihood of negative effects to fish, and only when they are very close to an intense sound source.

3.4 Estuarine Habitat

Project activities taking place in at NAVSTA Mayport would not directly or indirectly affect inland freshwater habitats. The St. Johns River's highest flows occur at the mouth, at times exceeding 150,000 cubic feet per second (Bourgerie 1999). It is tidally influenced by the ocean, producing an estuarine environmental with the generally constant 36 parts per thousand salinity of the Atlantic Ocean (U.S. Army Corps of Engineers 1994). The area of the St. Johns River where NAVSTA Mayport is located is at the northern ocean inlet. Water movement characteristic of inlets on the east coast of Florida typically includes extreme inflow and outflow of the area where the inlet meets the ocean. It would be assumed that this extreme movement of water during a flood tide would result in water from the area near NAVSTA Mayport potentially affecting (by temporarily increased sediment suspension) areas west of the inlet that are brackish, and eventually freshwater. But unlike the majority of the rivers in the United States, the St. Johns River's flow is from south to north, and then east out the inlet to the ocean (St. Johns River Water Management District 2007).

3.5 Sediments

Due to the small scale of temporary operations and the general lack of sediment contaminants in the action area, there would be no long-term impacts to sediments are anticipated. The NAVSTA Mayport turning basin was constructed during the early 1940s by dredging the eastern part of Ribault Bay. Dredge material from the basin was used to fill parts of Ribault Bay and other low-lying areas in order to elevate the land surface. The basin was originally dredged to a depth of −29 ft. MLLW and, in 1952, was deepened to a depth of −40 ft. MLLW to provide access to larger ships. Prior to 1960, the turning basin was dredged to −42 ft. MLLW. The turning basin is currently maintained at an average depth of −42 ft. MLLW, with ship berths ranging in depth from −30 to −50 ft. MLLW. The basin is a deepwater surface ship berthing facility whose entrance channel meets the main navigation channel at the mouth of the St. Johns River. The

NAVSTA Mayport entrance channel is approximately 500 ft. wide extending approximately 5,000 ft. until it joins with the federal navigation channel. Its depth ranges between −51 to −42 ft. MLLW (U.S. Department of the Navy 2008).

Sediment sampling and testing conducted in March 2007, in support of the Proposed Homeporting of Additional Surface Ships at NAVSTA Mayport Environmental Impact Statement; indicated sediments within the turning basin consist primarily of fine grained materials (e.g., silt and clay). Six sediment samples were collected. Water depths in the turning basin ranged from −40 to −45 ft. MLLW. The sediment that lies on the surface is silt/clay across the basin, ranging in thickness from 3 to 10 ft. (U.S. Department of the Navy 2008).

Five of the six March 2007 sediment samples were analyzed for the presence of chemical contaminants. Testing was conducted for bulk chemical parameters including metals, polychlorinated biphenyls, semi-volatile organics or polycyclic aromatic hydrocarbons, pesticides, and inorganics. The majority of these tests did not detect the presence of any contaminants in the dredge profile. The analyses did, however, find low concentrations of metals, some polycyclic aromatic hydrocarbons analytes, and some polychlorinated biphenyls in the samples. Of the substances detected in the turning basin sediments, only one metal (arsenic) and two of the polycyclic aromatic hydrocarbons (acenaphthene and fluorine) had concentrations exceeding National Oceanic and Atmospheric Administration Effects Range Low thresholds in two of the five sediment samples collected. These three incidents of exceedance are only slightly above the Effects Range Low threshold and are well below the Effects Range Medium levels. All of the other detected concentrations of metals, polycyclic aromatic hydrocarbons, and polychlorinated biphenyls are well below the respective Effects Range Low levels (U.S. Department of the Navy 2008).

Overall, the testing results generally reflected a low contamination level for marine sediments in the NAVSTA Mayport turning basin to depths of −56 ft. MLLW. Additionally, the contaminant levels of the March 2007 results correlate favorably with those found during testing conducted prior to recent maintenance dredging projects at NAVSTA Mayport (U.S. Department of the Navy 2008).

The Project is expected to disturb and temporarily suspend marine sediment in the water column. The use of the vibratory hammer and (contingency only) impact hammer could cause the fine silt and clay layers to be susceptible to liquefaction and subsequent contraction. Suspended sediments would be localized to the immediate area of the pile being driven, and are expected to quickly settle back to the bottom of the action area.

Construction activities would not result in the discharge of wastes containing metals or otherwise alter the concentrations of trace metals in bottom sediments. Nor would construction activities result in the discharge of high levels of contaminants or otherwise alter the concentrations of organic contaminants in bottom sediments. However, because the magnitude of metal and organic compound concentrations in sediment can vary as a function of grain size (higher concentrations typically are associated with fine-grained sediments due to higher interior surface areas), small changes to grain size associated with construction-related disturbances to bottom sediments could result in minor changes in metal and organic compound concentrations.

3.6 Water Quality

Salinity and temperature data for the action area are summarized in Table 3-1 and Figure 3-1, respectively. Based on available data, the water quality in the NAVSTA Mayport turning basin and entrance channel meets the Florida Department of Environmental Protection Class III Marine Water Quality Standards (U.S. Department of the Navy 2007). Tides within the NAVSTA Mayport entrance channel are semi-diurnal (two highs and two lows per day). The mean and spring tidal ranges at the NAVSTA Mayport turning basin are 4.5 ft. to 5.3 ft. respectively.

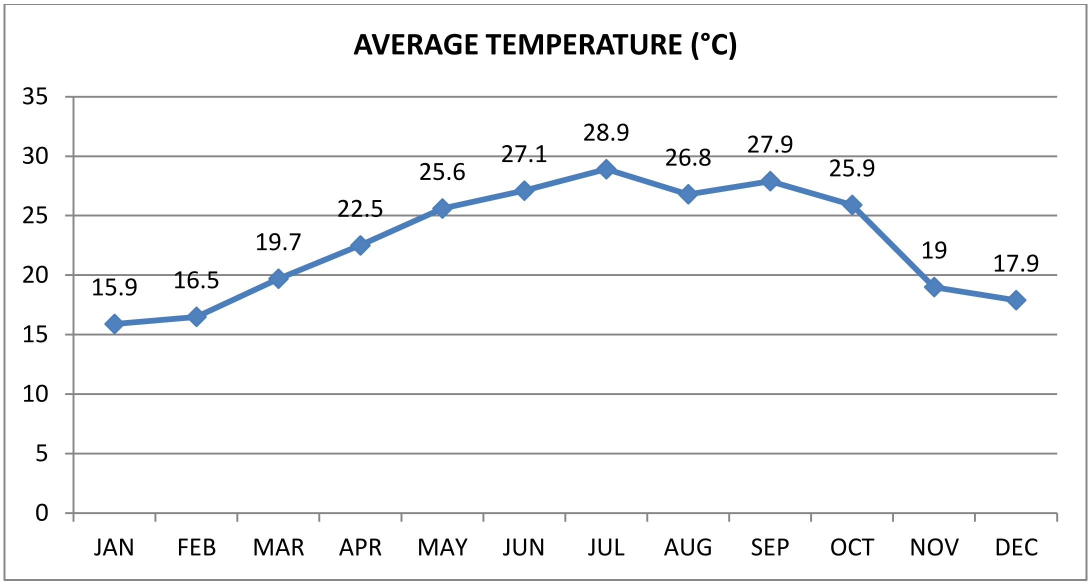
TABLE 3-1. MINIMUM AND MAXIMUM SURFACE AND BOTTOM SALINITIES

LOCATION	TIDE	WATER COLUMN	SALINITY (PSU)
NAVSTA Mayport Turning Basin	ebb	surface	30.6
		bottom	33.8
	flood	surface	30.2
		bottom	33.6
NAVSTA Mayport Entrance Channel	ebb	surface	30.0
		bottom	32.4
	flood	surface	33.4
		bottom	34.7
Federal Navigation Channel	ebb	surface	32.5
		bottom	33.8
	flood	surface	33.3
		bottom	35.2

Source: U.S. Department of the Navy 2008

While water temperatures for the action area are not regularly recorded, average monthly temperatures at the closest station (Bar Pilot's Dock) ranged from 60.6 °F (15.9 °C) in January to 84°F (28.9 °C) in August (Figure 3-1).

FIGURE 3-1. 2012 MONTHLY WATER TEMPERATURES AT BAR PILOT'S DOCK, FLORIDA



Source: National Oceanic and Atmospheric Administration 2012a

Due to the close proximity of the Atlantic Ocean, the presence of semi-diurnal tides and other hydrodynamic influences, flushing occurs continually within the turning basin and entrance channel. As part of an elutriate analysis, turning basin surface water samples were collected in March 2000 and analyzed for metals and semivolatile organic compound. No detectable concentrations of these substances were found in the samples, illustrating the relatively high quality of water and sediment in the NAVSTA Mayport turning basin (U.S. Department of the Navy 2000).

There is only limited information readily available of dissolved oxygen levels in the turning basin or entrance channel. Data collected in 1993 revealed no significant stratification from the surface to −40 ft. depths. Despite the deep water depths and hot summertime conditions, the maximum dissolved oxygen change from top to bottom was 1.43 parts per million (ppm) (ppm is equivalent to milligrams/liter) and minimum change was 0.20 ppm. No values were less than 4.0 ppm and a number of readings were above 5.0 ppm, suggesting that mixing is ongoing (U.S. Department of the Navy 2000).

3.7 Marine Vegetation

Features that influence the distribution and abundance of marine vegetation in the action area are the availability of light, water quality, water clarity, salinity level, seafloor type (important for rooted or attached vegetation), currents, tidal schedule, and temperature (Green and Short 2003). Marine ecosystems depend almost entirely on the energy produced by marine vegetation through photosynthesis (Castro and Huber 2000). In the lighted surface waters of coastal waters, marine algae and flowering plants provide oxygen and habitat for many organisms in addition to forming the base of the marine food web (Dawes 1998). The action area habitats include hardened shorelines grading steeply to depths of over 12 m (40 ft.) (National Oceanographic and Atmospheric Administration 2011) in sheltered, high salinity estuarine waters (National

Oceanographic and Atmospheric Administration 2012). Substrate on the bottom is dredged, unconsolidated material (U.S. Geological Survey 2000).

As a general rule, algae can grow down to bottom areas receiving one percent or more of surface light intensity (Wetzel 2001). Microalgae, including phytoplankton, are widespread and abundant in the estuarine water column where light is sufficient for growth. The dominant genus of floating macroalgae, *Sargassum,* is widely distributed in offshore waters of the North Atlantic Ocean (Gower and King 2008; South Atlantic Fishery Management Council 2002), but may find its way to nearshore water and estuaries on the winds and tides. Attached macroalgae (i.e., kelp, seaweed) form "meadows" or "beds" where they dominate intertidal shores or subtidal bottoms. Whereas kelp do not occur in the action area (Mathieson et al. 2009; Steneck et al. 2002), other species of seaweeds grow attached to hard bottom substrate (Nybakken 1993) in the action area. Green seaweed species (e.g., *Enteramorpha, Ulva, Codium*) may also grow on mudflats in sheltered estuarine waters (Gosner 1978). Attached macroalgae inhabit the hardened shoreline and shallower depths of the action area.

There are no seagrass beds mapped in this area of Florida, despite comprehensive mapping efforts (Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute 2011).

3.8 Sea turtles

Two species of sea turtles that are present in the action area during the adult phase of their life cycles are not known to nest in or around the action area, and are unlikely to be found on land in this region. Only two occurrences of hawksbill turtles were documented during a study between 1980 and 2002 in Duval County (Meylan and Redlow 2006); both were live strandings. Nesting of hawksbills in the vicinity of the action area is extremely unlikely. For Kemp's ridley turtles, nesting is largely limited to the Gulf of Mexico, where adult females take part in mass synchronized nesting emergences known as "arribadas" on only a few nesting beaches. Because of the extremely low likelihood of Kemps ridley and hawksbill turtles nesting in or around the action area, these species have been excluded from this analysis.

4. Project Details

The general project description can be found in Chapter 1.

Project Schedule

Construction of the wharf will occur over an 18-month period projected to begin on or after 30 September 2013. In-water pile driving work will be conducted year-round as needed, for no more than 70 days total.

Access and Staging

Any land-based construction equipment and material staging or support activities, if required, would take place in previously disturbed areas. No clearing or excavation would be required. A barge-mounted crane operates from the water adjacent to the pile during extraction activities. Removed piles and associated sediments (if any) shall be contained on a barge. If a barge is not utilized, piles and sediments may be stored in a containment area near the project location. The level of vehicular and marine traffic will not differ significantly from that of current conditions at NAVSTA Mayport. Pile delivery and disposal would generally be conducted via barge. Barge operations may be restricted to tide elevations adequate to prevent grounding of a barge.

Project Components

The steel king pile/sheet pile wall system (SSP) consists of large vertical king piles with paired steel sheet piles driven in between and connected to the ends of the king piles. Table 4-1 details the piles that will be used. The wall will be anchored at the top and fill consisting of clean gravel and/or flowable concrete fill will be placed behind it. A concrete cap will be formed along the top and outside face of the wall to tie the entire structure together and provide a berthing surface for vessels (Figure 4-1).

Overall, the project will include installation of approximately 120 steel sheet pile pairs, 119 king piles and 50 polymeric (plastic) fender piles. A maximum of 70 days of in-water pile driving work will take place over a 12-month period. Of the 70 days, 50 days are reserved for vibratory driving and the remaining 20 days are reserved for contingency impact driving (if impact driving is needed).

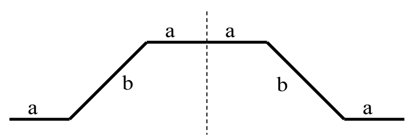
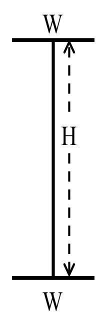
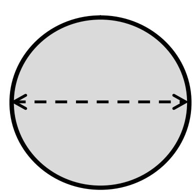
Contingency dredging of up to 4,000 cubic yards of substrate may be conducted to create space for the newly extended Wharf C-2 footprint if needed. Should dredging take place, it will be performed using a clamshell rig. If dredging is performed, it will be outside of the 70 day pile driving window, and activity is expected to take place behind the existing bulkhead which will reduce or eliminate the likelihood of negative impacts to ESA-listed and / ESA-candidate species and their habitat. There will be no direct discharges of waste to the marine environment. Construction-related impacts to water quality would be limited to short term, temporary and localized changes associated with resuspension of bottom sediments from pile installation and barge and tug operations, such as anchoring and propeller wash, as well as accidental spills of fuel into the turning basin. These changes would be spatially limited to the construction corridor, including areas potentially impacted by anchor drag and areas immediately adjacent to the driving sites that could be impacted by plumes of resuspended bottom sediments that are not expected to violate water quality standards. Fuel spills are unlikely as boats, barges, and equipment would be fueled offsite.

As part of the recapitalization of the wharf, new lighting fixtures will be installed. Four 50 ft. tall (15 m.) concrete posts each with two 1,000 watt metal halide luminaires are currently planned. Luminaires will be of the full cut off type to minimize stray light. This lighting profile may slightly increase the total amount of light over current conditions on Wharf C-2, but will be comparable to other areas surrounding the basin.

Construction will result in an increase to impervious surface of 10,100 square feet (.23 acres) located between the existing bulkhead and the new bulkhead. This would cause a slight decrease in infiltration of precipitation and result in localized impacts to stormwater flow in the basin. However, these minor impacts would be localized at the development site and minimized through adherence to best management practices and the Stormwater Pollution Prevention and Environmental Resource Permit conditions (required if total combined impervious surface associated with the proposed development is greater than 9,000 square feet).

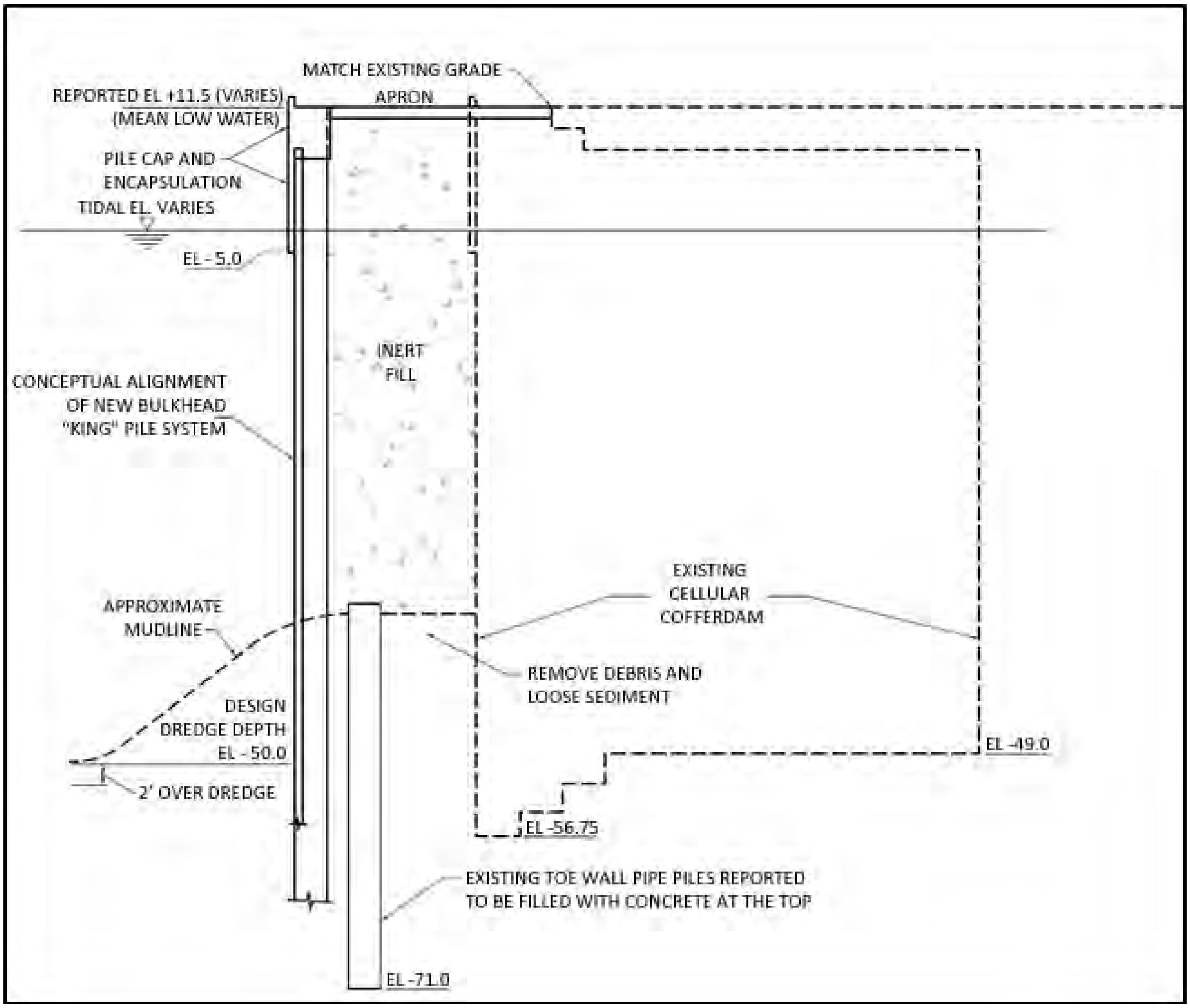
Post development stormwater treatment will be required for the new impervious areas. The expanded wharf surface area will not provide any practical areas for the treatment of stormwater. Therefore, NAVSTA Mayport is proposing to collect and treat stormwater from an impervious storage and vehicle parking area located several hundred feet north of Wharf C-2. Stormwater will be directed to an adjacent grassy area where it will be treated in a dry retention biobasin prior to release into the St. Johns River. This location is the closest practical compensatory treatment area to Wharf C-2 and will be capable of treating an area of 16,770 square feet and have a volume of 2,307 cubic feet. The Stormwater Treatment Basin will include four ten foot wide riprap overflows and will be located approximately 50-75 feet from the existing riprap shoreline.

TABLE 4-1. PILE DESCRIPTIONS

PILE TYPE AND DETAILS	SHAPE AND DIMENSIONS	ESTIMATED DISTURBANCE FOOTPRINT
AZ19-700 SHEET PILE PAIR A pile in the form of a plank driven in close contact or interlocking with others to provide a tight wall to resist the lateral pressure of water, adjacent earth, or other materials. A sheet pile may be tongued and grooved if made of timber or concrete, or interlocking if made of metal. Linear length=4×a+2×b = 70.4 in. a = 6.81 in. b = 21.6 in.		Area = W × H W = 55.12 in. H = 16.56 in. 55.12 in × 16.56 in = 912 in.^2 = 0.59 m^2
HZ1080 MB KING PILE In strutted sheet pile excavation, a long guide pile driven at the strut spacing in the center of the trench before it is excavated. Linear length=2×W+H = 77.2 in. W = 7.87 in. H = 41.47 in.		Area = W × H = 7.87 in × 47.47 in. = 326 in.^2 = 0.21 m^2
CIRCULAR POLYMERIC FENDER PILE Polymeric piles have been used primarily for corner protection, as secondary fender piles, and as primary fender piles for small craft facilities. Diameter = 12 in. Circumference = Diameter × π = 37.7 in.		Area = $\pi \times r^2$ = π × 36 = 113 in.^2 = 0.07 m^2

Sources: Dictionary of Construction 2013 and Integrated Publishing 2013; m^2 = square meters; in. = inch; in.^2 = square inch

FIGURE 4-1. LATERAL VIEW OF PROJECT PLAN



The recapitalization construction activities include:

- demolishing existing concrete pile cap, wharf deck and utilities (including lateral supply lines from utilities such as water, fuel, and electrical)
- removing existing timber fender piling
- installing new steel combination wall with tieback anchors
- placing a combination of self-hardening, flowable fill and clean fill between existing and new walls
- installing new concrete cap which partially encases the new steel wall
- installing sacrificial anode cathodic protection system for the new steel wall
- installing new polymeric fender piles
- installing new foam filled fenders (*continued on following page*)

- installing new utilities
- repairing wharf deck by milling and re-paving
- replacing area lighting fixtures on galvanized steel standards
- replacing security fencing
- installing stormwater mitigation basin.

The following steps describe the construction sequence for placing the new SSP system in front of the existing deteriorated wall.

Preparation and Demolition

Existing underwater obstructions and debris that may interfere with the installation of the new SSP wall will be removed utilizing divers and cranes. Up to 30 timber piles will be removed from the action area utilizing a crane. The locations at which the new SSP will attach to the existing sheet pile wall will be demolished above and below the waterline to expose the existing steel.

Along the face of the existing wall, the curb and a portion of existing concrete cap will be removed to accommodate the new concrete pavement that will be placed between the new wall and the existing wall. The concrete apron along the waterside perimeter of the wharf and the utilities (including lateral supply lines from utilities such as water, fuel, steam and electrical) will be removed. Utilities include water, fuel, waste, electrical and communications.

Installation of New Bulkhead

Crane barges will be used in lieu of shore-based equipment due to weight bearing and structural integrity issues on the existing structure. A crane barge with a pile installation suite (pile leads, vibratory hammer and an impact hammer) will mobilize to the project site with a material barge. A pile driving template (approximately 25 ft. in length) will be mounted to the crane barge. This allows the crane barge to control the alignment of the piles as they are driven. Once the crane barge is properly aligned, the king piles will be driven to the appropriate depth using the vibratory hammer (Figure 4-2). Sheet piles will be driven in pairs between the king piles to complete the template[2] (Figure 4-3). Approximately 120 steel sheet pile pairs and 119 king piles will be installed. Installation of up to three templates per pile-driving day is anticipated. Impact pile driving would only be used as a contingency in cases when vibratory driving is insufficient. A similar project that has been completed at adjacent Wharf Charlie One required impact pile driving on only seven piles. Once all of the piles are driven, closure plates are attached between the existing adjacent sheet pile walls and the new wall end terminations. Typically, these are welded in place using underwater welding techniques.

In general, the pile-driving process begins by placing a choker cable around a pile and lifting it into vertical position with a crane. The pile is then lowered into position inside the template and set in place at the mud line. During vibratory driving, the pile is stabilized by the template while the vibratory driver installs the pile to the required tip elevation.

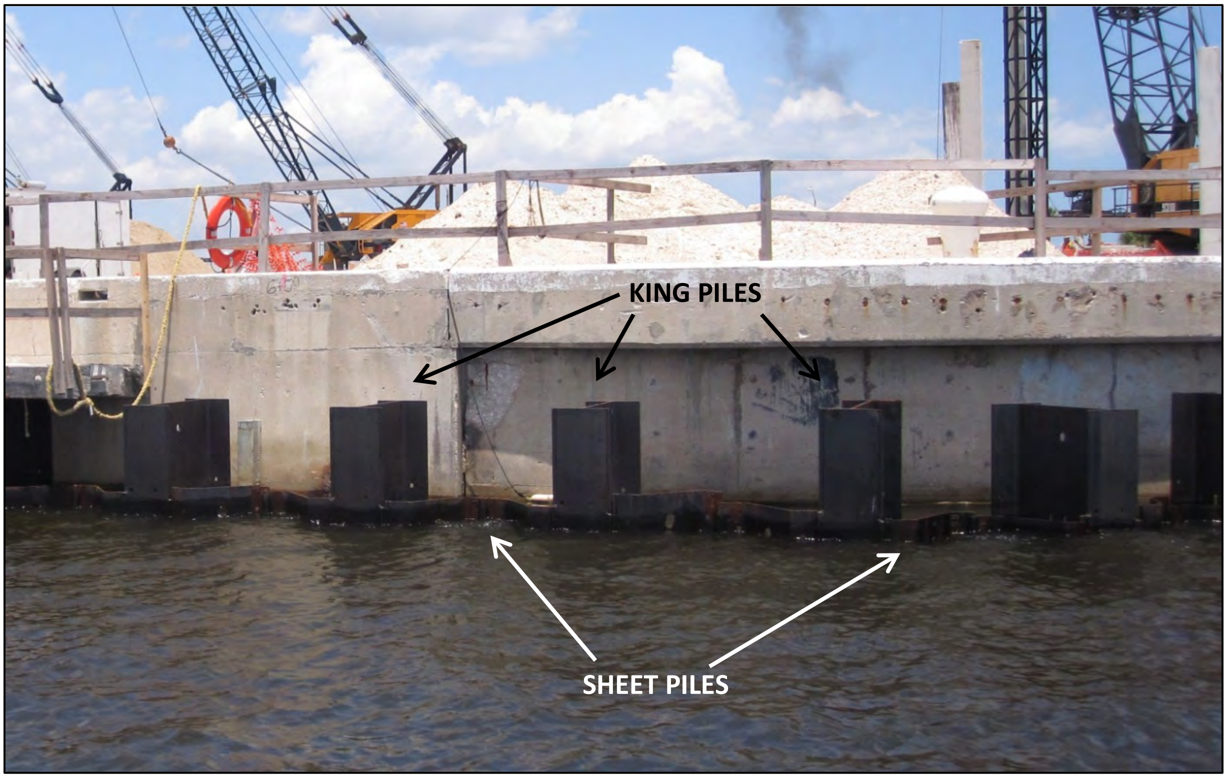
[2] Templates are prefabricated or site constructed steel frames into which piles are set to hold piles in the proper position and alignment during driving (Hannigan 2011).

FIGURE 4-2. VIBRATORY INSTALLATION OF SHEET PILES AT NAVSTA MAYPORT

Impact hammers have guides that hold the hammer in alignment with the pile while a heavy piston moves up and down, striking the top of the pile, driving the pile into the substrate from the downward force of the hammer.

Once piles are in position, installation typically takes less than 45 seconds to reach the required tip elevation depending on site conditions (i.e., bedrock, loose soils, etc.), driving method, and equipment used.

FIGURE 4-3. SHEET AND KING PILES AT NAVSTA MAYPORT



Installation of Anchors

There are multiple types of anchoring systems that can be utilized for a sheet pile wall. These methods include a grouted soil anchor system and a tie back wall system. Regardless of the method, anchor rods will be installed from the new SSP wall to the anchor system. This will require drilling through the old wall to the anchor location behind the wall. In general, this anchor location may lie 40-60 ft behind (shoreward) the existing wall. After the anchor holes are driven, the anchors will be placed in the holes and either the end of the anchor is grouted into the soil or the end of the anchor is attached to the tie back wall system. The tie back wall system normally consists of sheet piles of shortened lengths that are buried below grade.

Placement of Fill Behind Wall

After the anchors are installed, fill operations will be conducted behind the new wall. This will consist of placement of either gravel fill or concrete flowable fill into the space behind the wall; trapped water behind the wall is displaced.

Form and Placement of Pile Cap

After the fill operation has completed, the concrete pile cap will be formed and placed along the top of the new SSP wall. This will consist of installation of either wood or steel forms along the top of the wall down to some point below mean low water elevation. Water will be removed from the forms, steel reinforcement will be placed in the forms, and concrete will be poured to the required elevations.

After the concrete has cured sufficiently, the forms will be removed. A total of 50 polymeric (plastic) fender piles will then be installed (Figure 4-4).

Deck and Utility Replacement

After the pile cap is in place, a new reinforced concrete apron will be installed and the wharf deck repaired by milling and paving. A new high mast lighting system, new security fencing, and new utilities will be installed to replace those that were removed.

As part of the recapitalization of the wharf, new lighting fixtures will be installed. Four 50 ft. tall (15 m.) concrete posts each with two 1,000 watt metal halide luminaires are currently planned. Luminaires will be of the full cut off type to minimize stray light. This lighting profile may slightly increase the total amount of light over current conditions on Wharf C-2, but will be comparable to other areas surrounding the basin.

FIGURE 4-4. POLYMERIC FENDER PILES

Stormwater Bioretention Basin

Construction will result in an increase to impervious surface of 10,100 square feet (.23 acres) located between the existing bulkhead and the new bulkhead. This would cause a slight decrease in infiltration of precipitation and result in localized impacts to stormwater flow in the basin. However, these minor impacts would be localized at the development site and minimized through adherence to best management practices and the Stormwater Pollution Prevention and Environmental Resource Permit conditions (required if total combined impervious surface associated with the proposed development is greater than 9,000 square feet).

Post development stormwater treatment will be required for the new impervious areas. The expanded wharf surface area will not provide any practical areas for the treatment of stormwater. Therefore, NAVSTA Mayport is proposing to collect and treat stormwater from an impervious storage and vehicle parking area located several hundred feet north of Wharf C-2. Stormwater will be directed to an adjacent grassy area where it will be treated in a dry retention biobasin prior to release into the St. Johns River. This location is the closest practical compensatory treatment area to Wharf C-2 and will be capable of treating an area of 16,770 square feet and have a volume of 2,307 cubic feet. The Stormwater Treatment Basin will include four ten foot wide riprap overflows and will be located approximately 50-75 feet from the existing riprap shoreline.

Post-Project Site Restoration

Activities associated with the Project are limited to repair and replacement of existing infrastructure and installation of a stormwater treatment basin in a previously disturbed area. After installation of the stormwater basin, the grassy area will be re-seeded. No other project site restoration will be performed.

Operations and Maintenance

No change in the type or level of operations and maintenance in the action area is anticipated as a result of the Project.

Summary

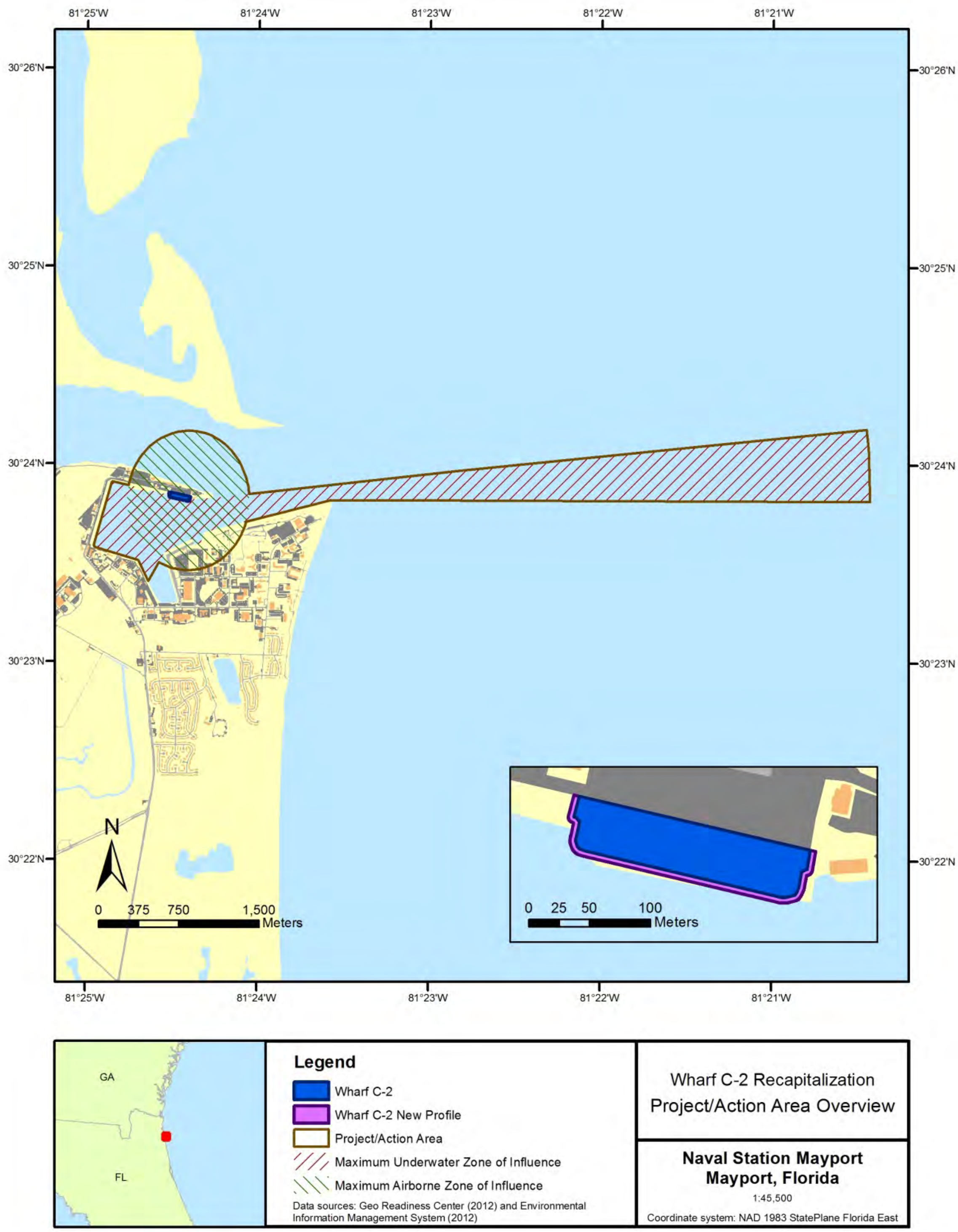
The Project will entail installation of approximately 120 single sheet piles and 119 king piles, requiring a maximum of 50 days of in-water vibratory pile driving work over a 12-month period. Fifty polymeric (plastic) fender piles will also be installed, requiring an additional five days of vibratory driving. The acoustic analysis for vibratory pile driving used the assumption that a maximum of three templates (each consisting of five king piles and four sheet pile pairs) would be driven each day, for a maximum linear distance of approximately 75 ft. Polymeric fender piles to be installed later in the project will be vibratory driven individually, at a rate of approximately 10 piles per day. Impact pile driving would only be used as a contingency in cases when vibratory driving is insufficient. A similar project that was completed at adjacent Wharf Charlie One required impact pile driving on only seven piles. Twenty days have been conservatively allotted for contingency impact driving even though only 2 days of impact pile driving occurred during the adjacent Wharf Charlie One project. Impact pile driving, if it were to be necessary, could occur on the same day as vibratory pile driving, but driving rigs would not be operated simultaneously.

Contingency dredging may be required within the new wharf footprint. If so, a clamshell dredge would be used to remove no more than 4,000 cubic yards. Dredged sediments would be disposed of in accordance with applicable laws and regulations. Direct impacts to marine mammals from dredging typically result from vessel collisions rather than the dredging equipment itself. Indirect effects may include loss or reduction in the quality of foraging sites / resources and possible behavioral effects if the dredging is being performed in aggregation sites (Florida Fish and Wildlife Conservation Commission n.d.). Because the habitat in the turning basin is not considered high quality for any marine mammal species, manatees are not expected to aggregate in the vicinity of dredging operations. Further, dredging – if conducted at all - may take place behind the bulkhead wall, essentially shielding marine mammals from much of the sound and exposure to equipment. Dredging is not addressed further in this BE.

5. Project Action Area

The action area is defined as the immediate vicinity of Wharf C-2 out to the limit of the most distant of the underwater and in-air acoustic thresholds for all protected species being addressed. In the absence of official airborne criteria for any protected species being addressed, the Navy has adopted the City of Jacksonville's airborne noise limit of 64 dBA at any sensitive receptor as the in-air boundary of the action area (Jacksonville Environmental Protection Board 1995). The most distant underwater threshold is the marine mammal behavioral disturbance (120 dB re 1 μPa rms) threshold. Under certain conditions, areas in and outside of the turning basin may have average ambient noise levels exceeding the 120 dB threshold. However, given the lack of actual ambient sound recording data for this location, the Navy has assumed ambient noise levels are below 120 dB re 1 μPa rms. The distance to the 120 dB threshold is therefore the maximum range at which the Navy expects to exert an environmental impact under water, and represents a reasonable boundary for the action area. The airborne and underwater zones of influence were modeled (refer to the Fundamentals of Acoustics and Analysis Addendum for full description of modeling methodologies) and incorporated into a single-boundary layer (Figure 5-1).

FIGURE 5-1. PROJECT ACTION AREA



6. Effects Analysis

Effects to all ESA-listed and ESA-candidate species addressed in this assessment are expected to be of such a scale or duration that they will be discountable with the exception of in-water and airborne noise produced by pile driving and a minor increase in lighting on the wharf surface. The analyses for in-water noise effects to each species and its critical habitat (if applicable) are summarized in Sections 6.3.1 and 6.3.2. Details on the methods employed to determine zones of influence for birds and marine mammals are described in the Fundamentals of Acoustics and Analysis Addendum.

6.1 Direct Effects

Effects on existing bathymetric, sediment, water quality and marine vegetation conditions are expected to be similar throughout the action area. Therefore, they are discussed collectively below, and summarized in Table 6-1.

Bathymetry

The Project is expected to result in only very localized, temporary degradation of the existing bathymetric conditions. The interaction of construction equipment, mooring ground tackle, vessel propeller wash, and anchor and spud placement would result in bottom scour and disturbance to the seafloor, such as mounding and displacement or movement of sediments. Changes to bathymetry would be limited to a highly localized area and would range between 0.5 and 3 ft. near each pile location. The greatest localized change in bathymetry would occur from pile driving and anchor or spud placement. The maximum sediment displacement is likely to result from deployment of a typical vessel or barge anchor (width of up to 3 ft.).

These impacts would be temporary because natural processes that would occur following completion of the Project activities would return the seafloor to near its original profile over time without intervention. A period of six to twelve months would allow for a full seasonal cycle of storm and wind events, tides, etc., and resumption of ambient sediment transport patterns to reshape the seabed to the surrounding environment.

Sediments

The Project is expected to result in only very localized, temporary degradation of the existing sediment conditions. There would be no direct discharge of wastes to the marine environment during construction. Effects to sediment quality would be limited to localized changes associated with disturbances of bottom sediments from pile removal and installation over the 18 month period. Setting spuds and anchors for the barges, as required, and propeller wash from tugs represent other sources for disturbance of bottom sediments. BMPs and minimization measures, discussed in Section 6.1, will be employed to prevent accidental losses or spills of construction debris into waters at each installation.

Some degree of localized changes in sediment composition may occur as a result of in-water construction activities. In particular, sediments that are re-suspended would be dispersed by currents and eventually re-deposited on the bottom. The distance over which suspended sediments are dispersed would depend on a number of factors, such as the sediment characteristics, currents, and height above the bottom. Project-related construction activities would not create sediment contamination concentrations or physical changes that violate state standards or interfere with beneficial uses of waters in the action area.

Water Quality

The Project is expected to result in only very localized, temporary degradation of the existing water quality. Direct discharges of waste to the marine environment will not occur. Impacts to water quality would be limited to short-term and localized changes associated with re-suspension of bottom sediments from pile removal and installation and barge and tug operations, such as anchoring and propeller wash. These changes would be spatially limited to the immediate action area. Construction-related impacts would not violate applicable state or federal water quality standards. BMPs and minimization measures, discussed in Section 6.1, will be employed to prevent accidental losses or spills of construction debris or hazardous materials into the waters at each installation.

The installation of a stormwater treatment basin near the project site will mitigate potential impacts to water quality from an increase in impervious surface area. The riprap overflows and riprap shoreline would diffuse the freshwater overflow into the St. Johns River resulting in a minor improvement in water quality in the project area.

Marine Vegetation

The Project is expected to result in only very localized, temporary degradation of the existing marine vegetation conditions at each installation. Any debris from pile removal would be collected and disposed of and would not impact marine vegetation. Based on the disturbance regime in the turning basin (regular dredging, high level of vessel traffic and propeller wash disturbance, the overall quality of marine vegetation is considered degraded and will not improve or decrease. Because the Project may result in an expansion of the Wharf C-2 deck by a maximum of 15 ft. from its current footprint, displacement of up to of 1,322 m^2 of existing vegetation may occur. Any shading that occurs from barges will be temporary in nature, and is not expected to have an effect on marine vegetation.

Decreased water and sediment quality can impede the growth of marine vegetation important to fish and other animals, and promote the growth of harmful algae. Impacts to water quality from the Project would be limited to temporary and localized changes associated with re-suspension of bottom sediments. Similarly, pile driving activities would not discharge contaminants or otherwise appreciably alter the concentrations of trace metal or organic contaminants in bottom sediments.

Direct removal of marine vegetation during the Project could occur through anchor and spud placement, as required, and removal of deteriorating piles. It is estimated that a maximum of 1,421 m^2 of benthic habitat could be disturbed or displaced in the action area over the 18 month (1,322 m^2 by the potential maximum expansion of the wharf footprint, and 99 m^2 by the piles themselves). Any vegetative growth found on existing piles would be removed when those piles are extracted from the water but because piles would be replaced, ultimately the same amount of surface area on which marine organisms could colonize would exist. Because marine vegetation does not occur densely in the area immediately surrounding Wharf C-2, direct removals should be minimal.

TABLE 6-1. POTENTIAL IMPACTS TO BATHYMETRY, SEDIMENTS, WATER QUALITY, AND MARINE VEGETATION RESULTING FROM PROJECT ACTIVITIES

Aspect	Determination
Timing	May take place for up to 70 days over the course of the project, year-round.
Proximity[1]	May occur only in the immediate vicinity of Wharf C-2
Duration	18 months (September 2013 – March 2015)
Frequency	May occur on any day that pile driving / extraction is taking place, or that barges / vessels are repositioned
Distribution	Immediate vicinity of Wharf C-2
Expected recurrence	Will not occur once repair activities are complete

[1]contingency clamshell dredging, if needed, may be conducted outside of the 70 day pile driving timeframe**;** [2]Some sediment deposition may occur a distance from the individual piles or location of anchor deployment depending on currents and sediment characteristics; however, no sediment deposition / disturbance is expected to occur outside the action area.

6.1.1 Marine Mammals – West Indian Manatee

Determination

The Project may affect, but is not likely to adversely affect, West Indian manatees; and will have no effect on West Indian manatee critical habitat.

Effects from Changes to Water Quality

No direct impacts to West Indian manatees are expected due to changes in water quality during construction. Water quality would be impacted during vessel operations, installation of new piles, and contingency dredging because bottom sediments would be temporarily resuspended. Resuspended sediments would increase turbidity and reduce dissolved oxygen periodically during in-water construction activities, as discussed above. The overall level of sediment disturbance associated with the Project will be significantly lower than that of maintenance dredging in the turning basin, and resuspended sediments are expected to dissipate within a few hours (National Marine Fisheries Service 2009). Thus marine mammals exposed to resuspended sediments are not likely to be impacted by contaminants. The activities that generate suspended sediments would be short-term and localized and suspended sediments are expected to disperse and/or settle rapidly. Moreover, marine mammals are expected to avoid the immediate construction area due to increased vessel traffic, noise and human activity.

The installation of a stormwater treatment basin near the project site will mitigate potential impacts to water quality from an increase in impervious surface area. The riprap overflows and riprap shoreline would diffuse the freshwater overflow into the St. Johns River resulting in a minor improvement in water quality in the project area, and is not expected to result in any impacts to West Indian manatees.

Effects from Pile Driving Noise

The effects of pile driving noise on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. Impacts to marine mammals from pile driving activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The further away from the source, the less intense the exposure should 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 which are soft (i.e. sand) will absorb or 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 forceful equipment, which would ultimately decrease the intensity of the acoustic source.

Impacts to marine species are expected to be the result of physiological responses to both the type and strength of the acoustic signature (Viada et al. 2008). Behavioral impacts are also expected, though the type and severity of these effects are more difficult to define due to limited studies addressing the behavioral effects of impulsive sounds on marine mammals. Potential effects from impulsive sound sources can range from brief acoustic effects such as behavioral disturbance, tactile perception, physical discomfort, slight injury of the internal organs and the auditory system, to death of the animal (Yelverton et al. 1973; O'Keeffe and Young 1984).

Behavioral Effects from Pile Driving Noise

Behavioral responses to sound can be highly variable. For each potential behavioral change, the magnitude of the change ultimately determines the severity of the response. A number of factors may influence an animal's response to noise, including its previous experience, its auditory sensitivity, its biological and social status (including age and sex), and its behavioral state and activity at the time of exposure. Habituation occurs when an animal's response to a stimulus such as pile driving noise 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 swimming speed, increased surfacing time, and cessation of foraging in the affected area would indicate disturbance or discomfort.

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway et al. 1997; Finneran et al. 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices and including pile driving) have been varied, but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds 2002; also see reviews in Gordon et al. 2004; Wartzok et al. 2003; and Nowacek et al. 2007).

Studies of marine mammal responses to non-impulsive noise, such as vibratory pile installation, 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 and Research Corporation 2009). 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. Background noise levels at this port are typically at 125 dB.

A comprehensive review of acoustic and behavioral responses to noise exposure by Nowacek et al. (2007) concluded that one of the most common behavioral responses is displacement. To assess the significance of displacements, it is necessary to know the areas to which the animals relocate, the quality of that habitat, and the duration of the displacement in the event that they return to the pre-disturbance area. Short-term displacement may not be of great concern unless the disturbance happens repeatedly. Similarly, long-term displacement may not be of concern if adequate replacement habitat is available.

Discussion

No physiological effects to West Indian manatees are expected from activities associated with the Project for several reasons. First, vibratory pile driving which is being utilized as the primary installation method does not generate high enough peak sound pressure levels that are commonly associated with physiological damage. Impact pile driving, if needed, will only occur for a short period of time (no more than 45 seconds to a minute per pile) and only if an obstruction such as a broken timber pile or broken segment of a ship rail is encountered in the sediment. While an estimate of a total of 70 days of pile driving for the Project has been used, the potential exposure time for pile driving noise on any given day is limited to approximately 45 minutes (Table 6-2). Additionally, the standard operation procedures that the Navy will be employing (Section 6.5) will greatly reduce the chance that a West Indian manatee may be injured by a vessel collision or exposed to sound pressure levels that could cause physical harm. Furthermore, the Navy will have observers monitoring a shutdown zone of no less than 50 ft. (15 m) from any pile being driven to ensure no marine mammals are injured.

TABLE 6-2. CONSERVATIVE ESTIMATE OF DAILY EXPOSURE TO PILE DRIVING NOISE

<table>
<tr><th>Pile Type</th><th>Notional Duration to Drive Pile</th><th>Max Piles per Day[1]</th><th>Max Total Time in a 24-hour Period</th></tr>
<tr><td>Steel King</td><td rowspan="3">1 minute[3]</td><td>15</td><td rowspan="2">30 minutes</td></tr>
<tr><td>Paired Steel Sheet</td><td>12</td></tr>
<tr><td>Polymeric</td><td>10</td><td>10 minutes[2]</td></tr>
</table>

[1]Assumes three templates (a template is a set of five king piles and four sheet piles); daily average number of templates is expected to be closer to two; these numbers are estimates for calculation purposes only and do not constitute work performance limits; [2]polymeric piles will not be driven on the same day as the king and paired sheet piles; total times are conservative estimates only and do not represent limits for daily pile driving work; [3]each pile is expected to take 45 seconds to a minute to install based on measurements on a similar project at NAVSTA Mayport.

The time required to drive each pile and the number of piles to be driven each day were determined using very conservative guidelines. Further, driving will be intermittent throughout the day, and no species is expected to remain static in the vicinity of the action area.

While no studies specific to West Indian manatee behavioral responses to pile driving noise have been conducted, Gerstein et al. (1999) obtained behavioral audiograms for two West Indian manatees and found an underwater hearing range of approximately 400 Hz – 76 kHz, with best sensitivity around 16 – 18 kHz. Mann et al. (2009) obtained masked behavioral audiograms from two manatees; sensitivity was shown to range from 250 Hz – 90 kHz, although the detection level at 90 kHz was 80 dB above the manatee's frequency of best sensitivity (16 kHz). This audible frequency range is similar to that of phocids (Gerstein et al. 1999; Southall et al. 2007). Some studies of acoustic harassment and acoustic deterrence devices have found habituation in resident populations of seals and harbor porpoises (see review in Southall et al. 2007). Blackwell et al. (2004) found that ringed seals exposed to underwater pile driving sounds in the 153–160 dB rms range tolerated this noise level and did not seem unwilling to dive. One individual was as close as 207 ft. (63 meters [m]) from the pile driving. Responses of two pinniped species to impact pile driving at the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project were mixed (California Department of Transportation 2001; Thorson & Reyff 2006; Thorson 2010). Harbor seals were observed in the water at distances of approximately 1,312 – 1,640 ft. (400–500 m) from the pile driving activity and exhibited no alarm responses, although several showed alert reactions, and none of the seals appeared to remain in the area. One of these harbor seals was even seen to swim to within 492 ft. (150 m) of the pile driving barge during pile driving.

West Indian manatees encountering pile driving operations over the course of the Project may avoid affected areas in which they experience noise-related discomfort, limiting their ability to forage or rest there. A shift in focus from resting to 'purposeful' behavior has also been noted in West Indian manatees exposed to elevated noise levels (Miksis-Olds and Wagner 2011). As described in the section above, individual responses to pile driving noise are expected to be variable. Some individuals may occupy the activity area during pile driving without apparent discomfort, but others may be displaced with undetermined long-term effects. The absence of quality foraging habitat in the action area leads to the expectation that any changes in West Indian manatees' behavior would be limited to temporary shifts in swimming speed or surfacing time.

Noise-related disturbance may also inhibit some individuals' transiting of the area. Given the duration of the project there is a potential for displacement of West Indian manatees from the action area due to these behavioral disturbances during the in-water work period. However, habituation may occur resulting in a decrease in the severity of response. One study suggests that West Indian manatees' foraging behavior may be more likely to be affected by ambient noise levels during morning hours (Miksis-Olds et al. 2007). Since pile driving will only occur during daylight hours, marine mammals transiting the activity area, foraging or resting in the action area at night will not be affected. Effects of pile driving activities will be experienced by individual marine mammals, but will not cause population-level impacts or affect the continued survival of the species. These effects would be considered insignificant for individual West Indian manatees, and discountable for the species as a whole. Table 6-3 summarizes the analysis of potential effects to West Indian manatees.

TABLE 6-3. ANALYSIS OF NOISE EFFECTS TO THE WEST INDIAN MANATEE

Species Presence / Occurrence in Action Area	Year-round (more common in winter), occasional[1]
Timing of Potential Effects	Year-round
Proximity of Effects	No official criteria for injury or disturbance resulting from pile driving noise have been established. Potential effects can be expected to correlate positively with proximity to Wharf C-2 when pile driving is taking place. However, implementation of shutdown measures is expected to minimize the likelihood of injurious and behavioral effects from Project noise.
Duration of Effects	70 days, not projected to exceed more than 45 net minutes per day
Frequency / Distribution of Effects	Intermittent; may occur on any day that pile driving is taking place
Expected Recurrence of Effects	Will not occur once Project activities are complete
Conclusion	Based on the low likelihood of occurrence in the action area, as well as the Navy's commitment to monitor the zone around the project location and shut down pile driving activities should an individual be observed (Section 6.5), a **may affect, not likely to adversely affect** determination was made for the West Indian manatee.

[1]Occasional – irregular during season; present in low densities and records infrequent: few records, erratic in occurrence due either to very little suitable habitat or very low population densities.

No effects to critical habitat for the West Indian manatee are expected to result from in-water noise generated by the Project. Other effects such as short term reductions in water quality may occur, but are expected to be temporary and highly localized to the immediate vicinity of Wharf C-2. Therefore, a **no effect** determination was made for West Indian manatee critical habitat.

6.1.2 Birds – Piping Plover, Wood Stork, Red Knot

Determination

The Project may affect, but is not likely to adversely affect, piping plovers, wood storks, and red knots; and will have no effect on piping plover critical habitat.

Effects from Pile Driving Noise

Although hearing range and sensitivity has been measured for many land birds, little is known of seabird hearing. The majority of the published literature on bird hearing focuses on terrestrial birds and their ability to hear in air. A review of 32 terrestrial and marine species reveals that birds generally have greatest hearing sensitivity between 1 and 4 kHz (Beason 2004; Dooling 2002). Very few can hear below 20 Hz, most have an upper frequency hearing limit of 10 kHz, and none exhibit hearing at frequencies higher than 15 kHz (Dooling 2002; Dooling et al. 2000). Hearing capabilities have been studied for only a few seabirds (Beason 2004; Beuter et al. 1986; Thiessen 1958; Wever et al. 1969); these studies show that seabird hearing ranges and sensitivity are consistent with what is known about bird hearing in general. No official sound level criteria for pile driving noise effects to birds have been established with the exception of the marbled murrelet in the Pacific Northwest. Details of the Project acoustic analysis can be

Numerous studies have documented that birds and other wild animals respond to human-made noise, including aircraft overflights, weapons firing, and explosions (Larkin et al. 1996; National Parks Service 1994; Plumpton et al. 2006). The manner in which birds respond to noise depends on several factors, including life history characteristics of the species; characteristics of the noise source, sound source intensity, onset rate, distance from the noise source, presence or absence of associated visual stimuli, and previous exposure. Researchers have documented a range of bird behavioral responses to noise, including no response, alert behavior, startle response, flying or swimming away, diving into the water, and increased vocalizations (Larkin et al. 1996; National Parks Service 1994; Plumpton et al. 2006; Pytte et al. 2003). Some behavioral responses are likely accompanied by physiological responses, such as increased heart rate or stress.

Chronic stress due to disturbance can compromise the general health of birds, but stress is not necessarily indicative of negative consequences to individual birds or to populations (Bowles et. al. in Larkin et al. 1996; National Parks Service 1994). For example, the reported behavioral and physiological responses of birds to noise exposure are within the range of normal adaptive responses to external stimuli, such as predation, that birds face on a regular basis. Unless repeatedly exposed to loud noises or simultaneously exposed to multiple stressors, it is possible that individuals would return to normal almost immediately after exposure, and the individual's metabolism and energy budget would not be affected. Studies have also shown that birds can habituate to noise following frequent exposure and cease to respond behaviorally to the noise (Larkin et al. 1996; National Parks Service 1994; Plumpton et al. 2006). Little is known about physiological stress responses of birds that have habituated to noise.

Physiological Effects from Pile Driving Noise

If a bird is close to an impulsive sound source, the exposure to high pressure levels can cause barotraumas. Barotrauma is physical injury due to a difference in pressure between an air space inside the body and the surrounding air or water. Damage could occur to the structure of the ear, resulting in hearing loss, or to internal organs, causing hemorrhage and rupture. If a bird is close to an intense sound source, it could suffer hearing loss due to fatigue of the hair cells of the ear. Studies have examined hearing loss and recovery in only a few species of birds, and none studied hearing loss in seabirds (e.g., (Hashino et al. 1988; Ryals et al. 1999; Ryals et al. 1995; Saunders and Dooling 1974). Unlike other species, birds have the ability to regenerate hair cells in the ear, usually resulting in considerable anatomical, physiological, and behavioral recovery within several weeks. Still, intense exposures are not always fully recoverable, even over periods up to a year after exposure, and damage and subsequent recovery vary significantly by species (Ryals et al. 1999). Birds may be able to protect themselves against damage from sustained sound exposures by regulating inner ear pressure, an ability that may protect ears while in flight (Ryals et al. 1999). Auditory fatigue can impair an animal’s ability to hear biologically important sounds within the affected frequency range. Biologically important sounds come from social groups, potential mates, offspring, or parents; environmental sounds; or predators.

Behavioral Effects from Pile Driving Noise

Seismic surveys had no noticeable impacts on the movements or diving behavior of long-tailed ducks undergoing wing molt, a period in which flight is limited and food requirements are high (Lacroix et al. 2003). The birds may have tolerated the seismic survey noise to stay in preferred feeding areas. The sensitivity of birds to disturbance may also vary during different stages of the nesting cycle. Similar noise levels may be more likely to cause nest abandonment during incubation of eggs than during brooding of chicks because birds have invested less time and energy and have a greater chance of re-nesting (Knight and Temple 1986).

Discussion

Piping plovers and red knots do not breed in Florida (U.S. Fish and Wildlife Service 1999, Cornell Laboratory of Ornithology n.d.). The closest wood stork nesting colony is well outside of the action area (4.8 miles [7.7 kilometers] to the northwest at Timucaun Ecological Reserve) and any elevated noise levels will have attenuated to normal ambient conditions by the time they reach the rookery. All three species forage in nearshore areas; however, the Project action area does not contain high quality habitat. Therefore, it is expected that any exposure to pile driving noise would be take place in the airborne environment (none of the species are divers), while the birds are resting or transiting the area.

Some birds may exhibit an annoyance or startle reaction and flee from the action area; however, behavioral responses and displacement from the area are expected to be temporary for the duration of the pile driving activities. These conservative assumptions, combined with the relatively low likelihood of occurrence in the action area due to lack of high quality foraging and nesting habitat, result in a conclusion that any effects to ESA-listed or candidate species will be insignificant. Table 6-4 summarizes the effects analysis for piping plovers, wood storks, and red knots.

TABLE 6-4. ANALYSIS OF NOISE EFFECTS TO PIPING PLOVERS, WOOD STORKS, AND RED KNOTS

	Piping Plover	Wood Stork	Red Knot
Species Presence / Occurrence in Action Area	Winter, rare[1]	Year-round, occasional[2]	Winter, rare
Timing of Potential Effects	Year-round		
Proximity of Effects	No official criteria for injury or disturbance resulting from pile driving noise have been established. Potential effects can be expected to correlate positively with proximity to Wharf C-2 when pile driving is taking place. However, low likelihood of occurrence in the action area combined with implementation of shutdown measures is expected to minimize the likelihood of injurious and behavioral effects from Project noise.		
Total Duration of Effects	70 days, not projected to exceed more than 45 net minutes per day		
Frequency / Distribution of Effects	Intermittent; may occur on any day that pile driving is taking place		
Expected Recurrence of Effects	Will not occur once Project activities are complete		
Conclusion	Based on the low likelihood of occurrence in the action area, as well as the Navy's commitment to monitor the zone around the project location and shut down pile driving activities should an individual be observed within 50 ft. of the in-water activity location (Section 6.5), a **may affect, not likely to adversely affect** determination was made for the piping plover, wood stork, and red knot.		

[1]rare = few records, erratic in occurrence due either to very little suitable habitat or very low population densities; [2]occasional = irregular either during the seasons indicated or in annual frequency, present in low densities and records infrequent

No effects to primary constituent elements of critical habitat for the piping plover are expected to result from in-water noise generated by the Project. Other effects such as short term reductions in water quality may occur, but are expected to be temporary and highly localized to the immediate vicinity of Wharf C-2. Therefore, a **no effect** determination was made for piping plover critical habitat.

6.2 Indirect Effects

Indirect effects are caused by the action and occur later in time after the action is completed. Effects for the duration of the Project have been addressed in this BE. With the exception of an increase in lighting on the wharf, conditions are expected to return to their previous state within a relatively short amount of time of completion of the Wharf C-2 recapitalization project. Sound in the water will return to normal ambient levels immediately upon completion of in-water work. As discussed in Section 6.1, baseline conditions such as bathymetry, sediment, water quality and marine vegetation are expected to return to prior states within hours (in the case of sediments and water quality) to a few months (in the case of bathymetry and marine vegetation) under normal deposition and succession regimes. With the exception of a slight projected increase in the Wharf C-2 footprint (up to 15 ft. beyond existing dimensions – see Marine Vegetation under Section 6.1) and a minor increase in wharf lighting, no permanent alteration of predator / prey relationships, habitat, or existing facility use is anticipated, and no new negative effects to species or their habitat are expected to begin once the Project is complete.

6.2.1 Sea Turtles – Green turtle, Leatherback Turtle, Loggerhead Turtle

Determination
The Project may affect, but is not likely to adversely affect, green turtles, leatherback turtles, and loggerhead turtles; and will have no effect on green turtle and leatherback turtle critical habitat.

Effects from Change in Lighting Regime

Sea turtle hatchlings emerging from nests use lighting cues to navigate towards the water. Previous studies have demonstrated that light from anthropogenic sources on the land-side of a beach can affect the behavior of hatchlings, causing them to move away from the water and exposing them to threats including increased predation, disorientation, and death. The nearest nesting beach is along the Atlantic shore of Huguenot Memorial Park across the St. Johns River 3,000 ft. (1,000 m.) away; other nesting areas include the Atlantic Ocean shoreline of NS Mayport. Given the distance and visual obstructions between known nesting beaches and Wharf C-2, hatchlings in these areas are unlikely to be affected by a minor increase in lighting in the Project Area.

Discussion
As part of the recapitalization of the wharf, new lighting fixtures will be installed. Four 50 ft. tall (15 m.) concrete posts each with two 1,000 watt metal halide luminaires are currently planned. Luminaires will be of the full cut off type to minimize stray light. This lighting profile may slightly increase the total amount of light over current conditions on Wharf C-2, but will be comparable to other areas surrounding the basin. Though these lights do not meet FWC turtle safe recommendations (low wattage, height less than 12 ft. [4 m.], and long wavelengths [red/orange]), installation of turtle-safe lighting would compromise OSHA and ATFP requirements, and as such cannot be accommodated. The Mayport basin is already a highly industrialized area and the new lights will not appreciably change the overall lighting at the installation. The nearest nesting beach is in Huguenot Memorial Park across the St. Johns River 3,000 ft. (1,000 m.) away. If possible, lights will be directed away from the river. It is not anticipated that this minor change in the overall lighting profile will adversely affect any nearby emerging hatchlings.

TABLE 6-5. ANALYSIS OF EFFECTS OF CHANGE IN LIGHTING REGIME TO SEA TURTLES

Species	Green Turtle	Loggerhead Turtle	Leatherback Turtle
Species Presence / Occurrence in Action Area	Occasional year round with a peak during nesting season. Nesting: June - September	Common year round with a peak during nesting season. Nesting: May - August	Occasional year round with a peak during nesting season. Nesting: March - August
Timing of Potential Effects	Year-round		
Proximity of Effects	Potential effects will be centered on the Wharf C-2 action area, with a minor increase in amount of light on the wharf.		
Duration of Effects	Permanent		
Conclusion	Based on the current lighting in and around the highly industrialized action area and the relatively minor increase in the amount of light at Wharf C-2, **a may affect, not likely to adversely affect** determination was made for green turtles, loggerhead turtles, and leatherback turtles.		

[1]Rare: few records, erratic in occurrence due either to very little suitable habitat or very low population densities; Occasional - irregular either during the seasons indicated or in annual frequency; present in low densities and records infrequent; Extralimital: extremely rare; not expected to occur in the action area

A **no effect** determination was made for green turtle and leatherback turtle critical habitats, based on distance from the action area.

6.3 Interrelated and Interdependent Actions and Activities

There are no interrelated or interdependent actions / activities associated with the Project.

6.4 Cumulative Effects

Cumulative effects include state, tribal, local, and private activities that are reasonably certain to occur within the action area and are likely to affect the ESA-listed species considered in this biological assessment. Cumulative effects do not include any federal actions.

Identified below are several nonfederal actions that occur or could occur in the vicinity of the action area. Other nonfederal projects may be taking place in the action area, and it can be expected that they will undergo ESA Section 7 consultation through the Army Corps of Engineers' permitting process; therefore, they are not discussed here.

Jacksonville Port Authority Dames Point Marine Terminal Intermodal Container Transfer Facility Draft Environmental Assessment

The original Jacksonville Port Authority, now known as JAXPORT, was created by a special act of the Florida Legislature in 1963 to develop, maintain and market Jacksonville's port facilities.

Since the creation of JAXPORT, marine port operations in Jacksonville have continued to grow. The purpose of the Intermodal Container Transfer Facility is to provide access to rail transportation for in-bound container ships, overseas shipments and shippers who use highway semi-trailers and containers, and by attracting new distribution, manufacturing, and warehousing development to its vicinity, significantly decreasing the economic and environmental cost for draying trailers and containers between the Dames Point Marine Terminal and shippers' and receivers' facilities. The Intermodal Container Transfer Facility is needed to 1) add new rail access to support operations on Dames Point and the continued growth of JAXPORT; 2) stay economically competitive in the global marketplace; and 3) stimulate economic growth and provide jobs to a depressed local economy. The proposed action would involve a five track rail yard extending from the existing rail line, two to six rubber tired gantry cranes, a paved area for containers, and several support uses including a road and gate for truck movement of cargo, a parking area, and stormwater retention facilities.

Effects resulting from this project would likely occur as increased noise and traffic in the terrestrial environment, limiting potential cumulative effects to listed bird species. However, based on the distance of the Dames Point Marine Terminal from the action area (approximately 8 miles [13 kilometers]), the zone of influence for airborne noise is not expected to overlap with that of the Project. Further, the Draft Environmental Assessment (Jacksonville Port Authority 2012) concluded that there would be no effect to wood storks, the only listed species in common with the Wharf C-2 project. If activities for the two projects were to overlap in time, the potential for cumulative effects from pile driving and construction noise would be slightly higher than if they did not overlap. Overall, the potential for cumulative effects to listed species is very low.

Village of Mayport Community and Economic Development

The Village of Mayport is the oldest, continually occupied community in Duval County. The Mayport Waterfront Partnership was created by the cities of Atlantic Beach and Jacksonville in 1997 to bring economic revitalizing to the eastern shore of Duval County. The Partnership's zone of interest includes the North Jacksonville barrier islands, the Village of Mayport, and Ft. George and Fanning Islands. In 1998, the State of Florida designated the Village of Mayport as one of the first three waterfront communities in need of revitalization. In recent years, the Partnership oversaw the installation of a $4.2 million sanitary sewer line and the upgrading of water lines in the commercial section of the Village of Mayport. Also, the Waterfront Partnership wrote and sponsored the Mayport Village Overlay Zone Regulations, which provide protection for characteristics unique to the village (City of Jacksonville 2012).

Continued residential and commercial development along the shorelines and in the nearshore waters off Mayport would result in increased airborne and underwater noise, pollution, and human presence.

Marine Vessel Traffic

The nearshore areas of NAVSTA Mayport, near the Jacksonville commercial port in particular, are heavily traveled by commercial, recreational, and government marine vessels. Recreational activities in the area consist primarily of motorboating, sport fishing, jetskiing, waterskiing, shellfishing, shrimping, sailing, sport diving, and bird and whale watching. Recreational boats range throughout the coastal waters, depending on season and weather conditions. A commercial ferry crosses the St. Johns River between Mayport, Florida, and Fort George Island, Florida.

The effects of high density boat and ship traffic on the environment and listed species include, but are not limited to, reduced water quality, increased turbidity and sediment suspension, increased risk of collisions, and elevated underwater and airborne noise levels (Bassett et al. 2012). Studies have suggested that vessel traffic may negatively impact foraging effort in other marine mammals (Lusseau et al. 2009); the same effects could occur in other listed marine species such as West Indian manatees. However, it is not possible to quantify the number of individual manatees - or birds - that could be affected or the scope or timing of such effects.

Climate Change

Climate change will likely cause alterations to hydrologic conditions within the action area. The southeastern U.S. has experienced a two degree increase in average temperatures since the 1970s (U.S. House of Representatives 2013). Changes to local hydrology could affect both marine and avian species as fresh- and saltwater mixing regimes change as a result of climate impacts to hydrology.

Studies have indicated that changes in climate could affect shorebird migration patterns (Farmer and Wiens 1998), habitat (Matthews et al. 2011), and distribution (Schippers et al. 2011).

Summary

Based on the geographic and temporal distribution of the projects and activities described above, cumulative effects to fish, marine mammals, and sea turtles are expected to be minimal. Other projects and activities, such as commercial and recreational fishing and boating, and shellfish harvest, may be considered a part of the environmental baseline because they are ongoing actions.

Overall, West Indian manatees exposed to underwater noise or reduced water quality would most likely experience temporary, noninjurious effects. Effects would be magnified only if the activities were to occur simultaneously with Project activities. As with West Indian manatees, cumulative effects to piping plovers, wood storks and red knots are expected to be minimal, and in most cases occur only as a result of simultaneous implementation of the above-referenced projects and Wharf C-2 activities. Behavioral effects similar to those described in Section 6.3.2, may occur during construction activities, but would be expected to return to normal within a short amount of time following cessation of the activities. Effects would be magnified only if the activities were to occur simultaneously with Project activities.

Given the already highly industrialized nature of the project area, a minor increase in permanent lighting on Wharf C-2 is unlikely to adversely affect hatchling sea turtles. Cumulative effects from other projects will be regulated under Florida and U.S. Fish and Wildlife Service management procedures for mitigating impacts to nesting and hatchling sea turtles.

6.5 Standard Operating Procedures

The Navy will employ the measures listed in this section to avoid and minimize impacts to marine mammals, fish, and sea turtles; their habitats; and forage species. BMPs are intended to avoid and minimize potential environmental impacts. BMPs and standard operating procedures (SOPs) are included in the construction contract plans and specifications and must be agreed upon by the contractor prior to any construction activities. Upon signing the contract, it becomes a legal agreement between the contractor and the Navy. Failure to follow the prescribed BMPs and SOPs is a contract violation.

6.5.1 General Construction Best Management Practices

- All work will adhere to performance requirements of the Clean Water Act, Section 404 permit and Section 401 Water Quality Certification. No in-water work will begin until after issuance of regulatory authorizations.
- The construction contractor is responsible for preparation of an Environmental Protection Plan. The plan will be submitted and implemented prior to the commencement of any construction activities and is a binding component of the overall contract. The plan shall identify construction elements and recognize spill sources at the site. The plan shall outline BMPs, responsive actions in the event of a spill or release, and notification and reporting procedures. The plan shall also outline contractor management elements such as personnel responsibilities, project site security, site inspections, and training.
- No petroleum products, lime, chemicals, or other toxic or harmful materials shall be allowed to enter surface waters.
- Washwater resulting from washdown of equipment or work areas shall be contained for proper disposal, and shall not be discharged unless authorized.
- Equipment that enters surface waters shall be maintained to prevent any visible sheen from petroleum products.
- No oil, fuels, or chemicals shall be discharged to surface waters, or onto land where there is a potential for re-entry into surface waters will occur. Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. shall be checked regularly for leaks and will be maintained and stored properly to prevent spills.
- No cleaning solvents or chemicals used for tools or equipment cleaning shall be discharged to ground or surface waters.
- Construction materials will not be stored where high tides, wave action, or upland runoff could cause materials to enter surface waters.
- Barge operations will be restricted to tidal elevations adequate to prevent grounding of a barge.

6.5.2 Pile Removal and Installation Best Management Practices

- A containment boom surrounding the work area shall be used during creosote-treated pile removal to contain and collect any floating debris and sheen. In some cases, the boom may be lined with oil-absorbing material to absorbed released creosote.

- Oil-absorbent materials shall be used in the event of a spill if any oil product is observed in the water.
- All creosote-treated material and associated sediments shall be disposed of in a landfill that meets Florida environmental standards.
- Removed piles and associated sediments (if any) shall be contained on a barge. If a barge is not utilized, piles and sediments may be stored in a containment area near the construction site.
- Piles that break or are already broken below the waterline may be removed by wrapping the piles with a cable or chain and pulling them directly from the sediment with a crane. If this is not possible, they shall be removed with a clamshell bucket. To minimize disturbance to bottom sediments and splintering of piles, the contractor shall use the minimum size bucket required to pull out piles based on pile depth and substrate. The clam shell bucket shall be emptied of piles and debris on a contained barge before it is lowered into the water. If the bucket contains only sediment, the bucket shall remain closed and be lowered to the mud line and opened to redeposit the sediment. In some cases (depending on access, location, etc.), piles may be cut below the mud line and the resulting hole backfilled with clean sediment.
- Any floating debris generated during installation shall be retrieved. Any debris in a containment boom shall be removed by the end of the work day or when the boom is removed, whichever occurs first. Retrieved debris shall be disposed of at an upland disposal site.
- Whenever activities that generate sawdust, drill tailings, or wood chips from treated timbers are conducted, tarps or other containment material shall be used to prevent debris from entering the water.
- If excavation around piles to be replaced is necessary, hand tools or a siphon dredge shall be used to excavate around piles to be replaced.

6.5.3 Timing Restrictions

All in-water construction activities will occur during daylight hours (sunrise to sunset[3]). Non in-water construction activities could occur between 6:00 a.m. and 10:00 p.m. during any time of the year.

6.5.4 Additional Minimization Measures for Marine Species

Potential effects to listed species from Project activities are discussed above in Sections 6.1.1 and 6.1.2. The following measures will be implemented during pile driving to avoid and minimize exposure to noise levels that could cause injury or behavioral disturbance for all ESA-listed species.

[3] Sunrise and sunset are to be determined based on the National Oceanic and Atmospheric Administration data which can be found at: http://www.srrb.noaa.gov/highlights/sunrise/sunrise.html.

Coordination

The Navy shall conduct a pre-construction briefing with the contractor. During the briefing, all personnel working in the Project vicinity will watch the Navy's Marine Species Awareness Training video. Information will also be provided on how to identify piping plovers, wood storks, and red knots.

Acoustic Minimization Measures

Vibratory installation will be used to the extent possible to drive steel piles to minimize higher sound pressure levels associated with impact pile driving. Polymeric piles will be driven exclusively with the vibratory hammer.

Soft Start

The objective of a soft-start is to provide a warning and/or give animals in close proximity to pile driving a chance to leave the area prior to an impact driver operating at full capacity; thereby exposing fewer animals to loud underwater and airborne sounds. A soft start procedure will be used at the beginning of each day's impact pile driving (only if impact driving is required), or if impact pile driving has ceased for more than one hour.

The contractor will provide an initial set of strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, then two subsequent sets. (The reduced energy of an individual hammer cannot be quantified because they vary by individual drivers. Also, the number of strikes will vary at reduced energy because raising the hammer at less than full power and then releasing it results in the hammer "bouncing" as it strikes the pile resulting in multiple "strikes").

Standard Conditions

Conditions in this section include those that will be followed for the protection of all listed species, not only those being addressed in this evaluation. The contractor will adhere to all requirements of the following:

- 2009 Standard Manatee Conditions for In-Water Work (Appendix C)
- Sea Turtle and Smalltooth Sawfish Construction Conditions (Appendix D)
- Southeast Regional Marine Mammal and Sea Turtle Viewing Guidelines (Appendix E)

Sea Turtle Lighting Conditions

- Lighting on construction equipment shall be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the nearby marine turtle nesting beach while still being consistent with human safety requirements.

- All permanent exterior lighting fixtures associated with the wharf redevelopment should be assessed by NAVSTA Mayport Environmental Department and designed according to the NAVSTA Mayport Light Management Plan to minimize light contribution to urban sky glow which could be visible from the marine turtle nesting beach.

Visual Monitoring and Shutdown Procedures

A separate Marine Species Monitoring Plan is being submitted to NMFS and USFWS; it includes all details for Project monitoring efforts. Major components of the monitoring plan are summarized below.

Observers and Procedures

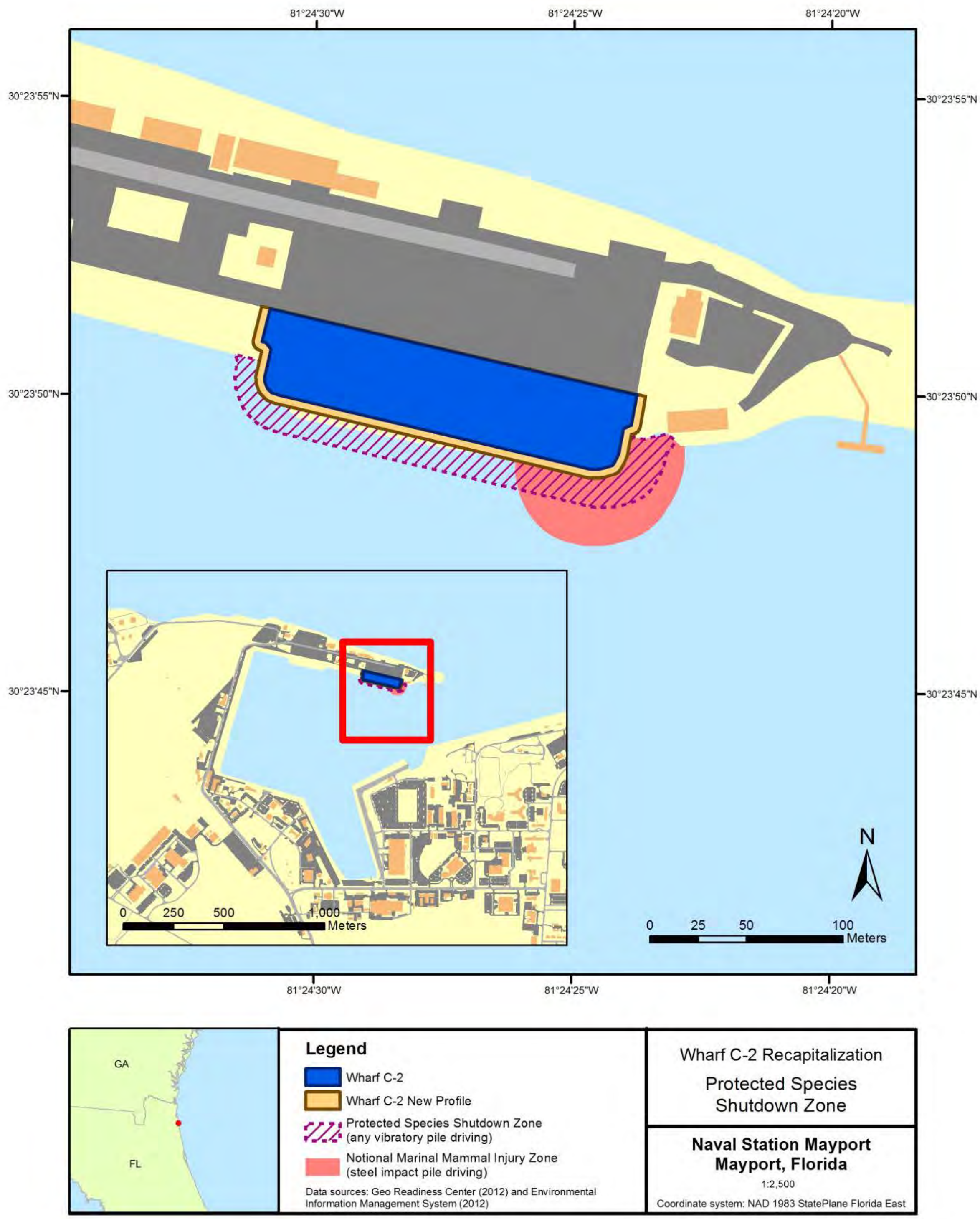
The Navy shall conduct a pre-construction briefing with the contractor. During the briefing, all contractor personnel working in the Project vicinity will watch the Navy's Marine Species Awareness Training video. An informal guide has been included with the Monitoring Plan to aid in identifying species should they be observed in the vicinity of the Project.

Marine species observers ("observers") designated by the contractor will be placed at the best vantage point(s) practicable to monitor for protected species and implement shutdown/delay procedures when applicable by calling for the shutdown to equipment operators. The observers shall have no other construction related tasks while conducting monitoring.

Methods

The observer(s) will monitor the shutdown zone (Figure 6-1) before, during, and after pile driving and removal. The shutdown zone for vibratory driving in 50 ft. (15 m) off Wharf C-2 in all directions. The shutdown zone for contingency only impact pile driving was calculated based on acoustic modeling at a notional pile location on the wharf. The zone to be monitored is 130 ft. (40) m in each direction from the pile being driven.

FIGURE 6-1. SHUTDOWN ZONES FOR VIBRATORY AND (CONTINGENCY ONLY) IMPACT PILE DRIVING ACTIVITIES



The observer(s) will be placed at the best vantage point practicable (e.g. from a small boat, construction barges, on shore, or any other suitable location) to monitor for marine species and implement shutdown/delay procedures when applicable by calling for the shutdown to the equipment operator(s). Elevated positions are preferable; it shall be the contractor's responsibility to ensure that appropriate safety measures are implemented to protect observers on elevated observation points. If a boat is used for monitoring, the boat will maintain minimum distances from all species (should they occur) as described in Southeast Region Marine Mammal and Sea Turtle Viewing Guidelines (Appendix E).

During all observation periods, observers would use binoculars and the naked eye to search continuously for ESA-listed and ESA-candidate species (with the exception of fish, which are not likely to be visible from the surface). If the shutdown zone is obscured by fog or poor lighting conditions, pile driving will not be initiated until the entire shutdown zone is visible.

Pre-Activity Monitoring

The shutdown zone will be monitored for 15 minutes prior to in-water construction/demolition activities. If a protected species is observed in or approaching the shutdown zone, the activity shall be delayed until the animal(s) leave the shutdown zone. Activity would resume only after the observer has determined, through re-sighting or by waiting approximately 15 minutes that the animal(s) has moved outside the shutdown zone. The observer(s) will notify the monitoring coordinator/construction foreman / point of contact (POC) when construction activities can commence.

Activity Monitoring

The shutdown zone will always be a minimum of 15 m (50 ft.) to prevent injury from physical interaction of protected species with construction equipment (Figure 6-1). For contingency impact pile driving, the larger shutdown 40 m (130 ft.) zone (Figure 6-1) shall be implemented for marine mammals only; the standard shutdown zone will continue to be applied for all other protected species.

If a protected species approaches or enters a shutdown zone during any in-water work, activity will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without re-detection of the animal.

Bulkhead sheet pile installation shall be completed only after confirmation that no manatees or marine turtles will be trapped in the area to be filled between the existing and new bulkheads.

Post-Activity Monitoring

Monitoring of the shutdown zone will continue for 15 minutes following the completion of the activity.

Data Collection

The following information will be collected on sighting forms used by observers:

- Date and time that pile driving or removal begins or ends
- Construction activities occurring during each observation period
- Weather parameters identified in the acoustic monitoring (e.g., wind, temperature, percent cloud cover, and visibility)
- Tide and sea state

If a protected species approaches or enters the shutdown zone, the following information will be recorded once shutdown procedures have been implemented:

- Species, numbers, and if possible sex and age class of the species
- Behavior patterns observed, including bearing and direction of travel
- Location of the observer and distance from the animal(s) to the observer

If possible, photographs of the animal(s) will be taken and forwarded to the Naval Facilities Engineering Command Southeast Environmental point of contact.

Data collection forms shall be furnished to the Environmental point of contact within a mutually agreeable timeframe.

Interagency Notification

If the Navy encounters an injured, sick, or dead marine mammal, NMFS will be notified immediately. Such sightings will be called into the NMFS Stranding Coordinator for the Southeast:

Erin Fougeres, Ph.D.
Marine Mammal Stranding Program Administrator
NOAA Fisheries
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
e-mail: erin.fougeres@noaa.gov
office: 727-824-5323
fax: 727-824-5309

The Navy will provide NMFS with the species or description of the animal(s), the condition of the animal (including carcass condition if the animal is dead), location, the date and time of first discovery, observed behaviors (if alive), and photo or video (if available).

In preservation of biological materials from a dead animal, the finder (i.e. marine mammal observer) has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. Observers should not handle dead animals.

Reporting

A draft report of any incidents of marine mammals entering the shutdown zone will be forwarded to NMFS / USFWS no later than 17 January 2015. A final report would be prepared and submitted to NMFS within 30 days following receipt of comments on the draft report from NMFS.

7. Effect Determinations

A summary of the Navy's determinations for effects to ESA-listed and candidate species and their critical habitat is listed in Table 7-1.

TABLE 7-1. EFFECTS DETERMINATIONS FOR ALL ESA-LISTED AND CANDIDATE SPECIES

Species	Navy Determination	
	Species	Critical Habitat
West Indian manatee	may affect, not likely to adversely affect	no effect
piping plover	may affect, not likely to adversely affect	no effect
wood stork	may affect, not likely to adversely affect	n/a
red knot	may affect, not likely to adversely affect	n/a
green turtle	may affect, not likely to adversely affect	no effect
leatherback turtle	may affect, not likely to adversely affect	no effect
loggerhead turtle	may affect, not likely to adversely affect	n/a

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Appendix A

Sample Photos of Wharf C-2 Deterioration

FIGURE A-1. VIEW OF A MINOR AREA OF CONCRETE DETERIORATION IN THE CONCRETE CAP ALONG THE CONSTRUCTION JOINT NEAR STATION 5+50, LOOKING NORTH

FIGURE A-2. VIEW OF THE TYPICAL SECTION LOSS ALONG THE EDGES OF THE PRECAST CONCRETE PANELS OF THE WHARF CAP NEAR STATION 0+90, LOOKING NORTHEAST

FIGURE A-3. VIEW OF THE SPALL ALONG THE CONCRETE CURB AT STATION 4+40 THAT WAS 3 FT LONG BY 12 IN. WIDE BY 8 IN. HIGH WITH EXPOSED AND CORRODED REINFORCING STEEL, LOOKING SOUTH

FIGURE A-4. VIEW OF SOUTHEASTERN CORNER OF DECK – NOTE DISLOCATION OF THE BULL RAIL

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Appendix B

Contractor’s Project Schematic

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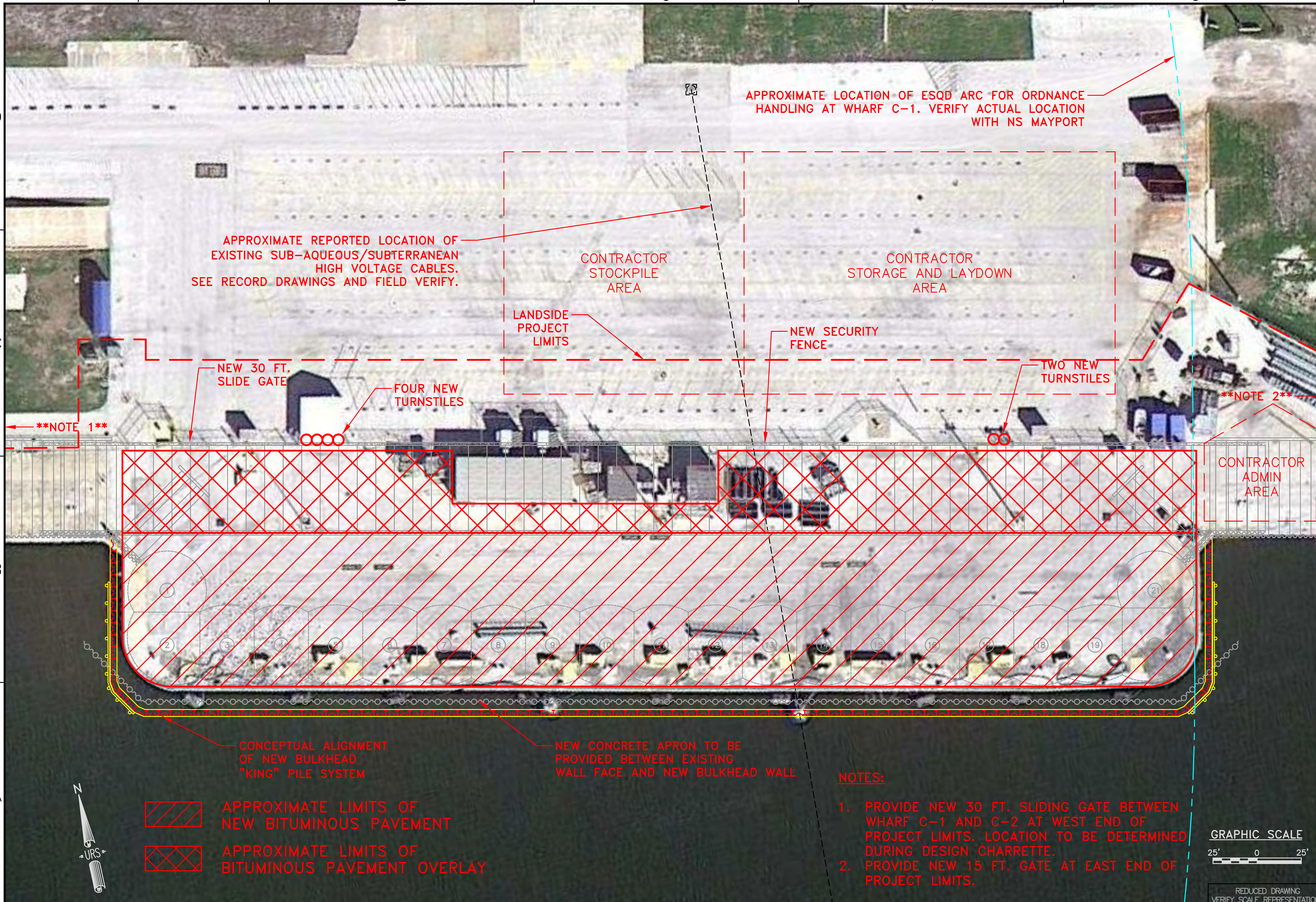

FILE NAME: N:\NAVY\MAYPORT\WHARF C2 IMPROVEMENTS\PLAN VIEW - Aerial Photo_Rev2.dwg LAYOUT NAME: Plan View - Asphalt PLOTTED: Tuesday, July 03, 2012 - 8:20am USER: vasco_duke

SYM | DESCRIPTION | DATE | APPR

NAVFAC

URS
URS Group, Inc.
7650 West Courtney Campbell Causeway
Tampa, FL 33607
Tel: 813.286.1711
FDBPR LICENSE NO. 7285

ACCEPTED
FOR COMMANDER NAVFAC / B.L.T.L.
ACTIVITY
SATISFACTORY TO DATE
DES KQG | DRW IZ | CHK JC
PROJECT MANAGER
IPT TECH. BRANCH HEAD
CHIEF ENG/ARCH (CORE)

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
IPT SOUTH ATLANTIC NAVAL AIR STATION JACKSONVILLE
NAVAL STATION MAYPORT, FLORIDA

WHARF C-2 REPLACEMENT

SITE PLAN – BULKHEAD, PAVING AND FENCING

SCALE: AS SHOWN
EPROJECT NO.:
CONSTR. CONTR. NO.
NAVFAC DRAWING NO.
SHEET OF
C-109
DRAWFORM REVISION: 1 AUGUST 2009

Appendix C

Standard Manatee Conditions for In-Water Work

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

2009

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the FWC Hotline at 1-888-404-FWCC. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or Vero Beach (1-772-562-3909) for south Florida.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Awareness signs that have already been approved for this use by the Florida Fish and Wildlife Conservation Commission (FWC) must be used (see MyFWC.com). One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 81/2" by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

CAUTION: MANATEE HABITAT

All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

Report any collision with or injury to a manatee:

Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC

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Appendix D

Sea Turtle and Smalltooth Sawfish Construction Conditions

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
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Appendix E

Marine Mammal and Sea Turtle Viewing Guidelines

Adapted from Southeast Region Marine Mammal & Sea Turtle Viewing Guidelines available at http://www.nmfs.noaa.gov/pr/education/southeast/guidelines.htm

Viewing "Code of Conduct"

These guidelines are intended to inform the public about protection of marine mammals and sea turtles. They are not a replacement for Federal legal requirements.

1. Remain a respectful distance from marine mammals and sea turtles. The minimum recommended distances are:
   - dolphins, porpoises, seals = 50 yards
   - sea turtles = 50 yards
   - whales = 100 yards*
     Federal law prohibits all approaches to North Atlantic right whales within 500 yards.
2. Marine mammals and sea turtles should not be encircled or trapped between watercraft, or watercraft and shore.
3. If approached by a marine mammal or sea turtle, put your watercraft's engine in neutral and allow the animal to pass. Any vessel movement should be from the rear of the animal.*
   Pursuit of marine mammals and sea turtles is prohibited by Federal law.
4. Never feed or attempt to feed marine mammals or sea turtles.*
   Federal law prohibits feeding or attempting to feed marine mammals.

Detailed Guidelines

Limit your viewing time.

- Prolonged exposure to one or more vessels increases the likelihood that marine mammals will be disturbed.
- Since individual animals' reactions will vary, carefully observe all animals and leave the vicinity if you see signs of disturbance.
- Your vessel may not be the only vessel in the day that approaches the same animal(s); please be aware of cumulative impacts.

Travel in a predictable manner.

- Marine mammals appear to be less disturbed by vessels that are traveling in a predictable manner.
- The departure from a viewing area has as much potential to disturb animals as the approach.

- If a marine mammal or sea turtle approaches, put your engine in neutral and allow the animal to pass.
- Never pursue of follow marine wildlife.
- Never attempt to herd, chase, or separate groups of marine mammals or females from their young.
- Avoid excessive speed or sudden changes in speed or direction in the vicinity of animals.

If you need to move around marine wildlife, do so from behind (i.e., never approach head-on).

- Vessels that wish to position themselves so that the animals would pass them, should do so in a manner that stays fully clear of the animal's path.

Be aware that marine mammals may surface in unpredictable locations.

- Breaching and flipper slapping whales may endanger people and/or vessels.

Marine mammals are more likely to be disturbed when more than one boat is near them.

- Avoid approaching the animals when another vessel is near.
- Always leave marine mammals an "escape route."
- When several vessels are in an area, communication between operators will help ensure that you do not cause disturbance.

Marine mammals have sensitive hearing and many species communicate by vocalizing underwater.

- Underwater sound produced by a vessel's engines and propellers can disturb these animals.

Cautiously move away from the animals if you observe any of the following behaviors:

- Rapid changes in direction or swimming speed.
- Erratic swimming patterns.
- Escape tactics such as prolonged diving, underwater exhalation, underwater course changes, or rapid swimming at the surface.
- Tail slapping or lateral tail swishing at the surface.
- Female attempting to shield a calf with her body or by her movements.

Even if approached by a marine mammal or sea turtle:

- Do not touch or swim with the animals.

Never feed or attempt to feed marine mammals or sea turtles.

- It can alter their natural behavior, make them dependent on handouts, and can be harmful to their health.

- Marine mammals, like all wild animals, may bite and inflict injuries to people who try to feed them.

Note: NMFS regulations at 50 CFR § 216.3 strictly prohibit feeding or attempting to feed a marine mammal in the wild.

Close approaches by humans to marine mammals may cause them to lose their natural wariness and become aggressive towards people. They are also vulnerable to injury or death from entanglement in fishing gear or boat strikes. NMFS strongly encourages people to follow the guidelines presented here while spending time on or near the water.

Appendix F
Fundamentals of Acoustics and Analysis Addendum

Fundamentals of Acoustics

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) (ANSI S1.1-1994). 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 physical attributes, 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, 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 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 1 μPa". 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 1 (adapted from URS Consultants Inc. 2007) summarizes common acoustic terminology. Two of the most common descriptors are the instantaneous peak SPL and the root-mean-square [rms] SPL. The peak SPL is the instantaneous maximum or minimum over- or underpressure observed during each sound event and is presented in dB re 1 μPa peak. The rms level is the square root of the energy divided by a defined time period, given as dB re 1 μPa rms.

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 (ANSI S1.1-1994). 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).

TABLE 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 an extremely 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).
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.

Vocalization and Hearing in Marine Mammals

All marine mammals that have been studied can produce sounds and use sounds to forage, orient, detect and respond to predators, and facilitate social interactions (Richardson et al., 1995). Measurements of marine mammal sound production and hearing capabilities provide some basis for assessing whether exposure to a particular sound source may affect a marine mammal behaviorally or physiologically. Marine mammal hearing abilities are quantified using live animals either via behavioral audiometry or electrophysiology (see Schusterman 1981; Au 1993; Wartzok and Ketten 1999; Nachtigall et al. 2007). Behavioral audiograms, which are plots of animals' exhibited hearing threshold versus frequency, are obtained from captive, trained live animals using standard testing procedures with appropriate controls, and are considered to be a more accurate representation of a subject's hearing abilities. Behavioral audiograms of marine mammals are difficult to obtain because many species are too large, too rare, and too difficult to acquire and maintain for experiments in captivity. Consequently, our understanding of a species' hearing ability may be based on the behavioral audiogram of a single individual or small group of animals. In addition, captive animals may be exposed to local ambient sounds and other environmental factors that may impact their hearing abilities and may not accurately reflect the hearing abilities of free-swimming animals. For animals not available in controlled settings (including large whales and rare species), estimates of hearing capabilities are made based on anatomical and physiological structures, the frequency range of the species' vocalizations, and extrapolations from related species.

Table 2 provides a summary of sound production and hearing capabilities for ESA-listed marine mammal species that may occur in the action area. For purposes of this analysis, marine mammals are arranged into functional hearing groups based on their generalized hearing sensitivities.

TABLE 2. HEARING AND VOCALIZATION RANGES FOR MARINE MAMMAL FUNCTIONAL HEARING GROUPS POTENTIALLY OCCURRING IN THE ACTION AREA

Functional Hearing Group	Species	Sound Production		General Hearing Ability Frequency Range
		Frequency Range	Source Level (dB re 1 µPa @ 1 m)	
Low-Frequency Cetaceans	North Atlantic right whale; humpback whale	10 Hz to 20 kHz	137 to 192	7 Hz to 22 kHz
Sirenians	West Indian manatee	500 Hz to 16 kHz	91 to 150	75 Hz to 75 kHz

Adapted and derived from Southall et al. (2007) and Richardson et al. (1995)

Vocalization and Hearing in Birds

Although hearing range and sensitivity has been measured for many terrestrial bird species, little is known of seabird hearing. A review of in-air hearing in 32 avian species reveals that both seabirds and terrestrial birds generally have greatest hearing sensitivity between 1 and 4 kHz (Beuter et al. 1986; Thiessen 1958; Wever et al. 1969; Beason 2004; Dooling 2002). Very few are sensitive to sounds below 20 Hz, most have an upper frequency hearing limit of 10 kHz, and none exhibit hearing at frequencies higher than 15 kHz (Dooling 2002; Dooling et al. 2000).

Vocal production in birds varies widely across species, with some passerines producing elaborately structured songs and other species restricted to relatively simple sounds (Kroodsma, D.E. and E.H. Miller 1996). The three ESA-listed species found in and around the action area do not sing, but do produce other types of vocalizations, which contain energy from around 800 Hz to 9 kHz, with peak frequencies between 1.5 and 3.0 kHz (Cornell Laboratory of Ornithology 2013).

Vocalization and Hearing in Sea Turtles

The auditory system of the sea turtle appears to work via water and bone conduction, with lower frequency sound conducted through to skull and shell, and does not appear to function well for hearing in air (Lenhardt 1982; Lenhardt et al. 1983). Investigations suggest that these species' auditory sensitivity is limited to low-frequency bandwidths, but the behavioral use of underwater low-frequency hearing in sea turtles is unclear. Sea turtles may use acoustic signals from their environment as guideposts during migration and as cues to identify their natal beaches (Lenhardt et al. 1983). Sea turtles are low-frequency hearing specialists, typically hearing frequencies from 30 to 2,000 Hertz (Hz), with a range of maximum sensitivity between 100 and 800 Hz (Bartol and Ketten 2006; Bartol et al. 1999; Lenhardt 2002; Lenhardt 1994; Ridgway et al. 1969). Hearing below 80 Hz is less sensitive but still potentially usable (Lenhardt 1994). Greatest sensitivities vary with species and possibly age; data for green turtles indicate that best hearing sensitivity ranges from 300 to 400 Hz for the green turtle (Ridgway et al. 1969) and around 250 Hz or below for juvenile loggerheads (Bartol et al. 1999). Bartol et al. (1999) reported that the range of effective hearing for juvenile loggerhead turtles is from at least 250 to 750 Hz using the auditory brainstem response technique. Juvenile and sub-adult green turtles detect sounds from 100 to 500 Hz, with maximum sensitivity at 200 and 400 Hz (Bartol and Ketten 2006). Auditory brainstem response recordings on green turtles showed peak response at 300 Hz (Yudhana et al. 2010). Juvenile Kemp‘s Ridley turtles were found to detect underwater sounds from 100 to 500 Hz, with a maximum sensitivity between 100 and 200 Hz (Bartol and Ketten 2006). There is a lack of audiometric information for leatherback turtles; however, their anatomy suggests they would hear similarly to other sea turtles.

Very little is known about sound production in sea turtles. However, nesting leatherback turtles were recorded producing sounds (sighs or belch-like sounds) up to 1,200 Hz with most energy ranging from 300 to 500 Hz (Mrosovsky 1972).

Vocalization and Hearing in Fish

Many researchers have investigated hearing and vocalizations in fish species. Although hearing capability data only exist for fewer than 100 of the 32,000 fish species, current data suggest that most species of fish detect sounds from 50 to 1,000 Hz, with few fish hearing sounds above 4 kHz (Popper 2008). It is believed that most fish have their best hearing sensitivity from 100 – 400 Hz (Popper 2003).

The inner ears of fish are directly sensitive to acoustic particle motion rather than acoustic pressure. Although a propagating sound wave contains both pressure and particle motion components, particle motion is most significant at low frequencies (less than a few hundred Hertz) and closer to the sound source. However, a fish's gas-filled swim bladder can enhance sound detection by converting acoustic pressure into localized particle motion, which may then be detected by the inner ear. Atlantic and shortnose sturgeon have swim bladders; smalltooth sawfish do not. Fish with swim bladders generally have better sensitivity and better high-frequency hearing than fish without swim bladders (Popper and Fay 2010). In reality many fish species possess a continuum of anatomical specializations that may enhance their sensitivity to pressure (versus particle motion), and thus higher frequencies and lower intensities (Popper and Fay 2010).

Bony fish can produce sounds in a number of ways and use them for a number of behavioral functions (Ladich 2008). Over 30 families of fish are known to use vocalizations in aggressive interactions, whereas over 20 families known to use vocalizations in mating (Ladich 2008). Sound generated by fish as a means of communication is generally below 500 Hz (Slabbekoorn et al. 2010). The air in the swim bladder is vibrated by the sound producing structures (often muscles that are integral to the swim bladder wall) and radiates sound into the water (Zelick et al. 1999).

Auditory Masking

Auditory masking occurs when the perception of a given signal is negatively influenced by the presence of another sound (Popper and Hawkins 2011). Behavioral, physiological, and anatomical changes may occur as a result of noise exposure. For example, many animals communicate via some sort of vocalization; if an ambient noise source is introduced into their environment, the animals' ability to detect communications from other members of their species may be reduced.

Factors influencing masking include 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). The behavioral function of a vocalization (e.g. contact call, group cohesion vocalization, echolocation click, etc.) and the acoustic environment at the time of signaling may both influence call source level (Hotchkin and Parks 2013; Miksis-Olds and Tyack 2009; Holt et al. 2011), which directly affects the chances that a signal will be masked (Nemeth and Brumm 2010).

Description of Noise Sources

Ambient noise in the action area is a composite of sounds from natural sources, normal port activities, and temporary projects such as maintenance dredging or pile driving. Ambient noise in the Mayport turning basin is addressed below.

In-water construction activities associated with this project include vibratory and impact pile driving. The sounds produced by these activities fall into two sound types: impulsive (impact driving) and non-impulsive (vibratory driving). Distinguishing between these two general sound types is important because of each sound type may cause different types of physical effects, particularly with regard to hearing (Ward 1997).

Impulsive sounds (e.g., explosions, seismic airgun pulses, and impact pile driving) are referred to as pulsed sounds in Southall et al. (2007), and 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 ("non-pulsed" in Southall et al. 2007) 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. Examples 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.

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. Sound levels from these sources are typically low, but can be pronounced during violent weather events. Sounds from natural sources are generally not considered undesirable. Ambient airborne 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 industrialized areas such as the NAVSTA Mayport waterfront, noise sources may include common construction equipment, such as trucks, cranes, compressors, generators, pumps, and other equipment that might typically be employed along industrial waterfronts (Washington State Department of Transportation 2010). Typical source levels for common industrial noise sources are given in Table 3. Maximum noise levels reach 99 dBA when multiple sources of noise are operating simultaneously, assuming an increase of 6 dB per doubling of sound pressure (Washington State Department of Transportation 2010). These maximum noise levels are intermittent in nature, may occur sporadically on any given day with construction or other waterfront activity.

TABLE 3. MAXIMUM NOISE LEVELS FOR COMMON CONSTRUCTION EQUIPMENT

Equipment Type	Maximum Noise Level (at 50 ft.)
impact pile driver	109
vibratory pile driver	96
scraper	90
backhoe	90
crane	81
pumps	81
generator	81
front loader	79
air compressor	78
Note: Maximum Sound Pressure Levels in dBA	

Sources: Washington State Department of Transportation 2008; Illingworth & Rodkin 2012

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 NAVSTA Mayport and the measured sound levels in a similar area, the Navy estimates that ambient airborne noise levels at the NAVSTA Mayport turning basin currently average between 60 and 65 dBA.

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 both 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 near shore 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). At NAVSTA Mayport, vessel wakes in the St. Johns River 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 port 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 NAVSTA Mayport turning basin is likely to be dominated by noise from day-to-day port and vessel activities. The basin is sheltered from most wave noise, but is a high-use area for naval ships, tugboats, and security vessels. 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 (rms) (Table 4). During the proposed action, normal port operations, including transits, docking and maintenance of multiple tugboats and ships would continue, and noise contributions from these sources would remain at current levels.

Dredging may be necessary as part of the proposed action. If so, a clamshell dredge would be used to remove up to 4,000 cubic yards of sediment from the increased footprint area of Wharf C-2. Dredging is likely to temporarily increase noise levels in the turning basin during operations; previously recorded sound levels from clamshell dredges ranged from 136 to 165 dB re 1 µPa at ranges of 12 to 25 meters. Dredging would only be used as a contingency, and any increases in noise level will be short-term and temporary.

TABLE 4. REPRESENTATIVE LEVELS OF UNDERWATER NOISE FROM ANTHROPOGENIC SOURCES

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	Blackwell and Greene 2002
vibratory driving of 24-inch steel pipe pile	50–1,500	159 dB rms at 10 m	Illingworth & Rodkin 2012
impact driving of 24-inch steel pipe pile	50–1,500	186 dB rms at 10 m	Washington State Department of Transportation 2010a

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

Underwater Noise from Pile Driving

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. A number of studies have examined sound pressure levels recorded from underwater pile driving projects in California and Washington, creating a large body of data for impact driving of steel pipe piles, concrete piles, and some timber piles. Data for vibratory pile driving is similarly concentrated on steel pipe piles of a range of diameters and on single 24-inch wide sheet piles at a project in California (California Department of Transportation 2009). There have been no measurements of sound pressure levels produced by the types of piles (paired steel sheet piles and king piles) that will be installed in the Mayport turning basin, and it was therefore necessary to extrapolate from available data to determine reasonable source levels for this project.

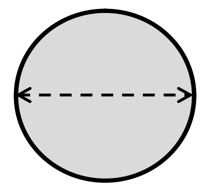
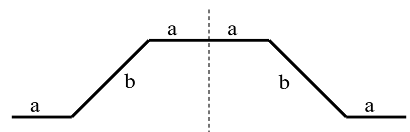
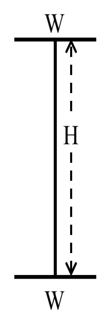
Because of the differences between the proposed action (driving of steel king piles, paired 27-inch wide steel sheet piles, and 12-inch diameter polymeric piles) and available measured sound pressure levels, the Navy evaluated potential source levels for modeling of steel piles based on two methods. The first method examined measured sound pressure levels for single 24-inch wide sheet piles; the second was a comparison of the linear length of piles with the circumference of steel pipe piles for which source levels have been measured. The second method was discussed with National Marine Fisheries Service Southeast Region in September 2012. Linear length was calculated as the sum of the lengths of all sides of each pile type (Table 5). Both the king and sheet pile linear lengths were comparable to the circumference of a 24-inch diameter pipe pile.

Source levels for polymeric piles were estimated based on a comparison of the material properties of timber, concrete, and steel piles. Data from timber piles were selected to model driving of HDPE polymer piles.

Measured sound pressure levels for 24 in. diameter steel sheet piles, 24 in. diameter steel pipe piles, and timber piles are available for both vibratory and impact driving methods. 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: steel pipe piles (24 in. diameter) steel sheet piles (24 in. wide), and/or timber piles
- Installation method: vibratory and/or impact hammer
- Physical environment - water depth 15 ft. (4.5 m) or greater, sediment similar to sandy bottom in Mayport turning basin.

TABLE 5. COMPARISON OF PILE SIZES AND SHAPES FOR DETERMINATION OF ESTIMATED SOURCE SOUND PRESSURE LEVELS

Pile Type	Shape and Dimensions
CIRCULAR STEEL PIPE PILE Diameter = 24 in. Circumference = Diameter*π = 75.4 in.	
AZ19-700 SHEET PILE PAIR Linear length = 4*a+2*b =70.4 in. a = 6.81 in. b= 21.6 in.	
HZ1080 MB KING PILE Linear length = 2*W +H = 77.2 in. W = 17.87 in. H= 41.47 in.	

The tables below detail representative pile driving sound pressure levels measured from 24 in. steel pipe piles and 12 in. timber piles. Comparison of measured sound pressure levels from the 24-inch steel pipe piles and 24-inch steel sheet piles revealed that levels from sheet pile driving were higher than those from pipe pile driving; the Navy has therefore used the more conservative sound pressure levels from 24-inch steel sheet piles to model both king and sheet pile pairs for the proposed action. The selected sound pressure levels used for modeling in this application are detailed in Tables 6 and 7.

TABLE 6. VIBRATORY INSTALLATION UNDERWATER SOUND PRESSURE LEVELS EXPECTED BASED ON SIMILAR IN-SITU MONITORED CONSTRUCTION ACTIVITIES

Project and Location	Pile Size and Type	Water Depth	RMS	Peak	Sediment
Bangor, WA; U.S. Navy Test Pile Program[a]	24 inch steel pipe	4.6 m (measured near seafloor)	Avg: 159 Max: 168	NA	Sand and gravel
Portage Bay, WA[b]	24 inch steel pipe	3 – 7 m	157	170	Unknown
Berth 23 Port of Oakland, CA[c, 1]	**24 inch steel sheet pile**	**6.1 m**	**163**	**177**	**Unknown**
Berth 30 Port of Oakland, CA[c]	24 inch steel sheet pile	4.9 m	162	175	Unknown
Berth 35/37 Port of Oakland, CA[c]	24 inch steel sheet pile	6.1 m	163	177	Unknown
Port Townsend Ferry, WA[c, 2]	**12 inch timber pile**	**10 m**	**153**	**167**	**Unknown**

Sound levels expressed as dB re 1 µPa rms and dB re 1 µPa peak for RMS and Peak SPL measurements, respectively. Average and Max values for Test Pile Program data are based on 10-second rms measurements over the 10 minute driving time for the pile. 1- This data point was selected for use in acoustic modeling based on similarity to physical environment at NAVSTA Mayport and measurement location in mid-water column; 2- Data selected for use in modeling polymeric fender piles based on similarity of material properties between timber and polymeric piles; there are no existing measurements for polymeric piles of any size and shape. Sources: a – Illingworth & Rodkin 2012; b- Washington Department of Transportation 2010; c- California Department of Transportation 2009

TABLE 7. IMPACT INSTALLATION UNDERWATER SOUND PRESSURE LEVELS EXPECTED BASED ON SIMILAR IN-SITU MONITORED CONSTRUCTION ACTIVITIES

Project and Location	Pile Size and Type	Water Depth	RMS	Peak	SEL	Sediment
Friday Harbor Ferry Terminal, WA[a]	24 inch steel pipe	12.8 m	170	183	180	Sandy silt/clay
		13.4 m	186	205	179	
		14.3 m	186	204	179	
		10 m	194	210	185	Sandy silt/rock
		10 m	195	215	187	
		10 m	193	212	184	
Typical values, Caltrans compendium summary table[b]	24 inch steel pipe	15	194	207	178	Unknown
Berth 23 Port of Oakland[b, 1]	**24 inch steel sheet pile**	**12 – 14 m**	**189**	**205**	**179**	**Unknown**
Ballena Bay, WA[b]	12 inch timber pile	2 - 4 m	170[2]	180	160	Unknown

Sound levels expressed as dB re 1 µPa rms and dB re 1 µPa peak for RMS and Peak SPL measurements, respectively; 1- This data point was selected for use in acoustic modeling based on similarity to physical environment at NAVSTA Mayport and measurement location in mid-water column; 2- Data selected for use in modeling polymeric fender piles based on similarity of material properties between timber and polymeric piles; there are no existing measurements for polymeric piles of any size and shape. Sources: **[a]**Washington State Department of Transportation 2005; **[b]**California Department of Transportation 2009

Underwater Sound Propagation

Pile driving can generate underwater noise that may result in disturbance to marine mammals within the project area. Modeling sound propagation is useful in evaluating noise levels to determine which marine mammals may be exposed at a given distance from the pile driving activity. The decrease in acoustic intensity as a sound wave propagates outward from a source is known as transmission loss (TL).

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)

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).

Airborne Sound Propagation

Airborne sound propagation was modeled using a variation of the model presented above, known as spherical spreading. In the spherical spreading model, the spreading loss coefficient B = 20, giving the formula TL = 20 $\log_{10}$ (R_1/10).

Because there are no available airborne sound pressure level measurements from steel sheet and king piles, data from 24 inch diameter steel pipe piles were used to estimate the airborne sound source levels (see Table 5).

TABLE 8. ESTIMATED SOURCE LEVELS FOR AIRBORNE PILE DRIVING NOISE

Driving method	Source Level
Vibratory[1]	96 dBA at 15 m (50 ft)
Impact[2]	100 dBA at 11 m (36 ft)
Note: m=meter; dBA= A-weighted decibel scale ft=feet	

Sources: [1] Illingworth & Rodkin 2012; [2] WSDOT 2010b

The source level selected for impact driving does not represent the maximum measured level for a 24 inch pipe pile (109 dBA; Illingworth & Rodkin 2012), which was obtained during short-term driving of a single pile in rocky sediment during the Navy Test Pile Program in Bangor, Washington in 2011. The selected source level shown in Table 8 was obtained during driving of a 24 inch pipe pile for a bridge replacement in Washington (Washington State Department of Transportation 2010a). Because softer sediments (such as those found in the NAVSTA Mayport turning basin) reduce the amount of force needed to drive a pile to desired depth, in turn reducing noise from pile reverberation (Kinsler et al. 1999), the non-maximal source level estimate selected is a reasonable assumption for airborne noise levels from pile driving at NAVSTA Mayport.

Noise associated with vibratory pile driving is expected to attenuate to 65 dBA within 0.34 miles (550 m) of the source; impact pile driving noise is expected to attenuate to 65 dBA at 0.40 miles (650 m). During both impact and vibratory pile driving, airborne noise levels are expected to exceed 84 dBA (the threshold for hearing protection) within 246 ft (75 m) of the incident pile. These estimates assume a free flowing medium (e.g. over water) without obstructions, which is a reasonable assumption for the majority of the project area. Vegetation and buildings within the land areas of the proposed action may obstruct sound transmission in the project area; however, this model did not include possible attenuation from land-based obstructions (e.g. vegetation and buildings). The ranges given are therefore a conservative estimate of the affected area.

Calculated Zones of Influence

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 Mayport turning basin. A total of 70 days of pile driving were modeled; 50 days of vibratory driving (45 days for steel piles, 5 days for polymeric fender piles), and 20 days of contingency impact driving (steel piles only). No sound mitigation methods (bubble curtains, cofferdams, etc.) are proposed and therefore no attenuation was included in the acoustic model.

For vibratory driving, the acoustic analysis used the assumption that a maximum of three templates (each consisting of five king piles and four sheet pile pairs) would be driven each day, for a maximum total length of approximately 75 ft.

For impact driving, modeling assumed a maximum of 20 strikes of the impact hammer per day, which is expected to take no more than five to ten minutes to complete.

The calculations presented in Tables 9 and 10 assume a field free of obstruction, which is unrealistic because the Mayport turning basin does not represent open water conditions (free field) and sounds will attenuate as they encounter land or other solid obstacles. As a result, the distances calculated may not actually be attained at the project area. The actual distances to the behavioral disturbance thresholds for impact and vibratory pile driving are likely to be shorter than those calculated due to the irregular contour of the waterfront and the maximum fetch (farthest distance sound waves travel without obstruction [i.e. line of sight]) at the project area. These tables also depict the actual areas encompassed by the thresholds during the project.

TABLE 9. CALCULATED DISTANCES AND ZONES OF INFLUENCE FOR MARINE MAMMALS DURING PILE DRIVING

Pile type	Driving method	Threshold (dB re 1µPa rms)	Distance (m)[1]	Area in (km^2)
Steel (sheet and king piles)	**Vibratory**	Level A (injury): 180	0.74	0
		Level B (behavioral): 120	7,356	2.9
	Impact (contingency)	Level A (injury): 180	39.8	0.004
		Level B (behavioral): 160	858	0.67
Polymeric Fender Piles	Vibratory	Level A (injury): 180	0.16	0
		Level B (behavioral): 120	1,585	0.88
	Impact (contingency)	Level A (injury): 180	10	0
		Level B (behavioral): 160	46.4	0.007

All sound levels expressed in dB re 1 µPa rms. dB=decibel; rms=root-mean-square; µPa=microPascal; Practical spreading loss (15 log, or 4.5 dB per doubling of distance) used for calculations; [1]Sound pressure levels used for calculations are given in Table 6 and 7

TABLE 10. CALCULATED DISTANCES AND ZONES OF INFLUENCE FOR FISH DURING PILE DRIVING

Pile Type	Driving Method	Threshold	Distance (m)[1]	Area (km^2)
Steel (sheet and king piles)	Vibratory	Behavioral (all):150 dB re 1 µPa rms	73.6	0.011
	Impact (contingency)	Injury (all): 206 dB re 1 µPa rms	8.6	0.00058
		Injury (≥ 2g): 187 dB re 1 μPa^2sec SEL	21.6	0.0019
		Injury (< 2g): 183 dB re 1 μPa^2sec SEL	39.9	0.0045
		Behavioral (all):150 dB re 1 µPa rms	3,981	1.37
Polymeric fender piles	Vibratory	Behavioral (all): 150 dB re 1 µPa rms	15.8	0.001

Note: no injury criteria for fish for vibratory driving; all sound levels expressed in dB re 1 µPa rms. dB=decibel; rms=root-mean-square; µPa=microPascal; Practical spreading loss (15 log, or 4.5 dB per doubling of distance) used for calculations; [1]Sound pressure levels used for calculations are given in Tables 6 and 7 3.4-4

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Appendix I

Supplement to the Biological Evaluation submitted to U.S. Fish and Wildlife Service Regarding Lighting Effects on Nesting Sea Turtles and Hatchlings

Supplement to the
Wharf Charlie Two (C2) Biological Evaluation
Naval Station Mayport
Regarding Lighting Effects on Nesting Sea Turtles and Hatchlings

17 October 2013

Background

Following re-nourishment of the beach at Naval Station Mayport (NAVSTA Mayport) in summer 2013, installation personnel became aware that light from proposed Wharf Charlie Two (C2) would be visible to nesting sea turtles and hatchlings at the northern end of the beach. Evidence was gathered on the night of 20 September 2013 that clearly demonstrates direct light visible from existing Wharf Charlie Two[a] (see Figure 1). It is assumed that direct light from the proposed recapitalized Wharf C2 would also be visible unless mitigation was enacted. As such, the U.S. Navy (Navy) reassessed proposed light fixtures for Wharf C2 to eliminate the issue of direct light and minimize the issue of glow to nesting sea turtles and hatchlings on the beach.

Mitigation

Mitigation was already in place to eliminate direct light on the beach at Hugenot Park. New mitigation needed to be enacted to prevent light to both Hugenot Park and the beach at NAVTSA Mayport. Safety, security, and liability requirements on Wharf C2 had to also be considered because they prescribe minimal light levels to satisfy their respective functions. The Navy was able to modify its lighting plan for Wharf C2 to eliminate direct light on the beach at NAVSTA Mayport and Hugenot Park, as described below.

Figure 2 depicts the floodlights at existing Wharf C2 and those from the recently recapitalized Wharf Charlie One (C1). Note that the luminaries at Wharf C1 are 18,000-watt floodlights and the light from them is markedly reduced as compared to that at Wharf C2.

- The new luminaries at Wharf C2 would not be floodlights. They would be full-cutoff luminaries, downward facing, and shielded above and 360^o around (Figure 3). This will eliminate visibility of direct light from all directions except down and greatly reduce upward glow.
- The luminaries at Wharf C2 would be 8,000 watts, which is 10,000 watts lower than what is pictured for the recapitalized Wharf C1 in Figure 2.
- The luminaries would be mounted on four 50-foot light posts, with two luminaries per post (eight total luminaries). Figure 4 depicts their proposed placement on the Wharf.

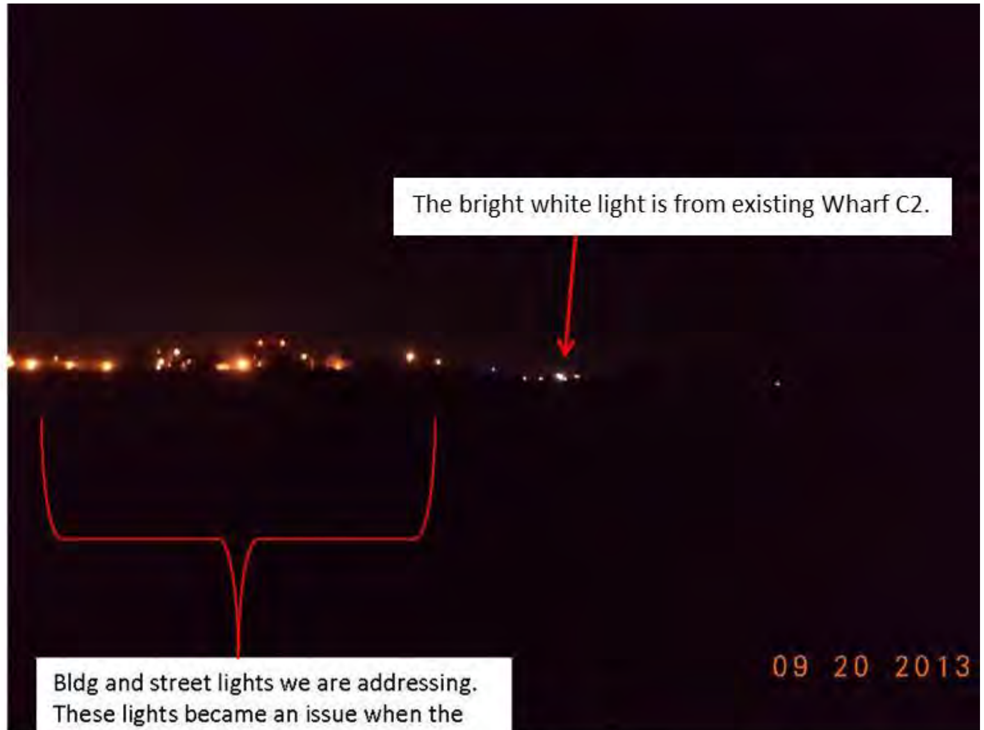
Conclusion

Direct light from the proposed recapitalized Wharf C2 would not be visible on any beaches in the action area, including Hugenot Park, NAVSTA Mayport, and the mouth of the St. Johns River. Glow may still exist, particularly on misty and hazy evenings, but would be minimized by using the lowest practical wattage and shielding the top and sides of the luminaries. Shadowing of the NAVSTA Mayport beach by dunes, vegetation, and buildings would also minimize glow from a sea turtle's perspective. With mitigations in place, the Navy does not foresee sea turtle nesting discouragement or hatchling disorientation as the result of the proposed lights at Wharf C2. As such, the Navy determines that light from the proposed recapitalized Wharf C2 may affect, but is not likely to adversely affect, nesting sea turtles and hatchlings in the action area.

(a) An e-mail correspondence from Patricia Loop, dated 30 September 2013, indicated the visible direct light was from Wharf C1. Subsequent verification validated the brightest light was actually from Wharf C2.

The C1 Pier Lights

The C2 Pier Lights



The photo above was taken from this spot marked by this arrow . The existing Wharf C2 lighting (white dot) is only visible from the north end of the Mayport Beach, north of a point 100 feet south of the #1 Dune Walkover.

Figure I. Direct light from Wharf Charlie One is visible to sea turtles on the north end of the beach at Naval Station Mayport. It is assumed that direct light would also be visible from the proposed lighting at Wharf Charlie Two unless it is mitigated.


Lights on C-1
Three light poles on C-2
10 10 2013
Picture taken from Road in front of RV Park

Figure 2. Nighttime photograph of the existing lights at Wharf Charlie Two and the recently re-capitalized Wharf Charlie One. The proposed luminaries for the recapitalization of Wharf Charlie Two would be 8,000 watts lower than the luminaries at Wharf Charlie One.

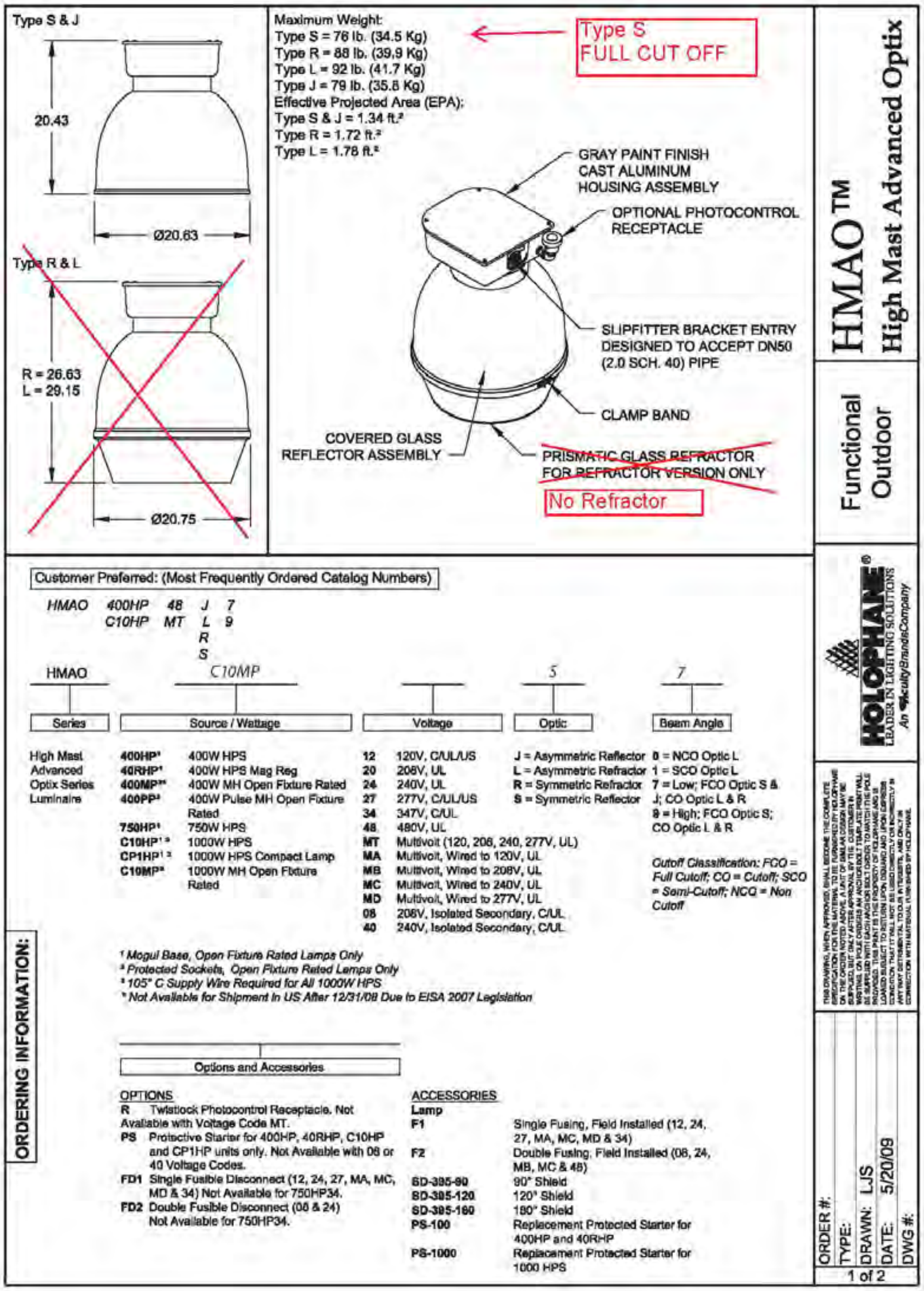


Figure 3. Schematic of the full-cutoff luminaries. Type S luminaries would be used, with the bulbs recessed.

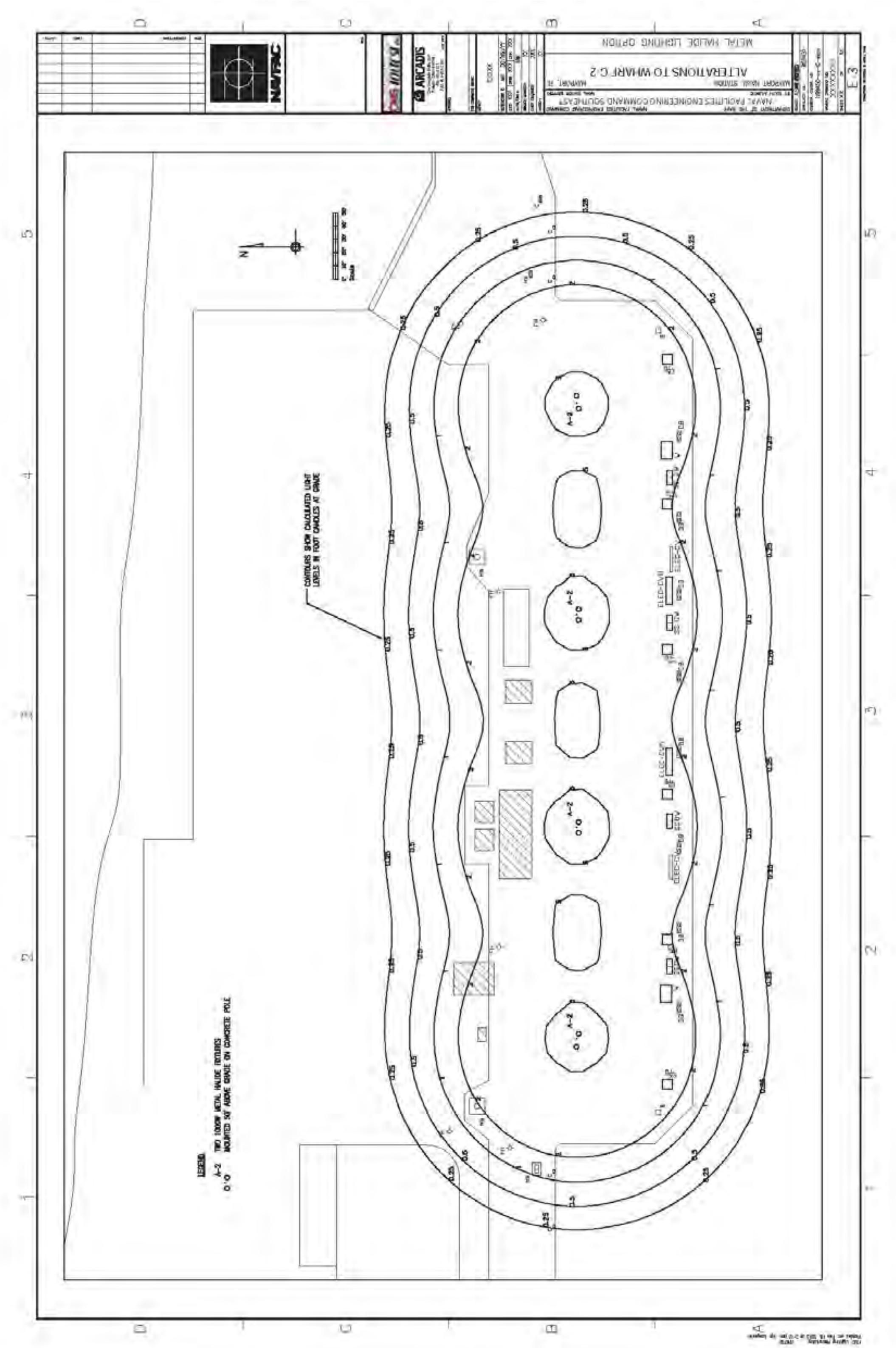


Figure 4. Proposed arrangement of the lights at Wharf C2. The pairs of small circles, labeled “A-2” constitute the luminaries.

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Finding of No Significant Impact
on Issuance of an Incidental Harassment Authorization to the U.S. Navy for Take of Marine Mammals Incidental to a Wharf Recapitalization Project

National Marine Fisheries Service

National Oceanic and Atmospheric Administration Administrative Order (NAO) 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality (CEQ) regulations at 40 CFR 1508.27 state that the significance of an action should be analyzed both in terms of 'context' and 'intensity'. Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The U.S. Navy has finalized an Environmental Assessment (EA; *Wharf C-2 Recapitalization at Naval Station Mayport, FL Environmental Assessment*), which we have subsequently adopted. We incorporate that document here by reference. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

1. *Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat (EFH) as defined under the Magnuson-Stevens Act and identified in FMPs?*

The wharf project is of short-term duration and will involve pile installation. Installation of piles will be accomplished primarily by vibratory pile driver. Certain piles may be finished with an impact pile driver if difficult substrate conditions are encountered.

The area encompassed by the Navy's proposed action (project area) extends through the jurisdiction of the South Atlantic Fishery Management Council (SAFMC) and through areas where NMFS has designated EFH for highly migratory species (e.g., tuna, billfish, swordfish, and sharks). As a result, the Navy's proposed action may occur within areas designated as EFH. Species groups that could occur in the project area include highly migratory, coastal migratory pelagics, snapper-grouper, juvenile summer flounder, and shrimp.

The effects of the Navy's action will primarily be from increased levels of sound resulting from pile installation, which will temporarily reduce the quality of water column EFH; these effects are temporary and will result in no long-term impacts to the environment. Pile installation and dredging would also locally increase turbidity and the temporary removal of habitat that provides shelter and/or prey resources in the immediate project vicinity. The water column may experience increased sedimentation and turbidity during operational periods. While some disruption to fish and fish habitat is unavoidable as a result of the activity, these impacts will be temporary in duration, with a minimal and localized zone of influence. Most species may already avoid this area due to the large amount of vessel traffic through the area and dredging activities; further, any behavioral avoidance by fish would not appreciably reduce the amount of fish and marine mammal foraging habitat in the nearby vicinity.

The above information pertains to the Navy's pile driving activity. The NMFS proposed action, which is the authorization of marine mammal take incidental to the wharf project, will result in no damage to ocean and coastal habitats or EFH.

2. *Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?*

The authorization of marine mammal take incidental to the Navy's wharf project will not have a substantial impact on biodiversity or ecosystem function. The Navy's wharf project may temporarily impact ecosystem function by i) temporarily creating elevated levels of underwater sound, thereby disturbing forage fish; ii) degrading water quality as a result of resuspension of bottom sediments from pile driving and dredging operations; and iii) directly damaging the benthos through pile driving, dredging and anchoring. Bottom disturbance would be temporary over a short-term project period and sediments would settle back in the general vicinity from which they rose, or would be dissipated by the strong tidal currents in the area. The temporary increase in turbidity, as well as direct impact to the benthos, is expected to decrease the light available for marine vegetation and to impact benthic organisms; however, these impacts would be minor and temporary in nature.

3. *Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?*

The proposed action is not expected to result in any impacts related to public health and safety. Construction activities are not likely to release hazardous materials into the environment. Construction crews would follow applicable state and federal laws to ensure a safe working environment. Increases in noise levels in public areas adjacent to NSM would be temporary and intermittent, occurring on a maximum of 70 days over a 12-month span. Adverse effects would be limited to behavioral disturbance, and would not be expected to significantly impact recreational users of the St. Johns River. The proposed action would not result in significant adverse impacts to health and safety.

4. *Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?*

Endangered or threatened fish and marine mammal species may occur in the general vicinity of the Navy's wharf project, but are not anticipated to be impacted. The proposed action – NMFS' authorization of incidental marine mammal take – is not expected to have a significant adverse impact on endangered or threatened species. North Atlantic right whales occur offshore from the Navy's project area. Humpback whales are rarely observed in nearshore waters in the vicinity of the project area. Both species are listed as endangered under the Endangered Species Act (ESA), but neither is expected to be affected by the Navy's action. Therefore, no incidental take of right or humpback whales is authorized under the Marine Mammal Protection Act or exempted under the ESA. No other such species will be affected by NMFS' proposed action.

5. *Are significant social or economic impacts interrelated with natural or physical environmental effects?*

The proposed action will not have any social or environmental impacts. The impacts resulting from NMFS' authorization of marine mammal take incidental to the Navy's wharf project will be limited to, at most, temporary behavioral harassment of small numbers of marine mammals. No social or economic impacts will be associated with this authorization.

6. *Are the effects on the quality of the human environment likely to be highly controversial?*

NMFS' issuance of an incidental harassment authorization (IHA) will not have effects on the human environment that are likely to be highly controversial. There is not substantial debate over the proposed action's size, nature, or effect, nor is there such debate over the underlying action (the Navy's wharf project). Due to the limited duration and intensity of the project, and the implementation of appropriate mitigation and monitoring measures, there will not be significant impacts to natural resources in the project area. During the public comment period on the proposed IHA, NMFS only received comments from the Marine Mammal Commission, which did not indicate that the environmental effects of NMFS' action were likely to be highly controversial.

7. *Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas?*

Access to NSM, including the project site, is controlled by the Navy and is restricted to authorized military personnel, civilians, and contractors. Since no public recreational uses occur at the project site, the proposed action would have no direct impact to recreational uses or access in the surrounding community. Traditional resources would not be impacted. The wharf project will occur in a shoreline area that already contains multiple built structures, and will not significantly degrade the existing environment. No other unique characteristics of the geographic area are known. NMFS' issuance of an IHA would not result in substantial impacts to any such places. NMFS is aware that an area adjacent to the project site has been proposed as critical habitat for loggerhead sea turtles. NMFS' proposed action will not adversely affect that habitat area.

8. *Are the proposed action's effects on the human environment likely to be highly uncertain or involve unique or unknown risks?*

The effects of the Navy's proposed action are primarily related to the input of sound, resulting from pile driving, into the environment. Pile driving is a relatively well-studied action, and wildlife and the environment in the vicinity of Mayport are relatively well understood. The implementation of mitigation and monitoring measures included in NMFS' IHA will ensure that no marine mammals are injured or killed, and that impacts to marine mammals are limited to, at most, temporary behavioral harassment. Monitoring of marine mammals that are behaviorally harassed, as well as numerous documented accounts of marine mammal behavior before, during, and after behavioral harassment, demonstrates that behavioral harassment of limited duration will not result in any permanent changes to the manner in which marine mammals utilize the vicinity of the Navy's wharf project. While NMFS' judgments on impact thresholds are based on somewhat limited data, enough is known for NMFS and the regulated entity (here the Navy) to develop precautionary monitoring and mitigation measures to minimize the potential for significant impacts on biological resources. As such, the effects of NMFS' issuance of an IHA are not highly uncertain, and the action does not involve unique or unknown risks.

9. *Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?*

NMFS' issuance of an IHA is not related to other actions that may have cumulatively significant impacts. NMFS has no other proposed or current actions in the project area. The Navy considered cumulative impacts from its proposed action and other past, present, and reasonably foreseeable projects and found that they were not significant. Specifically, the Navy found that environmental impacts of their proposed action may result in only temporary changes to the noise environment and sediment and water quality of the NSM turning basin and, as such, there is limited potential for such temporary impacts to affected resources to interact in cumulatively significant ways with impacts that may arise from other actions.

10. *Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?*

No structures eligible for the NRHP will be affected by the proposed action. No submerged archaeological sites are expected to occur in the project area. Traditional resources would not be impacted. Cultural resources were not carried forward for detailed analysis in the Navy's EA, as potential impacts were considered to be negligible or non-existent.

11. *Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?*

Neither the proposed action nor the underlying Navy action is expected to result in the spread of any nonindigenous species. Sufficient precautionary measures will be taken by the Navy to ensure that no introduction or spread of such species occurs.

12. *Is the proposed action likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?*

The Navy may have additional future projects at NSM that involve pile driving. However, subsequent applications for incidental take authorizations will be independently analyzed on the basis of the best scientific information available. A finding of no significant impact for the wharf project, and for NMFS' issuance of an IHA, may inform the environmental review for future projects but would not establish a precedent or represent a decision in principle about a future consideration.

13. Can the proposed action reasonably be expected to threaten a violation of Federal, state, or local law or requirements imposed for the protection of the environment?

The proposed action – NMFS' issuance of an IHA – is conducted in conformance with the MMPA. NMFS has made all appropriate determinations under other applicable statutes, and NMFS' action will not violate any laws or requirements. The Navy's wharf project requires issuance of multiple permits. The Navy is pursuing all required permits; each agency will review the Navy action as appropriate to ensure that no federal, state, or local laws or requirements will be violated.

14. Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

NMFS' issuance of an IHA is specifically designed to reduce the effects of the Navy's wharf project to the least practicable impact to marine mammals, through the inclusion of appropriate mitigation and monitoring measures. NMFS has no other proposed or current actions in the project area, and the issuance of an IHA does not result in significant cumulative impacts when considered with all other past, present, and reasonably foreseeable projects.

Similarly, the cumulative effects of the Navy's wharf project and other past, present, and reasonably foreseeable projects are not considered significant. Specifically, the Navy concluded that their proposed action is likely to result in no more than temporary changes to the noise environment and sediment and water quality. Therefore, there is limited potential for those effects to interact cumulatively with the effects of other past, present, and reasonably foreseeable projects. The Cumulative Impacts section of the Navy's EA addresses this topic in greater detail.

Implementation of the proposed action, in conjunction with other past, present, and reasonably foreseeable future actions, would not be expected to result in significant cumulative impacts to the environment. As such, the proposed action will not result in cumulative adverse effects that could have a substantial effect on species in the action area.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting EA prepared for the Navy's wharf project and application for an IHA, it is hereby determined that NMFS' issuance of an IHA will not significantly impact the quality of the human environment as described above and in the supporting documents. The proposed IHA was published in the *Federal Register*, and all public comments were considered and addressed. These public comments presented no new information that affects this determination. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an environmental impact statement for this action is not necessary.

Donna S. Wieting

Donna S. Wieting, Director
Office of Protected Resources

NOV 20 2013

Date