APPENDIX E

Biological Assessment and Essential Fish Habitat Assessment

-Page Intentionally Left Blank-

Sea Port Oil Terminal
Deepwater Port Project
Biological Assessment
and
Essential Fish Habitat Assessment

January 2020

U.S. Coast Guard
Maritime Administration

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

Acronym	**Definition**
°F	degrees Fahrenheit
µPa	microPascal
AOO	area of occurrence
API	American Petroleum Institute
ATBA	area to be avoided
BA	Biological Assessment
BO	Biological Opinion
CFR	Code of Federal Regulations
CMP	Coastal Migratory Pelagics
Cr	chromium
dB	decibel
dB re 1µPa	sound exposure level in decibels relative to 1 microPascal
dB re 1µPa^{2}s	sound exposure level in decibels relative to 1 microPascal squared second
DPS	distinct population segment
DWH	Deepwater Horizon
DWP	deepwater port
ECHO	Enterprise Crude Houston
EEM	estuarine emergent
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
EOO	extent of occurrence
ESA	Endangered Species Act
ESS	estuarine scrub-shrub
Fed. Reg.	Federal Register
FGBNMS	Flower Garden Banks National Marine Sanctuary
FMP	fishery management plans
ft^3	cubic feet
GMFMC	Gulf of Mexico Fishery Management Council
GoM	Gulf of Mexico
gpd	gallons per day

Acronym	**Definition**
gph	gallons per hour
gpm	gallons per minute
g/m^2	Gram per square meter
HAPC	habitat areas of particular concern
HDD	horizontal directional drill
HMS	highly migratory species
Hz	hertz
kHz	kilohertz
LED	light-emitting diode
MARAD	Maritime Administration
MARPOL	International Convention for the Prevention of Pollution from Ships
MLV	mainline valve
m^3/s	cubic meters per second
mm	millimeter
mg/L	milligrams per liter
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NA	not applicable
NARW	North Atlantic right whale
Ni	nickel
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NWR	National Wildlife Refuge
OCS	Outer continental shelf
Pa	Pascal
PAH	polycyclic aromatic hydrocarbon
PLEM	pipeline end manifold
Ppb	parts per billion
psi	pounds per square inch
PSO	protected species observers
RMS SPL	root mean square sound pressure level
SAFMC	South Atlantic Fishery Management Council
SEAMAP	Southeast Area Monitoring and Assessment Program
SEL_{cum}	cumulative sound exposure level
SPL	sound pressure level
SPOT	Sea Port Oil Terminal
SPM	single-point mooring
TPWD	Texas Parks and Wildlife Department
U.S.	United States
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VLCC	very large crude carrier
WCS	Western Canadian Select
WTI	West Texas Intermediate
YOY	young-of-the-year

-Page Intentionally Left Blank-

1. INTRODUCTION

On January 31, 2019, SPOT Terminal Services LLC (the Applicant), a wholly owned subsidiary of Enterprise Products Operating LLC, submitted an application to the United States Coast Guard (USCG) and Maritime Administration (MARAD) seeking a Federal license under the Deepwater Port Act of 1974 (as amended) to own, construct, operate, and eventually decommission a deepwater port (DWP) with onshore and offshore facilities for the transportation of crude oil for export to the global market in Federal waters between 27.2 and 30.8 nautical miles off the coast of Brazoria County, Texas. Together, the USCG and MARAD are the lead Federal agencies responsible for processing the application for the proposed Sea Port Oil Terminal (SPOT) Project. In accordance with Section 1504(f) of the Deepwater Port Act, an Environmental Impact Statement (EIS) is being prepared in cooperation with other Federal agencies and departments to comply with the requirements of the National Environmental Policy Act of 1969 and Section 7 of the Endangered Species Act of 1973 (as amended; ESA).

Under the ESA, the USCG and MARAD are required to consult with the United States Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) to determine whether any Federally listed, or candidate endangered or threatened species, or their designated critical habitats occur near the proposed Project. For species or habitats that might be affected by the proposed Project, the USCG and MARAD must request to initiate consultation with the USFWS and/or NOAA Fisheries. The nature and extent of effects and recommended measures that would avoid or reduce potential effects on the species and their designated critical habitat are discussed in an EIS, a Biological Assessment (BA), or a similar document. The information provided in that document is used for determining whether the effects of the proposed Project would likely jeopardize any listed species or result in the destruction or adverse modification of designated critical habitat. After review of the relevant information, NOAA Fisheries and/or the USFWS would issue a concurrence letter through informal consultation or a Biological Opinion (BO) through formal consultation on the potential for jeopardy. NOAA Fisheries and/or the USFWS may also issue an incidental take statement as an exception to the takings prohibitions in Section 7 of the ESA.

Together, as the lead Federal agencies for the SPOT Project, the USCG and MARAD have prepared this BA to initiate ESA consultation with the USFWS and NOAA Fisheries. This consultation also satisfies the ESA obligations of the United States (U.S.) Army Corps of Engineers and the U.S. Environmental Protection Agency, which are both cooperating agencies on the SPOT Project. This BA separates the Federally listed species and critical habitat into tables and discussion by either USFWS or NOAA Fisheries jurisdiction for the convenience of each agency’s review. This BA is prepared in accordance with the legal requirements set forth under Section 7 of the ESA (16 United States Code 1536 (c)). We have also included a separate section assessing essential fish habitat (EFH) pursuant to Magnuson-Stevens Act Provision (50 Code of Federal Regulations [CFR] Part 600).

This BA has been prepared with reference to a species list compiled by an official USFWS Information for Planning and Conservation System query, information retrieved from the NOAA Fisheries website, and agency correspondence. The probable presence of listed species was further evaluated by reviewing publicly available data from the Texas Parks and Wildlife Department (TPWD), fish distribution spatial data, National Hydrography and National Wetlands Inventory data, topographic maps, aerial photographs, and recent scientific literature. The actual occurrence of a species in the area would depend on multiple factors, such as the presence of suitable habitat, the season of the year, and the species' distinct migratory habits. Marine mammal species are protected by the Marine Mammal Protection Act of 1972 (as amended; MMPA), but those discussed within this BA are also listed as Federally threatened or endangered under the ESA. The six species of marine mammals under the NOAA Fisheries or USFWS jurisdiction are considered protected and depleted stock throughout their ranges under the MMPA.

Federal agency consultations under Section 7 of the ESA were initiated on May 1, 2019. Attachment A, Agency Correspondence, of this BA includes correspondence with the USFWS and NOAA Fisheries.

2. DESCRIPTION OF THE ACTION AREA

The action area, as defined in 50 CFR § 402.02, includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." This includes the area affected by onshore and offshore construction and operation activities, including the transit area for very large crude carriers (VLCCs) that would call on the proposed SPOT DWP to load and export crude oil, and areas that could be affected if an oil spill occurred during operation of the Project. The proposed action would include:

- Expansion of the onshore existing Enterprise Crude Houston (ECHO) Terminal, construction of the proposed Oyster Creek Terminal, and onshore pipelines in Harris and Brazoria counties, Texas;
- Offshore subsea pipelines approximately 40.8 nautical miles from the terminus of the onshore pipelines at the shoreline in Brazoria County to the proposed SPOT DWP in Federal waters;
- The SPOT DWP and anchorage area locations within the Outer Continental Shelf (OCS) in Federal waters of Galveston Area lease blocks 463 and A-59, respectively, approximately 27.2 to 30.8 nautical miles off the coast of Brazoria County, Texas; and
- The offshore transit area for VLCCs and other crude oil carriers that would call on the proposed SPOT DWP in the Gulf of Mexico (GoM) U.S. Exclusive Economic Zone (EEZ).

Construction activities would be limited to the pipeline route, terminal site, and SPOT DWP components in the GoM. Fugitive dust, onshore construction noise, turbidity from sediment suspended by jet trenching activities, impulsive noise/pressure waves from pile driving activities, and noise generated from VLCCs operating in the GoM would all extend beyond the construction footprint. Within the onshore environment, noise levels associated with construction of the Oyster Creek Terminal would be below the measured ambient noise levels, while noise associated with some horizontal directional drill (HDD) activities would be above ambient noise levels (SPOT 2019i).

Within the offshore environment, turbidity generated from jet sledding activities would exceed background levels over a maximum area of about 19,044 acres, and sediment deposition would occur over a maximum area of about 6,210 acres. Pile driving could affect aquatic species up to 6.8 miles from the source of the sound and noise generated from VLCCs operating within the safety zones and areas to be avoided (ATBAs) could affect marine mammals up to about 44 miles from the source. Therefore, the action area presented in this document would also include the portion of the GoM within a 6.8-mile radius from the platform, which represents the largest distance at which impulsive noise impacts are anticipated during construction, and the 19,044 acres anticipated to be affected by jet-sledding activities.

The action area would include areas affected by a potential oil spill. The action area defined within this BA is based on the models provided by the Applicant and covers the various scenarios modeled in the event of a spill. Model details are included in Section 4.7.2, Oil Spills and Petroleum Product Releases.

VLCC or other crude oil carriers would travel to the SPOT DWP facility from foreign ports and would be expected to use designated shipping fairways in the GoM as they approach the SPOT DWP. This BA limits its analysis to the boundary of the EEZ for potential impacts from vessel traffic during Project operations because of the uncertainty of vessel movements on the high seas beyond the limits of the EEZ.

2.1. TERRESTRIAL HABITAT

The onshore portions of the proposed SPOT Project are within the U.S. Environmental Protection Agency Level III Western Gulf Coast Plain Ecoregion (2016) and the TPWD Gulf Prairies and Marshes region (2017). The region is characterized by nearly level plains at or below 150 feet above mean sea level that are crossed by rivers and streams flowing to the GoM and includes barrier islands near the coast, tall woodlands and river bottomlands, bays and estuaries surrounded by salt grass marshes, tallgrass prairie remnants, and oak mottes and oak parklands along the coast. General land cover categories, based on national land cover data, within 1 mile of the SPOT Project are included in Table 2.1-1.

Table 2.1-1: Existing Terrestrial Land Cover Categories Within 1 Mile of the SPOT Project

Terrestrial Land Cover Category	Area (acres)	Percent Cover
Developed, open space	8,081	9.7
Developed, low intensity	6,991	8.4
Developed, medium intensity	5,507	6.6
Developed, high intensity	1,879	2.3
Barren land (rock/sand/clay)	479	0.6
Forest, deciduous	843	1.0
Forest, evergreen	1,054	1.3
Forest, mixed	1,393	1.7
Shrub/scrub	1,822	2.2
Grassland/herbaceous	4,042	4.8
Pasture/hay	19,010	22.8
Cultivated Crops	14,536	17.4

Source: MLRC 2019

2.2. ONSHORE AQUATIC HABITAT

The proposed Project area is within the coastal plain of the West Galveston Bay and Austin-Oyster watersheds (USGS 2018). Onshore aquatic habitats include freshwater and estuarine waterbodies and wetlands. General land cover categories, based on national land cover data, within 1 mile of the SPOT Project are included in Table 2.2-1.

Table 2.2-1: Existing Onshore Aquatic Land Cover Categories Within 1 Mile of the SPOT Project

Aquatic Land Cover Category	Area (acres)	Percent Cover
Woody wetlands	6,919	8.3
Emergent herbaceous wetlands	8,270	9.9
Open water	2,630	3.2

Source: MLRC 2019

2.3. Coastal and Marine Habitat

Offshore construction and operation of the proposed Project, including the subsea pipelines and the SPOT DWP, would be within coastal and marine waters in the GoM. This includes offshore transit areas for VLCCs and other crude oil carriers that would call on the proposed SPOT DWP from shipping fairways in coastal and marine waters to the EEZ, where vessels would then enter international waters.

Coastal waters are nearshore waters and are dominated by tides, nearshore circulation, freshwater discharge from rivers, and local precipitation. This area of mixing between freshwater and marine waters forms estuarine habitats such as marshes, mangroves, and coastal wetlands along the Gulf Coast. Coastal environments provide habitat, food, and shelter for shorebirds, migratory waterfowl, fish, invertebrates, reptiles, and mammals. Additionally, coastal estuaries benefit humans by providing habitat for estuarine-dependent fish species, including species important in commercial fisheries.

Marine waters are defined as the offshore waters of the continental shelf and beyond. Marine waters generally lie seaward of coastal waters and are hydraulically dominated by tides and currents, have salinity levels representative of natural seas, and merge into and become part of the deepwater environment of the GoM.

2.4. Land Use Requirements

A total of about 1,134 acres, including 3.2 acres at the existing ECHO Terminal, 140.1 acres for the proposed Oyster Creek Terminal, about 982.8 acres for the onshore pipelines, and about 8 acres for access roads would be crossed along the 62.3-mile pipeline corridor.

Onshore construction and operation of the proposed Project pipelines would affect about 50.1 miles (745.1 acres) of land between the existing ECHO Terminal in Harris County, Texas, and the Oyster Creek Terminal in Brazoria County, Texas, for construction of the ECHO to Oyster Creek Pipeline; and an additional 12.2 miles (237.9 acres) of land from the Oyster Creek Terminal to the shore crossing for the two collocated Oyster Creek to Shore Pipelines. Construction and operation would also affect 140.1 acres of land for the Oyster Creek Terminal. The Project would cross developed lands (open space, low, medium, and high intensity), barren lands, upland forests (deciduous, evergreen, and mixed), grasslands, agricultural lands (crop and pasture/grazing), and upland shrublands. Table 2.4-1 provides the existing TPWD terrestrial land cover types within the Project footprint.

The proposed footprint is situated mainly on herbaceous land, primarily classified as Gulf Coast: Coastal Prairie. Table 2.4-1 summarizes the TPWD land cover types affected by the SPOT Project.

Table 2.4-1: Terrestrial and Aquatic Community Land Cover Types Affected by the SPOT Deepwater Port Project [a]

	ECHO to Oyster Creek Pipeline and MLVs		Oyster Creek to Shore Pipelines and MLVs		Oyster Creek Terminal		Access Roads	
Community Type	**Construction Impacts (acres) [a]**	**Operation Impacts (acres)**	**Construction Impacts (acres) [a]**	**Operation Impacts (acres)**	**Construction Impacts (acres)**	**Operation Impacts (acres)**	**Construction Impacts (acres)**	**Operation Impacts (acres)**
Coastal and Sandsheet: Deep Sand Grassland	0.0	0.0	1.8	0.9	0.0	0.0	0.0	0.0
Coastal: Sea Ox-eye Daisy Flats	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.0
Coastal: Tidal Flat	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0
Columbia Bottomlands: Shrubland	<0.1	<0.1	10.7	3.8	5.2	5.2	1.6	1.6
Columbia Bottomlands: Grassland	4.1	1.5	32.9	11.0	59.8	59.8	0.7	0.4
Columbia Bottomlands: Hardwood Forest and Woodland; Mixed Evergreen; Live Oak	40.4	11.6	8.2	2.5	0.0	0.0	1.0	0.9
Columbia Bottomlands: Riparian Deciduous Shrubland	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Columbia Bottomlands: Riparian Grassland	4.0	1.0	0.0	0.0	0.0	0.0	0.2	0.1
Columbia Bottomlands: Riparian Hardwood Forest and Woodland; Mixed Evergreen; Live Oak	2.0	0.5	0.2	0.2	0.0	0.0	0.1	0.1
Grass Farm	0.6	<0.1	0.0	0.0	0.0	0.0	0.0	0.0
Gulf Coast: Coastal Prairie	443.1	94.6	24.1	6.9	0.0	0.0	3.3	1.8
Gulf Coast: Salty Prairie	0.03	0.3	53.3	16.4	57.6	57.6	0.2	0.2
Gulf Coast: Salty Prairie Shrubland	0.0	0.0	2.6	0.6	0.0	0.0	0.0	0.0
Native: Invasive Woody Vegetation	41.1	8.3	7.6	2.1	9.5	9.5	0.4	0.4
Non-Native: Invasive Woody Vegetation	18.9	2.6	13.2	3.9	0.8	0.8	0.3	0.3
Pine Plantation	3.9	0.9	1.7	0.6	0.0	0.0	0.1	<0.1
Pineywoods: Pine – Hardwood Forest or Plantation	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Post Oak Savanna: Live Oak Motte and Woodland	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Row Crops	40.8	10.6	0.0	0.0	0.0	0.0	<0.1	<0.1
Urban	137.1	11.4	1.0	0.7	1.1	1.1	0.0	0.0

	ECHO to Oyster Creek Pipeline and MLVs		Oyster Creek to Shore Pipelines and MLVs		Oyster Creek Terminal		Access Roads	
Community Type	**Construction Impacts (acres) [a]**	**Operation Impacts (acres)**	**Construction Impacts (acres) [a]**	**Operation Impacts (acres)**	**Construction Impacts (acres)**	**Operation Impacts (acres)**	**Construction Impacts (acres)**	**Operation Impacts (acres)**
Barren	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waterbodies	0.1	0.1	7.0	4.8	0.0	0.0	0.0	0.0
Wetland	6.4	1.3	73.2	18.6	6.1	6.1	0.2	0.1
Total	**745.1**	**145.2**	**237.9**	**73.4**	**140.1**	**140.1**	**8.0**	**5.9**

ECHO = Enterprise Crude Houston; MLV = mainline valve

[a] Construction impacts include construction and operation workspace, including MLVs.

Note: Total acreage may not sum exactly due to rounding.

3. DESCRIPTION OF THE PROPOSED ACTION

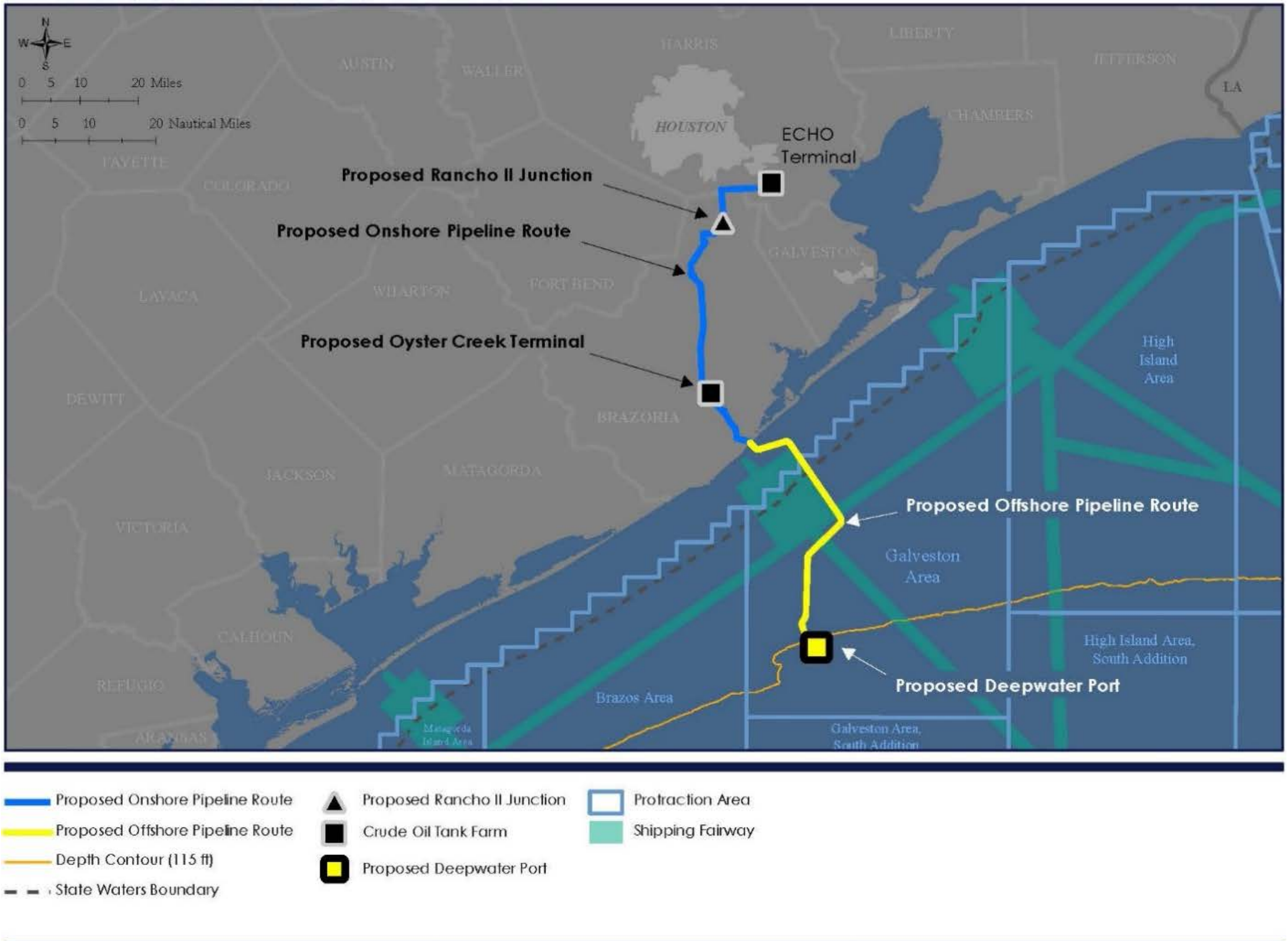
The Applicant proposes to construct, own, and operate the proposed SPOT Project to transport a range of crude oils, from ultralight, to light, to heavy grade, from existing and proposed onshore oil infrastructures to a proposed offshore SPOT DWP that would enable VLCCs and other crude oil carriers to deliver oil to foreign global markets.

The proposed Project would provide a safe, efficient, and reliable facility to allow full capacity loading of VLCCs and other crude oil carriers. Because of their large size, VLCCs require ports with waterways of sufficient width and depth for safe navigation (EIA 2018). All onshore U.S. ports along the Gulf Coast that actively trade petroleum are located in inland harbors, and are connected to the open ocean through shipping channels or navigable rivers (EIA 2018). Although these channels and rivers are regularly dredged to maintain depth and enable safe navigation for most ships, they are not deep enough for deep-draft vessels, such as fully loaded VLCCs (EIA 2018). VLCCs are currently partially loaded onshore, completely loaded via lightering offshore, or loaded using a combination of both. Lightering is a process in which smaller crude oil carriers are loaded at onshore facilities and then travel to designated lightering areas, where water depths are not a constraint, to load VLCCs via multiple product transfers. To meet the increased demand for crude oil exports, the proposed Project would be designed to allow for direct, single loading of VLCCs and other crude oil carriers at the proposed SPOT DWP. Thus, the Project would provide an alternative to some of the current lightering operations for VLCCs. The Project would also be an alternative to dredging inland waterways and constructing additional berths at shore-based deep draft ports that would be required to accommodate the draft of VLCCs when fully loaded.

The proposed Project is an export project and, as such, any alternatives considered must have the ability to export crude oil. Furthermore, surplus crude oil sources, at the time of this EIS, are primarily located in the Permian Basin in west Texas and the Eagle Ford Basin in south Texas. The Project would ultimately allow for the export of abundant crude oil supplies from the United States to meet global demands for crude oil at competitive prices in the global market.

3.1. PROJECT LOCATION

Onshore components of the Project would be located in Harris and Brazoria counties, Texas, and offshore components would be located in Federal waters within the OCS in Galveston Area lease blocks 463 and A-59, between 27.2 and 30.8 nautical miles off the coast of Brazoria County, Texas, in water depths of approximately 115 feet. Figure 3.1-1 shows the general location of the proposed Project and locations of the primary Project components.



Source: SPOT 2019a, Application, Volume IIa, Section 1

Figure 3.1-1: General Location of the SPOT Project

3.2. FACILITIES

The SPOT Project would have both onshore and offshore components.

The onshore components of the Project would include:

- The existing ECHO Terminal with modifications on the southeast side of Houston, Texas, just east of Pearland, Texas, including four electric motor-driven mainline crude oil pumps and four electric motor-driven booster crude oil pumps to support crude oil delivery of crude oil to the proposed Oyster Creek Terminal;
- One 50.1-mile, 36-inch-diameter ECHO to Oyster Creek Pipeline;
- One pipeline interconnection from the existing Rancho II 36-inch-diameter pipeline to the ECHO to Oyster Creek Pipeline (Rancho II Junction);
- A new Oyster Creek Terminal, including six electric motor-driven mainline crude oil pumps with the capability to push crude oil to the offshore pipelines at a rate of up to 85,000 barrels per hour (2 million barrels per day), four electric motor-driven booster crude oil pumps to supply crude oil to the proposed SPOT DWP via pipelines;
- Seven aboveground storage tanks (each with a capacity of 685,000 barrels [600,000 barrels of working storage]) at the proposed Oyster Creek Terminal, for a total onshore storage capacity of approximately 4.8 million barrels of crude oil;
- Two collocated 12.2-mile, 36-inch-diameter Oyster Creek to Shore Pipelines; and
- Ten mainline valves (MLVs), of which six would be along the ECHO to Oyster Creek Pipeline and four along the Oyster Creek to Shore Pipelines.

The offshore components of the Project would consist of the SPOT DWP and connected facilities, and would include:

- Two collocated, bi-directional, 46.9-mile, 36-inch-diameter crude oil offshore pipelines for crude oil delivery from the Oyster Creek Terminal to the platform;
- One fixed offshore platform with eight piles, four decks, and three vapor combustion units;
- Two single-point mooring (SPM) buoys to concurrently moor two VLCCs or other crude oil carriers for loading;
- Four pipeline end manifolds (PLEMs)—two per SPM buoy—to provide the interconnection between the SPOT DWP and the SPM buoys;
- Four 0.7-nautical mile, 30-inch-diameter pipelines (two per PLEM) to deliver crude oil from the platform to the PLEMs;
- Four 0.7-nautical mile, 16-inch-diameter vapor recovery pipelines (two per PLEM) to connect the VLCC or other crude oil carrier to the three vapor combustion units on the platform;
- Three service vessel moorings in the southwest corner of lease block 463; and

- An anchorage area in lease block A-59, which would not contain any infrastructure and would be used for VLCC anchoring only.

3.3. Construction Schedule

Construction of the proposed Project would begin in the fourth quarter of 2020 if a license is issued and all license conditions are met. Onshore construction would begin in November 2020 and be completed by September 2022. Construction of the offshore components of the proposed Project would begin in the first quarter of 2021 and be completed in the second or third quarter of 2022. The Applicant anticipates commissioning of the Project would occur in the third quarter of 2022 and the first shipments of oil for export would occur in October 2022.

3.4. Construction Procedures

Construction procedures are described below. Any construction best management practices are incorporated into the construction procedures and are discussed in the applicable sections below.

3.4.1. Onshore Components

Construction activities for onshore components would be limited to the terminal facilities and pipeline rights-of-way. The pipeline rights-of-way sizes are presented in Table 3.4.1-1.

Table 3.4.1-1: Onshore Pipeline Right-of-Way Widths

Pipeline Segment	Length (miles)	Construction Right-of-Way Width (feet)	Operation Right-of-Way Width (feet)
ECHO to Oyster Creek Pipeline	50.1	100	30
Oyster Creek to Shore Pipelines	12.1	150	50

ECHO = Enterprise Crude Houston

3.4.1.1. Site Preparation

Following mobilization, site preparation would begin by marking the limits of construction for the onshore pipelines and the terminal sites, drainages, access roads, highway and railroad crossings, additional temporary workspace, and underground utilities.

3.4.1.2. Pipeline Construction

Clearing and Grading

Workspace areas would be cleared and vegetation removed. Timber and vegetation debris would be chipped for use as erosion control mulch or disposed of in accordance with applicable local regulations and landowner requirements. The workspace would be graded, as necessary, to provide a level work surface to allow safe passage of equipment. Temporary erosion controls would be properly installed immediately after initial ground disturbance.

In unsaturated wetland or agricultural areas, or where requested by the landowner, at least 12 inches of topsoil would be segregated over the trench and spoil storage areas.

Foundation Construction

Concrete ring foundations would be installed for the crude oil storage tanks at the proposed Oyster Creek Terminal. Each ring would be the size of the storage tank and be placed 6 to 8 feet below the ground surface. An impermeable membrane, including a network of open plumbing would then be installed within each concrete ring and sand placed inside the ring. This design would allow for a leak detection system and meters to detect crude oil vapors in the open plumbing.

For on-grade buildings and other facilities, such as piping vaults and pumps, the construction contractor would set the forms, install rebar, and pour and cure the concrete foundations according to applicable industry standards. Concrete required for the proposed Project would be brought in from existing concrete plants.

Equipment and Storage Tank Installation

The Applicant would ship necessary equipment to the terminal sites, offload the equipment with cranes or other equipment, and store the equipment within additional temporary workspace until it is ready to be installed. To install the equipment, the construction contractor would place the necessary components on each foundation, level, grout where necessary, and secure.

Crude oil storage tanks would be constructed on the site on the concrete ring foundations. Once the tank is constructed, each geodesic aluminum roof would be assembled next to its respective storage tank and installed on top of each storage tank.

Non-screwed piping would be welded except where connected to flanged components. The Applicant would employ construction contractor welders that use welding procedures in accordance with American Petroleum Institute (API) and American Society of Mechanical Engineers standards. Welds in large-diameter piping systems would be examined using radiography, ultrasound, or other approved methods to ensure compliance with all applicable codes. Once installed, the construction contractor would clean and paint all aboveground piping. Paint inspection and cleanup procedures would be in accordance with Federal and/or state regulatory requirements and best management practices.

Trenching

Trenches would be excavated using a track-mounted excavator or similar equipment to a depth sufficient to allow a minimum of 3 feet of cover (unless otherwise specified) between the top of the pipe and the final land surface after backfilling. The bottom of the trench would be excavated to at least 12 inches wider than the outside diameter of the pipe. Excavated subsoil would be stockpiled separately from topsoil, where required, on the spoil side of the trench away from construction traffic.

Pipe Stringing, Bending, and Welding

Once the trench is excavated, the next process is stringing the pipe along the trench. Stringing involves initially hauling the pipe, generally in 40-foot lengths (referred to as joints), from the pipe yard onto the right-of-way via a stringing truck. The pipe would be offloaded and placed along the excavated trench end-to-end (or “strung”) to allow for welding into continuous lengths known as strings. Individual joints would be strung along the right-of-way parallel to the centerline to be easily accessible to construction personnel. At wetland and stream crossings, the amount of pipe required to cross the feature would be stockpiled in temporary work areas close to the feature.

Pipe would be delivered to the work area in straight sections. Some pipe bending would be required to enable the pipeline to follow the natural grade and directional changes of the right-of-way. Selected joints would be field-bent by track-mounted hydraulic bending machines as necessary prior to line-up and welding. For larger changes in direction, prefabricated pipe would be installed.

Following stringing and bending, the individual pipe joints would be aligned and welded together using multiple passes for a full penetration weld. Welding would be conducted according to applicable American Welding Society, American Society of Mechanical Engineers, and API standards.

Every completed weld would be visually examined and non-destructively tested to determine its quality using radiographic or other approved methods according to API standards. Any welds displaying unacceptable defects would be repaired or removed. After the weld is approved, the joint would be coated with epoxy. The coating on the entire pipe section would be inspected and any damaged areas repaired.

Lowering-In and Backfilling

Before the pipeline is lowered-in, the trench would be inspected to ensure that it is free of rocks and other debris that could damage the pipe or protective coating. The trench would also be inspected to ensure that the pipe and trench configurations are compatible.

After lowering the pipe into the trench, the trench would be backfilled with previously excavated materials. When the previously excavated material is not suitable backfill (i.e., rocky), screen fill (i.e., padding) would be placed around the pipe prior to backfilling. Screened materials would be generated from excavated material and processed with a track-mounted padding machine or a bucket screen on an excavator.

Hydrostatic Testing

Following terminal facility installation, all high-pressure service components would be hydrostatically tested in accordance with U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration requirements (49 CFR §192.505 and §195.588) to ensure the system is capable of withstanding the appropriate test pressure for 8 hours. Testing involves filling the pipelines or terminal components with water, pressurizing it, and then monitoring for pressure losses due to leaks in the system. Any leaks would be repaired and retested. The Applicant would withdraw about 47 million gallons of water from the firewater pond that would be constructed at the Oyster Creek Terminal to test onshore pipeline and terminal components, or would obtain water from municipal sources to conduct hydrostatic testing (Table 3.4.1-1).

Table 3.4.1-2: Water Requirements for Hydrostatic Testing of Onshore Pipelines and Terminals

Facility Component	Volume (gallons)
ECHO Terminal Modifications	521,857
ECHO to Oyster Creek Pipeline	13,183,596
Oyster Creek Terminal (1 storage tank)	24,573,483
Oyster Creek Terminal (piping)	2,274,814

Facility Component	Volume (gallons)
Oyster Creek to Shore Pipelines	6,412,193
Total for Onshore Pipeline and Terminal Components	**46,965,943**

Source: SPOT 2019b

ECHO = Enterprise Crude Houston

The Applicant does not anticipate treatment of the hydrostatic test water, and no chemicals or desiccant would be used to dry the pipe; therefore, no testing of hydrostatic test water would be conducted prior to use. Following testing, hydrostatic test water would be returned or sent to the firewater pond at the Oyster Creek Terminal, which would be designed with sufficient capacity to hold the water without discharging to downstream waters except during unusual or severe rain events.

Cleanup and Restoration

Following successful completion of hydrostatic testing, temporary workspaces would be returned to preconstruction contours, and debris would be removed and disposed of in accordance with local ordinances. Permanent erosion and sediment control measures, including slope breakers, trench breakers, and revegetation would be installed. Soils that supported vegetation prior to construction would be revegetated using approved seed mixes, application rates, and timing windows recommended by local soil conservation authorities and seed vendors, or as requested by the landowner. The Applicant would also adhere to any specific U.S. Army Corps of Engineers 404/401 permit conditions pertaining to revegetation. Fences, gates, driveways, and roads disturbed during construction would be restored to original or better condition.

Specialized Construction Procedures

Construction through areas containing sensitive resources (e.g., wetlands, waterbodies) or in areas with construction constraints would require construction techniques that differ from the standard measures described above. Special construction techniques are summarized below.

Open-Cut Stream Construction

All streams not crossed using a trenchless design (i.e., HDD, bore) would be crossed using the open-cut construction method. The Applicant proposed to use the open-cut construction method at 69 waterbodies, including 19 perennial, 13 intermittent, 33 ephemeral, and 4 ponds. A trench would be excavated across the stream bed and banks using backhoes, dozers, mechanical ditchers, and/or draglines. For most open-cut crossings, equipment would be staged and operated outside the water’s edge, when water is present, unless approved to operate in the stream bed. Trench spoil would be placed in upland areas where possible. Where storage in wetlands or waterbodies would be required, alternating piles would be used to allow sheet flow. Following excavation, prefabricated pipe strings would be lowered into the trench, fitted with buoyancy control, and covered with backfill. Backfilling would start at the center of the stream and work back toward the water edge. Following backfilling, the stream bed would be stabilized using standard restoration methods and temporary vehicle crossings would be removed.

Wetland Construction

Where construction would occur in wetlands, vegetation would be cut to ground level. Stump removal would be limited to areas directly over the trench. Silt fences would be installed at the edges of the right-of-way to minimize the potential for sediment runoff. If water is present in the trench, trench plugs would be left in the trench before its entrance into the wetland. The hydrologic integrity of the wetland would be maintained by installing trench breakers where the trench enters and exits the wetland. Where possible, additional temporary workspace would be located at least 50 feet from the edge of wetlands.

Standard pipeline construction, similar to construction methods described for uplands, would be conducted in unsaturated wetlands. Topsoil segregation would occur in the same manner as described for agricultural lands. In saturated wetlands with standing water or unstable soils, timber mats or crushed stone on geotextile fabric would be installed at work surfaces adjacent to the trench. Topsoil segregation would not be possible in saturated wetlands. Pipe stringing and fabrication may occur within the wetland or in adjacent additional temporary workspace. Trenchless construction techniques such as HDD would also be used to cross under certain wetlands, including Oyster Creek and Swan Lake.

Trenchless Construction Methods

The Applicant proposed to use the HDD or bore construction method at 101 locations, including crossing 59 waterbodies. The Applicant would use water obtained from locally approved vendors to create the drilling mud, and estimates that a total of about 4,255,536 gallons would be required; including 3,418,010 gallons for HDDs and 837,526 gallons for bores.

Horizontal Directional Drill

The HDD method involves establishing land-based staging areas along both sides of the proposed crossing. The process commences with the boring of a pilot hole beneath the waterbody and then enlarging the hole with one or more passes of a reamer until the hole is the necessary diameter to facilitate the pull-back (installation) of the pipeline. Once the remaining passes are completed, a prefabricated pipe segment is pulled through the hole to complete the crossing.

Throughout the drilling process, a slurry of non-toxic, bentonite clay and water would be pressurized and pumped through the drilling head to lubricate the drill bit, remove drill cuttings, and hold the hole open. Special additives may also be required, typically during the pilot hole phase, but would constitute a small fraction of the drilling fluid, which is generally considered to have low toxicity. The slurry, referred to as drilling mud or drilling fluid, has the potential to be inadvertently released to the surface if fractures or fissures occur, or during the drilling of the pilot hole when the pressurized drilling mud is seeking the path of least resistance. The path of least resistance is typically back along the drilled pilot hole. However, if the drill path becomes temporarily blocked or large fractures or fissures that lead to the surface are crossed, then an inadvertent release could occur. The drilling construction contractor would monitor the pipeline route and the circulation of drilling mud throughout the HDD operation for indications of an inadvertent drilling mud release and would immediately implement corrective actions if a release is observed or suspected, such as establishing containment structures where necessary and working with regulatory agencies in accordance with applicable regulations and permit conditions to determine the necessary course of action. The Applicant has also indicated that vacuum trucks, booms, absorbent pads, shovels, and hay bales would be available and maintained at each HDD site for cleanup in the event of an inadvertent release. The Applicant's HDD Contingency Plan is included in Attachment B.

Bore

The bore method is a trenchless installation procedure whereby a horizontal tunnel is installed beneath a surface feature (e.g., road, minor waterbody). Similar to the HDD, a fluid mixture of water and bentonite clay would be used throughout the boring process to lubricate the bit, transport cuttings to the surface, and maintain the integrity of the hole during installation. Similar inadvertent releases could occur if natural fractures or weak ground is encountered during the drilling process. The correction actions identified in the HDD Contingency Plan would also be applicable for the bore construction method.

3.4.2. Offshore Components

3.4.2.1. Pipeline Construction

The HDD technique would be used to install the two collocated pipelines between the onshore and offshore segments. The HDD entry hole would be located onshore and the exit pit or trench would be excavated offshore near the 25- to 28-foot water depth contour or about 5,500 feet from the shoreline. Spoil materials would be sidecast within the temporary workspace on either side and on the shore side of the trench. The HDD exit hole would be allowed to naturally backfill due to movement from currents, tides, and wave action.

A pipeline installation barge would install a start-up anchor approximately 200 feet from the planned HDD exit hole at about the 30-foot water depth contour and begin assembling the HDD pipe string. The barge would move forward once each pipe joint is welded together on the installation barge. The completed 7,500-foot-long pipe string would be laid on the seafloor and an anchor would be installed on the deep end to hold the pipe in place. The process would be repeated for the second pipeline.

The HDD drilling rig would operate from the shore side and a reaming support barge would operate offshore. The pipe installation barge and a support barge would assist in pullback operations once reaming is complete. After pullback of the two 36-inch-diameter pipe segments is completed, the ends would be secured with an anchor. Each pipeline segment would also be filled with seawater and hydrostatically tested.

The remaining sections of the two 36-inch-diameter offshore pipelines would be installed using a conventional, anchored pipeline installation barge (pipelay barge). This method uses cargo barges and tugs to transport pipe joints to the installation barge where pipe joints would be welded, inspected, and field joint coatings would be applied. Work would begin near the HDD exit hole and would use anchor handling tugs that would position and hold the pipeline installation barge along the right-of-way using two stem anchors, a minimum of two bow anchors, and four breast anchors. As pipe segments are completed, the pipelay barge would move forward until the entire pipeline is laid on the seafloor. The same process would be repeated for the second pipeline.

The pipelay barge would install the four 30-inch-diameter loading pipelines between the platform and PLEM target box locations. A deadman anchor would be set in line with the pipeline route and the pipelay barge would assemble and lay the pipe moving away from the startup anchor as described above.

Once the design length of the pipeline is welded, a flanged laydown head would be installed and the pipe would be lowered to the designated location on the seafloor. The four 16-inch vapor recovery pipelines would be installed in the same manner between the platform and PLEM locations.

Upon completion of pipeline installation on the seafloor, a trenching vessel using a jet sled would be positioned at the HDD point and use high-pressure water jets to break up the consolidated bottom materials alongside and underneath the pipeline. High-pressure compressed air would remove the slurry beneath the pipe as the barge moves ahead. The substrate hardness would determine the rate of travel. The same process would be followed for the two 36-inch, four 30-inch, and four 16-inch diameter pipelines. The pipelines would be buried to a minimum depth of 3 feet below the seafloor except at shipping fairway crossings, which would require a burial depth of 10 feet below the seafloor. Multiple passes may be required to achieve this depth.

Where the pipeline would cross existing pipelines and cables, high-pressure water jets and compressed air-lift operation would be used to remove any cover above the existing facilities. The same jetting and air-lift operation would then be used to lower the existing facilities to a depth that would allow 18-inch separation between the existing facilities and the new pipelines and the 3-foot cover over the new pipeline. Concrete mats would be placed on top of the existing pipeline or cable to maintain the 18-inch separation. Concrete mats or sandbags would be placed over the new pipeline in areas where 3 feet of cover could not be achieved due to existing pipeline elevations.

3.4.2.2. Platform Components and Pipeline End Manifolds

The platform would be supported by eight jacketed piles, each 72 inches in diameter. Table 3.4.2-1 outlines the piles that would be used for the SPOT Project. The jacket would be fabricated off site and brought to the SPOT DWP via cargo barge. Piles would be shipped with the jacket; jacket and pile installation would occur prior to deck installation. The 72-inch-diameter piles would be driven to a depth of 380 feet below sea bottom elevation using a pile hammer/driver operating from a derrick barge. Platform piles would require 1,278 strikes per hour and operations would occur 24 hours per day. The impact hammer would operate for 2 hours every 6 hours. This process would be repeated eight times and would result in a total of 10,255 strikes per pile. Installation of the eight 72-inch diameter piles would take about 10 days. The jacket would then be lifted and set in position, then verified by an on-site surveyor. The jacket would be leveled and the piles would be welded to the top of the jacket. Each deck would be lifted from the cargo barge to the derrick barge, set on top of the jacket legs, and then welded in place. The living quarters would then be lifted and set in place.

Table 3.4.2-1: Piles Summary for the SPOT Deepwater Port

Project Component	Number of Piles	Pile Diameter (inches)	Hammer Strikes (per pile)	Depth (feet)
Platform	8	72	10,255	380
PLEM	16	30	12,000	60

PLEM = pipeline end manifold

Tie-in spools would be fabricated at onshore facilities and transported to the installation location by a supply vessel. A dive support vessel would lower the tie-in spools to the seafloor and the flanged ends would be connected between the pipelines, the risers, and the PLEMs. Flanged connections with swivel and misalignment ball flanges would be used for installation, as required, to facilitate the connection of the offshore pipelines to the fixed orientation of the jacket risers.

The PLEMs would be transported on a material transport barge and would be lowered to the ocean floor with support from a dynamic positioned diving support vessel. The two PLEMs would be secured in place with four 40-inch-diameter driven piles each. Pile driving would occur 24 hours per day with 1,500 strikes every 40 minutes. One pile would be installed every 8 hours; it would take approximately 5.5 days to install the 16 piles.

The PLEMs would be transported on a material transport barge and would be lowered to the seafloor. PLEMs would be secured in place with four driven piles per PLEM.

The SPM system would use fluke anchors and anchor chains to secure the buoy in position. The six anchors would be equally spaced on a 1,043-foot radius circle with 1,080 feet of anchor chain between the anchor and the chain stopper on the buoy. An installation vessel would first install each fluke anchor and lay out the chain. A large anchor handling tug would set the anchors by pulling the anchor in the direction of the buoy’s proposed location, then laying the chain out on the seafloor. After the pile anchors and anchor chains are laid out and inspected, the SPM buoy would be towed into the designated location and the anchor chains would be installed in accordance with the buoy designer’s recommended installation sequence and procedures. After inspection, the underbuoy hoses would be installed following the Oil Companies International Marine Forum guidelines. Once the SPM buoy installation is complete, including the installation of the underbuoy hoses to the PLEM, the SPM buoy system would be fully inspected.

The SPM buoy would have a telemetry system that allows for monitoring the aspects determined to be of significance to the VLCC and the operations at the offshore platform. The system would be installed and tested in accordance with all relevant industry standards.

The floating hoses would connect to the SPM buoy swivel on the topsides and the hose sections flanged together until the final hose tail with additional floatation buoyancy is reached. The floating hoses would float on the water surface and would weathervane dependent on the current.

The mooring hawser would be used to moor the VLCC or other crude carrier to the SPM buoy. One end of the mooring hawser would be connected to the SPM buoy and the other end would be used to moor the VLCC or other carrier with assistance from support tugs.

After all mechanical and commissioning checks are completed, including removal of hydrostatic test water as described below, pigs propelled by air would be used to clean and dry the system. Nitrogen would then be pushed through the system to remove the air. Nitrogen would be removed from the system and startup would commence with introduction of hydrocarbons from the onshore terminal to the offshore platform.

3.4.2.3. Hydrostatic Testing

Approximately 14 million gallons of seawater would be used for hydrostatic testing of offshore pipelines. Corrosion inhibitors would be added to the test water during testing and, therefore, released into the GoM upon completion. The Applicant anticipates using a corrosion inhibitor with propylene glycol and polyoxyalkylenes. No information about polyoxyalkylene toxicity is available, but propylene glycol has been shown to be relatively non-toxic in marine and freshwater environments and is highly water soluble. Oxygen is required for organisms to metabolize propylene glycol, which can lead to low dissolved oxygen concentrations at release sites (Canadian Council of Ministers of the Environment 2006). The Applicant anticipates withdrawing seawater at a rate between 5,800 and 14,600 gallons per minute. Seawater would be filtered through one or more sieves with a final mesh screen no coarser than 5/16-inch, and would be capable of removing 99 percent of all particles greater than or equal to 92 microns in diameter.

After pressure testing is complete, the pipeline would be dewatered, cleaned, and dried, using air to run a series of pipeline pigs through the system. Upon completion, the hydrostatic test seawater would be discharged at a rate of 4,000 gallons per minute, and would take approximately 60 hours; discharge would occur via the platform deck drain which flows back to the GoM.

3.5. Maintenance Procedures

Activities associated with onshore and offshore, planned and unplanned maintenance would be similar to the activities described for onshore and offshore construction. Routine vegetation management of the full width of the permanent right-of-way would be conducted semi-annually.

4. EFFECTS OF THE ACTION

Construction of the SPOT Project could affect Federally listed birds, plants, marine mammals, sea turtles, and fish in multiple ways as described in the following sections. Section 4 describes the potential effects of the proposed action in general. Potential effects on individual species are discussed in Section 6.2, Analysis of Species Not Likely to be Adversely Affected (USFWS) and Section 7.4, Analysis of Species Not Likely to be Adversely Affected (NOAA Fisheries).

4.1. Onshore

4.1.1. Habitat Loss and Alteration

Project construction and operation would have temporary to permanent impacts on terrestrial vegetation and wildlife habitats. Impacts would include the permanent loss of habitat from installation of aboveground facilities, and temporary impacts on coastal habitats from clearing and grading for construction of the onshore pipelines.

Construction of the onshore pipelines, extra workspace, access roads, the Oyster Creek Terminal, and modifications to the ECHO Terminal would affect about 1,134 acres of land including both vegetated communities and other categories such as urban and waterbodies. Construction would affect 151.3 acres of forested habitat (including native and non-native woody vegetation), 20.4 acres of shrub habitat, and 812.7 acres of herbaceous vegetation. Other non-vegetated land categories that would be affected are included in Table 2.4-1. For operations, about 45.6 acres of forest, 11.3 acres of shrub, and 289.2 acres of herbaceous vegetation (including row crops) would be affected. For additional details of impacts on vegetation communities, see Section 3.4.3.2 of the EIS, Vegetation, Impacts and Mitigation.

The Applicant would apply restoration measures along the onshore pipeline rights-of-way and at the aboveground facilities temporary workspaces according to its Construction BMPs and its Revegetation Plan. Ground contours would be restored to preconstruction conditions and native seed would be used to reseed the pipeline right-of-way and workspaces used for construction. Monitoring and remediation would be completed to confirm successful revegetation. The Applicant would also implement noxious weed control measures as described in its Revegetation Plan, which include:

- Ensuring that equipment and vehicles working on site arrive clean and free of soil and debris capable of transporting undesirable seeds or other propagules;
- Using weed-free straw or hay bales for sediment barrier installation and/or mulch;
- Backfilling, grading, and preparing the disturbed areas for seeding with weed-free, native species suitable for rapid and competitive growth in Texas coastal plains after pipeline installation;
- Limiting traffic on the Project right-of-way by using “no access” signs, fences, or gates to reduce off-road vehicular, rutting, and disturbance;
- Filling and grading ruts and disturbed areas;
- Conducting a noxious and invasive species survey, noting areas of substantial noxious or invasive species, and employing control actions (chemical and/or mechanical controls), if warranted, after the post-construction growing season; and
- Removing successfully treated invasive or noxious species to an approved waste facility, if possible, and reseeding those areas with desirable species consistent with the Revegetation Plan.

These measures would assist in vegetation recovery and make the habitat suitable for species to use once construction is complete.

In four locations along the coast, HDD would be used to cross waterbodies, avoiding impacts on the waterbody and riparian or wetland areas on either side of the waterbody where some listed species may occur. The Applicant indicated there would be no guidewire laid between the HDD entry and exit points at the beach crossing; therefore, habitats along the beach would not be affected. However, there would be workspace within estuarine emergent (EEM) and estuarine scrub-shrub (ESS) wetlands at workspaces for HDDs # 3-OCS, 4-OCS, and 5-OCS and at the offshore HDD entry point (Attachment C, HDD Crossing Maps). About 45.1 acres of EEM and about 6.0 acres of ESS wetlands would be affected by construction. Impacts on emergent wetlands would be short-term because emergent wetlands would revegetate quickly, typically within 1 to 3 years. Vegetation in scrub-shrub wetlands would typically reestablish within 3 to 5 years. However, these wetlands would be unsuitable as habitats for listed species, such as the Eastern Black Rail until they recovered.

4.1.2. Onshore Construction Mitigation Measures

4.1.2.1. Erosion

The Applicant would install erosion control devices, as necessary, and would implement its Stormwater Pollution Prevention Plan to minimize stormwater runoff through post-construction stabilization. In the absence of specific permit conditions, and weather permitting, all upland areas would be seeded within 6 working days of final grading.

Sediment barriers would be installed at all open-cut waterbody crossings within 24 hours. Weather permitting, stream banks would be seeded within 6 working days of final grading.

Temporary seeding in wetlands would occur within 6 working days and permanent revegetation of wetlands would be conducted during the growing season. No seeding would occur in inundated wetlands.

4.1.2.2. Fugitive Dust

To minimize the amount of fugitive dust generated by construction activities, the Applicant would utilize the following dust control measures as appropriate:

- Watering areas likely to generate dust during dry conditions, such as site entrances and access roads, workspaces, and staging/laydown areas;
- Limiting traffic to designated access roads;
- Covering open-bodied haul trucks;
- Covering (or treating with dust-suppressant compounds) soil storage piles that remain inactive for more than 10 days; and
- Inspecting and washing, as necessary, vehicle tires to assure they are free of dirt before entering paved roadways.

4.1.2.3. Noise

In HDD locations where noise levels exceed background levels, the Applicant has committed to:

- Prohibiting unnecessary idling of internal combustion engines;
- Shutting off all equipment when not in use;
- Keeping all equipment in good repair and replacing worn, loose, and unbalanced machine parts as soon as possible;
- Keeping stationary noise-generating equipment such as air compressors or portable power generators as far as possible from neighboring houses;
- Designating a “disturbance coordinator” responsible for responding to any complaints about facility noise, determining the cause of the noise that generated the complaint, and requiring reasonable measures to correct the problem; and
- Using mufflers on appropriate equipment during operation.

4.1.2.4. Accidental Release of Hazardous Materials

In order to minimize the potential for an accidental release of hazardous material during construction, the Applicant would:

- Use secondary containment (capable of containing 110 percent of the volume) for the storage of hazardous materials;

- Conduct routine inspections of tanks for leaks;
- Provide spill response kits to all secondary containment areas;
- Provide fire extinguishers and spill response kits on all vehicles used to transport fuel;
- Restrict refueling and transferring of liquids to pre-designated locations away from sensitive areas; and
- Require contractors to use drip pans for all heavy equipment stored overnight.

4.2. OFFSHORE HABITAT LOSS AND ALTERATION

The composition of the seafloor along the offshore Project route includes sand, silty sand, silty clay, and sandy silty clay. These soft bottom sediments would be disturbed during construction of the proposed Project. The Applicant provided a sediment fate and transport model for offshore construction activities: pipeline trenching and jetting, pile driving, and HDD exit pit excavation (SPOT 2019c). A copy of the report is included in Attachment D, Sediment Fate and Transport Modeling The model simulated the deposition of sediment away from the construction activities in different sediment types and under varying tidal, bathymetric, current, and wind conditions. The model focused on near bottom sediments where the disturbance would take place.

The model predicted that offshore pipeline installation would cause sediment deposition greater than 1 millimeter (mm) up to about 656 feet from the trench, with sediment depths ranging from 0.1 mm to greater than 50 mm for the burial of one pipeline. Burial of one pipeline would result in sediment deposition greater than 1 mm over about 3,075 acres. The two pipelines would be trenched in at different times, which would result in some overlap of sediment deposition, thus further increasing sediment depth. The resulting sediment deposition of greater than 1 mm for the burial of both pipelines would occur over a maximum area of about 6,210 acres. For pile installation, the model predicted that sediment deposition greater than 1 mm would occur over a maximum area of about 0.02 acre. The 72-inch platform piles would be spaced 50 to 60 feet apart, and the model predicted no overlap in sediment deposition for installation of the eight piles. No modeling was conducted for installation of the PLEM pilings, but because the pile size would be smaller (30-inch vs. 72-inch), the associated turbidity and sediment deposition impacts would also be smaller. Finally, the model predicted that excavating the HDD exit pit would cause sediment deposition greater than 1 mm over a maximum area of about 4.8 acres.

The deep burial of some bivalve species can lead to reduced condition and survival through starvation or suffocation (De Goeij and Luttikhuizen 1998). Most bivalves in estuarine environments are adaptable to changes in turbidity and infauna are accustomed to burrowing through sediment and would likely be able to handle increased sediment deposition without adverse effects (Newell et al. 1998). Laboratory studies have shown that demersal eggs and larvae are sensitive to increased turbidity and sedimentation at levels of sediment accumulation greater than 1 mm, and that persistent suspended sediments can cause burial or abrasion to eggs and reduced swimming or settling ability in larvae (Berry et al. 2011; Wilber and Clarke 2001).

Benthic organisms within an approximately 2-acre area could be crushed due to anchoring of pipeline installation vessels. Additionally, about 1,212 acres of benthic habitat would be disturbed due to dropping and settling of the assembled pipes off the construction barge before being buried. These impacts would be temporary and benthic organisms would recolonize the area once construction is complete.

There would be a direct loss of benthic habitat within the footprint of the SPOT DWP pilings for the platform, PLEMs, fluke anchors for the SPM buoys, and concrete sinkers for three service vessel moorings. Long-term disturbance to benthic habitat would occur over about 0.364 acre for the two SPM buoys and over about 0.0016 acre (about 70 square feet) due to anchor chains dragging on the seafloor. The effects associated with dragging anchor chains would depend on water depth, wind, currents, chain length, and the size of the anchor and chain. Benthic organisms could be crushed beneath the anchors and chains.

The platform for the SPOT DWP would be supported by 8 72-inch diameter steel piles driven to a depth of 380 feet and 16 30-inch diameter steel piles would be driven to a depth of 60 feet. Direct mortality of 100 percent of non-motile benthic resources would occur in the footprint of the 24 piles and there would be a long-term loss of habitat within the footprint of the piles.

4.2.1. Artificial Lighting

Artificial lighting would be used at the Oyster Creek Terminal for security and operational activities. Artificial lighting at the terminal would extend into adjacent habitats. Birds can be affected by artificial lighting. Artificial lighting used for construction activities between sunset and sunrise may disorient migratory birds as some birds use natural light sources and patterns for navigation or other critical biological behaviors; however, Federally listed bird species would not occur near the Oyster Creek Terminal due to the lack of suitable habitat for these species.

Artificial lighting associated with in-water activities would have the greatest potential to affect aquatic resources. During construction, lighting would be limited to that necessary to complete HDD and pile driving activities. Lights would be affixed to offshore infrastructure for navigational purposes and safety during operation. The platform would be marked with marine lanterns on all four corners at an elevation of 68 feet above the water surface. These lanterns would flash approximately 60 times per minute. The platform would have rotating beacons as would the VLCCs or other crude carriers when connected to the SPOT DWP. The SPOT DWP would be marked with four lighted yellow navigation buoys for marking the four corners of Galveston Area lease block 463. Floating hoses would be lit with yellow lights along the entire length and the tail hose sections would have two red lights, all of which would flash 50 to 70 times per minute. The anchorage area would be marked with three white lighted buoys at each of the corners, except the northwest corner, which is also the southeast corner of lease block 463 and would be marked with a yellow buoy as previously noted. Additionally, Table 4.2.1-1 provides the estimated number of lights, pending final design, that would be used on the SPOT DWP platform.

Lighting for the helideck would be consistent with the API RP 2L—Recommended Practice for Planning, Designing, and Constructing Heliports for Fixed Offshore Platforms (SPOT 2019d).

Table 4.2.1-1: Estimated Number of Lights for the SPOT Deepwater Port Platform

Deck	V-Spring Poles [a]/ LED Fixture Quantity (Mounting Height: About 8 ft 6 in)	Ceiling/Pendant Mounted LED Fixture Quantity (Mounting Height: About 15 ft)	Floodlights (Mounting Height: About 20 ft)	Total Number of Lights	Total Number Plus 20 Percent
Main Deck	30	12	7	49	59
Cellar Deck	38	0	12	50	60
Sump Deck	28	3	0	31	38
Laydown Deck	14	0	0	14	17
Stair Towers / Crane Platforms	35	0	0	35	42
Total	**145**	**15**	**19**	**179**	**216**

Source: SPOT 2019d

ft = feet; in = inches; LED = light-emitting diode

[a] V-Spring poles would be placed every 20 feet around the perimeter

Illumination of surface waters in the vicinity of the SPOT DWP could cause artificially induced aggregations of small organisms that rely on sun or moonlight to determine movement patterns, resulting in increased predation by larger species. This lighting may alter behavior of fish in the immediate vicinity by causing fish to school and move toward the light source (Marchesan et al. 2005), which may be mistaken for natural light; however, specific responses by fish are dependent on the intensity of the light as well as the species and age-class of the fish (Hoar et al. 1957).

4.2.2. Marine Debris

Solid waste could be inadvertently released from the platform or from vessels calling on the DWP. Floating debris, including plastic particles and waste, can be mistaken for food and be ingested by marine mammals, sea turtles, and fish. Marine species can also become entangled in some marine debris. Ingestion of marine debris can have a variety of effects including, but not limited to, ulceration or laceration in the digestive tract leading to infection or internal bleeding, blockage of the digestive tract resulting in reduced nutrient uptake, retention of ingested debris, and reduction of the urge to feed (NOAA Marine Debris Program 2014a). Entanglement in marine debris can reduce the swimming and feeding abilities of marine animals and may result in injury or mortality (NOAA Marine Debris Program 2014b). Vessels calling on the SPOT DWP would be required to adhere to International Convention for the Prevention of Pollution from Ships (MARPOL) stipulations.

4.3. Water Quality

Burial of the pipeline is estimated to result in resuspension of about 29.4 million cubic feet of sediments. The coarse sediments would resettle first and the finer sediments would remain in suspension for a longer period.

As discussed above, the Applicant provided a sediment fate and transport model for offshore construction activities: pipeline trenching and jetting, pile driving, HDD exit pit excavation, and decommissioning (SPOT 2019c). In addition to modeling sediment deposition, the model simulated the resuspension of sediment in the water column resulting from construction activities in different sediment types and under varying tidal, bathymetric, current, and wind conditions. The model focused on near bottom sediments where the disturbance would take place.

The model predicted that offshore pipeline installation would cause increased turbidity (greater than 10 milligrams per liter [mg/L]) over a maximum area of about 19,044 acres that would attenuate to background levels within 24 hours after the disturbance ends. The total volume of water that would experience increased turbidity is estimated to be 152,400 cubic meters. Because the two pipelines would be trenched in at different times, turbidity plumes would not likely overlap. For pile installation, the model predicted increased turbidity (greater than 10 mg/L) over a maximum area of about 0.25 acre that would attenuate to background levels within hours after the disturbance ends. The 72-inch platform piles would be spaced 50 to 60 feet apart, and the model predicted no overlap in turbidity for installation of the eight piles. Though no modeling was conducted for the PLEM piles, because they are smaller than the platform piles, the associated plumes would also likely be smaller. Finally, the model predicted that excavation and backfilling of the HDD exit pit would cause increased turbidity (greater than 10 mg/L) over a maximum area of about 6.2 acres that would attenuate to background levels shortly after the disturbance ends. Though the Applicant modeled HDD exit pit excavation and backfilling, it indicated that the HDD exit pit would be in water about 25 feet deep and would be allowed to backfill naturally due to currents and wave action.

Effects of excess suspended sediments on fish can include behavioral changes in feeding, predator avoidance, and modified movement; reduced food availability; gill trauma; and metabolic changes (Kjelland, et al. 2015). Kjelland et al. (2015) also reported that opportunistic fish that feed in several layers of the water column may be more resilient than those that are more specialized.

The sediment plume could also overlap with part of the “dead zone” that forms annually in the GoM. The dead zone is an area of little-to-no oxygen that forms when excess nutrients from the Mississippi River drain into the GoM and cause an overgrowth of algae. When the algae dies and sinks, it results in oxygen levels near the seafloor that are too low to support most marine life. The 2019 dead zone was the eighth largest ever recorded based on data collected from July 23 to July 29, 2019, and covered an area of about 6,952 square miles (NOAA 2019b). The hypoxic zone was located about 32 nautical miles from the proposed subsea pipelines. The 2019 hypoxic zone was smaller than predicted due to mixing in the GoM that resulted from the passage of Hurricane Barry. Researchers also noted that the dead zone quickly reformed and was rapidly expanding after Hurricane Barry passed (NOAA 2019b). There would be little impact from the sediment plume on species in areas where the dead zone and sediment plume overlap because dissolved oxygen would be too low to support most marine life and, therefore, would not be present. The potential for turbidity plumes to overlap with the dead zone would depend on the time of year that installation occurred and the size of the dead zone that year.

Benthic organisms would also be permanently affected by installation of the SPMs, PLEMs, and pilings associated with the platform. The platform would be supported by 8 piles, 72 inches in diameter, and the PLEMS would be supported by a total of 16 piles, 30 inches in diameter. Sediment displacement and increased turbidity would occur during pile installations. During platform installation, anchor components would be tested under load, which would result in temporary impacts exceeding 100 feet in soft sediments, crushing any benthic organisms present. However, these temporary impacts would be negligible. Permanent disturbance to the seafloor would be equal to the footprint of the pilings and anchors, as well as the associated components of the SPMs and PLEMs.

The underwater structures would also provide a long-term positive impact by adding diversity through the placement of hard surfaces in the soft sediment habitat.

4.4. VESSEL STRIKES

The SPOT DWP would be about 16 nautical miles west of the nearest approach fairway. There are no established fishing grounds, lightering areas, or traffic routes at the SPOT DWP location. The Applicant analyzed publicly available vessel traffic data and indicated that 751 vessels transited through Galveston Area lease block 463 (where the SPOT DWP would be located) over a 2-year period, from January 1, 2016, to December 31, 2017.

MARAD (2013) reported that 10 of 132 U.S. ports accounted for 55.5 percent of calls by large oceangoing vessels in 2011, with Houston being the busiest port for tanker calls. Some of the other top 10 busiest U.S. ports included Texas City, Galveston, Corpus Christi, New Orleans, Mobile, Freeport, and Pascagoula, all within the GoM. MARAD (2013) also reported that in 2011, the United States ranked second in overall vessel calls, with tanker calls on U.S. ports accounting for almost 12 percent of all global tanker calls. Data shows that there were 38,075 tanker calls in the GoM in 2016 (Linden Houston, MARAD, Pers. Comm., July 26, 2019). Figure 4.4-1 shows the distribution of tanker traffic in the GoM in 2017, and includes the approximate location of the SPOT DWP. As vessel traffic in the GoM increases, the risk of collision with marine mammals and sea turtles also increases.

4.4.1. Construction Vessels

During construction, the Applicant estimates that a total of 25 vessels would be needed, but there would be a limited number used at any one time. Construction vessel speeds would vary, but barges and tugs would generally be intermittently stationary or moving at speeds of 14 knots or less during Project component installations. Smaller support vessels of 16 to 49 feet could reach speeds of up to 35 knots, especially when transporting crews or supplies to or from the Project area. Vessels would be associated with each phase of construction and are presented in Table 4.4-1; Table 4.4-2 provides the number of days anticipated for each phase of offshore construction. Increases in vessel traffic could also occur on a temporary basis in response to a spill of hazardous material during construction.

Table 4.4-1: Construction Vessels Required for Installation of SPOT Project Components

Facility Component	Pipelay Barge or Trenching Barge	Anchor Handling Tugs	Supply Vessel	Heavy Lift Vessel	Support Tugs with Cargo Barges	DP Dive Support Vessel and 4-point Dive Support Vessel	Construction Barge	Jack-Up Boat	Survey Vessel
Pipe laying	1	2	1	0	4	0	0	0	1
Trenching	1	2	1	0	0	0	0	0	0
Platform	0	2	1	1	3	0	0	1	0
SPM & PLEM	0	1	1	0	2	2 [a]	1	0	0

Facility Component	Pipelay Barge or Trenching Barge	Anchor Handling Tugs	Supply Vessel	Heavy Lift Vessel	Support Tugs with Cargo Barges	DP Dive Support Vessel and 4-point Dive Support Vessel	Construction Barge	Jack-Up Boat	Survey Vessel
Pre-Commissioning and Hydrostatic Testing	0	0	1	0	0	1	0	1	0

Source: SPOT 2019e

DP = drop point; PLEM = pipeline end manifold; SPM = single-point mooring

[a] One DP dive support vessel and one 4-point dive support vessel

Table 4.4-2: Time Period for Offshore Construction Activities

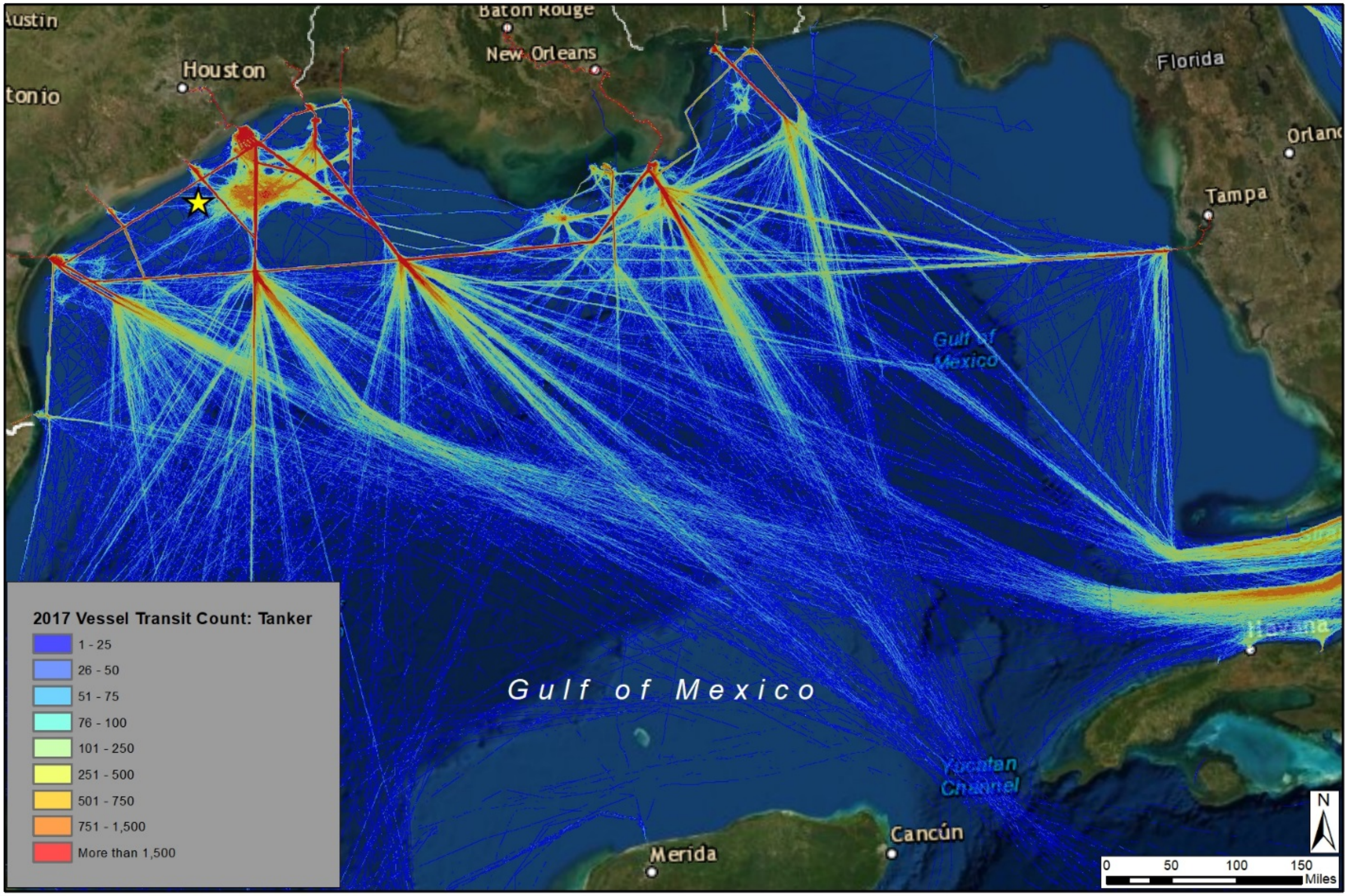
Facility Component	Number of Days Required for Installation
Pipe laying	152
Jet sledding	102
Platform Installation	65
PLEM and SPM buoy installation	88
Hydrostatic testing	96

PLEM = pipeline end manifold; SPM = single-point mooring

Source: SPOT 2019a, Application, Volume IIa, Section 1

4.4.2. Operation Vessels

Currently no DWPs are capable of fully loading VLCCs in Texas; however, LOOP is operational in eastern Louisiana. Consequently, VLCCs must use the lightering process, which relies on smaller tankers to transfer their product to larger tankers in lightering areas. The SPOT DWP would be in water deep enough to allow VLCCs to be fully loaded and therefore could reduce traffic volumes associated with offshore lightering. However, overall vessel traffic in the GoM continues to increase and, during Project operations, the Applicant anticipates a maximum of 365 vessel calls per year by VLCCs or other crude oil carriers. This would roughly double the vessel traffic in Galveston Area lease block 463 (based on vessel traffic reported during 2016 and 2017 for this lease block). The general characteristics of the crude oil carriers that could call on the SPOT DWP are provided in Table 4.4-3.



Source: NOAA Office of Coastal Management 2019

Note: The yellow star indicates the approximate location of the SPOT DWP.

Figure 4.4-1: Large Vessel Traffic (Tankers) in the Gulf of Mexico in 2017

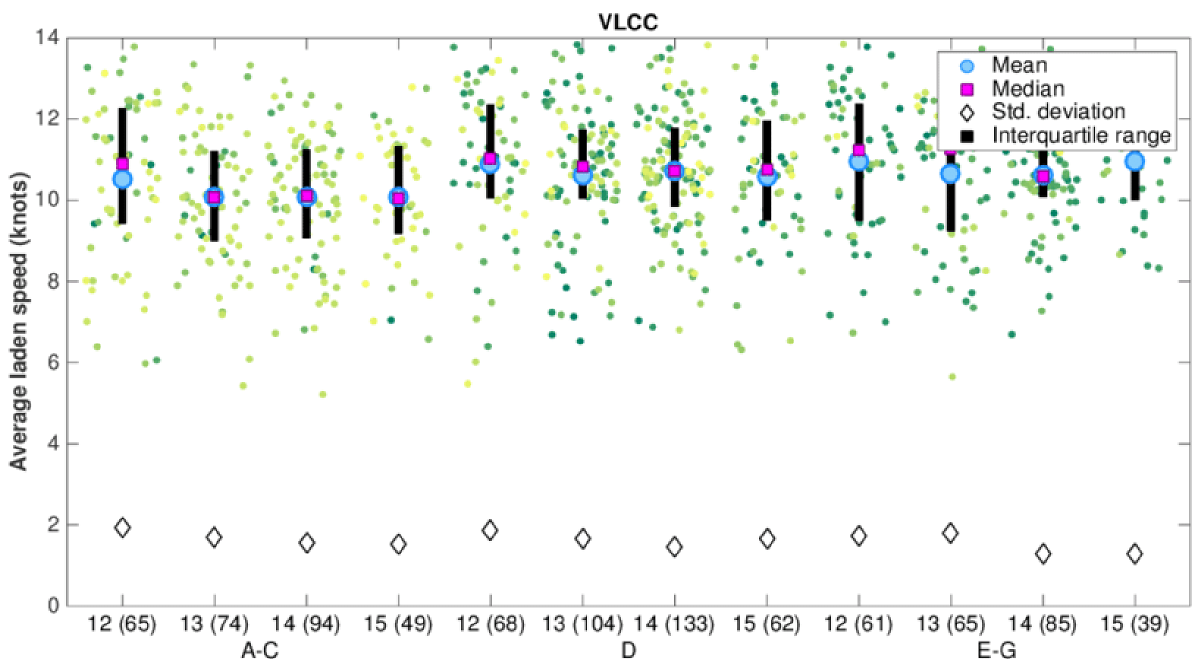
Table 4.4-3: General Characteristics of Crude Oil Carriers that Could Call on the SPOT Deepwater Port

Characteristic	VLCC	Suezmax	Aframax
Length	1,092 feet	900 feet	820 feet
Beam	197 feet	164 feet	105 feet
Draft	71 feet	66 feet	49 feet
Deadweight tonnage (maximum load)	320,000 metric tonnes	220,000 metric tonnes	120,000 metric tonnes

U.S. = United States; VLCC = very large crude carrier

Sources: SPOT 2019a, Application, Volume IIa, Section 1; EIA 2014; Maritime Connection 2019.

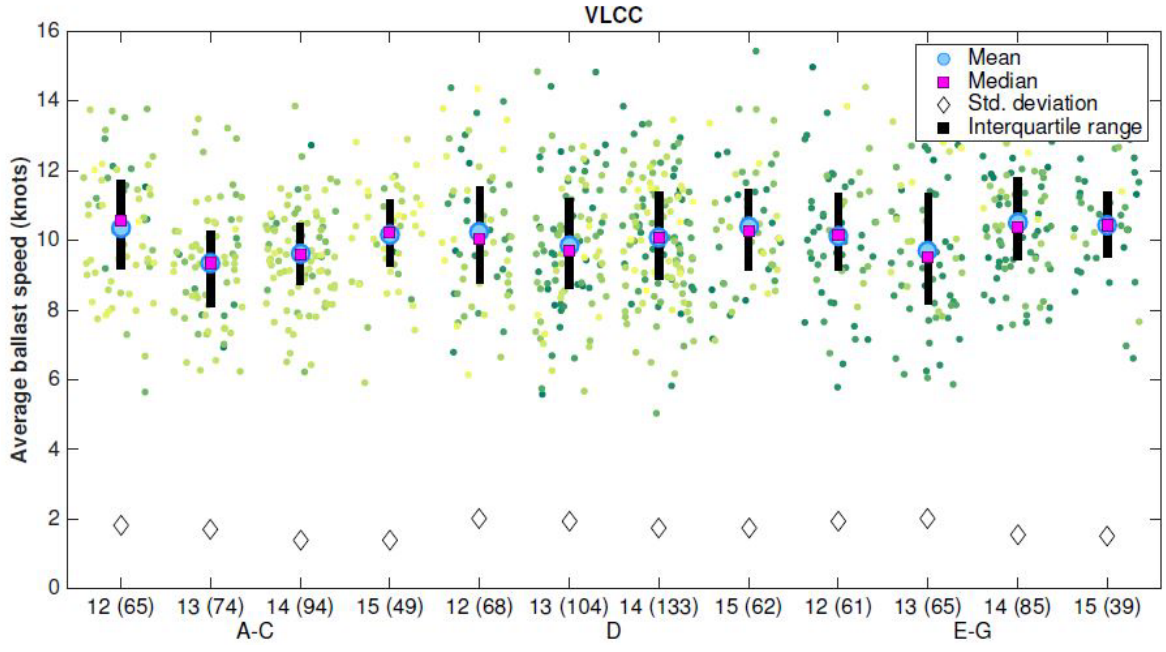
The 71-foot draft associated with VLCCs would put any species within that portion of the water column at risk of vessel collision, and the faster the vessel is traveling, the more likely the collision would lead to mortality. According to a report by the Ship and Bunker News Team (2015), VLCCs are operating at their fastest speeds since 2012, averaging 12.57 knots. Prakash et al. (2016) reported average annual speeds of laden VLCCs from 2012 through 2015 between 10 and 12 knots, but speeds were reported as high as 14 knots (Figure 4-4-2). Average annual ballast speeds for VLCCs during the same period were between 8 and 12 knots, but were reported as high as nearly 16 knots (Figure 4.4-3) (Prakash et al. 2016).



Source: Prakash et al. 2016

Note: The X axis represents the year (2012 through 2015), with the number of vessels in parenthesis, and A through G categories indicate the energy efficiency rating of the vessels. A-C sail the longest distances and transport the largest cargo.

Figure 4.4-2: Annual Average Laden Speeds for VLCC Fleet, 2012 Through 2015



Source: Prakash et al. 2016

Note: The X axis represents the year (2012 through 2015), with the number of vessels in parenthesis, and A through G categories indicating the energy efficiency rating of the vessels. A-C sail the longest distances and transport the largest cargo.

Figure 4.4-3: Annual Average Ballast Speeds for VLCC Fleet, 2012 Through 2015

Increases in vessel traffic could also occur on a temporary basis in response to an oil spill, which could increase the probability of a vessel strike.

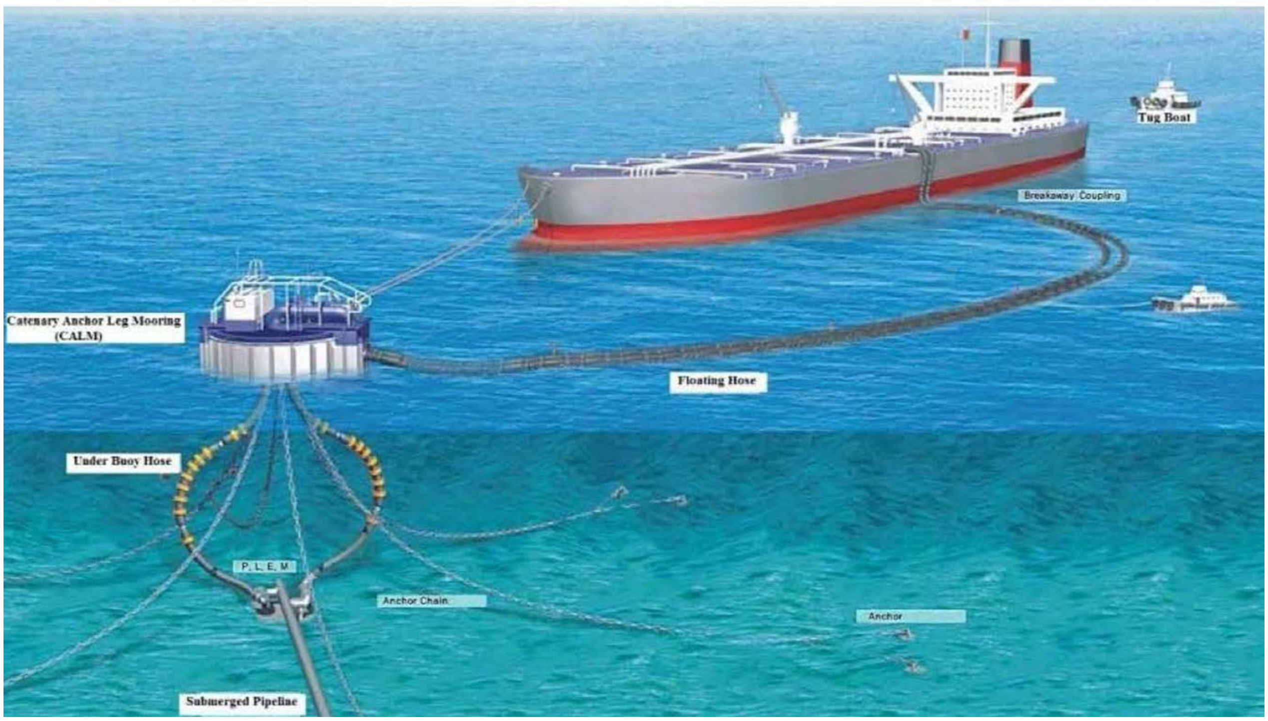
The Applicant assumes that VLCC operating speeds in open water outside the DWP safety zone would range between 12 and 15 knots. VLCC maneuvering to approach and depart from the SPMs would not exceed 3 knots.

4.4.3. Vessel Strike Mitigation Measures

To reduce the risk of a vessel strike during Project construction, all construction vessels would comply with NOAA's Sea Turtle and Smalltooth Sawfish Construction Conditions (Attachment E) and USFWS Standard Manatee Conditions for In-Water Work (Attachment F); which require, in part, that all vessels associated with the construction would operate at "no wake/idle" speeds at all times while in the construction area and when the draft of the vessel would provide less than 4 feet of clearance from the seafloor. Construction vessels would also comply with NOAA Fisheries' Vessel Strike Avoidance Measures and Reporting for Mariners (Attachment G), which requires, in part, that vessel operators and crew maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species. The full set of measures included in the attachments would reduce the risk of vessel strikes during construction of the SPOT DWP.

4.5. ENTANGLEMENT

Marine animals could become entangled in anchor lines during construction or operation of the SPOT Project; anchor lines could trap the animal and prevent it from swimming, resulting in injury or mortality. During construction, anchor handling tugs would support the pipeline installation barge and would use a minimum of two stem anchors, two bow anchors, and four breast anchors. A deadman anchor would also be used during pipeline installation in the GoM. Anchors would be set and raised repeatedly during the installation of the two subsea pipelines. The SPM system would use fluke anchors and anchor chains to secure the buoy in position. The two SPM buoys would each be held in place by three fluke anchors and anchor chains, for a total of six anchors. The anchor chains would be equally spaced on a 1,043-foot radius circle with 1,080 feet of anchor chain between the anchor and the chain stopper on the buoy (Figure 4.5-1).



Source: Mirji 2018

Figure 4.5-1: SPM Buoy Mooring Schematic

Anchor chains used to hold the SPM buoys and other navigation aids in place during Project operations could pose a threat to marine species. Anchor chains would provide enough play to allow the buoys to move with wave action and changing tides in the GoM. In addition to anchor chains associated with the SPM buoys, VLCCs and other crude carriers would use anchors to secure their position while in the anchoring area waiting to enter the DWP. VLCCs and other crude carriers would connect to the SPM buoy via a mooring hawser system while loading at the DWP.

Little information is available about the relative risk of entanglement in mooring devises by marine species. Harnois et al. (2015) report that the characteristics of the mooring lines and the configurations influence the risk posed by these devices. The lowest risk of entanglement by marine species is associated with taut mooring configurations, and the mooring layout, length of mooring line, and line material are all factors that should be considered when assessing the risk of entanglement (Harnois et al. 2015).

In 2017, a humpback whale in Alaska became entangled in an anchor line of a cruise ship (NOAA Fisheries, Alaska Regional Office 2017). NOAA Fisheries partners with other network partners under the National Marine Mammal Health and Stranding Program to free the whales that become entangled, and they were successful in releasing the whale entangled in the anchor line of the cruise ship by cutting the anchor line (NOAA Fisheries, Alaska Regional Office 2017). Anchor lines pose a greater risk than other floating cables (e.g. power cables) because marine species are more likely to be able to break a power cable than a mooring line (Harnois et al. 2015). In 2019, NOAA and the USCG freed a whale entangled in fishing gear and a weather buoy mooring (Coast Guard News 2019).

Marine animals are unlikely to become entangled in anchor lines during construction. Most animals would avoid active construction and the anchor lines would not be laterally affixed to other lines, but rather would radiate from the vessel and avoid a “web effect.” Anchor lines securing construction vessels would be large in diameter, non-floating, and would be deployed for short periods of time, thus making it unlikely that marine species would become entangled.

During operations, the potential for entanglement would be associated with the SPM buoy mooring system or the floating hoses used during the transfer of crude oil to VLCCs or other crude carriers. As shown on Figure 4.5-1 and described above, the anchor chains would be equally spaced on a 1,043-foot radius circle with 1,080 feet of anchor chain between the anchor and the chain stopper on the buoy. Anchor line spacing associated with the SPM buoys would make the potential for marine species to become entangled unlikely. VLCC or other crude carriers would moor to the SPM buoy via two mooring hawsers made from thick nylon or polyester rope. In a normal sea state, the mooring hawsers would be expected to be out of the water and not pose a risk of entanglement to marine animals.

The Applicant indicates that the floating hoses used during loading are designed with sufficient reserve buoyancy per Oil Companies International Marine Forum guidelines and float parallel to one another in normal sea conditions. The potential for the hoses to become entangled with one another, or with marine animals, would be most likely to occur during severe sea states.

4.6. UNDERWATER NOISE

Underwater noise associated with pipeline installation or trenching, pile driving, and marine vessel traffic would increase sound levels both temporarily and permanently in the GoM, which could affect fish, marine mammals, and sea turtles. Because sound consists of variations in pressure, the unit for measuring sound is referenced to a unit of pressure, the Pascal (Pa). A decibel (dB) is defined as the ratio between the measured sound pressure level (SPL) in microPascals (µPa) and a reference pressure. In water, the reference level is “dB re 1 µPa,” which is decibels relative to 1 microPascal.

The Applicant collected baseline information of the noise environment at the proposed platform site. The study deployed an acoustic recorder that collected a total of 68 hours and 45 minutes of acoustic data from November 3 to November 6, 2018. A total of 42 hours of recordings were analyzed for acoustic characteristics. The average SPL root mean square was 93 dB re 1 µPa and the maximum 30-minute average safe distance peak sound pressure level was 109 dB re 1 µPa. The levels reported were consistent with a marine industrial area. Results also found that the majority of the unique acoustic events were due to weather or anthropogenic sources and there was only one 6-hour period that included vocalizations from marine mammals.

NOAA Fisheries released its Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NOAA Fisheries 2016b, 2018d) to assess the potential impacts of underwater sound sources on species-specific marine mammals.

4.6.1. Marine Mammals

Table 4.6.1-1 presents the estimated marine mammal auditory bandwidth and species applicable to the associated functional hearing group.

Table 4.6.1-1: Marine Mammal Functional Hearing Groups from NOAA Fisheries Guidance

Hearing Group	Estimated Auditory Bandwidth	Relevant Species
Low-frequency cetaceans	7 kHz to 35 kHz	Baleen whales
Mid-frequency cetaceans	150 Hz to 160 kHz	Dolphins, toothed whales
High-frequency cetaceans	275 Hz to 160 kHz	Harbor porpoise
Phocid pinnipeds (underwater)	50 Hz to 86 kHz	True seals
Otariid pinnipeds (underwater)	60 Hz to 39 kHz	Sea lions, fur seals
West Indian Manatee	0.25kHz to 90.5 kHz	West Indian Manatee

Source: NOAA Fisheries 2016b, 2018d; Gaspard et al. 2012

Hz = hertz; kHz = kilohertz

NOAA Fisheries' Technical Guidance prescribes the applicable criteria for assessing underwater noise impacts on marine mammals. The Technical Guidance proposes dual criteria, using both peak SPL and cumulative sound exposure level (SEL_{cum}) metrics, with assessment based on whichever criterion is exceeded first. The criteria depend on whether the underwater sound produced is impulsive or non-impulsive. Impulsive sounds are typically transient, brief (less than 1 second), broadband, and consisting of high peak sound pressure with rapid rise time and rapid decay. Non-impulsive sounds can be broadband, narrowband, or tonal; brief or prolonged; continuous or intermittent; and typically do not have a high peak sound pressure with rapid rise and decay time. Table 4.6.1-2 presents a summary of injury and behavioral response criteria for marine mammals for impulsive and non-impulsive sounds.

Ocean noise pollution is of particular concern to marine mammals because of their high dependency on sound as their primary sense for navigating, finding prey, avoiding predators, and communicating with other marine fauna. Marine mammals may have varying reactions to noise. Noise disturbances may cause marine mammals to leave a habitat, may impair their ability to communicate, or may cause stress (Hildebrand 2005). Noise can cause behavioral changes and mask other sounds including their own vocalizations. Marine mammals' behavioral responses to noise range from no response to panic and flight (Southall et al. 2007). Displacement (both short and long distance) has been observed for cetaceans in response to in-water noise and can cause marine animals to move into less suitable habitat or into high traffic areas where they may be at risk of vessel collision.

Table 4.6.1-2: Underwater Noise Injury and Behavioral Response Criteria for Marine Mammals

Hearing Group	Permanent Injury, Peak SPL (dB re 1μPa)[a]	Permanent Injury, Cumulative SEL_{cum} (dB re 1 $μPa^2s$)[a]		Behavioral Response, RMS SPL (dB re 1μPa) [b]	
	Impulsive	Impulsive	Non-impulsive	Impulsive	Non-impulsive
Low-frequency cetaceans	219	183	199	160	120
Mid-frequency cetaceans	230	185	198	160	120
High-frequency cetaceans	202	155	173	160	120
Phocid pinnipeds [c] (underwater)	218	185	201	160	120
Otariid pinnipeds (underwater)	232	203	219	160	120

dB re 1μPa = sound exposure level in decibels relative to 1 microPascal; dB re 1$μPa^2$s = sound exposure level in decibels relative to 1 microPascal squared second; RMS SPL = root mean square sound pressure level; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level

[a] Source: NOAA Fisheries 2016b, 2018d

[b] Source: 70 Federal Register 7 (January 11, 2005)

[c] The injury thresholds were not available for the West Indian manatee which is a sirenian; however their hearing range is most similar to phocid pinnipeds. Therefore, the injury thresholds for pinnipeds were used to assess impacts on West Indian manatees.

Increasing ship traffic affects the ability of whales to communicate, search for prey, and avoid predators. Over the past decades, commercial shipping has become more prevalent, which in turn has led to an overall increase in underwater noise (Wright 2008). The sound frequency range within which whales communicate and echolocate overlaps to the frequency ranges of ship noise (Richardson et al. 1995). Reported whale responses to increased noise include habitat displacement, behavioral changes and alterations in the intensity, frequency, and intervals of calls. However, it has been unclear whether exposure to noise results in physiological responses that may lead to significant consequences for individuals or populations (Rolland et al. 2012). Researchers have found that dolphins and whales may change their behavior in response to noise from approaching vessels, and manatees appear to demonstrate a flight response by changing their direction and dive depth (Wright 2008).

Noise can also cause masking, which is the interference of a marine mammal's ability to send and receive acoustic signals due to the presence of another sound. Low-frequency cetaceans are particularly vulnerable to the effects of acoustic masking caused by anthropogenic noise and researchers are beginning to recognize this threat (Clark et al. 2009). Over the past decades, commercial shipping has become more prevalent, which in turn has led to an overall increase in underwater noise (Wright 2008). Increased underwater noise affects the ability of whales to communicate, search for prey, and avoid predators. However, Clark et al. (2009) report that assessing the effects of the ever-increasing chronic noise at the individual and population level has been difficult to evaluate.

Stress due to noise can lead to long-term health problems, and may pose increased health risks for cetaceans. Researchers have begun investigating the link between sound as a stressor and a corresponding immune response in marine mammals. One study found noise-induced changes in enzyme levels involved in tissue and organ functions of whales and dolphins, and significant changes in neurotransmitters that indicate a stress response that were associated with sound levels (Romano et al. 2004). Stress-related responses from increased ambient and local noise levels can include rapid swimming away from ship(s); changes in surfacing, breathing, and diving patterns; changes in group composition; changes in migration routes; and changes in vocalizations (Richardson et al. 1995; Weilgart 2007). Louder anthropogenic sounds may also lead to injury or behavioral responses, which in turn could interfere with foraging efforts or increase vulnerability to predators.

Ambient noise levels in the ocean within the auditory range critical for environmental, military, and economic interests have been predicted to increase significantly with global climate change due to the combined effects of decreased absorption and increasing sources from anthropogenic activities (Hester et al. 2008). When greenhouse gas reacts in the ocean, it lowers pH, creating more acidic waters. The more acidic the water, the less that sound waves are absorbed. This ocean acidification is also likely to reduce the ability of surface seawater to absorb sound at frequencies important to marine mammals (Gazioğlu et al. 2015). A louder ocean would negatively affect cetaceans that rely on sound to navigate, communicate, find food, and avoid predators.

4.6.2. Sea Turtles

The Applicant provided results of its sound propagation modeling and used criteria developed by the NOAA Fisheries Greater Atlantic Regional Fisheries Office (SPOT 2019f) to determine the potential impacts on sea turtles from underwater noise. The underwater sound exposure criteria for sea turtles acoustic injury and behavioral thresholds are provided in Table 4.6.2-1. No distinction is made between impulsive and continuous sources for these thresholds.

Table 4.6.2-1: Underwater Noise Criteria for Sea Turtles

Hearing Group	Injury Criteria RMS SPL (dB re 1 µPa)	Behavioral Response RMS SPL (dB re 1 µPa)
Sea turtles	180	166

Source: SPOT 2019f

dB re 1µPa = sound exposure level in decibels relative to 1 microPascal; RMS SPL = root mean square sound pressure level

Researchers have found that sea turtles respond on anthropogenic sounds, including boat sounds, in a variety of ways. They have been shown to display agitated behavior or startle responses, make abrupt body movements, and may even become inactive for extended periods of time. Additionally, in response to loud pulses from high-pressure air guns, sea turtles changed their swimming patterns and orientation (Samuel et al. 2005).

4.6.3. Fish

The Fisheries Hydroacoustic Working Group was formed in 2004 and consists of biologists from NOAA Fisheries, USFWS, the Federal Highway Administration, and the California, Washington, and Oregon Departments of Transportation, supported by national experts on sound propagation activities that affect fish and wildlife species of concern. In June 2008, the agencies reached agreement on the interim fish noise exposure thresholds. Table 4.6.3-1 presents the current injury and behavioral threshold for fish. For shipping activities, risks for behavioral response for fish within tens of meters, hundreds of meters, and thousands of meters have been suggested to be high, moderate, and low, respectively (Popper et al. 2014).

Table 4.6.3-1: Underwater Noise Criteria for Fish

Hearing Group	Permanent Injury, Peak SPL (dB re 1 µPa)	Permanent Injury, Cumulative (SEL_{cum}) (dB re 1 µPa^{2}s)	Behavioral Response, RMS SPL (dB re 1 µPa)
Fish (≥ 2 grams)	206	187	150
Fish (< 2 grams)	206	183	150

Source: SPOT 2019f

dB re 1µPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 µPa^{2}s = sound exposure level in decibels relative to 1 microPascal squared second; RMS SPL = root mean square sound pressure level; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level

Noise effects on fish include behavioral responses, masking, physiological stress responses, hearing loss, injury, and mortality. In addition, percussive effects from activities such as pile driving can damage fish swim bladders and cause temporary or permanent injury.

Sound generated by vessels, such as VLCCs or other crude oil carriers and support tugs, could also have adverse impacts on fish. Studies have shown that adults exhibit avoidance response to engine noise (Jørgensen et al. 2004). Noise from vessel traffic increases background noise in marine habitats and can cause acoustic masking of sounds important for biological functions, such as interfering with mating in some species. Increased background noise may cause some hearing loss in fish. Additionally, researchers are concerned that background noise, such as sounds associated with vessel traffic, may increase stress levels in fish and cause impacts on the immune system (URI and Inner Space Center 2019, Popper and Hastings 2009).

4.6.4. Sources of Underwater Noise

The primary sources of underwater noise associated with construction of the Project would be from:

- Jet sled burial of the offshore pipeline; and
- Impact pile driving (impulsive noise) during installation of the platform and PLEMs.

4.6.4.1. Jet Sledding

The Applicant provided a noise analysis for jet trenching, which they indicated would be expected to have similar acoustic characteristics to jet sledding. The source level used for modeling jet trenching was 168 dB re 1 µPa, as measured 1 meter from the sound source (SPOT 2019f). Typical underwater SPLs produced by jet trenching are summarized in Table 4.6.4-1.

Table 4.6.4-1: Typical Underwater Sound Pressure Levels Produced by Jet Trenching

Installation Method	Peak SPL (dB re 1 µPa)	SEL_{cum} (dB re 1 µPa^{2}s)	RMS SPL (dB re 1 µPa)
Jet trenching	NA	NA	168

Source: SPOT 2019f

dB re 1µPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 µPa^{2}s = sound exposure level in decibels relative to 1 microPascal squared second; NA = not applicable; RMS SPL = root mean square sound pressure level; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level

4.6.4.2. Pile Driving

The SPOT DWP would include the installation of eight 72-inch-diameter steel piles for the platform that would be driven into the seafloor to a depth of 380 feet. The piles would be installed using a conventional impact hammer operating off a derrick barge. Platform piles would require 1,278 strikes per hour and operations would occur 24 hours per day. The hammer would operate for 2 hours every 6 hours. This process would be repeated eight times and would result in a total of 10,255 strikes per pile. There would then be a 12-hour welding and cool down period and installation of the eight piles is expected to take about 10 days.

Sixteen 30-inch diameter piles would be installed to a depth of 60 feet below sea bottom elevation for installation of the PLEMs. Pile driving for the PLEMs would occur 24 hours per day with 1,500 strikes every 40 minutes. One pile would be installed every 8 hours and installation of all 16 piles is expected to take about 5.5 days.

Source levels were not available for 30-inch or 72-inch-diameter steel piles at water depths of 115 feet. The most applicable source level available for the 30-inch-diameter steel piles was obtained from the Siuslaw River Bridge Project in Oregon (Caltrans 2015). The most applicable source level available for 72-inch-diameter steel piles was obtained from the Northern Rail Extension Project in the Tanana River in Alaska (Caltrans 2015). In-water measurements at these projects for the 30- and 72-inch-diameter steel piles were recorded at 32.8 feet and 36.1 feet, respectively. Typical underwater SPLs produced by pile type and installation method are summarized in Table 4.6.4-2.

Table 4.6.4-2: Typical Underwater Sound Pressure Levels Produced by Pile Types and Installation Method

Pile Type/ Installation Method	Peak SPL (dB re 1 µPa)	SEL_{cum} (dB re 1 µPa^{2}s)	RMS SPL (dB re 1 µPa)
30-inch steel/impact hammer	210	177	190
72-inch steel/impact hammer	210	183	195

Source: Caltrans 2015

dB re 1µPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 µPa^{2}s = sound exposure level in decibels relative to 1 microPascal squared second; RMS SPL = root mean square sound pressure level; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level

4.6.4.3. Operational Noise

The primary sources of underwater noise associated with the operation of the proposed Project would be movement of VLCCs or other crude oil carriers, and support tugs (non-impulsive sound). The SPOT DWP would allow for up to two VLCCs or other crude oil carriers to moor at the SPM buoys and connect with the buoys via hawser lines. The maximum frequency of loading VLCCs would be up to 365 per year, although other smaller crude oil transport vessels may be loaded. Marine mammals, sea turtles, and fish could experience injury or behavioral impacts associated with increased vessel traffic and noise generated by vessels maneuvering at the SPOT DWP.

Some level of noise would also be generated due to an anticipated once-weekly helicopter trip to the platform. The low-frequency noise produced by a helicopter radiates forward and is generally transmitted underwater in a cone shape (Erbe et al. 2016). Therefore, the underwater noise generated from a passing helicopter would be brief, but would be influenced by the altitude of the helicopter as it passes as well as the water depth and bottom conditions. Noise occurring in shallow water would spread further than in deep water (Picher-Labrie 2019).

4.6.5. Underwater Noise Mitigation Measures

To reduce the risk of injury and disturbance to marine species, the Applicant would use the lowest noise producing impact hammer for pile driving and would employ a soft start procedure, which involves ramping up the intensity of the hammer strikes before operating at full capacity and allows marine species an opportunity to leave the area. The Applicant would use cushion blocks for all impact pile driving of 30-inch and 72-inch steel piles. Cushion blocks would be 1 to 3 inches thick and made of wood, nylon, or a polymer material and the Applicant applied 7 dB of noise reduction for pile driving source levels to determine the injury (mid-frequency cetaceans, sea turtles, and fish only) and behavioral isopleths. The Applicant would also utilize NOAA Fisheries-approved protected species observers (PSO) and would monitor a pre-determined zone of influence for protected species for 30 minutes to ensure the area is clear of mammals and sea turtles before beginning pile driving activities. During daylight hours, the PSO would use high-quality binoculars; during low or no light periods, the PSO would use thermal imaging cameras or night vision binoculars. The PSO would monitor the zone of influence during in-water work and record sightings of listed species. The PSO would continue monitoring the zone of influence for 30 minutes after the activity ceases.

4.7. Contaminants and Oil Spills

Sources of contaminants could come from vessel spills, inadvertent releases of drilling mud during HDD operations, and fluid and debris releases from the platform or vessels. The Applicant would comply with Federal regulations to control discharges of operational waste, trash and debris, and sanitary and domestic waste. Accidental spills of hazardous materials could include gasoline, oil, hydraulic fluids, drilling muds, or diesel fuel. The level of impact would depend on the phase of the SPOT Project, with spills occurring during construction likely to be less harmful than spills of crude oil during Project operations. Oil spills, in particular, pose a serious risk to all marine life.

4.7.1. Horizontal Directional Drilling Fluids

The Applicant would install approximately 1 mile of the subsea pipelines nearest the shore using the HDD construction method. This method of construction could result in the inadvertent release of drilling mud or other lubricants if a fracture occurs during the drilling process. However, the density of drilling mud (65 to 89 pounds per cubic foot) is greater than the density of seawater (64.2 pounds per cubic foot), and the non-toxic bentonite materials would be expected to settle on the seafloor. In order to limit the potential effects on marine life and habitats, the Applicant would implement the HDD Contingency Plan (Attachment B).

4.7.2. Oil Spills and Petroleum Product Releases

Crude oils are composed of thousands of chemical compounds including hydrocarbons, aromatic hydrocarbons, resins, asphaltenes, and polar compounds containing nitrogen, sulfur, or oxygen atoms known as nitrogen sulfur oxygen compounds. Polycyclic aromatic hydrocarbons (PAHs), among others, are typically associated with crude oil toxicity, and these compounds are taken up by oil-exposed organisms (Incardona et al. 2013).

The potential effects of an oil spill on listed whales, sea turtles, and fish would depend on their level of exposure. Using the Bureau of Ocean Energy Management's National Environmental Policy Act planning document for evaluating potential oil spills for this type of facility, the Applicant provided modeling of a most likely scenario spill of about 2,200 barrels of oil released over 1 hour for heavy crude (Western Canadian Select or WCS), lighter crude (West Texas Intermediate or WTI), and condensate. The Applicant also modeled a spill of about 71,000 gallons of diesel fuel, which would be the maximum capacity of diesel fuel stored for the Project. The model simulation represented the fate of each spill over a 60-day period and represented different times of year. The simulation for WCS was based on conditions in fall (November), the simulation for WTI was based on conditions in mid-summer (July), the simulation for condensate was based on conditions in late summer (August), and the simulation for diesel fuel was based on conditions in spring (May). In addition to providing the modeling results, the Applicant also included an analysis of the potential biological effects of a crude oil spill.

The WCS spill model predicted:

- The maximum surface exposure concentration of 5 to 10 grams per square meter (g/m^2) (appears as fresh black oil, mousse and sheens) would occur westward up to 62 miles from the spill site;
- A surface exposure concentration of <3 g/m^2 would spread to 93 miles southeast of the spill site;
- An estimated 243 miles of shoreline would be contaminated by >1 g/m^2 of oil along the Texas coast and part of Mexico; and
- Over a 60 day period, the model predicts that 34 percent of WCS oil would evaporate, 47 percent would reach shore, 4 percent would remain in the water column, 0.2 percent would settle in sediments, and 14 percent would biodegrade.

The WTI spill model predicted:

- A maximum surface exposure concentration of 5 to 10 g/m^2 (appears as metallic sheen) would occur within the immediate vicinity of the spill site;
- A surface exposure concentration of <3 g/m^2 (appears as rainbow sheen) would spread up to 62 miles west of the spill site;
- An estimated 146 miles of shoreline would be contaminated by >1 g/m^2 of oil from Galveston Bay to East Matagorda Bay, and
- Over a 60 day period, 64.8 percent of WTI oil would evaporate, 18.5 percent would reach shore, 0.8 percent would remain in the water column, 9.7 percent would settle in sediments, and 6.2 percent of WTI would biodegrade.

The condensate spill model predicted:

- A maximum surface oil exposure concentration of 1 to 3 g/m^2 (appears as a sheen) would occur within the immediate vicinity of the spill site;

- A concentration of <1 g/m^2 would occur within 45 miles east and west of the spill site with lower concentrations (<1 g/m^2) would appear as scattered colorless sheens;
- An estimated 7 miles of shoreline west-northwest of the spill site on the outer coast seaward of East Matagorda Bay would be contaminated with >1g/m^2 of oil; and
- Over a 60 day period, 88 percent of the oil would evaporate, 0.05 percent would reach shore, 4 percent would remain in the water column, 0.4 percent would settle in sediments, and 8 percent would biodegrade.

The diesel fuel spill model predicted:

- A maximum surface exposure concentration of 50 to 100 g/m^2 (appears as true color) would occur within the immediate vicinity of the spill site;
- A maximum surface oil exposure concentration of <5 g/m^2 (appears as a sheen) would occur up to 22 miles northwest of the spill site;
- About 10 miles of shoreline along Galveston Island would be contaminated with >1 g/m^2 of oil;
- Over a 60 day period, 61.7 percent would evaporate, 0.02 percent would reach shore, 4.2 percent would remain in the water column, 8.9 percent would settle in sediments, and 25 percent would biodegrade; and
- Within the first day after release, diesel fuel either evaporated or was dispersed into the water column (SPOT 2019g).

An oil spill would release PAHs into the water column where they can persist in the water or in the sediments where they settle. Volatilization and oxidation result in elimination of low molecular weight PAHs from the water column, but adsorbtion of high molecular weight PAHs occurs on particles in the water and bottom sediments (Olayinka et al. 2018). The bioavailability of chemicals is generally highest in true solution in the water and is lower for chemicals in solid or adsorbed forms. The effect of PAHs on marine organisms is dependent on the bioavailability of PAHs, the exposure time, and the ability of the organism to metabolize the compounds (NRC 2003). The model for the most likely scenario oil spill also included an evaluation of the concentrations of PAHs in the water column. PAHs are one of the most toxic constituents found in oil. PAHs that have not been metabolized can be toxic, while some reactive metabolites can result in biochemical changes in the body and can also cause cell damage that results in mutations, tumors, and cancer (Kannan and Perrotta 2008). Based on model results, the highest dose of PAHs in water would occur during a release of WCS at the platform. All four of the modeled spills resulted in the potential for exceeding the acute effects threshold for plankton (100 ppb-hours), while a release of WTI and WCS could both exceed the acute effects threshold for fish and pigmented invertebrates (1,000 ppb-hours). Therefore, the potential exists for acute effects to occur in the water volumes provided in Table 4.7.2-1. However, the report also indicates that PAH concentrations exceeding 1 ppb would only occur for a short time and the distribution would be patchy before diluting to levels below the threshold of concern (SPOT 2019g). Table 4.7.2-1 shows the concentrations of PAHs in the water column and the maximum exposure times for the Applicant’s modeled most likely scenario spills.

Table 4.7.2-1: Modeled Results of Polycyclic Aromatic Hydrocarbon in the Water Column

	2,200 bbl release of West Texas Intermediate	2,200 bbl release of Western Canadian Select	2,200 bbl release of Condensate	70,980 gallon release of Diesel Fuel
Maximum dose (ppb-hrs) [a]	4,756	5,518	1,650	694.4
Volume for maximum dose (m^3) [b]	80,640	35,960	76,210	79,330
Average dose in volume >1 ppb (ppb-hours) [c]	1,416	2,492	558.2	150.9
Volume contaminated >1 ppb (km^3) [d]	0.0445	0.150	0.112	0.167
Volume contaminated >10 ppb (km^3) [d]	0.0110	0.049	0.025	0.005
Max exposure time >1 ppb (hours) [e]	162	180	288	624
Max exposure time >10 ppb (hours) [e]	43	83	151	252

Source: SPOT 2019g

bbl = barrel of crude oil; km^3 = cubic kilometers; m^3 = cubic meters; ppb = parts per billion; ppb-hours = parts per billion–hours

[a] Maximum dose (concentration x exposure duration) at any single time step in any location

[b] Volume of water that contained the maximum dose

[c] Average dose in all waters that had dissolved oil concentrations > 1 ppb

[d] Volume of water that exceeded 1 ppb and 10 ppb at any given time

[e] Maximum number of hours with exposure concentrations >1 or 10 ppb

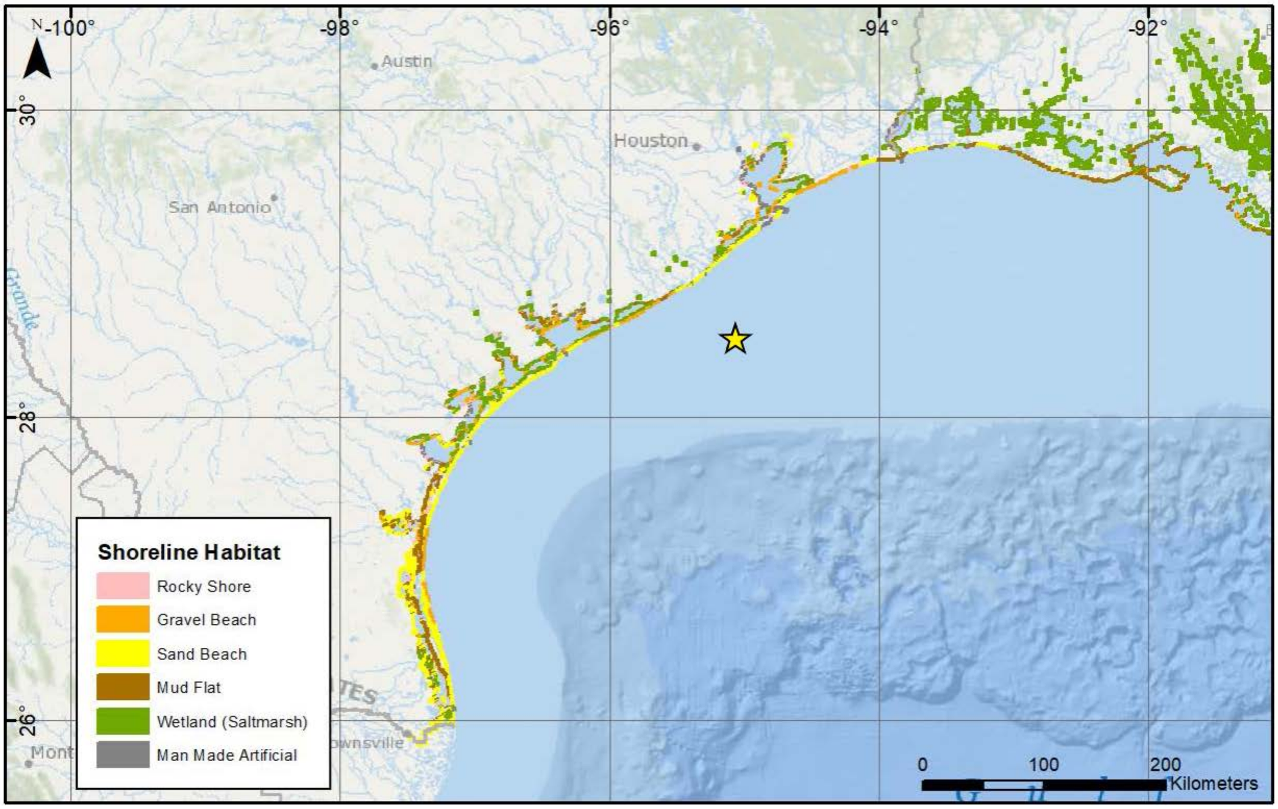
In general, lighter oils evaporate more quickly upon surfacing than heavier oils, which are more persistent in the environment. Based on the Applicant’s model, Table 4.7.2-2 shows the percent of shoreline habitats with >1 g/m^2 of each oil type during a most likely spill scenario and Figure 4.7.2-1 shows the shoreline habitat types within the Applicant’s model domain. For all oil types, most oiling occurred on coastal barrier beaches and the estimated time for oil to reach the shoreline is included in Table 4.7.2-3.

Table 4.7.2-2: Percent of Shoreline Habitats Oiled [a]

Shoreline Type	Percent of Habitat Oiled for Each Habitat and Oil Type			
	West Texas Intermediate	Western Canadian Select	Condensate	Diesel Fuel
Rocky shore	0.8% (1 mile)	0.8% (1 mile)	-	-
Gravel/cobble beach	8.7% (43 miles)	14.3% (71 miles)	1.2% (6 miles)	-
Sand beach—U.S.	2.5% (61 miles)	5.6% (153 miles)	-	-
Sand beach—other	-	0.4% (19 miles)	-	-
Mudflat	0.4% (7 miles)	0.1% (2 miles)	0.03% (< 1 mile)	-
Wetland	0.2% (13 miles)	0.1% (8 miles)	-	-
Artificial/manmade	2.1% (20 miles)	0.7% (7 miles)	-	1.0% (10 miles)
Percent of Total Shoreline Oiled	**0.8% (139 miles)**	**1.4% (243 miles)**	**0.04% (7 miles)**	**0.05% (9 miles)**

Source: SPOT 2019g

[a] Based on model results, “shoreline lengths oiled by >1 g/m^2 for the 99th percentile ranked run in shoreline length oiled for the most likely discharge scenario of each oil type modeled.”



Source: SPOT 2019g

Figure 4.7.2-1: Shoreline Habitats

Table 4.7.2-3: Minimum Time for Oil to Reach the Shore and Maximum Surface Area of Floating Oil for the Applicant's Modeled Most Likely Scenario Oil Spill

Oil Spill Scenario	Minimum Time to Reach Shore (Days)	Maximum Surface Area km^2 (>1 µm)
2,200 bbl release of West Texas Intermediate	2.5	21,960
2,200 bbl release of Western Canadian Select	4.0	58,506
2,200 bbl release of Condensate	6.7	18,675
70,980 gallon release of diesel fuel	3.5	913

Source: SPOT 2019g

bbl = barrel, the unit of volume for crude oil, 1 bbl is equal to 42 U.S. gallons

In addition to oil spill modeling provided by the Applicant, USCG requested that a third party conduct worst-case oil spill modeling and risk assessment to support the SPOT DWP license application process. The model evaluated nearshore (2 miles off the coastline) and offshore (at the SPOT DWP) spills of WCS, WTI, and condensate (Figure 4.7.2-2), and a spill associated with a VLCC collision. The modeled worst-case discharge assumed a subsea oil spill resulting from a rupture of both crude oil export pipelines caused by a dropped or dragged anchor, and included inputs for the maximum time to shut down flow during each of the four seasons. The release would occur in two phases: the early phase occurs during the first 30 minutes resulting in 70,125 bbl of oil released before shutdown occurs, and the late phase occurs after shutdown while the lines drain resulting in a release of 617,112 bbl. The total volume modeled was

687,237 bbl released over a 36.5 hour period from the pipelines, and 614,285 bbl for a 1.5 hour release due to a vessel collision. For a worst-case scenario, it was assumed that no response efforts took place to mitigate the impacts of the spill. The model was only for the GoM and did not include habitats on the shoreside of the barrier islands.

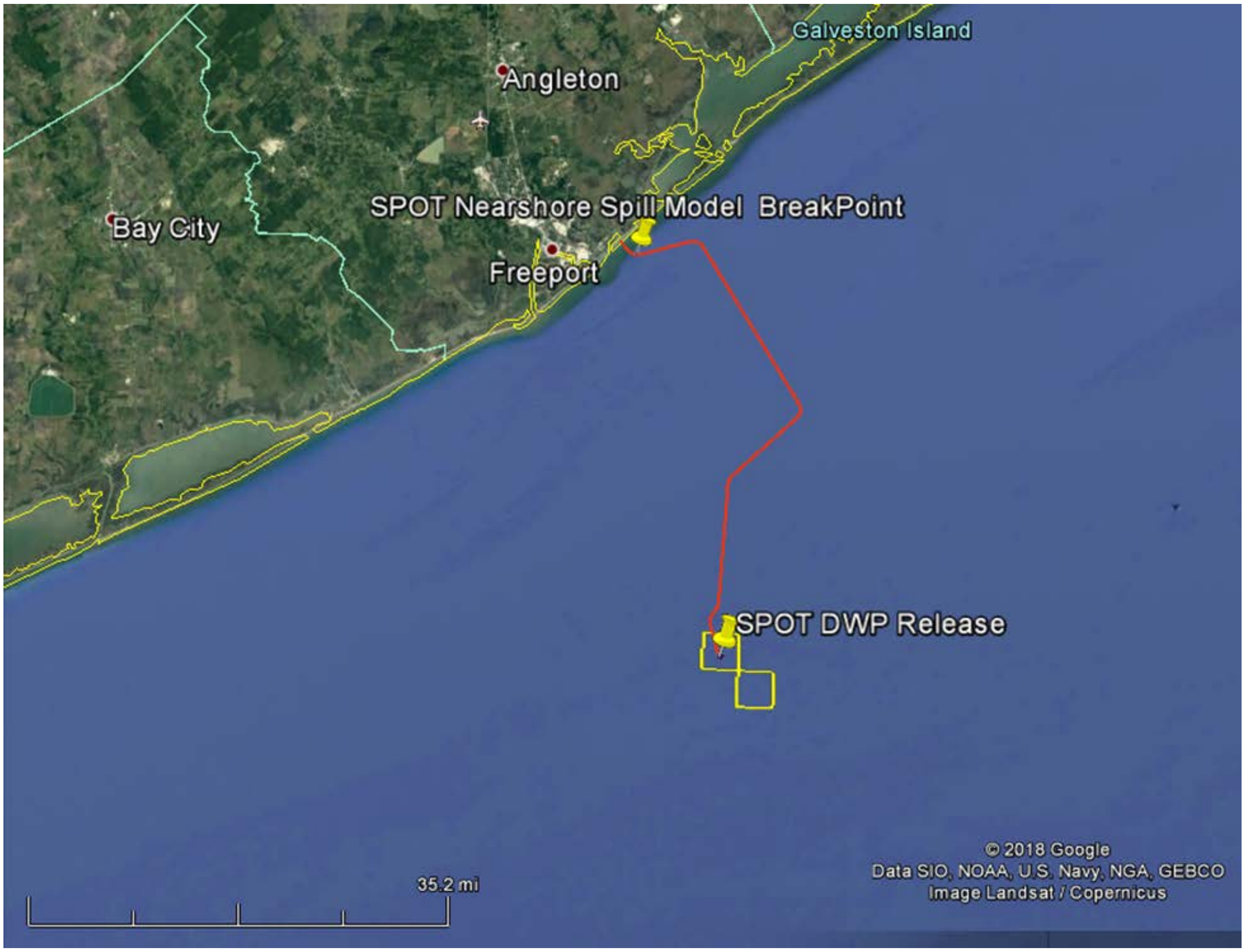


Figure 4.7.2-2: Selected Spill Locations: Nearshore and at the Deepwater Port

Depending on the winds and currents at the time of the release, some spills may directly contact the Freeport shoreline while others may spread along the coast potentially contacting locations between Port Aransas to the southwest and the middle of Port Arthur to the northeast. Oil is most likely to contact the shoreline in the region between Port O’Connor and Freeport. A spill at the SPOT DWP would have a greater potential of impacting more shoreline area and more of the GoM due to the ocean currents carrying the oil farther than when the oil spill is close to shore where currents have less of an effect. Model results for shoreline oiling and maximum GoM surface area affected are presented in Table 4.7.2-4 and results of the area affected by dissolved aromatic hydrocarbons (includes both PAHs and the mono-aromatic hydrocarbons such as benzene, toluene, ethylbenzene, and o-, m-, and p-xylene isomers) are presented in Table 4.7.2-5. Plots showing the fate of oil under each scenario are included in

Attachment H, Worst-case Scenario Spill Plots. The full report is available in Appendix X, Oil Spill Modeling Technical Report, of the EIS.

Table 4.7.2-4: Worst-Case Scenario Seasonal Spill Model Results

Spill Location/ Oil Type/ Season	Maximum Barrels of Oil to Reach Shoreline	Maximum Miles of Shoreline Oiled	Miles of Shoreline Oiled >1 g/m^2	Miles of Shoreline Oiled >100 g/m^2	Shortest Time for Oil to Contact Shoreline (days)	Maximum Surface Area (mi^2) Oil >0.1 µm / >1.0 µm
Nearshore Spill (2 miles off the coastline)						
Western Canadian Select						
Winter	503,049	94.2	2.63	2.63	0.25	17,536 / 15,982
Spring	536,286	91.1	1.53	1.53	0.25	2,370 / 2,281
Summer	489,344	40.2	1.98	1.98	0.25	334 / 302
Fall	499,738	78.8	6.84	6.84	0.25	4,245 / 4,158
West Texas Intermediate						
Winter	423,229	90.2	2.42	2.42	0.25	15,980 / 15,185
Spring	453,357	91.6	1.76	1.76	0.25	2,238 / 2,123
Summer	440,594	35.1	1.98	1.98	0.25	330 / 302
Fall	392,201	84.6	3.67	3.67	0.25	5,291 / 4,965
Condensate						
Winter	363,870	82.0	2.42	2.42	0.25	15,729 / 14,578
Spring	393,536	78.2	1.53	1.53	0.25	2,873 / 2,686
Summer	327,607	36.8	3.29	3.29	0.25	336 / 309
Fall	327,771	64.8	3.23	3.23	0.25	3,214 / 3,098
Offshore Spill (at the DWP)						
Western Canadian Select						
Winter	206,883	130.1	59.2	59.2	1.75	19,661 / 17,751
Spring	312,363	171.1	98.2	98.2	1.75	13,126 / 12,065
Summer	233,866	141.9	55.8	55.8	1.5	7,836 / 7,608
Fall	163,757	124.4	83.9	83.9	2.25	24,820 / 15,201
West Texas Intermediate						
Winter	166,707	95.4	94.6	94.6	2.5	14,762 / 14,079
Spring	181,664	141.2	63.3	63.3	1.75	12,743 / 11,198
Summer	173,502	142.9	52.1	52.1	1.5	8,586 / 8,178
Fall	95,946	100.6	57.8	57.8	2.5	12,107 / 11,368
Condensate						
Winter	107,336	94.8	28.6	28.6	2	14,187 / 13,090
Spring	124,283	121.5	39.3	39.3	1.75	10,532 / 9,816
Summer	77,451	118.2	49.4	49.4	1.75	1,000 / 895
Fall	65,849	100.6	49.8	49.8	2.5	12,690 / 11,404
VLCC Collision Spill						
Western Canadian Select						
Winter	214,871	96.7	96.7	96.7	1.75	14,391 / 12,752
Spring	255,098	105.4	105.4	105.4	1.75	14,725 / 11,619
Summer	349,732	65.8	65.8	65.8	1.75	5,780 / 5,618
Fall	187,070	85.2	85.2	85.2	2.25	17,355 / 11,299
West Texas Intermediate						
Winter	170,333	102	102	102	1.75	10,043 / 9,939
Spring	188,655	116.8	116.8	116.8	1.75	10,535 / 10,352
Summer	191,156	89.2	89.2	89.2	1.75	5,668 / 5,622
Fall	105,871	92.7	92.7	92.7	2.50	11,306 / 10,592

Spill Location/ Oil Type/ Season	Maximum Barrels of Oil to Reach Shoreline	Maximum Miles of Shoreline Oiled	Miles of Shoreline Oiled >1 g/m^2	Miles of Shoreline Oiled >100 g/m^2	Shortest Time for Oil to Contact Shoreline (days)	Maximum Surface Area (mi^2) Oil >0.1 µm / >1.0 µm
Condensate						
Winter	87,396	90.4	90.4	90.4	1.75	10,519 / 10,302
Spring	124,241	110.5	110.5	110.5	1.75	8,903 / 7,891
Summer	84,593	95.6	95.6	95.6	1.75	5,253 / 5,081
Fall	65,622	84.6	94.6	94.6	2.50	10,809 / 9,942

µm = micrometer; g/m^2 = gram per square meter; mi^2 = square mile; SPOT DWP = Sea Port Oil Terminal Deepwater Port

Table 4.7.2-5: Worst-Case Seasonal Area Affected by Dissolved Aromatic Hydrocarbons

Spill Location/Season	Maximum Area (mi^2) of DAH >5 ppb		
	Western Canadian Select	West Texas Intermediate	Condensate
Nearshore Spill (2 miles off the coastline)			
Winter	7,867	7,418	7,819
Spring	3,060	2,636	3,425
Summer	582	570	626
Fall	2,275	3,349	2,536
Offshore Spill (at SPOT DWP)			
Winter	8,592	8,031	8,839
Spring	4,996	8,704	8,388
Summer	6,272	6,874	2,169
Fall	8,871	7,979	6,883
VLCC Collision Spill			
Winter	6,461	7,197	8,319
Spring	5,831	8,959	8,323
Summer	6,121	5,887	6,691
Fall	6,854	7,212	8,483

DAH = dissolved aromatic hydrocarbons; mi^2 = square mile; ppb = parts per billion; SPOT DWP = Sea Port Oil Terminal Deepwater Port

In the event a spill occurs, an emergency consultation with NOAA Fisheries and/or USFWS would be initiated. The purpose of emergency consultation is to provide a process that allows Federal agencies to immediately and adequately conduct emergency responses, but still remain in compliance with the ESA. The effects of emergency response activities are not included in this BA.

4.7.2.1. Effects on Marine Mammals

Early studies suggested that cetaceans would be able to detect and avoid oil and that oil would not adhere to their skin. However, field observations and photographic evidence collected after the Deepwater Horizon (DWH) oil spill, which released millions of barrels of oil into the GoM for 87 days, documented cetaceans swimming through oil and oil sheen, and that oil not only adhered to their skin, but also persisted (Dias et al. 2017). Scientists studied how the DWH oil spill affected cetaceans from 2010 to 2015. Takeshita, et al. (2017) identified numerous cetacean exposure pathways and their effects. Exposure likely occurred through a combination of pathways including contaminated air, water, and sediment that were inhaled, ingested (either directly from the water column or through contaminated prey), aspirated, and absorbed. The effects of these exposures could include localized skin and eye wounds, lung disease, gastrointestinal injury, and effects on adrenal glands, reproduction, and the liver (Takeshita et al. 2017).

NOAA Fisheries (2018a) reported that there were 14 dolphin and whale live strandings during the DWH oil spill and that more than 150 dolphins and whales were found dead during the oil spill response. Because metals are known to accumulate in marine animal tissue, Wise et al. (2014) collected skin samples from sperm whales to evaluate if metals identified in crude oil from the DWH spill were found in whales. Of the metals identified, nickel (Ni) and chromium (Cr) are known human and animal carcinogens, and are known to damage DNA. Wise et al. (2014) found both Ni and Cr in whale tissue, with the highest concentrations found in whales that were nearest the accident. They also found that concentrations of Ni and Cr were significantly higher than concentrations found in non-resident GoM sperm whales. One GoM Bryde’s whale was also sampled and had similar concentrations of both Ni and Cr to the sperm whales.

4.7.2.2. Effects on Sea Turtles

Impacts on sea turtles associated with exposure to hazardous petroleum products include impacts on the respiratory system, skin, blood chemistry, and salt gland functions. Effects on the respiratory system can include a decrease in aerobic capacity resulting in changes in/reduction of foraging time and reduced growth. Oil exposure has been shown to decrease the volume of red blood cells, which would likely decrease oxygen carrying capacity. Oil exposure can result in the sluffing off of skin on the neck and flippers and cause inflammation in the affected areas, leading to an increased potential for infection. Studies have also shown that oil exposure affects the ability of sea turtles to regulate salt and water in the body due to the oil’s effects on salt glad functions (NOAA NOS 2010). Sea turtles were affected by the DWH oil spill, both from the oil and dispersants that were widely used. In a 2014 BO, NOAA Fisheries (2014a) reported a significant increase in Kemp’s ridley sea turtle strandings following the DWH oil spill (561 in 2010 from Louisiana, Mississippi, and Alabama; 390 from March through July of 2011 from Louisiana, Mississippi, and Alabama).

Stacy et al. (2017) reported a total of 319 live oiled sea turtles were rescued and treated after the DWH spill (192 Kemp’s ridley turtles, 113 green turtles, 9 loggerhead turtles, and 5 hawksbill turtles). Most were small, surface-pelagic juveniles. Oiled turtles experienced stress, exertion, physical exhaustion, and dehydration related to oiling, capture, and transport. Many turtles survived due to medical intervention. Based on the severity of injury to rescued turtles, it is likely that a significant percentage of oiled turtles not rescued died at sea (Stacy et al. 2017).

4.7.2.3. Effects on Fish

NOAA (2019b) reports that both shellfish and finfish may be unaffected or affected for a short period of time due to a limited route of exposure when oils float to the surface. However, when spills occur in shallow or confined waters, effects on shellfish and finfish can be substantial. Because shellfish are indiscriminant filter-feeders and do not have the same enzymes as finfish to break down contaminants, and because they are relatively immobile, shellfish may be exposed to oil or contaminants. Juvenile and adult finfish are mobile, can be more selective of prey items, and have enzymes that enable them to detoxify many oil compounds. There are cases where light oils or petroleum products can cause fish kills (NOAA 2019a).

The effects of oils spills on fish in early life stages are more significant than that reported for shellfish and finfish, generally. There were many studies on the effects of crude oil on fish in early life stages following the Exxon Valdez oil spill in 1989. Results indicated that the greatest impacts occurred in the cardiovascular system (Incardona et al. 2013). Following the DWH oil spill, Incardona et al. (2013) reported that fish embryos and larvae exposed to the type of crude released during the DWH spill experienced similar cardiotoxicity as that reported following the Exxon Valdez spill.

4.7.3. Mitigation Measures

To mitigate for the potential inadvertent return of drilling mud, the Applicant would implement its HDD Contingency Plan (Attachment B). To minimize the effects of any oil or hazardous substance spills, the Applicant developed a Construction Spill Response Plan for Oil and Hazardous Substances to address a spill during construction of the onshore Project components (Attachment I). The Applicant also indicated that during construction, all vessels would have spill containment kits and spill response plans for use in the event of an accidental release. The typical spill response kit for a vessel other than an oil carrier would be capable of cleaning up a spill of a half-barrel or less.

Prior to Project startup, the Applicant would:

- Train operations personnel;
- Develop Emergency Response Plans for the SPOT DWP and vessels;
- Contract with an Oil Spill Response Operator that owns and operates resources capable of responding to a spill; and
- Develop an Oil Spill Response Plan by the SPOT DWP operator.

The Applicant provided hypothetical actions it would take in the event of an oil spill during Project operations (Attachment J, Summary of Hypothetical Oil Spill Response Actions). Oil spill response methods on shorelines would vary based on the type of spill material, amount of material spilled, the type of habitat affected, and species affected. Response methods could include use of sorbents, barriers and berms, manual oil removal, debris removal, vacuuming, water flushing, natural recovery, sediment reworking, flooding, steam cleaning, sand blasting, solidifiers, cleaning agents, nutrient enrichment, natural microbe seeding, and in-situ burning. Oil spill response methods for offshore habitats would be largely dependent on the type of material spilled. Response methods offshore could include natural recovery, booming, skimming, physical herding, manual oil removal, use of sorbents, debris removal, dispersants, emulsion-treating agents, elasticity modifiers, herding agents, solidifiers, and in-situ burning.

Additionally, the pipeline system would be built with emergency shutdown valves, which would allow crude oil to be sealed into a number of isolatable sections in the event of a leak or rupture. The pipeline could be isolated from the Oyster Creek Terminal and the platform. Shut-off valves would be located on each incoming and departing crude oil/vapor recovery pipeline, between the Oyster Creek terminal and the Shoreline Terminal, and between the Shoreline Terminal and the platform. The volume of oil leaked would be limited to the oil available in the section between valves when the shutdown valves are closed. Table 4.7.3-1 presents isolatable sections and the volume of oil available in each section.

Table 4.7.3-1: SPOT Project Isolatable Sections

Isolatable Section	Oil Volume (ft^3)
ECHO Terminal–MLV100	263,493
MLV100–MLV200	307,160
MLV200–MLV300	333,658
MLV300–MLV400	294,470
MLV400–MLV500	210,869
MLV500–MLV600	342,242
MLV600–Oyster Creek Terminal	117,937
Oyster Creek Terminal Incoming Metering and Manifold	125,832
Oyster Creek Terminal Storage Tanks	3,366,000 [a]
Oyster Creek Terminal Export Metering and Pumps	2,400,000
Oyster Creek Terminal–MLV700	197,060
MLV700–Shore Crossing	254,536
Subsea Pipeline	1,772,800
Spot Platform Oil Metering	320,000
Subsea Flowline and Oil PLEM	10,000
Buoy	10,000
Very Large Crude Carrier	11,269,000

Source: SPOT 2019h

°F = degrees Fahrenheit; ECHO = Enterprise Crude Houston; ft^3 = cubic feet; MLV = mainline valve; PLEM = pipeline end manifold; psi = pounds per square inch

[a] The Applicant assumes the storage tank operating level would be 50 percent, resulting in a maximum release of half of the capacity shown here.

4.8. AIR QUALITY

An air quality analysis for the project was completed in Section 3.12 of the EIS. Air quality modeling according to the U.S. Environmental Protection Agency guidance determined that operating impacts for the onshore and offshore components of the proposed Project would be in compliance with all Federal and state guidelines for acceptable ambient pollutant concentrations. The best available scientific data at this time does not support drawing causal connections of air quality effects on listed species, so this has not been evaluated further in this document.

5. SPECIES CONSIDERED

To assist in compliance with Section 7 of the ESA, the Applicant reviewed websites of the USFWS, TPWD, and NOAA Fisheries to identify Federally listed or candidate species that may occur in the Project area. The Applicant conducted pedestrian surveys to evaluate the presence or absence of suitable habitat and the potential presence of listed species within the Project area. Through review of available resources, the USCG identified 30 Federally listed or candidate species, and designated critical *Sargassum* habitat for loggerhead sea turtles that could occur in the Project area (see Table 5.0-1).

Table 5.0-1: Federally Listed Species and Designated Critical Habitat Associated with the SPOT Deepwater Port Project

Common Name	Scientific Name	Federal Status
Species Under U.S. Fish & Wildlife Service Jurisdiction		
Mammals		
West Indian manatee	*Trichechus manatus latirostris*	Threatened
Birds		
Eastern Black Rail	*Laterallus jamaicensis*	Proposed
Least Tern	*Sterna antillarum*	Endangered
Piping Plover	*Charadrius melodus*	Threatened
Rufa Red Knot	*Calidris canutus rufa*	Threatened
Whooping Crane	*Grus americana*	Endangered
Reptiles–nesting beaches		
Green sea turtle	*Chelonia mydas*	Threatened
Hawksbill sea turtle	*Eretmochelys imbricate*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempi*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle	*Caretta*	Threatened [a]
Plants		
Texas prairie dawn-flower	*Hymenoxys texana*	Endangered
Species under National Oceanic and Atmospheric Administration, National Marine Fisheries Service Jurisdiction		
Mammals		
Fin whale	*Balaenoptera physalus*	Endangered
Gulf of Mexico Bryde's whale	*Balaenoptera edeni*	Endangered (effective 5/15/2019)
North Atlantic right whale	*Eubalaena glacialis*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
Reptiles—marine environment		
Green sea turtle	*Chelonia mydas*	Threatened [a]
Hawksbill sea turtle	*Eretmochelys imbricate*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempi*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle	*Caretta*	Threatened [b]
Fish		
Giant manta ray	*Manta birostris*	Threatened
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened
Nassau grouper	*Ephinephelus striatus*	Threatened
Oceanic whitetip shark	*Carcharhinus longimanus*	Threatened
Smalltooth sawfish	*Pristis pectinate*	Endangered [c]
Dwarf seahorse	*Hippocampus zosterae*	Candidate
Invertebrates		
Rough cactus coral	*Mycetophyllia ferox*	Threatened [d]
Pillar coral	*Dendrogyra cylindrus*	Threatened [d]
Lobed star coral	*Orbicella annularis*	Threatened
Mountainous star coral	*Orbicella faveolata*	Threatened
Boulder star coral	*Orbicella franksi*	Threatened
Staghorn coral	*Acropora cervicornis*	Threatened [d]
Elkhorn coral	*Acropora palmata*	Threatened [e]

Common Name	Scientific Name	Federal Status
Designated Critical Habitat		
Loggerhead sea turtle critical habitat /*Sargassum* habitat	NA	NA

Source: USFWS 2019f, NOAA Fisheries 2019r

NA = not applicable; U.S. = United States

[a] North Atlantic and South Atlantic Distinct Population Segments

[b] Northwest Atlantic Distinct Population Segment

[c] U.S. Distinct Population Segment

[d] Colonies located at Dry Tortugas National Park

[e] Colonies located at Flower Garden Banks National Marine Sanctuary and Dry Tortugas National Park

6. U.S. FISH AND WILDLIFE SERVICE JURISDICTION

One mammal, four birds, five reptiles, and one plant species listed as threatened or endangered under USFWS jurisdiction may occur within the Project area (see Table 5.0-1). One bird species is proposed for listing. There is no critical habitat under USFWS jurisdiction for any species within the Project footprint. The Least Tern (*Sterna antillarum*) is listed as endangered in Texas, but only needs to be considered for wind-related projects within the migratory corridor (USFWS 2019f). Because all Project components are within 50 miles of the coast, the Least Tern has not been included for consultation.

6.1. CONSULTATION HISTORY

USCG and MARAD conducted informal consultations with the USFWS through an Information for Planning and Consultation electronic data request as well as a letter request for the opening of information consultation with USFWS on May 1, 2019. A copy of the letter is included in Attachment A, Agency Correspondence. On May 1, 2019, C. Borland, a representative of the USCG, and Y. Fields, a representative of MARAD, mailed a letter to the attention of C. Ardizzone at the Texas Coastal Ecological Services Field Office of the USFWS to request initiation of informal consultation and technical assistance with development of the BA.

6.2. ANALYSIS OF SPECIES NOT LIKELY TO BE ADVERSELY AFFECTED

This BA has concluded that the proposed action ***may affect, but is not likely to adversely affect*** the West Indian manatee; Piping Plover; Red Knot; Whooping Crane; the green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles; and the Texas prairie dawn flower. This BA also concludes that the proposed action ***is not likely to jeopardize the continued existence*** of the Eastern Black Rail. The following discussions support the reasoning for these effect determinations.

6.2.1. West Indian Manatee

The West Indian manatee (*Trichechus manatus*) (manatee) was originally listed as endangered in 1967 and in 2017 was reclassified to threatened. The manatee is also protected under the MMPA. Approximately 6,500 manatees occur in the southeastern United States (USFWS 2019g). Manatees utilize nearshore habitats where they feed on submerged aquatic vegetation such as eelgrass and seagrass. They typically feed along the edges of grass beds with access to deep water channels. Manatees cannot tolerate water temperatures below 68 degrees Fahrenheit (°F) for extended periods and are often found congregating around warm water from natural springs and power plant discharges during winter months. Their range expands during summer months as water temperatures increase (USFWS 2019g).

6.2.1.1. Threats

Current anthropogenic threats to manatees include habitat loss, boat strikes, and entanglement in fishing gear (USFWS 2019g). Natural threats include harmful algal blooms, cold temperatures, extreme weather such as tropical storms and hurricanes, and disease (USFWS 2019g).

6.2.1.2. Potential Presence in the Project Area

Manatees are rare as far west as Texas along the GoM coast, but do occasionally occur in warmer summer months (USFWS 2001). In 2011 a manatee was documented in the Intracoastal Waterway approximately 1 mile northeast of the Project area (SPOT 2019a, Application, Vol. IIb, Appendix D), and in 2014 a manatee was rescued near Houston (USFWS 2019e). Manatees typically are found in waters less than 33 feet deep (Miksis-Olds et al. 2007). Manatees could be found along the coast near the offshore pipeline route and construction vessels in shallow waters, but are not expected to occur near the SPOT DWP or near vessel traffic associated with operation of the SPOT DWP. Manatees could also occur in fresh and brackish waters, including Swan Lake, the Intracoastal Waterway, and Oyster Creek, crossed by the onshore pipeline. During Project-related surveys, no seagrass beds were identified within the onshore pipeline survey corridor in intertidal waterbodies (SPOT 2019a, Application, Vol. IIb, Appendix E). There are no documented seagrass beds along the GoM coast near the offshore pipeline route; the nearest seagrass beds are located approximately 5 miles northeast of the pipeline route in Christmas Bay (TPWD 2019e). If a manatee were to occur in the Project area, it would likely be transitory due to the lack of seagrass beds in the immediate Project area.

6.2.1.3. Potential Effects on West Indian Manatee

Marine Debris

There are confirmed cases of manatees ingesting marine debris, and large pieces of ingested plastic have been reported as the cause of death for some manatees (NOAA Marine Debris Program 2014a). Manatees have also been reported to become entangled in marine debris, particularly monofilament line and rope (NOAA Marine Debris Program 2014b). However, the SPOT Project is not expected to be a source of marine debris in the GoM. In order to minimize the harm caused by ingestion of or entanglement in marine debris, the SPOT Project would develop an operational spill response plan to minimize the potential effects of a debris releases. Additionally, vessels calling on the SPOT DWP would adhere to MARPOL stipulations to ensure waste is not discharged into the ocean. Therefore, impacts associated with marine debris and entanglement from the SPOT Project would be discountable.

Noise

As described in Section 4.6, Underwater Noise, underwater noise can cause injury or disturbance to marine mammals, such as manatees. Use of the HDD method would avoid in-water impacts in potential habitat for manatees; however, this equipment can generate noise that could transmit underwater. Nedwell et al. (2012) measured HDD underwater sound levels from a drill installation under a riverbed—

measurements reached 129.5 dB re 1µPa at the riverbed. As described in Section 4.6, noise would not reach injury levels for manatees (which are similar to pinnipeds for noise effects); however, behavioral effects could be experienced if a manatee were to transit through the pipeline drilled area, along the GoM coast. In addition, if manatees were to occur within about 1.0 mile of jet sledding installation for the offshore pipeline, they would experience behavioral disturbance from the noise. Manatees would likely avoid the area with increased underwater noise (Miksis-Olds et al. 2007).

During Project operations, manatees could experience behavior effects from noise generated by once-weekly helicopter trips between the shore and platform. Because helicopters project sound forward in a cone shape, a manatee would need to be in the path of the helicopter to be affected as noise levels would spread out and dissipate rather quickly.

Vessel Strikes

As described in Section 4.4, Vessel Strikes, a variety of vessels would be used for construction of the offshore portion of the Project, and could strike manatees. Manatee mortalities and injuries are usually caused by blunt force trauma from striking the boat hull or propeller, or by lethal wounding from propeller cuts. Vessel speed is the primary factor in the probability of a vessel strike, and of the strike being lethal (Laist and Shaw 2006). Manatees are susceptible to a strike from vessels operating at speeds as low as 2.2 knots; therefore, there would be risk of a collision with construction vessels in transit between the coast and the offshore pipeline and the SPOT DWP (Calleson and Frohlich 2007). Due to the chance occurrence of a manatee in the project vicinity, the Applicant has committed to implementing the following USFWS recommended conservation measures:

- All personnel associated with the project shall be instructed about the presence of manatees, and the need to avoid collisions with and injury to manatees. The Project shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the MMPA, the ESA, and the Florida Manatee Sanctuary Act.
- All vessels associated with construction of the 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.
- 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.
- 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 shut down 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.
- Any collision with or injury to a manatee shall be reported immediately to the Texas Marine Mammal Stranding Network Hotline at 1-888-9-MAMMAL. Collision and/or injury should also be reported to the USFWS in Houston (1-281-286-8282).

- 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 USFWC must be used. One sign which reads Caution: Boaters must be posted. A second sign measuring at least 8 by 11 inches explaining the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

Due to the infrequency of manatees in this area, and implementation of the above conservation measures, the risk of a boat striking a manatee is low.

Entanglement

While vessel strikes pose the greatest threat to manatees, entanglement in lines, nets, and rope has been reported in the deaths of 29 manatees from 2003 to 2007 (NOAA Marine Debris Program 2014b). There are no reports of manatee deaths due to entanglement with anchor chains. Manatees are only infrequent visitors to the area and anchor chains would be used to hold the SPM buoys in place. Additionally, manatees would not be expected at the SPOT DWP location because they typically utilize nearshore habitats and feed on seagrass, which are not present at or near the Project site. Therefore, the potential for entanglement at the SPOT DWP is very low and thus discountable.

Contaminants and Oil Spills

The Applicant proposes to install the shore crossings using the HDD method, which would avoid in-water impacts where manatees could occur. Similarly, the Applicant also proposes to install the onshore pipelines across Swan Lake, the Intracoastal Waterway, and Oyster Creek using the HDD method. Use of HDD in these potential habitats would avoid direct impacts on manatees if they were present at the time of construction. However, if an inadvertent return were to occur in these waterbodies, it could affect manatees by causing reduced visibility by the input of drilling muds into the water column. The temporary and localized increase in turbidity from a potential inadvertent return in the GoM or intertidal waters would not likely have a significant impact on manatees, if in the area. Manatees would be expected to move away from the turbid waters. The Applicant would implement its HDD Contingency Plan in the case of an inadvertent return. As described in the HDD Contingency Plan, if an inadvertent return is identified, the HDD contractor would evaluate the necessity and effectiveness of installing containment. The HDD contractor would also consider whether installation of containment structures would increase adverse environmental impacts.

During Project operations, discharges from vessels, the platform, or spills associated with offshore pipeline network or vessel loading could result in a more significant release of hazardous material, particularly crude oil. Impacts associated with a crude oil release at the platform or the pipelines could reach coastal areas. Safety mechanisms such as shutdown valves built into the pipeline system would prevent a continuous release of oil. The Applicant indicates that the largest volume of oil in an isolatable section would be associated with the subsea pipeline, which could release over 1.7 million cubic feet (Table 4.7.3-1). In the event of a release of hazardous material, the Applicant would implement its Operational Spill Response Plan, which would be developed as part of the Port Operations Manual prior to the start of SPOT DWP operations (see Section 4.7.3, Contaminants and Oils Spills, Mitigation Measures).

The effects of crude oil contamination on manatees would be similar as described for whales in Section 4.7.2.1 (Oil Spills and Petroleum Product Releases, Effects on Marine Mammals), and could have long-term impacts. However, because manatees are rarely found near the Project site, the potential risk to manatees is also low.

6.2.1.4. Conclusion

West Indian manatees are uncommon off the coast of Texas, but in summer may travel to feeding areas near the Project area. The potential effects of construction of the Project include spills, inadvertent returns, construction noise, operation noise, and vessel strikes. Of these, construction vessels in transit in shallow waters pose the greatest threat to manatees, but manatees are rarely found in the Project area, making the potential impact insignificant. Therefore, this BA concludes that the Project ***is not likely to adversely affect*** the West Indian manatee.

6.2.2. Eastern Black Rail

The Eastern Black Rail (*Laterallus jamaicensis*) was proposed for listing as threatened on October 9, 2018. The Final Rule listing for the species is proposed for October 2019. The USFWS recommended including the Eastern Black Rail in the BA due to the overlap between the schedule for listing and the Project schedule. Eastern Black Rails are secretive birds and are typically rare locally (Texas A&M 2019). Eastern Black Rails are found in coastal marshes and freshwater wetlands and build their nests in dense vegetation near the ground (NatureServe 2019a).

6.2.2.1. Threats

Current threats to Eastern Black Rails include habitat loss from alteration of wetland habitats, land management practices, grazing, and impound management and climate change effects such as sea level rise, sever weather events, and changes in wildlife frequency and intensity (USFWS 2018b).

6.2.2.2. Potential Presence in Project Area

Eastern Black Rails may occur year-round in the Project area along the Gulf Coast, and may nest in saltgrass marshes from May through August (Texas A&M 2019). Eastern Black Rails were detected at Brazoria NWR during a 2015 study (Butler et al. 2015).

6.2.2.3. Potential Effects on Eastern Black Rail

Habitat

The Applicant proposes to install the proposed shore crossing, and four waterbody crossings along the coast via HDD; workspaces for these HDDs may occur in coastal marshes where Eastern Black Rail may occur and nest. Approximately 45.1 acres of suitable habitat would be affected by temporary and additional temporary workspaces for the HDDs and other construction activities (Attachment C, HDD Crossing Maps). As described in Section 4.1.1, Habitat Loss and Alteration, emergent wetlands would reestablish from disturbance in about 1 to 3 years, and shrub-scrub wetlands would reestablish in about 3 to 5 years. In order to improve reestablishment of wetlands, the Applicant would revegetate wetlands using Natural Resources Conservation Service and landowner-approved seed mixes. Eastern Black Rails would be unlikely to use these habitats until the vegetation returned to pre-construction conditions.

Contaminants and Oil Spills

If an inadvertent return were to occur above the drill path, it could affect Eastern Black Rails by causing damage to habitat. The temporary and localized release of drilling mud from a potential inadvertent return in coastal marshes or wetlands would not likely have a significant impact on Eastern Black Rails. The Applicant would implement its HDD Contingency Plan in the case of an inadvertent return. As described in the HDD Contingency Plan, if an inadvertent return is identified, “the HDD contractor will evaluate the release to determine if containment structures are warranted and can effectively contain the release. When making this determination, the HDD contractor will also consider if placement of containment structures will cause additional adverse environmental impacts” (Attachment B, HDD Contingency Plan).

During Project operations, discharges from vessels, the platform, or spills associated with offshore pipeline network or vessel loading could result in a more significant release of hazardous material, particularly crude oil. Impacts associated with a crude oil release at the platform or the pipelines could reach coastal areas. Eastern Black Rails could be affected if oil were to reach coastal marshes and wetlands, and clean-up of oil could disrupt Eastern Black Rails feeding and nesting in coastal areas. Individual birds could come into contact with spilled oil that could damage the thermal insulation and buoyancy of their feathers, leading to hypothermia, stress, injury, and/or mortality, and eggs could be suffocated by a coating of oil.

Safety mechanisms such as shutdown valves built into the pipeline system would prevent a continuous release of oil. The Applicant indicates that the largest volume of oil in an isolatable section would be associated with the subsea pipeline, which could release over 1.7 million cubic feet (Table 4.7.3-1). In the event of a release of hazardous material, the Applicant would implement its Operational Spill Response Plan, which would be developed as part of the Port Operations Manual prior to the start of SPOT DWP operations (see Section 4.7.3, Contaminants and Oil Spills, Mitigation Measures).

Noise

Noise from construction equipment, vehicle traffic, and general Project-related activity during construction and operation could affect bird behavior (AMEC Americas 2005). Construction and operational noise that would disturb Eastern Black Rails along the GoM coast and freshwater marshes crossed by the Project include clearing and grading for site preparation, HDD for pipeline installation, building construction, and facility operation. Noise from operation of the Oyster Creek Terminal would not reach levels above background in Eastern Black Rails habitat (SPOT 2019a, Application, Vol. IIb, Appendix L). Noise generated from the HDDs at Swan Lake, the Intracoastal Waterway, and Oyster Creek and for the proposed shore crossing would be detectable in habitat for Eastern Black Rails (SPOT 2019i), but the Applicant would implement the noise mitigation measures described in Section 4.1.2, Onshore Construction Mitigation Measures, to reduce the potential disturbance caused by the HDD installation method.

Birds use a vast array of sounds for communicating, finding mates, establishing and expressing territories, and other social behaviors (Dooling and Popper 2016). Birds can be negatively affected by noise emitted at continuous or irregular intervals during sensitive times of the year (Burton et al. 2002; Drewitt and Langston 2006). Extensive literature exists documenting the effects of anthropogenic noise on wildlife (Barber et al. 2011). Studies show that noise functions as a chronic stressor that can alter stress hormones and have multiple effects on fitness in bird communities (Kleist et al. 2018). Chronic and frequent noise interferes with animals' ability to detect important sounds, whereas intermittent and unpredictable noise is often perceived as a threat.

Given the energetic costs expended in responding to aural disturbance (e.g., flushing and increased stress), impacts from noise can lead to fitness costs, either directly or indirectly (Francis and Barber 2013). Behavioral responses to disturbance can include reduced feeding, and increased vigilance. Impacts on wildlife range from mild to severe and include damage to the auditory system, masking of sounds important to survival and reproduction, imposition of chronic stress and associated physiological responses, startle responses, interference with mating, and population declines (Schroeder et al. 2012; Blickley and Patricelli 2010). Temporary or permanent displacement and reduced fitness (e.g., foraging opportunities and behavior changes) are likely impacts resulting from noise disturbance.

6.2.2.4. Conclusion

Eastern Black Rails occur year-round along the GoM coast in Texas. Eastern Black Rail habitats could be affected by construction workspaces. Other potential effects from construction of the Project on Eastern Black Rails include spills of hazardous materials, inadvertent returns of drilling mud, and construction noise; however, construction impacts would be short-term and episodic, and the risk of an oil spill during operations is low. Therefore, this BA concludes that the potential impacts would be insignificant and the Project ***is not likely to jeopardize*** the continued existence of the Eastern Black Rail.

6.2.3. Piping Plover

The Piping Plover (*Charadrius melodus*) (Atlantic Coast and Northern Great Plains populations) was listed as threatened in 1985. Piping Plovers breed in the northern Great Plains, the shorelines of the Great Lakes, and the Atlantic Coast. Wintering habitat consists of intertidal beaches and mudflats with sparse to no vegetation along the GoM and southern Atlantic coasts of the United States (USFWS 2015d). There are multiple records of Piping Plovers in the vicinity of the project, one of which is within 1 mile and another within 5 miles. The Project is adjacent to the shoreline of the GoM which is known Piping Plover wintering habitat.

6.2.3.1. Threats

Current threats to Piping Plovers in their wintering range include development and construction; dredging and sand mining; inlet stabilization and relocation; beach stabilization measures such as groins, seawalls, and revetments; sand placement; loss of prey base due to shoreline modifications; beach cleaning; climate change; storm events; disturbance from recreational events; spills of contaminated materials; energy development; and disease (USFWS 2015d).

6.2.3.2. Potential Presence in Project Area

There are multiple records of Piping Plovers in the vicinity of the project, one of which is within 1 mile and another within 5 miles. The Project is adjacent to the shoreline of the GoM, which is known Piping

Plover wintering habitat. Piping Plovers may be on their wintering habitat from August through early June (USFWS 2019e).

6.2.3.3. Potential Effects on Piping Plover

Habitat

The Applicant proposes to install the proposed shore crossing via HDD, which would avoid impacts on sandy beaches where Piping Plover may occur in winter months.

Contaminants and Oil Spills

If an inadvertent return were to occur in the beach area, it could affect Piping Plovers by causing damage to habitat. The temporary and localized release of drilling mud from a potential inadvertent return on the beach would not likely have a significant impact on Piping Plovers. The Applicant would implement its HDD Contingency Plan in the case of an inadvertent return. As described in the HDD Contingency Plan, if an inadvertent return is identified, "the HDD contractor will evaluate the release to determine if containment structures are warranted and can effectively contain the release. When making this determination, the HDD contractor will also consider if placement of containment structures will cause additional adverse environmental impact" (Attachment B, HDD Contingency Plan).

During Project operations, discharges from vessels, the platform, or spills associated with offshore pipeline network or vessel loading could result in a more significant release of hazardous material, particularly crude oil. Impacts associated with a crude oil release at the platform or the pipelines could reach coastal areas. Wintering Piping Plovers could be affected if oil were to reach wintering beaches, and clean-up of oil on beaches could also disrupt Piping Plovers feeding and resting in coastal areas. Individual birds could come into contact with spilled oil that could damage the thermal insulation and buoyancy of their feathers, leading to hypothermia, stress, injury, and/or mortality.

Safety mechanisms such as shutdown valves built into the pipeline system would prevent a continuous release of oil. The Applicant indicates that the largest volume of oil in an isolatable section would be associated with the subsea pipeline, which could release over 1.7 million cubic feet (Table 4.7.3-1). In the event of a release of hazardous material, the Applicant would implement its Operational Spill Response Plan, which would be developed as part of the Port Operations Manual prior to the start of SPOT DWP operations (see Section 4.7.3, Contaminants and Oil Spills, Mitigation Measures).

Noise

Noise from construction equipment, vehicle traffic, and general Project-related activity during construction and operation could affect bird behavior (AMEC Americas 2005). Construction and operational noise that would disturb Piping Plovers on their wintering grounds along the GoM coast and intertidal waters crossed by the Project include clearing and grading for site preparation, HDD for pipeline installation, building construction, and facility operation. Noise from operation of the Oyster Creek Terminal would not reach levels above background in Piping Plover wintering habitat (SPOT 2019a, Application, Vol. IIb, Appendix L). Noise generated from the HDDs at Swan Lake, the Intracoastal Waterway, Oyster Creek, and for the proposed shore crossing would be detectable at wintering habitat for Piping Plovers (SPOT 2019i), but the Applicant would implement the noise mitigation measures described in Section 4.1.2.3 to reduce the potential disturbance caused by the HDD installation method. HDDs are scheduled to occur from February through July 2021. Piping Plovers would be present through mid-May.

Birds use a vast array of sounds for communicating, finding mates, establishing and expressing territories, and other social behaviors (Dooling and Popper 2016). Birds can be negatively affected by noise emitted at continuous or irregular intervals during sensitive times of the year (Burton et al. 2002; Drewitt and Langston 2006). Extensive literature exists documenting the effects of anthropogenic noise on wildlife (Barber et al. 2011). Studies show that noise functions as a chronic stressor that can alter stress hormones and have multiple effects on fitness in bird communities (Kleist et al. 2018). Chronic and frequent noise interferes with animals' ability to detect important sounds, whereas intermittent and unpredictable noise is often perceived as a threat.

Given the energetic costs expended in responding to aural disturbance (e.g., flushing and increased stress), impacts from noise can lead to fitness costs, either directly or indirectly (Francis and Barber 2013). Behavioral responses to disturbance can include reduced feeding, and increased vigilance. Impacts on wildlife range from mild to severe and include damage to the auditory system, masking of sounds important to survival and reproduction, imposition of chronic stress and associated physiological responses, startle responses, interference with mating, and population declines (Schroeder et al. 2012; Blickley and Patricelli 2010). Temporary or permanent displacement and reduced fitness (e.g., foraging opportunities and behavior changes) are likely impacts resulting from noise disturbance.

6.2.3.4. Conclusion

Piping Plovers occur in winter along the Gulf Coast in Texas. Use of HDD to cross the beach area would minimize impacts on Piping Plovers. Other potential effects from construction of the Project on Piping Plovers include spills, inadvertent returns, and construction noise. Disturbance of Piping Plovers on their wintering grounds would be temporary, and no permanent impacts from the Project would occur on wintering habitat for the Piping Plover. Therefore, this BA concludes that the impacts would be insignificant and the Project ***is not likely to adversely affect*** the Piping Plover.

6.2.4. Red Knot

The Red Knot (*Calidris canutus rufa*) was listed as threatened in 2014. Red Knots are migratory shorebirds and one of the longest-distance migrants in the world (USFWS 2018c). They are known to utilize wintering grounds along the coast of Texas (USFWS 2013a). Red Knots use similar habitats during migration and in wintering areas which include coastal marine and estuarine habitats with large areas of exposed intertidal sediments (USFWS 2013a). During winter, Red Knots are often found in flocks of hundreds of birds (USFWS 2013a).

6.2.4.1. Threats

Current threats to the Red Knot include availability of food, climate change, and habitat loss (USFWS 2018c).

6.2.4.2. Potential Presence in the Project Area

Red Knots may occur along the Texas coast in winter months near the onshore pipeline and associated facilities. The highest numbers of Red Knots occur along the Texas coast from December through February, but they can arrive as early as August and stay as late as early June (USFWS 2019f; USFWS 2015e).

6.2.4.3. Potential Effects on Red Knot

Habitat

The Applicant proposes to install the proposed shore crossing via HDD, which would avoid impacts on sandy beaches where Red Knots may occur in winter months.

Contaminants and Oil Spills

If an inadvertent return were to occur in the beach area, it could affect Red Knots by causing damage to habitat. The temporary and localized release of drilling mud from a potential inadvertent return on the beach would not likely have a significant impact on Red Knots. The Applicant would implement its HDD Contingency Plan in the case of an inadvertent return. As described in the HDD Contingency Plan, if an inadvertent return is identified, "the HDD contractor will evaluate the release to determine if containment structures are warranted and can effectively contain the release. When making this determination, the HDD contractor will also consider if placement of containment structures will cause additional adverse environmental impacts" (Attachment B, HDD Contingency Plan).

During Project operations, discharges from vessels, the platform, or spills associated with offshore pipeline network or vessel loading could result in a more significant release of hazardous material, particularly crude oil. Impacts associated with a crude oil release at the platform or the pipelines could reach coastal areas. Wintering Red Knots could be affected if oil were to reach wintering beaches, and clean-up of oil on beaches could also disrupt Red Knots feeding and resting in coastal areas. Individual birds could come into contact with spilled oil that could damage the thermal insulation and buoyancy of their feathers, leading to hypothermia, stress, injury, and/or mortality.

Safety mechanisms such as shutdown valves built into the pipeline system would prevent a continuous release of oil. The Applicant indicates that the largest volume of oil in an isolatable section would be associated with the subsea pipeline, which could release over 1.7 million cubic feet (Table 4.7.3-1). In the event of a release of hazardous material, the Applicant would implement its Operational Spill Response Plan, which would be developed as part of the Port Operations Manual prior to the start of SPOT DWP operations (see Section 4.7.3, Contaminants and Oil Spills, Mitigation Measures).

Noise

Noise from construction equipment, vehicle traffic, and general Project-related activity during construction and operation could affect bird behavior (AMEC Americas 2005). Construction and operational noise that would disturb Red Knots on their wintering grounds along the GoM coast and intertidal waters crossed by the Project include clearing and grading for site preparation, HDD for pipeline installation, building construction, and facility operation. Noise from operating the Oyster Creek Terminal would not reach levels above background in Red Knot wintering habitat (SPOT 2019a, Application, Vol. IIb, Appendix L). Noise generated from the HDDs at Swan Lake, the Intracoastal Waterway, Oyster Creek, and for the proposed shore crossing would be detectable at wintering habitat for Red Knot (SPOT 2019i), but the Applicant would implement the noise mitigation measures described in Section 4.1.2.3 to reduce the potential disturbance caused by the HDD installation method. HDDs are scheduled to occur from February through July 2021. Red Knots would be present through February and could occur in smaller numbers through May.

Birds use a vast array of sounds for communicating, finding mates, establishing and expressing territories, and other social behaviors (Dooling and Popper 2016). Birds can be negatively affected by noise emitted at continuous or irregular intervals during sensitive times of the year (Burton et al. 2002; Drewitt and Langston 2006). Extensive literature exists documenting the effects of anthropogenic noise on wildlife (Barber et al. 2011). Studies show that noise functions as a chronic stressor that can alter stress hormones and have multiple effects on fitness in bird communities (Kleist et al. 2018). Chronic and frequent noise interferes with animals' ability to detect important sounds, whereas intermittent and unpredictable noise is often perceived as a threat.

Given the energetic costs expended in responding to aural disturbance (e.g., flushing and increased stress), impacts from noise can lead to fitness costs, either directly or indirectly (Francis and Barber 2013). Behavioral responses to disturbance can include reduced feeding, and increased vigilance. Impacts on wildlife range from mild to severe and include damage to the auditory system, masking of sounds important to survival and reproduction, imposition of chronic stress and associated physiological responses, startle responses, interference with mating, and population declines (Schroeder et al. 2012; Blickley and Patricelli 2010). Temporary or permanent displacement and reduced fitness (e.g., foraging opportunities and behavior changes) are likely impacts resulting from noise disturbance.

6.2.4.4. Conclusion

Red Knots form large flocks in winter along the Gulf Coast in Texas. Use of HDD to cross the beach area would minimize impacts on Red Knots. Other potential effects from construction of the Project on Red Knots include spills, inadvertent returns, and construction noise. Disturbance of Red Knots on their wintering grounds would be temporary, and no permanent impacts from the Project would occur in wintering habitat for the Red Knot. Therefore, this BA concludes that the impacts would be insignificant and the Project ***is not likely to adversely affect*** the Red Knot.

6.2.5. Whooping Crane

Whooping Cranes (*Grus americana*) were listed as threatened in 1967 and endangered in 1970. They are only found in North America. A wild population nests in Canada and winters in Texas, and there are two captive bred populations: one that is resident in Florida and a second that nests in Wisconsin and winters in Florida (Canadian Wildlife Service and USFWS 2007). In 2010, the wild population comprised approximately 383 birds (USFWS 2019d). Nesting habitat is located in Canada, and winter habitat is in and near the Aransas National Wildlife Refuge (NWR) on the central GoM coast in Texas. During migration, Whooping Cranes use cropland and emergent wetlands for feeding, and shallow seasonal or semi-permanently flooded wetlands for roosting, along with some riverine habitats (USFWS 2009).

6.2.5.1. Threats

Current threats to Whooping Cranes include a limited genetic pool, loss or degradation of habitat, collisions with power lines, and spills (Canadian Wildlife Service and USFWS 2007).

6.2.5.2. Potential Presence in the Project Area

Whooping Cranes typically migrate along a corridor that falls more than 20 miles to the west of the onshore pipeline route and existing ECHO Terminal (Pearse et al. 2018). However, individual birds have been reported in nearby Brazoria NWR in winter, less than 1 mile from the southern end of the onshore pipeline route. Migrating birds could use suitable stopover/feeding habitat along the Project route during their migration to and from winter habitats (USFWS 2015f).

6.2.5.3. Potential Effects on Whooping Crane

Noise and Human Disturbance

Noise from construction equipment, vehicle traffic, and general Project-related activity during construction and operation could affect migrating Whooping Cranes. Studies show that Whooping Cranes are often displaced from winter habitats and behaviors are altered by human disturbance (Lewis and Slack 2008). Whooping Cranes are most disturbed by people on foot, but are also disturbed by vehicle and boat traffic (Lewis and Slack 2008). Within construction workspaces, vehicles would be limited to speeds of 10 miles per hour or less, minimizing the risk of striking a whooping crane if present. Due to the human presence in suitable habitat and associated construction activities, Whooping Cranes would likely avoid the Project area due to the disturbance caused by Project construction. The Applicant would implement the following measures recommended by the USFWS to avoid disturbing Whooping Cranes:

- Construction crews would be educated on the potential for Whooping Crane presence in the Project area; and
- When a Whooping Crane is observed from the Project area, all work would cease (if it is safe to do so) until the crane leaves the area (i.e., is no longer visible from the work area).

Habitat

Four MLVs (Numbers 3, 5, 6, and 7), totaling 0.4 acre, would be located in suitable stopover/feeding habitat that would be permanently affected by construction and operation of these facilities. In addition, the Oyster Creek Terminal would permanently affect 140.1 acres of suitable stopover/feeding habitat. The onshore pipeline construction workspaces would temporarily affect suitable habitat, but impacts would be limited to one season of construction. There is abundant suitable habitat in adjacent areas (e.g., Brazoria NWR); therefore, impacts on the Whooping Crane would be minor.

6.2.5.4. Conclusion

The potential effects of construction and operation of the Project on Whooping Cranes include disturbance from noise and human activity, and temporary and permanent loss of stopover/feeding habitat. With implementation of the above conservation measures and the small loss of stopover/feeding habitat, the effect on Whooping Cranes would be insignificant. Therefore, this BA concludes that the Project ***is not likely to adversely affect*** the Whooping Crane.

6.2.6. Sea Turtles

Five sea turtle species were identified in the Project area. USFWS has lead responsibility over sea turtle nesting beaches and NOAA Fisheries has lead responsibility over the marine environment (discussed in Section 7.4.2, Sea Turtles).

6.2.6.1. Green Sea Turtle, North Atlantic Distinct Population Segment

The green sea turtle (*Chelonia mydas*) North Atlantic Distinct Population Segment (DPS) was listed as threatened in the southeast United States in 2016. Green sea turtles can live up to 50 years (TPWD 2019a). Green sea turtles use open, undisturbed beaches with a gentle slope for nesting. In the United States, green sea turtles nest in Florida, Georgia, and North and South Carolina between June and September; they are occasional visitors to the Texas coast (USFWS 2019a). Green sea turtles have nesting site fidelity and travel long distances to reach their nesting beach (USFWS 2019a, TPWD 2019a). Green sea turtle females often lay more than one clutch of eggs a season, but they rarely nest every year (USFWS 2019a, TPWD 2019a). Hatchlings generally emerge at night and make their way to the ocean (USFWS 2019a).

Threats

Current threats to green sea turtle nesting beaches include anthropogenic impacts from artificial lighting, beach habitat alteration, human presence, and non-native vegetation (USWFS 1999a). Climate change is also a threat to sea turtles, including the green sea turtle (Hawkes et al. 2009). Climate change can affect nesting beaches through loss due to sea level rise and structures designed to protect human structures, such as sea walls; a change to nesting intervals and timing; and changes to incubation temperatures and sex ratios of hatchlings (Hawkes et al. 2009).

6.2.6.2. Hawksbill Sea Turtle

The hawksbill sea turtle (*Eretmochelys imbricata*) was listed as endangered in 1970. Hawksbill turtles typically nest on undisturbed beaches with deep sand on tropical beaches (USFWS 2018a). In the Atlantic, nesting beaches are found in Panama, Mexico, Cuba, Puerto Rico, and the U.S. Virgin Islands (USFWS 2018a). There has been only one confirmed hawksbill sea turtle nest in Texas; it was documented in 1998 on Padre Island National Seashore, which is over 170 miles from the Project area (NPS 2018). Nesting generally occurs at night between April and November on undisturbed beaches with deep sand (USFWS 2018a, NatureServe 2019a). Females lay on average four to five clutches per season, but only lay eggs every 2 to 3 years (USFWS 2018a, TPWD 2019b). Hatchlings generally emerge at night and make their way to the ocean (NOAA Fisheries 2019h).

Threats

Current threats to hawksbill sea turtles include illegal trade, loss or degradation of nesting habitat, artificial lighting, and nest predation by native and non-native predators (TPWD 2019b). Climate change is also a threat to sea turtles, including the hawksbill sea turtle, and would be similar as described for the green sea turtle (Hawkes et al. 2009).

6.2.6.3. Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle (*Lepidochelys kempii*) was listed as endangered in 1970. Kemp's ridley sea turtle females come ashore during the daytime to lay their eggs; they have strong nest site fidelity (USFWS 2019b; USFWS 2015a). Kemp's ridley sea turtles nest on GoM beaches in Mexico and Texas between April and July and may nest up to three times during a season (USFWS 2015a). Hatchlings generally emerge at night or in the early morning and make their way to the ocean (USFWS 2015a; NOAA Fisheries et al. 2011).

Threats

Current threats to Kemp's ridley sea turtles include illegal trade, loss or degradation of nesting habitat, artificial lighting, human presence, oil spills, and nest predation by native and non-native predators (NOAA Fisheries et al 2011). Climate change is also a threat to sea turtles, including the Kemp's ridley sea turtle, and would be similar as described for the green sea turtle (Hawkes et al. 2009).

6.2.6.4. Leatherback Sea Turtle

The leatherback sea turtle (*Dermochelys coriacea*) was listed as endangered in 1970. It is the most wide ranging of all the sea turtles, occurring in temperate and tropical waters globally, and is found on the east and west coasts of the United States, and in the GoM (USFWS 2019c). Individuals can live up to 50 years (TPWD 2019c). Leatherbacks typically nest in the fall and winter, with females coming ashore to nesting beaches in large groups (TPWD 2019c). Nesting beaches typically are sloped, sandy beaches with vegetation, near deeper water (NatureServe 2019a). Hatchlings generally emerge at night and make their way to the ocean (USFWS 2019c). It is an uncommon species along the Texas coast (TPWD 2019c).

Threats

Current threats to nesting leatherback sea turtles include illegal trade, loss or degradation of nesting habitat, artificial lighting, human presence, non-native vegetation, and nest predation by native and non-native predators (NOAA Fisheries and USFWS 1998). Climate change is also a threat to sea turtles, including the leatherback sea turtle, and would be similar as described for the green sea turtle (Hawkes et al. 2009).

6.2.6.5. Loggerhead Sea Turtle, Northwest Atlantic Ocean DPS

The loggerhead sea turtle (*Caretta caretta*) Northwest Atlantic Ocean DPS was listed as threatened in 1978. Loggerhead sea turtles are found in temperate and tropical waters of the Atlantic, Pacific, and Indian Ocean. Loggerhead sea turtles nest in the continental United States from Texas to Virginia; however, only small numbers of nests (less than 100) are typically found in Texas (NOAA Fisheries and USFWS 2008). Nesting occurs between April and September on steeply sloped beaches with well-developed dunes (NOAA Fisheries and USFWS 2008, NatureServe 2019a). Hatchlings generally emerge at night and make their way to the ocean (NOAA Fisheries and USFWS 2008).

Threats

Current threats to nesting loggerhead sea turtles include habitat loss or degradation, oil spills, artificial lighting, and nest predation by native and non-native predators (NOAA Fisheries and USFWS 2008). Climate change is also a threat to sea turtles, including the loggerhead sea turtle, and would be similar as described for the green sea turtle (Hawkes et al. 2009).

6.2.6.6. Potential Presence in the Project Area

Kemp's ridley turtle nests have been documented at Quintana Beach, Surfside Beach, and in Brazoria County beaches north of Surfside in 2017 and 2018 and at Surfside Beach in 2019. Table 6.2.6-1 and Figure 6.2.6-1 provide specific data for sea turtle nesting in Texas (Donna Shaver, NPS, Pers. Comm., April 29, 2019; Donna Shaver, NPS, Pers. Comm., October 1, 2019). Loggerhead sea turtle nests were documented at Surfside Beach in 2017 (Donna Shaver, NPS, Pers. Comm., April 29, 2019; Donna Shaver, NPS, Pers. Comm., October 1, 2019). Adult females, their nests, and hatchlings could be present in the Project area along the beach of the GoM. Due to the lack of historic nesting of green, hawksbill, and leatherback sea turtles on beaches near the Project area, these species are not expected to be affected by Project activities.

Table 6.2.6-1: Sea Turtle Nests in the Vicinity of the SPOT Project

Species/Year [a]	**Quintana Beach (Number of Nests)**	**Surfside Beach (Number of Nests)**	**Brazoria County, north of Surfside (Number of Nests)**	**Total Nests**
2019				
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	0	6	0	4
Loggerhead Sea Turtle (*Caretta caretta*)	0	0	0	0
2018				
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	1	9	1	11
Loggerhead Sea Turtle (*Caretta caretta*)	0	0	0	0
2017				
Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)	1	3	0	4
Loggerhead Sea Turtle (*Caretta caretta*)	0	1	0	1

Sources: Donna Shaver, NPS, Pers. Comm., April 29, 2019; Donna Shaver, NPS, Pers. Comm., October 1, 2019

[a] No green, hawksbill, or leatherback nests have been documented in 2017, 2018, or 2019 at these locations.

Figure 6.2.6-1: Sea Turtle Nesting Beaches in the Vicinity of the SPOT Project

6.2.6.7. Potential Effects on Sea Turtles

Lighting

Artificial lighting can cause disorientation in hatchlings and cause adult turtles to avoid nesting areas (Witherington and Bjorndal 1991; Salmon 2003). Hatchlings cannot see the ocean over the uneven surface of a sandy beach, so they use other cues such as moonlight and starlight reflecting on the ocean surface to orient towards the ocean. If artificial lights are present on shore, hatchlings will often travel towards the artificial light source where they perish from predators, exhaustion, or other manmade factors (Salmon 2003). Adult female sea turtles also typically avoid artificially lit beaches and prefer specific nest locations that are naturally dark when selecting a nest site (Salmon 2003).

The Oyster Creek Terminal is approximately 10 miles from potential sea turtle nesting habitat; therefore, operational lighting at the terminal would not affect nesting sea turtles. HDD activities at the proposed shore crossing are planned during Kemp's ridley and loggerhead sea turtle nesting seasons. HDD activities typically include nighttime work lights for 24-hour construction, and the HDD at the proposed shore crossing could take up to 5 months to complete. These lights may deter sea turtles from nesting at the beaches near the Project, and if nests are already in the area, could disorient hatchlings once they emerge from the nest (Weishampel et al. 2016; Witherington and Bjorndal 1991; Salmon 2003). The workspace where lighting for HDD #5 for the Gulf Intracoastal Waterway/Swan Lake would be located is approximately 700 feet from the beach; however, there is a road between the workspace and the beach, and houses along the beach. Therefore, lighting effects in this workspace would not affect nesting sea turtles due to the existing lighting (Attachment C, HDD Crossing Maps). The HDD entry point for the shoreline HDD is approximately 500 feet from the beach, and situated in a residential area; therefore, due to the distance and existing artificial light sources, lighting is not expected to affect nesting seas turtles (Attachment C, HDD Crossing Maps).

Noise and Human Disturbance

Noise from construction equipment, vehicle traffic, and general Project-related activity during construction and operation could affect nesting sea turtles. Construction and operational noise and activities that would disturb nesting sea turtles include clearing and grading for site preparation, HDD for pipeline installation, building construction, and facility operation. Noise from operation of the Oyster Creek Terminal would not reach levels above background on sea turtle nesting beaches (SPOT 2019a, Application, Vol. IIb, Appendix L). Noise generated from the HDDs at Swan Lake, the Intracoastal Waterway, Oyster Creek, and for the proposed shore crossing would be detectable at sea turtle nesting beaches (SPOT 2019i). HDD could cause vibration at the entry or exit points in adjacent habitats; however, due to the distance of the HDD entry points (greater than 400 feet) to sea turtle nesting beaches, these vibrations would not affect eggs and hatchlings during construction. The drill would rotate at a speed of 10 to 15 revolutions per minute and the drill would be approximately 60 to 70 feet below the beach which is unlikely to produce vibrations in the sand where sea turtles may nest.

Nesting success (i.e., how many hatchlings emerge) is generally greater on beaches without human disturbance (Pike 2008). While Project activities near nesting beaches would be temporary, HDD activities and associated noise disturbance would occur during one full sea turtle nesting season, which could have negative consequences for nesting success in the Project area.

Habitat

The Applicant proposes to install the shore crossing with HDD, which would avoid direct impacts on sandy beaches where sea turtles could nest.

Contaminants and Oil Spills

Beach habitat would be avoided by use of HDD; however, if an inadvertent return were to occur in the beach area, it could affect sea turtle nests by causing damage to nests. The temporary and localized release of drilling mud from a potential inadvertent return on the beach would not likely have a significant impact on sea turtles, except if it occurs in the immediate vicinity of the nest. The Applicant would implement its HDD Contingency Plan in the case of an inadvertent return. As described in the HDD Contingency Plan, if an inadvertent return is identified, "the HDD contractor will evaluate the release to determine if containment structures are warranted and can effectively contain the release. When making this determination, the HDD contractor will also consider if placement of containment structures will cause additional adverse environmental impacts" (Attachment B, HDD Contingency Plan).

During Project operations, discharges from vessels, the platform, or spills associated with offshore pipeline network or vessel loading could result in a more significant release of hazardous material, particularly crude oil. Impacts associated with a crude oil release at the platform or the pipelines could reach coastal areas. Adult females, eggs, and hatchlings could all be affected if oil were to reach nesting beaches, and clean-up of oil on beaches could also damage nests and containment of oil could interrupt nesting activities (Lauritsen et al. 2017). Depending on the size of the spill, long-term effects on sea turtle populations could occur by reducing the number of nesting visits to the beach, which would reduce the number of hatchlings that enter the population (Lauritsen et al. 2017). Oil spills can affect sea turtle olfactory organs, and smell is an important cue for navigation (NOAA, National Ocean Service 2010). Nesting beaches affected by oil spills may affect hatchlings' locational imprinting, which could prevent them from returning to their natal beaches to breed and nest as mature adults (NOAA, National Ocean Service 2010).

Safety mechanisms, such as shutdown valves built into the pipeline system, would prevent a continuous release of oil. The Applicant indicates that the largest volume of oil in an isolatable section would be associated with the subsea pipeline, which could release over 1.7 million cubic feet (Table 4.7.3-1). In the event of a release of hazardous material, the Applicant would implement its Operational Spill Response Plan, which would be developed as part of the Port Operations Manual prior to the start of SPOT DWP operations (see Section 4.7.3, Contaminants and Oil Spills, Mitigation Measures).

6.2.6.8. Conclusion

The potential effects of construction of the Project on sea turtles include effects associated with habitat disturbance and spills. Habitat effects due to construction lighting and noise, and human disturbance pose the greatest threats to nesting sea turtles. Kemp's ridley and loggerhead sea turtles are known to nest on beaches that these Project activities could affect; green, hawksbill, and leatherback are not known to nest in the Project area. Construction activities could make portions of the nesting beaches unsuitable for at least one nesting season due to light, noise, and human disturbance; however, effects would be temporary and no significant ground disturbance would occur on nesting beaches. Therefore, this BA concludes that the impacts would be insignificant and the Project ***is not likely to adversely affect*** the green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles.

6.2.7. Texas Prairie Dawn Flower

Texas prairie dawn flowers (*Hymenoxys texana*) occur on the base of small mounds in poorly drained, sparsely vegetated areas in grasslands, nearly barren areas on slightly salty soil, or at the base of pimple mounds (TPWD 2019d). It is an annual plant that flowers from February to April (TPWD 2019d).

6.2.7.1. Threats

Current threats to the Texas prairie dawn flower include habitat loss and degradation from development, herbicide use, and non-native vegetation (TPWD 2019d).

6.2.7.2. Potential Presence in the Project Area

The Texas prairie dawn flower could occur in Harris County, Texas, where the onshore pipeline and associated facilities and Oyster Creek Terminal are located. One record of this species exists approximately 2.7 miles east of the northern terminus of the onshore pipeline (SPOT 2019a, Application, Vol. IIb, Appendix D). During Project-specific field surveys, suitable habitat for the Texas prairie dawn flower was not identified, but surveys were not conducted during the bloom period when they would be identifiable (SPOT 2019a, Application, Vol. IIb, Appendix D). Approximately 69.5 acres of suitable soils for the species fall within the Project workspace, of which 47.1 acres are located within the existing ECHO Terminal site, which is unlikely to support the species. However, the remaining 22.4 acres could potentially support the species. The pipeline segments with suitable soils would all be collocated with existing, maintained utility corridors (Figure 6.2.7-1). Because a known occurrence was identified near the Project area, and suitable soils occur for the species, the Texas prairie dawn flower may occur in the Project area; however, it is unlikely due to existing disturbances from maintenance activities for existing utility corridors.

Figure 6.2.7-1: Suitable Soils for Texas Prairie Dawn Flower Along the Project Workspace

6.2.7.3. Potential Effects on Texas Prairie Dawn Flower

Habitat

Impacts from ground disturbance activities in suitable habitat could degrade habitat for the Texas prairie dawn flower. If individual plants were in the Project construction workspace, direct impacts could include the loss of individual plants or plant populations due to right-of-way clearing and long-term degradation or alteration of suitable habitat. Indirect construction impacts could include off-site sediment deposition due to storm water runoff and fugitive dust, which could degrade habitat, damage individual plants, and reduce productivity.

Invasive or Noxious Species

Invasive or noxious weeds could be introduced or spread by Project activities based on existing sources of noxious or invasive species in the Project area and dispersal mechanisms associated with the Project. Seven noxious or invasive plant species were identified during Project-specific surveys along the survey corridor. Texas prairie dawn flower could be outcompeted by noxious or invasive weeds if they were to become established in the right-of-way.

The pipeline rights-of-way would be reseeded with native vegetation as identified by the local U.S. Department of Agriculture Natural Resources Conservation Service, as described in the SPOT Project Revegetation Plan (SPOT 2019j). As described in Section 4.1, Effects of the Action, Onshore, the Revegetation Plan would minimize the spread of invasive species, reducing the potential for noxious weeds to become established in areas disturbed by Project activities.

6.2.7.4. Conclusion

The potential effects of construction and operation of the Project on the Texas prairie dawn flower include temporary effects on potential habitat and introduction of invasive or noxious species. Due to the existing disturbances in suitable habitats, and implementation of the Project Revegetation Plan, impacts on the Texas prairie dawn flower are expected to be insignificant. Therefore, this BA concludes that the Project ***is not likely to adversely affect*** the Texas prairie dawn flower.

7. NOAA FISHERIES JURISDICTION

Five species of whales, five species of sea turtles, six species of fish, and seven species of coral under NOAA Fisheries jurisdiction may occur within the Project area or marine vessel transit routes (see Table 5.0-1). Additionally, critical habitat for loggerhead sea turtles (*Sargassum*) is also present at the SPOT DWP and along the potential marine vessel transit routes.

7.1. NOAA FISHERIES CONSULTATION HISTORY

USCG and MARAD conducted informal consultations with NOAA Fisheries through review of online data and a letter request for the opening of informal consultation with NOAA Fisheries on May 1, 2019. A copy of the letter is included in Attachment A, Agency Correspondence. On May 1, 2019, C. Borland, a representative of USCG, and Y. Fields, a representative of MARAD, mailed a letter to the attention of

K. Reece at the Southeast Regional Office of NOAA Fisheries to request initiation of informal consultation and technical assistance with development of the BA.

7.2. Analysis of Species That Would Not Be Affected

This BA has concluded that the Project would have no effect on 7 of the 22 potential species identified because the SPOT Project area is either outside the species' known range or the Project area does not contain suitable habitat. Table 7.2-1 summarizes the reasoning for this determination of effect. These species, all of which are invertebrates, are not included in further analysis in this BA. This BA has also determined that the proposed Project would have no effect on the loggerhead sea turtle designated critical habitat because the Project would not affect any of the primary constituent elements as described below.

Table 7.2-1: No Effect Determination for Federally Listed Species under NOAA Fisheries Jurisdiction for the SPOT Deepwater Port Project

Species Type/Common Name/Scientific Name	Federal Status	Habitat	Effects Determination
Invertebrates			
Rough cactus coral (*Mycetophyllia ferox*)	Threatened [a]	Rough cactus coral is one of the reef-building corals in the order Scleractinia. They are generally found in shallow reef environments and are one of the least common species. These corals require a hard substrate and adequate water flow. Threats include ocean warming and acidification due to climate change, disease, and habitat degradation (Henry et al. 2018).	***No effect*** Project area is not within species range
Pillar coral (*Dendrogyra cylindrus*)	Threatened [a]	Pillar coral is one of the reef-building corals in the order Scleractinia. They are typically found as scattered, isolated colonies in warm marine waters off the southeast coast of Florida and throughout the Caribbean. These corals require a hard substrate, temperatures typically between 77 to 86 °F, and adequate light and water flow (NatureServe 2019b). A significant threat is ocean warming leading to coral bleaching (Hughes et al. 2018).	***No effect*** Project area is not within species range
Lobed star coral (*Orbicella annularis*)	Threatened	Lobed star coral is one of the reef-building star corals in the order Scleractinia. Star corals are part of the *Orbicella* species complex and were historically dominant components of coral reefs in the Caribbean. Reef-building corals require a hard substrate, mean temperatures typically between 77 °F to 86 °F, and adequate light and water flow (Henry et al. 2018). A significant threat is ocean warming leading to coral bleaching (Hughes et al. 2018).	***No effect*** Project area is not within species range

Species Type/Common Name/Scientific Name	Federal Status	Habitat	Effects Determination
Mountainous star coral *(Orbicella faveolata)*	Threatened	Mountainous star coral is one of the reef-building star corals in the order Scleractinia. Star corals are part of the *Orbicella* species complex and were historically dominant components of coral reefs in the Caribbean. Reef-building corals require a hard substrate, mean temperatures typically between 77 °F to 86 °F, and adequate light and water flow (UWI 2017). A significant threat is ocean warming leading to coral bleaching (Hughes et al. 2018).	***No effect*** Project area is not within species range
Boulder star coral *(Orbicella franksi)*	Threatened	Boulder star coral is one of the reef-building star corals in the order Scleractinia. Star corals are part of the *Orbicella* species complex and were historically dominant components of coral reefs in the Caribbean. Reef-building corals require a hard substrate, mean temperatures typically between 77 °F to 86 °F, and adequate light and water flow (UWI 2016). A significant threat is ocean warming leading to coral bleaching (Hughes et al. 2018).	***No effect*** Project area is not within species range
Staghorn coral *(Acropora cervicornis)*	Threatened [a]	This species is a branching coral typically found in shallow water areas with a lot of wave action. Staghorn coral is one of the Acroporids that was a dominant reef-building species in Florida and the Caribbean. Their distribution includes the Bahamas, south Florida, and the Caribbean (NOAA Fisheries 2019t). A significant threat is ocean warming leading to coral bleaching (Hughes et al. 2018).	***No effect*** No reefs present in Project area; transiting vessels would not be in shallow reef habitat
Elkhorn coral *(Acropora palmate)*	Threatened [b]	This species is a branching coral typically found in shallow water areas with a lot of wave action. Elkhorn coral is one of the Acroporids that was a dominant reef-building species in Florida and the Caribbean. Their distribution includes the Bahamas, south Florida, and the Caribbean (NOAA Fisheries 2019b). A significant threat is ocean warming leading to coral bleaching (Hughes et al. 2018).	***No effect*** Construction vessels, VLCCs, and other crude oil carriers would not be transiting in shallow reef areas

°F = degrees Fahrenheit

[a] Colonies located at Dry Tortugas National Park

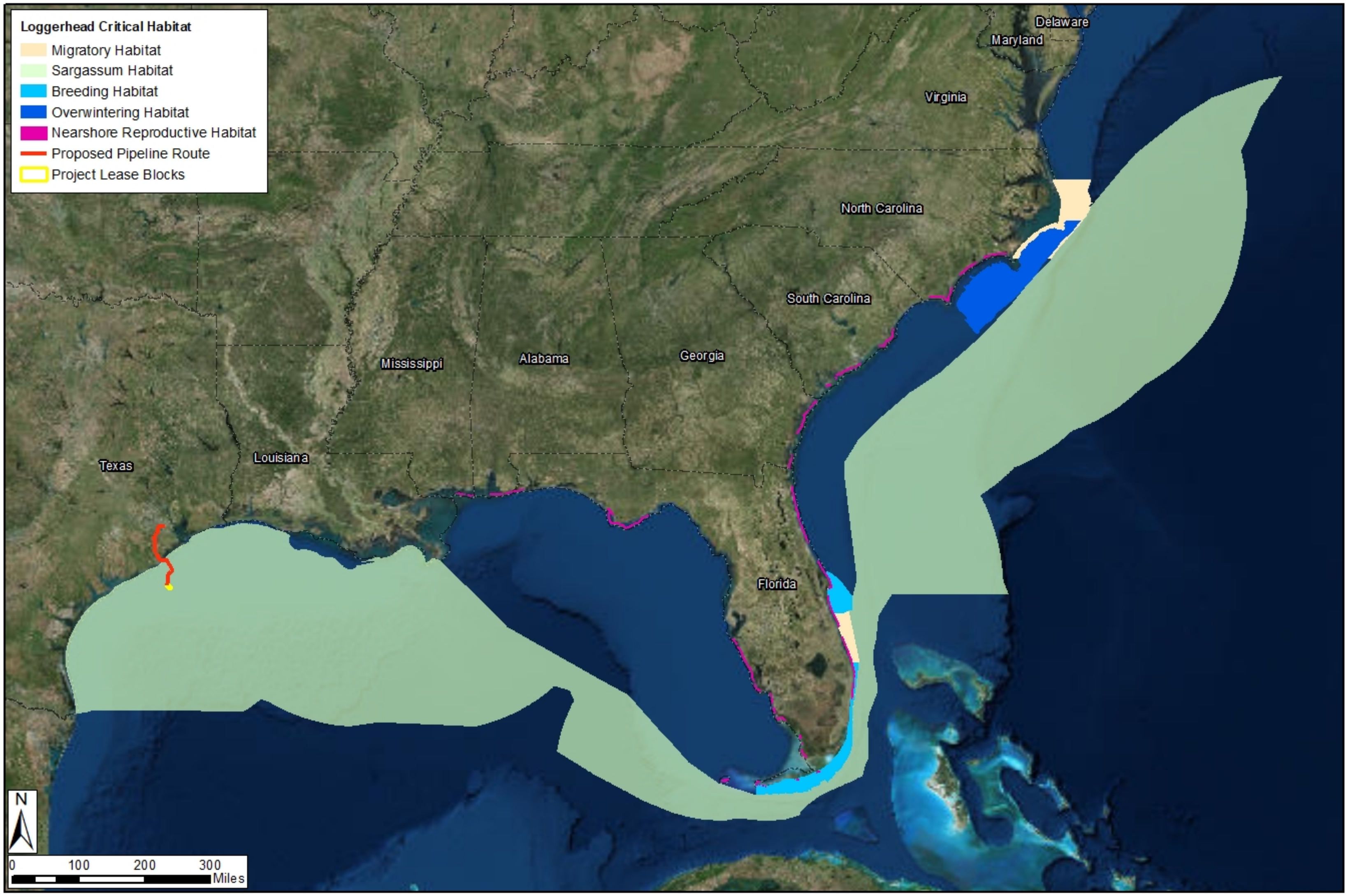
[b] Colonies located at Flower Garden Banks National Marine Sanctuary and Dry Tortugas National Park

7.3. LOGGERHEAD SEA TURTLE DESIGNATED CRITICAL HABITAT

The SPOT Project construction activities would occur within designated critical habitat for the loggerhead sea turtle. VLCCs and other crude oil carriers calling on the facility would transit through designated critical habitat for the North Atlantic DPS of loggerhead sea turtles. In July 2014, NOAA Fisheries published the final rule designating critical habitat for loggerhead sea turtles (see Figure 7.3-1). The marine habitats include six different habitat types:

- Foraging habitat
- Winter habitat
- Nearshore reproductive habitat
- Breeding habitat
- Constricted migratory habitat
- *Sargassum* habitat

Foraging habitat, winter habitat, nearshore reproductive habitat, breeding habitat, and constricted migratory habitat are outside the range of the SPOT Project and are not discussed further. The primary constituent elements of *Sargassum* habitat that could be affected by construction or operation of the Project are described below.



Source: NOAA Fisheries 2014b

Figure 7.3-1: Loggerhead Sea Turtle Northwest Atlantic Ocean Distinct Population Segment Critical Habitat Map

7.3.1. Sargassum Habitat

Sargassum habitat includes developmental and foraging habitat for young loggerheads where floating material, especially *Sargassum*, accumulates on the surface of the water. The habitat features are composed of locations where water temperature supports the optimal *Sargassum* growth and loggerhead inhabitance, where *Sargassum* concentrations support abundant prey and cover, and sufficient water depth and currents to ensure transport out of the surf zone (NOAA Fisheries 2013a).

- *Sargassum* Habitat Primary Constituent Element 1: Margins of Major Boundary Currents, Convergence Zones, Surface-Water Downwelling Areas, Appropriate Water Temperatures, Concentrated Amounts of *Sargassum*
  - The SPOT Project construction activities and vessels calling on the facility would not have any impact on the locations of major boundary currents, convergence and downwelling zones, water temperature, or concentration of *Sargassum*. Therefore, the Project would have no effect on these essential features of *Sargassum* habitat.
- *Sargassum* Habitat Primary Constituent Element 2: High Enough Concentrations of *Sargassum* to Support Adequate Prey Abundance and Cover
  - The SPOT Project construction activities would not have any impact on the density of *Sargassum* mats. Vessels transiting the area to call on the facility could scatter *Sargassum* mats when they passed through. Additionally, the wakes and surface water disruption associated with vessel transit could affect the distribution of *Sargassum*. However, this would not affect the amount of *Sargassum* matting, and would not affect prey abundance and cover within the *Sargassum*. Therefore, the Project would have no effect on this essential feature of *Sargassum* habitat.
- *Sargassum* Habitat Primary Constituent Element 3: Species Native to *Sargassum* Community Such As Hydroids, Copepods, Plants, Cyanobacteria
  - The SPOT Project construction activities and vessels calling on the facility would not have any impact on the presence or absence of species native to the *Sargassum* community. Therefore, the Project would have no effect on these essential features of *Sargassum* habitat.
- *Sargassum* Habitat Primary Constituent Element 4: Near to Available Currents, Deep Enough Water (More Than 10 Meters [33 feet]) to Ensure Movement Offshore Out of the Surf Zone for Post-Hatchlings, Foraging, and Cover Requirements By Sargassum
  - The SPOT Project or vessels calling on the facility would not have any impact on water movement or depth; therefore, the Project would have no effect on these essential features of *Sargassum* habitat.

7.3.2. Conclusion

Because the proposed Project and vessels calling on the facility would not have any effect on *Sargassum* habitat, this BA concludes that the Project would have ***no effect*** on designated loggerhead critical habitat. Therefore, this BA has concluded USCG and MARAD’s responsibilities under Section 7 of the ESA and no further consultation for designated critical habitat for loggerhead turtles with NOAA Fisheries is required.

7.4. Analysis of Species Not Likely to be Adversely Affected

This BA has concluded that the proposed action ***may affect, but is not likely to adversely affect*** the fin, GoM Bryde's, North Atlantic right, sei, or sperm whales; the green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles; giant manta ray; Gulf sturgeon; Nassau grouper; oceanic whitetip sharks; or smalltooth sawfish. This BA also concludes that the proposed action ***is not likely to jeopardize the continued existence*** of the dwarf seahorse. The following discussions support the reasoning for these effect determinations.

7.4.1. Whales

Whales are long-lived marine mammals that occur throughout the world's oceans. Many species of whales migrate extremely long distances to take advantage of seasonal food resources or calm wintering grounds for rearing young. Five species of whales could be encountered by vessels transiting to the Project site within the GoM.

7.4.1.1. Fin Whale

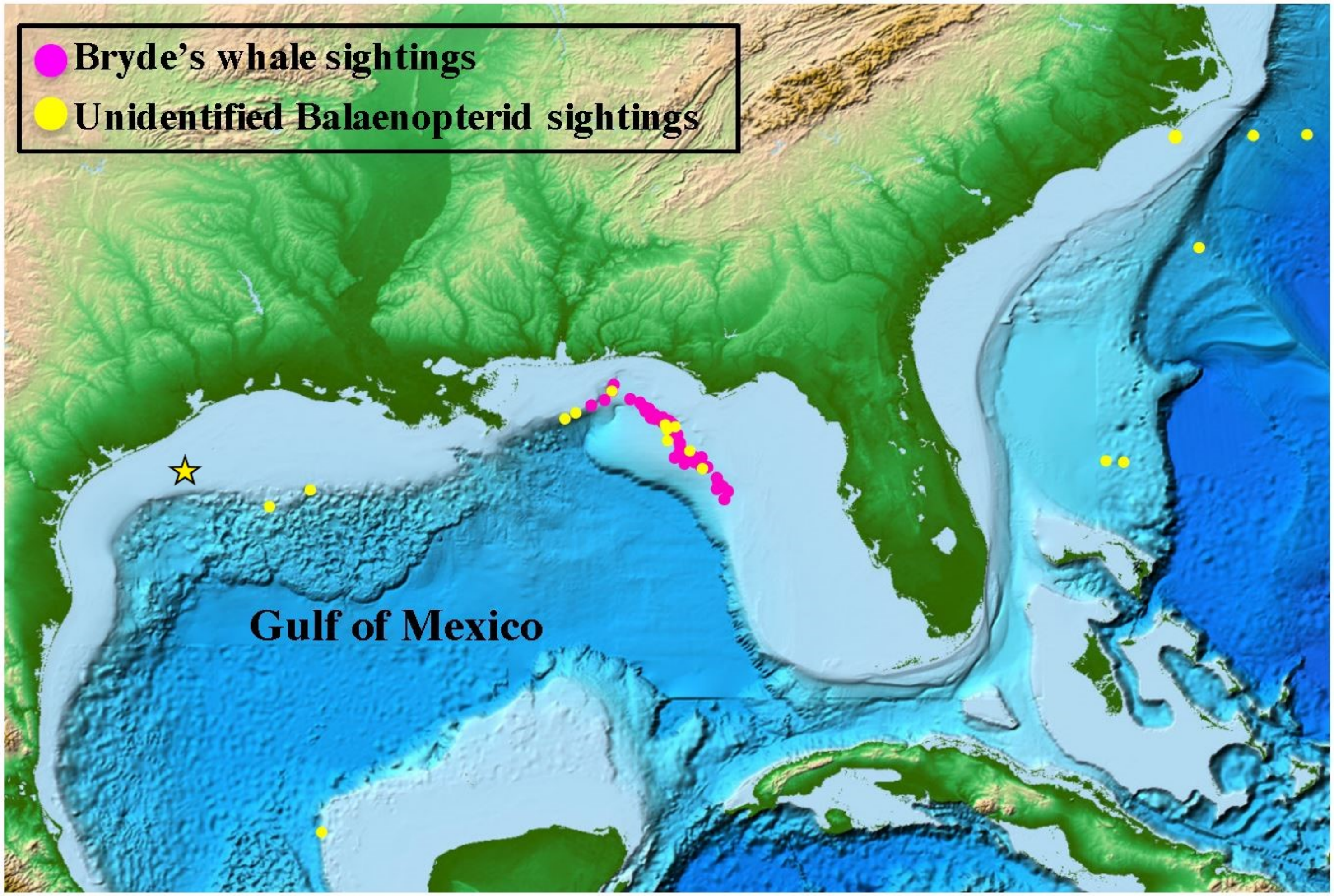
Fin whales (*Balaenoptera physalus*) are Federally listed as endangered and occur in deep, offshore waters of the world's major oceans. This baleen whale is a migratory species, generally moving seasonally to high food concentration areas in the higher latitudes, but no specific migration routes have been identified (NOAA Fisheries 2019c). Fin whales occur more frequently north of about 30º North latitude. Fin whales feed on pelagic crustaceans and schooling fish and research suggests that their distribution is largely governed by prey availability (NOAA Fisheries 2010a). Fin whales occur only rarely in the GoM (Würsig 2017). Like other baleen whales, fin whales are sensitive to low-frequency sounds (Cranford and Krysl 2015).

Threats

Current threats to the fin whale include vessel strikes, entanglement in fishing gear, reduced prey availability due to climate and ecosystem change, and ocean noise (NOAA Fisheries 2019c; NOAA Fisheries 2010a).

7.4.1.2. Gulf of Mexico Bryde's Whale

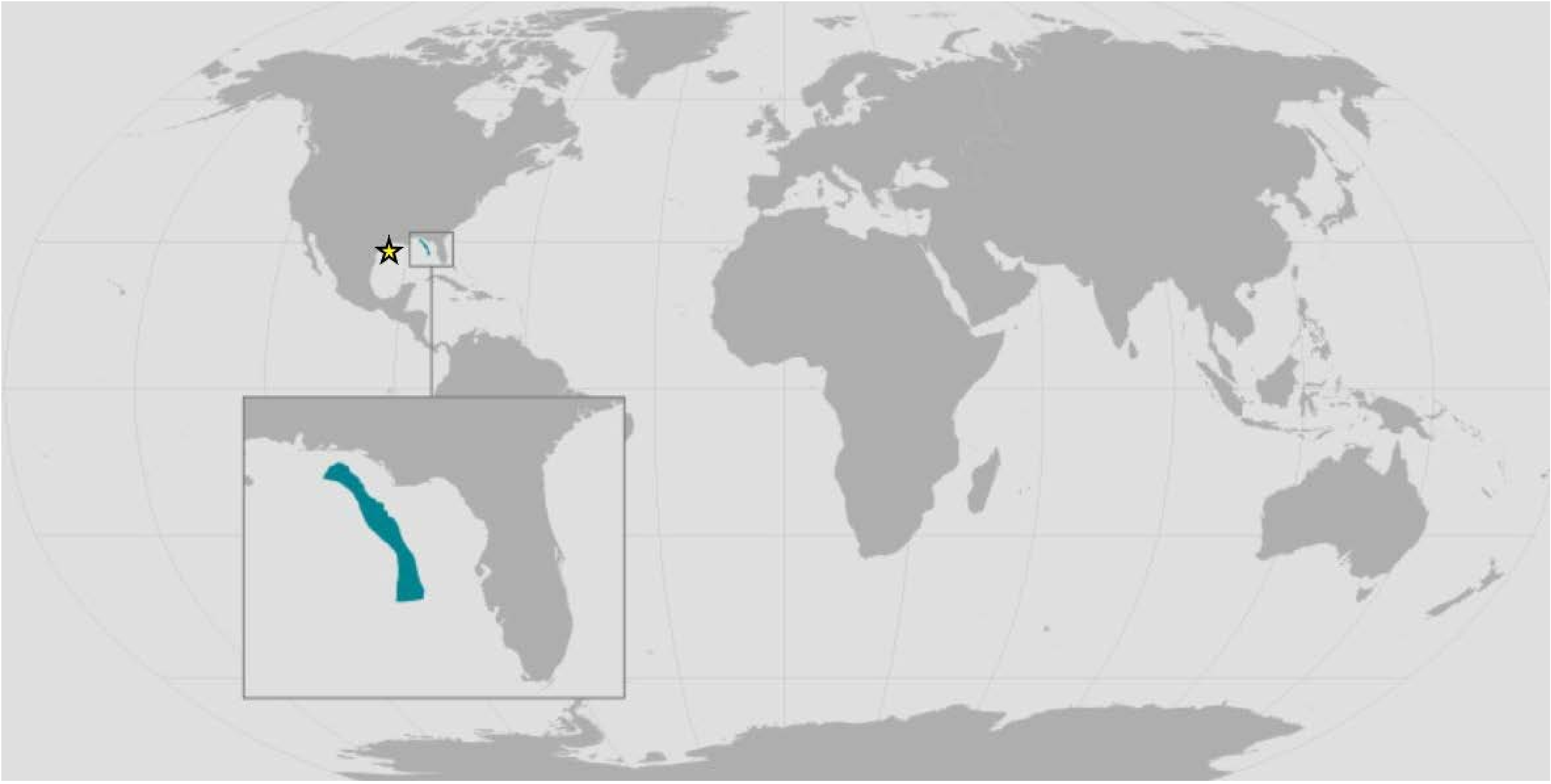
NOAA Fisheries listed the GoM Bryde's whale (*Balaenoptera edeni*) as endangered effective May 15, 2019 (80 Federal Register (Fed. Reg.) 15446, April 15, 2019). They are a subspecies of the Bryde's whales and are considered one of the most endangered whales in the world. Unlike many other baleen whales, GoM Bryde's whales do not migrate. Rather they are year-round residents in the GoM (NOAA Fisheries 2019f). Sightings during shipboard and aerial surveys conducted between 1989 and 2015 identified most GoM Bryde's whales in the northeastern GoM (Figure 7.4.1-1). The current distribution of GoM Bryde's whales occurs primarily along the continental shelf break at depths of about 328 feet to 1,312 feet in the northeastern Gulf, and the area is believed to be biologically important for the species (Figure 7.4.1-2) (Rosel et al. 2016). During ship-based surveys conducted from 1992 to 2015, a total of 112 GoM Bryde's whales were observed within the GoM EEZ and most sightings occurred in the biologically important area with a total of 104 whales observed (Soldevilla et al. 2017).



Source: Rosel, et al. 2016

Note: Star indicates approximate location of the SPOT DWP.

Figure 7.4.1-1: Sightings of Bryde's Whales and other Balaenopterid Whales Between 1989 and 2015 in the Northern Gulf of Mexico



Source: NOAA Fisheries 2019f

Note: Star indicates approximate location of the SPOT DWP

Figure 7.4.1-2: Biologically Important Area for the Gulf of Mexico Bryde's Whale

The diet of these baleen whales includes small crustaceans (e.g., shrimp) and schooling fish such as anchovy, sardine, mackerel, and herring, which all occur in the GoM (NOAA Fisheries 2019f). Little is known about their foraging ecology, but data obtained from one tagged whale suggests that they likely forage at or near the bottom during daylight hours (Rosel et al. 2016). Data also suggest that these whales spend most of their time within 50 feet of the water's surface, and 88 percent of their nighttime hours near the surface (NOAA Fisheries 2019f; Soldevilla et al. 2017).

Like other baleen whales, the GoM Bryde's whale communicates by producing a variety of low-frequency tonal and broadband calls within the 20 hertz (Hz) to 30 kilohertz (kHz) range. These calls are distinctive within geographic regions. It is presumed that their best hearing ability also falls within the same frequency range. Vocalizations are critically important in the life of marine mammals as they are used to perform important functions such as finding food, maintaining group structure and relationships, avoiding predators, navigation, and other critical functions (Rosel et al. 2016).

Threats

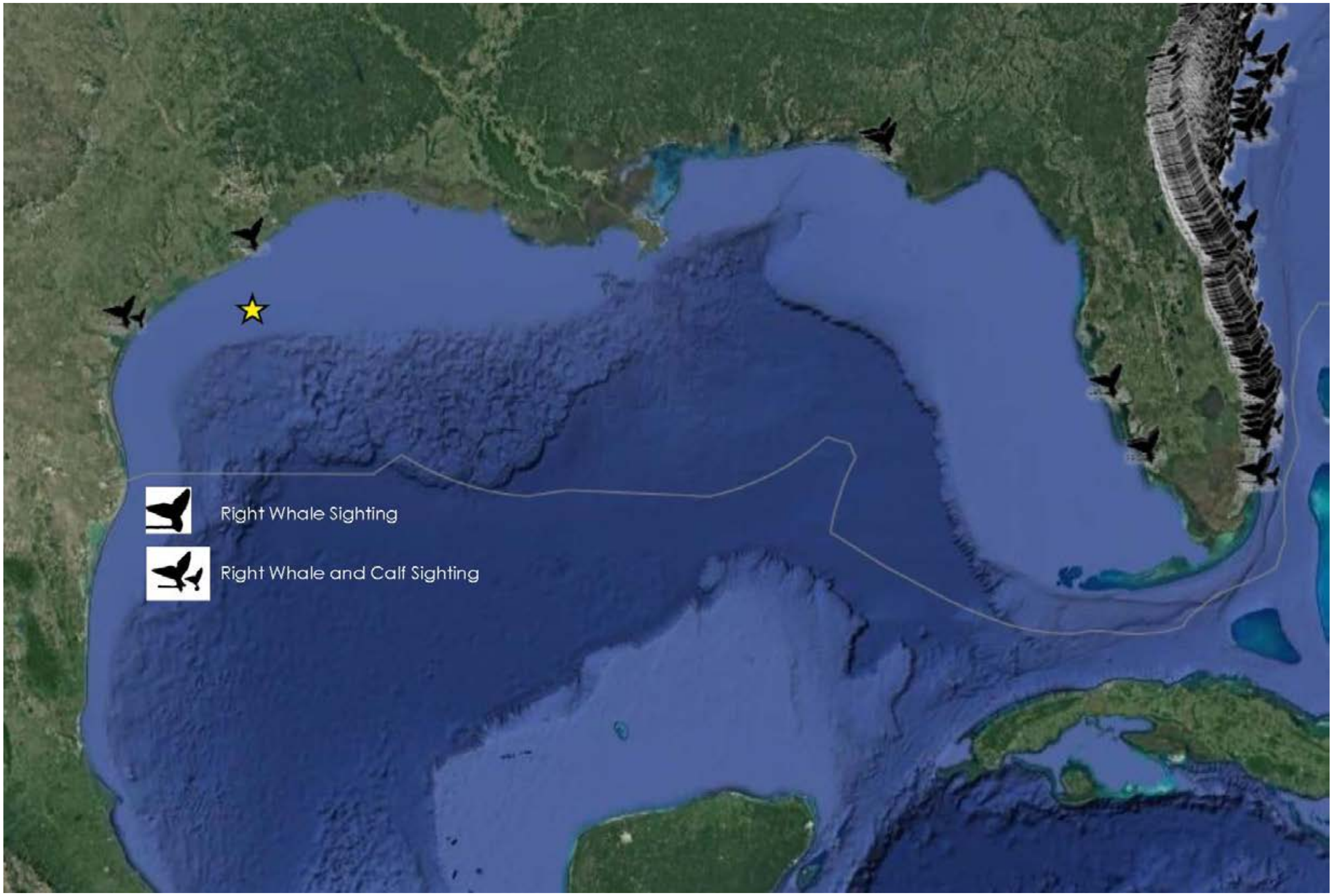
Current estimates are that fewer than 100 individual GoM Bryde's whales remain, which makes them extremely vulnerable to any threats (Rosel et al. 2016). Threats to GoM Bryde's whales include vessel strikes, ocean noise, energy exploration and development, and oil spills and responses.

7.4.1.3. North Atlantic Right Whale

The North Atlantic right whale (NARW) (*Eubaleana glacialis*) is Federally listed as endangered and is one of the most endangered whales in the world. NARWs are baleen whales that primarily occur in coastal or shelf waters, but have been known to occur in deep waters as well. Females give birth to about one calf every 3 years between in the calving grounds off the southeast Atlantic coast. Calving season occurs from November through April. Feeding is not believed to occur in the calving grounds. Occasional sightings of NARW adult female and calves have been documented in the GoM (Figure 7.4.1-3). NARWs communicate using low-frequency vocalizations (NOAA Fisheries 2019n; NOAA Fisheries 2018c; SERO 2019; NOAA Fisheries 2019m). Present population estimates indicate that there are fewer than 460 individuals within the western North Atlantic region (NOAA Fisheries 2018c).

NARWs are highly migratory. The majority of the western North Atlantic population ranges from wintering and calving areas in coastal waters off the southeastern United States, to summer feeding grounds as far north as the Canadian Bay of Fundy, including New England, the Scotian Shelf, and the Gulf of St. Lawrence. It is believed that NARWs only feed from spring to fall while in the feeding grounds in the northeast. NARWs are known to congregate seasonally in the coastal waters of the southeastern United States. Recent research shows that NARWs are using waters on the entire east coast year-round (NOAA Fisheries 2018c).

NARWs spend much of their time at or near the water surface, but because they are dark in color and lack a dorsal fin, they are difficult to see. Additionally, their migration route occurs primarily in coastal waters where vessel traffic frequently occurs and NARWs seem oblivious to nearby dangers (NOAA Fisheries 2013b).



Source: NOAA Fisheries 2019m

Note: Star indicates approximate location of the SPOT DWP.

Figure 7.4.1-3: North Atlantic Right Whale Sightings in the Gulf of Mexico

Threats

The main threat to NARWs is entanglement in fishing gear. Other major threats to the species include vessel strikes and underwater noise, which is known to interfere with their communication and disrupt their behavior (NOAA Fisheries 2019n). According to the Marine Mammal Commission (2017), entanglement is now regarded as the greatest anthropogenic threat to the NARW. As noted above, vessel strikes and noise also continue to be a threat.

7.4.1.4. Sei Whale

Sei whales (*Balaenoptera borealis*) are Federally listed as endangered. They are baleen whales that occur in deep water portions of subtropical to subpolar areas on the continental shelf edge and slope in the Atlantic, Pacific, and Indian Oceans, and occasionally in the GoM. The whale is usually found alone or in small groups of up to five individuals far from the coastline. (NOAA Fisheries 2011). Jefferson and Schiro (1997) reported only four reliable sightings of sei whales in the GoM, thus concluding that they are likely only accidental visitors in the Gulf.

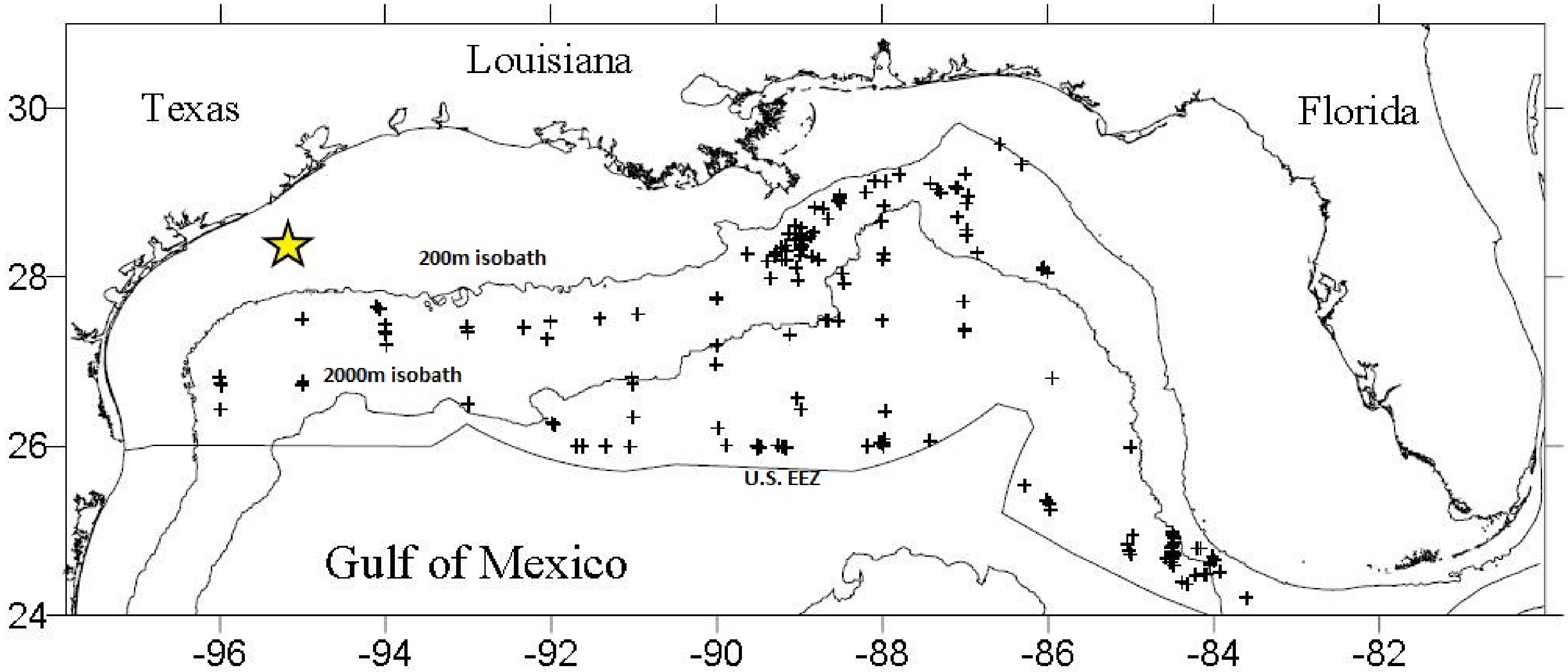
Threats

Current threats to the sei whale include vessel strikes, entanglement in fishing gear, loss of prey availability due to climate and ecosystem change, and ocean noise (NOAA Fisheries 2019p; NOAA Fisheries 2011).

7.4.1.5. Sperm Whale

The sperm whale (*Physeter microcephalus*) is Federally listed as endangered. They are toothed whales that inhabit the deeper waters of the world’s oceans throughout the year, where they feed primarily on squid and other deep sea creatures. Sperm whales regularly dive to depths of 2,000 feet and are capable of diving to 10,000 feet (NOAA Fisheries 2019s). Sperm whale migrations are not as distinct as other species and are thought to primarily follow food resources. Sperm whales organize in groups consisting of females and juveniles that occur in temperate and tropical waters ranging from the equator to about 45ºN. Males disperse and are often found at higher latitudes (78 Fed. Reg. 68032, November 13, 2013). Mullin et al. (2015) report that sperm whales are present throughout the year in the GoM, with higher concentrations found near the continental slope in the Mississippi River delta and west of south Florida in the period from 1991 to 2001 (Figure 7.4.1-4).

Sperm whales hear in the mid-frequency range, with an estimated range of 150 Hz to 160 kHz. Sperm whale vocalizations include patterned clicks called codas that appear to be associated with social behavior and intragroup communication. Sperm whales also produce usual clicks that are associated with foraging and diving and may be used as echolocation clicks. Other vocalizations include creaks and slow clicks. Evidence suggests that the loud, low-frequency clicks produced by sperm whales may be very important to an individual’s survival (NOAA Fisheries 2010b).



Source: Mullin et al. 2015

Note: Yellow star indicates the approximate location of the SPOT DWP.

Figure 7.4.1-4: Gulf of Mexico Sperm Whale Groups Identified During Ship Surveys between 1991 and 2001

.

The DWH oil spill occurred in an area where sperm whales were relatively common. In an effort to assess the impacts of the DWH spill on sperm whales, Ackleh et al. (2012) used acoustic recordings of sperm whales collected near the spill site in 2007 and compared it to new data collected in September 2010. The 2010 recording devices were set up at locations 9, 25, and 50 miles away from the spill site. Results demonstrate that acoustic activity and sperm whale abundance have changed, with a reduction in activity at the site closest to the spill and an increase in activity at the site 25 miles from the spill.

NOAA Fisheries (2016a) reported that there were eight sperm whale strandings in the northern GoM in the period covering 2009 to 2013. However, mortality or serious injury for offshore species such as sperm whales is likely underestimated because not all whales that die or are injured will wash ashore or be recovered (NOAA Fisheries 2016a).

Threats

The current threats to sperm whales include vessel strikes, entanglement in fishing gear, ocean noise, marine debris, climate change, and oil spills and contaminants (NOAA Fisheries 2010b; NOAA Fisheries 2019s).

7.4.1.6. Potential Presence in the Project Area

GoM Bryde’s, fin, sei, sperm, and NARW could be encountered in the GoM along transit routes of vessels calling on the port. Both GoM Bryde’s and sperm whales are resident species that could be encountered at any time of year, while encounters with fin, sei, and North Atlantic right whales would occur only rarely.

7.4.1.7. Potential Effects on Whales

Construction and operation of the Project could affect whales in the GoM. Construction activities include installation of the subsea pipeline and installation of the platform components. These activities would result in increased turbidity, sediment deposition, benthic community disturbance, underwater noise, and increases in vessel traffic. Operation of port facilities would result in increases in vessel traffic and potential contamination from an oil spill. NOAA Fisheries identified vessel strikes and ocean noise as threats to all whale species that could occur in the GoM, and also identified oil spills and contaminants as particular threats to the both the GoM Bryde’s whale and sperm whale.

Water Quality

Pipe installation would result in disturbance to the seafloor by direct contact from the pipeline and by anchoring of associated vessels. This disturbance would result in impacts on benthic communities and would cause the localized resuspension of sediments in the water column. These impacts would be temporary and minor.

Burial of the pipeline would occur to a minimum depth of 3 feet below bottom and would result in the resuspension of bottom sediments in the water column. As noted in Section 4.3, Water Quality, an estimated 29.4 million cubic feet of sediment would be re-suspended during burial of the pipelines. However, sediment plumes resulting from construction activities would not likely be factors affecting fin, GoM Bryde’s, NARW, sei, or sperm whales. Three whales—fin, NARW, and sei—occur only rarely in the GoM (Würsig 2017). The GoM Bryde's whale occurs in the northeastern Gulf and there have been no documented sightings west of Louisiana in the period from 1989 to 2015 (see Figure 7.4.1-1). Finally, sperm whales occur in deeper waters and have not been documented in water less than about 656 feet in the Gulf (see Figure 7.4.1-4). The sediment plume would extend about 2.5 miles from the pipeline trench, and is expected to attenuate to background levels within hours after trenching ends. These impacts would be short-term and minor; therefore, no direct effects on Federally listed whales would occur from installation of the pipelines.

Vessel Strikes

Vessel strikes could pose a threat to any whale in the GoM during both construction and operation of the Project. Vessel collisions may result in injury or death. Whale mortalities are usually caused by blunt force trauma from striking the ship bow, or by lethal wounding from propeller cuts. Vessel speed is the primary factor in the probability of a vessel strike, and of the strike being lethal (Vanderlaan and Taggart 2007). In their BO for the Jacksonville Harbor Deepening and Widening Project, NOAA Fisheries (2014a) cited numerous studies indicating that the probability of serious injury or death increase significantly as vessel speed increases. Vanderlaan and Taggart (2007) reported that at vessel speeds of 15 knots there was about an 80 percent chance of lethal injury. When vessel speed was reduced to about 8.6 knots, the risk of lethal injury was reduced to 20 percent.

Vessel strikes can occur anywhere, but collisions involving ships and whales are more likely to occur in areas with heavy commercial shipping traffic (NOAA Fisheries 2017a). According to data in the International Whaling Commission Vessel Strike database (2014) and provided by Soldevilla et al. (2017), there have been four confirmed ship strikes in the GoM:

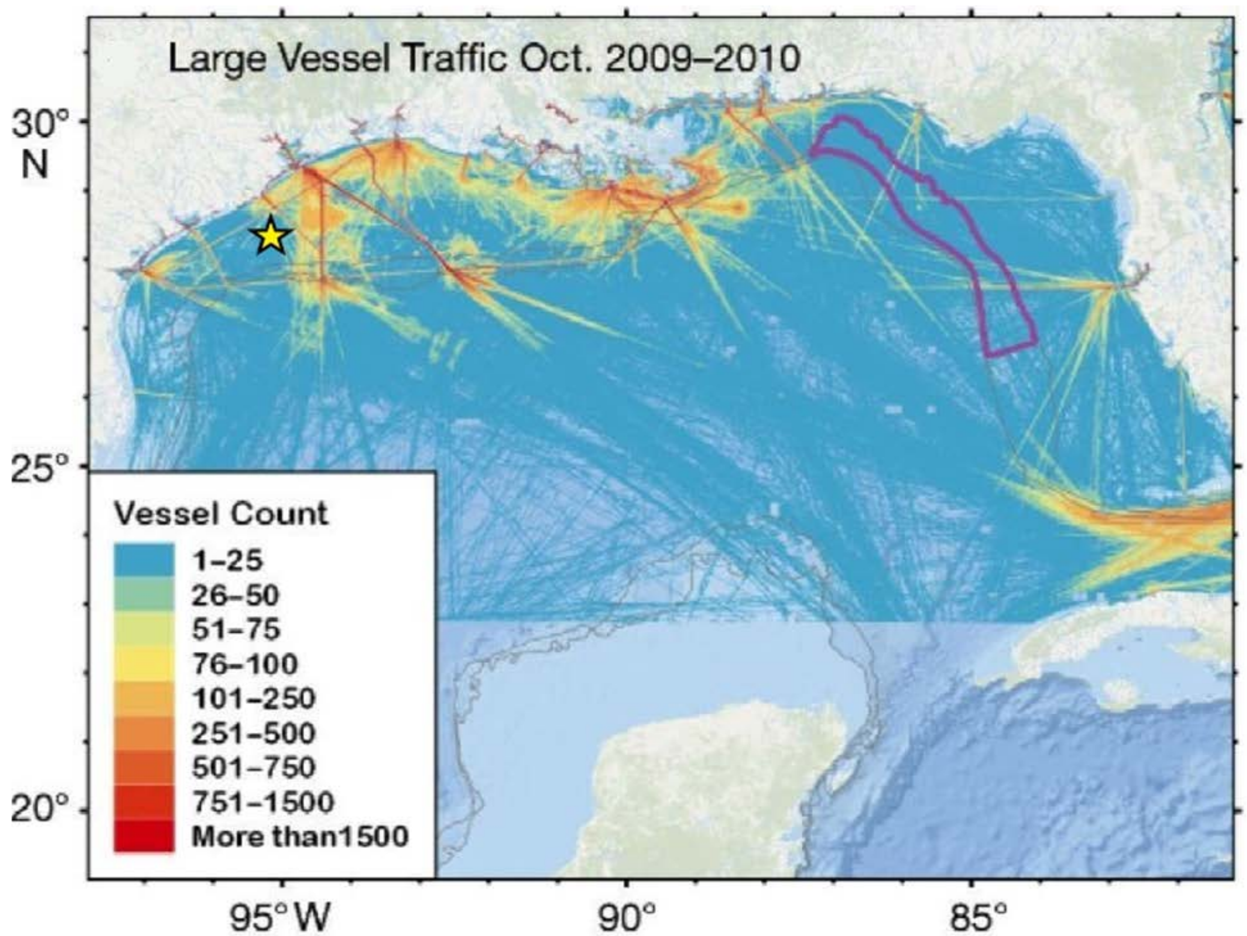
- One NARW near Freeport, Texas in 1972
- One fin whale on the U.S. Gulf coast in 1996
- One NARW on the Texas coast in 2006
- One lactating female GoM Bryde's whale in 2009 that was brought to Tampa Bay on a ship's bow

The low incidence of confirmed vessel strikes does not indicate that vessel strikes are not occurring. There are likely many more strikes that go undetected or unreported, perhaps because they occurred in remote areas or because the whales never washed up on shore (Jensen and Silber 2004).

As described in Section 4.4, Vessel Strikes, during construction, vessel speeds would range from stationary to 35 knots, depending on the vessel type and activity. The fastest moving vessels would be those traveling to and from the work site. During operations, vessels would be traveling in the deeper waters of the Gulf to call on the SPOT DWP. VLCC speeds range from 8 to as high as nearly 16 knots. Depending on the route and the time of year, whales that would be closer to shore and/or near the water surface would be at the greatest risk during construction. During operations, whales in the deeper waters of the GoM and those that spend much of their time near the water surface would be at greatest risk.

Encounters with fin and sei whales would be very uncommon as these whales are rarely found in the GoM. NARWs spend a significant amount of time near the water surface, putting them at greater risk of vessel strikes. Nowacek et al. (2003) reported that NARWs ignore both the sound and the presence of approaching vessels. This makes NARWs more vulnerable to vessel strikes than other species. Of the four confirmed vessel strikes in the GoM, two have involved NARWs and both were off the Texas coast. It is possible that construction or operation of the Project could result in vessel collision with NARWs.

The GoM Bryde's whale also spends much of its time near the water surface. However, there have been no documented sightings of Bryde's whales west of Louisiana (see Figure 7.4.1-1 above). Figure 7.4.1-5 shows areas of large vessel traffic in the GoM, and includes the approximate location of the SPOT DWP and the area identified as biologically important for GoM Bryde's whales.



Source: Soldevilla et al. 2017

Note: Star indicates approximate location of the SPOT DWP.

Figure 7.4.1-5: Large Commercial Vessel Traffic in Relation to the Biologically Important Area for the Gulf of Mexico Bryde's Whale

There was one confirmed vessel strike of the Bryde's whale in the GoM. However, because GoM Bryde's whales appear to be restricted to an area near Florida, the probability of vessel strikes by construction vessels or VLCCs transiting to the SPOT DWP is low.

Sperm whales have been documented in the deeper waters south of the proposed Project. During operations, vessels calling on the SPOT DWP are likely to travel through areas where sperm whales are present. Vessels would enter and exit the GoM either through the Florida Straight or the Yucatan

Channel, a distance of about 823 nautical miles and 596 nautical miles, respectively. However, because these whales inhabit deeper waters and make regular deepwater dives, they would likely only be at risk while coming to the surface to breathe or when they are within the upper 75 feet of the water column. The risk is small, but it cannot be completely discounted. With the increase in vessel traffic in whale habitat, vessel strikes are possible, but not reliably quantifiable.

Entanglement

As described in Section 4.5, Entanglement, whales could become entangled in anchor lines associated with construction vessels, VLCCs or other crude carriers, or those used to hold the SPM buoys and other navigation aids in place. A common threat to some whales is entanglement in fishing gear, while entanglement with anchor lines is less common. The NOAA Marine Debris Program (2014b) indicates that baleen whale entanglement reports only include one species of listed whale (i.e., NARW) that could occur in the GoM. NARW entanglements are associated with nets and pot lines, and entanglement with unknown sources of rope also occurs. Most listed whales are only infrequent visitors in the GoM and neither of the resident whale species (i.e., GoM Bryde’s and sperm whales) would be expected to occur at the SPOT DWP location in water depths of about 115 feet. The GoM Bryde’s whale is largely restricted to the biologically important area east of the Project site (see Figure 7.4.1-5) and sperm whales occur in deeper waters of the GoM. SPM buoys would be held in place with anchor chains and VLCCs would use mooring hawsers to moor to the SPM buoy. Anchor chains are less likely than rope to be associated with entanglement and the mooring hawser ropes would likely be held out of the water, thus minimizing any potential for entanglement. Furthermore, none of the listed whales are likely to be found at the DWP site. As previously noted, fin, NARW, and sei whales are only infrequent visitors in the GoM and the two resident listed whales are located to the east or in deeper waters of the GoM.

Underwater Noise

As described in Section 4.6.1, Underwater Noise, Marine Mammals, underwater noise poses a threat to marine mammals because of their dependency on sound as their primary sense for navigating, finding prey, avoiding predators, and communicating with other marine fauna. The SPLs that would produce injury and behavioral response in marine mammals are provided in Table 4.6.1-2. The scale and nature of the activity associated with installation of the proposed Project, application of mitigation measures, and proximity of whales to the sound source determines the level of potential impact from construction related noise.

Jet Sledding

Jet sledding involves high pressure water jets to create a trench and bury the pipeline and has the potential to cause behavioral changes to whales. Table 7.4.1-1 provides the distances within which behavioral responses would occur if a whale were present.

Table 7.4.1-1: Threshold Distances for Injury and Behavioral Response to Marine Mammals for Jet Sledding Activities

Project Component	Threshold Distance		
	Low-frequency Cetacean Injury Threshold	Mid-frequency Cetacean Injury Thresholds	Behavioral Response Threshold
	199 dB re 1 μPa²s (SEL_{cum})	198 dB re 1 μPa²s (SEL_{cum})	120 dB re 1 μPa (RMS SPL)
Jet sledding	0 feet	0 feet	5,200 feet

Source: SPOT 2019f

dB re 1μPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 μPa²s = sound exposure level in decibels relative to 1 microPascal squared second; RMS SPL = root mean square sound pressure level; SEL_{cum} = cumulative sound exposure level

Pile Driving

Pile driving associated with construction of the proposed SPOT DWP has the potential to cause behavioral changes and physiological damage to whales. Table 7.4.1-2 provides the distances within which injury or behavioral responses would occur if a whale were present.

Fin, GoM Bryde's, NARW, and sei whales are all low-frequency cetaceans that would experience injury if present within 0.5 mile and about 3.2 miles of pile driving of 30-inch and 72-inch steel piles, respectively. Sperm whales are mid-frequency cetaceans that would experience injury if present within about 33 feet and 207 feet for 30-inch and 72-inch piles, respectively. Behavior responses for all whales would occur if they were within about 0.2 mile and about 0.5 miles for 30-inch and 72-inch steel piles, respectively.

Table 7.4.1-2: Threshold Distances for Injury and Behavioral Response to Marine Mammals for 30-inch and 72-inch Impact Driven Steel Piles

Project Component/ Pile Type/ Installation Method	Threshold Distance				
	Low-frequency Cetacean Injury Thresholds [a]		Mid-frequency Cetacean Injury Thresholds [b]		Behavioral Response Threshold [b]
	219 dB re 1 μPa (Peak SPL)	183 dB re 1 μPa²s (SEL_{cum})	230 dB re 1 μPa (Peak SPL)	185 dB re 1 μPa²s (SEL_{cum})	160 dB re 1 μPa (RMS SPL)
PLEM/30-inch steel/impact hammer	N/A	2,713 feet	N/A	33 feet	1,119 feet
Platform/72-inch jacketed steel/impact hammer	N/A	16,997 feet	N/A	207 feet	2,654 feet

Source: SPOT 2019a, Application, Vol. IIa, Section 6

dB re 1μPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 μPa²s = sound exposure level in decibels relative to 1 microPascal squared second; peak = peak sound pressure; PLEM = pipeline end manifold; RMS SPL = root mean square sound pressure level; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level

[a] Low frequency cetaceans are unlikely to be present in the project area; therefore, the injury thresholds presented assume no mitigation measures.

[b] Injury thresholds for mid-frequency cetaceans and behavioral response thresholds were calculated assuming the use of cushion blocks.

Note: N/A indicated that the source level was lower than the threshold and so modeling did not proceed.

The Applicant estimates that pile driving would occur over a total of about 15.5 days (10 days for the 72-inch piles and 5.5 days for the 30-inch piles). Fin and sei whales are unlikely to be affected because they are more likely to be found in deeper water and are rarely present in the GoM. NARWs are also uncommon in the GoM (see Figure 7.4.1-3), but if present, would utilize nearshore habitats putting them at greater risk of being affected by the impulsive sounds generated by pile driving. NARW would not be expected to occur in the GoM outside the November to April calving season as the species typically migrates to feeding grounds located off New England and Canada.

The Applicant has proposed using a soft start and cushion blocks during pile driving activities. The Applicant would also use NOAA Fisheries-approved PSOs at the site to monitor the area within a predetermined zone of influence and would record any sightings of protected species. The GoM Bryde's whale and the sperm whale are both resident species in the GoM. The GoM Bryde's whale occurs primarily in the biologically important area off the Florida coast (see Figures 7.4.1-1 and 7.4.1-2) and would not be affected by pile driving activities. Sperm whales utilize deep waters of the GoM and are typically found at or deeper than the 656 feet isobaths (see Figure 7.4.1-4). Therefore, although sperm whales may detect noise generated from pile driving activities, they are not likely to be present within the area that would generate injury or disturbance. Therefore, the effects on whales due to pile driving noise would be minor.

Vessel Traffic

Sound generated by VLCCs and other crude oil carriers calling on the SPOT DWP could affect whales. As described in Section 4.6, Underwater Noise, the Applicant's baseline acoustic survey found that the Project area is already affected by anthropogenic noise. Additional noise from VLCCs and other crude carriers, and any associated support vessels, would cause increased noise in the area. The SPOT DWP would allow for up to two VLCCs or crude oil carriers to moor at the SPM buoys at one time. The Applicant anticipates loading a maximum of 365 vessels per year. Engine noise generated while vessels are moored at the SPOT DWP would increase overall noise in the area. While vessels are in transit, sound levels would not induce auditory injury to low or mid-frequency cetaceans, but whales in the vicinity of the transiting vessel would likely experience behavioral impacts that could include temporary avoidance of the area, disruption of communication, or other behavioral responses. The greatest disturbance would occur when vessels are operating at 3 knots, which would likely occur when vessels enter the safety zones and ATBAs of the SPOT DWP. The threshold distances for disturbance are provided in Table 7.4.1-3.

Table 7.4.1-3: Threshold Distances for Behavioral Response of Marine Mammals Due to Vessel Traffic Associated with the SPOT Project

Vessel Speed	Behavioral Response Threshold (feet)
	RMS SPL (120 dB re 1µPa)
VLCC transit fast (15 knots)	45,919
VLCC transit slow (12 knots)	55,999
VLCC safety zone and ATBA transit (3 knots)	232,954

ATBA = area to be avoided; dB re 1 µPa = decibels relative to 1 microPascal; RMS SPL = root mean square sound pressure level; VLCC = very large crude carrier

Marine mammals within about 44 miles of the activity would experience disturbance from vessels operating within the safety zones and ATBAs. Disturbance of marine mammals would also occur while vessels are transiting in the GoM at distances of about 8.7 miles for vessels traveling at 15 knots, and 10.6 miles for vessels traveling at 12 knots. The radius affected by increased noise levels from transiting vessels would be greatest when vessels are traveling at slower speeds, which would occur as vessels enter the safety zones and ATBAs for the SPOT DWP. However, most whales would not be present in the immediate vicinity of the SPOT DWP because they are either rarely found in the GoM or because they primarily occur in deeper waters.

Helicopters

Disturbance due to noise generated from once-weekly helicopter trips between the shore and platform could cause behavioral effects on whales present in the area. Helicopters project sound forward in a cone shape, and whales would likely need to be in the immediate vicinity of the passing helicopter to experience disturbance effects. Helicopter flights associated with the Project would not occur in deeper waters where sperm whales would likely be found, and other whale species are either infrequent visitors in the GoM or not found in the Project area, and any disturbance would be brief and infrequent. Therefore, noise impacts on whales associated with helicopter traffic would be discountable.

Contaminants and Oil Spills

During construction, release of hazardous materials would be limited to an inadvertent release of drilling mud at the offshore HDD location and accidental releases of hazardous substances associated with construction vessels. As described in Section 4.7.1, Horizontal Directional Drilling Fluids, the release of drilling mud is not likely to affect whales. The release of hazardous materials such as oil, gas, or diesel fuel during construction would be cleaned up using the typical spill kit contained on each vessel as described in Section 4.7.3, Contaminants and Oil Spills, Mitigation Measures. Given the low density of whales in the area, and with implementation of the Applicant’s HDD Contingency Plan and Construction Spill Response Plan for Oil and Hazardous Substances, the potential for exposure to hazardous materials during Project construction would be low.

During Project operations, discharges from vessels, the platform, or spills associated with the offshore pipeline network or vessel loading could result in a more significant release of hazardous material, particularly crude oil. As described in Section 4.7.2.1, Oil Spills and Petroleum Product Releases, Effects on Marine Mammals, the effects of crude oil on whales would depend on their level of exposure. Furthermore, if a marine mammal were within the vapor dispersion and/or flash fire hazard zones from a potential condensate or crude oil spill, an immediate adverse impact could occur if an ignition source were encountered and the species cannot avoid the area.

The Applicant would develop its Operational Spill Response Plan as part of the Port Operations Manual prior to the start of SPOT DWP operations. Impacts associated with a crude oil release at the platform or along the offshore pipelines would involve areas where tides and currents disperse the oil not recovered during an emergency response. Offshore crude oil pipeline releases can result from internal or external corrosion, incorrect operations, construction/material failure, or damage by natural forces, among others. The number of offshore pipeline incidents that do not include refined petroleum products obtained by distillation and processing is included in Table 7.4.1-4. As described in Section 4.7.2.1, the effects of crude oil contamination on whales could be significant and have long-term effects. However, the potential for an oil spill is generally low.

Table 7.4.1-4: Crude Oil Offshore Pipeline Incident Summary

Cause	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Corrosion, External	0	2	0	0	1	1	2	1	0	0	0
Corrosion, Internal	0	0	0	0	0	0	0	1	0	0	0
Excavation Damage	0	0	0	1	0	0	0	0	0	0	0
Incorrect Operation	0	2	1	0	0	0	0	0	0	1	0
Construction/Material Failure	1	1	2	1	1	0	0	1	0	1	3
Damage by Natural Force	5	1	1	0	0	0	0	1	0	1	0
Damage by Outside Force	0	0	0	0	1	0	0	0	0	0	0
Other Causes	1	0	0	1	0	0	1	0	0	0	0
Total	**7**	**6**	**4**	**3**	**3**	**1**	**3**	**4**	**0**	**3**	**3**

Source: PHMSA 2019

7.4.1.8. Conclusion

The potential effects of construction and operation of the SPOT DWP on whales include effects associated with water quality, vessel strikes, underwater noise, and exposure to contaminants. Of these, vessel strikes pose the greatest threat to whales in the GoM. Of the two resident species (GoM Bryde’s whale and sperm whale), only the sperm whale is likely to be encountered near the Project site. Vessels transiting within the EEZ could encounter whales, but densities are generally low for listed whales in the GoM. The effects from an oil spill could be significant, but given the current technologies and safety features that the Applicant would employ, the potential of a spill occurring is relatively low and cannot be quantified. Overall, the Project impacts would be insignificant. Therefore, this BA concludes that the Project ***is not likely to adversely affect*** the fin, GoM Bryde’s, NARW, sei, or sperm whale.

7.4.2. Sea Turtles

Sea turtles are found throughout the tropical and subtropical seas of the world where they often occur at or near the surface of the water. All of the species are Federally listed under the ESA and are under the shared jurisdiction of the USFWS and NOAA Fisheries. The major threats to sea turtle populations are overharvesting, fisheries bycatch, disease, pollution, and coastal development of nesting beaches. Five species of Federally listed sea turtles are found in the GoM, including the green, hawksbill, Kemp’s ridley, leatherback, and loggerhead sea turtles.

7.4.2.1. Green Sea Turtle

Green sea turtles (*Chelonia mydas*) in the North Atlantic DPS occur from Texas to Massachusetts and are listed as threatened. Green sea turtles are generally found in shallow waters inside bays, inlets, and reefs with an abundance of seagrass and algae. They use coral reefs and rocky outcrops near feeding areas to rest, and adults feed primarily on seagrass and algae, but also eat sponges and other invertebrates. Hatchlings swim offshore and go through a pelagic stage where they feed close to the surface on a variety of plants and animals, and have been observed using *Sargassum* mats for food and refuge

(NOAA Fisheries 2019e; NOAA Fisheries 2014a). Green sea turtles can exhibit high nesting site fidelity, which can lead to common migratory routes between feeding grounds and nesting beaches. Green sea turtles nest on open, sloping beaches with minimal disturbance (USFWS 2017a). In a recent BO, NOAA Fisheries (2014a) identified Gulf inlets of Texas as one of their principal foraging areas in the southeastern United States.

Threats

Threats to green sea turtles at sea include bycatch in fishing gear, ocean pollution/marine debris, and disease. Fibropapillomatosis is a disease that causes tumors on soft external tissues and is most prevalent in green turtles. Evidence suggests that the disease is associated with degraded marine habitats (NOAA Fisheries 2019e).

7.4.2.2. Hawksbill Sea Turtle

The hawksbill sea turtle (*Eretmochelys imbricata*) is Federally listed as endangered throughout its range. This sea turtle is found in the Atlantic, Pacific, and Indian Oceans and occurs throughout the Caribbean Sea and the GoM (especially Texas). Their habitat includes rocky areas, coral reefs, and shallow, hard bottom areas where they feed on sponges, jellyfish, crustaceans, sea urchins, and mollusks. They are seldom found in water deeper than 65 feet. They nest in low densities on scattered small beaches in the tropics and nesting is primarily restricted to south and central Florida in the continental United States. Hatchlings and juveniles are frequently found floating in algal mats and drift lines of flotsam and jetsam (USFWS 2018a; NOAA Fisheries 2019h).

Threats

Currently, the greatest threat to hawksbill turtles is habitat loss on nesting beaches and loss of coral reefs. Other threats to the species include bycatch in fishing gear, intentional killing of turtles, vessel strikes, and ocean pollution/debris (NOAA Fisheries 2019h).

7.4.2.3. Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle (*Lepidochelys kempii*) is Federally listed as endangered and is one of the smallest marine turtles in the world. The Kemp's ridley sea turtle inhabits nearshore waters less than 120 feet deep. They are benthic feeders utilizing sandy or muddy areas where they primarily feed on crabs and other crustaceans. Outside of nesting, the major habitat is nearshore and inshore waters that contain muddy or sandy bottoms in the northern GoM. Females migrate between foraging and breeding grounds, while males may migrate or may remain near their feeding grounds, only mating with females they encounter. Although most nesting occurs in Mexico, some occurs on Texas beaches (NOAA Fisheries 2019i; NOAA Fisheries 2014a). Nesting at beaches near the Project site occurred in 2017, 2018, and 2019 (see Figure 6.2.6-1 above). Hatchlings quickly swim offshore to open ocean where, as juveniles, they associate with floating *Sargassum* vegetation for up to about 2 years or when they reach 8 inches in length. Some hatchlings remain in the GoM currents while others are swept out of the GoM where the Gulf Stream carries them into the Atlantic (USFWS 2015a; NOAA Fisheries 2019i). Juvenile Kemp's ridley sea turtles move from nearshore coastal environments to deeper or more southern offshore waters as water temperature drops (NOAA Fisheries 2014a).

Threats

The greatest threat to this species is bycatch in fishing gear while other threats include harvest of eggs and ocean pollution/marine debris (NOAA Fisheries 2019i).

7.4.2.4. Leatherback Sea Turtle

The leatherback sea turtle (*Dermochelys coriacea*) is Federally listed as endangered. The leatherback is the largest sea turtle and spends more of its life in the open ocean environment than other sea turtles. Leatherback sea turtles feed primarily on soft-bodied animals such as jellyfish and salps; however, they are also known to consume sea urchins, crustaceans, fish, blue-green algae, and floating seaweed. Leatherback sea turtles occur globally, and range farther north and south than other sea turtles, likely due to their ability to maintain warmer body temperatures. Females require sandy beaches with deepwater approach for nesting habitat (USFWS 2015b; NOAA Fisheries 2019j). TPWD reports that leatherback sea turtles are rare on the Texas Gulf Coast (TPWD 2005a).

Threats

The greatest threat to leatherback sea turtles is bycatch in fishing gear. Other threats include harvest of eggs, intentional killing of turtles, vessel strikes, nesting beach habitat loss and alteration, and ocean pollution/marine debris (NOAA Fisheries 2019j).

7.4.2.5. Loggerhead Sea Turtle

Loggerhead sea turtles (*Caretta caretta*) found in the GoM belong to the Northwest Atlantic DPS and are Federally listed as threatened. Loggerheads are the most abundant species of sea turtle found in U.S. coastal waters. The loggerhead sea turtle can migrate significant distances between foraging areas, breeding areas, and nesting locations. They inhabit continental shelf environments and are also found in inshore areas such as bays, ship channels, large river mouths, and salt marshes. Loggerhead sea turtles feed on mollusks, crustaceans, fish, conchs, and other marine animals (USFWS 2015c; NOAA Fisheries 2019k; NOAA Fisheries 2014a). Loggerheads nest primarily on the east coast of Florida, Georgia, South Carolina, and North Carolina with only minor and solitary nesting reported in the GoM (TPWD 2005b). Hatchlings use offshore floating *Sargassum* mats, while juveniles use coastal areas in the western Atlantic where they become benthic feeders in lagoons, estuaries, bays, river mouths, and shallow coastal waters (NOAA Fisheries 2019k).

Threats

The greatest threats to loggerhead sea turtles are bycatch in fishing gear, intentional killing of turtles, and ocean pollution/marine debris (NOAA Fisheries 2019k). In a recent BO, NOAA Fisheries (2014a) also identified organochlorine contaminants as a threat due to results of tissue samples analyzed from stranded loggerhead sea turtles. The numbers of strandings is significantly higher than previous years, though it is important to note that there is a greater effort to record strandings following the DWH oil spill.

7.4.2.6. Potential Presence in the Project Area

Most sea turtles are highly migratory and the green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles could be encountered in the GoM within the EEZ during construction or operation of the Project.

7.4.2.7. Potential Effects on Sea Turtles

Marine Debris and Entanglement

Marine debris is a major threat to sea turtles that occur in the GoM. Nutrient deficiency in sea turtles has been linked to ingestion of marine debris and marine debris is also closely associated with entanglement. Sea turtle behavior makes them prone to entanglement because young turtles in particular seek shelter or food under floating objects, which increases the potential for them ingest marine debris or to become entangled. Reports of entanglement of sea turtles is primarily associated with fishing gear such as monofilament line, rope, and net, but entanglement in other marine debris is also common. In combined data from 1980 to 1992 for the GoM, southeast U.S., northeast U.S., and U.S. Caribbean, 6.8 percent of sea turtles were entangled in burlap bags, six pack rings, onion bags, steel cables, plastic bags, rubber gloves, and other material. Most sea turtle strandings reported in Texas and the northern GoM in the late 1980s were entangled in marine debris (NOAA Marine Debris Program 2014a, NOAA Marine Debris Program 2014b). Though entanglement is a significant issue for sea turtles, there are no reported entanglements associated with anchor chains.

The SPOT Project would comply with federal regulations to control the discharge of trash and debris during Project construction and would develop a USCG-approved Port Operations Manual, which would minimize the potential effects of a release of debris. Additionally, vessels calling on the SPOT DWP would adhere to MARPOL stipulations to ensure waste is not discharged into the ocean. Therefore, impacts associated with marine debris and entanglement from the SPOT Project would be discountable.

Water Quality

As described in Section 4.2, Offshore Habitat Loss and Alteration, construction of the offshore pipeline would disturb the seafloor along the pipeline route and at the location of the platform, PLEMs, and SPM buoys. An estimated 29.4 million cubic feet of sediment would be resuspended during burial of the pipelines. Sediment plumes and degraded water quality resulting from construction activities would not likely be factors affecting the green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles. These impacts would be temporary and turtles would likely avoid the area. Additionally, the potential risk of direct impact by the jet-sled itself is low. The Jacksonville Harbor Deepening and Widening Project BO stated that "non-hopper type dredging methods (e.g., clamshell or bucket dredging, cutterhead dredging, pipeline dredging, sidecast dredging) are slower and unlikely to overtake or adversely affect [turtles]" (NOAA Fisheries 2014a). The SPOT Project would utilize jet sleds, which are not expected to cause any direct impact on sea turtles. Pipe laying and jet sledding could disrupt a turtle's ability to reach nesting beaches (see Figure 6.2.6-1), but these impacts would be temporary and short-term. Therefore, this BA concludes that effects on sea turtles from burial of the pipeline would be discountable.

Vessel Strikes

Sea turtles could be vulnerable to vessel strikes during construction or operation of the Project. Vulnerability to collision would be greatest while sea turtles feed, swim, and rest near the surface of the water. Vessels traveling to and from the construction site would operate at higher speeds and would pose the greatest risk to turtles as the vessels travel through the nearshore habitats these turtles use. At the construction site, vessels would be moving at lower speeds, and sea turtles would be expected to avoid the immediate areas where construction activity is occurring.

Sea turtles could be affected by VLCCs or other crude oil carriers transiting in the GoM. Post-hatchling and immature sea turtles move out to sea and are often associated with *Sargassum* mats or other floating debris. As previously stated, the Applicant anticipates a maximum of 365 vessel calls per year and these vessels would likely travel through areas where young sea turtles are present. The Sea Turtle Stranding and Salvage Network keeps records related to sea turtle strandings by year, month, region, zone, state, county, and species. The SPOT DWP would be located near the boundary of zones 18 and 19. The preliminary 2018 sea turtle stranding report for Texas included a total of 161 strandings in Zone 18 and 445 strandings in Zone 19. The preliminary 2019 sea turtle stranding report for Texas includes a total of 128 strandings in Zone 18 and 48 strandings in Zone 19 as of October 26, 2019. Some of these included blunt force trauma (STSSN 2018, STSSN 2019).

The Jacksonville Harbor Deepening and Widening Project BO found evaluated vessel strikes and found that:

> The Sea Turtle Stranding and Salvage Network (STSSN) includes many records of vessel interaction (crush and/or propeller injury) with sea turtles…The stranding records include all causes of mortality, such as disease, hopper dredge impacts, hypothermic stunning (i.e., cold-stunning), interactions with fisheries, interactions with pollution, and vessel strikes. However, due to the condition of stranded turtles in many cases (i.e., decomposition), it is impossible to definitively determine actual cause of mortality for 70% of the specimens. In addition, it is not possible to determine in many cases whether the vessel strike occurred before or after the turtle's death. Additionally, it should be noted that many turtles killed by anthropogenic causes will not show up on the strandings database, as the mortality event may occur far offshore or the damage to the turtle is so significant the carcass sinks, preventing the turtle from washing ashore…Though there are numerous stranding of turtles indicating vessel strike impacts each year, the exact extent of the vessel traffic impact on sea turtles is not quantifiable at this time (NOAA Fisheries 2014a).

Given the density of sea turtles and the increasing traffic in the GoM, it is possible that a sea turtle could be struck by a vessel during construction or operation of the Project. Sea turtles would be expected to avoid active construction, but could be struck by construction vessels traveling to or from the work site. Sea turtles could also be struck by VLCCs or other crude oil carriers. Therefore, this BA concludes that vessel strikes could occur, but the exact extent of the vessel traffic impact on sea turtles is not quantifiable.

Underwater Noise

As described in Section 4.6, underwater noise associated with pipeline installation/trenching, pile driving, and marine vessel traffic would increase sound levels both temporarily and permanently in the GoM. The SPLs that would produce injury or disturbance to sea turtles are presented in Table 4.6.2-1.

Jet Sledding

Jet sledding involves using high-pressure water jets to create a trench to bury the pipeline, and has the potential to cause behavioral changes to sea turtles. Table 7.4.2-1 provides the distances within which behavioral responses would occur if a sea turtle were present.

Table 7.4.2-1: Threshold Distances for Injury and Behavioral Response to Sea Turtles During Jet Sledding Activities

Construction Activity	Threshold Distance	
	Injury Threshold 180 dB re 1 µPa (RMS SPL)	Behavioral Response Threshold 166 dB re 1 µPa (RMS SPL)
Jet sledding	NA	4.6 feet

Source: SPOT 2019f

dB re 1µPa = sound exposure level in decibels relative to 1 microPascal; NA = not applicable; RMS SPL = root mean square sound pressure level

It is very unlikely that sea turtles would be present close enough to the jet sledding activities to experience behavioral changes. Therefore, impacts associated with jet sledding activities would be discountable.

Pile Driving

Pile driving associated with construction of the proposed SPOT DWP has the potential to cause behavioral changes and physiological damage to sea turtles. The scale and nature of the pile driving activity associated with installation of the proposed Project, application of mitigation measures, and proximity of sea turtles to the sound source determines the level of potential impact of noise from pile driving. The Applicant has proposed to use a soft start and cushion blocks during pile driving activities. The Applicant would also use NOAA Fisheries-approved PSOs at the site to monitor the area within a predetermined zone of influence and record any sightings of protected species. Table 7.4.2-2 provides the distances within which injury or behavioral responses would occur if a sea turtle were present during pile driving activities.

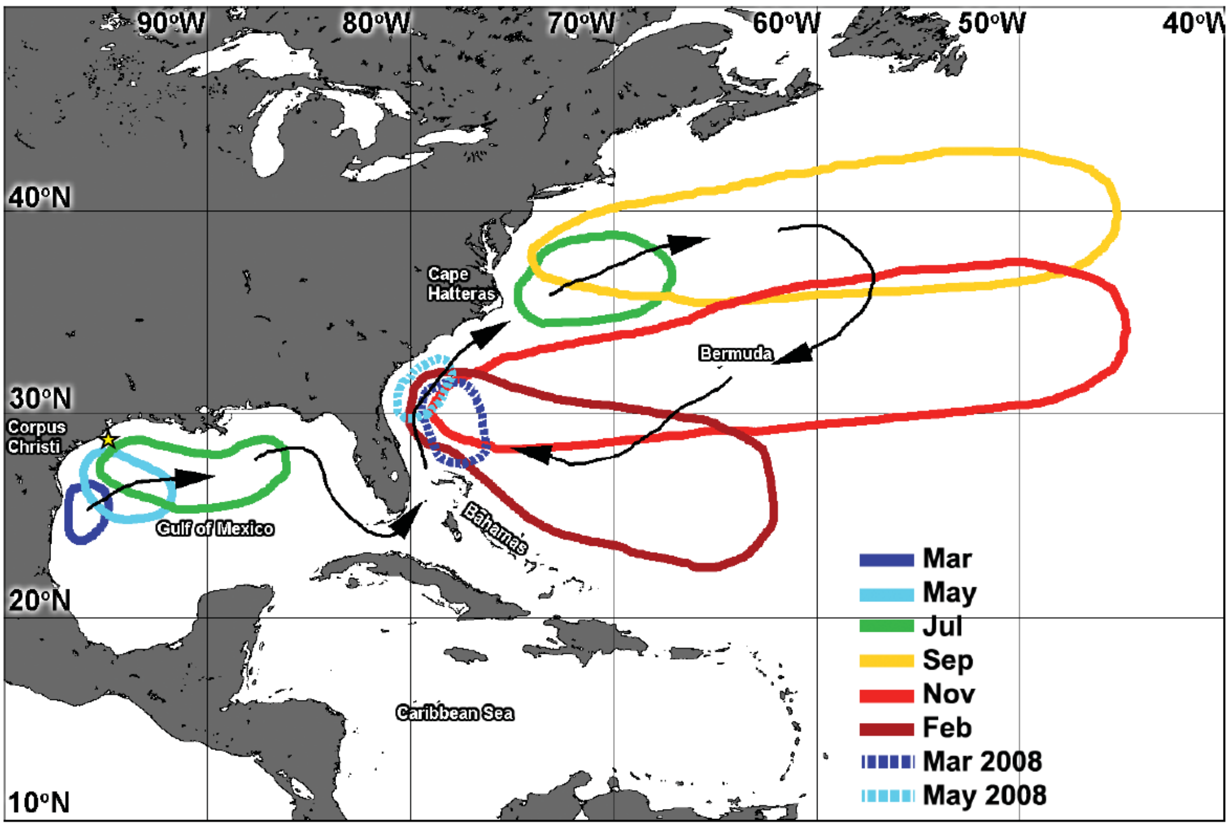
Table 7.4.2-2: Threshold Distances for Injury and Behavioral Response to Sea Turtles for 30-inch and 72-inch Impact Driven Steel Piles

Pile Type/Installation Method	Threshold Distance	
	Injury Threshold 180 dB re 1 µPa (RMS SPL)	Behavioral Response Threshold 166 dB re 1 µPa (RMS SPL)
PLEM 30-inch steel/impact hammer	52 feet	446 feet
Jacket 72-inch steel/impact hammer	125 feet	1,056 feet

Source: SPOT 2019f

dB re 1µPa = sound exposure level in decibels relative to 1 microPascal; PLEM = pipeline end manifold; RMS SPL = root mean square sound pressure level

Platform construction would occur in soft bottom sediments in waters about 115 feet deep. Suitable habitat for adult green, hawksbill, and leatherback sea turtles is not present as these turtles utilize nearshore habitats with algae and seagrass, hard bottom habitats, and open ocean, respectively. Both adult Kemp's ridley and loggerhead turtles could utilize habitat at the platform location, but would be expected to leave the area due to increased activity prior to pile driving activities. Construction would be located in designated *Sargassum* habitat for loggerhead turtles, and post-hatching juvenile sea turtles could be present in the area, especially within the approximate 0.6-mile radius in which behavioral response to pile driving would occur. Adult sea turtles are mobile and are expected to avoid areas with high noise levels. Hatchling and juvenile sea turtles rely on *Sargassum* mats for protection and food. *Sargassum* lives about 1 year and begins growing in the western GoM in March where it moves eastward and expands. The greatest coverage of *Sargussum* in the GoM generally occurs in summer as represented on Figure 7.4.2-1 (Gower and King 2011). Young sea turtles would not be able to avoid exposure to noise generated from pile driving if present in *Sargassum* mats within the distances provided in Table 7.4.2-2.



Source: Gower and King 2011

Figure 7.4.2-1: Average Extent of Sargassum from 2002 to 2008

Vessel Traffic

Sound generated by VLCCs and other crude oil carriers calling on the SPOT DWP could affect sea turtles. As described in Section 4.6, Underwater Noise, the Applicant's baseline acoustic survey found that the Project area is already affected by anthropogenic noise. Additional noise from VLCCs and other crude carriers, and any associated support vessels, would cause increased noise in the area. The SPOT DWP would allow for up to two VLCCs or crude oil carriers to moor at the SPM buoys at one time. The Applicant anticipates loading a maximum of 365 vessels per year. Engine noise generated while vessels are navigating in the safety zones and ATBAs, and while moored at the SPOT DWP would increase overall noise in the area. While vessels are in transit, sound levels would not induce auditory injury, but sea turtles in the vicinity of the transiting vessel within the EEZ and within the safety zone would experience behavioral impacts that could include exhibiting avoidance behavior. Table 7.4.2-3 provides the distance within which injury and behavioral responses would occur if a sea turtle were present in the area where a vessel is transiting.

Table 7.4.2-3: Threshold Distances for Injury and Behavioral Response in Sea Turtles Due to Vessel Traffic

Type	Injury Criteria, SEL_{cum} (dB re 1 μPa^2s)	Behavioral Response, RMS SPL (dB re 1 µPa)	Approximate Distance to Injury (feet)	Distance to Behavioral Disturbance (feet)
VLCC Transit	180	166	50	426

dB re 1 µPa2s = decibels relative to 1 microPascal squared normalized to 1 second; dB re 1 µPa = decibels relative to 1 microPascal; RMS = root mean square; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level; VLCC = very large crude carrier

Because sea turtles would not be expected to be in the immediate vicinity of platform except while traveling to nearshore habitats or accessing nesting beaches, noise impacts due to vessel traffic would be insignificant.

Contaminants and Oil Spills

The release of drilling mud (non-toxic bentonite) due to an inadvertent return during HDD operations could cause drilling mud to settle on the seafloor and temporarily affect nearshore soft bottom habitats and associated benthic organisms. However, extensive soft bottom areas would be available nearby and there would be no substantial or long-term reduction in benthic organisms that some sea turtles rely on. Therefore, the impacts from an inadvertent release of drilling mud would be discountable.

As discussed in more detail in Section 4.7, Contaminants and Oil Spills, direct effects on sea turtles that encounter a spill, leak, or accidental release of fuels, lubricants, or other hazardous substances during construction or operation of the Project include impacts on its respiratory system, skin, blood chemistry, and salt gland functions. Indirect effects include olfactory impairment, which can be devastating for turtles as they rely on their sense of smell to aid in navigation and orientation, ingestion of contaminated food, and/or a reduction in prey availability. Furthermore, if a sea turtle were within the vapor dispersion and/or flash fire hazard zones from a potential condensate or crude oil spill, an immediate adverse impact could occur if an ignition source were encountered and the species could not avoid the area.

Post-hatchling turtles are at particular risk because they inhabit and feed in areas that collect anthropogenic materials (NOAA NOS 2010). Young loggerhead sea turtles use floating *Sargassum*, which is a large and important part of the GoM ecosystem. The GoM is the second most productive ecosystem of *Sargassum* in the world. An oil spill that reached *Sargassum* habitat, and thus juvenile sea turtles, would affect both the *Sargassum* directly (i.e., grow less or die resulting in shrinking *Sargassum* mats) and the juvenile sea turtles that use the habitat. Young turtles could be exposed to oil through inhalation of vapors, by swallowing oil with their food, or the shell could be oiled resulting in loss of thermal insulation (NOAA ORR 2019). Additionally, nesting beaches affected by oil spills may affect a hatchling's locational imprinting, which could prevent them from returning to their natal beaches to breed and nest as mature adults (NOAA NOS 2010).

Generally, the potential for sea turtle exposure to hazardous materials, including oil spills, is quite low due to the turtles' wide ranges and the fact that they are usually highly dispersed (NOAA NOS 2010). Additionally, as indicated in Table 7.4.1-4, there are relatively few incidences of offshore pipeline releases of oil. Accidents like the DWH oil spill, which released millions of barrels of oil into the GoM for 87 days, are rare. Safety mechanisms, such as shutdown valves built into the pipeline system, would prevent a continuous release of oil as occurred with the DWH accident. The Applicant indicates that the largest volume of oil in an isolatable section would be associated with the subsea pipeline, which could release over 1.7 million cubic feet of oil. The Applicant would develop and implement its Operational Spill Response Plan, which would be developed as part of the USCG-approved Port Operations Manual prior to the start of SPOT DWP operations. Juvenile sea turtles associated with floating *Sargassum* or debris would be at the greatest risk, but the risk is not quantifiable.

7.4.2.8. Conclusion

Sea turtles are widely dispersed and migrate to different regions at various times of year. Turtles would be temporarily displaced from soft sediment areas during pipe laying and jet sledding. Turtles' levels of mobility make it likely that they would actively avoid construction activities, including pile driving activities. However, they appear somewhat inflexible about shifting to new nesting beaches, new foraging areas, or changing migratory corridors (Samuel et al. 2005). The SPOT Project would control the release of debris from the platform and vessels calling on the DWP would comply with MARPOL requirements. Therefore, the threat to sea turtles from release of marine debris at the SPOT Project would be discountable. Sea turtles face a risk of vessel strike by construction vessels transiting to and from the Project site and from VLCCs or other crude oil carriers transiting in the GoM, but this risk is not quantifiable. Additionally, there is a risk of exposure to hazardous materials resulting from an oil spill, but given the current technologies and safety features that the Applicant would employ, the potential of a spill occurring is relatively low and is also not quantifiable. Impacts on sea turtles would be insignificant, discountable, or not quantifiable due construction and operation of the SPOT Project. Therefore, this BA concludes that the Project ***is not likely to adversely affect*** green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles.

7.4.3. Giant Manta Ray

In 2018, NOAA Fisheries listed the giant manta ray (*Manta birostris*) as threatened under the ESA and determined that there were not sufficient data available to designate critical habitat (83 *Fed. Reg*. 2916).

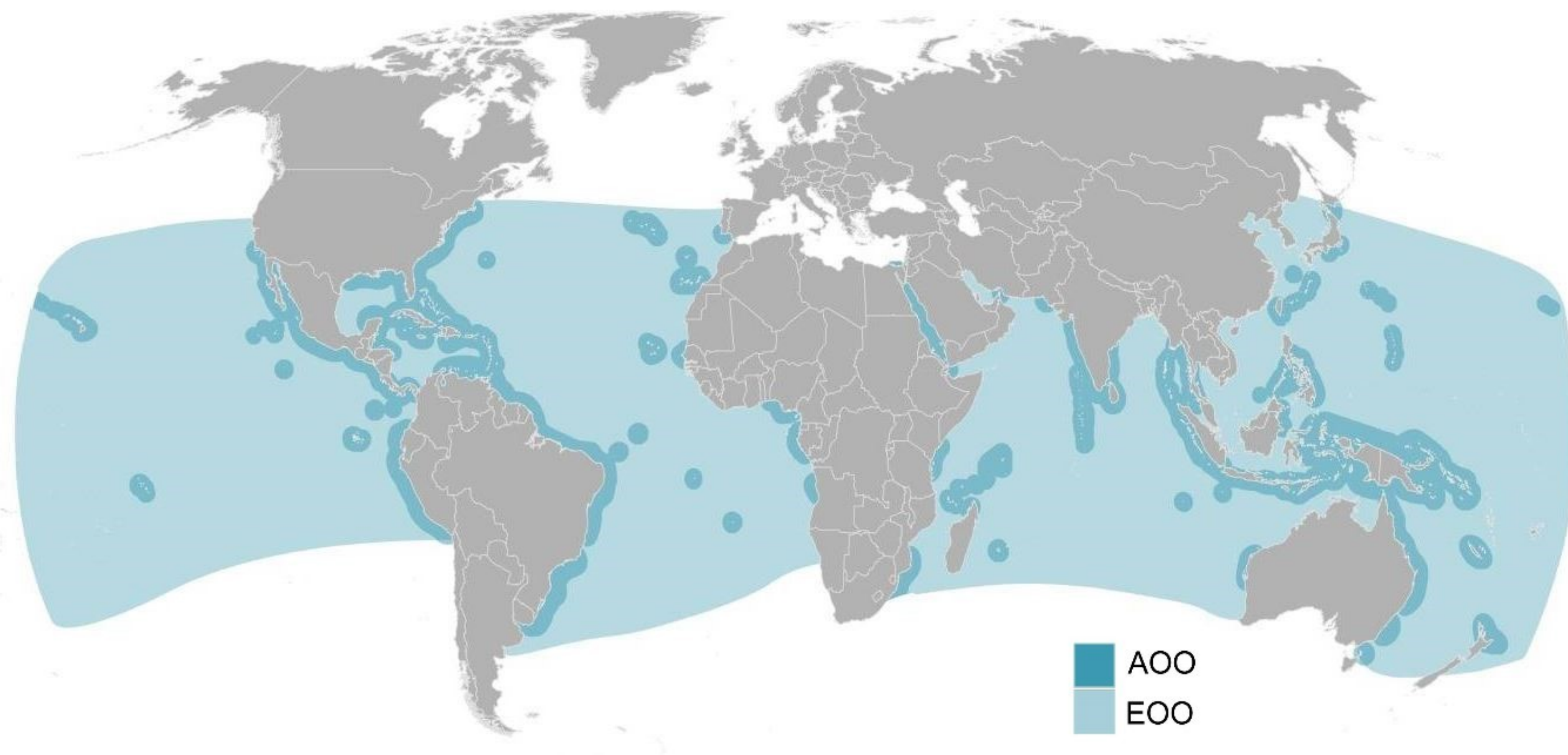
In the Status Review Report, Miller and Klimovich (2017) indicated that giant manta ray inhabit marine waters in tropical, subtropical, and temperate areas around the world, and are known to occur in the GoM (Figure 7.4.3-1). Their diet is primarily composed of zooplankton, but may also include small to moderately sized fish (NOAA Fisheries 2019d; Burgess et al. 2016). They are believed to forage primarily in pelagic waters where they likely move in response to prey abundance, but they have been observed feeding in shallow waters about 32 feet deep. Manta rays also make night descents of up to about 1,400 feet, though they are capable of diving to depths greater than 3,200 feet. One known feeding area is in the southern GoM near the Yucatan Peninsula. Although often considered solitary, giant manta rays are known to aggregate during mating, feeding, and at cleaning stations at offshore reefs. They are considered a migratory species and have been documented moving between the Yucatan, Mexico, and the wider GoM (Miller and Klimovich 2017; NOAA Fisheries 2019d.).

Little is known about the growth and development of giant manta rays or their nursery areas. To help further the research, Heupel, et al. (2007) established a definition for elasmobranch nursery areas that is compatible with other aquatic species, using three criteria:

- They are more commonly found in some areas than other areas.
- They remain in or return to the same area for extended periods.
- They repeatedly use an area across years.

Many believe that a nursery area must also provide some overall benefit to the population (Heupel, et al. 2007).

Using this definition of a nursery area, Stewart et al. (2018) identified the Flower Garden Banks National Marine Sanctuary (FGBNMS) as potentially important habitat for juvenile manta rays. Though rarely found across the globe, juvenile manta rays are quite abundant at FGBNMS and the same individuals have been identified at the sanctuary across years. The data also suggested that some individuals remain in the area for days to months. The perceived benefit to the population was less clear, but the benefit might be associated with the sanctuary's location near the edge of the continental shelf. The location provides easy access to abundant food resources in the deep, pelagic waters of the GoM while the sanctuary offers an area of relatively shallow but protected warmer water that would allow manta rays a place to recover body temperature after deep foraging dives into colder waters (Stewart et al. 2018).



Source: Lawson et al. 2017

Notes: AOO = area of occupancy; EOO = extent of occurrence

Figure 7.4.3-1: Distribution of Giant Manta Ray

7.4.3.1. Threats

The most significant threats to giant manta rays are associated with targeting fisheries and bycatch. Other threats include ingestion of plastic marine debris, tourism impacts, environmental contaminants, boat strikes and entanglement, and climate change (Miller and Klimovich 2017).

7.4.3.2. Potential Presence in the Project Area

Giant manta rays utilize water depths ranging from shallow nearshore waters to deep pelagic waters. Juvenile manta rays are abundant at FGBNMS, which is within 40 nautical miles of the proposed SPOT DWP (Figure 7.4.3-2). Consequently, it is possible that giant manta rays could be present in the Project area during construction and operation of the facility. Giant manta rays could also be encountered by vessels transiting to the SPOT DWP.

7.4.3.3. Potential Effects on Giant Manta Ray

Giant manta ray could be affected by construction and operation of the SPOT DWP. They are known to use both shallow and deep marine waters to feed. Manta rays are highly mobile and would be expected to avoid construction areas during pipe laying or jet sledding. Though ingestion of marine debris is listed as a threat to this species, the SPOT Project would not increase the amount of debris released into the GoM.

Underwater Noise

The SPLs that would produce injury to fish are presented in Table 4.6.3-1. Noise effects from jet sledding would occur within less than 1 foot from the activity and fish are likely to avoid the area during jet sledding activities; therefore, impacts from jet sledding would be discountable.

The scale and nature of the pile driving activity associated with installation of the proposed Project, application of mitigation measures, and proximity of giant manta rays to the sound source determines the level of potential impact of noise from pile driving. The Applicant has proposed to use a soft start and cushion blocks during pile driving. The Applicant would also use NOAA Fisheries-approved PSOs at the site to monitor the area within a predetermined zone of influence and record any sightings of protected species. Table 7.4.3-1 provides the distances within which injury or behavioral responses would occur if a fish were present during pile driving activities.

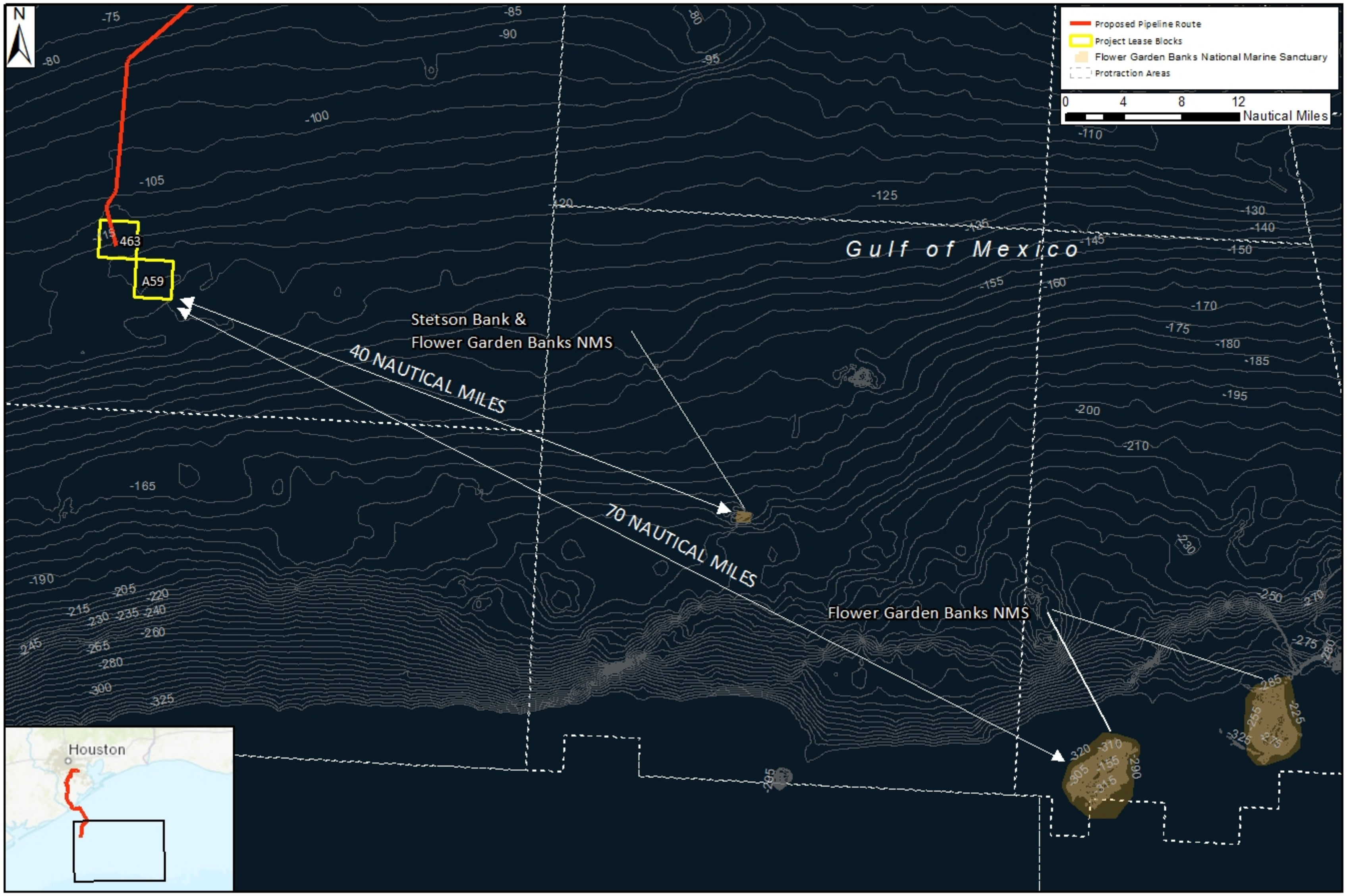


Figure 7.4.3-2: Location of Flower Garden Banks National Marine Sanctuary in Relation to the SPOT Deepwater Port

Table 7.4.3-1: Threshold Distances for Injury and Behavioral Response to Fish for the 30-inch and 72-inch Impact Driven Steel Piles

Pile Type/Installation Method	Threshold Distances			
	Injury Threshold			Behavioral Response Threshold
	206 dB re 1 µPa (Peak SPL)	187 dB re 1 µPa^{2}s (SEL_{cum}) (Fish > 2 grams)	183 dB re 1 µPa^{2}s (SEL_{cum}) (Fish < 2 grams)	150 dB re 1 µPa (RMS SPL)
SPM/PLEM 30-inch steel/impact hammer	20 feet	502 feet	705 feet	5,200 feet
Jacket 72-inch steel/impact hammer	23 feet	1,952 feet	1,952 feet	12,323 feet

Source: SPOT 2019a, Application, Vol. IIa, Section 6

dB re 1µPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 µPa2s = sound exposure level in decibels relative to 1 microPascal squared second; PLEM = pipeline end manifold; RMS = root mean square; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level; SPM = single-point mooring

The cumulative sound impacts would cause injury to giant manta rays within about 0.4 mile of the pile driving activities for the 72-inch diameter piles and would cause behavioral responses within about 1.0 mile. The likelihood of this solitary species being within the radius that would cause injury or a behavioral response is small, as the species would likely avoid areas with active construction activity and the location of the SPOT DWP does not support the hard bottom habitat that would attract manta rays for use as a cleaning station. Additionally, because they are considered more of an oceanic species, it is more likely that any manta rays that would be in the GoM would be found off the continental shelf or at the FGBNMS, well outside the radius of injury or behavioral response influence.

Sound generated by vessels, such as VLCCs or other crude oil carriers and support tugs, could also have adverse impacts on fish, including the giant manta ray. Table 7.4.3-2 provides the distances within which injury or behavioral responses would occur if a fish were present near transiting vessels.

Table 7.4.3-2: Threshold Distances for Injury and Behavioral Response to Fish Due to Vessel Traffic Associated with the SPOT Project

Fish Size	Injury Criteria, SEL_{cum} (dB re 1 µPa^{2}s)	Behavioral Response, RMS SPL (dB re 1 µPa)	Approximate Distance to Injury (feet)	Distance to Behavioral Disturbance (feet)
Fish ($\geq$ 2 grams)	187	150	17	4,965
Fish (< 2 grams)	183	150	31	4,965

dB re 1 µPa^{2}s = decibels relative to 1 microPascal squared normalized to 1 second; dB re 1 µPa = decibels relative to 1 microPascal; RMS = root mean square; SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level

Fish have been shown to react when engine and propeller sounds exceed a certain level. Avoidance reactions have been observed in fish such as cod and herring when vessel sound levels were 110 to 130 decibels (dB) (Ona and Godø 1990), but others have found that fish may be attracted to stationary vessels (silent, engines running, and in dynamic-positioning) and vessels underway (Røstad et al. 2006). Any avoidance reactions would last minutes longer than the vessel's presence at any one location (Mitson and Knudsen 2003; Ona et al. 2007). Fish would need to be close to the vessel to be injured, but fish as far away as about 0.9 mile would experience behavioral disturbance.

Vessel Strikes

Miller and Klimovich (2017) described evidence of manta ray vessel strikes and entanglements with boat anchor lines, but noted that little information is available documenting the number of occurrences or the impacts of the injuries. Because manta rays are primarily a pelagic species, their greatest risk of vessel strike would occur from VLCCs or other crude carriers transiting in the GoM. However, there are limited data available, making the risk unquantifiable.

Contaminants and Oil Spills

Giant manta rays would not be affected by an inadvertent release of bentonite during HDD operations. However, little information is available about the effects that contaminants associated with oil spills would have on elasmobranchs. As noted in Section 4.7.2, Oil Spills and Petroleum Product Releases, PAHs are one of the most toxic constituents found in oil. Evidence suggests that these compounds have an adverse effect on numerous species including increased mortality and population declines (Walker 2011). Researchers have measured ethoxyresorufin-*O*-deethylase activity in fish as a biomarker of exposure to various toxins, including PAHs (Whyte and Tillitt 2001). Following the DWH oil spill, ethoxyresorufin-*O*-deethylase activity was measured in sharks in the GoM and results indicate sharks are at risk of accumulating environmental pollutants that could result in adverse health effects (Walker 2011). Until additional research is conducted, the resulting effects of exposure to oil or other petrochemical pollutants are not quantifiable. If a giant manta ray were within the vapor dispersion and/or flash fire hazard zones from a potential condensate or crude oil spill, an immediate adverse impact could occur if an ignition source were encountered and the species could not avoid the area.

As previously noted, shutdown valves in the pipeline system would limit the volume of oil released in the event of a leak or rupture, and oil spills are generally rare. The Applicant would develop and implement its Operational Spill Response Plan, which would be developed as part of the USCG-approved Port Operations Manual prior to the start of SPOT DWP operations. Oil spill modeling described in Section 4.7.2 indicated that under various scenarios an oil spill could reach FGBNMS. Impacts on giant manta ray due to an oil spill could occur due to the proximity of FGBNMS, where juvenile manta rays are known to occur, but the impacts are not quantifiable.

7.4.3.4. Conclusion

The risk of exposure to underwater noise during construction is discountable because giant manta rays would only be infrequent visitors in the area of the SPOT DWP. Both vessel strikes and exposure to contaminants (including oil spills) would be threats to giant manta ray, but the risk is not quantifiable. Therefore, this BA concludes the Project ***is not likely to adversely affect*** giant manta rays.

7.4.4. Gulf Sturgeon

In 1991, Gulf sturgeon (*Acipenser oxyrinchus desotoi*) were listed as threatened under the ESA and in 2003, 14 geographic areas encompassing about 1,730 river miles of GoM rivers and tributaries were designated as critical habitat for Gulf sturgeon (68 Fed. Reg. 13369).

Gulf sturgeon are a subspecies of the Atlantic sturgeon and inhabit the northern GoM, bays, estuaries and major rivers in Florida, Alabama, Mississippi, and Louisiana. Their historic range extended the

Mississippi River east to Tampa Bay with occasional occurrences also recorded from the Rio Grande River in Texas and Mexico to Florida Bay. Their current range is from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi to the Suwannee River in Florida (NOAA Fisheries 2019g; USFWS 2018).

Gulf sturgeon are anadromous fish. Adults move from marine waters of the GoM to freshwater rivers where they spawn in spring and fall. They spend the summer months in the river and both adults and subadults move to estuaries and bays in September through November where they feed extensively. Gulf sturgeon are benthic feeders whose diet and foraging areas change based on their life stage (NOAA Fisheries 2019g). During winter months, most subadults and adults inhabit bays, estuaries, or the GoM (68 Fed. Reg. 13369).

Ross et al. (2009) studied estuarine and coastal habitats of tagged Gulf sturgeon in the north central GoM. They identified relatively shallow waters of barrier island passes with strong tidal currents, and clean sand substrata as the predominant habitat. Ross et al. (2009) reported that other researchers working in the Choctawhatchee Bay, Florida found Gulf sturgeon showed a similar utilization of shallow water and clean sand substrata.

7.4.4.1. *Threats*

Current threats to Gulf sturgeon include contaminants that cause physical, behavioral, and physiological impacts such as muscle atrophy; abnormal development; organ mutations; and tumors. Because sturgeon are benthic feeders, they consume chemicals and metals that settle on the bottom where they feed. Other threats to Gulf sturgeon are associated with dredging activities, which can cause turbidity, re-suspend contaminants, cause disturbance due to noise, and modify benthic feeding areas by changing the quality, quantity, and availability of prey. Climate change may also pose a threat to sturgeon by worsening the size of the ‘dead zone’ in the northern GoM (NOAA Fisheries 2019g).

7.4.4.2. Potential Presence in the Project Area

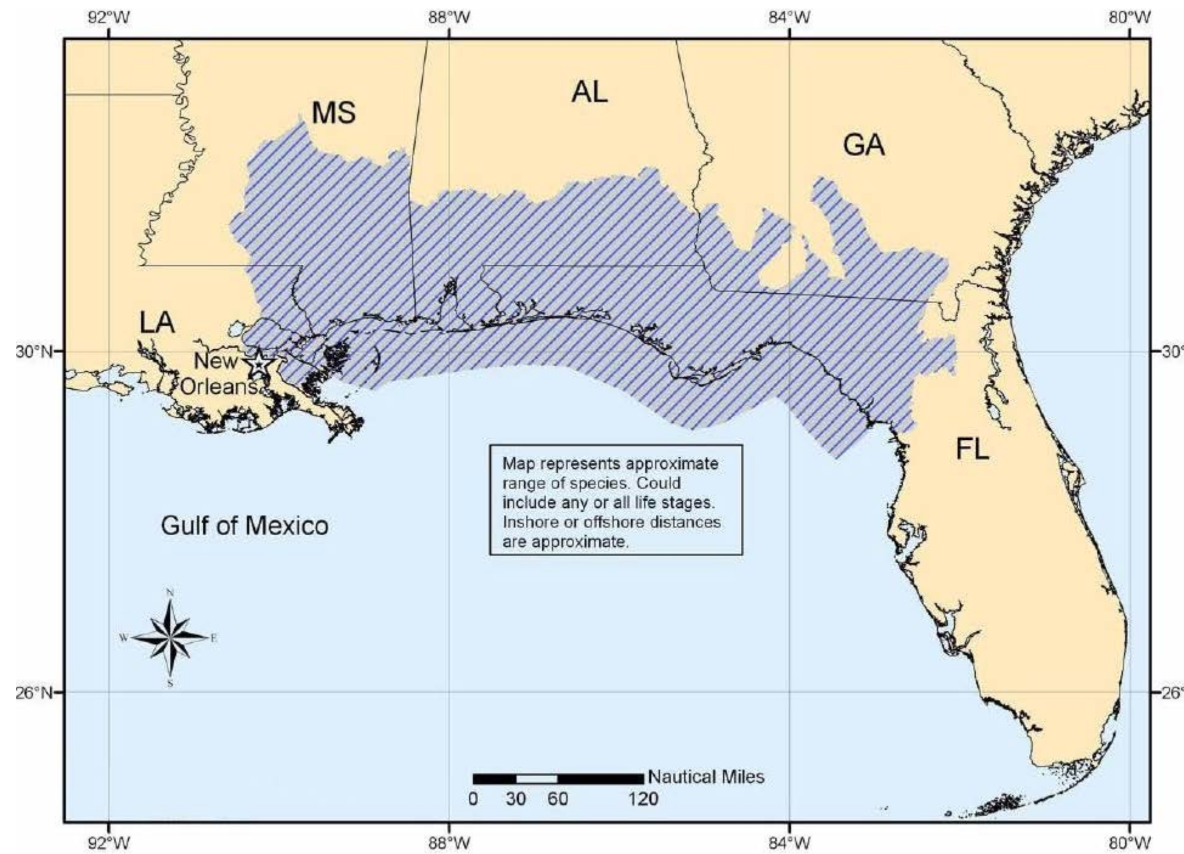
As noted above, the current range of the Gulf sturgeon extends from east of Tampa Bay to Louisiana (see Figure 7.4.4-1). According to Ross et al. (2009), movement of sturgeon within the GoM is not well known. Studies suggest that sturgeon within the GoM move within the nearshore area at depths of about 32 feet, but researchers note that it is possible that sturgeon are utilizing deeper waters of the continental shelf (Ross et al. 2009). However, given the western limits of documented sturgeon identification, it is unlikely that Gulf sturgeon would be present in the Project area.

7.4.4.3. Potential Effects on Gulf Sturgeon

Gulf sturgeon would not be affected directly or indirectly by turbidity in the water column or by changes to the benthic community that would affect where they feed because their current distribution does not extend to Texas waters. Potential effects on Gulf sturgeon would be associated with direct or indirect effects from oil spills if oil were to reach habitats where sturgeon are present. However, a spill is unlikely and safety shutdowns contained within the pipeline system would limit the volume of oil discharged should a spill occur.

7.4.4.4. Conclusion

Gulf sturgeon would not be expected in the Project area and impacts on them would be discountable. In the event of a spill, the Applicant would implement its Operational Spill Response Plan, which would be developed as part of the Port Operations Manual prior to the start of SPOT DWP operations. Impacts on Gulf sturgeon due to an oil spill could occur but the impacts are not quantifiable. Therefore, this BA concludes that construction and operation of the Project ***is not likely to adversely affect*** Gulf sturgeon.



Source: USM GCRL 2019

Figure 7.4.4-1: Gulf Sturgeon Range

7.4.5. Nassau Grouper

Nassau grouper (*Epinephelus striatus*), Federally listed as threatened, are reef fish that inhabit hard bottom areas such as reefs, rocks, and ledges. This fish is an ambush predator that preys indiscriminately on other fish. As juveniles, they eat both fish and invertebrates. Nassau grouper occur in tropical and subtropical waters of the western Atlantic. There has been one documented report of Nassau grouper in the GoM at the FGBNMS. The current range of the Nassau grouper is shown on Figure 7.4.5-1. This fish is generally associated with shallow reefs, but can be found in waters as deep as 426 feet (NOAA Fisheries 2019l).

7.4.5.1. Threats

Fishing is the major threat to Nassau grouper, as the species is targeted during spawning and non-spawning months, which results in increased adult mortality and reduces the rate at which juveniles enter the fishery as adults. Another threat to this species is lack of effective regulations and enforcement, particularly outside the United States (NOAA Fisheries 2019l).

Source: NOAA Fisheries 2019l

Figure 7.4.5-1: Nassau Grouper Range Map

7.4.5.2. Potential Presence in the Project Area

As shown on Figure 7.4.5-1, the Nassau grouper range does not include GoM waters off the coast of Texas where the SPOT DWP would be located, and there has been only one documented report of this fish in the GoM. Therefore, Nassau grouper are not likely to be present in the Project area.

7.4.5.3. Potential Effects on Nassau Grouper

Nassau grouper is primarily a shallow reef species that utilize hard bottom habitats. The SPOT DWP is not located in hard bottom habitat, and with only one documented report of this species in the GoM, they are unlikely to be affected by construction of the proposed Project. Because they are typically associated with reefs, they are not likely to be in areas where VLCCs would be transiting, and therefore would not be at risk for a vessel strike. Based on modeled most likely scenario spills during Project operations, it is unlikely that locations where Nassau grouper are present would be affected.

7.4.5.4. Conclusion

Nassau grouper habitat is not present in the Project area. With implementation of the Operation Spill Response Plan that the Applicant would develop as part of the Port Operations Manual prior to the start of SPOT DWP operations, potential impacts associated with an oil spill would be unlikely to reach areas where Nassau grouper are present; therefore, the impacts would be discountable. This BA concludes that the Project ***is not likely to adversely affect*** Nassau grouper.

7.4.6. Oceanic Whitetip Shark

Oceanic whitetip sharks (*Carcharhinus longimanus*) are Federally listed as threatened. They are considered a surface-dwelling shark due to their preference for the surface mixed layer of water warmer than 68ºF. Oceanic whitetip sharks are top predators and opportunistic feeders whose diets consist primarily of bony fishes and squid but also includes many other species. This shark is typically found in the open ocean on the OCS or near oceanic islands in waters at least 600 feet. They live from the water surface to water at least 498 feet deep (NOAA Fisheries 2019o).

7.4.6.1. *Threats*

The primary threat to this species is incidental bycatch in commercial fisheries due to their distribution in warm tropical waters and their preference to be at or near the water surface. Harvest for international trade is also a threat to these sharks because their distinct fins are highly valued (NOAA Fisheries 2019o).

7.4.6.2. Potential Presence in the Project Area

Oceanic whitetip sharks spend their lives in the open ocean, in areas with deep water. Therefore, they would not be expected near the proposed Project. Oceanic whitetip sharks could be in the path of vessels calling on the SPOT DWP.

7.4.6.3. Potential Effects on Oceanic Whitetip Sharks

This shark is a pelagic species and would not be affected by construction of the SPOT DWP. During operations, sharks could be affected by collision with vessels transiting within the GoM. However, vessel strikes do not appear to be a threat to these sharks and they would be expected to move away from any approaching vessels.

Whitetip sharks could be affected by an accidental spill of crude oil during Project operations. However, the model for a most likely scenario oil spill did not predict oil in the deeper parts of the Gulf where this shark is likely to be present. However, if an oil spill occurred, because sharks are top predators, they would likely accumulate PAHs and other toxic compounds from a spill by consuming other contaminated fish. However, given the current technologies and safety features that the Applicant would employ, the potential for an oil spill to occur is generally low and is not quantifiable. The pipeline system would include shutdown valves that would limit the volume of oil released in the event of a leak or rupture. With implementation of the Operation Spill Response Plan that the Applicant would develop as part of the Port Operations Manual prior to the start of SPOT DWP operations, the impacts would be mitigated as much as possible.

7.4.6.4. Conclusion

Oceanic whitetip sharks are found in the open ocean with deep waters, far from the SPOT DWP. There is no evidence to suggest they are at risk of vessel collision and they would likely be outside the contamination zone in the event of an oil spill. Therefore, impacts on this species would be discountable and this BA concludes that the Project ***is not likely to adversely affect*** oceanic whitetip sharks.

7.4.7. Smalltooth Sawfish

Smalltooth sawfish (*Pristis pectinata*), Federally listed as endangered, are large fish that inhabit shallow coastal waters and estuaries. They utilize habitat with muddy or sandy bottoms in waters that are less than 32 feet deep and show a preference for warm water greater than 64°F. Sawfish also travel inland in river systems. Adult habitat includes estuaries, waters off the beach, and along deepwater reefs. Nursery habitat for juvenile sawfish includes highly vegetated shallow waters and mangrove forests (NOAA Fisheries 2019q; NOAA Fisheries 2009).

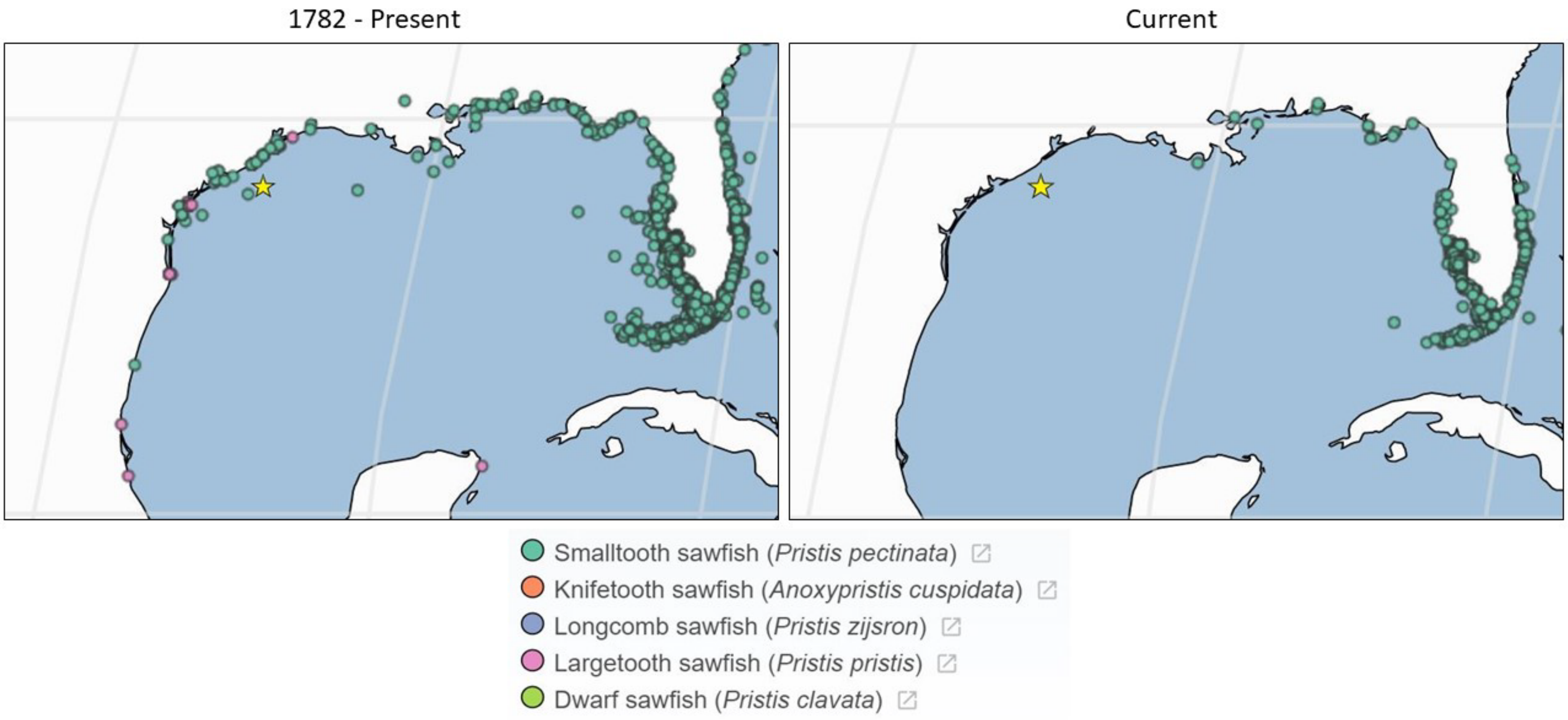
In 2009, NOAA Fisheries designated critical habitat for the species that includes the Charlotte Harbor Estuary and the Ten Thousand Island/Everglades Units. Both are in southwest Florida between Charlotte Harbor (about 50 miles south of Tampa) and Florida Bay (off of the Florida Keys). NOAA Fisheries (2009) determined that the essential habitat features necessary to recruit juveniles into the adult population include both the presence of red mangroves and shallow (3 feet or less) euryhaline habitats. Smalltooth sawfish critical habitat is not within the SPOT DWP area.

7.4.7.1. *Threats*

Habitat loss poses a serious threat to sawfish in the United States. Development in coastal areas has modified or destroyed habitat essential for the birth and development of juveniles. Though not as significant as it once was, bycatch still poses a risk to sawfish today (NOAA Fisheries 2019q).

7.4.7.2. Potential Presence in the Project Area

Smalltooth sawfish are not likely to be present in the Project area. Distribution of the smalltooth sawfish once included waters off the coast of Texas, but current distribution in the United States is limited to the Florida coast (Florida Museum 2018; NOAA Fisheries 2019q). The last sawfish sighting recorded in Texas waters was in 2011 (Florida Museum 2018). Figure 7.4.7-1 shows both historical and current smalltooth encounters.



Source: Florida Museum 2018

Figure 7.4.7-1: Historical and Current Smalltooth Sawfish Encounters in the Gulf of Mexico

7.4.7.3. Potential Effects on Smalltooth Sawfish

Smalltooth sawfish would not be affected by construction or operation of the Project because their current distribution does not extend to Texas waters. Sawfish habitat includes shallow waters or reefs and they would not likely inhabit areas where VLCCs or other crude carriers transit.

7.4.7.4. Conclusion

Smalltooth sawfish would not be expected in the Project area. Therefore, this BA concludes that impacts from construction and operation of the Project would be discountable and the Project ***is not likely to adversely affect*** smalltooth sawfish.

7.4.8. Dwarf Seahorse

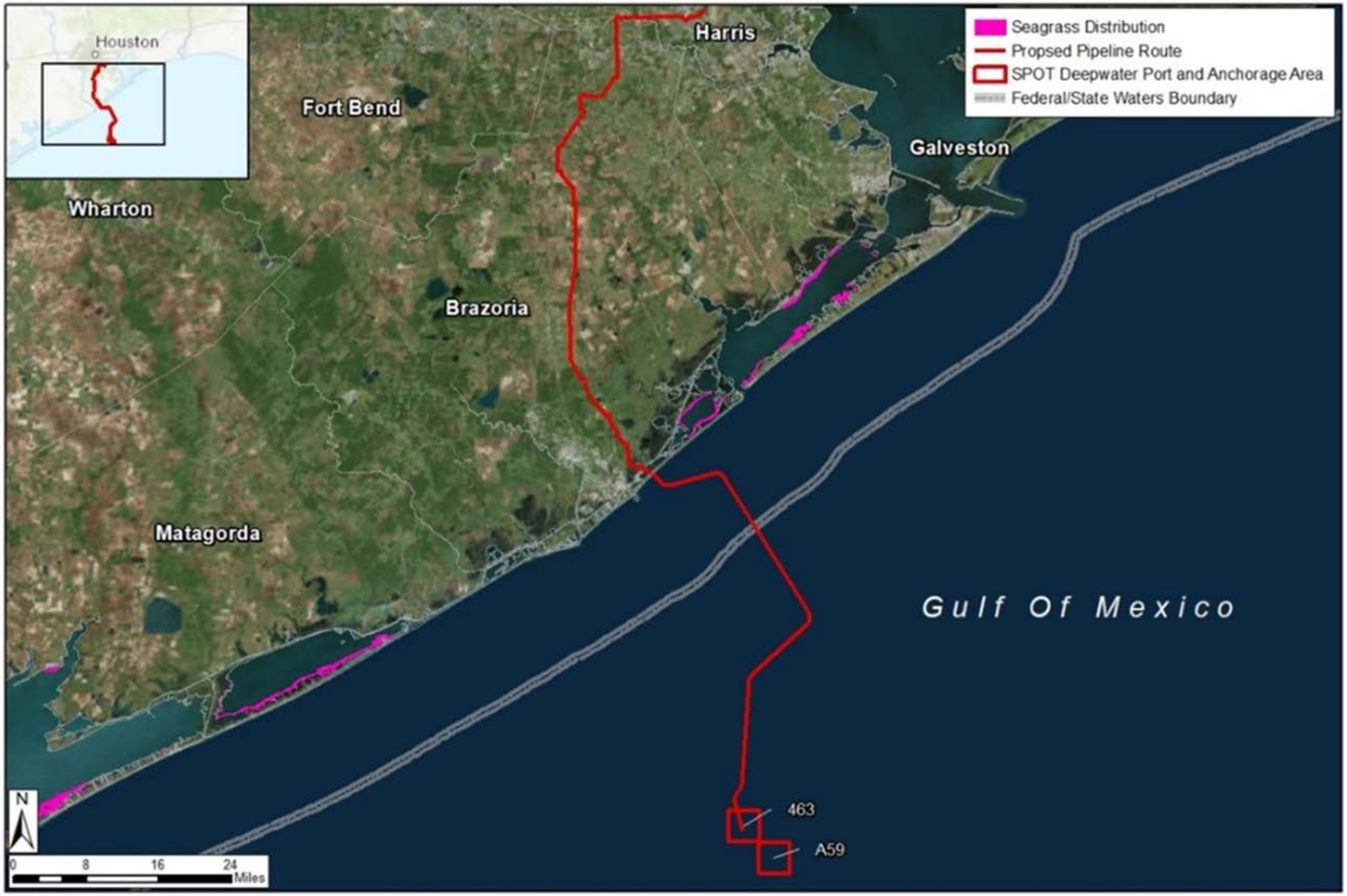
The dwarf seahorse (*Hippocampus zosterae*) is a candidate for listing under the ESA (NOAA Fisheries 2019a). The dwarf seahorse is one of the smallest seahorses in the world. It occurs in suitable habitats of tropical and subtropical waters along the Atlantic coast of Florida, the entire GoM, and the Caribbean, including in the Bahamas, Cuba, and Bermuda. This species is a habitat specialist, lives in seagrass beds, is particularly associated with eelgrass (*Zostera* sp.), but may also utilize manatee grass (*Syringodium filiforme*), turtlegrass (*Thalassia testudinum*), star grass (*Halophila engelmanni*), widgeon grass (*Ruppia maritime*), and shoal grass (*Halodule beaudetteii*). Dwarf seahorses are ambush predators that feed on small crustaceans, amphipods, fish fry, and invertebrates (Center for Biological Diversity 2011).

7.4.8.1. Threats

The loss of seagrass beds within the species range poses a significant threat to the dwarf seahorse. Loss of seagrass beds can be attribute to water quality degradation, coastal development, damage from boats, and global climate change. Dwarf seahorses are also sensitive to oil pollution. Other threats include commercial trade of seahorses and inadequate regulatory protections (Center for Biological Diversity 2011).

7.4.8.2. Potential Presence in the Project Area

The closest seagrass beds to the Project area are at Christmas Bay (part of the Galveston Bay complex) over 35 nautical miles from the SPOT DWP location and approximately 4.3 nautical miles from the HDD exit pit (Figure 7.4.8-1).



Source: TPWD 2015

Figure 7.4.8-1: Seagrass Distribution Nearest to SPOT Deepwater Port

7.4.8.3. Potential Effects

As described in Section 4.7, Contaminants and Oil Spills, the Applicant provided most likely scenario modeling for the Project which included the anticipated time for oil to reach the shoreline for each of the products modeled. Because each of the models predicts at least some shoreline oiling, dwarf seahorses present would be affected.

The Applicant would implement its Construction Spill Response Plan for leaks that occurred during construction and would develop and implement its Operational Spill Response Plan that would be developed prior to the start of SPOT DWP operations for leaks that occurred during Project operations. Any leaks would be contained and remedied as soon as possible in compliance with the Spill Plans.

7.4.8.4. Conclusion

Dwarf seahorses are found in seagrass beds along the Texas coast. There would be no direct impacts on seagrass beds or dwarf seahorses due to construction of the SPOT DWP. All modeled scenarios for an operational oil spill show that seagrasses would be affected, and consequently dwarf seahorses would also be affected. However, given the current technologies and safety features that the Applicant would employ, the potential for an oil spill to occur is low and the impacts are not quantifiable. Therefore, this BA concludes that the Project ***is not likely to jeopardize the continued existence*** of the dwarf seahorse.

8. ESSENTIAL FISH HABITAT

8.1. Introduction

The purpose of this section of the document is to evaluate the impacts of the SPOT Deepwater Port Project on EFH as required by the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended through 1996 (MSA).

The MSA defines EFH as “those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity” (50 CFR Part 600). For the purposes of this definition, “waters” means aquatic areas and their associated physical, chemical, and biological properties; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means the habitat required to support a sustainable fishery and healthy ecosystem; and “spawning, feeding, and breeding” is meant to encompass the complete life cycle of species (50 CFR Part 600). EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity by the 1996 amendments to the MSA. While NOAA Fisheries and regional fishery management councils have identified and mapped EFH for nearly 1,000 species, this document is limited to the species with EFH within the proposed Project area.

The MSA created eight regional fishery management councils responsible for conservation of the fisheries in their region to promote long-term biological and economic sustainability of the fisheries in the U.S. EEZ. Fisheries in the GoM are managed by the Gulf of Mexico Fishery Management Council (GMFMC) and NOAA Fisheries. The GMFMC and NOAA Fisheries are required to identify EFH in fishery management plans (FMP) for all Federally managed species. GMFMC has developed six FMPs including Coastal Migratory Pelagics (CMP), Corals, Red Drum, Reef Fish, Shrimp, and Spiny Lobster

(GMFMC 2016). The primary authority for developing and implementing an FMP for Atlantic highly migratory species (HMS) belongs to NOAA Fisheries (NOAA Fisheries 2019). EFH for these groups consists of substrates and waters of the GoM from the U.S./Mexico border to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council (SAFMC) from estuarine waters out to depths of 600 feet.

Habitat areas of particular concern (HAPC) are subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. All HAPCs managed by the GMFMC in the GoM protect coral areas. NOAA Fisheries identified HAPC in the GoM for the western Atlantic bluefin tuna, as it is their only known spawning location (NOAA Fisheries 2015a).

8.2. Project Description

The complete Project description is included in Section 3, Description of the Proposed Action, above.

8.3. Categories of Essential Fish Habitat by Life Stage of Managed Species

EFH identifies habitat or habitat types for each life stage of the managed species. The GMFMC uses the following life stages for fishes: eggs, larvae, postlarvae, early juveniles, late juveniles, adults, and spawning adults. Shrimp species life stages are fertilized eggs, larvae/pre-settlement postlarvae, late postlarvae/juveniles, sub-adults, non-spawning adults, and spawning adults (GMFMC 2016). The life stages for sharks that NOAA Fisheries uses are: young-of-the-year (YOY)/neonate, juvenile, and adult. YOY are individuals born within the past year and neonates are primarily newborns and small YOY (NOAA Fisheries 2017a).

The GoM was divided into five eco-regions by the GMFMC to account for the varying fish distribution and environmental factors across the GoM. The eco-regions are further divided into estuarine (inside estuaries or bays and areas on or inshore of barrier islands), nearshore (marine waters from 0 to 60 feet in depth), or offshore zones (marine waters greater than 60 feet deep). The Project would be located near the border of eco-regions 4 and 5. The pipeline would cross the estuarine, nearshore, and offshore zones where the SPOT DWP would be located. Eco-region 4 spans from the Mississippi River Delta to Freeport, Texas and is directly influenced by the Mississippi and Atchafalaya Rivers. It contains extensive areas of marsh with rocky reefs found offshore. Eco-region 5 covers the area from Freeport, Texas to the U.S./Mexico border. This region has increased subtropical influence with higher temperatures and lower rainfall compared to other eco-regions. The following 12 habitat types have been identified as EFH in the GoM (NOAA Fisheries 2015a):

- Mangroves
- Emergent marsh (tidal wetlands, salt marshes, tidal creeks)
- Drift algae
- Oyster reefs
- Submerged aquatic vegetation (seagrasses, benthic algae)
- Reefs (reef halos, patch reefs, deep reefs)
- Hard bottom (live bottom, low- relief bottoms, and high-relief bottoms)

- Soft bottom (mud, clay, silt)
- Sand/shell bottom (sand, shell)
- Banks/shoals
- Shelf edge/slope (shelf edge, shelf slope)
- Pelagic

The Project area would overlap 4 of the 12 habitat types: emergent marsh, soft bottom, sand/shell bottom, and pelagic.

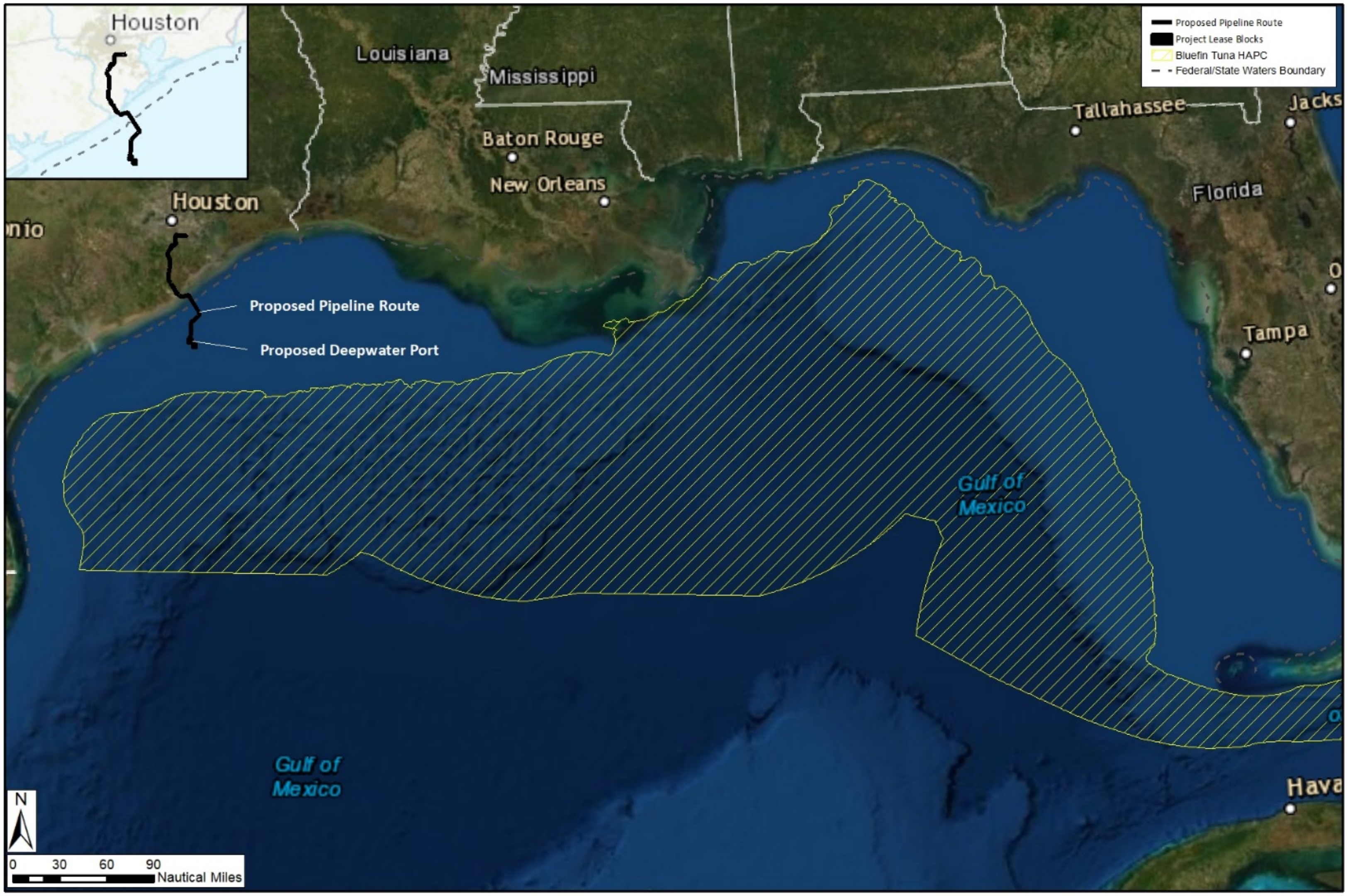
Emergent marsh includes tidal wetlands, salt marshes, and tidal creeks and is dominated by herbaceous, low-growing, water-tolerant vegetation. These wetlands are typically dominated by perennial plants and have relatively stable climatic conditions (Cowardin et al. 1979).

Soft bottom habitats consist of substrate such as mud, clay, or silt and provide an area for marine animals to burrow, forage, and spawn. Soft bottom provides important spawning habitat for many fish species. The surface sediments support an abundance of benthic microalgae and numerous burrowing animals (NCDEQ 2016).

Sand/shell bottom consists of hard bottom habitats with sand or shell substrates. Hard bottom provides a structure where organisms such as sponges, seaweed, and coral can attach. Hard bottoms attract a large number of fish as they are often the only source of structure and refuge in open ocean waters. Hard bottoms can provide nursery, forage, spawning, and refuge habitats (NCDEQ 2016).

Pelagic habitat encompasses the water column not near the bottom or the shore. Distribution of species in the pelagic zone depends on availability of light, nutrients, dissolved oxygen, temperature, salinity, and pressure (NOAA NOS 2018).

The Project area would not be located within any designated HAPCs, but vessels calling on the SPOT DWP would cross the bluefin tuna HAPC (see Figure 8.3-1).



Source: NOAA Fisheries 2018b.

Figure 8.3-1: Bluefin Tuna Habitat Areas of Particular Concern in Relation to the SPOT Deepwater Port

8.3.1. Managed Species with Essential Fish Habitat in Project Area

EFH in the GoM occurs within the Project area for CMP, red drum, reef fish, shrimp, and HMS (Table 8.3.1-1). EFH for coral or spiny lobster is not located within the Project area.

Table 8.3.1-1: Essential Fish Habitat Species Associated with the Project Area

Common Name/Scientific Name	Life Stage	Project Component	Effects Analysis
Coastal Migratory Pelagic Fishes			
King mackerel *Scomberomorus cavalla*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Spanish mackerel *Scomberomorus maculates*	Larvae, adult	Vessel routes	Unlikely to affect
Cobia *Rachycentron canadum*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Red Drum			
Red drum *Sciaenops ocellatus*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Reef Fish			
Queen snapper *Etelis oculatus*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Mutton snapper *Lutjanus analis*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Blackfin snapper *Lutjanus buccanella*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Red snapper *Lutjanus campechanus*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Cubera snapper *Lutjanus cyanopterus*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Gray (mangrove) snapper *Lutjanus griseus*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Lane snapper *Lutjanus synagris*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Silk snapper *Lutjanus vivanus*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Yellowtail snapper *Ocyurus chrysurus*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Wenchman *Pristipomoides aquilonaris*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Vermillion snapper *Rhomboplites aurorubens*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Speckled hind *Epinephelus drummondhayi*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Yellowedge grouper *Epinephelus flavolimbatus*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Goliath grouper *Epinephelus itajara*	Egg, larvae, adult	Pipelines, DWP, vessel routes	Potential to affect

Common Name/Scientific Name	Life Stage	Project Component	Effects Analysis
Red grouper *Epinephelus morio*	Egg, larvae, adult	Vessel routes	Unlikely to affect
Warsaw grouper *Epinephelus nigritus*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Snowy grouper *Epinephelus niveatus*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Nassau grouper *Epinephelus striatus*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Black grouper *Mycteroperca bonaci*	Larvae, adult	Vessel routes	Unlikely to affect
Yellowmouth grouper *Mycteroperca interstitialis*	Egg, larvae, adult	Pipelines, DWP, vessel routes	Potential to affect
Gag *Mycteroperca microlepis*	Egg, larvae, adult	Vessel routes	Unlikely to affect
Yellowfin grouper *Mycteroperca venenosa*	Juvenile, adult	Vessel routes	Unlikely to affect
Scamp *Mycteroperca phenax*	Egg, larvae, adult	Vessel routes	Unlikely to affect
Goldface tilefish *Caulolatilus crysops*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Blueline tilefish *Caulolatilus microps*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Tilefish *Lopholatilus chamaeleonticeps*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Greater amberjack *Seriola dumerili*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Lesser amberjack *Seriola fasciata*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Almaco jack *Seriola rivoliana*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Banded rudderfish *Seriola zonata*	Larvae, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Gray triggerfish *Balistes capriscus*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Hogfish *Lachnolaimus maximus*	Egg, larvae	Vessel routes	Unlikely to affect
Shrimp			
Brown shrimp *Farfantepenaeus aztecus*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
White shrimp *Litopenaeus setiferus*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Pink shrimp *Farfantepenaeus duorarum*	Egg, larvae, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Royal red shrimp *Hymenopenaeus robustus*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect

Common Name/Scientific Name	Life Stage	Project Component	Effects Analysis
Highly Migratory Species			
Albacore tuna *Thunnus alalunga*	Juvenile, adult	Vessel routes	Unlikely to affect
Bigeye tuna *Thunnus obesus*	Juvenile, adult	Vessel routes	Unlikely to affect
Bluefin tuna *Thunnus thynnus*	Egg, larvae, adult	Vessel routes	Unlikely to affect
Skipjack tuna *Katsuwonus pelamis*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Yellowfin tuna *Thunnus albacares*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Swordfish *Xiphias gladius*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Blue marlin *Makaira nigricans*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
White marlin *Kajikia albidus*	Juvenile, adult	Vessel routes	Unlikely to affect
Sailfish *Istiophoriformes*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Longbill spearfish *Tetrapturus pfluegeri*	Egg, larvae, juvenile, adult	Vessel routes	Unlikely to affect
Blacktip shark *Carcharhinus limbatus*	Neonate, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Bull shark *Carcharhinus leucas*	Neonate, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Great hammerhead shark *Sphyrna mokarran*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Lemon shark *Negaprion brevirostris*	Neonate, juvenile, adult	Pipelines, vessel routes	Potential to affect
Nurse shark *Ginglymostoma cirratum*	Juvenile	Vessel routes	Unlikely to affect
Sandbar shark *Carcharhinus plumbeus*	Adult	Vessel routes	Unlikely to affect
Scalloped hammerhead shark *Sphyrna lewini*	Neonate, juvenile, adult	Pipelines, vessel routes	Potential to affect
Silky shark *Carcharhinus falciformis*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Spinner shark *Carcharhinus brevipinna*	Neonate, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Tiger shark *Galeocerdo cuvier*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Blacknose shark *Carcharhinus acronotus*	Juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Bonnethead shark *Sphyrna tiburo*	Neonate, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Finetooth shark *Carcharhinus isodon*	Neonate, juvenile, adult	Pipelines	Potential to affect

Common Name/Scientific Name	Life Stage	Project Component	Effects Analysis
Atlantic sharpnose shark *Rhinocodon terraenovae*	Neonate, juvenile, adult	Pipelines, DWP, vessel routes	Potential to affect
Oceanic whitetip shark *Carcharhinus longimanus*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Shortfin mako shark *Isurus oxyrinchus*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Smoothhound shark complex	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Atlantic angel shark *Squatina dumeril*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Bigeye thresher *Alopia superciliosus*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Caribbean reef shark *Carcharhinus perezii*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Dusky shark *Carcharhinus obscurus*	Juvenile, adult	Vessel routes	Unlikely to affect
Longfin mako shark *Isurus paucus*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Night shark *Carcharhinus signatus*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect
Whale shark *Rhincodon typus*	Neonate, juvenile, adult	Vessel routes	Unlikely to affect

Source: GMFMC 2016, NOAA Fisheries 2017b

DWP = SPOT deepwater port

8.3.2. Coastal Migratory Pelagics

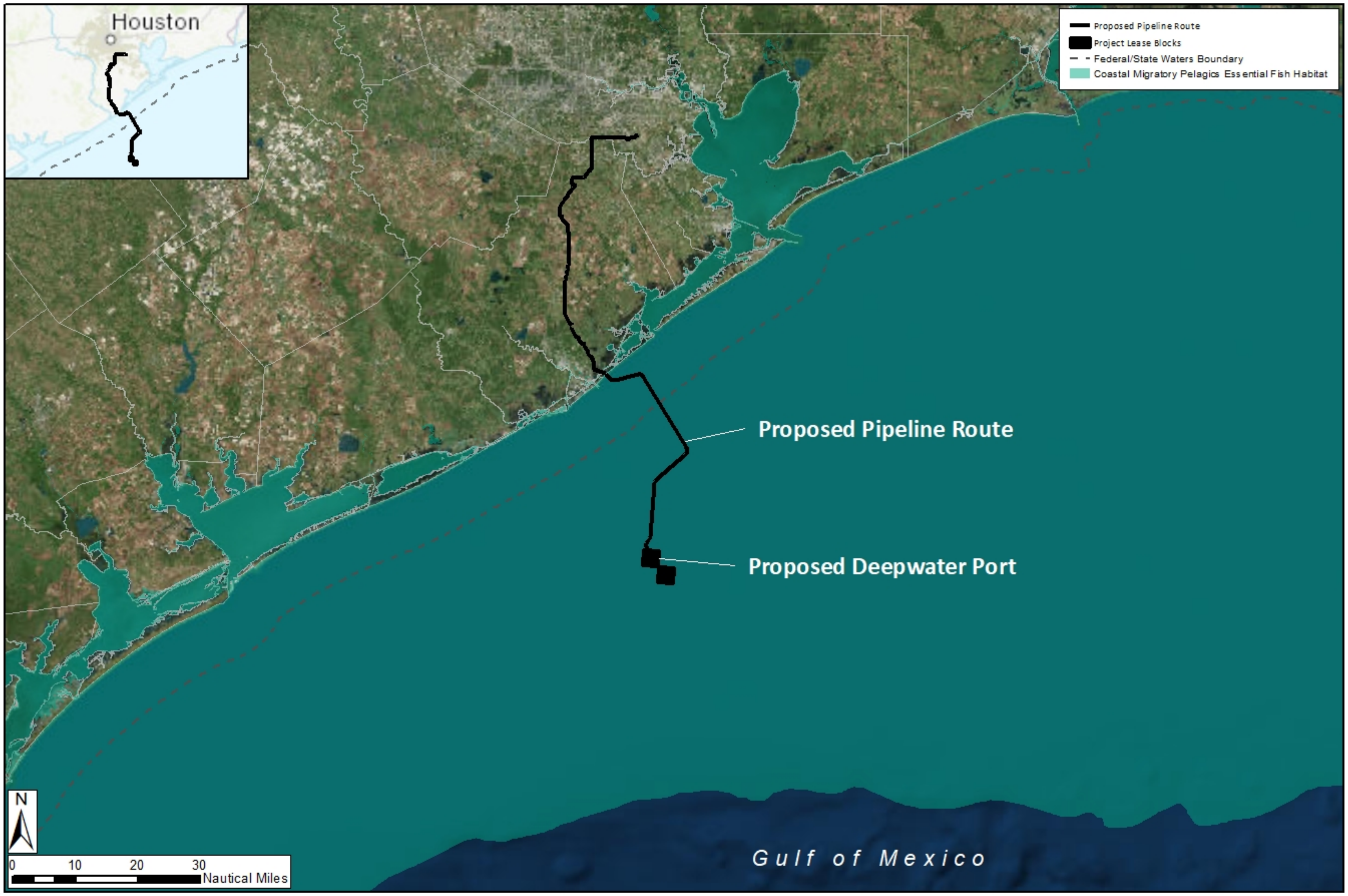
The Coastal Migratory Pelagic FMP manages king mackerel, Spanish mackerel, and cobia. These species typically migrate throughout the Gulf and South Atlantic, with their occurrence dependent on temperature and salinity. Adults are seldom found in water temperatures less than 68°F and generally prefer higher salinities (GMFMC 2004). Eggs and larvae are found in the pelagic habitat and concentrated in surface waters. Juveniles utilize coastal and estuarine waters (Table 8.3.2-1).

Designated EFH for CMPs includes all GoM waters and substrates from the U.S./Mexico border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 600 feet (GMFMC 2005, 2016; NOAA Fisheries 2015a). The proposed pipeline routes and SPOT DWP are within the CMP EFH as shown on Figure 8.3.2-1.

Table 8.3.2-1: Essential Fish Habitat for Coastal Migratory Pelagics

Species	Eggs	Larvae	Juveniles	Adults
King mackerel	Pelagic and occur offshore at depths of 115 to 590 feet in spring and summer	Pelagic and occur offshore at depths of 115 to 590 feet from May to October and feed on other larval fishes	Nearshore waters at depths less than 30 feet along the inner shelf and feed on estuarine dependent fishes	Pelagic and occur in coastal to offshore waters, feed on nekton, and spawn from May to October on the outer continental shelf
Spanish mackerel	Pelagic and found on the continental inner shelf (<164 feet) in spring and summer	Continental inner shelf at depths of 30 to 275 feet from spring to fall and feed on larval fishes	Estuarine and coastal waters at depths of 6 to 164 feet with a wide salinity range and feed on fishes	Inshore and coastal waters, feed on estuarine dependent fishes, and spawn on the inner shelf from May to September
Cobia	Estuarine and nearshore waters towards the top 3 feet of the water column	Estuarine, nearshore, and offshore waters at depths of 9 to 984 feet from May to September and feed on zooplankton	Nearshore and offshore waters on the shelf in depths of 16 to 984 feet from March to September and feed on nekton	Shallow coastal waters and offshore shelf waters (3 to 229 feet) from March to October and spawn in the shelf waters in the spring and summer

Source: GMFMC 2016



Source: NOAA Fisheries 2018b

Figure 8.3.2-1: Coastal Migratory Pelagics Essential Fish Habitat

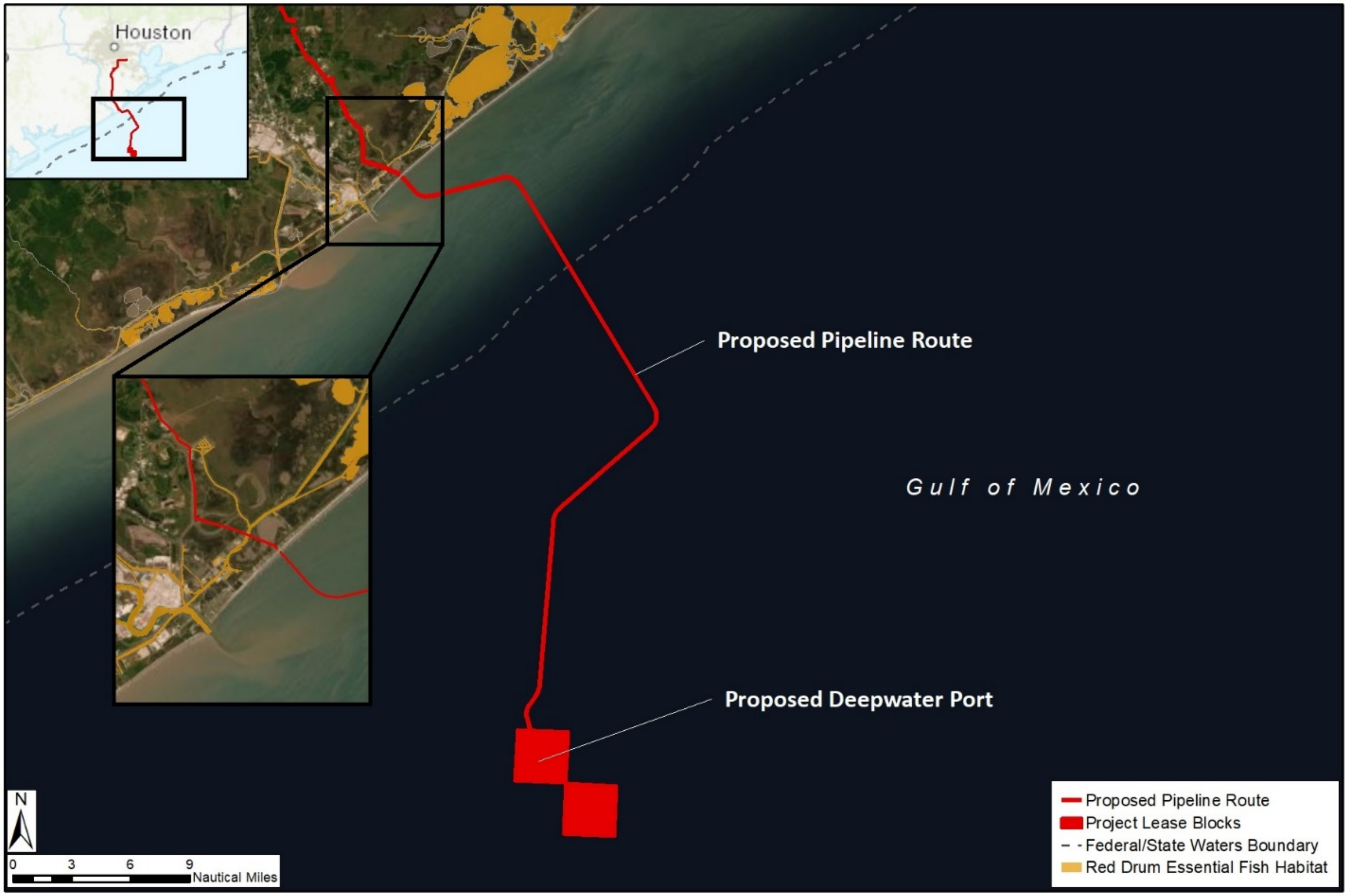
8.3.3. Red Drum

Red drum (*Sciaenops ocellatus*) are found throughout the GoM from estuarine to offshore waters and in a variety of habitat types including submerged aquatic vegetation, soft bottom, hard bottom, emergent marsh, sand/shell, and associated with the water column during early life stages. Adults spawn along nearshore regions of the central Texas coast from mid-August through October. Eggs typically hatch in the Gulf estuaries from late summer through early fall before being passively transported to estuaries for maturation. Larval stages can be found in estuaries from August through November. Juveniles mature in shallow, protected waters with grassy or muddy bottoms before moving offshore as adults. Adults can be found in schools of large individuals in depths up to 230 feet (GMFMC 2016).

Designated EFH for red drum includes:

- All estuaries in the GoM;
- Substrates and water out to 150 feet that extend from Vermilion Bay, Louisiana to the eastern edge of Mobile Bay, Alabama;
- Waters that are 30 to 60 feet deep from Crystal River, Florida to Naples, Florida; and
- Waters that are 30 to 60 feet deep from Cape Sable, Florida to the boundary between the areas covered by the GMFMC and the SAFMC (GMFMC 2005, 2016; NOAA Fisheries 2015a).

The proposed pipeline route crosses the EFH for red drum as shown on Figure 8.3.3-1.



Source: NOAA Fisheries 2018b

Figure 8.3.3-1: Red Drum Essential Fish Habitat

8.3.4. Reef Fish

Reef fish consist of snapper, grouper, tilefish, jack, triggerfish, and hogfish that utilize different habitats in the Gulf depending on the species and life history stage. These habitats include estuaries, pelagic, benthic, topographic features on the continental shelf with high relief and some soft bottoms. Habitats for the Reef Fish identified as "Potential to affect" in Table 8.3.1-1 above are further described in Table 8.3.4-1 below.

Designated EFH for reef fish consists of GoM waters and substrates extending from the U.S./Mexico border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 600 feet (GMFMC 2005, 2016; NOAA Fisheries 2015a). The proposed pipeline route and the proposed SPOT DWP are within the reef fish EFH, as shown on Figure 8.3.4-1.

Table 8.3.4-1: Essential Fish Habitat for Selected Reef Fishes

Species	Eggs	Larvae	Post Larvae	Juveniles	Adults
Gray triggerfish	Nearshore and offshore waters gulfwide, at depths of 33 to 328 feet from spring to summer	Gulfwide and water column associated with beds of drifting algae	Upper water column in spring and summer seasons	Upper water column associated with *Sargassum* and eat from *Sargassum*	Continental shelf waters (33 to 328 feet deep), reefs in the late spring and summer, and eat invertebrates, spawns from spring to summer
Greater amberjack	Gulfwide	Gulfwide in offshore waters in drifting algae habitat, found year round	Offshore in the summer	Gulfwide in floating structures (*Sargassum*) and hard-bottom habitat, found through late summer and fall and feed on invertebrates	Gulfwide near the structured habitats (hard bottom, banks, and reefs), feeds on invertebrates and fishes, and spawns in offshore waters in spring and summer
Lesser amberjack	Gulfwide	Gulfwide	NA	Gulfwide; associated with floating structures (*Sargassum*), reefs, and hard-bottom habitats in the late summer and fall and feed on invertebrates	Gulfwide; near the bottom of hard-bottom habitats, associated with structures, feed on squid, and spawn in spring (February to March) and fall (September to December)
Almaco jack	Gulfwide in estuarine and nearshore waters from spring through fall	Gulfwide in estuarine and nearshore waters	NA	Gulfwide in nearshore and offshore waters at depths 22 to 55 feet; associated with floating structures (*Sargassum*) and artificial reefs in the late summer and fall, and feed on invertebrates	Gulfwide; northern Gulf in summer months and southern Gulf year round, found at depths of 69 to 587 feet, associated with floating algae and artificial reef habitat, feeds on fishes, spawns from spring to fall

Species	Eggs	Larvae	Post Larvae	Juveniles	Adults
Red snapper	Offshore from depths of 60 to 413 feet in the summer and fall	Continental shelf waters at depths of 60 to 413 feet in summer and fall, feeds on rotifers and algae	NA	Continental shelf (water depths of 56 to 600 feet) associated with structures and feeds on zooplankton and shrimp	Nearshore and offshore waters at depths of 23 to 479 feet on hard and irregular bottoms, feed on nekton, and spawn offshore away from coral reefs in sand bottoms with low relief in summer and fall
Gray snapper	High salinity offshore continental shelf waters at depths up to 590 feet near coral reefs in the summer	High salinity continental shelf at depths up to 590 feet near coral reefs in the summer and feed on zooplankton	Move to estuaries with vegetation (seagrass), wide salinity and temperature ranges, and eat copepods and amphipods	Estuarine waters with depths of 3 to 10 feet for early juveniles up to 590 feet for late juveniles. Feed on crustaceans and worms	Estuarine, nearshore, and offshore waters at depths up to 590 feet. Feed on crustaceans, and spawn offshore near reefs in summer
Lane snapper	Continental shelf at depths 13 to 433 feet and offshore from March to September	Gulfwide both in the water column and amongst submerged aquatic vegetation in depths up to 164 feet	NA	Gulfwide amongst low salinity inshore grasses, coral reefs, and soft bottoms (0 to 65 feet), and eat small invertebrates	High salinity offshore waters in sand bottoms with structure; wide depth range of 13 to 426 feet; eat nekton, annelids, and algae; spawning peak offshore in midsummer
Vermillion snapper	Gulfwide in offshore waters at depths of 59 to 328 feet	Gulfwide in offshore waters from depths of 98 to 131 feet from June through November	NA	Gulfwide in nearshore and offshore waters at depths of 59 to 328 feet along hard-bottom and reef habitats	Gulfwide in nearshore and offshore waters at depths of 59 to 328 feet along hard-bottom, reef, and bank habitats. Feed on tunicates, amphipods, and occasionally cannibalize juveniles.
Goliath grouper (protected)	Offshore waters at depths from 118 to 150 feet in the late summer and early fall	Offshore waters from 118 to 150 feet deep in the late summer and early fall	Migrate to mangroves	Estuarine and nearshore waters with depths of 3 to 16 feet amongst marsh, submerged aquatic vegetation, and mangroves. Feed on crustaceans	Nearshore and offshore waters amongst jetties, coral reefs, and crevices at depths of 6 to 180 feet; feed on crustaceans; and spawn from summer to winter with peaks in the late summer offshore in structures or patchy reefs
Nassau grouper (protected)	Offshore waters from November to February	Planktonic	NA	Nearshore shallow vegetated waters or associated with reefs in similar waters, move offshore with size, and start feeding on fishes	Associated with reefs and crevices, feed on nekton, and spawn in the winter at full moon over soft corals, sponges, and sand

Species	Eggs	Larvae	Post Larvae	Juveniles	Adults
Yellowmouth grouper	Offshore water at depths of 66 to 620 feet	Offshore water at depths of 66 to 620 feet	NA	Offshore water at depths of 59 to 79 feet and feed on fishes	Offshore water at depths of 66 to 620 feet over rocky bottom and corals, feed on nekton, and spawn year round with peaks in spring and summer

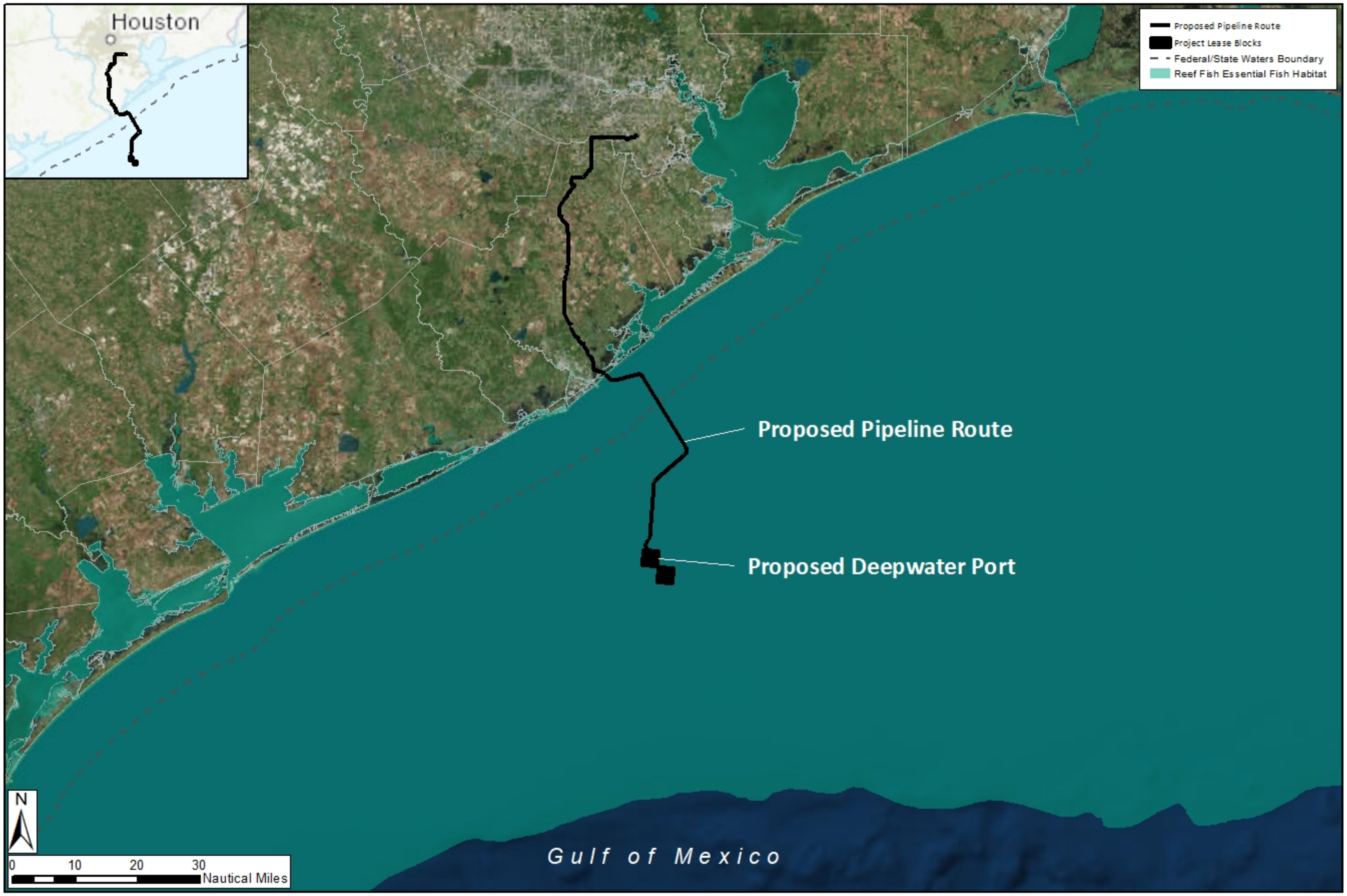
Source: GMFMC 2016; NOAA Fisheries 2019l

NA = not applicable

8.3.5. Shrimp

Shrimp managed within the FMP include pink shrimp (*Farfantepenaeus duorarum*), white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), and royal red shrimp species (*Pleoticus robustus*). Pink and brown shrimp are found within estuaries to offshore depths of 361 feet in the GoM. They typically spawn offshore and postlarvae migrate to estuaries (Table 8.3.5-1); sub-adults or adults leave estuaries and are found in shallow coastal waters, gradually migrating into deeper waters. White shrimp are also found within estuaries and offshore in the GoM, but to shallower depths of up to 269 feet. They spawn in estuarine, nearshore, and offshore environments and remain in that range throughout their life. Royal red shrimp spend their entire life cycle in open Gulf waters, with the highest concentration reported in depths between 820 and 1,558 feet (GMFMC 2016).

Designated EFH for shrimp includes waters and substrates extending from the U.S./Mexico border to Fort Walton Beach, Florida, from estuarine waters out to depths of 600 feet; Grand Isle, Louisiana, to Pensacola Bay, Florida, between depths of 600 to 1,950 feet; Pensacola Bay, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC out to depths of 210 feet, with the exception of waters extending from Crystal River, Florida, to Naples, Florida, between depths of 60 to 150 feet, and in Florida Bay between depths of 30 to 60 feet (GMFMC 2005, 2016; NOAA Fisheries 2015a). The proposed pipeline route and SPOT DWP are located within the shrimp EFH as shown on Figure 8.3.5-1.



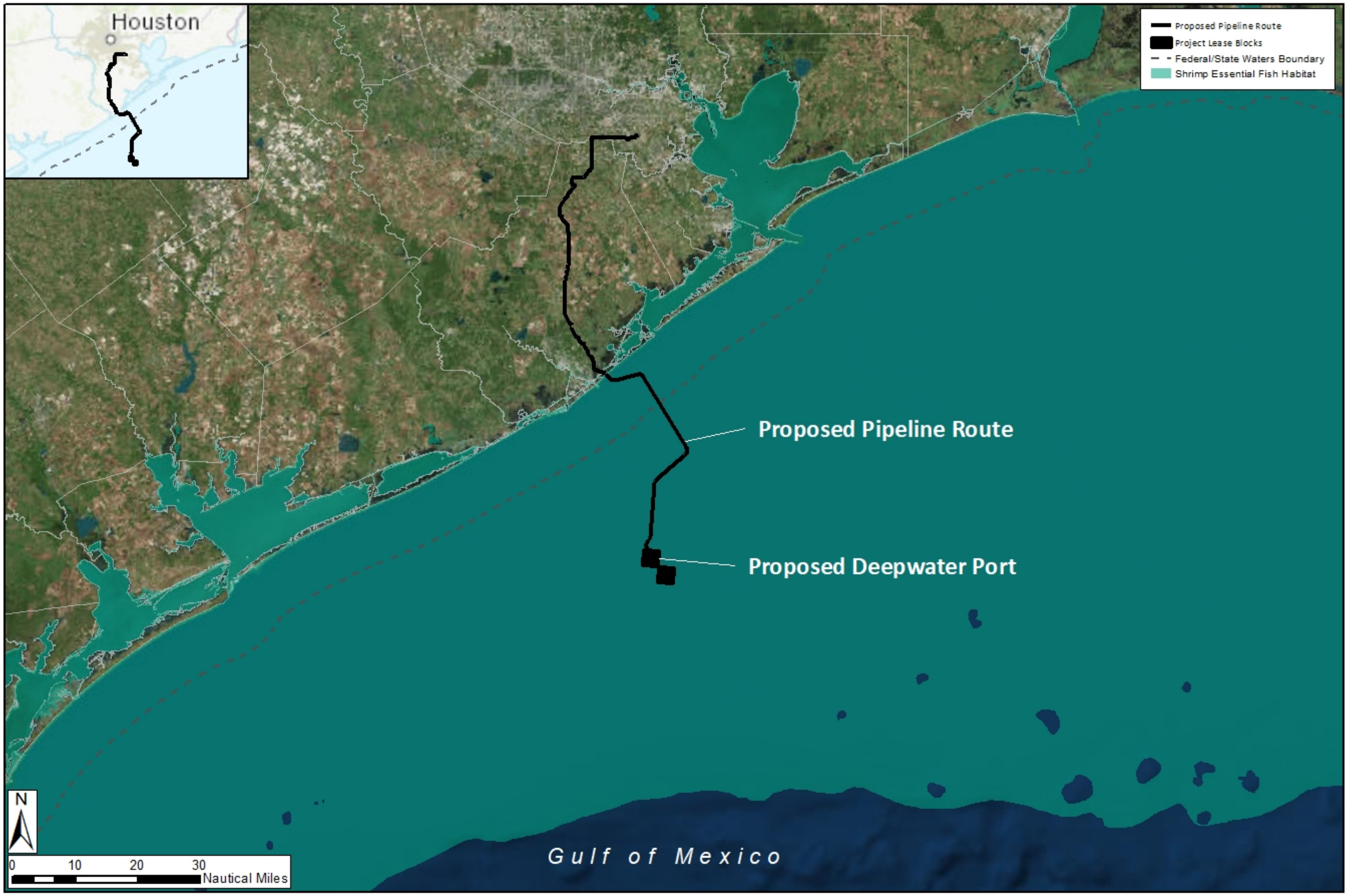
Source: NOAA Fisheries 2018b

Figure 8.3.4-1: Reef Fish Essential Fish Habitat

Table 8.3.5-1: Essential Fish Habitat for Shrimp

Species	Eggs	Larvae	Post Larvae	Juveniles	Adults
Brown shrimp	Offshore waters with soft-bottom or sand/shell habitats at depths of 59 to 360 feet from fall to spring	Estuarine, nearshore, and offshore waters at depths of 0 to 270 feet, feed on plankton	Migrate to estuaries at depths less than 3 feet in early spring, feed on algae, worms, and crustaceans	Estuarine and nearshore waters at depths of 3 to 60 feet from spring to fall, feed on worms, amphipods, and invertebrates	Spawn in deep waters (59 to 360 feet) over the continental shelf generally in the spring, feed on algae and invertebrates
White shrimp	Estuarine, nearshore, and offshore waters at depths of 30 to 112 feet through the spring and fall	Estuarine, nearshore, and offshore waters at depths of 0 to 270 feet, feed on plankton	Estuarine and nearshore waters at depths less than 3 feet from late spring through fall	Estuarine, nearshore, and offshore waters at depths of 3 to 98 feet associated with soft bottoms with detritus and vegetation	Nearshore soft bottoms and spawn at <88 feet from spring to fall, and migrate through the water column between night and day
Pink shrimp	Year-round in offshore waters at depths from 30 to 158 feet	Estuarine, nearshore, and offshore waters at depths of 3 to 165 feet, feed on plankton	Estuarine and nearshore waters at depths less than 10 feet associated with submerged aquatic vegetation	Estuarine, nearshore, and offshore waters at depths of 3 to 213 feet from fall through spring	Nearshore and offshore waters over the continental shelf on sand/shell bottoms at depths of 10 to 158 feet from spring through fall
Royal red shrimp	Winter and spring along the shelf edge and slope in offshore waters from depths of 820 to 1,804 feet	Offshore waters along the shelf edge from depths of 820 to 1,804 feet	Offshore waters along the shelf edge from depths of 820 to 1,804 feet	Offshore waters along the shelf edge from depths of 820 to 1,804 feet	Shelf edge/slope at depths of 460 to 2,395 feet associated with muddy bottoms and spawn there from winter to spring, feed on benthic organisms, and are not estuarine dependent

Source: GMFMC 2016



Source: NOAA Fisheries 2018b

Figure 8.3.5-1: Shrimp Essential Fish Habitat

8.3.6. Highly Migratory Species

HMS include tunas, swordfish, billfish, and shark species. These species are managed internationally and domestically as they migrate across long distances and cross domestic and international borders.

Designated EFH for the HMS in the GoM spans from the U.S./Mexico border around the tip of Florida and to the EEZ in the south (Table 8.3.6-1). The EFH for the following HMS species overlap the proposed Project area for at least one life stage (NOAA Fisheries 2015b, 2017):

- Scalloped hammerhead shark (*Sphyrna lewini*)
- Blacktip shark (*Carcharhinus limabatus*)
- Bull shark (*Carcharinus leucas*)
- Lemon shark (*Negaprion brevirostris*)
- Spinner shark (*Carcharhinus brevipinna*)
- Bonnethead shark (*Sphyrna tiburo*)
- Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)
- Blacknose shark (*Carcharhinus acronotus*)
- Finetooth shark (*Carcharhinus isodon*)

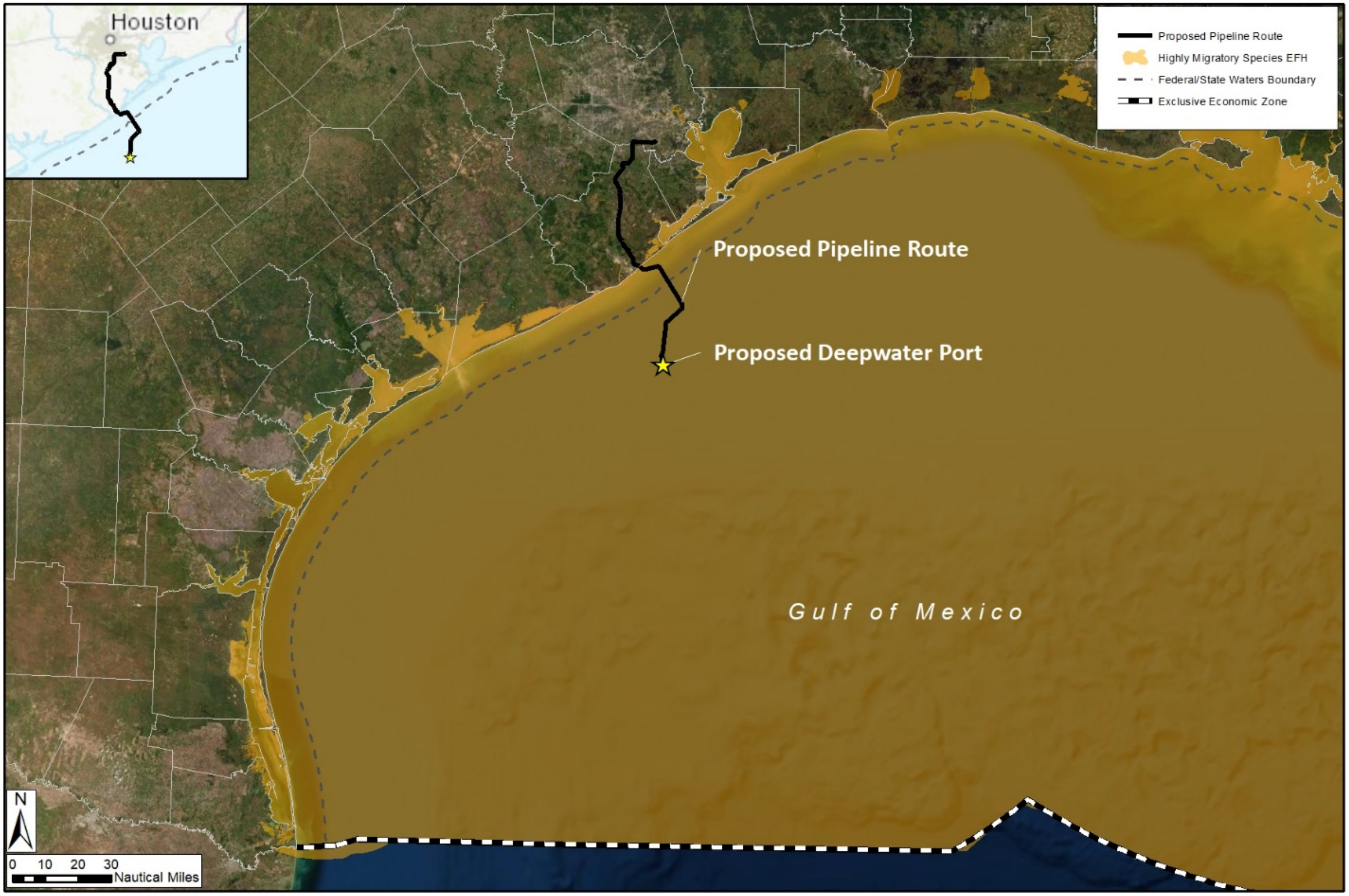
The proposed pipeline route and SPOT DWP are located within the highly migratory species EFH as shown on Figure 8.3.6-1.

Table 8.3.6-1: Essential Fish Habitat for Highly Migratory Species

Species	Neonate	Juveniles	Adults
Scalloped hammerhead	Shallow estuarine and nearshore waters from south Texas to south Florida at depths up to 82 feet	Shallow warm nearshore and offshore waters from south Texas to southern Florida at depths up to 656 feet	Nearshore waters from southern Texas to southern Florida and offshore waters from Texas to eastern Louisiana at depths of 82 to 656 feet
Blacktip shark	Shallow estuarine and nearshore waters with muddy bottoms from Texas to Florida at depths up to 82 feet	Shallow estuarine and nearshore waters from Texas to Florida at depths of 0 to 82 feet	Shallow nearshore waters from Texas to the Florida Keys at depths of 82 to 656 feet
Bull shark	Shallow estuarine and nearshore waters of Texas and Louisiana but also found in localized areas in Florida at depths up to 82 feet	Shallow estuarine and nearshore waters of Texas through eastern Louisiana to the panhandle of western Florida at depths up to 82 feet	Shallow estuarine and nearshore waters of Texas to Louisiana and the Florida Keys at depths of 0 to 82 feet
Lemon shark	Shallow estuarine and nearshore waters of the south and central coast of Texas and the Florida Keys at depths up to 82 feet	Shallow estuarine and nearshore waters of Louisiana and Florida at depths up to 82 feet	Shallow estuarine and nearshore waters of Louisiana and Florida at depths up to 82 feet

Species	Neonate	Juveniles	Adults
Spinner shark	Shallow nearshore waters with muddy bottoms near Texas, Louisiana, and Florida at depths up to 16 feet	Nearshore waters reaching from south Texas to the Florida panhandle at depths up to 656 feet	Nearshore waters reaching from south Texas to the Florida panhandle at depths up to 328 feet
Bonnethead shark	Shallow estuarine and nearshore waters of Texas and Florida at depths up to 82 feet	Shallow estuarine and nearshore waters of Texas and Florida at depths up to 82 feet	Shallow estuarine and nearshore waters with sandy and muddy bottoms around Texas, eastern Mississippi, to the Florida Keys at depths up to 82 feet
Atlantic sharpnose shark	Shallow estuarine and nearshore waters from Texas to the Florida panhandle at depths up to 82 feet	Shallow estuarine and nearshore waters from Texas to southern Florida at depths up to 164 feet	Shallow nearshore waters from Texas to the Florida Keys at depths of 82 to 328 feet
Blacknose shark	Shallow nearshore waters off the coast of Florida at depths up to 82 feet	Shallow estuarine and nearshore waters of Texas, Louisiana, Mississippi, and Florida at depths up to 82 feet	Shallow nearshore waters from Texas to the Florida Keys at depths of 82 to 328 feet
Finetooth shark	Shallow estuarine and nearshore waters off the coast of Texas, eastern Louisiana, Mississippi, Alabama, and the Florida panhandle at depths up to 82 feet	Shallow estuarine and nearshore waters off the coast of Texas, eastern Louisiana, Mississippi, Alabama, and the Florida panhandle at depths up to 82 feet	Shallow estuarine and nearshore waters off the coast of Texas, eastern Louisiana, Mississippi, Alabama, and the Florida panhandle at depths up to 82 feet

Source: NOAA Fisheries 2017b



Source: NOAA Fisheries 2018b

Figure 8.3.6-1: Highly Migratory Species Essential Fish Habitat

8.4. EGGS AND LARVAE WITHIN THE PROJECT AREA

Many marine fish use external fertilization (releasing eggs and sperm into the water column) and are therefore considered broadcast spawners, and the majority of fishes in the GoM have pelagic larval stages. The length of time spent in the egg and larval stages varies from 10 to 100 days, depending on the species. Ichthyoplankton is abundant in the northern GoM. Peak seasons for ichthyoplankton concentrations on the shelf are spring and summer, and larval densities are lowest during the winter (Table 8.4-1). The distribution of fish larvae is dependent on the spawning behavior of adults, physical and biological parameters that vary spatially and temporally, duration of the pelagic period, behavior of larvae, and larval mortality and growth. Two of the most influential hydrographic features in the GoM are the Mississippi River discharge plume and the Loop Current (BOEM 2012).

Table 8.4-1: Seasonality and Peak Seasonal Occurrence of Larval Fishes (less than 10 millimeter standard length) in the Northern Gulf of Mexico

			Month (January through December)											
Family	**Common Name**	**Scientific Name**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Herring and Menhaden	Gulf menhaden	*Brevoortia patronus*	*	*	X	X					X	X	X	*
	Round herring	*Etrumeus teres*	*	*	*	X	X	X					X	X
	Atlantic thread herring	*Opisthonema oglinum*			X	X	*	*	*	*	X	X	X	
Anchovy	Striped	*Anchoa hepsetus*	X	X	*	*	*	*	*	*	*	X	X	X
	Bay	*Anchoa mitchilli*	X	X	*	*	*	*	*	*	*	X	X	X
	Longnose	*Anchoa nasuta*	X	X	*	*	*	*	*	*	*	X	X	X
Sea Bass and Grouper	Sand perch	*Diplectrum formosum*	X	X	X	X	*	*	*	*	X	X	X	X
	Pygmy sea bass	*Serraniculus pumilio*					X	*	*	*	*	X	X	
Jacks, scads, pompanos, and relatives	Blue runner	*Caranx crysos*			X	X	X	*	*	*	X	X	X	
	Atlantic bumper	*Chloroscombrus chrysurus*				X	X	*	*	*	*	X		
	Round scad	*Decapterus punctatus*			X	*	*	*	*	*	*	X	X	
	Rough scad	*Trachurus lathami*	*	*	X	X	X						X	X
	Dolphin	*Coryphaena hippurus*					X	X	X	X	X	X	X	
Snapper	Red	*Lutjanus campechanus*				X	X	*	*	*	X	X	X	
	Gray	*Lutjanus griseus*				X	X	*	*	*	X	X	X	
	Lane	*Lutjanus synagris*				X	X	*	*	*	X	X	X	
Majorras, Porgies	Pigfish	*Orthopristis chrysoptera*	X	X	*	X	X							
	Sheepshead	*Archosargus Probatocephalus*	X	*	*	*	X							
	Pinfish	*Lagodon rhomboids*	*	*	X	X						X	X	*
Drums, Croakers, Seatrout	Spotted seatrout	*Cynoscion nebulosus*		X	X	*	*	*	*	*	X	X		
	Spot	*Leiostomus xanthurus*	*	X	X	X						X	X	*
	Atlantic croaker	*Micropogonias undulates*	*	X	X	X					X	*	*	*
	Red drum	*Sciaenops ocellatus*								X	*	*	X	
Spadefish	Atlantic spadefish	*Chaetodipterus faber*				X	X	*	*	*				

Family	Common Name	Scientific Name	**Month (January through December)**											
			J	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Mackerels, Tunas, Wahoo	Bullet mackerel	*Auxis rochei*	X	X	X	X	*	*	*	*	*	X	X	
	Little tunny	*Euthynnus alletteratus*				X	*	*	*	*	*	X	X	
	Skipjack tuna	*Euthynnus pelamis*				X	X	X	X	X	X	X		
	King mackerel	*Scomberomorus cavalla*					X	X	X	*	*	X	X	
	Spanish mackerel	*Scomberomorus maculatus*				X	X	X	X	*	*	X		
	Bluefin tuna	*Thunnus thynnus*				X	X	X						
Butterfish	Gulf butterfish	*Peprilus burti*	*	*	*	X	X	X	X	X	X	X	*	*

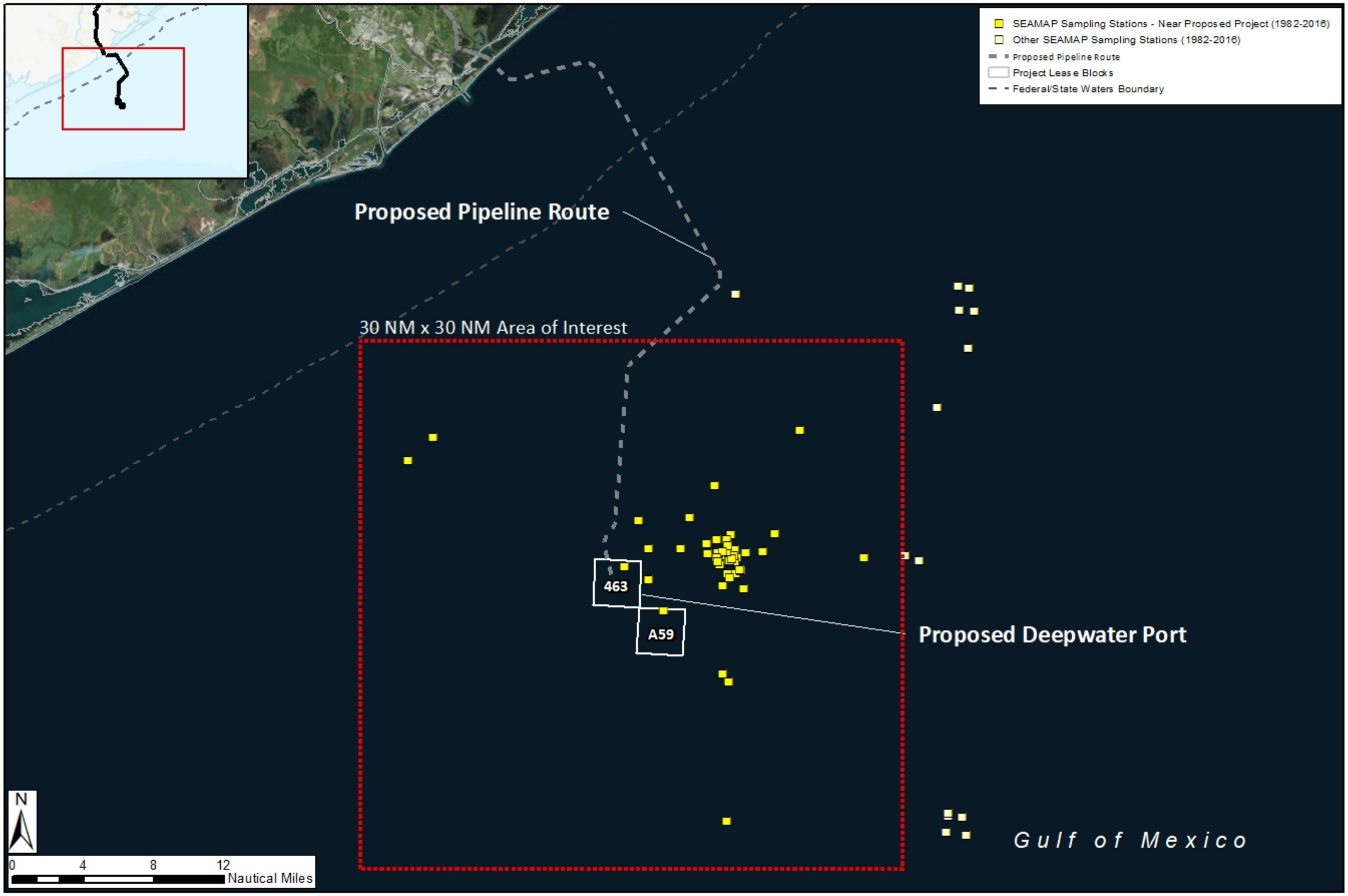
Source: SPOT 2019a, Application, Volume IIa, Section 6

X = Seasonality; * = Peak Seasonal Occurrence

NOAA Fisheries began conducting ichthyoplankton surveys in the GoM in 1982 as part of the Southeast Area Monitoring and Assessment Program (SEAMAP). In order to assess ichthyoplankton abundance, the Applicant used SEAMAP data from a 30 by 30-nautical mile coverage of SEAMAP sampling stations near the proposed SPOT DWP location (Figure 8.4-1). The Applicant indicated that net data collected between 1982 and 2016 for 82 SEAMAP stations within the established block showed an overall fish larvae density of 0.22 per cubic meter, whereas the density of fish eggs averaged 2.97 eggs per cubic meter. However, these data are specific to the time period referenced, but ichthyoplankton data generally varies widely both seasonally and annually. A total of 156 taxonomic groups were represented in the larvae samples collected from the 82 stations; the samples also included a group of unidentified fish (SPOT 2019a, Application, Vol. IIa, Section 6). Fish eggs are not identified to taxa level. The most abundant larval taxa, in decreasing order of abundance, and the phylogenetic level they represent, are:

- Gobiidae (gobies)
- Engraulidae (anchovies/sardines)
- Sciaenidae (*Micropogonias undulatus*—Atlantic croaker)
- Paralichthyidae (*Syacium papillosum*—dusky flounder)
- Cynoglossidae (*Symphurus* spp.—tonguefishes)
- Clupeidae (*Brevoortia spp*.—menhaden)
- Ophidiidae (cusk-eels)
- Bothidae (flounders)

The Applicant provided a ranked list identifying the top 20 taxa found cumulatively for all 82 stations and their average larval abundance in a million gallons of filtered seawater is presented in Table 8.4-2.



Source: SPOT 2019a, Application, Vol. IIa, Section 6

Figure 8.4-1: SEAMAP Sampling Stations near the SPOT Deepwater Port Location

Table 8.4-2: Larval Taxa Identified for 82 SEAMAP Stations near the Proposed SPOT Deepwater Port

Rank	Taxa	Common Name	Average Number per Mgal of Seawater in the SPOT DWP Block
1	*Gobiidae*	goby	5,707
2	*Engraulidae*	anchovies & sardines	3,810
3	*Micropognias undulatus*	Atlantic croaker	3,478
4	*Syacium papillosum*	dusky flounder	3,191
5	*Syacium spp.*	large-toothed flounder	2,162
6	*Symphurus spp.*	tonguefish	1,759
7	*Cynoglossidae*	tonguefish	1,589
8	*Brevoortia spp.*	menhaden	1,531
9	*Ophidiidae*	cusk-eel	1,099
10	*Bothidae*	left-eye flounder	974
11	*Bregmaceros spp.*	Codlet	886
12	*Chloroscombrus chrysurus*	Atlantic bumper	866
13	*Etrumeus teres*	round herring	773
14	*Unidentified fish*	NA	740
15	*Pleuronectiformes*	flatfish	738
16	*Trachurus lathami*	rough scad	726
17	*Clupeidae*	ray-finned fish	719
18	*Harengula jaguana*	scaled sardine	694
19	*Diplectrum spp.*	perch	685
20	*Clupeiformes*	herring and anchovy	678

Source: SPOT 2019a, Application, Vol. IIa, Section 6

DWP = SPOT deepwater port; Mgal = million gallons; SEAMAP = Southeast Area Monitoring and Assessment Program; SPOT = Sea Port Oil Terminal

8.5. Impacts and Mitigation

Impacts on EFH components would occur because the subsea pipeline would traverse state and Federal waters and the SPOT DWP platform would be located in Federal waters. Habitat disturbance would occur in soft bottom areas of the GoM and within the water column due to pipeline installation and burial, water intake and discharges at the platform, artificial lighting, underwater noise, and potential exposure to contaminants as detailed below.

8.5.1. Impacts on the Estuarine Component of the Essential Fish Habitat

Construction of the onshore pipelines would cross estuarine habitats using the HDD construction method, and, therefore, would not result in direct impacts on estuarine EFH.

8.5.2. Impacts on the Marine Components of the Essential Fish Habitat

8.5.2.1. Sediment Deposition and Turbidity

The offshore pipelines predominantly cross soft-bottom habitat on the continental shelf. Impacts on EFH and associated fish species would vary based on distribution, abundance, habitat use, and life history. Anchoring by pipe installation barges could have direct impacts on EFH associated fish by crushing fish eggs or larvae.

As described in Section 4.2, Offshore Habitat Loss and Alteration, the resuspension of sediments during jet sledding for pipeline burial could disrupt filter-feeding mechanisms and interfere with ingestion and respiration of sedentary invertebrates (Berry et al. 2003). Pipeline installation would result in short-term disturbance of approximately 1,212 acres of benthic habitat along the proposed pipeline route due to dropping and settling of the assembled pipes before being buried, as well as disturbance of about 3,075 acres of seafloor due to burial of the pipeline. An additional 1 to 2 acres of benthic habitat would be affected by additional activities such as support vessel anchoring. Anchoring of the pipe installation barges could crush fish eggs, larvae, and/or benthic macroinvertebrates in the sediments.

The assembled pipe would be buried to a minimum of 3 feet using the jet sledding technique. The sediment transport model showed sediment deposition greater than 1 mm would occur over about 3,075 acres for burial of one pipeline. The coarse sediments would resettle first and the finer sediments would remain in suspension for a longer period. Sediment deposition would be additive in adjacent areas due to installation of two pipelines adjacent to each other and would affect a maximum area of about 6,210 acres.

The deep burial of some bivalve species can lead to reduced condition and survival through starvation or suffocation (De Goeij and Luttikhuizen 1998). Most bivalves in estuarine environments are adaptable to changes in turbidity and infauna are accustomed to burrowing through sediment and would likely be able to handle increased sediment deposition without adverse effects (Newell et al. 1998). Lab studies have shown that demersal eggs and larvae are sensitive to increased turbidity and sediment deposition at levels of sediment accumulation greater than 1 mm, and that persistent suspended sediments can cause burial or abrasion to eggs and reduced swimming or settling ability in larvae (Berry et al. 2011; Wilbur and Clarke 2001). These impacts would be temporary and benthic organisms would recolonize the area once construction is complete.

The SPM buoys would be attached to the seafloor with six fluke anchors per buoy. There would be a direct loss of benthic habitat within the footprint of the fluke anchors for the SPM buoys, and a long-term disturbance to benthic habitat would occur within the 1,043-foot radius of each SPM buoy due to anchor chains dragging on the seafloor. The area affected by an anchor would depend on water depth, wind, currents, chain length, and the size of the anchor and chain. Live-bottom areas are affected most by anchor damage that could include crushing and breaking of live/hard bottoms (MMS 2001). Soft-bottom habitats such as those in the Project area are not typically affected as greatly by anchor chains. Benthic organisms would be crushed beneath the anchors and chains and impacts would be direct, adverse, long-term, and minor.

The platform for the SPOT DWP would be supported by 8 72-inch diameter steel piles driven to a depth of 380 feet and 16 30-inch diameter steel piles would be installed for the PLEMs. Direct mortality of 100 percent of non-mobile benthic resources would occur in the footprint of the 24 piles. Installation of the piles would result in long-term loss of habitat and cause direct impacts such as injury, mortality, or displacement of mobile organisms. However, as the footprint of the SPOT DWP piles is small in comparison to the available surrounding habitat, impacts on benthic EFH resources would be direct, adverse, long-term, and minor.

Benthic communities tend to be resilient and recover fairly quickly from direct disturbances; however, a change in the characteristics of the seabed after construction may result in changes to the community assemblage. Studies show that benthic communities recover from a direct, physical disturbance at various rates; some recover as quickly as 6 months and others can take 2 years or more to recover (Germano et al. 1994; Rhoads et al. 1978; Murray and Saffert 1999). Habitats with estuarine muds and frequent disturbance typically recover more quickly, while habitats consisting of sands and gravels take longer (Newell et al. 1998). Based on the ability of benthic communities to recover and the relatively small footprint compared to the surrounding area, construction of the SPOT Project would result in direct, adverse, short-term, and minor impacts on benthic EFH resources as a result of seafloor disturbance.

Increased turbidity (Section 4.3, Water Quality) in the water column could also result in physical impairment of fish species, causing potential turbidity-induced clogged gills (i.e., suffocation or abrasion of sensitive epithelial tissue) and alteration of foraging behavior for visual predators (Wenger et al. 2017). Construction would result in the resuspension of about 29.4 million cubic feet of sediments. Based on the sediment transport model results, the burial of one of the offshore pipelines would result in turbidity and resuspended sediments in the water column for 37 days while trenching activities are occurring. The model predicts the sediment plume would occur over a maximum area of about 19,044 acres that would attenuate to background levels within 24 hours after the disturbance ends. Because the two pipelines would be trenched in at different times, turbidity plumes would not overlap. Fish would typically avoid areas of increased suspended sediment (Wenger et al. 2017). As fishes are well adapted to occasional turbulent conditions, they would likely avoid turbid areas, and would have substantial suitable habitat outside the sediment plume. Disturbance of benthic habitat would result in impacts on benthic organisms. These impacts could include localized disruption, crushing, and burial, which could result in secondary impacts on some fish species by reducing prey availability.

During operations, the SPOT DWP would convert open water habitat to an artificial reef-like habitat in the marine environment and would likely function as a fish aggregating device that attracts fish by providing a place for them to congregate. Fish aggregating devices are purposely deployed to draw pelagic fish to targeted areas by commercial, recreational, and artisanal fishers (Fisheries and Aquaculture 2010). The SPOT DWP would provide a suitable environment for encrusting organisms such as algae and invertebrates to attach, thereby providing a food source and shelter for fish. Oil and gas platforms support substantial coral communities in the northern GoM. Platforms provide settlement cues for demersal and reef fish, increasing the likelihood of settlement and recruitment on the newly added structure (Sammarco 2014). As epibenthic species begin to recolonize, other larger fish would likely be attracted to the new habitat because it would provide prey, shelter, and potential spawning habitat (Andersson et al. 2009). This potentially beneficial impact spreading across the trophic levels is known as the “reef effect” (Langhamer 2012). While the reef effect may be beneficial to some species, it could have adverse impacts on other species, potentially increasing their risk of predation (Copping et al. 2016). As the footprint of the converted habitat is small in comparison to the available surrounding habitat, impacts on EFH and managed fish species would be both adverse and beneficial (depending on the species), direct, long-term, and negligible.

8.5.2.2. Water Intakes and Discharges

The offshore pipelines would be hydrostatically tested as part of the National Pollutant Discharge Elimination System (NPDES) permit requirements. Approximately 14 million gallons of seawater would be withdrawn during the one-time hydrostatic testing of the pipelines at a rate of 5,800 to 14,600 gallons per minute. Screens no coarser than 8 mm would be fitted to intake structures for hydrostatic test water withdrawals to reduce potential impingement of marine organisms. Corrosion inhibitors would be added to the hydrostatic test water during testing and, therefore, released into the GoM when hydrostatic test water is discharged back to the GoM. Entrainment of fish eggs, fish larvae, or benthic species is possible during the water intake process, which could cause direct injury or mortality of organisms. The level of impact depends on the time of year and which species are present in the area at the time of intake. The Applicant would adhere to any permit requirements related to water withdrawals. The intake volume is relatively small compared to the size of the GoM.

After pressure testing is complete, the pipeline would be dewatered, cleaned, and dried, using air to run pipeline pigs through the system. The hydrostatic test water would be discharged back into the GoM at a rate of approximately 4,000 gallons per minute and would take about 60 hours; discharge would occur via the platform deck drain which flows back to the GoM. The use of intake screens on the pipe would minimize potential entrainment of ichthyoplankton and impingement of fishes. The discharged water would include corrosion inhibitors used during hydrostatic testing. The Applicant anticipates using a corrosion inhibitor with propylene glycol and polyoxyalkylenes. No information about polyoxyalkylene toxicity is available, but propylene glycol has been shown to be relatively non-toxic in marine and freshwater environments and is highly water soluble (Canadian Council of Ministers of the Environment 2006).

Discharge rates of seawater from hydrostatic testing in one location could cause scouring on the seafloor. The amount of turbidity caused by scour would be dependent on the currents and location of discharge; the Applicant does not plan to use diffusers. The discharge outlet would be located about 15 feet below the surface of the sea. Due to the volume and rate of water discharges, scour is likely to occur near the platform, but would be limited to less than 3 days. The seafloor would return to preconstruction conditions once hydrostatic test water discharges are complete. The release of corrosion inhibitors into the GoM would have direct, adverse, short-term, negligible impacts on EFH. Discharges would meet requirements of the individual NPDES permit for hydrostatic test water discharges; therefore, impacts would be direct, adverse, short-term, and minor.

Routine water intake and discharges during operation would occur from vessels mooring at the SPOT DWP, including ballast water exchange, engine cooling, bilge water, wastewater, scrubber water, general deck drainage, emergency water reserves, and any other typical vessel operational requirements. Additional details on water intake and discharges for the SPOT DWP and VLCCs are provided in Tables 8.5.2-1 and 8.5.2-2. Water use at the SPOT DWP would be about 46.032 million gallons annually, ballast water exchange and cooling water volumes for a single VLCC would use about 14.016 billion gallons annually and 4.628 billion gallons per year, respectively. The combined water intake is expected to amount to 18.690 billion gallons annually.

Table 8.5.2-1: SPOT Deepwater Port Operational Seawater Usage

Equipment	System	Rate	Period
Jockey Water Pump	Water Main	20 gpm each ($0.001\ m^3$/sec)	Maximum flowrate, run continuously to feed water users on platform. Excess water flows overboard.
Firewater Pump	Water Main	4,000 gpm each ($0.25\ m^3$/sec)	Maximum flowrate, run only for testing and emergencies.
Water Maker	Potable Water System	9,624 gpd ($36.4\ m^3$/day)	Continuous, includes potable water system reject water.
Sewage Treatment Unit	Utility Water	1,980 gpd ($7.5\ m^3$/day)	Continuous, to maintain sanitary waste system operation.
Utility Water Hoses	Utility Water	1,440 gpd ($5.5\ m^3$/day)	Intermittent, deck and equipment washdown.
VLCC	Ballast Water Exchange	1.6 million gph ($6{,}057\ m^3$/hour)	Continuous, to maintain acceptable stability conditions.
VLCC	Cooling Water	528,344 gph ($2{,}000\ m^3$/hour)	Continuous, to prevent overheating.

Source: SPOT 2019a, Application, Vol. IIa, Section 1

gpd = gallons per day; gph = gallons per hour; gpm = gallons per minute; m^3/day = cubic meters per day; m^3/hour = cubic meters per hour; m^3/sec = cubic meters per second; VLCC = very large crude carrier

Table 8.5.2-2: Water Discharge Rates During Operations at the Proposed SPOT Deepwater Port

ID	Stream	Maximum Flow Rate (gpm)	Assumed Temperature (description)	Assumed Salinity (description)
D1	Jockey Water Pump 1*	20	Ambient	Sea water
D2	Jockey Water Pump 2*	20	Ambient	Sea water
D3	Water Maker Effluent	5.5	Ambient	Concentrated sea water
D4	Sewage Treatment	3.05	Ambient	Fresh
D5	Open Drain Sump*	1,463	Ambient	Rain water (fresh)
D6	Firewater Pump 1*	4,000	Ambient	Sea water
D7	Firewater Pump 2*	4,000	Ambient	Sea water
VLCC1	VLCC—Ballast	26,667	Ambient	Sea water
VLCC2a	VLCC—Cooling Water Summer	8,806	Ambient + 10°C	Sea water
VLCC2b	VLCC—Cooling Water Winter	8,806	Ambient + 10°C	Sea water

Source: SPOT 2019l

°C = degrees Celsius; gpm = gallons per minute; VLCC = very large crude carrier

* Streams with intermittent discharges as needed

The Applicant provided an Ichthyoplankton Impact Assessment (SPOT 2019k) to estimate the number of fish eggs and larvae entrained annually during SPOT DWP operation and for VLCC ballast and cooling water. The annual mean of fish eggs entrained was calculated to be 113,131,012 and the annual mean of fish larvae entrained was calculated to be 300,688,451 (Table 8.5.2-3). The Applicant used the USCG and MARAD (2004) models as amended by USCG and MARAD (2005) to estimate the impacts due to water intakes during Project operation (SPOT 2019k). One hundred percent mortality is assumed for all entrained organisms. Tables 8.5.2-4 and 8.5.2-5 show the projected entrainment values for larvae and eggs, respectively, and these values were used to model the impacts on the four identified species of concern. Based on these calculations, the Applicant estimated the loss of 190,247 age-1 equivalents of the four species of concern (red drum, red snapper, Gulf menhaden, and bay anchovy; see Table 8.5.2-6). The Ichthyoplankton Impact Assessment is included in Attachment K. Based on the estimated economic impacts, impacts on the Gulf menhaden fishery and bay anchovy as a prey species would be direct, adverse, long-term, and minor. Impacts on the red drum recreational and red snapper commercial and recreational fisheries would be direct, adverse, long-term, and moderate.

Table 8.5.2-3: Project Annual Estimates of Entrained Fish Eggs and Larvae

	Lower 95% Confidence Limit	Annual Mean	Upper 95% Confidence Limit
DWP Operation			
Fish Eggs	173,789	278,628,383,467	383,467
Fish Larvae	405,817	740,559	1,075,301
VLCC Ballast Water			
Fish Eggs	52,915,850	84,837,699	116,759,549
Fish Larvae	123,564,813	225,488,272	327,411,730
VLCC Cooling Water			
Fish Eggs	17,473,610	28,014,685	38,555,760
Fish Larvae	40,802,961	74,459,620	108,116,280
Totals			
Fish Eggs	70,563,248	113,131,012	155,698,776
Fish Larvae	164,773,591	300,688,451	436,603,310

Source: SPOT 2019k

DWP = SPOT deepwater port; VLCC = very large crude carrier

Table 8.5.2-4: Projected Annual Larval Entrainment Values

Species	Associated Taxa in SEAMAP Data	Lower 95% Confidence Limit	Annual Mean	Upper 95% Confidence Limit
DWP Operation				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	343,511	526,195	708,880
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	48,200	134,684	221,168
Red Snapper	F. Lutjanidae, *L. campechanus*	16,883	22,344	27,805
Red Drum	F. Sciaenidae, *S. ocellatus*	-2,777	57,335	117,448
VLCC Ballast Water				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	104,593,515	160,218,023	215,842,531
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	14,676,147	41,009,114	67,342,531
Red Snapper	F. Lutjanidae, *L. campechanus*	5,140,690	6,803,440	8,466,191
Red Drum	F. Sciaenidae, *S. ocellatus*	-845,539	17,457,694	35,760,928
VLCC Cooling Water				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	34,538,353	52,906,402	71,274,451

Species	Associated Taxa in SEAMAP Data	Lower 95% Confidence Limit	Annual Mean	Upper 95% Confidence Limit
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	4,846,285	13,541,826	22,237,368
Red Snapper	F. Lutjanidae, *L. campechanus*	1,697,533	2,246,598	2,795,663
Red Drum	F. Sciaenidae, *S. ocellatus*	-279,210	5,764,793	11,808,796
Totals				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	139,475,379	213,650,621	287,825,862
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	19,570,632	54,685,624	89,800,617
Red Snapper	F. Lutjanidae, *L. campechanus*	6,855,107	9,072,383	11,289,659
Red Drum	F. Sciaenidae, *S. ocellatus*	-1,127,526	23,279,823	47,687,172

Source: SPOT 2019k

SEAMAP = Southeast Area Monitoring and Assessment Program; DWP = SPOT deepwater port; NA = not applicable; VLCC = very large crude carrier

Table 8.5.2-5: Projected Annual Egg Entrainment Values

Species	Associated Taxa in SEAMAP Data	Lower 95% Confidence Limit	Annual Mean	Upper 95% Confidence Limit
DWP Operation				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	162,429	248,811	335,193
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	3,599	10,056	16,512
Red Snapper	F. Lutjanidae, *L. campechanus*	8,193	10,843	13,494
Red Drum	F. Sciaenidae, *S. ocellatus*	-432	8,918	18,268
VLCC Ballast Water				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	49,456,905	75,758,880	102,060,855
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	1,095,726	3,061,753	5,027,781
Red Snapper	F. Lutjanidae, *L. campechanus*	2,494,736	3,301,656	4,108,575
Red Drum	F. Sciaenidae, *S. ocellatus*	-131,517	2,715,410	5,562,338
VLCC Cooling Water				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	16,331,414	25,016,722	33,702,030
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	361,825	1,011,037	1,660,249
Red Snapper	F. Lutjanidae, *L. campechanus*	823,799	1,090,256	1,356,713
Red Drum	F. Sciaenidae, *S. ocellatus*	-43,429	896,669	1,836,768
Totals				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	65,950,748	101,024,413	136,098,078
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	1,461,150	4,082,846	6,704,543
Red Snapper	F. Lutjanidae, *L. campechanus*	3,326,729	4,402,755	5,478,782
Red Drum	F. Sciaenidae, *S. ocellatus*	-175,378	3,620,998	7,417,374

Source: SPOT 2019k

DWP = SPOT deepwater port; NA = not applicable; SEAMAP = Southeast Area Monitoring and Assessment Program; VLCC = very large crude carrier

Table 8.5.2-6: Summary of Annual Impacts on Fish Species of Concern from Water Withdrawals

Species	Annual Age-1 Equivalents Lost [a]	Pounds of Fish Lost Annually	Estimated Annual Economic Impact
DWP Operation			
Bay Anchovy (*Anchoa* spp.)	292	1.26	NA
Gulf Menhaden (*Brevoortia patronus*)	119	24	$0–$2.16
Red Snapper (*Lutjanus campechanus*)	9	16	$0–$71.52
Red Drum (*Sciaenops ocellatus*)	48	239	$0–$621.40
VLCC Ballast Water			
Bay Anchovy (*Anchoa* spp.)	89,000	384.07	NA
Gulf Menhaden (*B. patronus*)	36,268	7,205	$0–$648.45
Red Snapper (*L. campechanus*)	2,840	4,952	$0–$22,135.44
Red Drum (*S. ocellatus*)	14,560	72,820	$0–$189,332.00
VLCC Cooling Water			
Bay Anchovy (*Anchoa* spp.)	29,389	126.83	NA
Gulf Menhaden (*B. patronus*)	11,976	2,379	$0–$214.11
Red Snapper (*L. campechanus*)	938	1,635	$0–$7,308.45
Red Drum (*S. ocellatus*)	4,808	24,046	$0–$62,519.60
Totals			
Bay Anchovy (*Anchoa* spp.)	118,681	512.16	NA
Gulf Menhaden (*B. patronus*)	48,363	9,608	$0–$864.72
Red Snapper (*L. campechanus*)	3,787	6,603	$0–$29,515.41
Red Drum (*S. ocellatus*)	19,416	97,105	$0–$252,473.00

Source: SPOT 2019k

DWP = SPOT deepwater port; NA = not applicable; VLCC = very large crude carrier

[a] Age-1 equivalents represent the number of individuals of each taxon that would have been expected to survive to age 1 had they not been entrained.

Routine discharges from the SPOT DWP during operation would include brown water (from domestic sources such as bathtubs, showers, sinks, washing machines, etc.), black water (sanitary sewage), and stormwater. Discharges from the platform would be via two downward-oriented discharge pipes that extend from the platform to a depth of approximately 15 feet below the water's surface. One pipe would discharge only stormwater and the second would co-mingle discharges from the sewage treatment facility, potable water system, and reject water discharge. The Applicant conducted discharge modeling for discharges at the SPOT DWP (SPOT 2019l). Intermittent discharges, such as those from the jockey water pumps, the open drain sump, and the firewater pumps would have temporary plumes; while the persistent discharges from the water maker and sewage discharges would have permanent plumes. At a distance of 328 feet, discharges would have dilutions varying between a factor of 16 to 1,267. The size of the plume at a distance of 328 feet would range from 10 to 374 feet. Dilution would be more efficient for discharges of seawater than for freshwater or concentrated seawater. Temperature-related effects from water discharges at the SPOT DWP platform would be unlikely since discharges are expected to be at ambient temperatures. The model also predicted that some discharge plumes from the SPOT DWP platform and from VLCCs mooring at the SPMs would co-mingle, but in every scenario, the plumes would be sufficiently diluted before the plume trajectories crossed paths.

Discharges at the SPOT DWP platform would generally mix quickly with surrounding seawater; however, there could be minor impacts on water quality from discharges of concentrated seawater and freshwater discharges and persistent discharges in a small area around the discharge location. All marine vessel discharges would be required to comply with NPDES permit requirements for discharges to waters of the United States from an offshore facility. Since all discharges would meet NPDES permit requirements, routine discharges would have indirect, adverse, short-term, and minor impacts on EFH and managed fish species.

VLCCs and other crude oil carriers would undergo ballast water exchange to maintain proper ballast and stability. All vessels would be required to meet 46 CFR Part 162, which addresses requirements for ballast water management systems onboard vessels for the purpose of complying with the ballast water discharge standard of 33 CFR Part 151, Subparts C and D. Ballast water discharges would comply with USCG regulations and exchange would occur in international waters prior to arriving at the SPOT DWP. However, there is potential for water discharge during loading operations. VLCCs would exchange up to 1.6 million gallons per hour for the duration of the 24-hour loading period, totaling approximately 38 million gallons per ship. Ballast water would be discharged at a maximum rate of 26,667 gallons per minute. Discharge water would be the same temperature as ambient water temperature and contain a total suspended solids concentration of 30 parts per million. Sediment deposition and turbidity from ballast water would not be substantial. VLCCs calling on the SPOT DWP would be required to treat ballast water for invasive species; therefore, no introduction of aquatic invasive species is expected. With adherence to Federal and state ballast water exchange regulations, impacts from ballast water discharge on EFH and managed fish species would be indirect, adverse, short-term, and minor.

8.5.2.3. Artificial Lighting

As described in Section 4.1, Onshore, Habitat Loss and Alteration, lighting at the SPOT DWP would affect EFH in the area and could affect some managed species. Illumination of surface waters in the vicinity of the SPOT DWP could cause artificially induced aggregations of small organisms that rely on sun or moonlight to determine movement patterns, resulting in increased predation by larger species. This lighting may alter behavior of fish in the immediate vicinity by causing fish to school and move towards the light source (Marchesan et al. 2005); however, specific responses by fish are dependent on the intensity of light as well as the species and age-class of fish (Hoar et al. 1957). Impacts on EFH due to artificial lighting would be direct, adverse, long-term, and minor.

8.5.2.4. Underwater Noise

As described in Section 4.6, Underwater Noise, construction and operation of the SPOT DWP would result in increased sound levels in the GoM. The SPLs that would produce injury to fish are presented in Table 4.6.3-1. Noise effects from jet sledding would occur within less than 1 foot from the activity; therefore, impacts from jet sledding would be direct, adverse, short-term, and minor.

The scale and nature of the pile driving activity associated with installation of the proposed Project, application of mitigation measures, and proximity of fish to the sound source determines the level of potential impact of noise from pile driving. The Applicant has proposed to use a soft start during pile driving. Table 8.5.2-1 provides the distances within which injury or behavioral responses would occur if a fish were present during pile driving activities.

Table 8.5.2-1: Threshold Distances for Injury and Behavioral Response to Fish for the 30-inch and 72-inch Impact Driven Steel Piles

Pile Type/ Installation Method	Threshold Distances			
	Injury Threshold			Behavioral Response Threshold
	206 dB re 1 µPa (Peak SPL)	187 dB re 1 μPa^2s (SEL_{cum}) (Fish > 2 grams)	183 dB re 1 μPa^2s (SEL_{cum}) (Fish < 2 grams)	150 dB re 1 µPa (RMS SPL)
PLEM 30-inch steel/impact hammer	59 feet	1,470 feet	2,070 feet	15,230 feet
Jacket 72-inch steel/impact hammer	66 feet	5,719 feet	5,719 feet	36,089 feet

Source: SPOT 2019a, Application, Vol. IIa, Section 6

dB re 1µPa = sound exposure level in decibels relative to 1 microPascal; dB re 1 μPa^2s = sound exposure level in decibels relative to 1 microPascal squared second, PLEM = pipeline end manifold; RMS = root mean square, SEL_{cum} = cumulative sound exposure level; SPL = sound pressure level

The cumulative sound impacts would cause injury to fish within about 1.1 miles of the pile driving activities for the 72-inch diameter piles and would cause behavioral responses within about 6.8 miles. The Applicant estimates that pile driving would occur over about 16 days. There is little research about the impacts of pile driving on fish eggs and larvae, but limited studies have indicated that there are no significant effects on fish larvae at peak pressure levels of 210 dB re 1 µPa (Bolle et al. 2016).

Pile driving could directly affect adult fish if present during the activity, and impacts would be direct, adverse, short-term, and moderate.

8.5.2.5. Contaminants and Oil Spills

As described in Section 4.7, a release of hazardous material could occur during construction or operation of the Project, with a release of crude oil during Project operations having the most substantial impact on water quality, and would diminish the quality of managed species habitats. Based on the most likely scenario modeling described in Section 4.7, Contaminants and Oil Spills, water quality would be affected over large areas and estuarine and coastal habitats would be affected along the Texas coast. Modeling also suggests that an oil spill could affect the Bluefin tuna HAPC, which is located about 32.5 nautical miles from the SPOT DWP. Impacts from a spill of hazardous material, including crude oil, would be direct, adverse, minor to major, and short-term to long-term.

8.5.3. Summary of Potential Impacts

Habitat degradation of coastal and marine EFH habitats would occur as a result of the following activities:

- Sediment transport/redeposition and turbidity due to jet sledding;
- Temporary loss of prey species;

- Temporary water quality degradation due to construction activities (i.e., discharge of hydrostatic test water, jet sledding), discharges from the platform and VLCCs, discharge of drilling mud, or discharge of crude oil;
- Temporary disturbance of fish species due to underwater noise (i.e., HDD, pile driving, vessel noise);
- Disturbance to soft bottom habitat due to anchor chain movement at SPM buoys;
- Loss of fish eggs and larvae due to operational water intakes; and
- Permanent alteration of open water habitat due to artificial lighting.

Potential impacts associated with construction and operation of the SPOT DWP are summarized in Table 8.5.3-1.

Table 8.5.3-1: Summary of Potential Impacts on Essential Fish Habitat and Associated Species

Type of Impact	Temporary (Recovery in Days to Weeks)	Short-Term (Recovery <3 Years)	Long-Term (Recovery >3 Years to <20 Years)	Permanent (Recovery ≥20 Years)
Barge anchoring		X		
Pipelay on seafloor (trenched)		X		
Sediment deposition/turbidity	X			
Disruption of soft substrate	X	X		X
Seafloor area occupied [a]				X
Fish fauna (species) disturbance	X			
Fish fauna habitat disturbance		X		X [b]
Entrainment of fish eggs and larvae [c]	X			X
Reduction in water quality/ spills, drilling mud discharges	X	X	X	

[a] Seafloor area occupied refers to the location of the buried pipeline, the pilings for platform and PLEMS, and the anchors for SPM buoy.

[b] Permanent habitat disturbance due to artificial lighting associated with the deepwater port

[c] Entrainment would be temporary while water intake is occurring, but would be permanent as water intake would occur throughout the expected 30 year life of the Project.

Overall, the impacts on EFH and commercial fisheries would be minor. The total area affected is small relative to the size of the GoM. The benthic habitat disturbed by pipeline trenching would be expected to recover quickly, and turbidity would settle out of the water column within hours to days. Noise impacts associated with pile driving activities would be temporary while engine noise associated with activities at the SPOT DWP would be permanent.

8.5.4. Mitigation Measures

To minimize impacts associated with construction and operation of the SPOT DWP, the Applicant would:

- Construct the pipeline along the least environmentally damaging route by utilizing the HDD construction method to cross estuarine habitats and oyster reefs, and avoid submerged aquatic vegetation.
- Use the HDD construction method at the shore crossing.

- Bury pipelines below the seafloor.
- Locate the platform more than 1 mile from any live reef.
- Employ a soft start during pile driving activities to alert marine species and allow them to leave the area.
- Develop an Emergency Response Plan for the platform and vessels.
- Implement its Construction Spill Response Plan for Oil and Hazardous Substances and Operation Spill Plan in the event of an accidental release of hazardous material, including crude oil.

9. REFERENCES

Ackleh, A.S., G.E. Loup, JW. Loup, Baoling Ma, J.J. Newcomb, N. Pal, N.A. Sidorovskaia, and C. Tiemann. 2012. Assessing the Deepwater Horizon oil spill impact on marine mammal population through acoustics: Endangered sperm whales.” *The Journal of the Acoustical Society of America*, 2306–2314, DOI: 10.1121/1.3682042. Accessed: June 9, 2019. Available online: https://asa.scitation.org/doi/10.1121/1.3682042.

AMEC Americas Limited. 2005. *Effects of Noise on Wildlife: Mackenzie Gas Project*. Prepared for Imperial Oil Resources Ventures Limited. July 2005. Accessed: June 18, 2019. Available online: http://ulpeis.anl.gov/documents/dpeis/references/pdfs/AMEC_Americas_2005.pdf.

Andersson, M.H., M. Berggren, D. Wilhelmsson, and M.C. Ohman. 2009. Epibenthic colonization of concrete and steel pilings in a cold-temperate embayment: a field experiment. Accessed: July 18, 2019. Available online: https://link.springer.com/article/10.1007/s10152-009-0156-9.

Barber, J.R., C.L. Burdett, S.E. Reed, K.A. Warner, C. Fomichella, K.R. Crooks, D.M. Theobald, and K.M. Fristrup. 2011. “Anthropogenic noise exposure in protected natural areas: estimating the scale of ecological consequences.” *Landscape Ecology* 26: 1281–1295.

Berry, W., N. Rubinstein, and B. Melzian. 2003. The Biological Effects of Suspended and Bedded Sediment (SABS) in Aquatic Systems: A Review. Accessed: September 19, 2019. Available online: https://deq.idaho.gov/media/525784-EPA_biological_Effects_Suspended_bed_sediment_aquatic_systems_review_2003.pdf.

Berry, W.J., N.I. Rubinstein, E.K. Hinchey, G. Klein-MacPhee, and D.G. Clarke. 2011. “Assessment of Dredging-Induced Sedimentation Effects on Winter Flounder (*Pseudopleuronectes Americanus*) Hatching Success: Results of Laboratory Investigation.” *Proceedings, WEDA XXXI Technical Conference & TAMU 42 Dredging Seminar*. June 5–8, 2011. Accessed: September 19, 2019. Available online: https://www.westerndredging.org/phocadownload/ConferencePresentations/2011_Nashville/Session1B-DredgingStudies/1%20-%20Berry%20Rubenstein%20Hinchey%20KleinMacPhee%20Clarke%20-%20Dredging%20Induced%20Effects%20Winter%20Flounder%20Hatching.pdf.

Blickley, J.L., and G.L. Patricelli. 2010. "Impacts of Anthropogenic Noise on Wildlife: Research Priorities for the Development of Standards and Mitigation." *Journal of International Wildlife Law & Policy* 13 (2010): 274–292.

BOEM (Bureau of Ocean Energy Management). 2012. "Gulf of Mexico OCS Oil and Gas Lease Sales: 2012–2017 Western Planning Area Lease Sales 229, 233, 238, 246, and 248 Central Planning Area Lease Sales 227, 231, 235, 241, and 247." *Final Environmental Impact Statement*, Bureau of Ocean Energy Management, Vol. 3: Chapters 6–8, Keyword Index, Figures, Tables, and Appendices.

Bolle, L.J., C.A. de Jong, S.M. Bierman, P.J. van Beek, P.W. Wessels, E. Blom, C.J. van Damme, H.V. Winter, and R.P. Dekeling. 2016. "Effect of Pile-Driving Sounds on the Survival of Larval Fish." *Advances in Experimental Medicine and Biology* 875: 91–100, DOI: 10.1007/978/1-4939-2981-8_11.

Burgess, K.B., L.I.E. Couturier, A.D. Marshall, A.J. Richardson, S.J. Weeks, and M.B. Bennett. 2016. "*Manta birostris*, predator of the deep? Insight into the diet of the giant manta ray through stable isotope analysis." *Royal Society Open Science*, Vol. 3, Issue 11. Online ISSN: 20545703. Accessed: June 4, 2019. Available online: https://royalsocietypublishing.org/doi/full/10.1098/rsos.160717.

Burton, N.H.K., M.M. Rehfisch, and N.A. Clark. 2002. "Impacts of Disturbance from Construction Work on the Densities and Feeding Behavior of Waterbirds using the Intertidal Mudflats of Cardiff Bay, United Kingdom." *Environmental Management* 30: 865–871. December 2002. Available online: https://www.ncbi.nlm.nih.gov/pubmed/12402100.

Butler, C.J., J.B. Tibbits, and J. Wilson. 2015. *Assessing Black Rail Occupancy and Vocalizations Along the Texas Gulf Coast*, Final Report. University of Central Oklahoma. February 16, 2015. Accessed: July 26, 2019. Available online: https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/nongame/grants-research/media/2015-black-rail.pdf.

Calleson C.S., and R.K. Frohlich. 2007. "Slower Boat Speeds Reduce Risks to Manatees." *Endangered Species Research* 3: 295–304.

Caltrans (California Department of Transportation). 2015. *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish*. Report No. CTHWANP-RT- 15-306.01.01. November, 2015.

Canadian Council of Ministers of the Environment. 2006. "Canadian soil quality guidelines for the protection of environmental and human health: Propylene Glycol." *Canadian environmental quality guidelines*, 1999, Canadian Council of Ministers of the Environment, Winnipeg. 2006. Accessed: September 24, 2019. Available online: http://ceqg-rcqe.ccme.ca/download/en/278.

Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. "International Recovery Plan for the Whooping Crane." *Recovery of Nationally Endangered Wildlife (RENEW) and U.S. Fish and Wildlife Service*. Albuquerque, New Mexico.

Center for Biological Diversity. 2011. “Petition to List the Dwarf Seahorse (Hippocampus Zosterae) as Threatened or Endangered Under the Endangered Species Act.” *Center for Biological Diversity*, Before the Secretary of Commerce. Accessed: September 24, 2019. Available online: https://www.biologicaldiversity.org/species/fish/dwarf_seahorse/pdfs/CBDDwarfSeahorsePetition.pdf.

Clark, C.W., W.T. Ellison, B.L. Southall, L. Hatch, S.M. Van Parijs, A. Frankel, and D. Ponirakis. 2009. “Acoustic masking in marine ecosystems: Intuitions, analysis, and implication.” *Marine Ecology Progress Series.* December 2009. Accessed: September 6, 2019. Available online: https://www.researchgate.net/publication/236124127_Acoustic_masking_in_marine_ecosystems_Intuitions_analysis_and_implication.

Coast Guard News. 2019. “Coast Guard, Partner Agencies Assist Entangled Whale.” *Coast Guard News*, August 1, 2019. Accessed: November 19, 2019. Available online: https://coastguardnews.com/coast-guard-partner-agencies-assist-entangled-whale/2019/08/01/.

Copping, A., N. Sather, L. Hanna, J. Whiting, G. Zydlewski, G. Staines, A. Gill, I. Hutchison, A. O’Hagan, T. Simas, J. Bald, C. Sparling, J. Wood, and E. Masden. 2016. “Environmental Effects of Marine Renewable Energy Development Around the World.” *Annex IV, State of the Science Report*. April 2016. Accessed: July 18, 2019. Available online: https://tethys.pnnl.gov/sites/default/files/publications/Annex-IV-2016-State-of-the-Science-Report_MR.pdf.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States*. Washington, D.C.: U.S. Department of the Interior, Fish and Wildlife Service. December 1979. Accessed: June 10, 2019. Available online: https://www.fws.gov/wetlands/Documents/Classification-of-Wetlands-and-Deepwater-Habitats-of-the-United-States.pdf.

Cranford, T.W., and P. Krysl. 2015. “Fin Whale Sound Reception Mechanisms: Skull Vibration Enables Low-Frequency Hearing.” *PLOS ON*, Vol. 10, Issue 1. January 29, 2015. Accessed: June 16, 2019. Available online: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0116222.

De Goeij, P., and P.C. Luttikhuizen. 1998. “Deep-burying reduces growth in intertidal bivalves: field and mesocosm experiments with *Macoma balthica*.” *Journal of Experimental Marine Biology and Ecology,* Vol. 228: 327–337.

Dias, L.A., J. Litz, L. Garrison, A. Martinez, K. Barry, and T. Speakman. 2017. “Exposure of cetaceans to petroleum products following the Deepwater Horizon oil spill in the Gulf of Mexico.” *Endangered Species Research*, Vol. 33: 119–125. Accessed: June 9, 2019. Available online: https://www.int-res.com/abstracts/esr/v33/.

Dooling, R.J., and A.N. Popper. 2016. *Technical Guidance for Assessment and Mitigation of the Effects of Highway and Road Construction Noise on Birds*. California Department of Transportation. June 2016. Accessed: June 18, 2019. Available online: http://www. dot.ca.gov/hq/env/noise/pub/caltransBirdReport_6_15_2016.pdf.

Drewitt, A.L., and R.H.W. Langston. 2006. "Assessing the Impacts of Wind Farms on Birds." *IBIS,* Vol. 148, Issue 1: 29–42. Accessed: November 20, 2019. Available online: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1474-919X.2006.00516.x.

EIA (U.S. Energy Information Administration). 2018. U.S. Gulf Coast Port Limitations Impose Additional Costs on Rising U.S. Crude Oil Exports. May 16, 2018. Accessed: April 9, 2019. Available online: https://www.eia.gov/todayinenergy/detail.php?id=36232.

Erbe, C., C. Reichmuth, K. Cunningham, K. Lucke, and R. Dooling. 2016. "Communication Masking in Marine Mammals: A Review and Research Strategy." *Marine Pollution Bulletin*, Vol. 103, Issue 1-2: 15-38. Accessed: November 18, 2019. Available online: https://www.sciencedirect.com/science/article/pii/S0025326X15302125

Fisheries and Aquaculture (Food and Agriculture Organization of the United States). 2010. *Fishing Technology Equipment. Fish Aggregating Device (FAD)*. Accessed: May 8, 2019. Available online: http://www.fao.org/fishery/equipment/fad/en.

Florida Museum. 2018. *Global Sawfish Encounters Map.* Accessed: June 18, 2019. Available online: https://www.floridamuseum.ufl.edu/sawfish/map/.

Francis, C., and J. Barber. 2013. "A Framework for Understanding Noise Impacts on Wildlife: An Urgent Conservation Priority." *Frontiers in Ecology and the Environment Vol.* 11, Issue 6: 305–313.

Gaspard, J.C., G.B. Bauer, R.L. Reep, K. Dziuk, A. Cardwell, L. Read, and D.A. Mann. 2012. "Audiogram and Auditory Critical Ratios of Two Florida Manatees (*Trichechus manatus latirostris*)." *Journal of Experimental Biology*, Vol. 215: 1442–1447.

Gazioğlu, C., A.E. Müftüoğlu, V. Demir, A. Aksu, and V. Okutan. 2015. "Connection between Ocean Acidification and Sound Propagation." *International Journal of Environment and Geoinformatics*, Vol. 2 Issue 2: 16–26. Accessed: October 19, 2019. Available online: https://www.researchgate.net/publication/283507752_Connection_between_Ocean_Acidification_and_Sound_Propagation.

Germano, J.D., J.H. Parker, and J. Charles. 1994. *Monitoring cruise at the Massachusetts Bay Disposal Site, August 1990*. Waltham, MA: U.S. Army Corps of Engineers, New England Division. Accessed: October 16, 2019. Available online: https://archive.org/details/monitoringcruise01germ.

GMFMC (Gulf of Mexico Fishery Management Council). 2004. *Final Environmental Impact Statement of the Generic Amendment for Addressing Essential Fish Habitat Requirements in the following Fishery Management Plans of the Gulf of Mexico: Shrimp Fishery of the Gulf of Mexico, Red Drum Fishery of the Gulf of Mexico, Reef Fishery of the Gulf of Mexico, Stone Crab Fishery of the Gulf of Mexico, Coral and Coral Reef Fishery of the Gulf of Mexico, Spiny Lobster Fishery of the Gulf of Mexico and South Atlantic, and Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic*. Tampa, Florida: GMFMC. March Accessed: April 18, 2019. Available online: https://gulfcouncil.org/wp-content/uploads/March-2004-Final-EFH-EIS.pdf

GMFMC (Gulf of Mexico Fishery Management Council). 2005. *Final Generic Amendment Number 3 for Addressing Essential Fish Habitat Requirements, Habitat Areas of Particular Concern, and Adverse Effects of Fishing in the following Fishery Management Plans of the Gulf of Mexico: Shrimp Fishery of the Gulf of Mexico, United States Waters Red Drum Fishery of the Gulf of Mexico Reef Fish Fishery of the Gulf of Mexico Coastal Migratory Pelagic Resources (Mackerels) in the Gulf of Mexico and South Atlantic Stone Crab Fishery of the Gulf of Mexico Spiny Lobster in the Gulf of Mexico and South Atlantic Coral and Coral Reefs of the Gulf of Mexico*. Tampa, Florida: GMFMC. Accessed: April 9, 2019. Available online: http://archive.gulfcouncil.org/Beta/GMFMCWeb/downloads/FINAL3_EFH_Amendment.pdf

GMFMC. 2016. *Final Report 5-Year Review of Essential Fish Habitat Requirements*. December 2016. Accessed: April 9, 2019. Available online: http://gulfcouncil.org/wp-content/uploads/EFH-5-Year-Revew-plus-App-A-and-B_Final_12-2016.pdf.

Gower, J.F.R. and S.A. King. 2011. “Distribution of Floating Sargassum in the Gulf of Mexico and the Atlantic Ocean Mapped Using MERIS.” *International Journal of Remote Sensing*. Accessed: January 8, 2020. Available online: https://www.researchgate.net/publication/232973136_Distribution_of_floating_Sargassum_in_the_Gulf_of_Mexico_and_the_Atlantic_Ocean_mapped_using_MERIS.

Harnois, V., H.C.M. Smith, S. Benjamins, and L. Johanning. 2015. “Assessment of Entanglement Risk to Marine Megafauna Due to Offshore Renewable Energy Mooring Systems.” *International Journal of Marine Energy* 11, doi: 10.1016/j.ijome.2015.04.001.

Hawkes, L.A., A.C. Broderick, M.H. Godfrey, and B.J. Godley. 2009. “Climate Change and Marine Turtles.” *Endangered Species Research,* Vol. 7: 137–154.

Henry, J.A., R.P.E. Yanong, M.P. McGuire, and J.T. Patterson. 2018. “A Guide to Common Stony Corals of Florida.” Florida: UF, IFAS (University of Florida, Institute of Food and Agricultural Sciences). October 2018. Accessed: September 11, 2019. Available online: https://edis.ifas.ufl.edu/fa210.

Hester, K.C., E.T. Peltzer, W.J. Kirkwood, and P.G. Brewer. 2008. “Unanticipated consequences of ocean acidification: A noisier ocean at lower pH.” *Geophysical Research Letters*, Vol. 35, Issue 19. DOI: 10.1029/2008GL034913. October 1, 2008. Accessed: September 25, 2019. Available online: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2008GL034913.

Heupel, M.R., J.K. Carlson, and C.A. Simpfendorfer. 2007. “Shark nursery areas: concepts, definition, characterization and assumptions.” *Marine Ecology Progress Series,* Vol. 337: 287–297. May 14, 2007. Accessed: June 4, 2019. Available online: https://www.int-res.com/articles/meps2007/337/m337p287.pdf.

Hildebrand, J.A. 2005. “Impacts of Anthropogenic Sound.” *Marine Mammal Research: Conservation Beyond Crisis*. Baltimore, Maryland: Johns Hopkins University Press, 101–124. Accessed: September 25, 2019. Available online: http://www.cetus.ucsd.edu/sio133/PDF/HildebrandJHU-MMR2005.pdf.

Hoar, W.S., M.H.A. Keenleyside, and R.G. Goodall. 1957. "Reaction of Juvenile Pacific Salmon to Light." *Journal of the Fisheries Research Board of Canada*, Vol. 14, Issue 6: 815–830. April 13, 2011. Accessed: October 7, 2019. Available online: https://www.nrcresearchpress.com/doi/abs/10.1139/f57-036#.XZtMFlVKiCh.

Hughes, T.P., K.D. Anderson, S.R. Connolly, S.F. Heron, J.T. Kerry, J.M. Lough, A.H. Baird, J.K. Baum, M.L. Berumen, T.C. Bridge, D.C. Claar, C.M. Eakin, J.P. Gilmour, N.A.J. Graham, H. Harrison, J.-P.A. Hobbs, A.S. Hoey, M. Hoogenboom, R.J. Lowe, M.T. McCulloch, J.M. Pandolfi, M. Pratchett, V. Schoepf, G. Torda, and S.K. Wilson. 2018. "Spatial and temporal patterns of mass bleaching of corals in the Anthropocene." *Science*, Vol. 359: 80–83.

Incardona, J.P., T.L. Swarts, R.C. Edmunds, T.L. Linbo, A. Aquilina-Beck, C.A. Sloan, L.D. Gardner, B.A. Block, and N.L. Scholz. 2013. "Exxon Valdez to Deepwater Horizon: Comparable toxicity of both crude oils to fish early life stages." *Aquatic Toxicology*, Vol. 142–143: 303–316. Accessed: June 16, 2019. Available online: https://www.researchgate.net/publication/257248492_Exxon_Valdez_to_Deepwater_Horizon_Comparable_toxicity_of_both_crude_oils_to_fish_early_life_stages.

IWC (International Whaling Commission). 2014. *Ship Strike Database*. January 17, 2014. Accessed: April 30, 2018. Available online: https://iwc.int/ship-strikes.

Jefferson, T.A., and A.J. Schiro. 1997. "Distribution of cetaceans in the offshore Gulf of Mexico." *Mammal Review* Vol. 27: 27–50. Accessed: June 10, 2019. Available online: https://swfsc.noaa.gov/uploadedFiles/Divisions/PRD/Publications/Jefferson_Schiro1997(39).pdf.

Jensen, A.S., and G.K. Silber. 2004. "Large Whale Ship Strike Database." U.S. Department of Commerce: *NOAA Technical Memorandum* NMFS-OPR-25, 1–37. January 1, 2004. Accessed: June 12, 2019. Available online: https://www.fisheries.noaa.gov/resource/document/large-whale-ship-strike-technical-report-2004.

Jørgensen, R., N.O. Handegard, H. Gjøsæter, and A. Slotte. 2004. "Possible vessel avoidance behavior of capelin in a feeding area and on a spawning ground." *Fisheries Research*, Vol. 69, Issue 2: 251–261.

Kannan, K., and E. Perrotta. 2008. "Polycyclic aromatic hydrocarbons (PAHs) in livers of California sea otters." *Chemosphere*, Vol. 71: 649–655. Accessed: October 15, 2019. Available online: http://www.otterproject.org/wp-content/uploads/2012/05/Kannan_etal_2008_Polycyclic_aromatic_hydrocarbons_in_livers_of_CA_sea_otters.pdf.

Kjelland, M.E., C.M. Woodley, T.M. Swannack, and D.L. Smith. 2015. "A Review of the Potential Effects of Suspended Sediment on Fishes: Potential Dredging-Related Physiological, Behavioral, and Transgenerational Implications." *Environment Systems and Decisions*, Vol. 35, Issue 3: 334–350. Accessed: June 12, 2019. Available online: https://link.springer.com/article/10.1007/s10669-015-9557-2.

Kleist, N.J., R.P. Guralnick, A. Cruz, C.A. Lowry, and C.D. Francis. 2018. "Chronic Anthropogenic Noise Disrupts Glucocorticoid Signaling and Has Multiple Effects on Fitness in an Avian Community." *Proceedings of the National Academy of Sciences*, Vol. 115, Issue 9: E648–E657.

Laist, D.W., and C. Shaw. 2006. “Preliminary Evidence That Boat Speed Restrictions Reduce Deaths of Florida Manatees.” *Marine Mammal Science*, Vol. 22, Issue 2: 472–479.

Langhamer, O. 2012. “Artificial Reef Effect in relation to Offshore Renewable Energy Conversion: State of the Art.” The Scientific World Journal, DOI: 10.1100/2012/386713. December 2012. Accessed: July 18, 2019. Available online: https://www.researchgate.net/publication/234158750_Artificial_Reef_Effect_in_relation_to_Offshore_Renewable_Energy_Conversion_State_of_the_Art.

Lauritsen, A.M., P.M. Dixon, D. Cacela, B. Brost, R. Hardy, S.L. MacPherson, A. Meylan, B.P. Wallace, and B. Witherington. 2017. “Impact of the *Deepwater Horizon* Oil Spill on Loggerhead Turtle *Caretta* Nest Densities in Northwest Florida.” *Endangered Species Research*, Vol. 33: 83–93.

Lawson, J.M., S.V. Fordham, M.P. O’Malley, L.N.K Davidson, R.H.L. Walls, M.R. Heupel, G. Stevens, D. Fernando, A. Budziak, C.A. Simpfendorfer, I. Ender, M. P. Francis, G. Notabartolo di Sciara, and N.K Dulvy. 2017. “Sympathy for the devil: a conservation strategy for devil and manta rays.” *PeerJ*, Vol. 5, Issue 5. March 2017. Accessed: June 4, 2019. Available online: https://www.researchgate.net/publication/315059287_Sympathy_for_the_devil_A_conservation_strategy_for_devil_and_manta_rays.

Lewis, T.E., and R.D. Slack. 2008. “Whooping Cranes and Human Disturbance: An Historical Perspective and Literature Review.” *North American Crane Workshop Proceedings*, 182. Available online: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1182&context=nacwgproc.

Houston, Linden. 2019. Email vessel data provided from Linden Houston, MARAD, to Amanda Gregory, Project Manager, Environmental Resources Management. July 26, 2019.

MARAD (Maritime Administration). 2013. *Vessel Calls Snapshot, 2011*. Washington, D.C.: US Department of Transportation, Office of Policy Plans. March 2013. Accessed: June 6, 2019. Available online: https://www.maritime.dot.gov/sites/marad.dot.gov/files/docs/outreach/data-statistics/6826/vesselcallsatusportssnapshot.pdf.

Marchesan, M., M. Spoto, L. Verginella, and E.A. Ferrero. 2005. “Behavioural effects of artificial light on fish species of commercial interest.” *Fisheries Research*, Vol. 73: 171–185. June 2005. Accessed: October 7, 2019. Available online: https://www.sciencedirect.com/science/article/abs/pii/S0165783604003133.

Marine Mammal Commission. 2017. “North Atlantic Right Whale Session Summary.” *Marine Mammal Commission 2017 Annual Meeting*. April 5–7, 2017. Accessed: October 7, 2019. Available online: https://www.mmc.gov/wp-content/uploads/2017-MMC-Right-Whale-Session-Summary.pdf.

Miksis-Olds, J.L., P.L. Donaghay, J.H. Miller, P.L. Tyack, and J.A. Nystuen. 2007. “Noise Level Correlates with Manatee Use of Foraging Habitats.” *Journal of the Acoustical Society of America*, Vol. 121, Issue 5: 3011–3020.

Miller, M.H., and C. Klimovich. 2017. “Endangered Species Act Status Review Report: Giant Manta Ray (*Manta birostris*) and Reef Manta Ray (*Manta alfredi*).” Silver Spring, MD*: Report to National Marine Fisheries Service, Office of Protected Resources*. September 1, 2017. Accessed: June 3, 2019. Available online: https://www.fisheries.noaa.gov/resource/document/endangered-species-act-status-review-report-giant-manta-ray-manta-birostris-reef.

Mirji, Captain M.G. 2018. “Single Point Mooring: SPM Operations.” Accessed January 8, 2020. Available online: https://cultofsea.com/tanker/spm-single-point-mooring/.

Mitson, R.B., and H.P. Knudsen. 2003. “Causes and effects of underwater noise on fish abundance estimation.” *Aquatic Living Resources,* Vol.16, Issue 3: 255–263.

MLRC (Multi-Resolution Land Characteristics Consortium). 2019. “National Land Cover Database 2016 Land Cover Coterminous United States (raster geospatial data).” *United States Geological Survey*. Updated: May 2019. Accessed: May 2019. Available online: https://www.mrlc.gov/data.

MMS (U.S. Department of the Interior, Minerals Management Service). 2001. “Brief Overview of Gulf of Mexico OCS Oil and Gas Pipelines: Installation, Potential Impacts, and Mitigation Measures.” New Orleans, LA: *OCS Report*, MMS 2001-067. August 2001. Accessed: April 19, 2019. Available online: https://www.boem.gov/BOEM-Newsroom/Library/Publications/2001/2001-067.aspx.

Mullin, K.D., D. Engelhaupt, C.E. Cates, and N.B. Barros. 2015. Sperm Whale Research in the Gulf of Mexico. Accessed: June 7, 2019. Available online: https://www.researchgate.net/publication/267296014_Sperm_Whale_Research_in_the_Gulf_of_Mexico.

Murray, P.M., and H.L. Saffert. 1999. “Monitoring Cruises at the Western Long Island Sound Disposal Site September 1997 and March 1998.” US Army Corps of Engineers: *Disposal Area Monitoring System.* Accessed: October 16, 2019. Available online: https://pdfs.semanticscholar.org/d914/027b1bbb4b13a9f6f175cc4f9f9248120641.pdf.

NatureServe. 2019a. NatureServe Explorer. Version 7.1, data last updated March 2019. Accessed: July 29, 2019. Available online: http://explorer.natureserve.org/servlet/NatureServe?post_processes=PostReset&loadTemplate=nameSearchSpecies.wmt&Type=Reset.

NatureServe. 2019b. Pillar Coral. Accessed: September 11, 2019. Available online: http://explorer.natureserve.org/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTemplate=species_RptComprehensive.wmt&selectedReport=RptComprehensive.wmt&summaryView=tabular_report.wmt&elKey=115639&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=115639&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=115639.

NCDEQ (North Carolina Department of Environmental Quality). 2016. North Carolina Coastal Habitat Protection Plan. Morehead City, NC. Division of Marine Fisheries. 33 p. Accessed: July 30, 2019. Available online: https://files.nc.gov/apnep/documents/files/2016_CHPP_Final.pdf.

Nedwell, J.R., A.G. Brooker, and R.J. Barham. 2012. *Underwater Noise Modelling Technical Report*, Report No. E318R0106. Accessed: June 14, 2019. Available online: https://sse.com/media/341124/ES-Volume-4-Annex-7A-7B-Wind-Farm-and-OfTW-Underwater-Noise.pdf.

Newell, R.C., L.D. Seiderer, and D.R. Hitchcock. 1998. "The impact of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources in the sea bed." *Oceanography and Marine Biology: an Annual Review,* Vol. 36: 127–178.

NOAA (National Oceanic and Atmospheric Administration). 2019a. How Oil Spills Affect Fish and Whales. Accessed: June 17, 2019. Available online: https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/how-oil-spills-affect-fish-and-whales.html.

NOAA. 2019b. Large 'dead zone' measured in Gulf of Mexico. August 1, 2019. Accessed: October 3, 2019. Available online: https://www.noaa.gov/media-release/large-dead-zone-measured-in-gulf-of-mexico.

NOAA Fisheries. 2009. Recovery Plan for Smalltooth Sawfish (*Pristis pectinata*). Prepared by the Smalltooth Sawfish Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. Accessed: June 18, 2019. Available online: https://repository.library.noaa.gov/view/noaa/15983.

NOAA Fisheries. 2010a. Recovery Plan for the Fin Whale (*Balaenoptera physalus*). National Marine Fisheries Service, Silver Spring, MD. 121 pp. Accessed: June 6, 2019. Available online: https://repository.library.noaa.gov/view/noaa/4952.

NOAA Fisheries. 2010b. Recovery Plan for the sperm whale (*Physeter microcephalus*). National Marine Fisheries Service, Silver Spring, MD. 165 pp. Accessed: June 9, 2019. Available online: https://repository.library.noaa.gov/view/noaa/15976.

NOAA Fisheries. 2011. Final Recovery Plan for the Sei Whale (*Balaenoptera borealis*). National Marine Fisheries Service, Office of Protected Resources, Silver Spring, MD. 108 pp. Accessed: June 7, 2019. Available online: https://repository.library.noaa.gov/view/noaa/15977.

NOAA Fisheries. 2013a. Biological Report on the Designation of Marine Critical Habitat for the Loggerhead Sea Turtle, *Caretta caretta*. Accessed: May 16, 2019. Available online: https://repository.library.noaa.gov/view/noaa/16867.

NOAA Fisheries. 2013b. North Atlantic Right Whale Factsheet. Accessed: June 10, 2019. Available online: https://sero.nmfs.noaa.gov/protected_resources/outreach_and_education/documents /rightwhale_factsheet.pdf.

NOAA Fisheries. 2014a. *Jacksonville Harbor Deepening and Widening Project Biological Opinion*. SER-2013-10716. Accessed: June 13, 2019. Available online:https://pcts.nmfs.noaa.gov/pcts-web/publicAdvancedQuery.pcts.

NOAA Fisheries. 2014b. Loggerhead Turtle—Northwest Atlantic Ocean DPS Critical Habitat Map. Accessed: April 24, 2019. Available online: https://www.fisheries.noaa.gov/resource/map/logger head-turtle-northwest-atlantic-ocean-dps-critical-habitat-map.

NOAA Fisheries. 2016a. Sperm Whale (Physeter microcephalus): Norther Gulf of Mexico Stock. Accessed: June 9, 2019. Available online: https://www.nefsc.noaa.gov/publications/tm /tm238/255_f2015_spermGmex.pdf.

NOAA Fisheries. 2016b. Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-55.

NOAA Fisheries. 2017a. Understanding Vessel Strikes. Accessed: June 12, 2019. Available online: https://www.fisheries.noaa.gov/insight/understanding-vessel-strikes.

NOAA Fisheries. 2017b. Final Amendment 10 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan: Essential Fish Habitat and Environmental Assessment. Accessed: January 8, 2020. Available online: https://www.habitat.noaa.gov/application/efhinventory/docs/a10_hms_efh.pdf#page=340.

NOAA Fisheries. 2018a. Deepwater Horizon Oil Spill 2010—Sea Turtles, Dolphins, and Whales. Accessed: June 17, 2019. Available online: https://www.fisheries.noaa.gov/national/marine-life-distress/deepwater-horizon-oil-spill-2010-sea-turtles-dolphins-and-whales.

NOAA Fisheries. 2018b. Essential Fish Habitat—Data Inventory. Accessed: May 2019. Available online: https://www.habitat.noaa.gov/application/efhinventory/index.html.

NOAA Fisheries. 2018c. North Atlantic Right Whale (*Eubalaena glacialis*): Western Atlantic Stock. Accessed: June 10, 2019. Available online: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-species-stock.

NOAA Fisheries. 2018d. Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59.

NOAA Fisheries. 2019a. Dwarf Seahorse. Accessed: September 27, 2019. Available online: https://www.fisheries.noaa.gov/species/dwarf-seahorse.

NOAA Fisheries. 2019b. Elkhorn Coral. Accessed: August 1, 2019. Available online: https://www.fisheries.noaa.gov/species/elkhorn-coral.

NOAA Fisheries. 2019c. Fin Whale. Accessed: June 7, 2019. Available online: https://www.fisheries.noaa.gov/species/fin-whale.

NOAA Fisheries. 2019d. Giant Manta Ray. Accessed: June 18, 2019. Available online: https://www.fisheries.noaa.gov/species/giant-manta-ray.

NOAA Fisheries. 2019e. Green Turtle. Accessed: June 17, 2019. Available online: https://www.fisheries.noaa.gov/species/green-turtle.

NOAA Fisheries. 2019f. Gulf of Mexico Bryde's Whale. Accessed: June 6, 2019. Available online: https://www.fisheries.noaa.gov/species/gulf-mexico-brydes-whale.

NOAA Fisheries. 2019g. Gulf Sturgeon. Accessed: April 24, 2019. Available online: https://www.fisheries.noaa.gov/species/gulf-sturgeon.

NOAA Fisheries. 2019h. Hawksbill Turtle. Accessed: June 17, 2019. Available online: https://www.fisheries.noaa.gov/species/hawksbill-turtle.

NOAA Fisheries. 2019i. Kemp's Ridley Turtle. Accessed: June 17, 2019. Available online: https://www.fisheries.noaa.gov/species/kemps-ridley-turtle.

NOAA Fisheries. 2019j. Leatherback Turtle. Accessed: June 17, 2019. Available online: https://www.fisheries. noaa.gov/species/leatherback-turtle.

NOAA Fisheries. 2019k. Loggerhead Turtle. Accessed: June 17, 2019. Available online: https://www.fisheries.noaa.gov/species/loggerhead-turtle.

NOAA Fisheries. 2019l. Nassau Grouper. Accessed: June 18, 2019. Available online: https://www.fisheries.noaa.gov/species/nassau-grouper.

NOAA Fisheries. 2019m. NOAA Right Whale Sighting Advisory System. Accessed: June 10, 2019. Available online: https://www.nefsc.noaa.gov/psb/surveys/MapperiframeWithText.html.

NOAA Fisheries. 2019n. North Atlantic Right Whale. Accessed: June 12, 2019. Available online: https://www.fisheries.noaa.gov/species/north-atlantic-right-whale.

NOAA Fisheries. 2019o. Oceanic Whitetip Shark. Accessed: October 7, 2019. Available online: https://www.fisheries.noaa.gov/species/oceanic-whitetip-shark.

NOAA Fisheries. 2019p. Sei Whale. Accessed: June 12, 2019. Available online: https://www.fisheries.noaa.gov/species/sei-whale.

NOAA Fisheries. 2019q. Smalltooth Sawfish. Accessed: June 18, 2019. Available online: https://www.fisheries.noaa.gov/species/smalltooth-sawfish.

NOAA Fisheries. 2019r. Species Directory, ESA Threatened & Endangered. Accessed: April 12, 2019. Available online: https://www.fisheries.noaa.gov/species-directory/threatened-endangered.

NOAA Fisheries. 2019s. Sperm Whale. Accessed: June 9, 2019. Available online: https://www.fisheries.noaa.gov/species/sperm-whale.

NOAA Fisheries. 2019t. Staghorn Coral. Accessed: August 1, 2019. Available online: https://www.fisheries.noaa.gov/species/staghorn-coral.

NOAA Fisheries, Alaska Regional Office. 2017. "NOAA-Trained Team Hopeful Strategic Cut Freed an Entangled Humpback Whale near Tracy Arm." Accessed: November 18, 2019. Available online: https://alaskafisheries.noaa.gov/node/56901.

NOAA Fisheries (National Oceanic and Atmospheric Administration, National Marine Fisheries Service) and USFWS (U.S. Fish and Wildlife Service). 1998. Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (*Dermochelys coriacea*). National Marine Fisheries Service, Silver Spring, MD.

NOAA Fisheries (National Oceanic and Atmospheric Administration, National Marine Fisheries Service) and USFWS (U.S. Fish and Wildlife Service). 2008. Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (*Caretta caretta*), Second Revision. National Marine Fisheries Service, Silver Spring, MD.

NOAA Fisheries (National Oceanic and Atmospheric Administration, National Marine Fisheries Service), U.S. Fish and Wildlife Service, and Secretary of Environment and Natural Resources, Mexico (SEMARNAT). 2011. BiNational Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), Second Revision. National Marine Fisheries Service. Silver Spring, Maryland.

NOAA (National Oceanic and Atmospheric Administration) Marine Debris Program. 2014a. Ingestion, Occurrence and Health Effects of Anthropogenic Debris Ingested by Marine Organisms. Accessed: November 20, 2019. Available online: https://marinedebris.noaa.gov/reports-and-technical-memos.

NOAA (National Oceanic and Atmospheric Administration) Marine Debris Program. 2014b. "Report on the Entanglement of Marine Species in Marine Debris with an Emphasis on Species in the United States." Accessed: November 19, 2019. Available online: https://marinedebris.noaa.gov/sites/default/files/mdp_entanglement.pdf.

NOAA NOS (National Ocean Service). 2010. Oil and Sea Turtles; Biology, Planning, and Response. Accessed: June 18, 2019. Available online: https:// response.restoration.noaa.gov/sites/default /files/Oil_Sea_Turtles.pdf.

NOAA NOS. 2018. What is lightering? Accessed: April 16, 2019. Available online: https://oceanservice.noaa.gov/facts/lightering.html.

NOAA, Office for Coastal Management. 2019. 2017 Vessel Counts by Type. Accessed: September 10, 2019. Available online: https://inport.nmfs.noaa.gov/inport/item/55363.

NOAA ORR (National Oceanic and Atmospheric Administration, Office of Response and Restoration). 2019. The Wide and Oily Sargasso Sea. Accessed: October 20, 2019. Available online: https://response.restoration.noaa.gov/about/media/what-happens-when-oil-spills-meet-massive-islands-seaweed.html.

Nowacek, D.P., M.P. Johnson, and P.L. Tyack. 2003. "North Atlantic right whales (*Eubalaena glacialis*) ignore ships but respond to alerting stimuli." *The Royal Society*. Accessed: June 14, 2019. Available online: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1691586/pdf/15058431.pdf.

NPS (National Park Service). 2018. The Hawksbill Sea Turtle, Padre Island National Seashore, Texas. Accessed: June 13, 2019. Available online: https://www.nps.gov/pais/learn/nature/hawksbill.htm.

NRC (National Research Council). 2003. *Oil in the Sea III: Inputs, Fates, and Effects*. Washington, DC: The National Academies Press. Available online: https://doi.org/10.17226/10388.

Olayinka, O.O., A.A. Adewusi, O.O. Olarenwaju, and A.A. Aladesida. 2018. "Concentration of Polycyclic Aromatic Hydrocarbons and Estimated Human Health Risk of Water Samples Around Atlas Cove, Lagos, Nigeria." *Journal of Health and Pollution*. Accessed: November 12, 2019. Available online: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6285678/.

Ona, E., and O.R. Godø. 1990. "Fish reaction to trawling noise: the significance for trawl sampling." *Rapports et Procès-Verbaux des Réunions*, Vol. 189: 159–166.

Ona, E., O.R. Godø, N.O. Handegard, V. Hjellvik, R. Patel, and G. Pedersen. 2007. "Silent research vessels are not quiet." *Journal of the Acoustical Society of America*, Vol. 121: 145–150.

Pearse, A.T., M. Rabbe, M.T. Bidwell, L.M. Juliusson, L. Craig-Moore, D.A. Brandt, and W. Harrell. 2018. "Map of Whooping Crane Migration Corridor." *U.S. Geological Survey Data Release*. Accessed: June 13, 2019. Available online: https://www.sciencebase.gov/catalog/item/5a314a72e4b08e6a89d707e0.

PHMSA (Pipeline and Hazardous Materials Safety Administration). 2019. Serious Incidents-Hazardous Liquids. Accessed: January 10, 2019. Available online: https://www.phmsa.dot.gov/data-and-statistics/pipeline/source-data.

Picher-Labrie, J. 2019. "Do Planes and Helicopters Disturb Whales?" Accessed: November 20, 2019. Available online: https://baleinesendirect.org/en/do-planes-and-helicopters-disturb-whales/.

Pike, D.A. 2008. "Natural Beaches Confer Fitness Benefits to Nesting Marine Turtles." *Biology Letters*, Vol. 4: 704–706.

Popper, A.N., and M.C. Hastings. 2009. "Review Paper. The effects of anthropogenic sources of sound on fish." *Journal of Fish Biology*, Vol.75: 455–489.

Popper, A.N., A.D. Hawkins, R.R. Fay, D.A. Mann, S. Bartol, T.J. Carlson, S. Coombs, W.T. Ellison, R.L. Gentry, M.B. Halvorsen, S. Løkkeborg, P.H. Rogers, B.L. Southall, D.G. Zeddies, and W.N. Tavolga. 2014. "Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI." *Acoustical Society of America*. Accessed: October 7, 2019. Available online: https://searchworks.stanford.edu/view/10564897.

Prakash, V., T. Smith, N. Rehmatulla, J. Mitchell, and R. Adland. 2016. "Revealed preferences for energy efficiency in the shipping markets." DOI: 10.13140/RG.0.0.08444.69766. September 2016. Accessed: June 13, 2019. Available online: https://www.researchgate.net/publication/312041816_Revealed_preferences_for_energy_efficiency_in_the_shipping_markets.

Rhoads, D., P.L. Mccall, and J.Y. Yingst. 1978. "Disturbance and Production on the Estuarine Seafloor." *American Scientist,* Vol. 66, Issue 5: 577–586. Accessed: October 16, 2019. Available online: https://www.researchgate.net/publication/230888810_Disturbance_and_Production_on_the_Estuarine_Seafloor.

Richardson, W.J., C.R. Greene, C.I. Malme, D.H. Thomson, S.E. Moore, and B. Wursig. 1995. Marine Mammals and Noise. San Diego, California: Academic Press.

Rolland, R.M., S.E. Parks, K.E. Hunt, M. Castellote, P.J. Corkeron, D.P. Nowacek, S.K. Wasser, and S.D. Kraus. 2012. "Evidence that ship noise increases stress in right whales." *Proceedings of the Royal Society B, Biological Sciences.* February 8, 2012. Accessed: September 25, 2019. Available online: https://royalsocietypublishing.org/doi/full/10.1098/rspb.2011.2429.

Romano, T.A., M.J. Keogh, C. Kelly, P. Feng, L. Berk, C.E. Schlundt, D.A. Carder, and J.J. Finneran. 2004. "Anthropogenic sound and marine mammal health: Measures of the nervous and immune systems before and after intense sound exposure." *Canadian Journal of Fisheries and Aquatic Sciences*, Vol. 61, Issue 7: 1124–1134. Accessed: September 6, 2019. Available online: https://www. researchgate.net/publication/255588954_Anthropogenic_sound_and_marine_mammal_health_Measures_of_the_nervous_and_immune_systems_before_and_after_intense_sound_exposure.

Rosel, P.E., P. Corkeron, L. Engleby, D. Epperson, K.D. Mullin, M.S. Soldevilla, and B.L. Taylor. 2016. "Status Review of Bryde's Whales (*Balaenoptera edeni*) in the Gulf of Mexico under the Endangered Species Act." *NOAA Technical Memorandum* NMFS-SEFSC-692. DOI:10.7289/V5/TM-SEFSC-692. Accessed: June 5, 2019. Available online: https://repository.library.noaa.gov/view/noaa/14180.

Ross, S.T., W.T. Slack, R.J. Heise, M.A. Dugo, H. Rogillio, B.R. Bowen, P. Mickle, and R.W. Heard. 2009. "Estuarine and Coastal Habitat Use of Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) in the North-Central Gulf of Mexico." *Estuaries and Coasts*, Vol. 32: 360–374. March 2009. DOI: 10.1007/s12237-008-9122-z. Accessed: April 24, 2019. Available online: https://www.researchgate.net/publication/225468853_Estuarine_and_Coastal_Habitat_Use_of_Gulf_Sturgeon_Acipenser_oxyrinchus_desotoi_in_the_North-Central_Gulf_of_Mexico.

Røstad, A., S. Kaartvedt, T.A. Klevjer, and W. Melle. 2006. "Fish are attracted to vessels." *ICES Journal of Marine Science*, Vol. 63:1431–1437.

Salmon, M. 2003. "Artificial Night Lighting and Sea Turtles." *Biologist*, Vol. 50, Issue 4. August 2003. Accessed: June 17, 2019. Available online: https://www.researchgate.net/publication/283857765_Artificial_night_lighting_and_sea_turtles.

Sammarco, P.W., and G.S. Borland. 2014. "Coral Communities on artificial reefs in the Gulf of Mexico: Standing vs. toppled oil platforms." *ICES Journal of Marine Science*, Vol. 71, Issue 2: 417–426. January 2014. Accessed: July 10, 2019. Available online: https://www.researchgate.net/publication/260709752_Coral_communities_on_artificial_reefs_in_the_Gulf_of_Mexico_Standing_vs_toppled_oil_platforms.

Samuel, Y., S.J. Morreale, C.W. Clark, C.H. Greene, and M.E. Richmond. 2005. *Underwater, low-frequency noise in coastal sea turtle habitat*. Acoustical Society of America. March 2005. Accessed: September 27, 2019. Available online: https://pdfs.semanticscholar.org/a796/94f5efbd8d6ad82861a1a053f859185085cf.pdf.

Schroeder, J., S. Nakagawa, I.R. Cleasby, and T. Burke. 2012. "Passerine Birds Breeding under Chronic Noise Experience Reduced Fitness." *PLOS ONE,* Vol. 7, Issue 6. July 11, 2012.

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. "Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations." *Aquatic Mammals,* Vol. 33, Issue 4: 1–121. Accessed: September 6, 2019. Available online: https://tethys.pnnl.gov/publications/marine-mammal-noise-exposure-criteria-initial-scientific-recommendations.

SPOT (Sea Port Oil Terminals, LLC). 2019a. Application.

SPOT (Sea Port Oil Terminals, LLC). 2019b. Response to Information Request #105. June 24, 2019.

SPOT (Sea Port Oil Terminals, LLC). 2019c. Response to Information Request #48, *Sediment Transport Modeling*. August 5, 2019; and Follow-up Information Request #206 and Information Request #220. October 1, 2019.

SPOT (Sea Port Oil Terminals, LLC). 2019d. Response to Information Request #185. September 20, 2019.

SPOT (Sea Port Oil Terminals, LLC). 2019e. Response to Information Request #40. May 7, 2019

SPOT (Sea Port Oil Terminals, LLC). 2019f. Response to Information Request #224. *Acoustic Analysis and Mitigation Plan for Marine Mammals*. September 20, 2019.

SPOT (Sea Port Oil Terminals, LLC). 2019g. Response to Information Request #20 (May 27, 2019), #21 (August 5, 2019), #113 (August 5, 2019), and #210 (October 1, 2019).

SPOT (Sea Port Oil Terminals, LLC). 2019h. Response to Information Request #166, *Spill Risk Analysis*. July 30, 2019.

SPOT (Sea Port Oil Terminals, LLC). 2019i. Response to Information Request #68, #70, and #72. May 27, 2019.

SPOT (Sea Port Oil Terminals, LLC). 2019j. Response to Information Request #30. *Revegetation Plan*. May 27, 2019.

SPOT (Sea Port Oil Terminals, LLC). 2019k. Response to Information Request #26. *Ichthyoplankton Impact Assessment.* October 28, 2019.

SPOT (Sea Port Oil Terminals, LLC). 2019l. Response to Information Request #106. *Water Discharge Modeling.* August 5, 2019.

SERO (Southeast Regional Office), NOAA Fisheries (National Oceanic and Atmospheric Administration, National Marine Fisheries Service). 2019. *Take Pleasure in Protecting Our Treasures; Help Prevent Extinction of the North Atlantic Right Whale*. Accessed: June 14, 2019. Available online: https://sero.nmfs.noaa.gov/protected_resources/outreach_and_education/documents/help_prevent_extinction_rightwhales.pdf.

Shaver, Donna. 2019. Email interview with Donna Shaver, NPS, and Janet Nunley, Environmental Resources Management. April 29, 2019.

Shaver, Donna. 2019. Email Interview with Donna Shaver, NPS, and Janet Nunley, Environmental Resources Management. October 1, 2019.

Ship and Bunker News Team. 2015. VLCCs Steaming at Their Fastest Since 2012. Accessed: June 12, 2019. Available online: https://shipandbunker.com/news/world/556711-vlccs-steaming-at-their-fastest-since-2012.

Soldevilla, M.S., J.A. Hildebrand, K.E. Frasier, L.A. Dias, A. Martinez, K.D. Mullin, P.E. Rosel, and L.P. Garrison. 2017. "Spatial distribution and dive behavior of Gulf of Mexico Bryde's whales: potential risk of vessel strikes and fisheries interactions." *Endangered Species Research*, Vol. 32: 533–550. Accessed: June 6, 2019. Available online: https://repository.library.noaa.gov/view/noaa/16050.

Stacy, N.I., C.L. Field, L. Staggs, R.A. MacLean, B.A. Stacy, J. Keene, D. Cacela, C. Pelton, C. Cray, M. Kelley, S. Holmes, and C.J. Innis. 2017. "Clinicopathological findings in sea turtles assessed during the Deepwater Horizon oil spill response." *Endangered Species Research*, Vol. 33: 25–37. Accessed: June 9, 2019. Available online: https://www.int-res.com/abstracts/esr/v33/.

Stewart, J.D., M. Nuttall, E.L. Hickerson, and M.A. Johnston. 2018. "Important juvenile manta ray habitat at Flower Garden Banks National Marine Sanctuary in the northwestern Gulf of Mexico." *Marine Biology*, Vol. 165: 111, 8 pp. June 15, 2018.

STSSN (Sea Turtle Stranding and Salvage Network). 2018. Weekly Reports. Accessed: June 17, 2019. Available online: https://grunt.sefsc.noaa.gov/stssnrep/SeaTurtleReportI.do?action=reportquery.

STSSN. 2019. Weekly Reports. Accessed: June 17, 2019. Available online: https://grunt.sefsc.noaa.gov/stssnrep/SeaTurtleReportI.do?action=reportquery.

Takeshita, R., L. Sullivan, C. Smith, T. Collier, A. Hall, T. Brosnan, T. Rowles, and L. Schwacke. 2017. "The Deepwater Horizon oil spill marine mammal injury assessment." *Endangered Species Research*, Vol. 33: 95–106. Accessed: June 9, 2019. Available online: https://www.int-res.com/abstracts/esr/v33/.

Texas A&M. 2019. The Texas Breeding Bird Atlas, Black Rail. Accessed: July 26, 2019. Available online: https://txtbba.tamu.edu/species-accounts/black-rail/.

TPWD (Texas Parks and Wildlife Division). 2005a. Leatherback Sea Turtle (*Dermochelys coriacea*). Accessed: June 17, 2019. Available online: https://tpwd.texas.gov/huntwild/wild/species/lethback/.

TPWD. 2005b. Loggerhead Sea Turtle (*Caretta caretta*). Accessed: June 17, 2019. Available online: https://tpwd.texas.gov/huntwild/wild/species/logghead/.

TPWD. 2015. Geographic Information Systems/Seagrass. Accessed: May 14, 2019. Available online: https://tpwd.texas.gov/gis/.

TPWD 2017. Texas Ecoregions. Accessed: April 9, 2019. Available online: https://tpwd.texas.gov/education/hunter-education/online-course/wildlife-conservation/texas-ecoregions.

TPWD. 2019a. Green Sea Turtle (*Chelonia mydas*). Accessed: June 13, 2019. Available online: https://tpwd.texas.gov/huntwild/wild/species/greentur/.

TPWD. 2019b. Hawksbill Sea Turtle (*Eretmochelys imbricata*). Accessed: June 13, 2019. Available online: https://tpwd.texas.gov/huntwild/wild/species/seaturtle/.

TPWD. 2019c. Leatherback Sea Turtle (*Dermochelys coriacea*). Accessed: June 13, 2019. Available online: https://tpwd.texas.gov/huntwild/wild/species/lethback/.

TPWD. 2019d. Texas Prairie Dawn. Accessed: October 7, 2019. Available online: https://tpwd.texas.gov /huntwild/wild/wildlife_diversity/nongame/listed-species/plants/texas_prairie_dawn.phtml.

TPWD. 2019e. TPWD Seagrass Viewer. Accessed: June 13, 2019. Available online: https://tpwd.texas. gov/landwater/water/habitats/seagrass/.

URI (University of Rhode Island) and Inner Space Center. 2019. Masking in Fishes. Accessed: October 11, 2019. Available online: https://dosits.org/animals/effects-of-sound/potential-effects-of-sound-on-marine-fishes/masking-in-fishes/.

USCG and MARAD (United States Coast Guard and Maritime Administration). 2004. *Final Environmental Impact Statement for the Gulf Landing LLC Deepwater Port License Application; Appendix G (prepared by e2M): Ichthyoplankton Assessment Model Methodology and Results for the Gulf Landing LLC Deepwater Port License Application Environmental Impact Statement. U.S. Department of Transportation.* Docket # USCG-2004-16860-67. November 2004. Washington, D.C.

USCG and MARAD. 2005. *Final Environmental Impact Statement for the Gulf Landing LLC Deepwater Port License Application; Revised Appendix G: Ichthyoplankton Assessment Model Methodology and Results for the Gulf Landing LLC Deepwater Port License Application Environmental Impact Statement*. Docket # USCG-2004-16860-89. February 2005. Washington, D.C.

U.S. Environmental Protection Agency. 2016. Level III Ecoregions of the Continental United States. Accessed: April 8, 2019. Available online: https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states.

USFWS (U.S. Fish and Wildlife Service). 1999. South Florida Multi-Species Recovery Plan—Species: Green Sea Turtle. Accessed: June 13, 2019. Available online: https://www.fws.gov/vero beach/MSRPPDFs/GreenSeaTurtle.pdf

USFWS. 2001. Florida Manatee Recovery Plan, (*Trichechus manatus latirostris*), Third Revision. U.S. Fish and Wildlife Service. Atlanta, Georgia: 144 pp.

USFWS. 2009. Whooping Cranes and Wind Development—An Issue Paper. April 2009. Accessed: May 3, 2019. Available online: https://www.fws.gov/southwest/es/oklahoma/documents/te _species/wind%20power/whooping%20crane%20and%20wind%20development%20fws%20issue%20paper%20-%20final%20%20april%202009.pdf

USFWS. 2013a. Rufa Red Knot (*Calidris canutus rufa*). Accessed: June 12, 2019. Available online: https://www.fws.gov/northeast/redknot/pdf/Redknot_BWfactsheet092013.pdf.

USFWS. 2015a. Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) Factsheet. Accessed: June 17, 2019. Available online: https://www.fws.gov/northflorida/SeaTurtles/Turtle%20Factsheets/kemps-ridley-sea-turtle.htm.

USFWS. 2015b. Leatherback Sea Turtle (*Dermochelys coriacea*) Factsheet. Accessed: June 17, 2019. Available online: https://www.fws.gov/northflorida/SeaTurtles/Turtle Factsheets/leatherback-sea-turtle.htm.

USFWS. 2015c. Loggerhead Sea Turtle (*Caretta caretta*). Accessed: June 17, 2019. Available online: https://www.fws.gov/northflorida/SeaTurtles/Turtle%20Factsheets/loggerhead-sea-turtle.htm.

USFWS. 2015d. Recovery Plan for the Northern Great Plains piping plover (*Charadrius melodus*) in two volumes. Volume I: Draft breeding recovery plan for the Northern Great Plains piping plover (*Charadrius melodus*). Volume II: Draft revised recovery plan for the wintering range of the Northern Great Plains piping plover (*Charadrius melodus*) and comprehensive conservation strategy for the piping plover (*Charadrius melodus*) in its coastal migration and wintering range in the continental United States. July 2015. Denver, Colorado: 166 pp.

USFWS. 2015e. Status of the Species—Red Knot. Accessed: June 14, 2019. Available online: https://www.fws.gov/verobeach/StatusoftheSpecies/20151104_SOS_RedKnot.pdf.

USFWS. 2015f. Wintering Whooping Crane Update. November 4, 2015. Accessed: June 13, 2019. Available online: https://www.fws.gov/nwrs/threecolumn.aspx?id=2147580596.

USFWS. 2017. Green Sea Turtle (*Chelonia mydas*) Factsheet. Accessed: June 17, 2019. Available online: https://www.fws.gov/northflorida/seaturtles/turtle%20factsheets/green-sea-turtle.htm.

USFWS. 2018a. Hawksbill Sea Turtle (*Eretmochelys imbricata*) Fact Sheet. Accessed: June 13, 2019. Available online: https://www.fws.gov/northflorida/seaturtles/turtle%20factsheets/hawksbill-sea-turtle.htm.

USFWS. 2018b. Proposed Listing for the Eastern Black Rail. Accessed: July 26, 2019. Available online: https://www.fws.gov/southeast/faq/proposed-listing-for-the-eastern-black-rail/#what-threats-were-identified-for-the-eastern-black-rail-section.

USFWS. 2018c. Rufa Red Knot. Accessed: June 12, 2019. Available online: https://www.fws.gov/northeast/redknot/.

USFWS. 2019a. Environmental Conservation Online System Species Profile for the Green Sea Turtle (*Chelonia mydas*). Accessed: June 13, 2019. Available online: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C00S.

USFWS. 2019b. Environmental Conservation Online System Species Profile for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*). Accessed: June 13, 2019. Available online: https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=5523.

USFWS. 2019c. Environmental Conservation Online System Species Profile for the Leatherback Sea Turtle (*Dermochelys coriacea*). Accessed: June 13, 2019. Available online: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C00F.

USFWS. 2019d. Environmental Conservation Online System Species Profile for the Whooping Crane (*Grus americana*). Accessed: June 12, 2019. Available online: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B003.

USFWS. 2019e. Meeting between USCG, ERM, and USFWS. July 3, 2019.

USFWS. 2019f. Official Species List, Consultation Code: 02ETTX00-2019-SLI-1267. Accessed: April 12, 2019. Available online: https://ecos.fws.gov/ipac/.

USFWS. 2019g. West Indian Manatee (*Trichechus manatus*). Accessed: June 12, 2019. Available online: https://www.fws.gov/southeast/wildlife/mammals/manatee/#trichechus-manatus-section.

USGS (U.S. Geological Survey). 2018. Science in Your Watershed. Accessed: October 7, 2019. Available online: https://water.usgs.gov/wsc/acc/120402.html.

USM GCRL (University of Southern Mississippi, Gulf Coast Research Lab). 2019. Gulf Sturgeon. Accessed: October 7, 2019. Available online: https://gcrl.usm.edu/public/fish/gulf.sturgeon.php.

UWI (University of the West Indies). 2016. *Orbicella annularis* (Boulder Star Coral). Accessed: August 1, 2019. Available online: https://sta.uwi.edu/fst/lifesciences/sites/default/files/lifesciences/documents/ogatt/Orbicella_annularis%20-%20Boulder%20Star%20Coral.pdf.

UWI. 2017. *Orbicella faveolata* (Mountainous Star Coral). Accessed: August 1, 2019. Available online: https://sta.uwi.edu/fst/lifesciences/sites/default/files/lifesciences/documents/ogatt/Orbicella_faveolata%20-%20Mountainous%20Star%20Coral.pdf.

Vanderlaan, A.S.M., and C.T. Taggart. 2007. “Vessel Collisions with Whales: The Probability of Lethal Injury Based on Vessel Speed.” *Marine Mammal Science,* Vol. 23, Issue 1: 144–156. January 2007. Accessed: June 13, 2019. Available online: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1748-7692.2006.00098.x.

Walker, C.J. 2011. “Assessing the Effects of Pollutant Exposure on Sharks: A Biomarker Approach.” Master of Science Thesis, University of Northern Florida, 2011. Accessed: June 18, 2019. Available online: https://digitalcommons.unf.edu/cgi/viewcontent.cgi?article=1142&context=etd.

Weilgart, L.S. 2007. “A Brief Review of Known Effects of Noise on Marine Mammals.” *International Journal of Comparative Psychology*, Vol. 20, Issue 2:159–168. 2007. Accessed: September 25, 2019. Available online: https://escholarship.org/uc/item/11m5g19h.

Weishampel, Z.A., W.H. Cheg, and J.F. Weishampel. 2016. “Sea turtle nesting patterns in Florida vis-à-vis satellite derived measures of artificial lighting”. *Remote Sensing in Ecology and Conservation*. January 19, 2016. Accessed: June 17, 2019. Available online: https://zslpublications.onlinelibrary.wiley.com/doi/full/10.1002/rse2.12.

Wenger, A.S., E. Harvey, S. Wilson, C. Rawson, S.J. Newman, D. Clarke, B.J. Saunders, N. Browne, M.J. Travers, J.L. Mcilwain, P.L.A. Erftemeijer, J.P.A. Habbs, D. Mclean, M. Depczynski, and R.D. Evans. 2017. “A critical analysis of the direct effects of dredging on fish.” *Fish and Fisheries,* Vol. 18, Issue 5. September 2017. Accessed: on July 30, 2019. Available online: https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12218.

Whyte, J.J., and D.E. Tillitt. 2001. EROD Activity. Accessed: June 18, 2019. Available online: https://www.cerc.usgs.gov/pubs/BEST/EROD.pdf.

Wilber, D.H., and D.G. Clarke. 2001. “Biological effects of suspended sediments: a review of suspended sediment impacts on fish and shellfish with relation to dredging activities in estuaries.” *North American Journal of Fisheries Management,* Vol. 121: 855–875.

Wise, Jr., J.P., J.T.F. Wise, C.F. Wise, S.S. Wise, C. Gianios, Jr., H. Xie, W.D. Thompson, C. Perkins, C. Falank, and J.P. Wise, Sr. 2014. "Concentrations of the Genotoxic Metals, Chromium and Nickel, in Whales, Tar Balls, Oil Slicks, and Released Oil from the Gulf of Mexico in the Immediate Aftermath of the Deepwater Horizon Oil Crisis: Is Genotoxic Metal Exposure Part of the Deepwater Horizon Legacy?" *Environmental Science and Technology*, Vol. 48(5): 2997–3006. February 19, 2014. Accessed: June 17, 2019. Available online: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3983321/.

Witherington, B.E., and K.A. Bjorndal. 1991. "Influences of Artificial Lighting on the Seaward Orientation of Hatchling Loggerhead Turtles (*Caretta caretta*)." *Biological Conservation* 55: 139–149.

Wright, A.J. ed. 2008. International Workshop on Shipping Noise and Marine Mammals. April 21–24, 2008. Hamburg, Germany: Okeanos—Foundation for the Sea, Auf der Marienhöhe 15, D-64297.

Würsig, B. 2017. "Marine Mammals of the Gulf of Mexico." In *Habitats and Biota of the Gulf of Mexico: Before the Deepwater Horizon Oil Spill*, edited by C. Ward. New York, NY: Springer. Accessed: June 12, 2019. Available online: https://link.springer.com/chapter/10.1007/978-1-4939-3456-0_5.

ATTACHMENT A

Agency Correspondence

USFWS

NOAA

-Page Intentionally Left Blank-

Organization Name	Title	Date on Document	Date Sent by USCG	From	To	Description	# of Pages
United States Fish and Wildlife Service – 001	Agency and Tribal Consultation Letters for Signature; USFWS Request for Information	5/1/2019	4/30/2019	Curtis Borland (USCG)	Chuck Ardizzone (USFWS)	Request for informal consultation and technical assistance.	8

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. SE
Washington, DC 20593-7509
Staff Symbol: CG-OES-2
Phone: (202) 372-1444
Fax: (202) 372-8382
Email: Curtis.E.Borland@uscg.mil

May 1, 2019

Mr. Chuck Ardizzone
Project Leader
U.S. Fish and Wildlife Service
Houston Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, TX 77058

Re: Request for Informal Consultation and Technical Assistance – SPOT Terminal Services LLC Deepwater Port (MARAD-2019-0011)

Dear Mr. Ardizzone:

On January 31, 2019, SPOT Terminal Services LLC, a subsidiary of Enterprise Products Operating LLC, (SPOT, or the Applicant) submitted an application to the U.S. Coast Guard (Coast Guard) and Maritime Administration (MARAD) seeking approval to own, construct, and operate the Sea Port Oil Terminal (SPOT) crude oil export deepwater port (DWP) in the Gulf of Mexico to provide crude oil loading services on very large crude carriers (VLCCs) and other crude oil carriers for export to the global market. The application was supplemented on April 8, 2019 to provide updated information regarding agency correspondence and permit applications, as well as additional financial information.

In accordance with Section 7 of the Endangered Species Act of 1973, as amended, we seek technical assistance and to initiate informal consultation with your office regarding the presence of federally listed threatened and endangered species, including proposed and candidate species, as well as designated critical habitat, including habitat proposed for designation, within the SPOT Project area. We also are requesting your input on the extent to which the listed species and designated critical habitat may be affected by the Proposed Action. To fully analyze the impacts associated with the Proposed Action, we request you review the Threatened and Endangered Species Table (enclosed) to confirm the proposed and listed threatened and endangered species within the Project area. In addition, we request you confirm that no designated or proposed critical habitat is present within the Project area. This review will confirm what the Applicant has provided, as well as outline any specific concerns you have with respect to the proposed action and interactions with the species and habitat under U.S. Fish and Wildlife Service jurisdiction. Please note we have made a similar request for technical assistance and initiation of informal consultation with the National Marine Fisheries Service regarding species and habitat under its jurisdiction.

The SPOT DWP application was noticed in the Federal Register and posted to the federal docket on March 4, 2019. The SPOT DWP application supplement was posted to the federal docket on April 11, 2019. Both submittals are available for viewing and downloading from the Federal

Docket Management System at http:///www.regulations.gov, Docket Number MARAD-2019-0011.

The SPOT Project would consist of two distinct but interrelated components: 1) the offshore component and 2) the onshore component. The offshore component would be located in federal waters within the Outer Continental Shelf in Galveston Area Lease Blocks 463 and A-59, between 27.2 and 30.8 nautical miles off the coast of Brazoria County, Texas, in water depths of approximately 115 feet. The SPOT DWP would allow for up to two VLCCs or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with a fixed offshore platform by floating connecting crude oil hoses and a floating vapor recovery hose. The offshore component would consist of the following elements:

- One fixed offshore platform;
- Two SPM buoys to moor VLCCs or other crude oil carriers for loading;
- Four pipeline end manifolds (PLEMs)—two per SPM buoy—that would provide the interconnection between the pipelines and the SPM buoys;
- Four 30-inch pipelines to deliver crude oil from the platform to the PLEMs;
- Four 16-inch vapor recovery pipelines (two per PLEM) to transfer recovered vapors from the VLCC or other crude oil carrier to three vapor combustion units on the platform; and
- Two offshore co-located 36-inch-diameter crude oil pipelines that would connect the fixed offshore platform to the onshore components.

The onshore component would provide the crude oil supply and interconnection for the proposed Project and would consist of the following components:

- Addition of measurement skids and electric motor-driven pumps at the existing Enterprise Crude Houston (ECHO) Terminal to supply crude oil to the proposed Oyster Creek Terminal;
- One 36-inch pipeline connecting the existing ECHO Terminal to the proposed Oyster Creek Terminal (ECHO to Oyster Creek Pipeline);
- One connection from the existing Rancho II 36-inch pipeline to the proposed ECHO to Oyster Creek Pipeline;
- Construction and operation of the proposed Oyster Creek Terminal in Brazoria County, Texas;
- Seven aboveground storage tanks at the proposed Oyster Creek Terminal, each with a total storage capacity of 685,000 barrels (600,000 barrels working storage capacity);
- Two co-located 36-inch crude oil pipelines from the proposed Oyster Creek Terminal to the proposed shore crossing and offshore pipeline infrastructure (Oyster Creek to Shore Pipeline); and
- Ten mainline valves—six mainline valves within the permanent right-of-way of the ECHO to Oyster Creek Pipeline and four mainline valves within the permanent right-of-way of the Oyster Creek to Shore Pipeline.

As stated in MARAD's Notice of Intent to Prepare an Environmental Impact Statement, dated March 7, 2019 (enclosed), the Coast Guard, in coordination with MARAD, are preparing an environmental impact statement (EIS) as part of the processing of SPOT's DWP license application. As part of the EIS, we will fully analyze potential impacts on listed and proposed threatened and endangered species, and designated and proposed critical habitat, if applicable.

If you have any questions about this request or the preparation of the SPOT EIS, please contact Ms. Melissa Perera, Coast Guard Environmental Protection Specialist, (202) 372-1446 (melissa.e.perera@uscg.mil). Thank you for your assistance. We look forward to working with you on the SPOT Project.

Sincerely,

Curtis E. Borland
Attorney/Advisor, Deepwater Ports
Standards Division
U.S. Coast Guard

Yvette M. Fields
Director, Office of Deepwater Port
Licensing and Port Conveyance
Maritime Administration

Encl: (1) Threatened and Endangered Species and Critical Habitat Table
(2) Federal Register Notice of Intent to Prepare an Environmental Impact Statement

Copy: Melissa Perera, U.S. Coast Guard
Amanda Gregory, ERM
Janet Nunley, ERM
Christine Willis, U.S. Fish and Wildlife Service
David Hoth, U.S. Fish and Wildlife Service
Charrish Stevens, U.S. Fish and Wildlife Service

ENCLOSURE 1

Threatened and Endangered Species and Critical Habitat Table

Common Name	Scientific Name	Federal Status
Species Under U.S. Fish & Wildlife Jurisdiction		
Mammals		
West Indian manatee	*Trichechus manatus latirostris*	Threatened
Birds		
Rufa red knot	*Calidris canutus rufa*	Threatened
Piping plover	*Charadrius melodus*	Threatened
Whooping crane	*Grus americana*	Endangered
Least tern	*Sterna antillarum*	Endangered
Reptiles		
Kemp’s ridley sea turtle (nesting beaches)	*Lepidochelys kempi*	Endangered
Green sea turtle (nesting beaches)	*Chelonia mydas*	Threatened
Loggerhead sea turtle (nesting beaches)	*Caretta caretta*	Threatened
Hawksbill sea turtle (nesting beaches)	*Eretmochelys imbricate*	Endangered
Leatherback sea turtle (nesting beaches)	*Dermochelys coriacea*	Endangered
Species Under National Marine Fisheries Service Jurisdiction		
Mammals		
North Atlantic right whale	*Eubalaena glacialis*	Endangered
Bryde’s whale	*Balaenoptera edeni*	Proposed for listing
Blue whale	*Balaenoptera musculus*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
Reptiles		
Kemp’s ridley sea turtle	*Lepidochelys kempi*	Endangered
Green sea turtle	*Chelonia mydas*	Threatened
Loggerhead sea turtle	*Caretta caretta*	Threatened
Hawksbill sea turtle	*Eretmochelys imbricate*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Fish		
Smalltooth sawfish	*Pristis pectinate*	Endangered
Largetooth sawfish	*Pristis pristis*	Endangered
Oceanic whitetip shark	*Carcharhinus longimanus*	Threatened
Giant manta ray	*Manta birostris*	Threatened

ENCLOSURE 2

Notice of Intent to Prepare an Environmental Impact Statement

Federal Register / Vol. 84, No. 45 / Thursday, March 7, 2019 / Notices 8401

There is no limit on the length of the attachments.

Where do I go to read public comments, and find supporting information?

Go to the docket online at *http://www.regulations.gov.*, keyword search MARAD–2019–0007 or visit the Docket Management Facility (see **ADDRESSES** for hours of operation). We recommend that you periodically check the Docket for new submissions and supporting material.

Will my comments be made available to the public?

Yes. Be aware that your entire comment, including your personal identifying information, will be made publicly available.

May I submit comments confidentially?

If you wish to submit comments under a claim of confidentiality, you should submit three copies of your complete submission, including the information you claim to be confidential business information, to the Department of Transportation, Maritime Administration, Office of Legislation and Regulations, MAR–225, W24–220, 1200 New Jersey Avenue SE, Washington, DC 20590. Include a cover letter setting forth with specificity the basis for any such claim and, if possible, a summary of your submission that can be made available to the public.

Privacy Act

In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, to *www.regulations.gov,* as described in the system of records notice, DOT/ALL–14 FDMS, accessible through *www.dot.gov/privacy.* To facilitate comment tracking and response, we encourage commenters to provide their name, or the name of their organization; however, submission of names is completely optional. Whether or not commenters identify themselves, all timely comments will be fully considered. If you wish to provide comments containing proprietary or confidential information, please contact the agency for alternate submission instructions.

(*Authority:* 49 CFR 1.93(a), 46 U.S.C. 55103, 46 U.S.C. 12121)

* * *

Dated: March 4, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.,

Secretary, Maritime Administration.

[FR Doc. 2019–04105 Filed 3–6–19; 8:45 am]

BILLING CODE 4910–81–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0011]

Deepwater Port License Application: SPOT Terminal Services LLC (SPOT)

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; Notice of public meeting; Request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the SPOT Terminal Services LLC (SPOT) deepwater port license application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 27.2 to 30.8 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 115 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring buoy system.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate, and announces an informational open house and public meeting in Lake Jackson, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended, Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the SPOT deepwater port application. The meeting will be held in Lake Jackson, Texas, on March 20, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 5:30 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the SPOT deepwater port license application must reach the Federal Docket Management Facility as detailed below by Friday, April 5, 2019.

ADDRESSES: The open house and public meeting in Lake Jackson, Texas will be held at the Courtyard Lake Jackson, 159 State Highway 288, Lake Jackson, Texas, 77566, phone: (979) 297–7300, web address: *https://www.marriott.com/hotels/travel/ljncy-courtyard-lake-jackson/.* Free parking is available at the venue.

The public docket for the SPOT deepwater port license application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.

The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0011.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Efrain Lopez, USCG, or Ms. Yvette M. Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Efrain Lopez, USCG, telephone: 202–372–1437, email: *Efrain.Lopez1@uscg.mil,* or Ms. Yvette M. Fields, MARAD, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see ADDRESSES).

Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend the open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see FOR FURTHER INFORMATION CONTACT) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the SPOT deepwater port license application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see DATES). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0011.

Public comment submissions should include:

- Docket number MARAD–2019–0011.
- Your name and address.

Submit comments or material using only one of the following methods:

- Electronically (preferred for processing) to the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0011.
- By mail to the Federal Docket Management Facility (MARAD–2019–0011), U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001.
- By personal delivery to the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.
- By fax to the Federal Docket Management Facility at 202–493–2251.

Faxed, mailed or hand delivered submissions must be unbound, no larger than 8½ by 11 inches and suitable for copying and electronic scanning. The format of electronic submissions should also be no larger than 8½ by 11 inches. If you mail your submission and want to know when it reaches the Federal Docket Management Facility, please include a stamped, self-addressed postcard or envelope.

Regardless of the method used for submitting comments, all submissions will be posted, without change, to the FDMS website (*http://www.regulations.gov*) and will include any personal information you provide. Therefore, submitting this information to the docket makes it public. You may wish to read the Privacy and Use Notice that is available on the FDMS website and the Department of Transportation Privacy Act Notice that appeared in the **Federal Register** on April 11, 2000 (65 FR 19477), see Privacy Act. You may view docket submissions at the Federal Docket Management Facility or electronically on the FDMS website.

Background

Information about deepwater ports, the statutes, and regulations governing their licensing, including the application review process, and the receipt of the current application for the proposed SPOT deepwater port appears in the SPOT Notice of Application, March 4, 2019 edition of the **Federal Register**. The "Summary of the Application" from that publication is reprinted below for your convenience.

Consideration of a deepwater port license application includes review of the proposed deepwater port's impact on the natural and human environment. For the proposed deepwater port, USCG and MARAD are the co-lead Federal agencies for determining the scope of this review, and in this case, it has been determined that review must include preparation of an EIS. This NOI is required by 40 CFR 1501.7. It briefly describes the proposed action, possible alternatives and our proposed scoping process. You can address any questions about the proposed action, the scoping process or the EIS to the USCG or MARAD project managers identified in this notice (see FOR FURTHER INFORMATION CONTACT).

Proposed Action and Alternatives

The proposed action requiring environmental review is the Federal licensing of the proposed deepwater port described in "Summary of the Application" below. The alternatives to licensing the proposed port are: (1) Licensing with conditions (including conditions designed to mitigate environmental impact), (2) evaluation of deepwater port and onshore site/pipeline route alternatives or (3) denying the application, which for purposes of environmental review is the "no-action" alternative.

Scoping Process

Public scoping is an early and open process for identifying and determining the scope of issues to be addressed in the EIS. Scoping begins with this notice, continues through the public comment period (see DATES), and ends when USCG and MARAD have completed the following actions:

- Invites the participation of Federal, state, and local agencies, any affected Indian tribe, the applicant, in this case SPOT, and other interested persons;
- Determines the actions, alternatives and impacts described in 40 CFR 1508.25;
- Identifies and eliminates from detailed study, those issues that are not significant or that have been covered elsewhere;
- Identifies other relevant permitting, environmental review and consultation requirements;
- Indicates the relationship between timing of the environmental review and other aspects of the application process; and
- At its discretion, exercises the options provided in 40 CFR 1501.7(b).

Once the scoping process is complete, USCG and MARAD will prepare a draft EIS. When complete, MARAD will publish a **Federal Register** notice announcing public availability of the Draft EIS. (If you want that notice to be sent to you, please contact the USCG or MARAD project manager identified in FOR FURTHER INFORMATION CONTACT). You will have an opportunity to review and comment on the Draft EIS. The USCG, MARAD and other appropriate cooperating agencies will consider the received comments and then prepare the Final EIS. As with the Draft EIS, we will announce the availability of the Final EIS and give you an opportunity

for review and comment. The Act requires a final public hearing to be held in the Adjacent Coastal State. Its purpose is to receive comments on matters related to whether or not an operating license should be issued. The final public hearing will be held after the Final EIS is made available for public review and comment.

Summary of the Application

SPOT is proposing to construct, own, and operate a deepwater port terminal in the Gulf of Mexico to export domestically produced crude oil. Use of the deepwater port would include the loading of various grades of crude oil at flow rates of up to 85,000 barrels per hour (bph). The SPOT deepwater port would allow for up to two (2) very large crude carriers (VLCCs) or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with the deepwater port via floating connecting crude oil hoses and a floating vapor recovery hose. The maximum frequency of loading VLCCs or other crude oil carriers would be 2 million barrels per day, 365 days per year.

The overall project would consist of offshore and marine components as well as onshore components as described below.

The SPOT deepwater port offshore and marine components would consist of the following:

- One (1) fixed offshore platform with eight (8) piles in Galveston Area Outer Continental Shelf lease block 463, approximately 27.2 to 30.8 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 115 feet. The fixed offshore platform would be comprised of four (4) decks including: A sump deck with shut-down valves and open drain sump; a cellar deck with pig launchers and receivers, generators, and three (3) vapor combustion units; a main deck with a lease automatic custody transfer (LACT) unit, oil displacement prover loop, living quarters, electrical and instrument building, and other ancillary equipment; and a laydown deck with a crane laydown area.
- Two (2) single point mooring buoys (SPMs), each having: Two (2) 24-inch inside diameter crude oil underbuoy hoses interconnecting with the crude oil pipeline end manifold (PLEM); two (2) 24-inch inside diameter floating crude oil hoses connecting the moored VLCC or other crude oil carrier for loading to the SPM buoy; one (1) 24-inch inside diameter vapor recovery underbuoy hose interconnecting with the vapor recovery PLEM; and one (1) 24-inch inside diameter floating vapor recovery hose to connect to the moored VLCC or other crude oil carrier for loading. The floating hoses would be approximately 800 feet in length and rated for 300 psig (21-bar). Each floating hose would contain an additional 200 feet of 16-inch "tail hose" that is designed to be lifted and robust enough for hanging over the edge railing of the VLCC or other crude oil carrier. The underbuoy hoses would be approximately 160 feet in length and rated for 300 psig (21-bar).
- Four (4) PLEMS would provide the interconnection between the pipelines and the SPM buoys. Each SPM buoy would have two (2) PLEMs—one (1) PLEM for crude oil and one (1) PLEM for vapor recovery. Each crude oil loading PLEM would be supplied with crude oil by two (2) 30-inch outside diameter pipelines, each approximately 0.66 nautical miles in length. Each vapor recovery PLEM would route recovered vapor from the VLCC or other crude oil carrier through the PLEM to the three (3) vapor combustion units located on the platform topside via two (2) 16-inch outside diameter vapor recovery pipelines, each approximately 0.66 nautical miles in length.
- Two (2) co-located 36-inch outside diameter, 40.8-nautical mile long crude oil pipelines would be constructed from the shoreline crossing in Brazoria County, Texas, to the SPOT deepwater port for crude oil delivery. These pipelines, in conjunction with 12.2 statute miles of new-build onshore pipelines (described below), would connect the onshore crude oil storage facility and pumping station (Oyster Creek Terminal) to the offshore SPOT deepwater port. The crude oil would be metered at the offshore platform. Pipelines would be bi-directional for the purposes of maintenance, pigging, changing crude oil grades, or evacuating the pipeline with water.

The SPOT deepwater port onshore storage and supply components would consist of the following:

- New equipment and piping at the existing Enterprise Crude Houston (ECHO) Terminal to provide interconnectivity with the crude oil supply network for the SPOT Project. This would include the installation of four (4) booster pumps, one (1) measurement skid, and four (4) crude oil pumps.
- An interconnection between the existing Rancho II pipeline and the proposed ECHO to Oyster Creek pipeline consisting of a physical connection as well as ultrasonic measurement capability for pipeline volumetric balancing purposes.
- The proposed Oyster Creek Terminal located in Brazoria County, Texas, on approximately 140 acres of land consisting of seven (7) aboveground storage tanks, each with a total storage capacity of 685,000 barrels (600,000 barrels working storage capacity), for a total onshore storage capacity of approximately 4.8 million barrels (4.2 million barrels working storage) of crude oil. The Oyster Creek Terminal also would include: Six (6) electric-driven mainline crude oil pumps; four (4) electric driven booster crude oil pumps—two (2) per pipeline to the SPOT deepwater port, working in parallel to move crude oil from the storage tanks through the measurement skids; two (2) crude oil pipeline pig launchers/receivers; one (1) crude oil pipeline pig receiver; two (2) measurement skids for measuring incoming crude oil—one (1) skid located at the incoming pipeline from the existing Enterprise Crude Houston (ECHO) Terminal, and one (1) skid installed and reserved for a future pipeline connection; two (2) measurement skids for measuring departing crude oil; three (3) vapor combustion units—two (2) permanent and one (1) portable; and ancillary facilities to include electrical substation, office, and warehouse buildings.
- Three onshore crude oil pipelines would be constructed onshore to support the SPOT deepwater port. These would include: One (1) 50.1 statute mile long 36-inch crude oil pipeline from the existing ECHO Terminal to the Oyster Creek Terminal. This pipeline would be located in Harris County and Brazoria County, Texas; two (2) 12.2 statute mile long, co-located 36-inch crude oil export pipelines from the Oyster Creek Terminal to the shore crossing where these would join the above described subsea pipelines supplying the SPOT deepwater port. These pipelines would be located in Brazoria County, Texas.

Privacy Act

DOT posts comments, without edit, to *www.regulations.gov,* as described in the system of records notice, DOT/ALL–14 FDMS, accessible through *www.dot.gov/privacy.* To facilitate comment tracking and response, we encourage commenters to provide their name, or the name of their organization; however, submission of names is completely optional. Whether or not commenters identify themselves, all timely comments will be fully considered. If you wish to provide comments containing proprietary or confidential information, please contact the agency for alternate submission instructions.

(Authority: 49 CFR § 1.93).

Dated: March 4, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.

Secretary, Maritime Administration.

[FR Doc. 2019–04101 Filed 3–6–19; 8:45 am]

BILLING CODE 4910–81–P

Organization Name	Title	Date on Document	From	To	Description	# of Pages
National Oceanic and Atmospheric Administration – 001	Agency and Tribal Consultation Letters for Signature - NMFS ESA Request for Information	5/1/2019	Curtis Borland (USCG), Yvette Fields (MARAD)	Karla Reece (NOAA)	NMFS ESA Request for Information to Karla Reece (NMFS)	8
National Oceanic and Atmospheric Administration – 002	Agency and Tribal Consultation Letters for Signature - MMFS EFH Request for Information	5/1/2019	Curtis Borland (USCG), Yvette Fields (MARAD)	Rusty Swafford (NOAA)	Request for Technical Assistance to Rusty Swafford of National Marine Fisheries Service. Information request for NMFS EFH	8

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. SE
Washington, DC 20593-7509
Staff Symbol: CG-OES-2
Phone: (202) 372-1444
Fax: (202) 372-8382
Email: Curtis.E.Borland@uscg.mil

May 1, 2019

Ms. Karla Reece
Section 7 Team Lead
National Marine Fisheries Service, Southeast Region
Protected Resources Division
263 13th Avenue South
St. Petersburg, FL 33701

Re: Request for Informal Consultation and Technical Assistance – SPOT Terminal Services LLC Deepwater Port (MARAD-2019-0011)

Dear Ms. Reece:

On January 31, 2019, SPOT Terminal Services LLC, a subsidiary of Enterprise Products Operating LLC, (SPOT, or the Applicant) submitted an application to the U.S. Coast Guard (Coast Guard) and Maritime Administration (MARAD) seeking approval to own, construct, and operate the Sea Port Oil Terminal (SPOT) crude oil export deepwater port (DWP) in the Gulf of Mexico to provide crude oil loading services on very large crude carriers (VLCCs) and other crude oil carriers for export to the global market. The application was supplemented on April 8, 2019 to provide updated information regarding agency correspondence and permit applications, as well as additional financial information.

In accordance with Section 7 of the Endangered Species Act of 1973, as amended, we seek technical assistance and to initiate informal consultation with your office regarding the presence of federally listed threatened and endangered species, including proposed and candidate species, as well as designated critical habitat, including habitat proposed for designation, within the SPOT Project area. We are also requesting your input on the extent to which the listed species and designated critical habitat may be affected by the Proposed Action. To fully analyze the impacts associated with the Proposed Action, we request you review the Threatened and Endangered Species Table (enclosed) to confirm the proposed and listed threatened and endangered species within the Project area. In addition, we request you confirm that no designated or proposed critical habitat is present within the Project area. This review will confirm what the Applicant has provided, as well as outline any specific concerns you have with respect to the proposed action and interactions with the species and habitat under National Marine Fisheries Service jurisdiction. Please note we have made a similar request for technical assistance and initiation of informal consultation with the U.S. Fish and Wildlife Service regarding species and habitat under its jurisdiction.

The SPOT DWP application was noticed in the Federal Register and posted to the federal docket on March 4, 2019. The SPOT DWP application supplement was posted to the federal docket on April 11, 2019. Both submittals are available for viewing and downloading from the Federal

Docket Management System at http:///www.regulations.gov, Docket Number MARAD-2019-0011.

The SPOT Project would consist of two distinct but interrelated components: 1) the offshore component and 2) the onshore component. The offshore component would be located in federal waters within the Outer Continental Shelf in Galveston Area Lease Blocks 463 and A-59, between 27.2 and 30.8 nautical miles off the coast of Brazoria County, Texas, in water depths of approximately 115 feet. The SPOT DWP would allow for up to two VLCCs or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with a fixed offshore platform by floating connecting crude oil hoses and a floating vapor recovery hose. The offshore component would consist of the following elements:

- One fixed offshore platform;
- Two SPM buoys to moor VLCCs or other crude oil carriers for loading;
- Four pipeline end manifolds (PLEMs)—two per SPM buoy—that would provide the interconnection between the pipelines and the SPM buoys;
- Four 30-inch pipelines to deliver crude oil from the platform to the PLEMs;
- Four 16-inch vapor recovery pipelines (two per PLEM) to transfer recovered vapors from the VLCC or other crude oil carrier to three vapor combustion units on the platform; and
- Two offshore co-located 36-inch-diameter crude oil pipelines that would connect the fixed offshore platform to the onshore components.

The onshore component would provide the crude oil supply and interconnection for the proposed Project and would consist of the following components:

- Addition of measurement skids and electric motor-driven pumps at the existing Enterprise Crude Houston (ECHO) Terminal to supply crude oil to the proposed Oyster Creek Terminal;
- One 36-inch pipeline connecting the existing ECHO Terminal to the proposed Oyster Creek Terminal (ECHO to Oyster Creek Pipeline);
- One connection from the existing Rancho II 36-inch pipeline to the proposed ECHO to Oyster Creek Pipeline;
- Construction and operation of the proposed Oyster Creek Terminal in Brazoria County, Texas;
- Seven aboveground storage tanks at the proposed Oyster Creek Terminal, each with a total storage capacity of 685,000 barrels (600,000 barrels working storage capacity);
- Two co-located 36-inch crude oil pipelines from the proposed Oyster Creek Terminal to the proposed shore crossing and offshore pipeline infrastructure (Oyster Creek to Shore Pipeline); and
- Ten mainline valves—six mainline valves within the permanent right-of-way of the ECHO to Oyster Creek Pipeline and four mainline valves within the permanent right-of-way of the Oyster Creek to Shore Pipeline.

As stated in MARAD's Notice of Intent to Prepare an Environmental Impact Statement, dated March 7, 2019 (enclosed), the Coast Guard in coordination with MARAD, are preparing an environmental impact statement (EIS) as part of the processing of SPOT's DWP license application. As part of the EIS, we will fully analyze potential impacts on listed and proposed threatened and endangered species, and designated and proposed critical habitat, if applicable.

If you have any questions about this request or the preparation of the SPOT EIS, please contact Ms. Melissa Perera, Coast Guard Environmental Protection Specialist, (202) 372-1446 (melissa.e.perera@uscg.mil). Thank you for your assistance. We look forward to working with you on the SPOT Project.

Sincerely,

Curtis E. Borland
Attorney/Advisor, Deepwater Ports
Standards Division
U.S. Coast Guard

Yvette Fields
Director, Office of Deepwater Port
Licensing and Port Conveyance
Maritime Administration

Encl: (1) Threatened and Endangered Species Table
(2) Federal Register Notice of Intent to Prepare an Environmental Impact Statement

Copy: Melissa Perera, U.S. Coast Guard
Amanda Gregory, ERM
Janet Nunley, ERM
Dr. Roy E. Crabtree, National Marine Fisheries Service
Michael Tucker, National Marine Fisheries Service
Noah Silverman, National Marine Fisheries Service

ENCLOSURE 1

Threatened and Endangered Species Table

Common Name	Scientific Name	Federal Status
Species Under National Marine Fisheries Service Jurisdiction		
Mammals		
North Atlantic right whale	*Eubalaena glacialis*	Endangered
Bryde's whale	*Balaenoptera edeni*	Proposed for listing
Blue whale	*Balaenoptera musculus*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
Reptiles		
Kemp's ridley sea turtle	*Lepidochelys kempi*	Endangered
Green sea turtle	*Chelonia mydas*	Threatened
Loggerhead sea turtle	*Caretta caretta*	Threatened
Hawksbill sea turtle	*Eretmochelys imbricate*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Fish		
Smalltooth sawfish	*Pristis pectinate*	Endangered
Largetooth sawfish	*Pristis pristis*	Endangered
Oceanic whitetip shark	*Carcharhinus longimanus*	Threatened
Giant manta ray	*Manta birostris*	Threatened
Species Under U.S. Fish & Wildlife Jurisdiction		
Mammals		
West Indian manatee	*Trichechus manatus latirostris*	Threatened
Birds		
Rufa red knot	*Calidris canutus rufa*	Threatened
Piping plover	*Charadrius melodus*	Threatened
Whooping crane	*Grus americana*	Endangered
Least tern	*Sterna antillarum*	Endangered
Reptiles		
Kemp's ridley sea turtle (nesting beaches)	*Lepidochelys kempi*	Endangered
Green sea turtle (nesting beaches)	*Chelonia mydas*	Threatened
Loggerhead sea turtle (nesting beaches)	*Caretta caretta*	Threatened
Hawksbill sea turtle (nesting beaches)	*Eretmochelys imbricate*	Endangered
Leatherback sea turtle (nesting beaches)	*Dermochelys coriacea*	Endangered

ENCLOSURE 2

Notice of Intent to Prepare an Environmental Impact Statement

Federal Register / Vol. 84, No. 45 / Thursday, March 7, 2019 / Notices 8401

There is no limit on the length of the attachments.

Where do I go to read public comments, and find supporting information?

Go to the docket online at *http://www.regulations.gov.*, keyword search MARAD–2019–0007 or visit the Docket Management Facility (see ADDRESSES for hours of operation). We recommend that you periodically check the Docket for new submissions and supporting material.

Will my comments be made available to the public?

Yes. Be aware that your entire comment, including your personal identifying information, will be made publicly available.

May I submit comments confidentially?

If you wish to submit comments under a claim of confidentiality, you should submit three copies of your complete submission, including the information you claim to be confidential business information, to the Department of Transportation, Maritime Administration, Office of Legislation and Regulations, MAR–225, W24–220, 1200 New Jersey Avenue SE, Washington, DC 20590. Include a cover letter setting forth with specificity the basis for any such claim and, if possible, a summary of your submission that can be made available to the public.

Privacy Act

In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, to *www.regulations.gov,* as described in the system of records notice, DOT/ALL–14 FDMS, accessible through *www.dot.gov/privacy.* To facilitate comment tracking and response, we encourage commenters to provide their name, or the name of their organization; however, submission of names is completely optional. Whether or not commenters identify themselves, all timely comments will be fully considered. If you wish to provide comments containing proprietary or confidential information, please contact the agency for alternate submission instructions.

(*Authority:* 49 CFR 1.93(a), 46 U.S.C. 55103, 46 U.S.C. 12121)

* * *

Dated: March 4, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.,

Secretary, Maritime Administration.

[FR Doc. 2019–04105 Filed 3–6–19; 8:45 am]

BILLING CODE 4910–81–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0011]

Deepwater Port License Application: SPOT Terminal Services LLC (SPOT)

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; Notice of public meeting; Request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the SPOT Terminal Services LLC (SPOT) deepwater port license application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 27.2 to 30.8 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 115 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring buoy system.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate, and announces an informational open house and public meeting in Lake Jackson, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended, Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the SPOT deepwater port application. The meeting will be held in Lake Jackson, Texas, on March 20, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 5:30 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the SPOT deepwater port license application must reach the Federal Docket Management Facility as detailed below by Friday, April 5, 2019.

ADDRESSES: The open house and public meeting in Lake Jackson, Texas will be held at the Courtyard Lake Jackson, 159 State Highway 288, Lake Jackson, Texas, 77566, phone: (979) 297–7300, web address: *https://www.marriott.com/hotels/travel/ljncy-courtyard-lake-jackson/.* Free parking is available at the venue.

The public docket for the SPOT deepwater port license application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.

The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0011.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Efrain Lopez, USCG, or Ms. Yvette M. Fields, MARAD, as listed in the following FOR FURTHER INFORMATION CONTACT section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Efrain Lopez, USCG, telephone: 202–372–1437, email: *Efrain.Lopez1@uscg.mil,* or Ms. Yvette M. Fields, MARAD, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see **ADDRESSES**).

Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend the open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see **FOR FURTHER INFORMATION CONTACT**) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the SPOT deepwater port license application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0011.

Public comment submissions should include:

• Docket number MARAD–2019–0011.

• Your name and address.

Submit comments or material using only one of the following methods:

• Electronically (preferred for processing) to the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0011.

• By mail to the Federal Docket Management Facility (MARAD–2019–0011), U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001.

• By personal delivery to the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.

• By fax to the Federal Docket Management Facility at 202–493–2251.

Faxed, mailed or hand delivered submissions must be unbound, no larger than 8½ by 11 inches and suitable for copying and electronic scanning. The format of electronic submissions should also be no larger than 8½ by 11 inches. If you mail your submission and want to know when it reaches the Federal Docket Management Facility, please include a stamped, self-addressed postcard or envelope.

Regardless of the method used for submitting comments, all submissions will be posted, without change, to the FDMS website (*http://www.regulations.gov*) and will include any personal information you provide. Therefore, submitting this information to the docket makes it public. You may wish to read the Privacy and Use Notice that is available on the FDMS website and the Department of Transportation Privacy Act Notice that appeared in the **Federal Register** on April 11, 2000 (65 FR 19477), see Privacy Act. You may view docket submissions at the Federal Docket Management Facility or electronically on the FDMS website.

Background

Information about deepwater ports, the statutes, and regulations governing their licensing, including the application review process, and the receipt of the current application for the proposed SPOT deepwater port appears in the SPOT Notice of Application, March 4, 2019 edition of the **Federal Register**. The "Summary of the Application" from that publication is reprinted below for your convenience.

Consideration of a deepwater port license application includes review of the proposed deepwater port's impact on the natural and human environment. For the proposed deepwater port, USCG and MARAD are the co-lead Federal agencies for determining the scope of this review, and in this case, it has been determined that review must include preparation of an EIS. This NOI is required by 40 CFR 1501.7. It briefly describes the proposed action, possible alternatives and our proposed scoping process. You can address any questions about the proposed action, the scoping process or the EIS to the USCG or MARAD project managers identified in this notice (see **FOR FURTHER INFORMATION CONTACT**).

Proposed Action and Alternatives

The proposed action requiring environmental review is the Federal licensing of the proposed deepwater port described in "Summary of the Application" below. The alternatives to licensing the proposed port are: (1) Licensing with conditions (including conditions designed to mitigate environmental impact), (2) evaluation of deepwater port and onshore site/pipeline route alternatives or (3) denying the application, which for purposes of environmental review is the "no-action" alternative.

Scoping Process

Public scoping is an early and open process for identifying and determining the scope of issues to be addressed in the EIS. Scoping begins with this notice, continues through the public comment period (see **DATES**), and ends when USCG and MARAD have completed the following actions:

• Invites the participation of Federal, state, and local agencies, any affected Indian tribe, the applicant, in this case SPOT, and other interested persons;

• Determines the actions, alternatives and impacts described in 40 CFR 1508.25;

• Identifies and eliminates from detailed study, those issues that are not significant or that have been covered elsewhere;

• Identifies other relevant permitting, environmental review and consultation requirements;

• Indicates the relationship between timing of the environmental review and other aspects of the application process; and

• At its discretion, exercises the options provided in 40 CFR 1501.7(b).

Once the scoping process is complete, USCG and MARAD will prepare a draft EIS. When complete, MARAD will publish a **Federal Register** notice announcing public availability of the Draft EIS. (If you want that notice to be sent to you, please contact the USCG or MARAD project manager identified in **FOR FURTHER INFORMATION CONTACT**). You will have an opportunity to review and comment on the Draft EIS. The USCG, MARAD and other appropriate cooperating agencies will consider the received comments and then prepare the Final EIS. As with the Draft EIS, we will announce the availability of the Final EIS and give you an opportunity

for review and comment. The Act requires a final public hearing to be held in the Adjacent Coastal State. Its purpose is to receive comments on matters related to whether or not an operating license should be issued. The final public hearing will be held after the Final EIS is made available for public review and comment.

Summary of the Application

SPOT is proposing to construct, own, and operate a deepwater port terminal in the Gulf of Mexico to export domestically produced crude oil. Use of the deepwater port would include the loading of various grades of crude oil at flow rates of up to 85,000 barrels per hour (bph). The SPOT deepwater port would allow for up to two (2) very large crude carriers (VLCCs) or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with the deepwater port via floating connecting crude oil hoses and a floating vapor recovery hose. The maximum frequency of loading VLCCs or other crude oil carriers would be 2 million barrels per day, 365 days per year.

The overall project would consist of offshore and marine components as well as onshore components as described below.

The SPOT deepwater port offshore and marine components would consist of the following:

• One (1) fixed offshore platform with eight (8) piles in Galveston Area Outer Continental Shelf lease block 463, approximately 27.2 to 30.8 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 115 feet. The fixed offshore platform would be comprised of four (4) decks including: A sump deck with shut-down valves and open drain sump; a cellar deck with pig launchers and receivers, generators, and three (3) vapor combustion units; a main deck with a lease automatic custody transfer (LACT) unit, oil displacement prover loop, living quarters, electrical and instrument building, and other ancillary equipment; and a laydown deck with a crane laydown area.

• Two (2) single point mooring buoys (SPMs), each having: Two (2) 24-inch inside diameter crude oil underbuoy hoses interconnecting with the crude oil pipeline end manifold (PLEM); two (2) 24-inch inside diameter floating crude oil hoses connecting the moored VLCC or other crude oil carrier for loading to the SPM buoy; one (1) 24-inch inside diameter vapor recovery underbuoy hose interconnecting with the vapor recovery PLEM; and one (1) 24-inch inside diameter floating vapor recovery hose to connect to the moored VLCC or other crude oil carrier for loading. The floating hoses would be approximately 800 feet in length and rated for 300 psig (21-bar). Each floating hose would contain an additional 200 feet of 16-inch "tail hose" that is designed to be lifted and robust enough for hanging over the edge railing of the VLCC or other crude oil carrier. The underbuoy hoses would be approximately 160 feet in length and rated for 300 psig (21-bar).

• Four (4) PLEMS would provide the interconnection between the pipelines and the SPM buoys. Each SPM buoy would have two (2) PLEMs—one (1) PLEM for crude oil and one (1) PLEM for vapor recovery. Each crude oil loading PLEM would be supplied with crude oil by two (2) 30-inch outside diameter pipelines, each approximately 0.66 nautical miles in length. Each vapor recovery PLEM would route recovered vapor from the VLCC or other crude oil carrier through the PLEM to the three (3) vapor combustion units located on the platform topside via two (2) 16-inch outside diameter vapor recovery pipelines, each approximately 0.66 nautical miles in length.

• Two (2) co-located 36-inch outside diameter, 40.8-nautical mile long crude oil pipelines would be constructed from the shoreline crossing in Brazoria County, Texas, to the SPOT deepwater port for crude oil delivery. These pipelines, in conjunction with 12.2 statute miles of new-build onshore pipelines (described below), would connect the onshore crude oil storage facility and pumping station (Oyster Creek Terminal) to the offshore SPOT deepwater port. The crude oil would be metered at the offshore platform. Pipelines would be bi-directional for the purposes of maintenance, pigging, changing crude oil grades, or evacuating the pipeline with water.

The SPOT deepwater port onshore storage and supply components would consist of the following:

• New equipment and piping at the existing Enterprise Crude Houston (ECHO) Terminal to provide interconnectivity with the crude oil supply network for the SPOT Project. This would include the installation of four (4) booster pumps, one (1) measurement skid, and four (4) crude oil pumps.

• An interconnection between the existing Rancho II pipeline and the proposed ECHO to Oyster Creek pipeline consisting of a physical connection as well as ultrasonic measurement capability for pipeline volumetric balancing purposes.

• The proposed Oyster Creek Terminal located in Brazoria County, Texas, on approximately 140 acres of land consisting of seven (7) aboveground storage tanks, each with a total storage capacity of 685,000 barrels (600,000 barrels working storage capacity), for a total onshore storage capacity of approximately 4.8 million barrels (4.2 million barrels working storage) of crude oil. The Oyster Creek Terminal also would include: Six (6) electric-driven mainline crude oil pumps; four (4) electric driven booster crude oil pumps—two (2) per pipeline to the SPOT deepwater port, working in parallel to move crude oil from the storage tanks through the measurement skids; two (2) crude oil pipeline pig launchers/receivers; one (1) crude oil pipeline pig receiver; two (2) measurement skids for measuring incoming crude oil—one (1) skid located at the incoming pipeline from the existing Enterprise Crude Houston (ECHO) Terminal, and one (1) skid installed and reserved for a future pipeline connection; two (2) measurement skids for measuring departing crude oil; three (3) vapor combustion units—two (2) permanent and one (1) portable; and ancillary facilities to include electrical substation, office, and warehouse buildings.

• Three onshore crude oil pipelines would be constructed onshore to support the SPOT deepwater port. These would include: One (1) 50.1 statute mile long 36-inch crude oil pipeline from the existing ECHO Terminal to the Oyster Creek Terminal. This pipeline would be located in Harris County and Brazoria County, Texas; two (2) 12.2 statute mile long, co-located 36-inch crude oil export pipelines from the Oyster Creek Terminal to the shore crossing where these would join the above described subsea pipelines supplying the SPOT deepwater port. These pipelines would be located in Brazoria County, Texas.

Privacy Act

DOT posts comments, without edit, to *www.regulations.gov*, as described in the system of records notice, DOT/ALL–14 FDMS, accessible through *www.dot.gov/privacy*. To facilitate comment tracking and response, we encourage commenters to provide their name, or the name of their organization; however, submission of names is completely optional. Whether or not commenters identify themselves, all timely comments will be fully considered. If you wish to provide comments containing proprietary or confidential information, please contact the agency for alternate submission instructions.

(Authority: 49 CFR § 1.93).

Dated: March 4, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.

Secretary, Maritime Administration.

[FR Doc. 2019–04101 Filed 3–6–19; 8:45 am]

BILLING CODE 4910–81–P

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. SE
Washington, DC 20593-7509
Staff Symbol: CG-OES-2
Phone: (202) 372-1444
Fax: (202) 372-8382
Email: Curtis.E.Borland@uscg.mil

May 1, 2019

Mr. Rusty Swafford, Supervisor
National Marine Fisheries Service
Gulf of Mexico Branch
Habitat Conservation Division
4700 Avenue U, Building 307
Galveston, TX 77551

Re: Request for Technical Assistance – SPOT Terminal Services LLC Deepwater Port (MARAD-2019-0011)

Dear Mr. Swafford:

On January 31, 2019, SPOT Terminal Services LLC, a subsidiary of Enterprise Products Operating LLC, (SPOT, or the Applicant) submitted an application to the U.S. Coast Guard (Coast Guard) and Maritime Administration (MARAD) seeking approval to own, construct, and operate the Sea Port Oil Terminal (SPOT) crude oil export deepwater port (DWP) in the Gulf of Mexico to provide crude oil loading services on very large crude carriers (VLCCs) and other crude oil carriers for export to the global market. The application was supplemented on April 8, 2019 to provide updated information regarding agency correspondence and permit applications, as well as additional financial information.

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act, we seek technical assistance with your office regarding the presence of essential fish habitat (EFH) within the SPOT Project area and the extent to which EFH may be affected by the proposed action. To fully analyze the impacts associated with the Proposed Action, we request you review the EFH Table (enclosed) to confirm the EFH present within the Project area. This review will confirm what the Applicant has provided, as well as outline any specific concerns you have with respect to the proposed action and interactions with the species and habitat under the jurisdiction of the National Marine Fisheries Service.

The SPOT DWP application was noticed in the Federal Register and posted to the federal docket on March 4, 2019. The SPOT DWP application supplement was posted to the federal docket on April 11, 2019. Both submittals are available for viewing and downloading from the Federal Docket Management System at http:///www.regulations.gov, Docket Number MARAD-2019-0011.

The SPOT Project would consist of two distinct but interrelated components: 1) the offshore component and 2) the onshore component. The offshore component would be located in federal waters within the Outer Continental Shelf in Galveston Area Lease Blocks 463 and A-59, between 27.2 and 30.8 nautical miles off the coast of Brazoria County, Texas, in water depths of approximately 115 feet. The SPOT DWP would allow for up to two VLCCs or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with a fixed offshore platform by floating connecting crude oil hoses and a floating vapor recovery hose. The offshore component would consist of the following elements:

- One fixed offshore platform;
- Two SPM buoys to moor VLCCs or other crude oil carriers for loading;
- Four pipeline end manifolds (PLEMs)—two per SPM buoy—that would provide the interconnection between the pipelines and the SPM buoys;
- Four 30-inch pipelines to deliver crude oil from the platform to the PLEMs;
- Four 16-inch vapor recovery pipelines (two per PLEM) to transfer recovered vapors from the VLCC or other crude oil carrier to three vapor combustion units on the platform; and
- Two offshore co-located 36-inch-diameter crude oil pipelines that would connect the fixed offshore platform to the onshore components.

The onshore component would provide the crude oil supply and interconnection for the proposed Project and would consist of the following components:

- Addition of measurement skids and electric motor-driven pumps at the existing Enterprise Crude Houston (ECHO) Terminal to supply crude oil to the proposed Oyster Creek Terminal;
- One 36-inch pipeline connecting the existing ECHO Terminal to the proposed Oyster Creek Terminal (ECHO to Oyster Creek Pipeline);
- One connection from the existing Rancho II 36-inch pipeline to the proposed ECHO to Oyster Creek Pipeline;
- Construction and operation of the proposed Oyster Creek Terminal in Brazoria County, Texas;
- Seven aboveground storage tanks at the proposed Oyster Creek Terminal, each with a total storage capacity of 685,000 barrels (600,000 barrels working storage capacity);
- Two co-located 36-inch crude oil pipelines from the proposed Oyster Creek Terminal to the proposed shore crossing and offshore pipeline infrastructure (Oyster Creek to Shore Pipeline); and
- Ten mainline valves—six mainline valves within the permanent right-of-way of the ECHO to Oyster Creek Pipeline and four mainline valves within the permanent right-of-way of the Oyster Creek to Shore Pipeline.

As stated in MARAD's Notice of Intent to Prepare an Environmental Impact Statement, dated March 7, 2019 (enclosed), the Coast Guard, in coordination with MARAD, are preparing an environmental impact statement (EIS) as part of the processing of SPOT's DWP license application. As part of the EIS, we will fully analyze potential impacts on EFH.

If you have any questions about this request or the preparation of the SPOT EIS, please contact Ms. Melissa Perera, Coast Guard Environmental Protection Specialist, (202) 372-1446 (melissa.e.perera@uscg.mil). Thank you for your assistance. We look forward to working with you on the SPOT Project.

Sincerely,

Curtis E. Borland Attorney/Advisor, Deepwater Ports Standards Division U.S. Coast Guard	Yvette M. Fields Director, Office of Deepwater Port Licensing and Port Conveyance Maritime Administration

Encl: (1) Essential Fish Habitat Table
(2) Federal Register Notice of Intent to Prepare an Environmental Impact Statement

Copy: Melissa Perera, U.S. Coast Guard
Amanda Gregory, ERM
Janet Nunley, ERM
Virginia Fay, National Marine Fisheries Service
Noah Silverman, National Marine Fisheries Service

ENCLOSURE 1

Essential Fish Habitat Table

Fishery Management Plan	Managed Taxa	
Red Drum	Red drum (*Sciaenops ocellatus*)	
Reef Fish	Snappers	
	Etelis oculatus	*Lutjanus analis*
	Lutjanus buccanella	*Lutjanus campechanus*
	Lutjanus cyanopterus	*Lutjanus griseus*
	Lutjanus synagris	*Lutjanus vivanus*
	Ocyurus chrysurus	*Pristipomoides aquilonaris*
	Rhomboplites aurorubens	
	Groupers	
	Epinephelus drummondhayi	*Epinephelus flavolimbatus*
	Epinephelus itajara	*Epinephelus morio*
	Epinephelus nigritus	*Epinephelus niveatus*
	Mycteroperca bonaci	*Mycteroperca interstitialis*
	Mycteroperca microlepis	*Mycteroperca phenax*
	Mycteroperca venenosa	
	Tilefishes	
	Caulolatilus chrysops	*Caulolatilus microps*
	Lopholatilus chamaeleonticeps	
	Jacks	
	Seriola dumerili	*Seriola fasciata*
	Seriola rivoliana	*Seriola zonata*
	Triggerfish (*Balistes capriscus*)	
	Hogfish (*Lachnolaimus maximus*)	
Coastal Migratory Pelagics	King mackerel (*Scomberomorus cavalla*) Spanish mackerel (*Scomberomorus maculatus*) Cobia (*Rachycentron canadum*) Cero (*Scomberomorus regalis*) Little tunny (*Euthynnus alletteratus*) Dolphin (*Coryphaena hippurus*) Bluefish (*Pomatomus saltatrix*)	
Shrimp	Pink shrimp (*Farfantepenaeus duorarum*) White shrimp (*Litopenaeus setiferus*) Brown shrimp (*Farfantepenaeus aztecus*) Royal red shrimp (*Pleoticus robustus*)	
Stone Crab	Florida stone crab (*Menippe mercenaria*)	
Highly Migratory Species	Blacktip shark (*Carcharhinus limbatus*) Bull shark (*Carcharhinus leucas*) Lemon shark (*Negaprion brevirostris*) Scalloped hammerhead shark (*Sphyrna lewini*) Spinner shark (*Carcharhinus brevipinna*) Blacknose shark (*Carcharhinus acronotus*) Bonnethead (*Sphyrna tiburo*) Finetooth shark (*Carcharhinus isodon*) Atlantic sharpnose (*Rhizoprionodon terraenovae*)	

ENCLOSURE 2

Notice of Intent to Prepare an Environmental Impact Statement

There is no limit on the length of the attachments.

Where do I go to read public comments, and find supporting information?

Go to the docket online at *http://www.regulations.gov.*, keyword search MARAD–2019–0007 or visit the Docket Management Facility (see **ADDRESSES** for hours of operation). We recommend that you periodically check the Docket for new submissions and supporting material.

Will my comments be made available to the public?

Yes. Be aware that your entire comment, including your personal identifying information, will be made publicly available.

May I submit comments confidentially?

If you wish to submit comments under a claim of confidentiality, you should submit three copies of your complete submission, including the information you claim to be confidential business information, to the Department of Transportation, Maritime Administration, Office of Legislation and Regulations, MAR–225, W24–220, 1200 New Jersey Avenue SE, Washington, DC 20590. Include a cover letter setting forth with specificity the basis for any such claim and, if possible, a summary of your submission that can be made available to the public.

Privacy Act

In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, to *www.regulations.gov,* as described in the system of records notice, DOT/ALL–14 FDMS, accessible through *www.dot.gov/privacy.* To facilitate comment tracking and response, we encourage commenters to provide their name, or the name of their organization; however, submission of names is completely optional. Whether or not commenters identify themselves, all timely comments will be fully considered. If you wish to provide comments containing proprietary or confidential information, please contact the agency for alternate submission instructions.

(*Authority:* 49 CFR 1.93(a), 46 U.S.C. 55103, 46 U.S.C. 12121)

* * *

Dated: March 4, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.,

Secretary, Maritime Administration.

[FR Doc. 2019–04105 Filed 3–6–19; 8:45 am]

BILLING CODE 4910–81–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0011]

Deepwater Port License Application: SPOT Terminal Services LLC (SPOT)

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; Notice of public meeting; Request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the SPOT Terminal Services LLC (SPOT) deepwater port license application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 27.2 to 30.8 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 115 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring buoy system.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate, and announces an informational open house and public meeting in Lake Jackson, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended, Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the SPOT deepwater port application. The meeting will be held in Lake Jackson, Texas, on March 20, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 5:30 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the SPOT deepwater port license application must reach the Federal Docket Management Facility as detailed below by Friday, April 5, 2019.

ADDRESSES: The open house and public meeting in Lake Jackson, Texas will be held at the Courtyard Lake Jackson, 159 State Highway 288, Lake Jackson, Texas, 77566, phone: (979) 297–7300, web address: *https://www.marriott.com/hotels/travel/ljncy-courtyard-lake-jackson/.* Free parking is available at the venue.

The public docket for the SPOT deepwater port license application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.

The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0011.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Efrain Lopez, USCG, or Ms. Yvette M. Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Efrain Lopez, USCG, telephone: 202–372–1437, email: *Efrain.Lopez1@uscg.mil,* or Ms. Yvette M. Fields, MARAD, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see **ADDRESSES**).

Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend the open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see **FOR FURTHER INFORMATION CONTACT**) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the SPOT deepwater port license application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0011.

Public comment submissions should include:

- Docket number MARAD–2019–0011.
- Your name and address.

Submit comments or material using only one of the following methods:

- Electronically (preferred for processing) to the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0011.
- By mail to the Federal Docket Management Facility (MARAD–2019–0011), U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001.
- By personal delivery to the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.
- By fax to the Federal Docket Management Facility at 202–493–2251.

Faxed, mailed or hand delivered submissions must be unbound, no larger than 8½ by 11 inches and suitable for copying and electronic scanning. The format of electronic submissions should also be no larger than 8½ by 11 inches. If you mail your submission and want to know when it reaches the Federal Docket Management Facility, please include a stamped, self-addressed postcard or envelope.

Regardless of the method used for submitting comments, all submissions will be posted, without change, to the FDMS website (*http://www.regulations.gov*) and will include any personal information you provide. Therefore, submitting this information to the docket makes it public. You may wish to read the Privacy and Use Notice that is available on the FDMS website and the Department of Transportation Privacy Act Notice that appeared in the **Federal Register** on April 11, 2000 (65 FR 19477), see Privacy Act. You may view docket submissions at the Federal Docket Management Facility or electronically on the FDMS website.

Background

Information about deepwater ports, the statutes, and regulations governing their licensing, including the application review process, and the receipt of the current application for the proposed SPOT deepwater port appears in the SPOT Notice of Application, March 4, 2019 edition of the **Federal Register**. The "Summary of the Application" from that publication is reprinted below for your convenience.

Consideration of a deepwater port license application includes review of the proposed deepwater port's impact on the natural and human environment. For the proposed deepwater port, USCG and MARAD are the co-lead Federal agencies for determining the scope of this review, and in this case, it has been determined that review must include preparation of an EIS. This NOI is required by 40 CFR 1501.7. It briefly describes the proposed action, possible alternatives and our proposed scoping process. You can address any questions about the proposed action, the scoping process or the EIS to the USCG or MARAD project managers identified in this notice (see **FOR FURTHER INFORMATION CONTACT**).

Proposed Action and Alternatives

The proposed action requiring environmental review is the Federal licensing of the proposed deepwater port described in "Summary of the Application" below. The alternatives to licensing the proposed port are: (1) Licensing with conditions (including conditions designed to mitigate environmental impact), (2) evaluation of deepwater port and onshore site/pipeline route alternatives or (3) denying the application, which for purposes of environmental review is the "no-action" alternative.

Scoping Process

Public scoping is an early and open process for identifying and determining the scope of issues to be addressed in the EIS. Scoping begins with this notice, continues through the public comment period (see **DATES**), and ends when USCG and MARAD have completed the following actions:

- Invites the participation of Federal, state, and local agencies, any affected Indian tribe, the applicant, in this case SPOT, and other interested persons;
- Determines the actions, alternatives and impacts described in 40 CFR 1508.25;
- Identifies and eliminates from detailed study, those issues that are not significant or that have been covered elsewhere;
- Identifies other relevant permitting, environmental review and consultation requirements;
- Indicates the relationship between timing of the environmental review and other aspects of the application process; and
- At its discretion, exercises the options provided in 40 CFR 1501.7(b).

Once the scoping process is complete, USCG and MARAD will prepare a draft EIS. When complete, MARAD will publish a **Federal Register** notice announcing public availability of the Draft EIS. (If you want that notice to be sent to you, please contact the USCG or MARAD project manager identified in **FOR FURTHER INFORMATION CONTACT**). You will have an opportunity to review and comment on the Draft EIS. The USCG, MARAD and other appropriate cooperating agencies will consider the received comments and then prepare the Final EIS. As with the Draft EIS, we will announce the availability of the Final EIS and give you an opportunity

for review and comment. The Act requires a final public hearing to be held in the Adjacent Coastal State. Its purpose is to receive comments on matters related to whether or not an operating license should be issued. The final public hearing will be held after the Final EIS is made available for public review and comment.

Summary of the Application

SPOT is proposing to construct, own, and operate a deepwater port terminal in the Gulf of Mexico to export domestically produced crude oil. Use of the deepwater port would include the loading of various grades of crude oil at flow rates of up to 85,000 barrels per hour (bph). The SPOT deepwater port would allow for up to two (2) very large crude carriers (VLCCs) or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with the deepwater port via floating connecting crude oil hoses and a floating vapor recovery hose. The maximum frequency of loading VLCCs or other crude oil carriers would be 2 million barrels per day, 365 days per year.

The overall project would consist of offshore and marine components as well as onshore components as described below.

The SPOT deepwater port offshore and marine components would consist of the following:

• One (1) fixed offshore platform with eight (8) piles in Galveston Area Outer Continental Shelf lease block 463, approximately 27.2 to 30.8 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 115 feet. The fixed offshore platform would be comprised of four (4) decks including: A sump deck with shut-down valves and open drain sump; a cellar deck with pig launchers and receivers, generators, and three (3) vapor combustion units; a main deck with a lease automatic custody transfer (LACT) unit, oil displacement prover loop, living quarters, electrical and instrument building, and other ancillary equipment; and a laydown deck with a crane laydown area.

• Two (2) single point mooring buoys (SPMs), each having: Two (2) 24-inch inside diameter crude oil underbuoy hoses interconnecting with the crude oil pipeline end manifold (PLEM); two (2) 24-inch inside diameter floating crude oil hoses connecting the moored VLCC or other crude oil carrier for loading to the SPM buoy; one (1) 24-inch inside diameter vapor recovery underbuoy hose interconnecting with the vapor recovery PLEM; and one (1) 24-inch inside diameter floating vapor recovery hose to connect to the moored VLCC or other crude oil carrier for loading. The floating hoses would be approximately 800 feet in length and rated for 300 psig (21-bar). Each floating hose would contain an additional 200 feet of 16-inch "tail hose" that is designed to be lifted and robust enough for hanging over the edge railing of the VLCC or other crude oil carrier. The underbuoy hoses would be approximately 160 feet in length and rated for 300 psig (21-bar).

• Four (4) PLEMS would provide the interconnection between the pipelines and the SPM buoys. Each SPM buoy would have two (2) PLEMs—one (1) PLEM for crude oil and one (1) PLEM for vapor recovery. Each crude oil loading PLEM would be supplied with crude oil by two (2) 30-inch outside diameter pipelines, each approximately 0.66 nautical miles in length. Each vapor recovery PLEM would route recovered vapor from the VLCC or other crude oil carrier through the PLEM to the three (3) vapor combustion units located on the platform topside via two (2) 16-inch outside diameter vapor recovery pipelines, each approximately 0.66 nautical miles in length.

• Two (2) co-located 36-inch outside diameter, 40.8-nautical mile long crude oil pipelines would be constructed from the shoreline crossing in Brazoria County, Texas, to the SPOT deepwater port for crude oil delivery. These pipelines, in conjunction with 12.2 statute miles of new-build onshore pipelines (described below), would connect the onshore crude oil storage facility and pumping station (Oyster Creek Terminal) to the offshore SPOT deepwater port. The crude oil would be metered at the offshore platform. Pipelines would be bi-directional for the purposes of maintenance, pigging, changing crude oil grades, or evacuating the pipeline with water.

The SPOT deepwater port onshore storage and supply components would consist of the following:

• New equipment and piping at the existing Enterprise Crude Houston (ECHO) Terminal to provide interconnectivity with the crude oil supply network for the SPOT Project. This would include the installation of four (4) booster pumps, one (1) measurement skid, and four (4) crude oil pumps.

• An interconnection between the existing Rancho II pipeline and the proposed ECHO to Oyster Creek pipeline consisting of a physical connection as well as ultrasonic measurement capability for pipeline volumetric balancing purposes.

• The proposed Oyster Creek Terminal located in Brazoria County, Texas, on approximately 140 acres of land consisting of seven (7) aboveground storage tanks, each with a total storage capacity of 685,000 barrels (600,000 barrels working storage capacity), for a total onshore storage capacity of approximately 4.8 million barrels (4.2 million barrels working storage) of crude oil. The Oyster Creek Terminal also would include: Six (6) electric-driven mainline crude oil pumps; four (4) electric driven booster crude oil pumps—two (2) per pipeline to the SPOT deepwater port, working in parallel to move crude oil from the storage tanks through the measurement skids; two (2) crude oil pipeline pig launchers/receivers; one (1) crude oil pipeline pig receiver; two (2) measurement skids for measuring incoming crude oil—one (1) skid located at the incoming pipeline from the existing Enterprise Crude Houston (ECHO) Terminal, and one (1) skid installed and reserved for a future pipeline connection; two (2) measurement skids for measuring departing crude oil; three (3) vapor combustion units—two (2) permanent and one (1) portable; and ancillary facilities to include electrical substation, office, and warehouse buildings.

• Three onshore crude oil pipelines would be constructed onshore to support the SPOT deepwater port. These would include: One (1) 50.1 statute mile long 36-inch crude oil pipeline from the existing ECHO Terminal to the Oyster Creek Terminal. This pipeline would be located in Harris County and Brazoria County, Texas; two (2) 12.2 statute mile long, co-located 36-inch crude oil export pipelines from the Oyster Creek Terminal to the shore crossing where these would join the above described subsea pipelines supplying the SPOT deepwater port. These pipelines would be located in Brazoria County, Texas.

Privacy Act

DOT posts comments, without edit, to *www.regulations.gov*, as described in the system of records notice, DOT/ALL–14 FDMS, accessible through *www.dot.gov/privacy*. To facilitate comment tracking and response, we encourage commenters to provide their name, or the name of their organization; however, submission of names is completely optional. Whether or not commenters identify themselves, all timely comments will be fully considered. If you wish to provide comments containing proprietary or confidential information, please contact the agency for alternate submission instructions.

(Authority: 49 CFR § 1.93).

Dated: March 4, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.

Secretary, Maritime Administration.

[FR Doc. 2019–04101 Filed 3–6–19; 8:45 am]

BILLING CODE 4910–81–P

ATTACHMENT B

HDD Contingency Plan

(SPOT Application, Vol IIb, Appendix H)
(Response to Information Request #227)

-Page Intentionally Left Blank-

Sea Port Oil Terminal Project
Offshore Brazoria County, Texas

VOLUME IIb

APPENDIX H

HORIZONTAL DIRECTIONAL DRILL CONTINGENCY PLAN

H HORIZONTAL DIRECTIONAL DRILL CONTINGENCY PLAN

1.0 INTRODUCTION

Horizontal directional drills (HDDs) are commonly used in pipeline construction for crossing large waterbodies, transportation corridors, and other sensitive features. This special pipeline construction method allows for the pipeline to be placed via a drill without impacting the ground surface between the entry and exit locations. This HDD Contingency Plan provides procedures to manage contingencies that may occur during HDDs associated with the installation of the Sea Port Oil Terminal (SPOT) Project's onshore pipelines. Section 1.4.4.12, "Special Pipeline Construction Methods," Volume IIb, provides a detailed description of the HDD installation process and the locations of all HDDs planned for the SPOT Project.

2.0 ALTERNATIVE CONSTRUCTION TO HDD

HDDs have been in use since the 1970s. The technology has become commonplace and is a proven method that is readily available for installing crude oil pipelines. Issues that occur with HDDs are primarily related to geotechnical issues, where significant non-uniformity exists in the underlying formations (notably containing scattered rock, sands, and gravel) or cavities where the drilling fluid pressures on the drill string head cannot be maintained or could be lost. In these cases, the pilot hole or reaming hole may collapse and not accommodate pulling through the welded pipe section.

If, for any reason, it becomes necessary to suspend HDD operations and/or abandon a partially completed drill hole, the drill string will be withdrawn and the hole will be pumped with flowable backfill material and pugged at the surface. If it is determined necessary to abandon the original HDD location, the proposed alignment may be modified to accommodate a new HDD. The typical procedure to replace an HDD is to move its location approximately 50 feet (15.2 meters) to either side of the original location.

In the event that an HDD is found to be technically unfeasible, an alternative construction method to suit the site-specific conditions may be selected, including open cut construction of bore methods (see Section 1.4.4, "Pipeline Construction," Volume IIb). Such alternative methods would only be used after notifying applicable regulatory agencies and obtaining any necessary approvals. As the proposed SPOT Project would occur in Harris County and Brazoria County, Texas, the geology is generally conducive to the use of HDDs and, therefore, the chance would be low for an HDD to be non-viable and an alternative method to be chosen.

3.0 HDD MONITORING PROCEDURES

During an HDD, there is the potential risk of an inadvertent release of drilling muds to the ground surface. The HDD contractor supervisor will be onsite at all times during an HDD and will continuously monitor all operations during drilling activities for any indication of loss of pressure or loss of drilling muds/fluids. Drilling mud that would be used for HDDs will consist of fresh water with a high-yield bentonite to achieve the necessary viscosity for the drilling mud. Bentonite is the commercial name for a nontoxic mixture of naturally-occurring clays and rock particles and is not considered a hazardous material by the U.S. Environmental Protection Agency or the Texas Department of Environmental Quality. Drilling parameters will be established to maximize circulation of drilling muds and minimize the risk of inadvertent releases. Monitoring of the HDD will include:

- Visual inspection along the drill path, including monitoring the wetlands and waterbodies for evidence of a release;
- Continuous monitoring of drilling mud, drilling mud pressures, and return flows by the HDD contractor; and
- Periodic recording of HDD status regarding site conditions, pressures, returns, and progress during the course of HDD activities.

Once the HDD is complete, the HDD contractor would inspect the site after equipment removal for any signs of an inadvertent release.

4.0 DRILLING FLUIDS CONTROL AND CONTAINMENT

4.1 STORAGE OF FLUIDS AND LUBRICANTS

Any use of fluids and lubricants that could harm the environment if released would be handled in accordance with the applicable federal, state, and local regulations as well as the HDD contractor's Spill Response Plan. The HDD contractor would be required to provide the Spill Response Plan for review and approval by the SPOT Terminal Services LLC (the Applicant) or their representative.

4.2 CONTAINMENT AND CLEANUP OF DRILLING FLUIDS

HDD procedures demand that highly accurate monitoring and control systems are used to track the progress and exact location of the drilling head at all times. Drilling mud is used during the advancement of the drill string to erode the formation and aid in stabilizing the pilot hole. The specific weight of the drilling mud is adjusted throughout the installation method to ensure hydrological stability. If a release of drilling mud should occur, the following measures will be implemented. Only experienced personnel trained in the HDD will be assigned the task of conducting and monitoring the HDD.

4.2.1 Measures to Contain a Release of Drilling Fluid in a Wetland or Waterbody

1. If the inadvertent release of drilling mud occurs within a wetland or sensitive area, appropriate regulatory agencies will be contacted in accordance with application regulations and permit conditions. Drilling mud pressure will be reduced and operations will be temporarily suspended to assess the extent of the release and to implement other possible corrective actions.

2. If public health and safety is threatened, drilling mud circulation pumps will be turned off until the threat is eliminated. This measure will be taken as a last resort because of the potential for drill-hole collapse resulting from loss of down-hole pressure.

3. A sample of the drilling mud will be collected and held for future analysis in the event that an analysis is requested by regulatory agencies.

4. Inspection will be initiated to determine the potential movement of released drilling mud within the wetland, waterbody, or other sensitive feature.

5. The HDD contractor will determine and implement modifications to the HDD technique or composition of drilling mud (i.e., thickening of drilling mud by increasing bentonite content), as appropriate, to minimize or prevent further releases of drilling mud.

6. Reasonable measures, within the limitation of HDD technology and the HDD contractor's capability, will be taken to re-establish drilling mud circulation.

7. The HDD contractor will evaluate the release to determine if containment structures are warranted and can effectively contain the release. When making this determination, the HDD contractor will also consider if placement of containment structures will cause additional adverse environmental impacts.

8. Upon completion of HDD operations, the Applicant will consult with the applicable regulatory agencies to determine if there is a need for any final cleanup requirements for the inadvertent release.

4.2.2 Measures to Contain a Release of Drilling Fluid on Land

1. If a land release is detected, the HDD contractor will take corrective action to contain the release and to prevent offsite migration.

2. If public health and safety are threatened by an inadvertent release, HDD operations will be shut down until the threat is effectively addressed or eliminated.

3. The HDD contractor will determine and implement modifications to the HDD technique or composition of drilling mud (i.e., thickening of drilling mud by increasing bentonite content), as appropriate, to minimize or prevent further releases of drilling mud.

4. If the amount of drilling mud from an on-land release does not allow for practical collection, the drilling mud will be diluted with freshwater and allowed to dry. If warranted, a containment structure will be installed to prevent silt-laden water from flowing into a wetland or waterbody.

5. If the amount of release is enough to allow collection, the drilling mud released will be collected and returned to either the HDD operation or disposed offsite.

5.0 NOTIFICATION PROCEDURES

If a release occurs, the HDD contractor must immediately notify the Applicant's Chief Inspector. The Applicant's Chief Inspector will then notify the appropriate regulatory agencies of the inadvertent release. The Applicant's Chief Inspector will maintain an agency contact list for the SPOT Project.

Annex #227 – Data Gap #227 Response

Annex 227 (Responses to Questions in Appendix DR4-227)

Modify the HDD Contingency Plan to include additional information as follows:

a. In Section 3.0, HDD Monitoring Procedures:

   i. Indicate how often visual inspection of the drilled alignment would occur on land and in waterbodies.

      Response:

      Visual inspection of the drilled alignment would occur on land and in waterbodies on a continuous basis.

   ii. Indicate how often seeps or springs along or near the drill path would be visually inspected.

      Response:

      Seeps or springs along or near the drill path would not be visually inspected, as a loss of pressure or reduction of drilling mud/fluid return would provide a more reliable and timely indication of a release than visual inspection of seeps or springs. However, the horizontal directional drill (HDD) contractor supervisor would be on site at all times during an HDD operation and would continuously monitor all operations during drilling activities for any indication of loss of pressure or loss of drilling muds/fluids.

   iii. Indicate who would conduct visual inspections.

      Response:

      The HDD contractor supervisor would conduct visual inspections.

b. In Section 4.2, Containment and Cleanup of Drilling Fluids:

   i. Better describe the procedures that would be followed by the Contractor in the event of an inadvertent release. For example, clarify if the Environmental Inspector and SPOT representative would be notified immediately and whether drilling operations would be suspended until authorized to move forward.

      Response:

      Wetland or Waterbody Release

      Section 4.2.1 of the HDD Contingency Plan (Volume IIb, Appendix H, of the Deepwater Port License Application, January 2019) details the procedures that would be followed by the HDD contractor in the event of an inadvertent release in a wetland or waterbody. The HDD contractor would notify the SPOT Representative and Environmental Inspector immediately. Drilling operations would be suspended to assess the extent of the release and to implement other possible corrective actions, such as installation of booms, silt fences, sandbags, and straw bales.

      Land Release

      Section 4.2.2 of the HDD Contingency Plan details the procedures that would be followed by the contractor in the event of an inadvertent release on land. The HDD contractor would notify the SPOT Representative and Environmental Inspector immediately. Drilling operations would be suspended to assess the extent of the release and to implement other possible corrective actions, such as installation of booms, silt fences, sandbags, and straw bales. Only after the release is controlled and all appropriate contingency measures are implemented would HDD operations continue.

ii. Provide details for the types of containment barriers that could be used in wetlands or on land, such as hand-placed barriers (e.g., hay bales, sand bags, silt fences) or excavation of small pits to contain the fluids.

Response:

Containment barriers, including straw bales, sandbags, and silt fences, would be used, as appropriate, to contain drilling fluids. Excavation of small pits would also be used, as appropriate, to contain drilling fluids.

iii. If a small pit is necessary to contain the fluids, indicate how the fluid would be removed from the pit and disposed of.

Response:

Drilling fluids would be removed from the pit(s) by pumping or mechanical means and disposed of in locally approved land farms.

iv. Indicate under what circumstances drilling would be allowed to continue or resume.

Response:

Drilling would be allowed to continue only after compliance with all requirements listed in Sections 4.0 and 5.0 of the HDD Contingency Plan (Volume IIb, Appendix H, of the Deepwater Port License Application, January 2019) are satisfied.

v. Indicate under what circumstances drilling would be required to cease and whether consultation with regulatory agencies would be initiated to determine how to proceed.

Response:

Drilling would cease if an inadvertent release occurs in a wetland or waterbody. Reference Section 4.2.1 of the HDD Contingency Plan (Volume IIb, Appendix H, of the Deepwater Port License Application, January 2019).

Drilling would cease on land if public safety and health are threatened by an inadvertent release, or if drilling fluid threatens to enter a waterbody or other sensitive environment. Reference Section 4.2.2 of the HDD Contingency Plan.

vi. Provide details for cleanup if an inadvertent return occurs in a waterbody where it can be contained (e.g., shallow, standing, or slow-moving water) and indicate under what circumstances drilling could resume.

Response:

Details for cleanup, if an inadvertent release occurs in a waterbody where it can be contained, will follow applicable agency requirements. Drilling would be allowed to resume only after compliance with all requirements listed in Sections 4.0 and 5.0 of the HDD Contingency Plan (Volume IIb, Appendix H, of the Deepwater Port License Application, January 2019) are satisfied.

vii. Indicate what thickening agents could be used.

Response:

Thickening agents may or may not be used, and as a result, they have not been defined at this time. The use of thickening agent(s) would be determined in coordination with the drilling contractor(s) selected, if needed.

viii. Indicate the procedures to be followed if impacts on fish and wildlife are observed due to exposure of drilling fluids, and indicate if SPOT would consult with the appropriate regulatory agencies before proceeding.

Response:

As indicated in Section 4.1 of the HDD Contingency Plan (Volume IIb, Appendix H, of the Deepwater Port License Application, January 2019), the HDD contractor would be responsible for emergency response if an inadvertent release of drilling mud/fluids occurs, with immediate involvement of the Environmental Inspector, Chief Inspector, and SPOT Project Personnel. Additionally, the HDD contractor would maintain a record of HDD activities and the Environmental Inspector would document any observed impacts to fish and wildlife. If impacts are observed, the U.S. Fish and Wildlife Service (USFWS) and Texas Parks & Wildlife Department (TPWD) would be consulted for technical guidance on the specific situation prior to initiating any clean-up efforts. Contact information for these agencies follows:

U.S. Fish and Wildlife Contact Information:

USFWS Texas Ecological Services Field Office
Mr. Chuck Ardizzone, Project Leader
17629 El Camino Real, Suite 211
Houston, Texas 77058
Telephone Number: (281) 286-8282
E-mail: chuck_ardizzone@fws.gov

Texas Parks & Wildlife Department Contact Information:

Texas Parks and Wildlife Department
Mr. David Forrester
District Leader, Brazoria and Harris Counties
111 E. Travis, Suite 200
La Grange, Texas 78945
Telephone Number: (979) 968-6591
E-mail: david.forrester@tpwd.texas.gov

ix. Indicate if an Emergency Response Contractor would be deployed, if necessary, to assist with containing and remediating large returns.

Response:

Emergency response would be conducted by the HDD contractor with involvement from the Environmental Inspector, Chief Inspector, and SPOT Project Personnel.

x. Indicate if the contractor would be instructed on Federally-listed species and what procedures would be followed if Federally-listed species are observed in area of an inadvertent release.

Response:

As indicated in the USACE SPOT application, SWCA has opined that the proposed Project would have no effect on federally-listed species and the bald eagle due to a variety of factors, including, but not limited to, avoidance of potential habitat via horizontal bore or HDD. Further, there is only one immobile listed species (i.e., the Texas prairie-dawn) and SWCA has opined that this species is unlikely to occur within the project area due to a lack of potentially suitable habitat. The remaining species include the West Indian manatee, bird species, and sea turtles. The manatee, bird species, and sea turtles while in the water are physically capable of evading and/or avoiding areas affected by an inadvertent release. Thus, the only species that have the potential to be affected by an inadvertent release are the sea turtle species while on land. It is also worthwhile noting that laboratory results from the Geotechnical Survey (Volume III, Attachment 2B, "Geotechnical Investigation," [Confidential], of the Deepwater Port License Application, January 2019) of the pipeline route near shore show that the HDD would be in "Stiff to Very Stiff Clay," which would act as a natural barrier in the unlikely event of an inadvertent release of drilling mud/fluids.

As indicated in Section 4.1 of the HDD Contingency Plan (Volume IIb, Appendix H, of the Deepwater Port License Application, January 2019), the HDD contractor would be responsible for the emergency response if an inadvertent release of drilling mud/fluids occurs, with immediate involvement of the Environmental Inspector, Chief Inspector, and SPOT Project Personnel. Additionally, the HDD contractor would maintain a record of HDD activities and an Environmental Inspector would document any observed federally listed species in the area, if present. In the unlikely event that federally-listed species are affected by an inadvertent return, USFWS and TPWD would be consulted for technical guidance and approval on the specific situation prior to initiating any clean-up effort. Contact information for these agencies follows:

U.S. Fish and Wildlife Contact Information:
USFWS Texas Ecological Services Field Office
Mr. Chuck Ardizzone, Project Leader
17629 El Camino Real, Suite 211
Houston, Texas 77058
Telephone Number: (281) 286-8282
E-mail: chuck_ardizzone@fws.gov

Texas Parks & Wildlife Department Contact Information:
Texas Parks and Wildlife Department
Mr. David Forrester
District Leader, Brazoria and Harris Counties
111 E. Travis, Suite 200
La Grange, Texas 78945
Telephone Number: (979) 968-6591
E-mail: david.forrester@tpwd.texas.gov

c. Include a section that addresses how an inadvertent release would be handled specifically for the offshore HDD location.

Response:

The laboratory results from the Geotechnical Survey (Volume III, Attachment 2B, "Geotechnical Investigation," [Confidential], of the Deepwater Port License Application, January 2019) of the pipeline route near shore show that the HDD would be in "Stiff to Very Stiff Clay." Therefore, it is doubtful that an inadvertent release of drilling fluids would occur; however, during the drilling or reaming sequence of the HDD procedure, should the natural bottom materials above the HDD bore not be able to contain the drilling fluids, and the drilling fluid is released onto the ocean floor, a loss of drilling fluid pressure would be observed and recorded at the HDD drilling control station. The drilling fluid is comprised primarily of bentonite, a naturally occurring swelling clay, as well as other non-toxic additives. Tides, bottom currents, and wave action would naturally disperse the drilling fluid over time.

If deemed appropriate in response to an inadvertent release offshore, the support vessel near the HDD exit pit can place lighted buoys at the release location and a shallow draft boat would inspect the HDD route in an attempt to locate the release and monitor the natural movement of the materials to ensure that the materials do not interfere with vessel traffic. The HDD drilling rig would be repositioned and a new pilot hole would be drilled using a larger entry angle, and the depth of the horizontal bore would be increased to a deeper elevation, while using the same exit angle and location.

d. Include a section that describes what supplies would be available and maintained at each HDD site for cleanup of an inadvertent release. Include a list of materials and vehicles.

Response:

Equipment and supplies that would be available to address an inadvertent release include: vacuum trucks, booms, absorbent pads, shovels, and hay bales.

e. Include a section that describes restoration activities and indicate if appropriate regulatory agencies would be consulted if activities would occur in wetlands or waterbodies.

Response:

Restoration activities have not been defined at this time. Restoration activities would be conducted in consultation with USFWS, TPWD, and landowner(s).

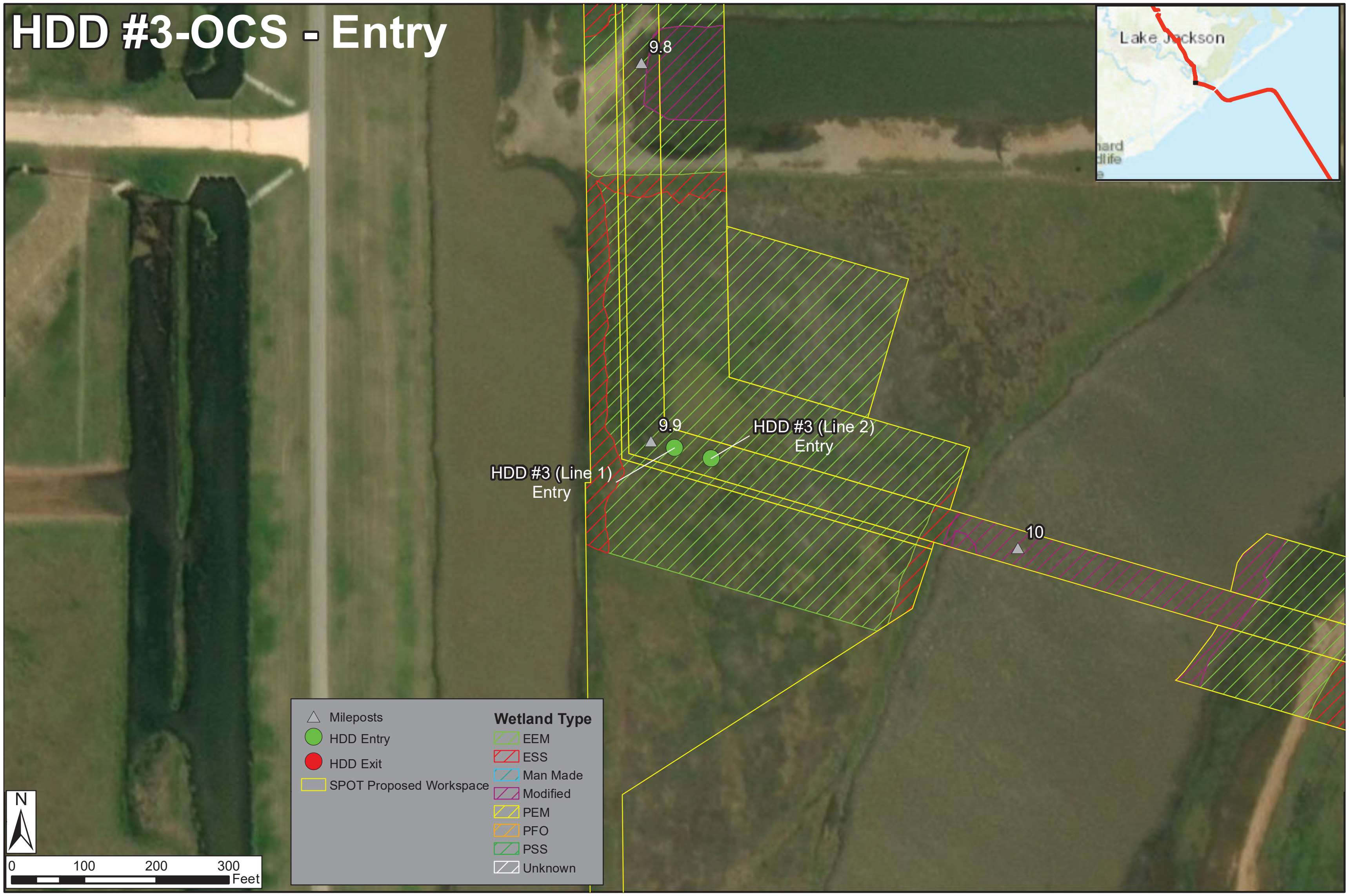
-Page Intentionally Left Blank-

ATTACHMENT C

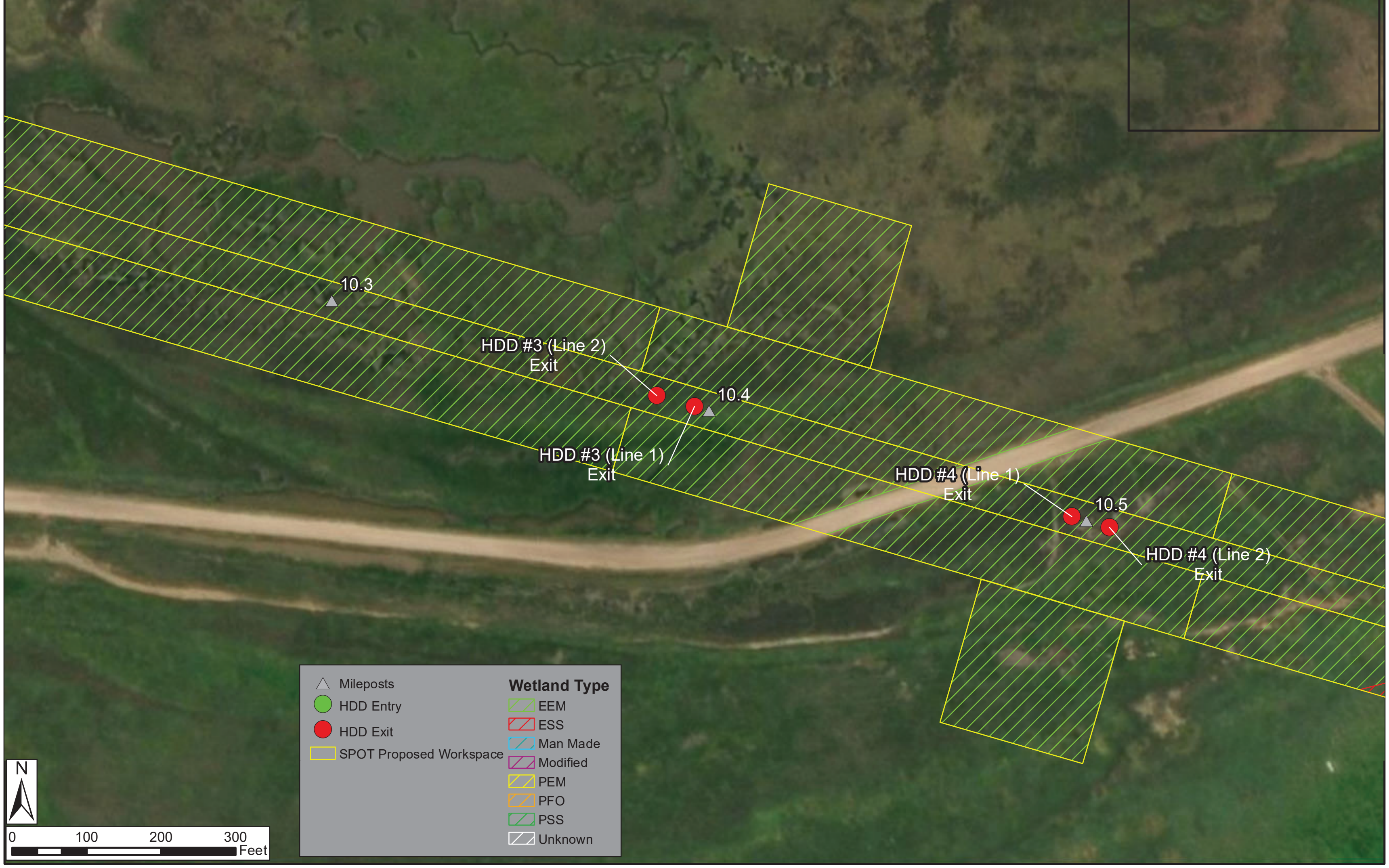
HDD Crossing Maps

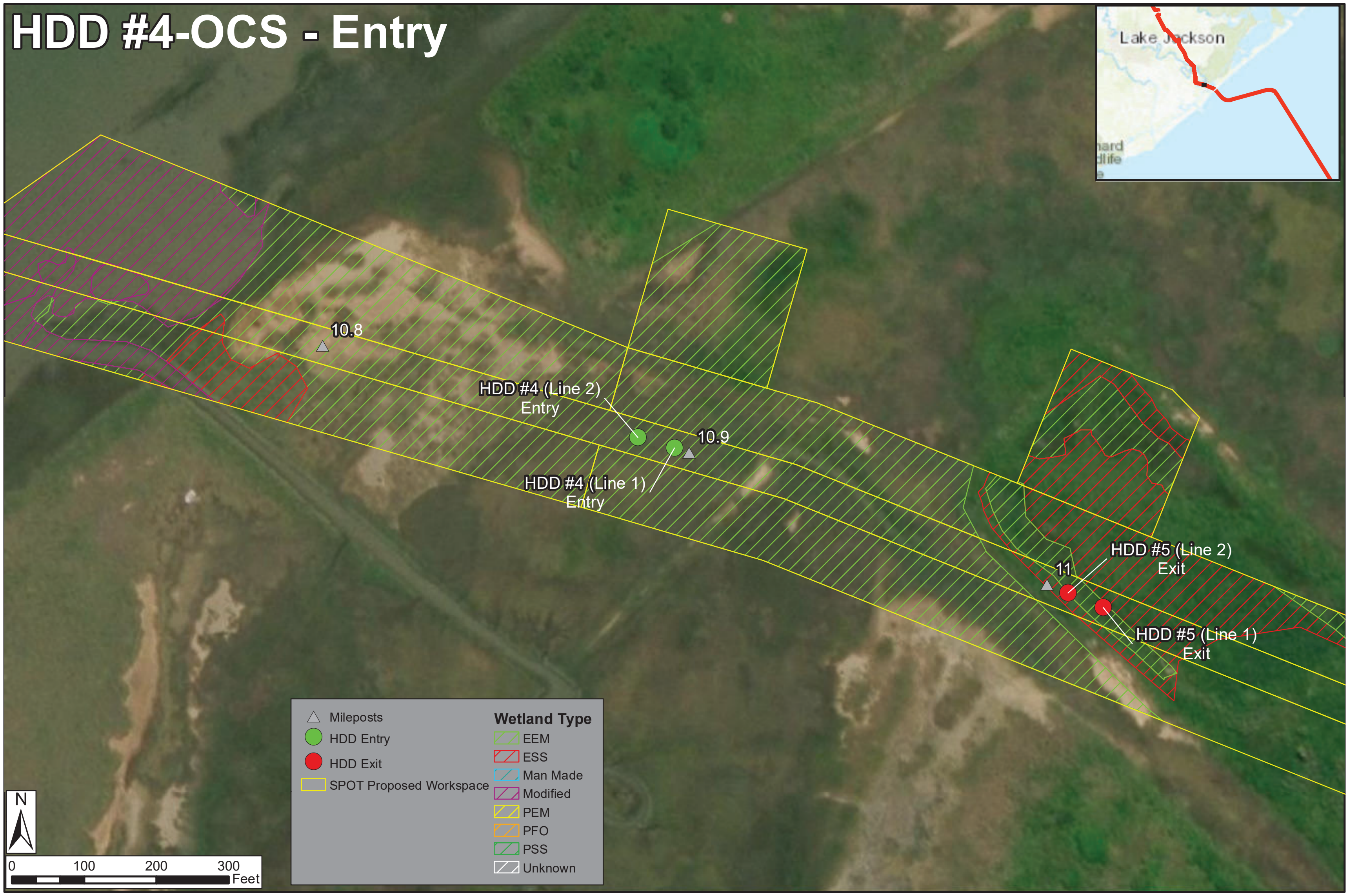
-Page Intentionally Left Blank-

HDD #3-OCS - Entry



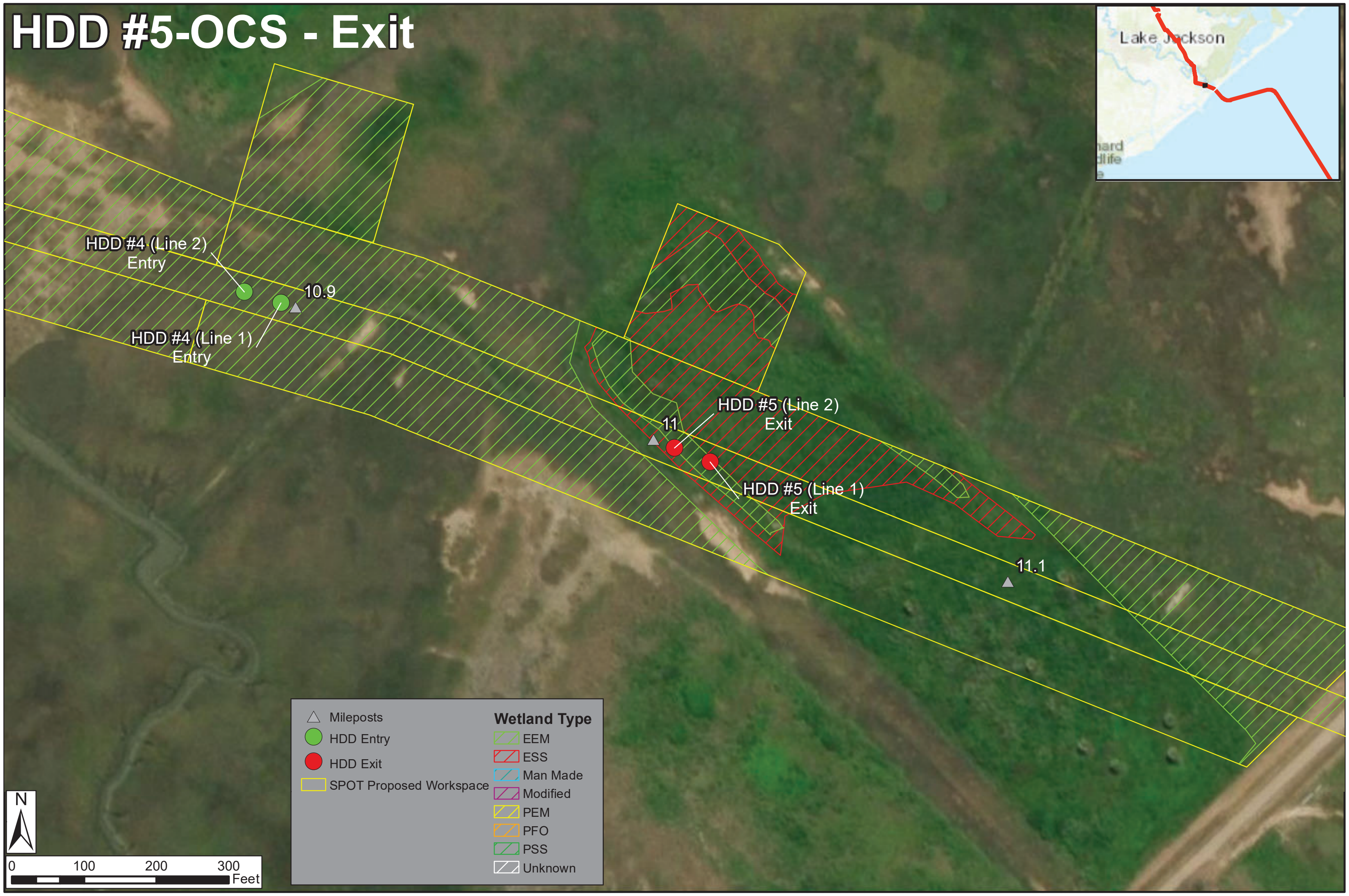
HDD #3-OCS - Exit



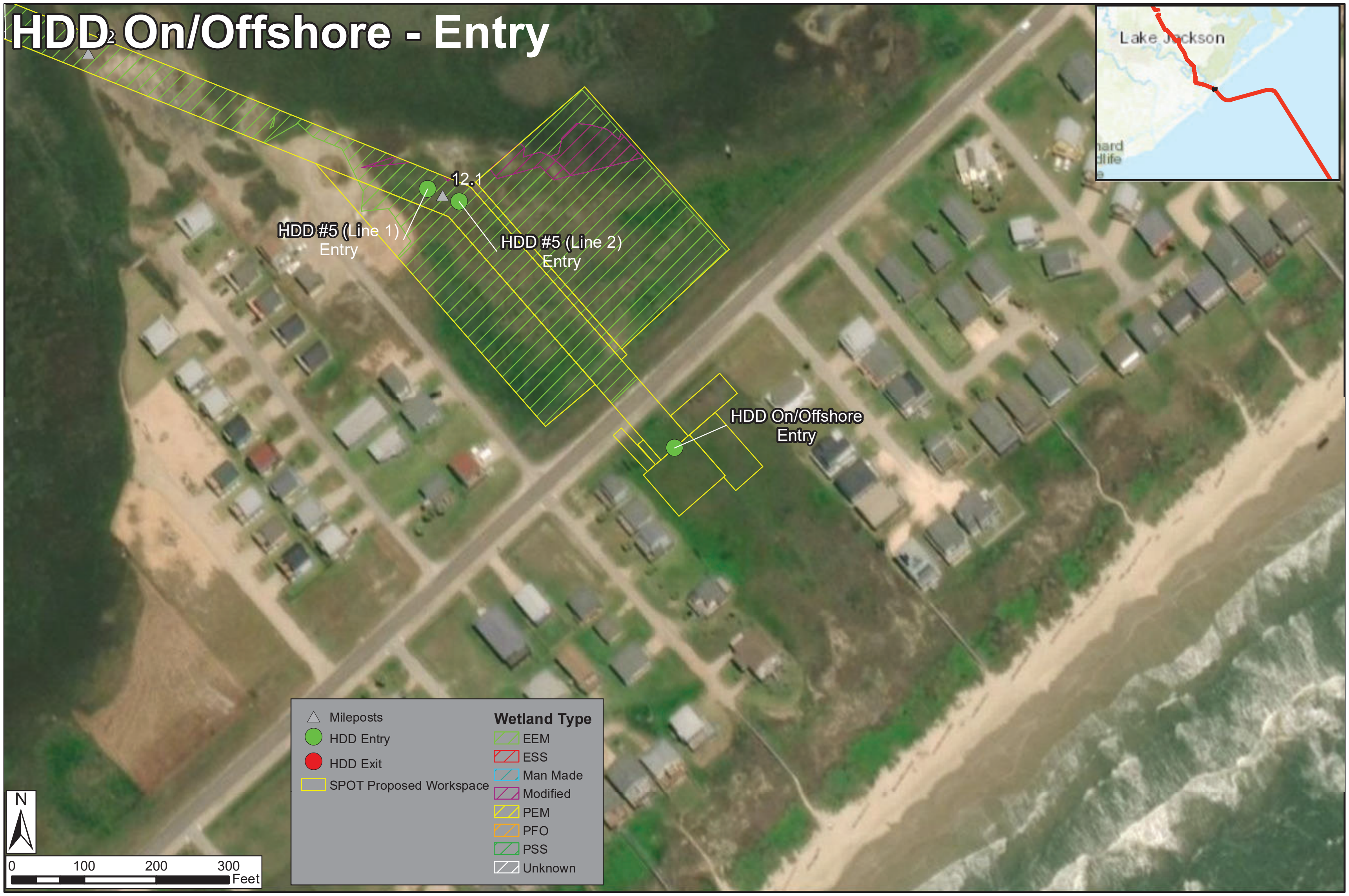

HDD #4-OCS - Entry
Lake Jackson
10.8
10.9
11
HDD #4 (Line 2)
Entry
HDD #4 (Line 1)
Entry
HDD #5 (Line 2)
Exit
HDD #5 (Line 1)
Exit
Mileposts
HDD Entry
HDD Exit
SPOT Proposed Workspace
Wetland Type
EEM
ESS
Man Made
Modified
PEM
PFO
PSS
Unknown
N
0
100
200
300
Feet

HDD #4-OCS - Exit

HDD #5-OCS - Entry

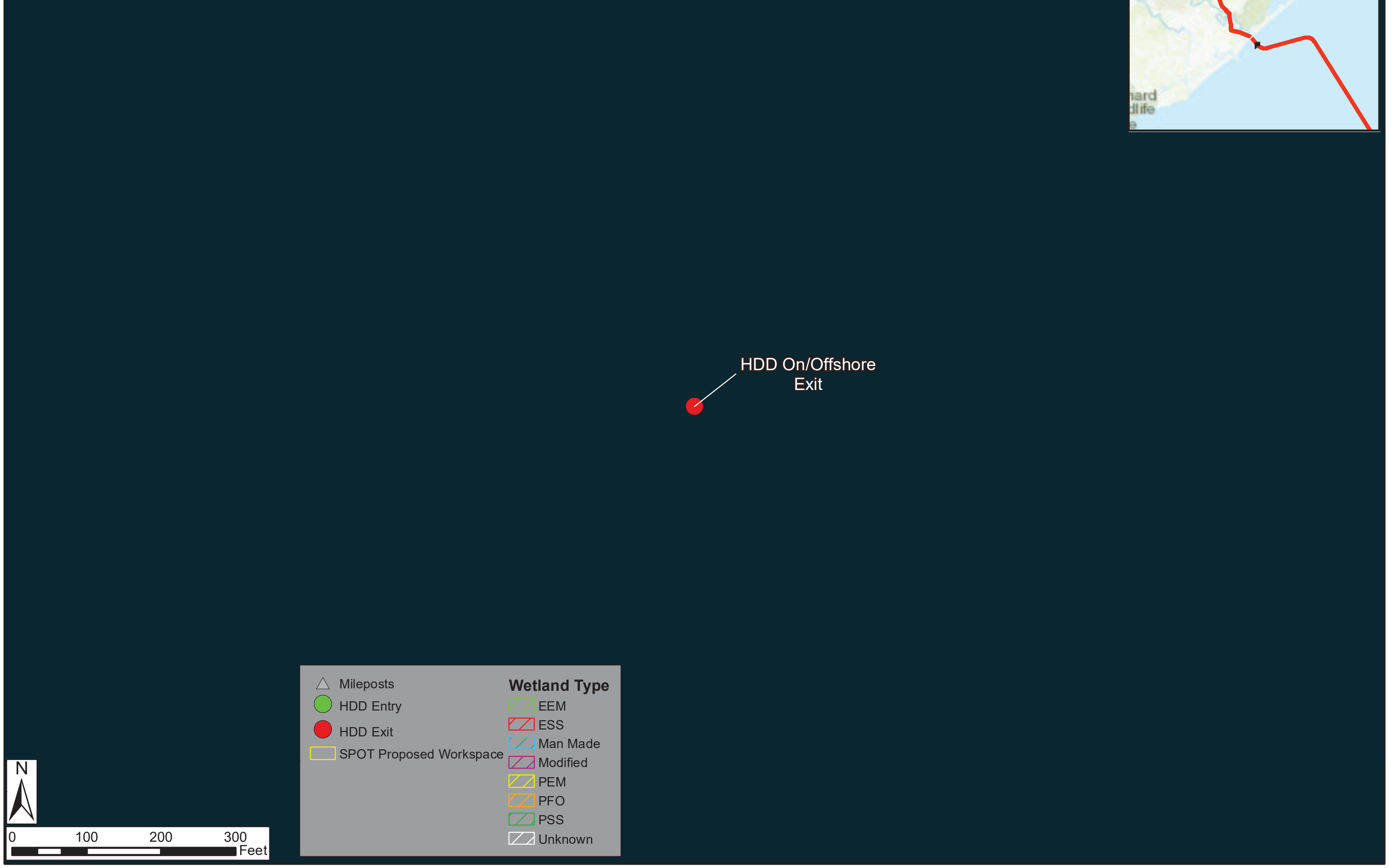


HDD #5-OCS - Exit
Lake Jackson
HDD #4 (Line 2)
Entry
10.9
HDD #4 (Line 1)
Entry
HDD #5 (Line 2)
Exit
11
HDD #5 (Line 1)
Exit
11.1
Mileposts
HDD Entry
HDD Exit
SPOT Proposed Workspace
Wetland Type
EEM
ESS
Man Made
Modified
PEM
PFO
PSS
Unknown
N
0
100
200
300
Feet



HDD On/Offshore - Entry
12.1
HDD #5 (Line 1) Entry
HDD #5 (Line 2) Entry
HDD On/Offshore Entry
Lake Jackson
Mileposts
HDD Entry
HDD Exit
SPOT Proposed Workspace
Wetland Type
EEM
ESS
Man Made
Modified
PEM
PFO
PSS
Unknown
N
0
100
200
300
Feet

HDD On/Offshore - Exit



ATTACHMENT D

Sediment Fate and Transport Modeling

(Annex #48a – Sediment Transport Modeling)
(Response to Information Request #206 – Sediment Transport Model Results)

-Page Intentionally Left Blank-

Annex #48a – Sediment Transport Modeling

TEXAS SPOT TERMINAL

Response to Data Gap #48 – Sediment Transport Modeling

Prepared by:

RPS

Deborah Crowley, Nathan Vinhateiro and Deborah French-McCay

55 Village Square Drive
South Kingstown RI 02879

T +1 401 789 6224
E Deborah.Crowley@rpsgroup.com

Prepared for:

SPOT Terminal Services, LLC

18-P-200643 SPOT Terminal
Data Gap #48

July 16, 2019

Contents

Figures

Tables

1 INTRODUCTION

RPS was contracted by Ecology and Environment (E & E) through SPOT Terminal Services LLC (the Applicant), a subsidiary of Enterprise Products Operating LLC (EPROD), a Texas limited liability company, to conduct a sediment transport modeling study of construction activities in support of Data Gaps identified in their application filed for a license to construct, own, and operate a deepwater port (DWP) pursuant to the Deepwater Port Act of 1974, as amended, and in accordance with the U.S. Coast Guard's (USCG's) and U.S. Maritime Administration's (MARAD's) implementing regulations. The activities covered by the application are referred to as the Project in this document. This study was performed in response to Data Gap #48 identified by USCG:

> *"Vol IIa did not include any sediment transport modeling. Provide sediment modeling results that identify the fate and transport of excavated sediments during trenching, pile driving, and decommissioning activities. Include assumptions used in the model and identify ambient suspended sediment conditions, areal extent of the anticipated sediment plume resulting from trenching, pile driving, and decommissioning activities, concentrations of suspended sediments as a function of distance from the activities, and anticipated depths and areas of sediment deposition when the sediments fall out of suspension."*

This document serves as an annex to the application in response to Data Gap #48. The Project includes components that have the potential to resuspend sediment in marine waters thus causing sediment effects such as a sediment plume and seabed deposition. Figure 1 illustrates relevant Project components. All aspects of the Project are described in detail in the application, though some details are also presented again in this annex to facilitate reading of this report. In response to the elements requested in Data Gap #48, and in coordination with the applicant, RPS developed and executed modeling scenarios representative of activities with potential sediment effects. This annex presents a summary of the methodology including a description of the scenarios simulated and models used (Section 2), modeling results (Section 3), a summary of the findings and conclusions (Section 4), and references (Section 5).

Figure 1. Project components relative to the sediment effects study. Individual pile locations cannot be viewed in this extent as they appear on top of each other; they are located at the DWP (green square marker).

2 METHODS

This study evaluated the physical effects of specific construction activities associated the Project that may resuspend sediment in the water column. The physical effects are characterized by the spatial and temporal patterns of excess total suspended solids (TSS) concentrations in the water column and the patterns and thickness of seabed deposition as the suspended sediments settle out of the water column. Excess in this study refers to levels above background concentrations. The method for this evaluation included two separate modeling tasks: (1) hydrodynamic modeling using BFHYDRO to develop spatially and temporally varying current data and (2) subsequent sediment transport modeling using SSFATE, which integrated the hydrodynamic modeling output as well as other environmental and construction based inputs to predict spatially and temporally varying excess TSS and seabed deposition. The modeling activities assessed, the models used, and definition of key model inputs are described in this section.

2.1 Scenario Specifications

Data Gap #48 had identified trenching, pile driving, and decommissioning as activities that should be addressed with respect to sediment effects. The matrix of scenarios to be simulated to capture these activities was developed in coordination with E & E and the applicant; the scenario summary is provided in Table 1. Some points relative to the development of the scenarios follow:

- The activity of decommissioning was determined to be similar to installation with respect to the location and potential for resuspending sediments. Therefore, the single scenario simulating installation was determined to be adequate as a proxy for decommissioning.

- There are two pipelines being installed (and eventually may be removed during decommissioning). The pipelines are located within the same corridor in close proximity. Scenario 1 will be run for one pipeline, the effects generated are assumed the same for the additional pipeline.

- Eight piles will be installed in close proximity at the DWP as part of the Project. It was determined that a representative single pile installation would be simulated and that the results could be used as a proxy for the remaining piles.

- Noting that the jet assisted pipeline installation portion of the route would tie in to the horizontal directionally drilled (HDD) portion of the route via an HDD tie-in pit, an additional scenario of the activities associated with this pit was included in the assessment. The excavation and backfill of the pit are similar with respect to the location and potential for resuspending sediments; therefore a single scenario was determined to be adequate to represent both excavation and backfill.

Table 1. Summary of sediment effects modeling scenarios.

ID	Scenario
1	Representative Pipeline Installation/Decommissioning
2	Representative Pile Installation
3	HDD Pit Excavation/Backfill

2.2 Hydrodynamic Model

RPS' WQMAP model system, containing the BFHYDRO hydrodynamic model (Muin and Spaulding, 1997) was used to model the circulation patterns in the study area and to provide hydrodynamic conditions (spatially and temporally varying currents) for input to the sediment dispersion model. WQMAP (Mendelsohn, et al., 1995) is a modeling system which integrates geographic information, environmental data and models. The computational engine is a family of general curvilinear coordinate system computer models including a boundary conforming gridding model (BFGRID), a hydrodynamic model (BFHYDRO), a single constituent mass transport model (BFMASS) and an eight-state-variable water quality, eutrophication model (BFWASP). The output from BFHYDRO is seamlessly integrated as input in RPS' transport models including SSFATE (sediment transport and fates model).

2.2.1 BFHYDRO Model Description and Theory

BFHYDRO is a general curvilinear coordinate, boundary-fitted hydrodynamic model (Muin and Spaulding, 1997; Mendelsohn et.al, 1995; Huang and Spaulding, 1995; Swanson et al., 1989) that can be used to generate tidal elevations, velocities, and salinity and temperature distributions in either two or three dimensions. The model utilizes a boundary-fitting technique, which allows for matching grid coordinates with shoreline and bathymetric feature boundaries for highly accurate representations of areas with complex coastal geometry as well as variable grid resolution for computational efficiency. A detailed description of the model with associated test cases is described in Muin and Spaulding (1997), and (Muin, 1993). The model has undergone extensive testing against analytical solutions and has been found to perform accurately and quickly. Specific model comparisons are found in Swanson et al. (2012), Mendelsohn et al. (2003), Muin and Spaulding (1997), Mendelsohn et al. (1995) and Huang and Spaulding, (1995).

The boundary-fitted method uses a set of coupled, quasi-linear, elliptic transformation equations to map an arbitrary horizontal multi-connected region from physical space to a rectangular mesh structure in the transformed horizontal plane (Spaulding, 1984). The three-dimensional conservation of mass and momentum equations, with approximations suitable for lakes, rivers, estuaries, and coastal oceans (Swanson, 1986; Muin, 1993) that form the basis of the model, are then solved in this transformed space. A sigma stretching system (Figure 2) is used in the vertical to map the free surface and bottom onto coordinate surfaces to resolve bathymetric variations. The vertical mesh stretches and shrinks with the changing tidal elevation, maintaining a constant number of layers, so that no interpolation is required to simulate the surface wave or the bathymetry. The velocities are represented in their contra-variant form, on an Arakawa-C grid.

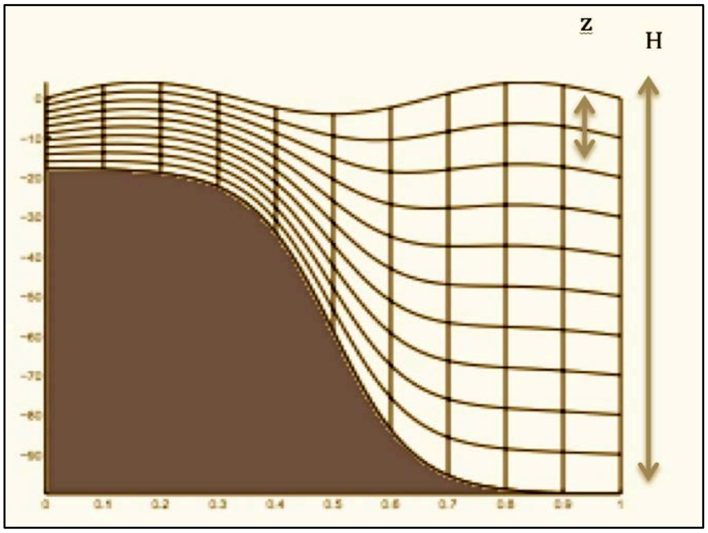


Figure 2. Illustration of sigma grid representation.

The basic equations are written in spherical coordinates to allow for accurate representation of large modeled areas without distortion. The conservation equations for water mass, momentum (in three dimensions) and constituent mass (temperature and salinity) form the basis of the model and are well established. It is assumed that the flow is incompressible, that the fluid is in hydrostatic balance, the horizontal friction is not significant and the Boussinesq approximation applies; all customary assumptions.

The boundary conditions are as follows:

- At land, the normal component of velocity is zero.
- At open boundaries, the free surface elevation must be specified, and temperature (and salinity for estuarine and coastal applications) specified on inflow.
- On outflow, temperature (heat) and salinity is advected out of the model domain.
- At river boundaries, the volume flux is specified, with positive flow into the model domain, and temperature and salinity are also specified.
- A bottom stress or a no slip condition can be applied at the bottom. No temperature (heat) is assumed to transfer to or from the bottom, a conservative assumption as some transfer of shear to the bottom is expected to occur.
- Wind stress, and appropriate heat transfer terms, are applied at the water surface. The surface heat balance includes all the primary heat transfer mechanisms for environmental interaction.

There are various options for specification of vertical eddy viscosity, A_v, (for momentum) and vertical eddy diffusivity, D_v, (for constituent mass [temperature and salinity]). The simplest formulation is that both are constant, A_{vo} and D_{vo}, throughout the water column. They can also be functions of the local Richardson number, which, in turn, is a function of the vertical density gradient and vertical gradient of horizontal velocity. A 1-equation or 2-equation turbulence closure model may also be used. This application used the spatially and temporally varying 1-equation model to predict the eddy viscosity and eddy diffusivity, consistent with estuarine application of this type.

The set of governing equations with dependent and independent variables transformed from spherical to curvilinear coordinates, in concert with the boundary conditions, is solved by a semi-implicit, split mode finite difference procedure (Swanson, 1986). The equations of motion are vertically integrated and, through simple algebraic manipulation, are recast in terms of a single Helmholtz equation in surface elevation. This equation is solved using a sparse matrix solution technique to predict the spatial distribution of surface elevation for each grid.

The vertically averaged velocity is then determined explicitly using the momentum equation. This step constitutes the external or vertically averaged mode. Vertical deviations of the velocity field from this vertically averaged value are then calculated, using a tridiagonal matrix technique. The deviations are added to the vertically averaged values to obtain the vertical profile of velocity at each grid cell thereby generating the complete current patterns. This constitutes the internal mode. The methodology allows time steps based on the advective, rather than the gravity, wave speed as in conventional explicit finite difference methods, and therefore results in a computationally efficient solution procedure (Swanson, 1986; Muin, 1993).

2.2.2 Project Hydrodynamic Model Application

The objective of the hydrodynamic model application was to create spatially and temporally varying current fields for use in the sediment transport model. As such, the focus was on the near bottom currents, close to where the sediments will be resuspended.

The currents in the study area are influenced by tides, winds and the presence of the loop current and its associated eddies. The Texas Automated Buoy System (TABS) network of observations, model data and analysis were reviewed to determine the typical tends and patterns local to the pipeline route and platform. Observations of currents from TABS are focused on surface waters with no observations of current speed and direction throughout the vertical water column. Reviewing this data and climatological summaries the following trends were noted:

- The currents vary throughout the year, though at varying degrees depending on location.

- The currents run parallel to the shoreline, primarily westward during most months of the year, reversing in the ‘summer’ months. The duration of reversal depends on the year and the location. The average annual current is presented in Figure 3 and the average summer and winter are presented in Figure 4. Based on review of the data, what is shown for the winter season is more aligned with the typical trends. The winter and summer are presented to demonstrate that the net residual flow changes in direction during different times of the year.
- Surface currents are generally weak, monthly average speeds in the tens of cm/s. The monthly averages at buoy B were calculated for years 2010-2018 and are presented in Figure 5 along with the average of the nine-year period.

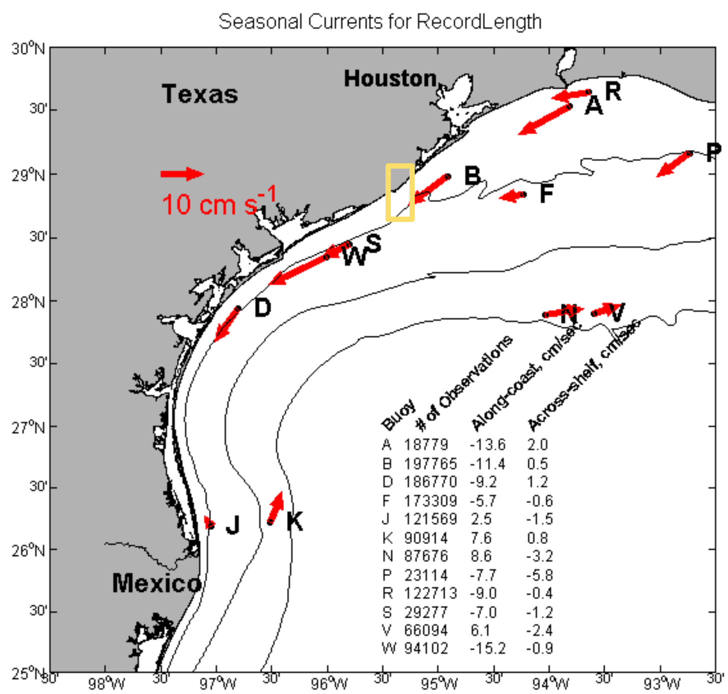


Figure 3. Annual average observed surface currents. (Source http://tabs.gerg.tamu.edu/) Overlaid yellow box indicates approximate extent of pipeline.

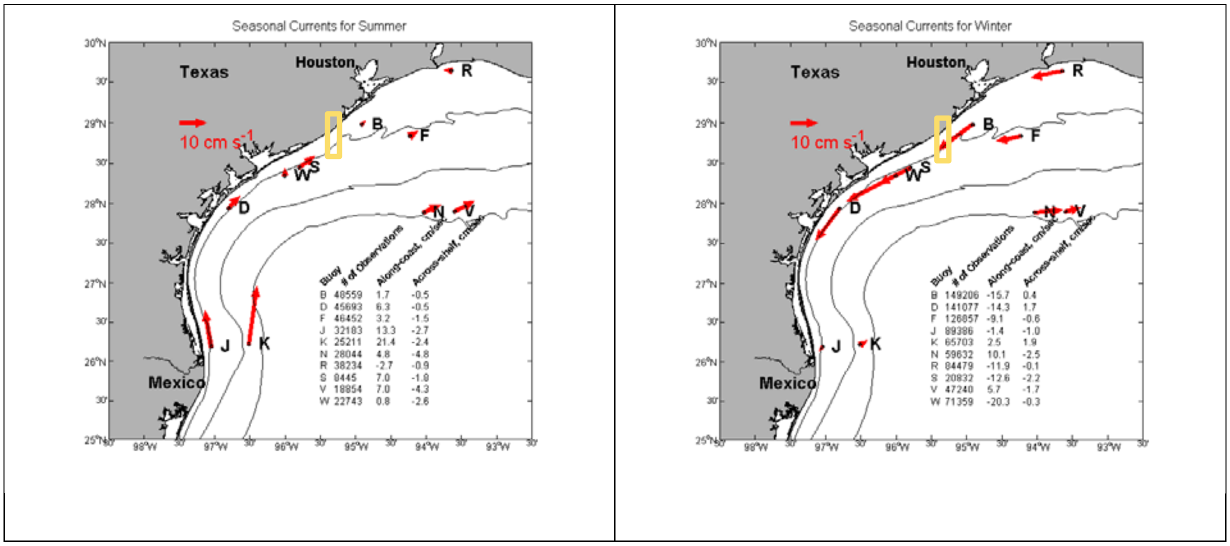


Figure 4. Average summer (left) and winter (right) observed surface currents. (Source http://tabs.gerg.tamu.edu/) . Overlaid yellow box indicates approximate extent of pipeline.

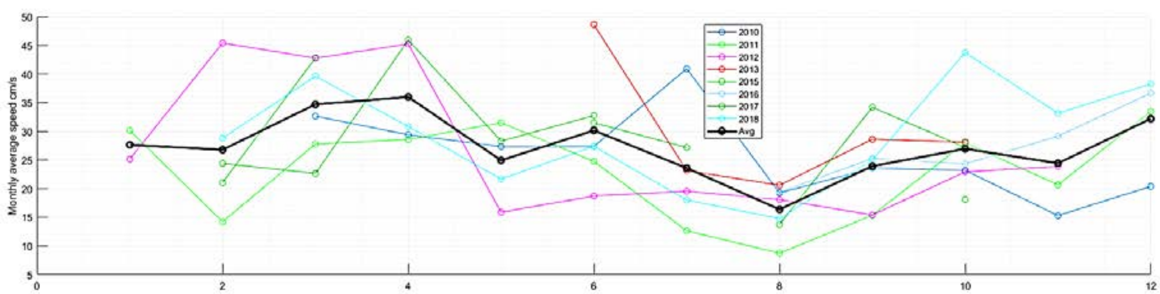


Figure 5. Monthly average speeds at TABS buoy B for years 2010 – 2018.

A model application in BFHYDRO was developed that included a model grid to capture the study area. Depths were assigned based on soundings from the National Oceanic and Atmospheric Administration (NOAA) Electronic Navigational Charts (ENCs). The boundary forcing included tidal constituent harmonic characterizations at the open boundary cells and a surface wind was applied to all cell surfaces. The tidal forcing was applied at the western and eastern extents based on established values from nearshore stations close to either extent as summarized in Table 2 and Table 3. The wind was used to recreate the typical westward/southwestwardly flow local to the pipeline. The model was run for a representative winter time period and the model was run to produce the typical winter west-south-westward flows with surface speeds averaging approximately 22 cm/s at the location of TABS buoy B.

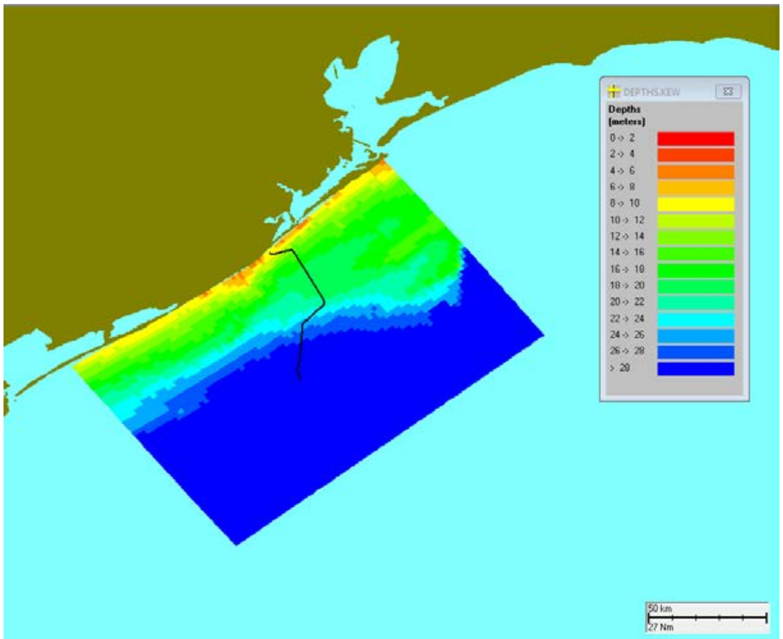


Figure 6. Hydrodynamic model grid domain and associated bathymetry.

Table 2. Open boundary tidal amplitude by harmonic constituent.

Constituent	Amplitude (m)	
	West	East
M2	0.043	0.139
N2	0.012	0.036
S2	0.014	0.034
K1	0.114	0.171
O1	0.112	0.161
M4	0.005	0.006

Table 3. Open boundary tidal phase by harmonic constituent.

Constituent	Phase (degrees GMT)	
	West	East
M2	245.4	276.1
N2	229.5	254.6
S2	251.6	267.9
K1	45.2	20.3
O1	38.8	28.0
M4	42.4	203.3

2.3 Sediment Transport Model

The SSFATE (Suspended Sediment FATE) model system includes tools and computational engines used to predict spatial and temporally varying excess TSS concentrations and sedimentation patterns on the seabed resulting from prescribed sediment resuspending activities. The main computation engine, also referred to as SSFATE, is a three-dimensional Lagrangian (particle) model developed jointly by the US. Army Corps of Engineers ("USACE") Environmental Research and Development Center ("ERDC") and Applied Science Associates (now RPS) to simulate sediment resuspension and deposition originally from marine dredging operations. Model development was documented in a series of USACE Dredging Operations and Environmental Research ("DOER") Program technical notes (Johnson et al., 2000; Swanson et al., 2000); at previous World Dredging Conferences (Anderson et al., 2001) and a series of Western Dredging Association Conferences (Swanson et al., 2006; Swanson and Isaji, 2004). Following dozens of technical studies which demonstrated successful application to dredging, SSFATE was further developed to include the simulation of cable and pipeline burial operations using water jet trenchers (Swanson et al., 2006) and mechanical ploughs, as well as sediment dumping and dewatering operations.

The model requires a spatial and time varying circulation field (i.e., from hydrodynamic model output), definition of the water body bathymetry, and parameterization of the sediment resuspension (source), which includes spatially variable sediment flux and associated sediment grain size characteristics. The model predicts the transport, dispersion and settling of suspended sediment released to the water column. The focus of the model is on the far-field (i.e., beyond the initial disturbance) processes affecting the dispersion of suspended sediment. The model uses specifications for the suspended sediment source strengths (i.e., mass flux), vertical distributions of sediments and sediment grain-size distributions to represent loads to the water column from different types of mechanical or hydraulic dredges, sediment dumping practices or other sediment disturbing activities such as jetting or ploughing for cable or pipeline burial. Multiple sediment types or fractions can be simulated simultaneously as can discharges from moving sources. SSFATE has been successfully applied in numerous modeling studies receiving acceptance from federal and state regulatory agencies.

2.3.1 SSFATE Model Description and Theory

SSFATE addresses the short-term movement of sediments that are disturbed during mechanical ploughing, hydraulic jetting, dredging, and other processes where sediment is resuspended into the water column. The model predicts the three-dimensional path and fate of the sediment particles based on sediment properties, sediment loading characteristics, and environmental conditions (bathymetry and currents). The computational model utilizes a Lagrangian or particle-based scheme to represent the total mass of sediments suspended over time. The particle-based approach provides a method to track suspended sediment without any loss of mass as compared to Eulerian (continuous) models due to the nature of the numerical approximation used for the conservation equations. Thus, the method is not subject to artificial diffusion near sharp concentration gradients and can easily simulate all types of sediment sources.

Sediment particles in SSFATE are divided into five size classes (see Table 4.), each having unique behaviors for transport, dispersion, and settling. For any given location (segment of the route), the sediment characterization is defined by this set of five classes with each class representing a portion of the distribution that sums to 100%. The model determines the number of particles to be used per time step depending on the model time step and the overall duration, in this way ensuring equal number of particles used to define the source throughout the simulation. A minimum of one particle per sediment size class per time step is enforced however typically multiples are used. The mass per particle varies based on the total number of particles released, the grain size distribution and the mass flux per time step.

Table 4. Sediment size classes used in SSFATE.

Description	**Class**	**Type**	**Size Range (microns)**
Fine	1	Clay	0-7
	2	Fine silt	8-35
	3	Coarse silt	36-74
	4	Fine sand	75-130
Coarse	5	Coarse sand	>130

Horizontal transport, settling, and turbulence-induced suspension of each particle are computed independently by the model for each time step. Particle advection is based on the relationship that a particle moves linearly, in three-dimensions, with a local velocity obtained from the hydrodynamic field, for a specified model time step. Diffusion is assumed to follow a simple random walk process. The diffusion distance is defined as the square root of the product of an input diffusion coefficient and at each time step is decomposed into X and Y displacements via a random direction function. The vertical Z diffusion distance is scaled by a random positive or negative direction.

Particle settling rates are calculated using Stokes equations and based on the size and density of each particle class. Settling of mixtures of particles is a complex process due to interaction of the different size classes, some of which tend to be cohesive and thus clump together to form larger particles that have different settling rates than would be expected from their individual sizes. Enhanced settlement rates due to flocculation and scavenging are particularly important for clay and fine-silt sized particles (Teeter 1998; Swanson 2004) and these processes have been implemented in SSFATE. These processes are bound by upper and lower concentrations limits, defined through empirical studies, which contribute to flocculation for each size class of particles. Above and below these limits, particle collisions are either too infrequent to promote aggregation or so numerous that the interactions hinder settling.

Deposition is calculated as a probability function of the prevailing bottom stress and local sediment concentration and size class. The bottom shear stress is based on the combined velocity due to waves (if used) and currents using the parametric approximation by Soulsby (1998). Sediment particles that are deposited may be subsequently resuspended into the lower water column if critical levels of bottom stress are exceeded, and the model employs two different resuspension algorithms. The first applies to material deposited in the last tidal cycle (Lin et al., 2003). This accounts for the fact that newly deposited material will not have had time to consolidate and will be resuspended with less effort (lower shear force) than consolidated bottom material. The second algorithm is the established Van Rijn method (Van Rijn, 1989) and applies to all other material that has been deposited prior to the start of the last tidal cycle. Swanson et al. (2007) summarize the justifications and tests for each of these resuspension schemes. Particles initially released by operations are continuously tracked for the length of the simulation, whether in suspension or deposited.

For each model time step, the suspended concentration of each sediment class as well as the total concentration is computed on a concentration grid. The concentration grid is a uniform rectangular grid in the horizontal dimension with user-specified cell size and a uniform thickness in the vertical dimension (z-grid). The concentration grid is independent of the resolution of the hydrodynamic data used to calculate transport, thus supporting finer spatial differentiation of plume concentrations and avoiding underestimation of concentrations caused by spatial averaging over larger volumes/areas. Model outputs include water-column concentrations in both horizontal and vertical dimensions, time-series plots of suspended sediment concentrations at points of interest, and thickness contours of sediment deposited on the sea floor. Deposition is calculated as the mass of sediment particles that accumulate over a unit area and is calculated on the same grid as concentration. Because the amount of water in the sediment deposited is not known, SSFATE by default converts deposition mass to thickness by assuming no water content. For detailed description of the SSFATE model equations governing sediment transport, settling, deposition, and resuspension, the reader is directed to Swanson et al. (2007).

2.3.2 SSFATE Model Applications for Project Scenarios

Setup of a SSFATE model scenario consists of defining how each sediment disturbance activity will be parameterized and establishing the sediment source terms, as well as defining environmental and numerical calculation parameters. For each scenario the source definition integrates the following considerations:

- The geographic extent of the activity (point release vs. line source)
- The timing and duration of the activity

- Source volumes disturbed as part of the activity
- The production rate (volume/time) for each sediment disturbance method
- Loss rates for each sediment disturbance method (percent of the volume disturbed)
- Spatially varying sediment grain size characteristics
- The vertical distribution of sediments as they are initially released to the water column for each activity

A model scenario also requires characterization of the environment, including a definition of the spatially and temporally varying currents and bathymetry in the study area. Model setup also requires specification of the concentration and deposition grid, which is the grid in which concentration and deposition calculations are made. The concentration and deposition grid in SSFATE is independent of the resolution of the hydrodynamic or bathymetric data used as inputs; this allows finer resolution calculations, which better captures water column concentrations without being biased by numerical diffusion. The concentration and deposition gridding is based on a prescribed square gird resolution in the horizontal plan view and a constant thickness in the vertical. The extent of the concentration is determined dynamically, fit to the extent the sediments travel. Given the difference in spatial scales of the different activities, the resolution of concentration gridding was variable for the different simulations.

An overview of key scenario parameters for each scenario are presented in Table 5; this includes a pointer to an additional table with more information relative to the specifics for that scenario. Supporting information for each scenario is presented in the bullets below.

- The pipeline installation scenario was developed to represent installation of a single pipeline. After the pipeline is laid, a jet sled will be run from the HDD tie-in location to the offshore platform where the jets will inject water to fluidize the sediment bed, allowing the pipeline to become buried to the desired depth. A summary of key installation parameters used in the modeling of the pipeline installation are presented in Table 6. This table presents the variants for the 'typical' and 'deep' trench cross sections. The majority of the route requires the typical cross section, however deeper burial depths are required where the route crosses safety fairways (See Figure 1). Table 6 also presents the variation in installation speeds (advance rates in terms of linear distance installed per unit time) and associated production rates (volume disturbed per unit time) that differ based on a water depth threshold of 40 ft (~12.2 m) (locational delineation shown in Figure 1). Two pipelines will be installed, one after the other in the same manner. Similarly, in future years the pipelines may be decommissioned; the decommissioning is assumed to have similar effects as the installation.

- The Project will sequentially install eight piles at the DWP. A representative scenario was modeled based on the construction parameters and modeling assumptions for this activity as summarized in Table 5 and Table 7. The volume flux for the pile installation was estimated as a fraction of the volume to be displaced by operations. A resuspension rate was estimated based on a study published as part of the NY New Bridge Environmental Impact Assessment (Federal Highway Administration, 2012).

- A pit will be excavated to facilitate tie-in between the jet installed portion and the HDD portion of the route. As the pit is excavated, sediments will be side cast to the nearby seabed. After tie-in is complete, the pit will be backfilled. Both the excavation with side cast and the backfilling will introduce approximately the same amount of sediments into the water column near the seabed. Both processes were modeled assuming a bucket dredge operation. Assumptions for this scenario are provided in Table 5 and Table 8.

- The spatially varying sediment grain size characteristics, as classified by the delineation used in SSFATE, are presented in Figure 7. These grain size distributions were established based on data provided by the applicant. The sediments in this area have relatively large fraction of fine material (e.g., clay and silt). Such sediments take longer to settle based on their size. The grain size analysis also included a measure of moisture, such that the percent solids could be calculated for each sample. The percent solid ranged from 35 – 59 % across all samples, indicating a relatively large amount of interstitial pore water. This property was reflected in the sediment load file.

- In all scenarios, the resuspension was assumed to occur close to the seabed. The resuspended sediments were initialized within the bottom 2 m of the water column.

Table 5. Summary of key scenario parameters.

ID	1	2	3
Scenario	Pipeline Installation/Decommissioning	Single Pile Installation	HDD Pit Excavation/Backfill
Construction Equipment	Jet sled	Hammer	Bucket dredge
Source Type	Line	Point	Point
Sediment Disturbing Activity Duration	~ 37 days	~ 8 hours	~ 1 hour
Approximate Total Volume Disturbed (m^3)	497,305	304	29
Concentration Grid Horizontal Dimension (m)	50	5	5
Concentration Grid Vertical Dimension (m)	1	1	1
Table with Activity Details	Table 6	Table 7	Table 8

Table 6. Installation parameters associated with Scenario 1: Pipeline Installation/Decommissioning.

Parameter	Typical Cross Section	Deep Cross Section
Trench Width at base (ft)	7	7
Trench Depth (ft)	7	14
Trench Cross Section (ft^2)	64.25	150.00
Trench Cross Section (m^2) also Volume per meter length of installation (m^3/m)	5.97	13.94
Advance Rate < 40 ft depth of water (miles per day) [meters/day]	0.75 (1207)	0.43 (517)
Advance Rate > 40 ft depth of water (miles per day) [meters/day]	1.5 (2414)	0.6425 (1034)
Production Rate < 40 ft depth of water (m^3/hr)	300	300
Production Rate > 40 ft depth of water (m^3/hr)	600	600
Assumed Sediment Resuspension Rate (%)	25	25
Resuspended flux per meter of installation (m^3/m)	1.49	3.48
Resuspension rate < 40 ft depth of water (m^3/hr)	75	75
Resuspension rate > 40 ft depth of water (m^3/hr)	150	150

Table 7. Installation parameters associated with Scenario 2: Single Pile Installation.

Location Simulated	A1	28° 27' 59.49" N, 95° 07' 25.54" W
Pile Diameter	m	1.83
Depth of Installation	m	115.8
Volume Displaced	m^3	304.6
Total Strikes	#	10,255
Strike Rate	strikes/hour	1,278
Duration for Installation	hours	8.02
Sediment Production Rate	m^3/hr	37.96
Assumed Sediment Resuspension Rate	%	0.4
Sediment Resuspension Rate	m^3/hr	0.152

Table 8. Installation parameters associated with Scenario 3: HDD Pit Excavation/Backfilling.

Pit Volume	m^3	29
Duration of Excavation	hrs	1
Sediment Production Rate	m^3/hr	29
Loss Rate	%	100
Resuspension Rate	m^3/hr	29

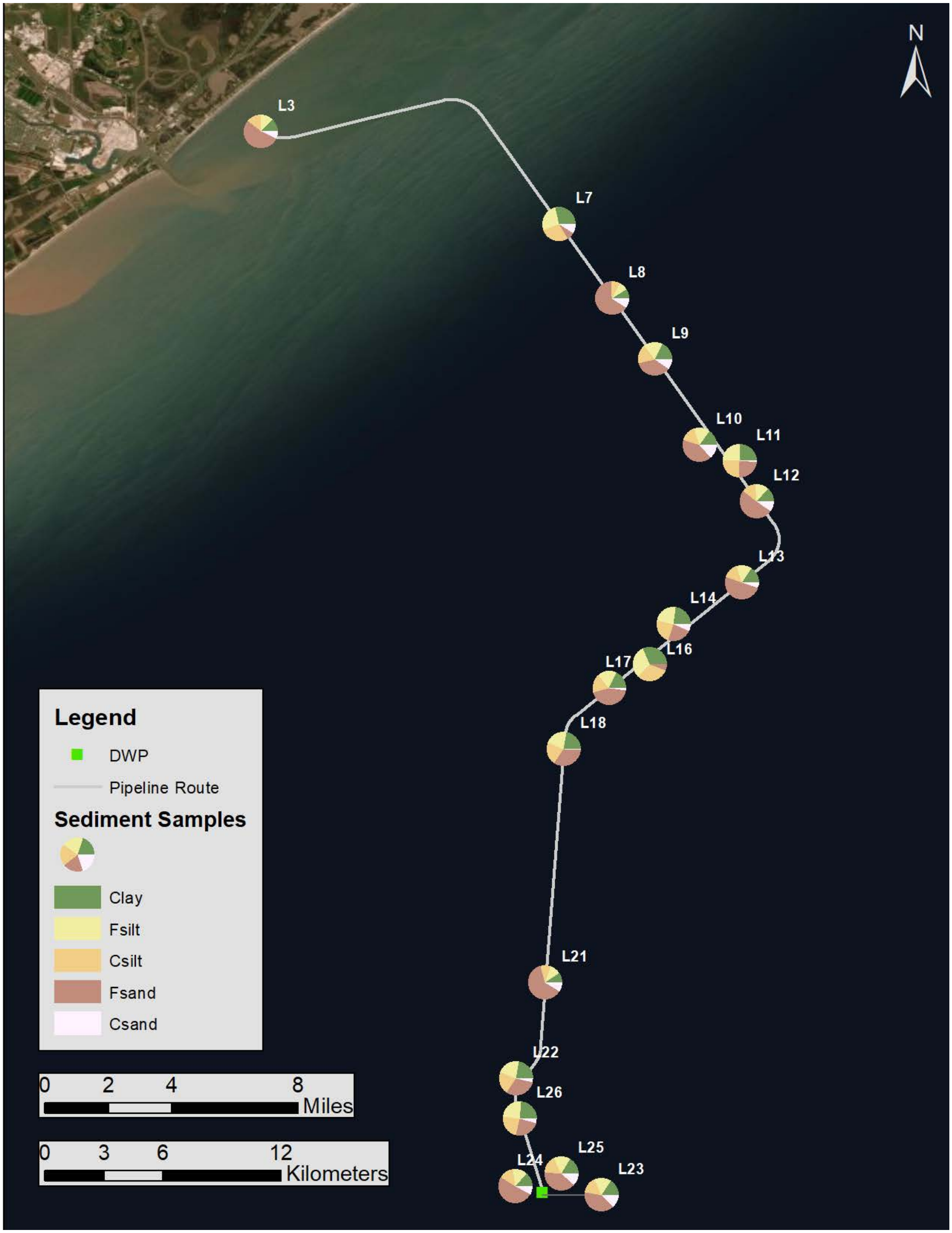


Figure 7. Spatial distribution of sediment grain size characteristics. Fsilt – fine silt, CSilt – coarse silt, Fsand – fine sand, Csand – coarse sand.

3 RESULTS

3.1 Hydrodynamic Modeling Results

The hydrodynamic modeling was performed to produce spatially and temporally varying current fields for use in the sediment transport modeling. The directions of the modeled currents were primarily toward the west/southwest. The modeled speeds were greatest at the surface and diminished slightly at depth. Further, the current speeds, and direction at times, fluctuated in response to the tides. Figure 8 shows the net flow from the hydrodynamic simulation.

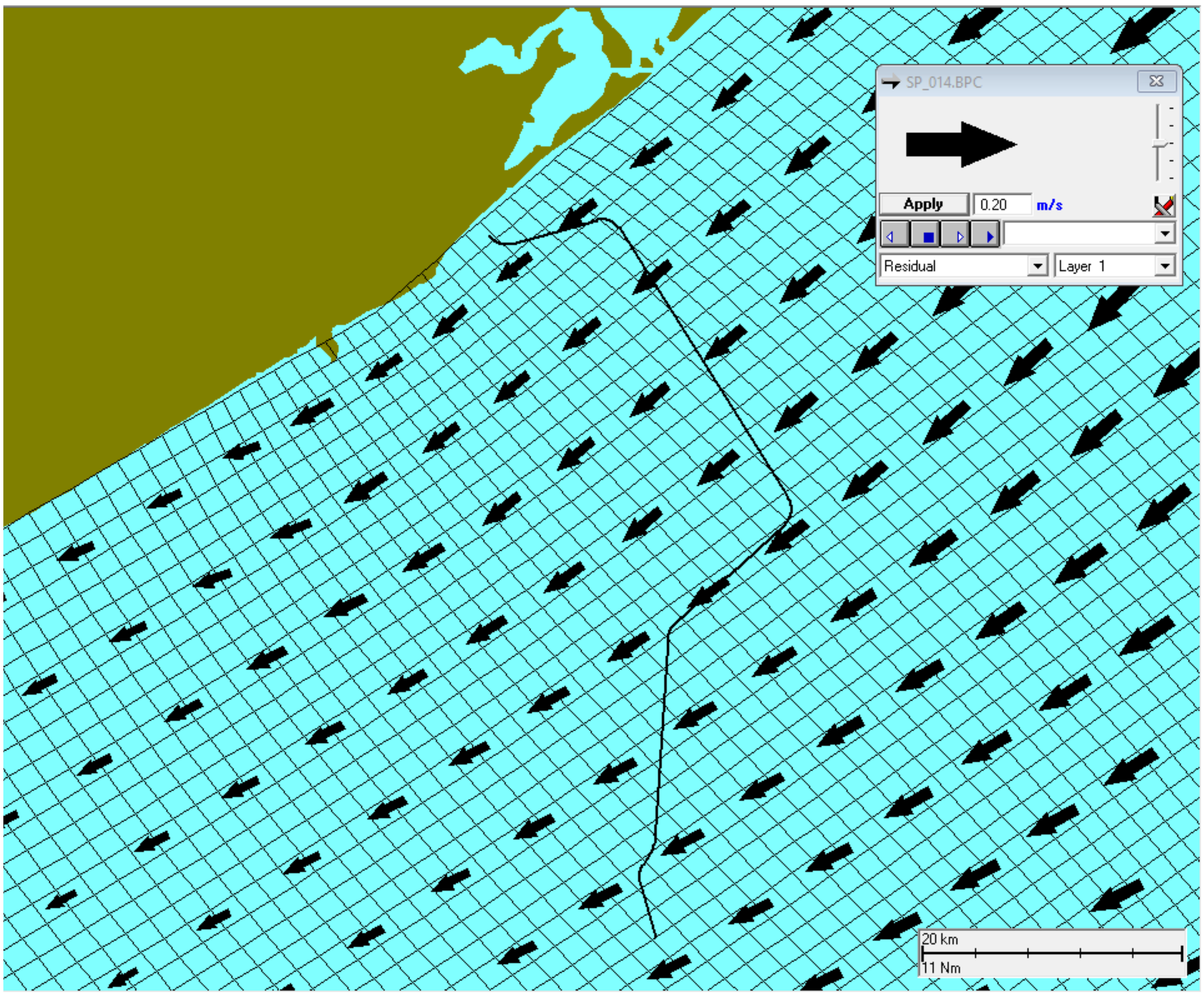


Figure 8. Residual (i.e., net) flow from the hydrodynamic model simulation.

3.2 Sediment Transport Modeling Results

The modeling produced spatially and time varying water column concentrations of excess TSS and seabed deposition patterns. A snapshot of the instantaneous maximum excess concentration from an instance within the pipeline installation simulation (Scenario 1) is presented in Figure 9. This figure shows the maximum excess concentrations from anywhere in the water column in the plan view and shows the cross-sectional view of excess concentrations within the inset. The plume at any given time during the simulation for this scenario looks similar to this, though sometimes it extends further or shorter distances and is located in different positions along the route reflecting the location of activity. The plume is primarily moving towards the west-southwest, although at times it is moving towards the east-northeast. The map of time-integrated maximum instantaneous excess concentrations for this scenario is presented in Figure 10; this figure shows the maximum predicted excess concentration at any location within the vertical water column from any time over the course of the simulation. It is important to note that these excess instantaneous concentrations do not occur simultaneously, and they may be experienced only briefly. To demonstrate the transient nature of the plume in any given location a second version of the map of time integrated maximum instantaneous excess concentrations for Scenario 1 is presented in Figure 11 with an inset that shows the time history of concentrations at a location queried along the route. From the inset it is evident that the presence of excess concentrations is temporary, in this particular location, excess concentrations greater 10 mg/L last less than 8 hours. The map of time integrated maximum instantaneous excess concentrations for Scenario 2 and Scenario 3 are presented in Figure 13 and Figure 15 respectively. The footprints associated with these scenarios are much smaller due to the localized short-term disturbance. The seabed deposition patterns and associated thickness are provided in Figure 12, Figure 14 and Figure 16 for scenarios 1-3 respectively. These figures show areas of cumulative deposition from the entire simulated activity.

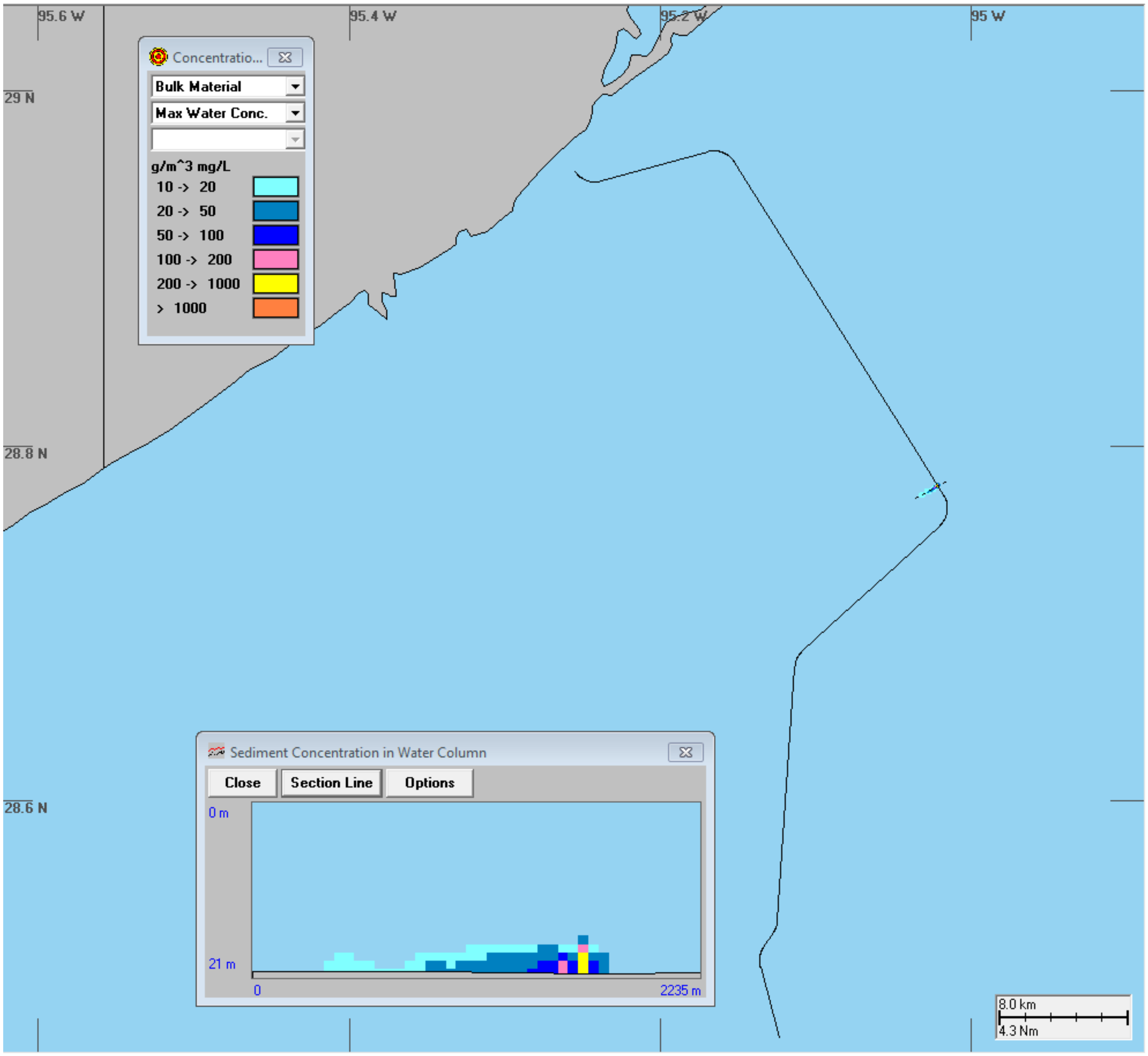


Figure 9. Snapshot of maximum instantaneous excess TSS concentrations for a time step from Scenario 1: Representative Pipeline Installation/Decommissioning. The map shows maximum concentration experienced throughout the water column. Inset shows the cross-sectional view along the transect delineated by the dashed black line in the plan view.

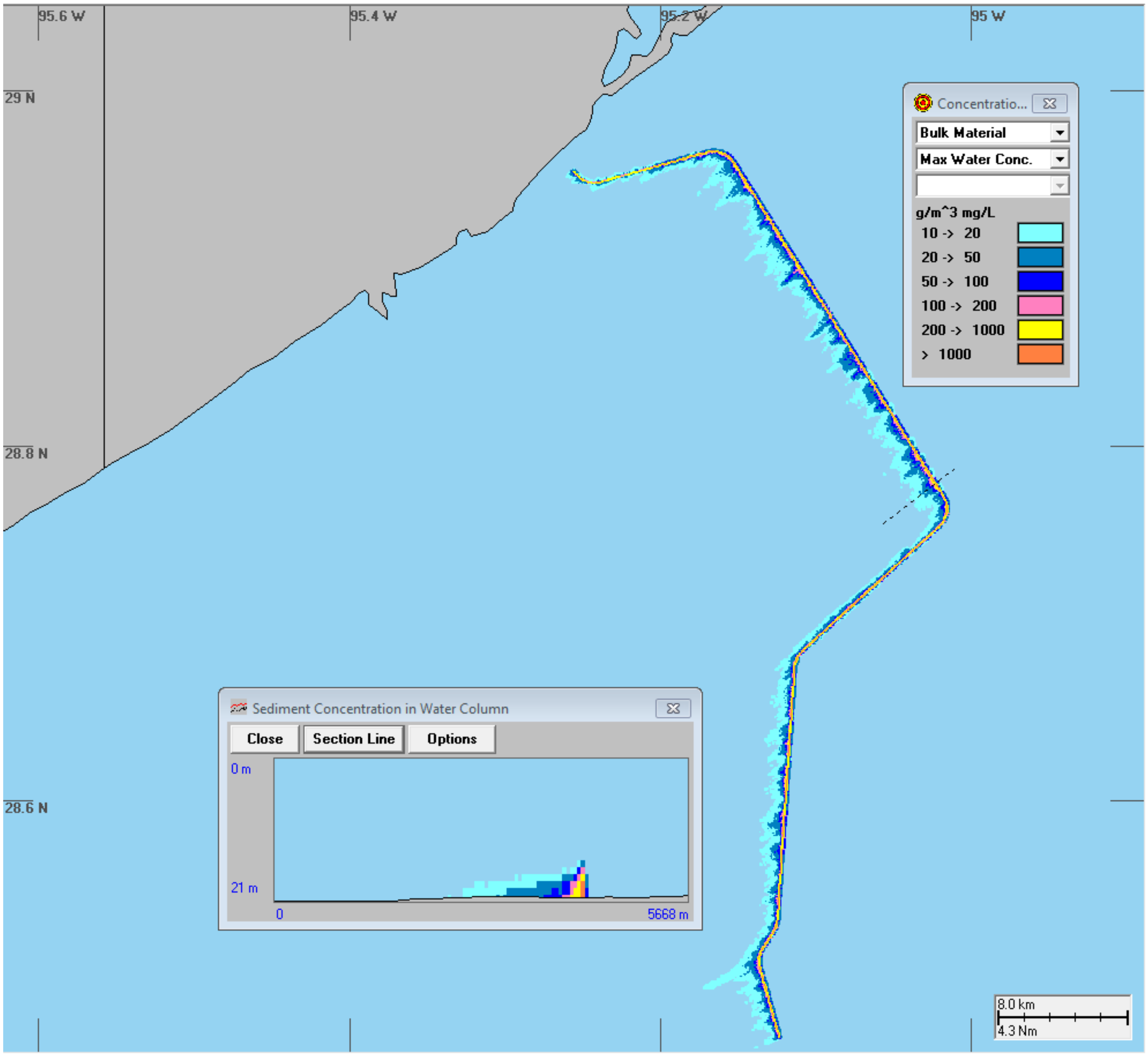


Figure 10. Map of time integrated maximum instantaneous excess TSS concentrations for Scenario 1: Representative Pipeline Installation/Decommissioning. This map shows maximum concentration experienced at each location in the model domain over the entire simulation period. These excess concentrations do not occur simultaneously, and this figure does not indicate the duration that these excess concentrations are experienced. Inset shows the cross-sectional view along the transect delineated by the dashed black line in the plan view.

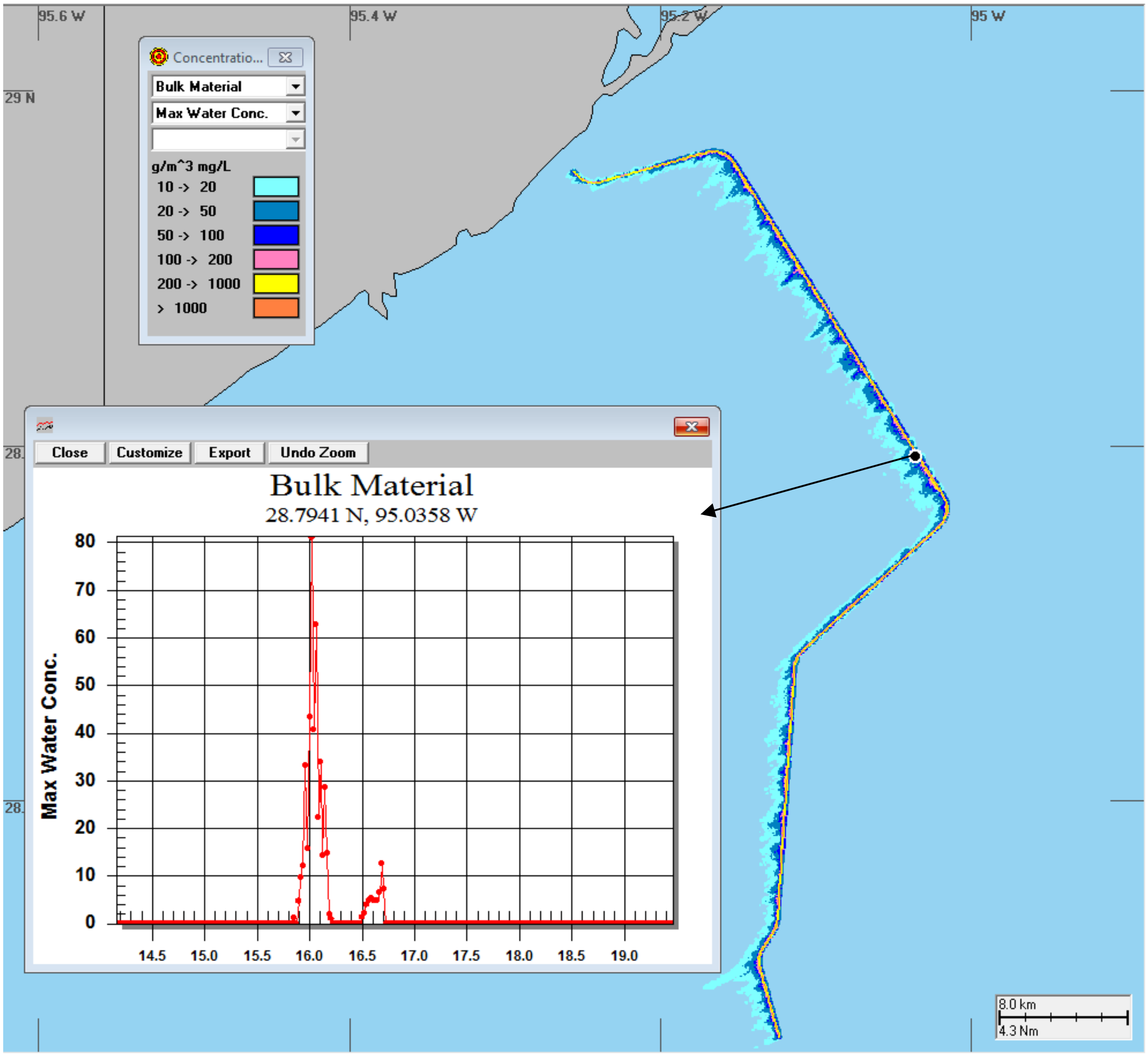


Figure 11. Map of time integrated maximum instantaneous excess TSS concentrations for Scenario 1: Representative Pipeline Installation/Decommissioning with an inset showing the actual time history at the point queried in the figure.

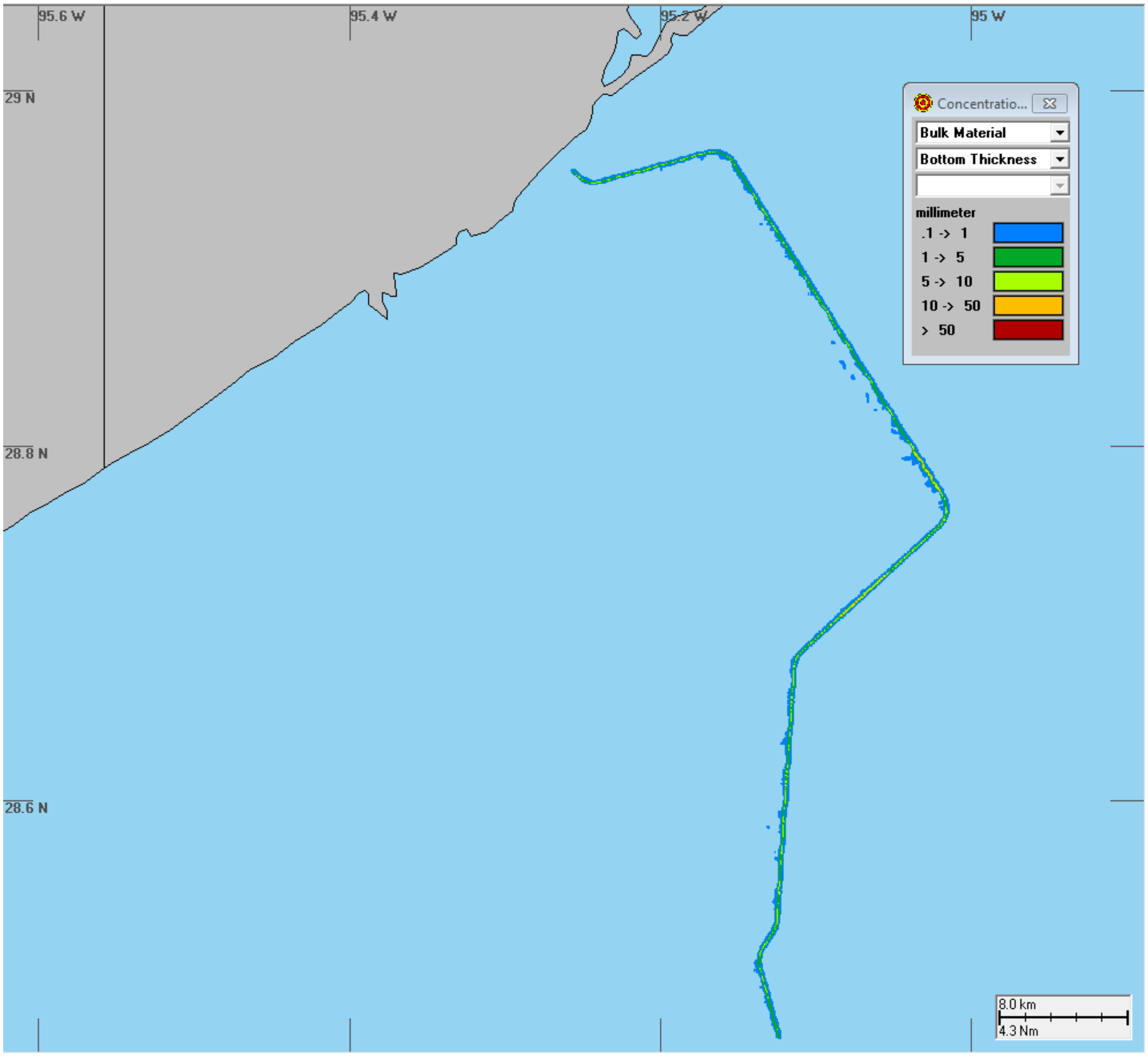


Figure 12. Map of seabed deposition thickness for Scenario 1: Representative Pipeline Installation/Decommissioning. This is the cumulative thickness of construction sediments that settle on the seabed over the entire simulation period.

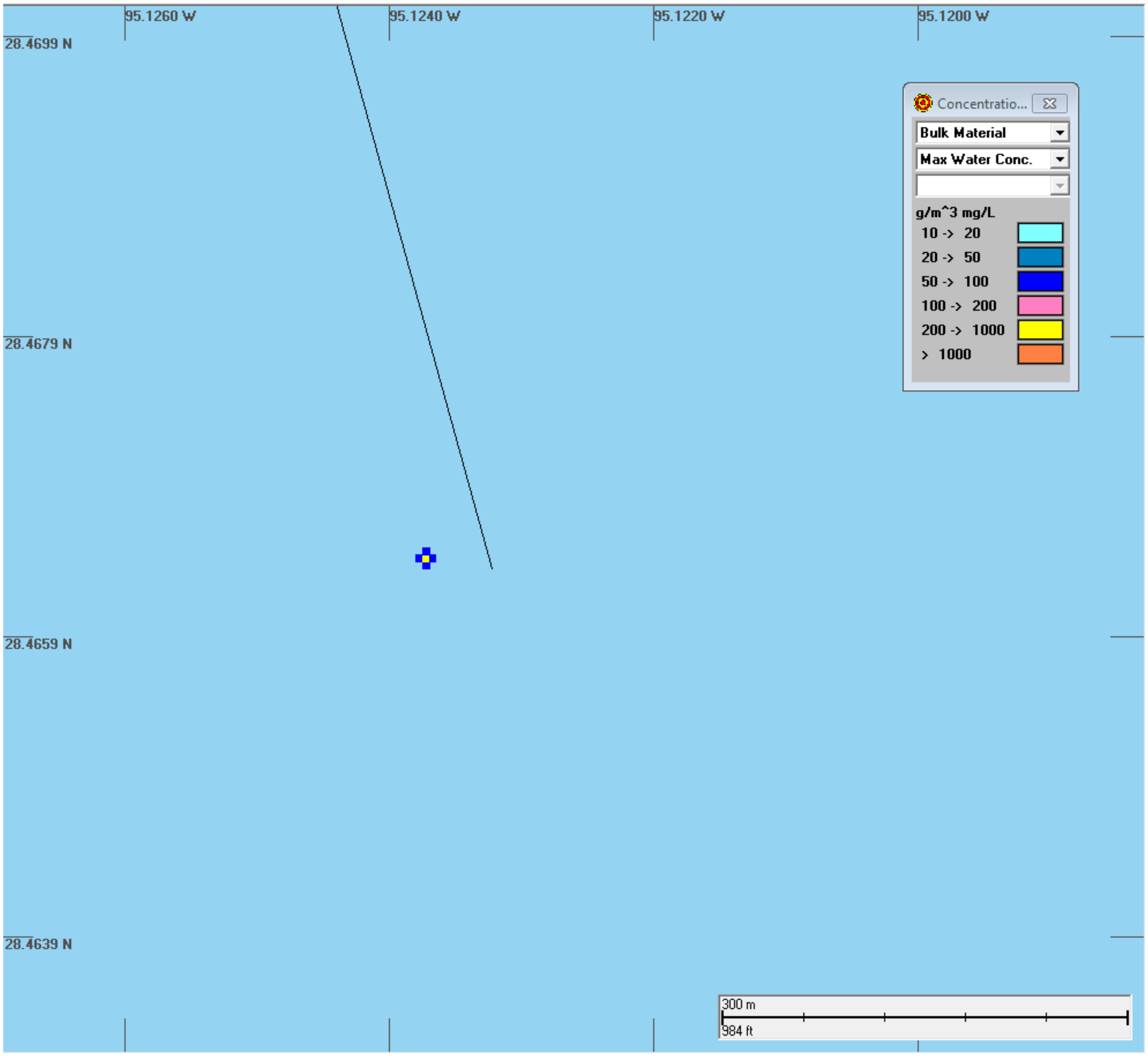


Figure 13. Map of time integrated maximum instantaneous excess TSS concentrations for Scenario 2: Representative Pile Installation. This map shows maximum concentration experienced at each location in the model domain over the entire simulation period. These excess concentrations do not occur simultaneously, and this figure does not indicate the duration that these excess concentrations are experienced.

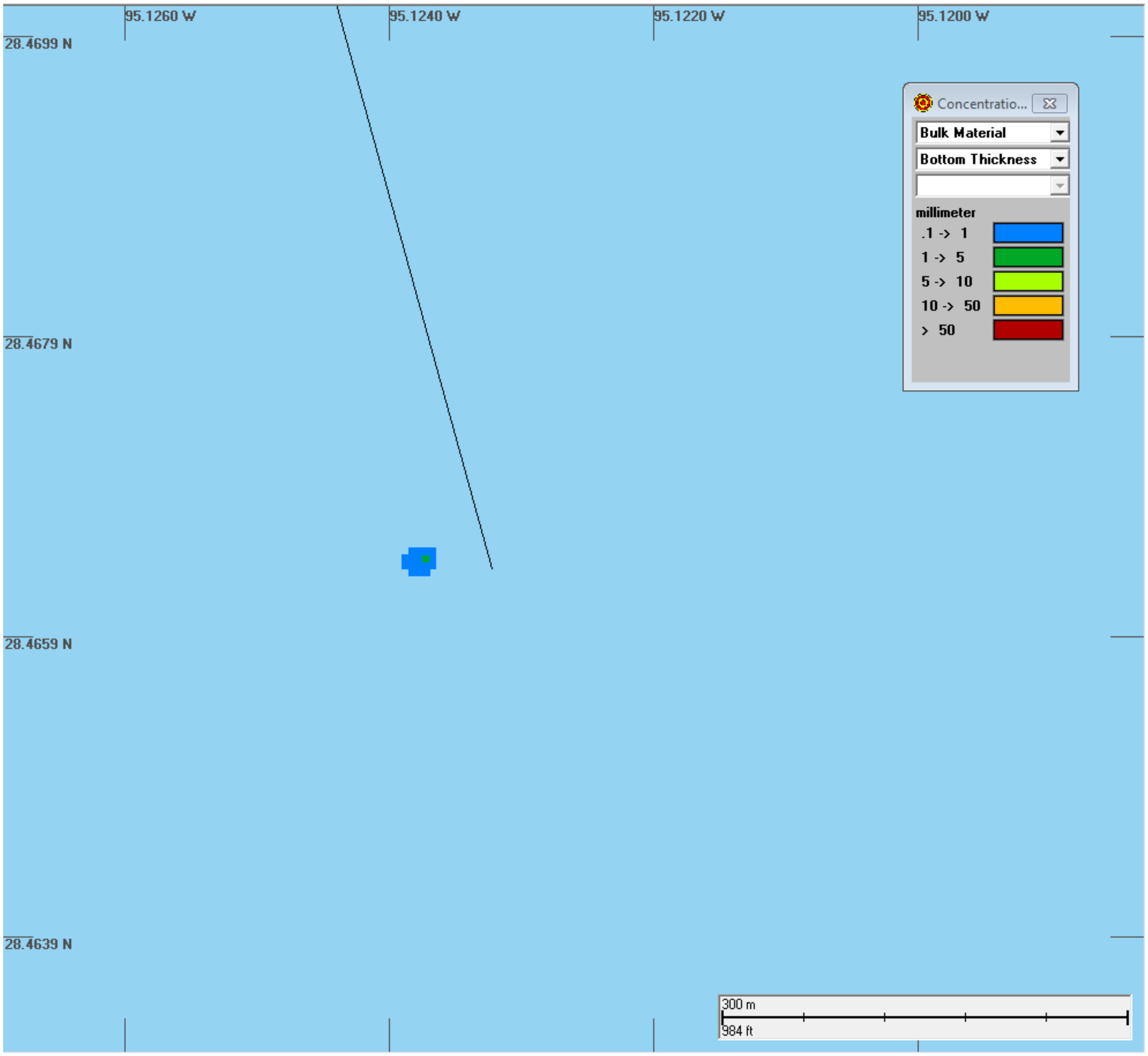


Figure 14. Map of seabed deposition thickness for Scenario 2: Representative Pile Installation. This is the cumulative thickness of construction sediments that settle on the seabed from the entire simulation period.

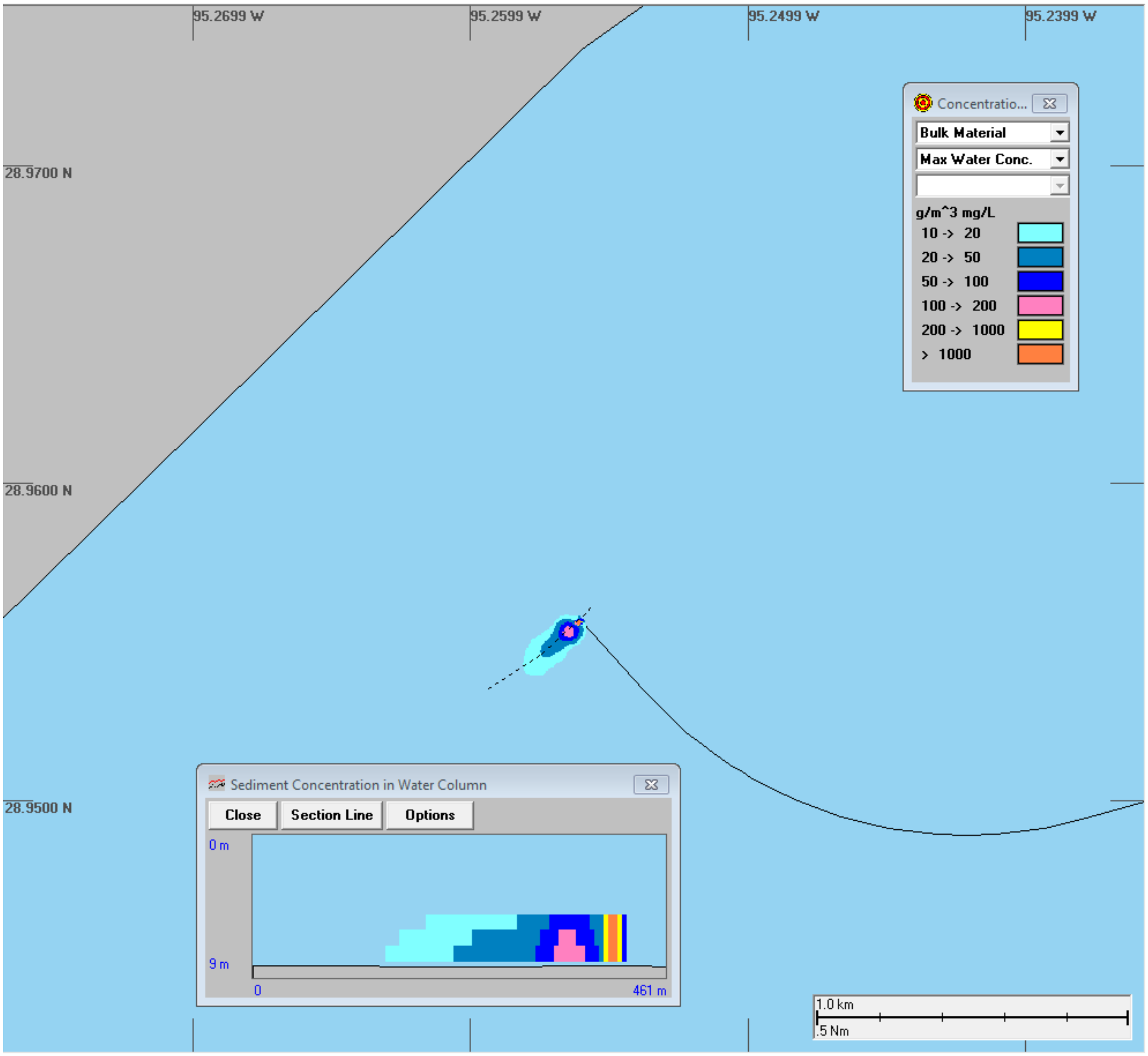


Figure 15. Map of time integrated maximum instantaneous excess TSS concentrations for Scenario 3: Representative HDD Pit Excavation/Backfilling. This map shows maximum concentration experienced at each location in the model domain over the entire simulation period. These excess concentrations do not occur simultaneously, and this figure does not indicate the duration that these excess concentrations are experienced. Inset shows the cross-sectional view along the transect delineated by the dashed black line in the plan view.

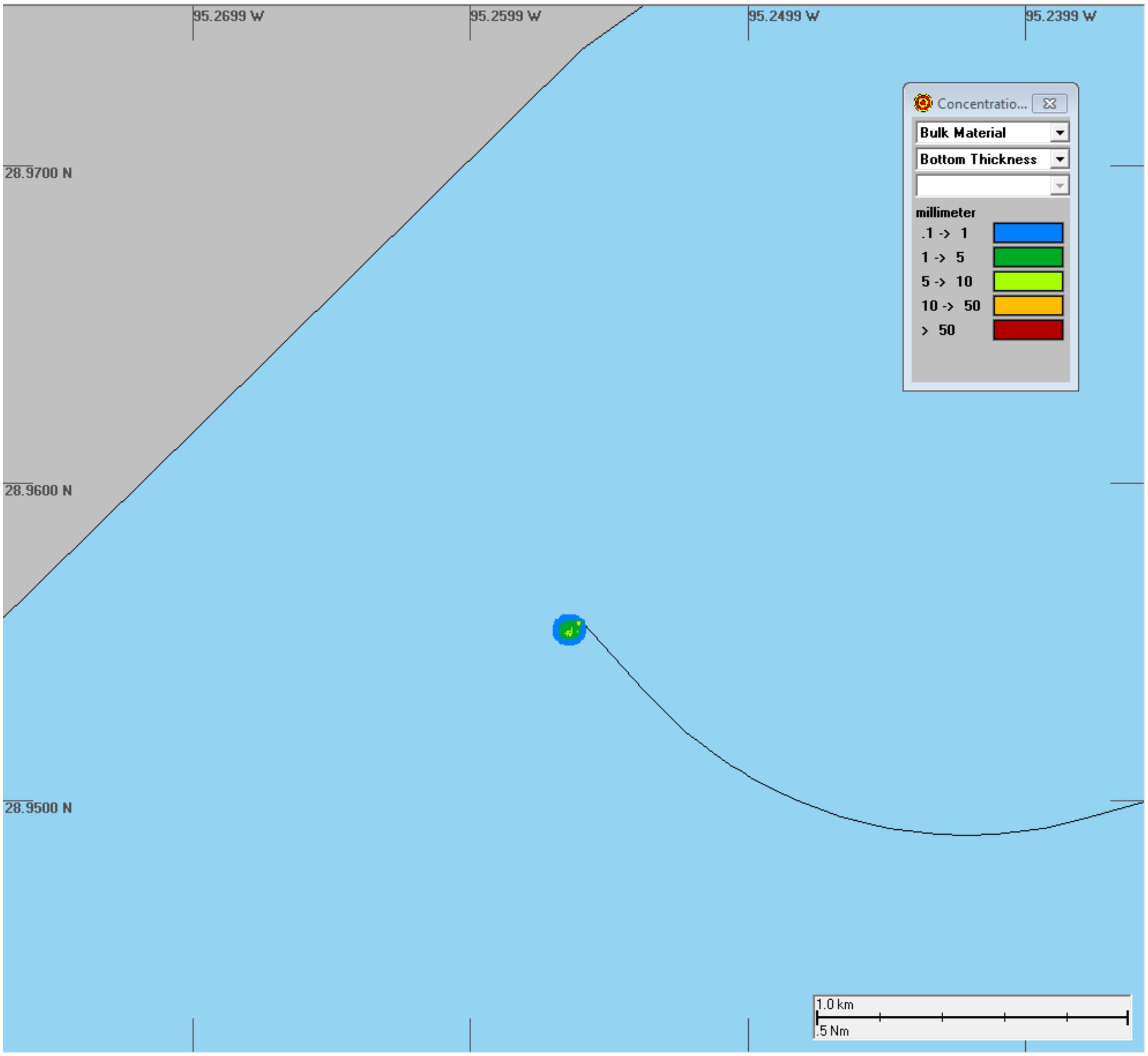


Figure 16. Map of seabed deposition thickness for Scenario 3: Representative HDD Pit Excavation/Backfilling. This is the cumulative thickness of construction sediments that settle on the seabed from the entire simulation period.

4 CONCLUSIONS

The modeling produced footprints of the maximum instantaneous excess TSS concentration and seabed deposition. The following points are noted regarding the model predictions.

- Excess concentrations greater than 10 mg/L are predicted to extend from ~ a few hundred meters up to 4 km from the pipeline route during installation. These excess concentrations are confined to the bottom of the water column. Deposition greater than 1 mm extends up to ~ 200 m from the route centerline. Excess concentrations in any given location are temporary in response to the activity and attenuate to ambient levels within hours after they begin. The effects associated with the pipeline installation will be experienced twice reflecting the two pipelines to be installed. The timing will be offset from one another and the plumes will therefore not interact. The deposition from each installation will likely overlap.
- Excess concentrations greater than 10 mg/L are predicted to extend less than 10 m from the pile location and are confined to the bottom of the water column. Deposition greater than 1 mm extends up to ~ 5 m from the pile location. The activity is relatively short (8 hours) and concentrations in the area are expected during this entire period, although they quickly subside when the activity ceases. Each pile installation will produce a plume and deposition, although based on the sequence of events and the spacing of the piles there is not likely to be overlap of the sediment plumes (measured as greater than 10 mg/L) or deposition (measured as greater than 1 mm).
- Excess concentrations greater than 10 mg/L are predicted to extend up to 270 m from the HDD pit location and are confined to the bottom of the water column. Deposition greater than 1 mm extends up to ~ 90 m from the pit location. The activity is short (1 hour), and concentrations are expected in the area throughout the activity, although they will quickly subside once the activity ceases. The plume will be experienced twice, once for excavation and again for backfilling, and these periods will be separated in time. The deposition from both activities would likely overlap.

5 REFERENCES

Anderson, E.L., Johnson, B., Isaji, T., and E. Howlett, 2001. SSFATE (Suspended Sediment FATE), a model of sediment movement from dredging operations. WODCON XVI World Dredging Congress, 2-5 April 2001, Kuala Lumpur, Malaysia.

Federal Highway Administration. 2012. Federal Highway Administration. United States Government. Final Environmental Impact Statement for the Tappan Zee Hudson River Crossing Project. Retrieved from https://www.newnybridge.com/environmental-doc/

Huang, W. and M. Spaulding, 1995. 3D Model of Estuarine Circulation and Water Quality Induced by Surface Discharges. Journal of Hydraulic Engineering 121: 300-311.

Johnson, B.H., E. Anderson, T. Isaji, and D.G. Clarke, 2000. Description of the SSFATE numerical modeling system. DOER Technical Notes Collection (TN DOER-E10). U.S. Army Engineer Research and Development Center, Vicksburg, MS. http: //www.wes.army.mil/el/dots/doer/pdf/doere10.pdf.

Lin, J.; Wang, H.V.; Oh, J-H.; Park, K.; Kim, S-C.; Shen, J., and Kuo, A.Y., 2003. A new approach to model sediment resuspension in tidal estuaries. Journal of Coastal Research, 19(1), 76-88.

Mendelsohn, D., E. Howlett, and J.C. Swanson, 1995. WQMAP in a Windows Environment. In: Proceedings of the 4th International Conference on Estuarine and Coastal Modeling, October 26-28, 1995, San Diego, CA.

Mendelsohn, D., S. Peene, W. Saunders and M. Goodrich, 2003. Three-Dimensional Modeling Of Anthropogenic Impacts To Dissolved Oxygen In A Stratified Estuarine Environment: Savannah River Estuary. In: Proceedings, TMDL 2003, Chicago, Ill, Nov 16-19, 2003. Water Environment Federation.

Muin, M., 1993. A Three-Dimensional Boundary Fitted Circulation Model in Spherical Coordinates, Ph. D. Dissertation, Dept. of Ocean Engineering, University of Rhode Island, Kingston, RI.

Muin, M. and M. Spaulding, 1997a. Three-Dimensional Boundary-Fitted Circulation Model. Journal of Hydraulic Engineering 123: 2-12.

NOAA. (Accessed 2019).ENC Data. Retrieved from https://encdirect.noaa.gov/

NOAA. (Accessed 2019). Harmonic Constituents. Retrieved from https://tidesandcurrents.noaa.gov/

Soulsby, R.L., 1998. Dynamics of Marine Sands. Thomas Telford, England.

Spaulding, M.L., 1984. A vertically averaged circulation model using boundary-fitted coordinates. J. Phys. Oceanography 14: 973-982.

Swanson, J. C., 1986. A three dimensional numerical model system of coastal circulation and water quality. Ph.D. Thesis, Dept. of Ocean Engineering, University of Rhode Island, Kingston, RI.

Swanson, J.C., M. Spaulding, J-P. Mathisen and O.O. Jenssen, 1989. A three dimensional boundary fitted coordinate hydrodynamic model, Part I: development and testing. Dt. hydrog, Z. 42, 1989, p. 169-186.

Swanson, J.C., T. Isaji, M. Ward, B.H. Johnson, A. Teeter, and D.G. Clarke, 2000. Demonstration of the SSFATE numerical modeling system. DOER Technical Notes Collection (TN DOER-E12). U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://www.wes.army.mil/el/dots/doer/pdf/doere12.pdf.

Swanson, C., and T. Isaji, 2004. Modeling Dredge-Induced Suspended Sediment Transport and Deposition in the Taunton River and Mt. Hope Bay, Massachusetts. Western Dredging Association Annual Meeting and Conference, March 26, 2004.

Swanson, J.C., Galagan, C. and Isaji, T., 2006, September. Transport and fate of sediment suspended from jetting operations for undersea cable burial. In *OCEANS 2006* (pp. 1-6). IEEE.

Swanson, C., T. Isaji, and C. Galagan, 2007. Modeling The Ultimate Transport And Fate Of Dredge-Induced Suspended Sediment Transport and Deposition. Proceedings of WODCON 2007, Lake Buena Vista, Florida.

Texas Automated Buoy System. (Accessed 2019). Current Data and Images. Retrieved from http://tabs.gerg.tamu.edu/Tglo/index.php/

Teeter, A.M., 2000. Clay-silt sediment modeling using multiple grain classes: Part I: Settling and deposition. Proceedings in Marine Science, 3, 157-171.

Van Rijn L.C., 1989. Sediment Transport by Currents and Waves. Report H461, Delft Hydraul. Lab., Delft, Netherlands.

TEXAS SPOT TERMINAL

Response to Data Gap #206
Sediment Transport Model Results

Prepared by:

Prepared for:

SPOT Terminal Services, LLC

RPS

Deborah Crowley and Deborah French McCay, RPS

David Trimm and Madison Clapsaddle, Ecology and Environment, Inc.

55 Village Square Drive

South Kingstown RI 02879

T +1 401 789 6224

E Deborah.Crowley@rpsgroup.com

18-P-200643 SPOT Terminal
Data Gap #206

September 27, 2019

rpsgroup.com

Contents

Figures

Tables

1 INTRODUCTION

RPS was contracted (via subcontract to Ecology and Environment, E & E) by SPOT Terminal Services LLC (the Applicant), a subsidiary of Enterprise Products Operating LLC (EPROD), a Texas limited liability company, to provide modeling and analysis of various aspects of the Applicant's application filed for a license to construct, own, and operate a deepwater port (DWP) pursuant to the Deepwater Port Act of 1974, as amended, and in accordance with the U.S. Coast Guard's (USCG's) and U.S. Maritime Administration's (MARAD's) implementing regulations. The activities covered by the application are referred to as the Project in this document. Previously, RPS had addressed Data Gap #48 (shown below) relative to sediment effects associated with the Project.

> *"Vol IIa did not include any sediment transport modeling. Provide sediment modeling results that identify the fate and transport of excavated sediments during trenching, pile driving, and decommissioning activities. Include assumptions used in the model and identify ambient suspended sediment conditions, areal extent of the anticipated sediment plume resulting from trenching, pile driving, and decommissioning activities, concentrations of suspended sediments as a function of distance from the activities, and anticipated depths and areas of sediment deposition when the sediments fall out of suspension."*

RPS performed a study and issued a report to address Data Gap #48 (Crowley et al. 2019). Subsequent to that report, additional Data Requests were received from USCG as part of Data Gap Set Request # 4 relative to the sediment effects. This report serves to address Data Gap #206 (listed below).

> *The sediment transport model (DR #48), provided on August 5, 2019, concludes that excess TSS concentrations of 10mg/L could extend from a few hundred meters up to 4 km.*
>
> *a. Explain the significance of concentrations of 10 mg/L.*
>
> *b. Provide tabular summaries of areas/volume of water for thresholds above the average, minimum, and maximum TSS concentrations for the Gulf of Mexico.*
>
> *c. Provide a discussion of anticipated impacts from these excess concentrations in addition to the current baseline.*
>
> *d. Provide a timeseries to support the statement that excess concentrations would "...quickly subside once the activity ceases."*

This annex # 206 provides responses to the points outlined in Data Gap #206. This response should be read in conjunction with information provided in response to Data Gap # 48 included in the RPS report (Crowley et al. 2019). Response to Data Gap # 48 covers background information, approach, and results, which are not all reiterated in this annex. As a summary, Data Gap #48 included sediment modeling to characterize the plume of total suspended solids (TSS) and seabed deposition associated with three different scenarios that represent the different Project activities as presented in Table 1. More details and description of the scenarios can be found in section 2.1 of the original RPS report (Crowley et al. 2019).

Table 1. Summary of sediment effects modeling scenarios.

ID	Scenario
1	Representative Pipeline Installation/Decommissioning
2	Representative Pile Installation
3	HDD Pit Excavation/Backfill

This annex provides responses in Section 2 and references in Section 3. Response ‘c’ was prepared by E & E and responses ‘a’, ‘b’, & ‘d’ were prepared by RPS.

2 RESPONSES

Data Gap #206 parts and associated responses are provided in this section.

2.1 Response to Data Gap 206#-a

Data Gap #206-a is reiterated below:

a. Explain the significance of concentrations of 10 mg/L.

Response:

There is no specific significance of 10 mg/L, other than it is a typical TSS concentration for coastal waters of the Gulf of Mexico (see Figure 2-4 in Vol IIa, Appendix L of the application). The modeling had provided results which were shown using different contour levels to demonstrate the intensity of the plume as excess total suspended solids (TSS) concentrations. The concentrations were shown at intervals that were chosen only to demonstrate the variation in intensity; the levels were not tied to any biological thresholds of significance.

2.2 Response to Data Gap 206#-b

Data Gap #206-b is reiterated below:

b. Provide tabular summaries of areas/volume of water for thresholds above the average, minimum, and maximum TSS concentrations for the Gulf of Mexico.

Response:

The modeling was performed such that the results are provided as excess concentrations of TSS, where ‘excess’ refers to above ambient (background) concentrations. Thus, the areas/volumes above each of the average, minimum, and maximum TSS concentrations for the Gulf of Mexico are the same values.

Areas and volumes were calculated for six thresholds of excess concentrations that span the resulting excess concentration range: 10, 20, 50, 100, 200, and 1,000 mg/L. Further, since the excess concentrations vary in time, such that the areas/volumes above specific thresholds change in time, results are provided for 15 time-duration intervals. Given the many values, these results are provided in histogram plots.

Thus, RPS post-processed the modeling results in a manner to quantify the area that sustained excess concentrations above specific thresholds for specific durations. These areas were calculated based on the maximum concentration anywhere in the vertical water column. Therefore, the area results do not indicate that the entire water column within the area was above the threshold. The post-processor does not provide a calculation of the associated volume. However, estimates of the volume have been made based on inspection of the vertical extent of the plume. The results show that for all of the scenarios the excess concentrations occupy approximately the bottom 19.7 ft (6 m) of the water column, although the most intense concentrations are within the bottom meter where the load is first introduced to the water column. The map of time-integrated maximum instantaneous concentrations from the scenario of the single pipe installation is shown in Figure 1, along with an inset of the vertical cross-section taken approximately at the pipe centerline. This figure shows how the excess concentrations remain in the bottom of the water column. Based on the results, it was determined that a conservative estimate of the volume is six times the area (assuming the plume occupies 19.7 ft [6 m] or less within the water column). Using this assumption, plots of volume over specific excess concentration thresholds for specific durations were generated for each scenario (as shown in the following sections). Note that each scenario is presented with different units of volume due to the large differences in the order of magnitude of volumes associated with the different scenarios.

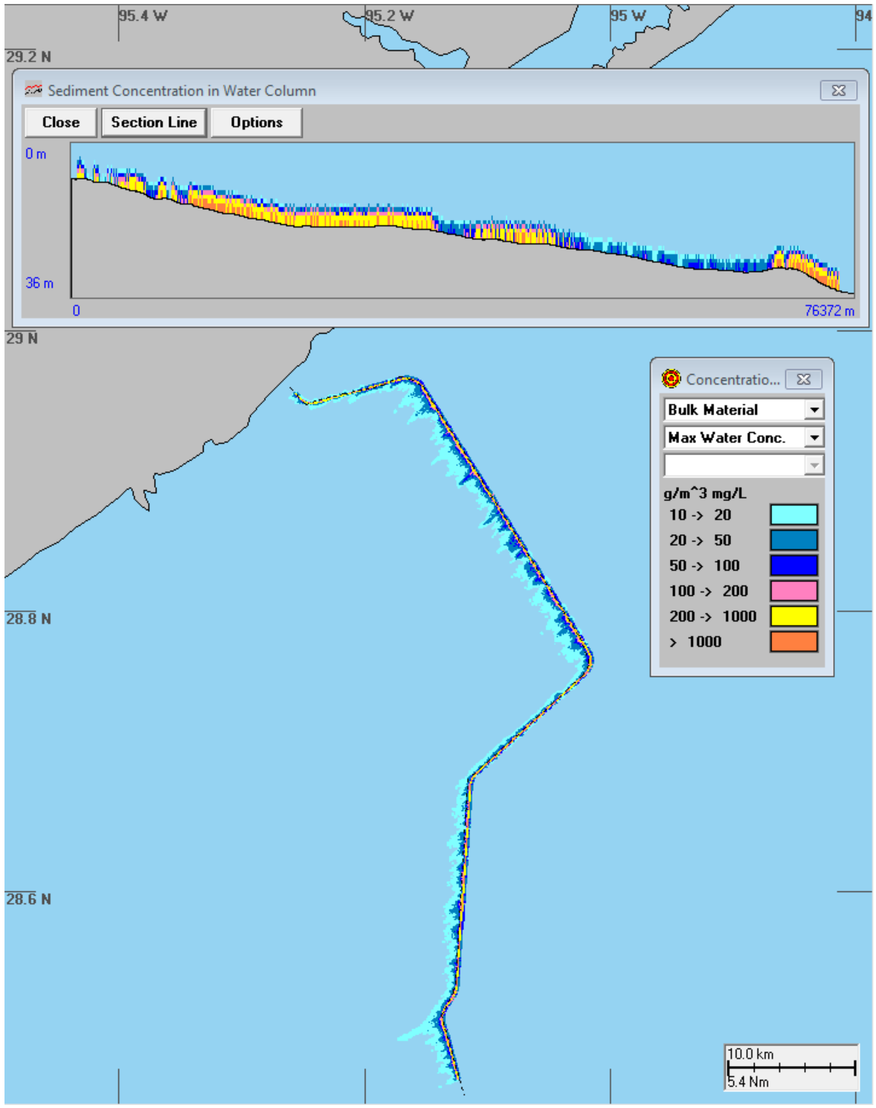


Figure 1. Map of time-integrated maximum instantaneous excess TSS concentrations for the representative single pipeline installation scenario. Inset shows the vertical cross section approximately along the route centerline.

Pipeline Installation

The Project is proposed to have two pipelines. The original modeling was performed to assess the installation of a single pipeline, to be representative of the activity in a standalone manner. Note that 'representative' reflects the conservative installation parameters (trench dimensions and resuspension rate) used, and the use of currents from a period reflecting the predominant circulation patterns (currents moving towards the west). Model results would vary somewhat if different time periods with different circulation patterns were modeled. The modeling of sediment suspension associated with the representative pipeline installation used a concentration and deposition grid with a resolution of 164 ft by 164 ft (50 m by 50 m) in the horizontal and 3.3 ft (1 m) in the vertical. Pipeline spacing of 30 ft. (9.14 m) between pipeline centerlines is assumed. Therefore, the pipeline spacing is small relative to the deposition grid cell size (smaller than a grid cell dimension).

If both pipelines were installed at the same time, they would not likely be installing in the same exact place along the route at the same time. For example, one pipeline installation may start offshore and the other nearshore. Therefore, even if they are installed at the same time, it is unlikely that there would be comingling plumes since the immediate plume is localized. In order to approximate the area/volume duration effects associated with two pipelines, it is assumed that the same areas (and volumes) would be exposed to specific excess water column concentrations for each pipeline and estimates of total duration were made by doubling the duration from the single pipeline installation scenario.

The resulting area/duration and volume/duration exposure summaries are presented in Table 2 and in the following figures:

- Figure 2 – Area/duration for single standalone pipeline installation.
- Figure 3 - Area/duration for two pipeline installations.
- Figure 4 - Volume/duration for single standalone pipeline installation.
- Figure 5 - Volume/duration for two pipeline installations.

Table 2. Maximum areas and volumes above threshold excess TSS concentrations for pipeline installations.

Excess Concentration Threshold (mg/L)	Area (hectares; 1 hectare = 2.47 acre)	Volume (millions m^3; 1 m^3 = 1.308 yd^3)
10	7710	462.6
20	4180	250.8
50	2120	127.2
100	1420	85.2
200	1090	65.4
1000	343	20.6

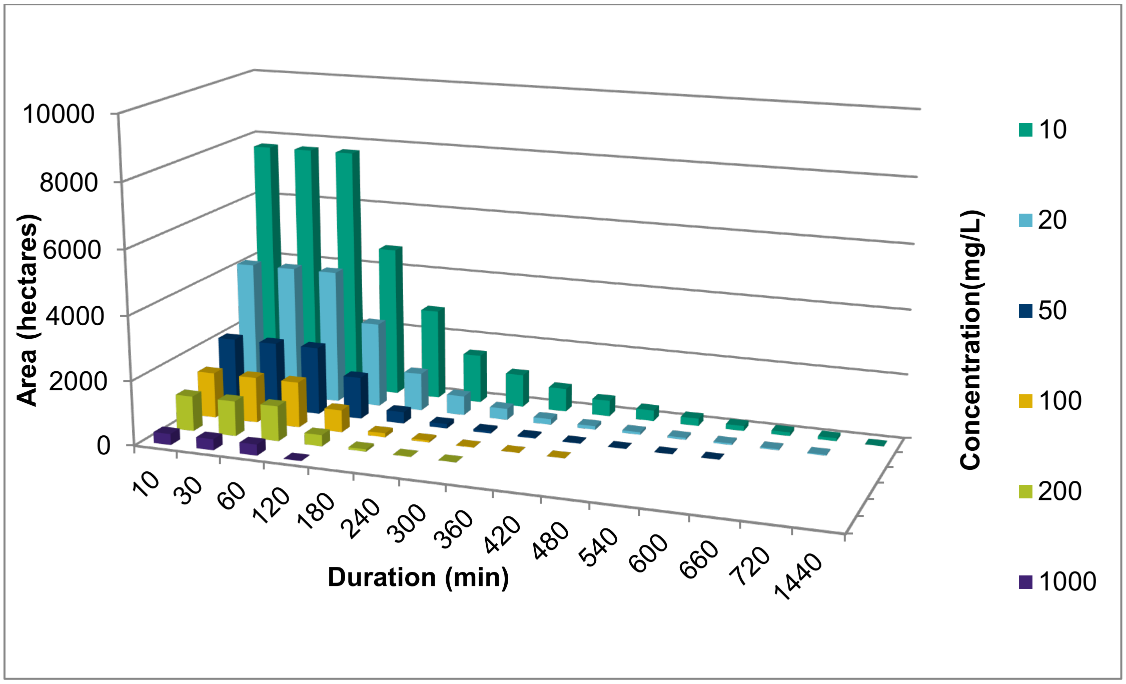


Figure 2. Total area exposed to excess concentration above specific thresholds for specific durations for the representative single pipeline installation scenario. Areas are presented in hectares (1 hectare = 10,000 m^2 = 2.47 acres).

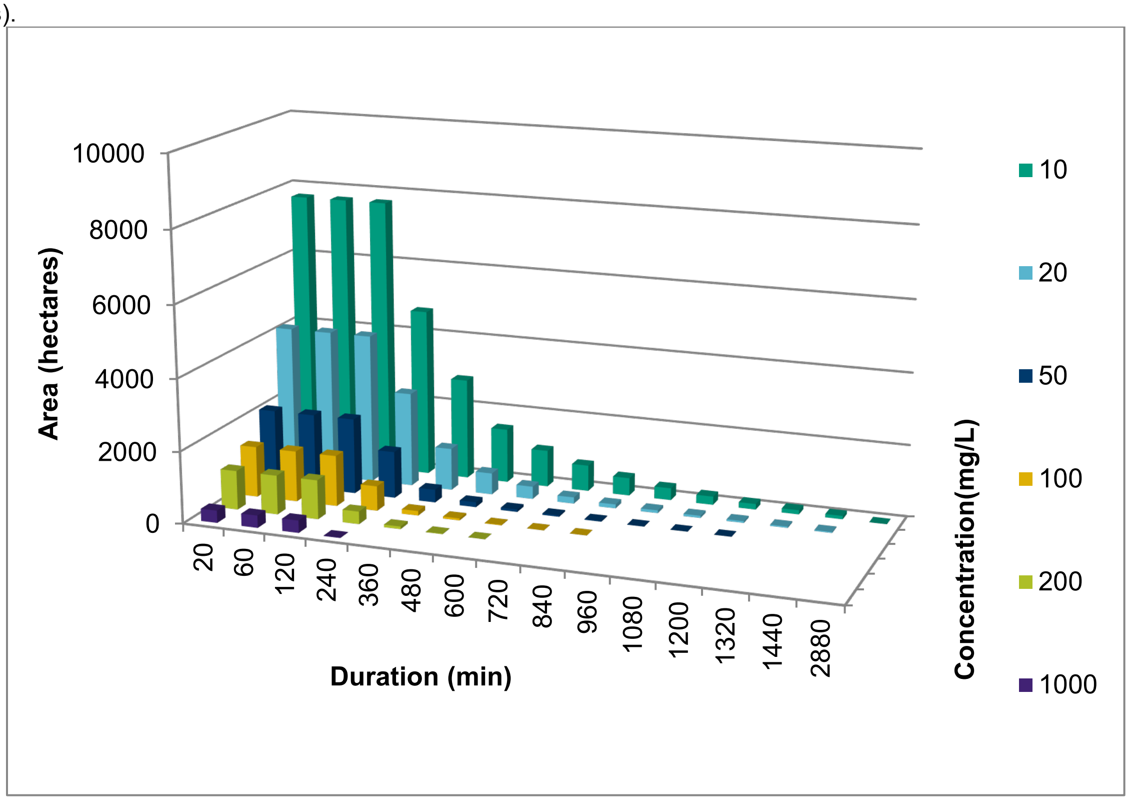


Figure 3. Total area exposed to excess concentration above specific thresholds for specific durations for installation of two pipelines. Areas are presented in hectares (1 hectare = 10,000 m^2 = 2.47 acres).

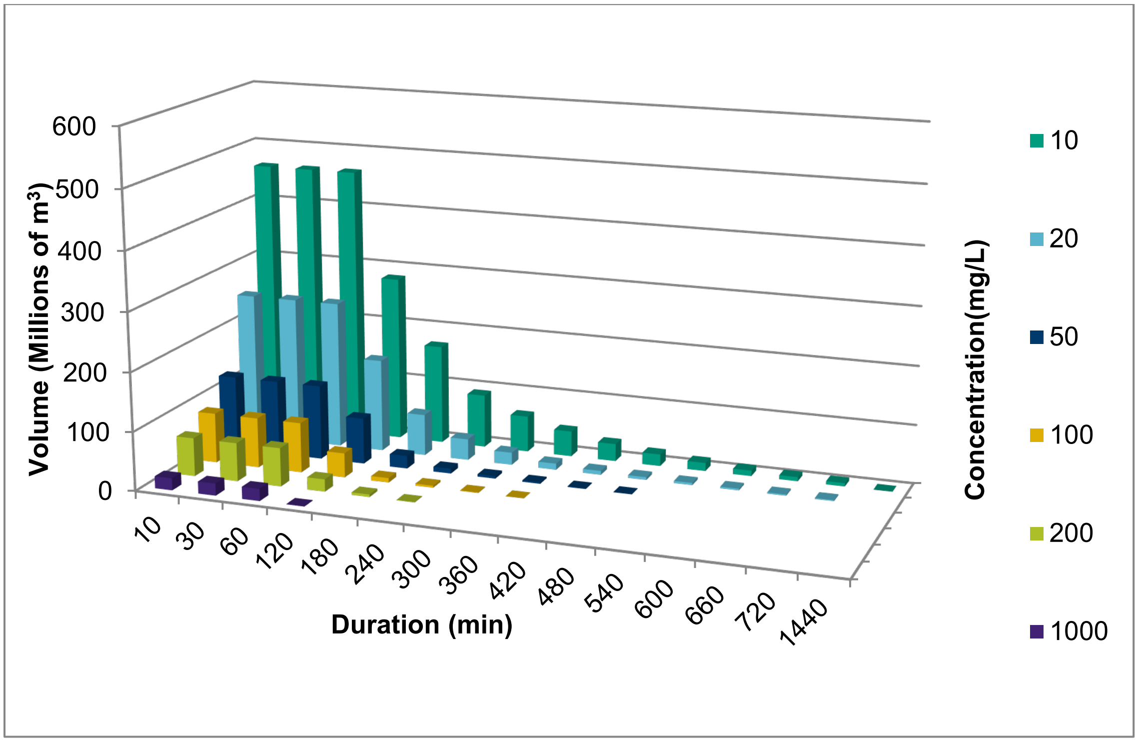


Figure 4. Total volume exposed to excess concentration above specific thresholds for specific durations for the representative single pipeline installation scenario. Volumes are presented in millions of cubic meters (1 m^3 = 1.308 yd^3).

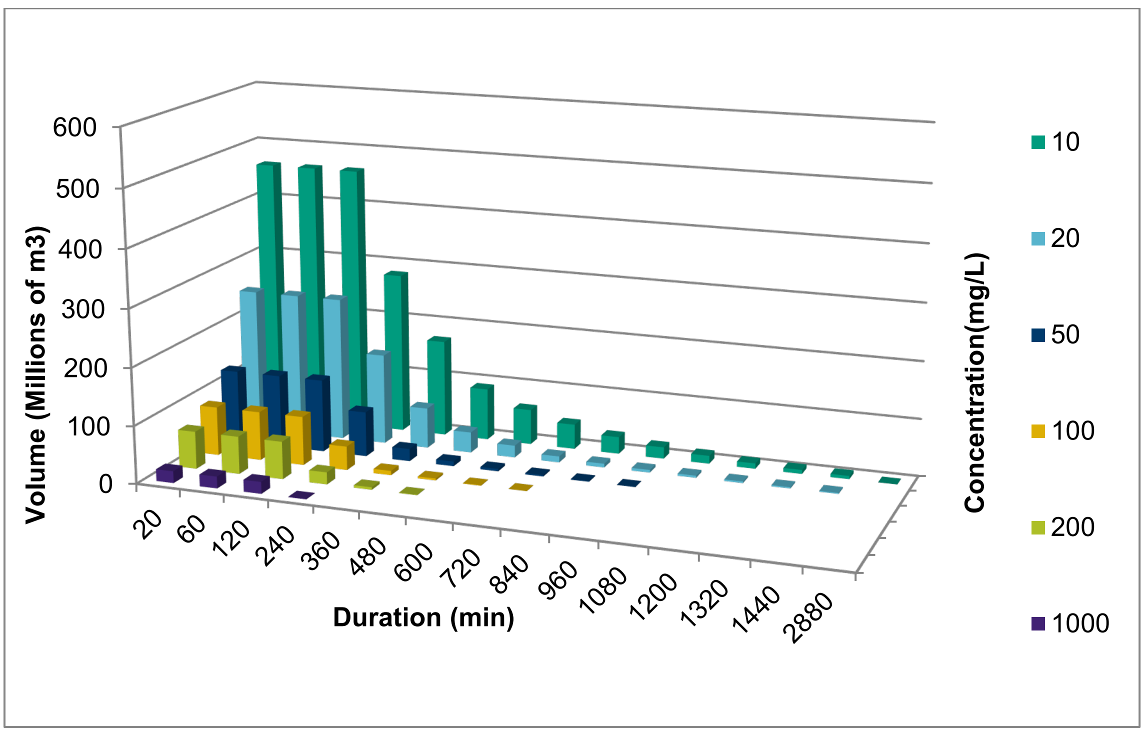


Figure 5. Total volume exposed to excess concentration above specific thresholds for specific durations for installation of two pipelines. Volumes are presented in millions of cubic meters (1 m^3 = 1.308 yd^3).

DWP Pile Installation

The DWP pile installation will not occur for all eight piles simultaneously, and there will be enough lag between hammer operations from pile to pile that the plume from any given installation would subside to background. (The hammer operates for two hours, every six hours per pile, and the cycle is repeated four times over 10 days). Further, the concentrations are localized to the areas immediately adjacent to the piles and even if two piles were being installed simultaneously, it is unlikely that the plumes would comingle at the minimum excess concentration at which the results have been presented (10 mg/L). Therefore, the exposure area and volume for the installation of all eight DWP piles was assumed to be eight times that of the single pile installation scenario. The area over thresholds for specific durations are presented in Figure 6 and Figure 7, and volumes over thresholds for specific durations are presented in Figure 8 and Figure 9 for results of one and all eight DWP pile installations, respectively. The maximum areas/volumes above threshold excess TSS concentrations for DWP pile installations are presented in Table 3.

Table 3. Maximum areas and volumes above threshold excess TSS concentrations for DWP pile installations.

Excess Concentration Threshold (mg/L)	Area (hectares; 1 hectare = 2.47 acre)		Volume (m^3; 1 m^3 = 1.308 yd^3)	
# of Piles	1	8	1	8
10	0.0125	0.10	750	6000
20	0.0125	0.10	750	6000
50	0.0125	0.10	750	6000
100	0.0025	0.02	150	1200
200	0.0025	0.02	150	1200

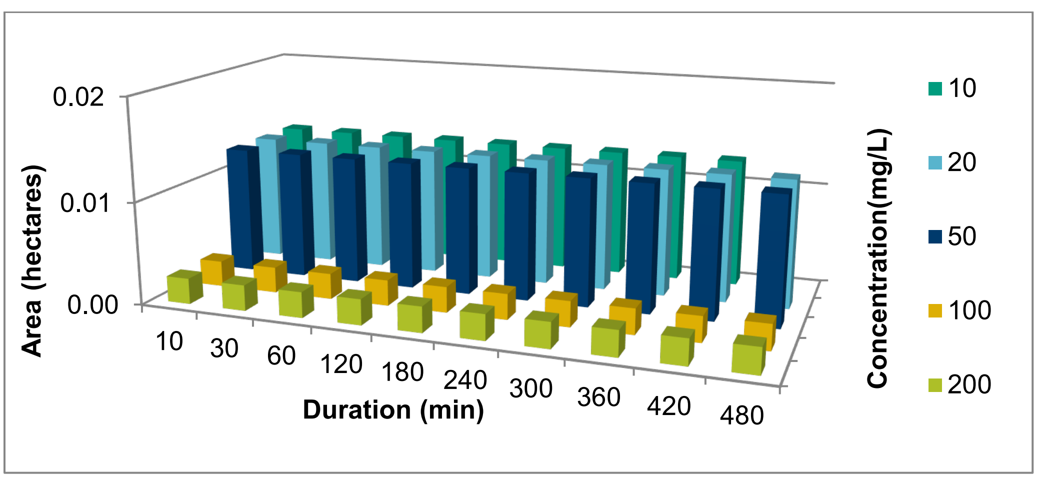


Figure 6. Total area exposed to excess concentration above specific thresholds for specific durations for the representative single DWP pile installation scenario. Areas are presented in hectares (1 hectare = 10,000 m^2 = 2.47 acres).

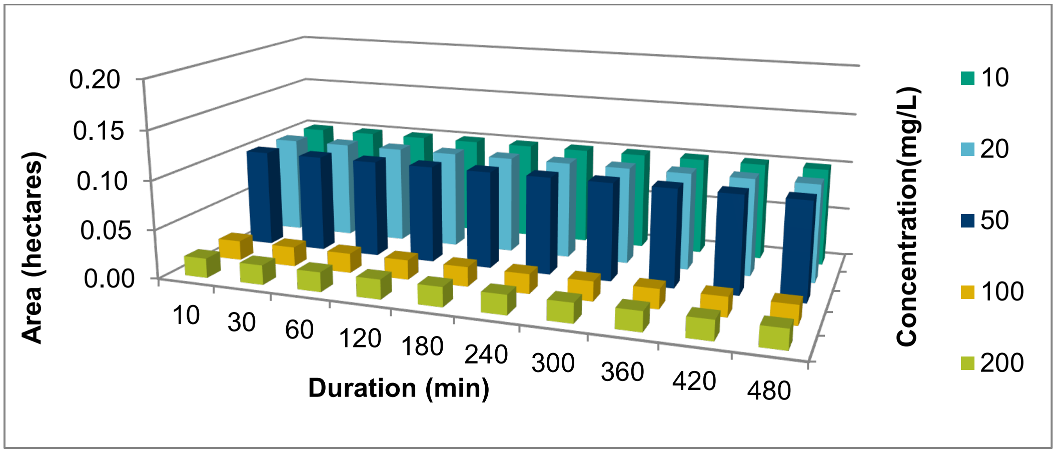


Figure 7. Total area exposed to excess concentration above specific thresholds for specific durations for installation of all eight DWP piles. Areas are presented in hectares (1 hectare = 10,000 m^2 = 2.47 acres).

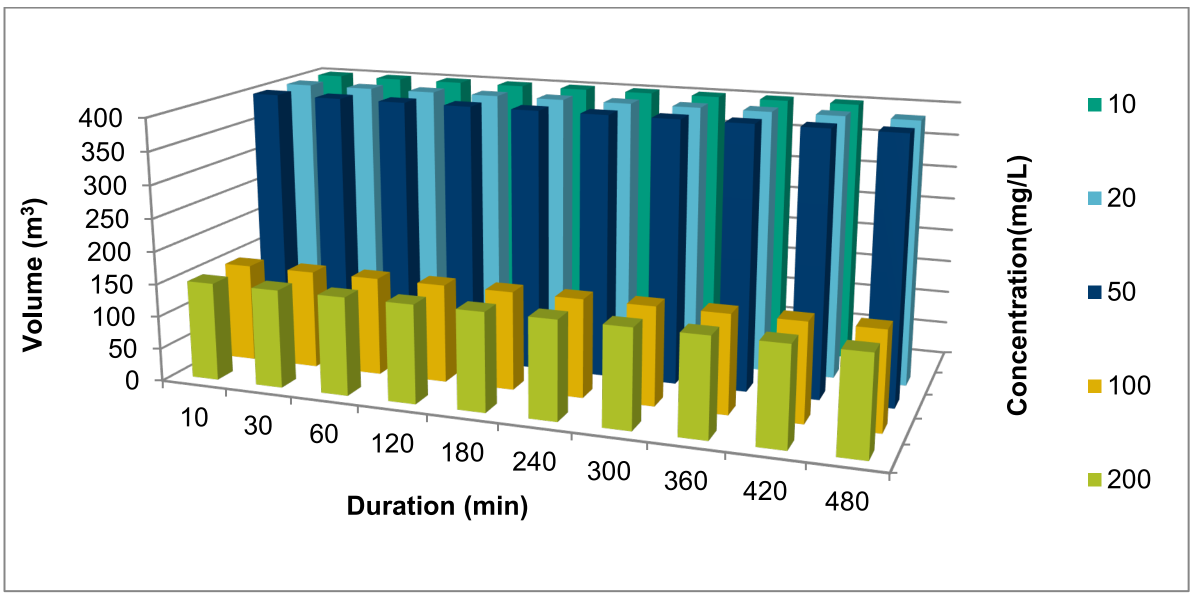


Figure 8. Estimate of volume exposed to excess concentration above specific thresholds for specific durations for the representative single DWP pile installation scenario. Volumes are presented in cubic meters (1 m^3 = 1.308 yd^3).

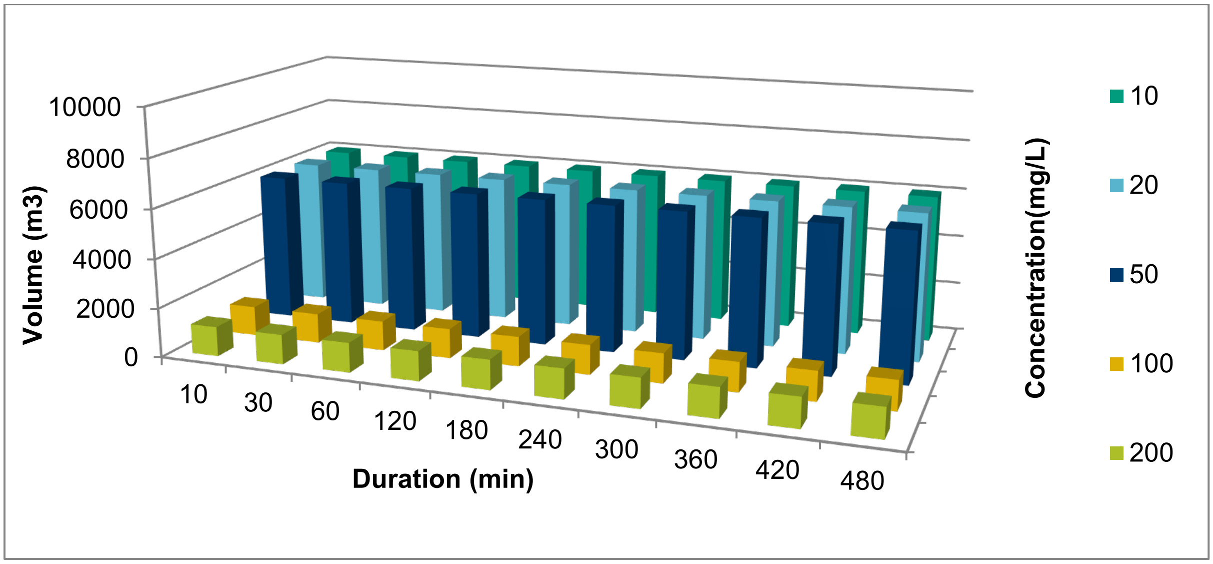


Figure 9. Estimate of volume exposed to excess concentration above specific thresholds for specific durations for installation of all eight DWP piles. Volumes are presented in cubic meters (1 m^3 = 1.308 yd^3).

HDD

The HDD pit will be excavated with side casting and then backfilled at a later time; therefore, the same areas (and volumes) will be exposed to the same plume sizes and excess concentrations at two different times. A scenario representing either of these activities (excavation or backfilling) had previously been modeled. To estimate the areas and volumes for both activities (excavation and backfilling), the durations predicted from the modeled scenario were doubled. The area over thresholds for specific durations are presented in Figure 10 and Figure 11, and volumes over thresholds for specific durations are presented in Figure 12 and Figure 13 for results of (1) representative scenario of excavation with side casting ***or*** backfilling or (2) excavation with side casting **and** backfilling, respectively. Table 4 summarizes the maximum areas and volumes above threshold excess TSS concentrations for the HDD excavation and/or backfilling.

Table 4. Maximum areas and volumes above threshold excess TSS concentrations for the HDD excavation and/or backfilling.

Excess Concentration Threshold (mg/L)	Area (hectares; 1 hectare = 2.47 acre)	Volume (m^3; 1 m^3 = 1.308 yd^3)
10	2.5	152,400
20	1.2	70,800
50	0.4	26,800
100	0.2	9,000
200	0.03	1,900
1000	0.02	1,400

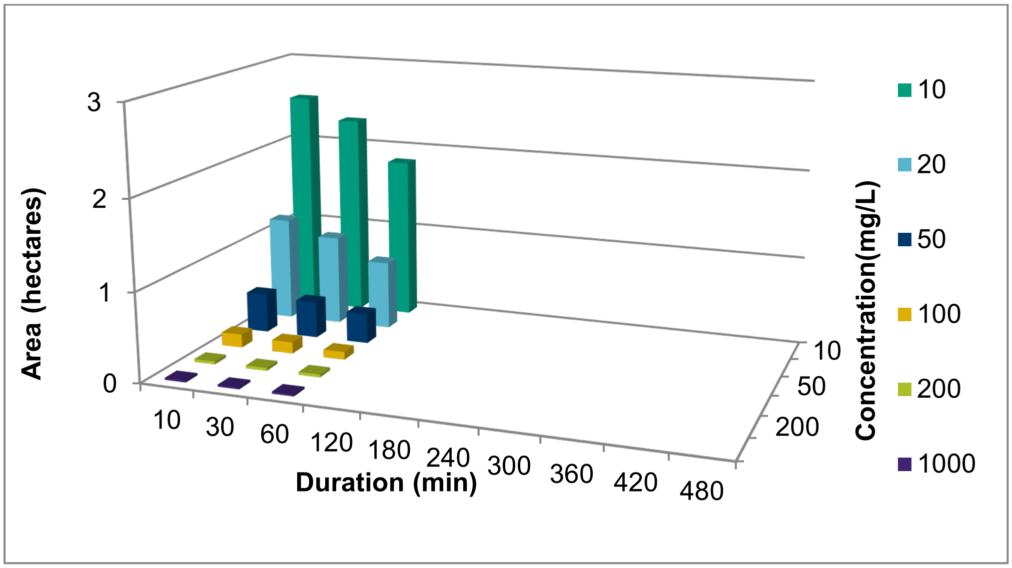


Figure 10. Total area exposed to excess concentration above specific thresholds for specific durations for the representative HDD excavation with side cast OR backfilling. Areas are presented in hectares (1 hectare = 10,000 m^2 = 2.47 acres).

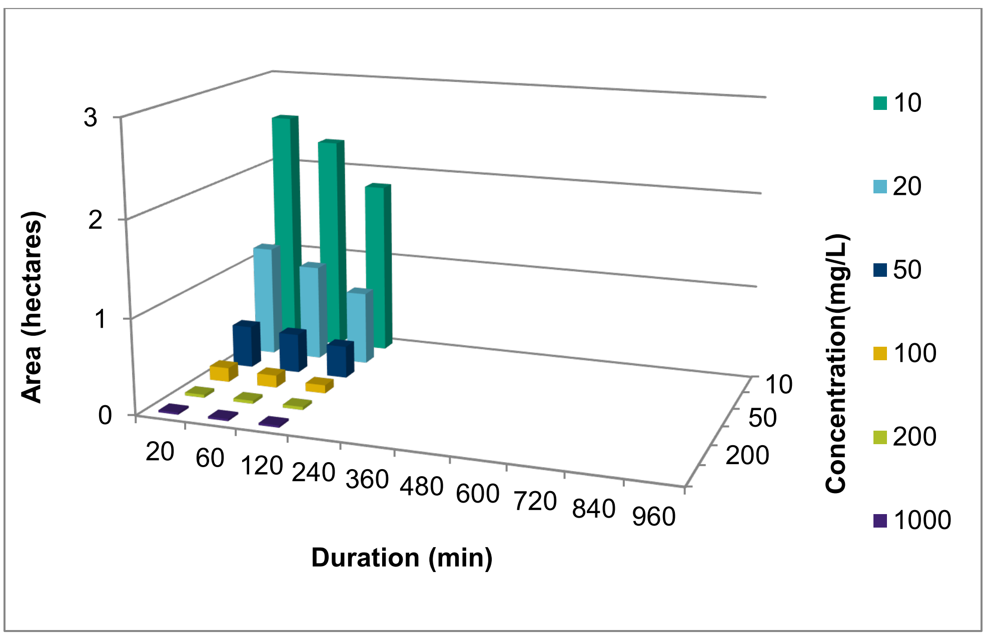


Figure 11. Total area exposed to excess concentration above specific thresholds for specific durations for the representative HDD excavation with side cast AND backfilling. Areas are presented in hectares (1 hectare = 10,000 m^2 = 2.47 acres).

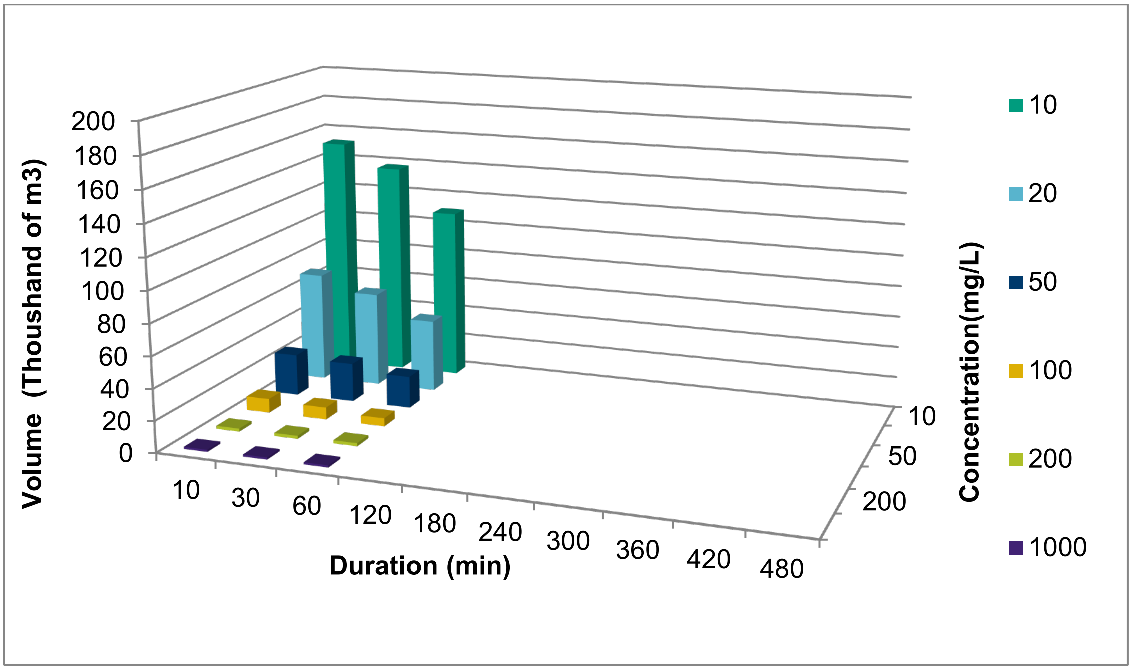


Figure 12. Estimate of volume exposed to excess concentration above specific thresholds for specific durations for the representative HDD excavation with side cast OR backfilling. Volumes are presented in thousands of cubic meters (1 m^3 = 1.308 yd^3).

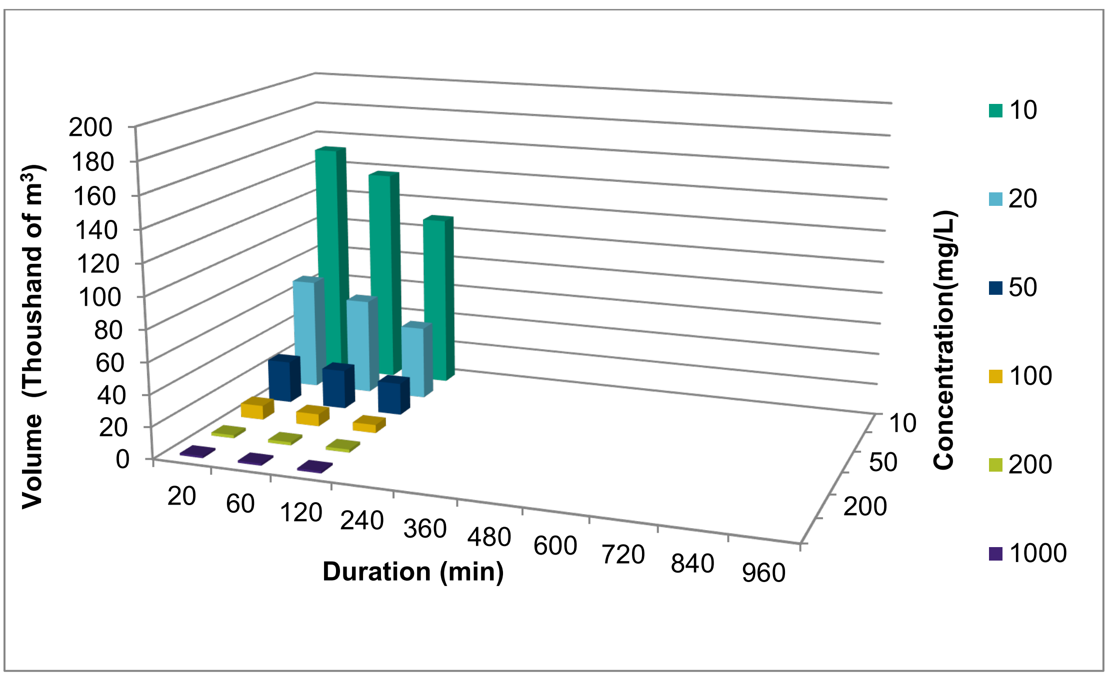


Figure 13. Estimate of volume exposed to excess concentration above specific thresholds for specific durations for the representative HDD excavation with side cast AND backfilling. Volumes are presented in thousands of cubic meters (1 m^3 = 1.308 yd^3).

2.3 Response to Data Gap 206#-c

Data Gap #206c is reiterated below:

> *c. Provide a discussion of anticipated impacts from these excess concentrations in addition to the current baseline.*

Response (provided by E& E):

Information on baseline average total suspended solids (TSS) concentrations along the continental shelf of the Gulf of Mexico are not readily available. Generally, near-shore coastal areas and estuaries have been studied more extensively due to shallow depths, the influx of nutrients from riverine systems, and intrusive anthropogenic activities (dredging, etc) that cause resuspension of substrate particles. But, it is expected that Gulf waters in the Project's location, generally, have lower concentrations of suspended solids due to water depths, currents and cohesive sediments.

Kjelland et al. (2015) provided a review of the potential effects to fish from suspended sediment from dredging. Their study focused primarily on long-term effects on fish populations. They note that studies (Caux et al. 1997; Newcombe 2003, Fleming et al. 2005) on suspended sediments show that short- and long-term responses by aquatic biota depend on the quantity, quality, and duration of suspended sediment exposure, and that developed federal and state water quality criteria/standards vary based on methods to assess effects and exposure thresholds. In general, Kjelland et al. (2015) note that fish are more likely to undergo sublethal stress from suspended sediment rather than lethality because of their ability to move away from or out of an area of higher concentration to a lower concentration, versus sessile or less mobile species. For example, Carlson et al. (2001) showed that salmonids in the Columbia River modified their movement patterns based on dredge discharge plumes. Effects on marine fish species vary greatly, with most typically assessed based on laboratory-derived exposures over 12 to 48 hours (Kjelland et al. 2015; Table 1).

Relative to the data gap question, the SPOT model shows that for all scenarios the turbidity plume will only extend a few meters from the bottom (see Data Gap #48 Response, Figures 9 & 10 and response to 206#-b above). The plume's concentration is greatest near the installation trench, and it dissipates quickly as it moves away from the trench due to water current action. Importantly, as noted in the report, "…the presence of excess concentrations is temporary, in this particular location, excess concentrations greater 10 mg/L last less than 8 hours." Also, it is important to point out that the derived plume is transient along the pipeline as the jet plow moves along the route.

Based on the information presented above, there is little cause for concern that elevated turbidities will cause anything more than behavioral modifications to fish and other marine species. Turbidity plumes will be close to the bottom, short-term, and inconsequential. Additionally, fish will likely move away from the work areas due to disruption of their habitat, and noise from the equipment.

2.4 Response to Data Gap 206#-d

Data Gap #206d is reiterated below:

> *d. Provide a timeseries to support the statement that excess concentrations would "...quickly subside once the activity ceases."*

Response:

This statement was made in reference to the result that in any particular location the excess concentrations would attenuate quickly after the activity in that location ceased. In the previous report, Figure 11 had included a time history of excess concentrations at a point to demonstrate that point. However, the units were not displayed on the plot (x-axis was time in days and y-axis was excess concentration in mg/L). A such, RPS has generated time histories at select points to demonstrate the transient nature of the TSS plume associated with each scenario.

For the representative pipeline scenario, the results were post-processed to determine the number of hours the excess concentration greater than 10 mg/L persisted at each concentration grid cell. This is presented in Figure 14. Note that the time is counted when any given vertical grid cell is greater than the 10 mg/L threshold; however, the entire water column is not greater than this threshold. This result was used as a guide to pick locations to query the time histories. These point locations are also called out in Figure 14. The corresponding time histories at these five locations are shown in Figure 15, with a zoom of days 15 – 25 presented in Figure 16.

Notably, location 5 has the longest duration experiencing excess concentrations. This is due to the orientation of the pipeline at this location. The pipeline route is shore-parallel along this stretch, which is aligned with the predominant current. As such, the plume is transported along the pipeline route in this stretch. Thus, this location experiences excess concentration-days before its peak when the plume is related to more localized activity. Once the installation reaches this location and continues towards the DWP, the plume subsides relatively quickly, similar to the recession experienced at other locations that are not down current from active installation along other portions of the pipeline route (e.g. time series location 1).

The time histories were also queried from the results of the representative pile installation and representative HDD activity. However, these are much more localized activities and the points queried are local to the source. A plot of hours over 10 mg/L was not needed to guide selection of these point locations. Figure 17 shows the locations that were queried for the pile installation (left) and HDD scenario (right), both plotted over the map of maximum instantaneous concentrations. The queried time histories of excess concentration for the pile installation scenario are shown in Figure 18 and the time histories of excess concentration for the HDD scenario are shown in Figure 19 & Figure 20. Two figures were used due to the different peak concentrations. These figures show that the concentrations at these locations attenuate within an hour after the activity ceases. At the points closest to the source, plumes attenuate immediately. Further away, the plume takes slightly longer to pass by. However, the peak concentrations are attenuated.

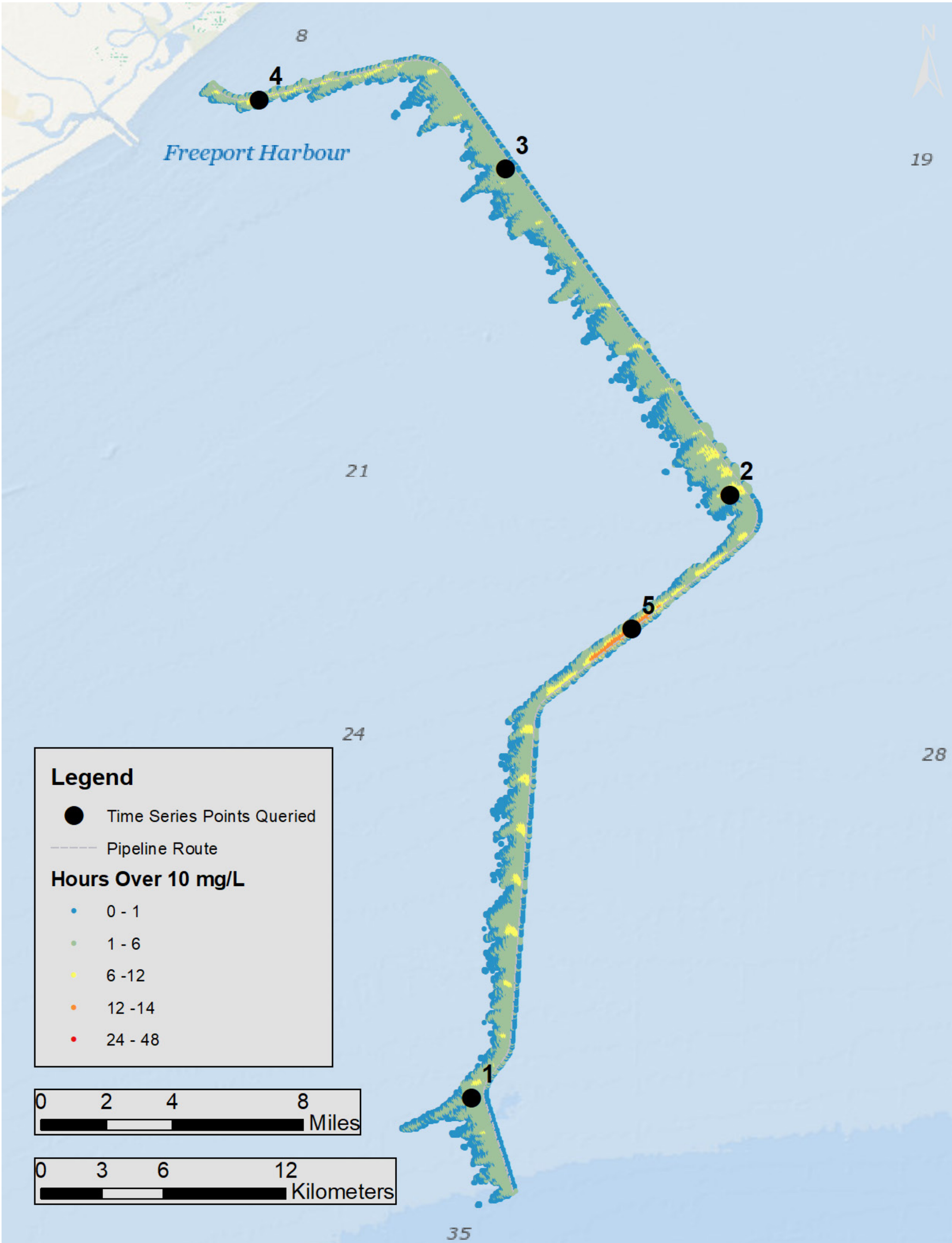


Figure 14. Map showing locations where time histories of excess concentrations were queried from the pipeline installation scenario.

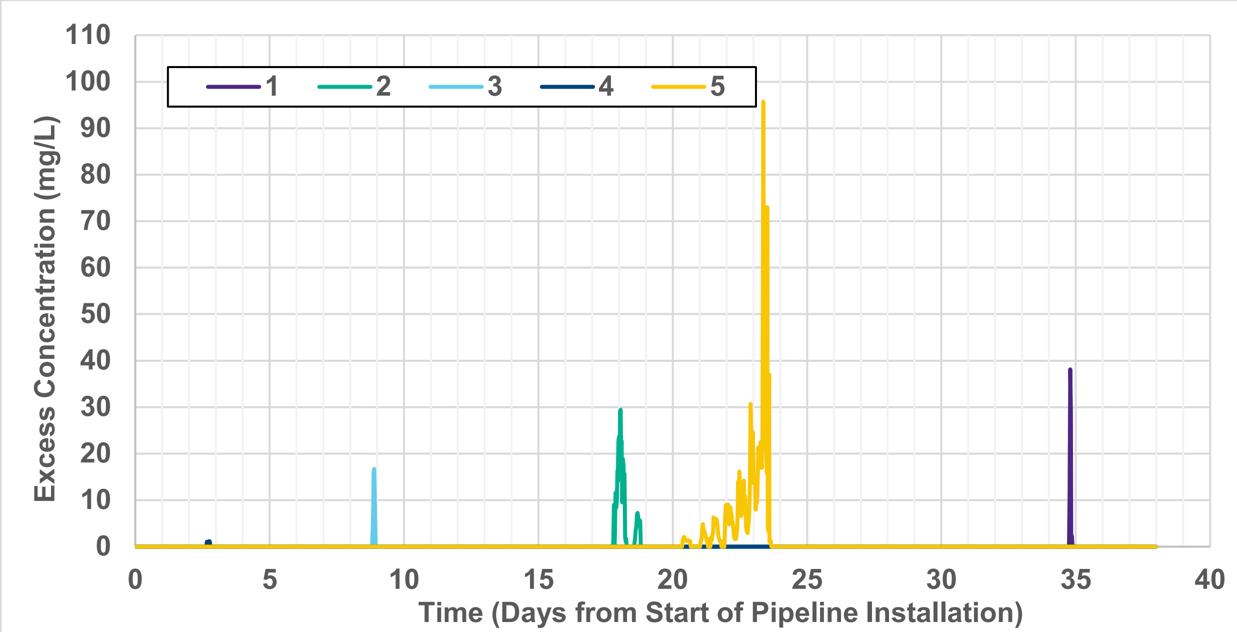


Figure 15. Time histories of excess concentrations associated with pipeline installation at select points. The scenario modeled was an active moving source, installing pipeline over ~ 37 days.

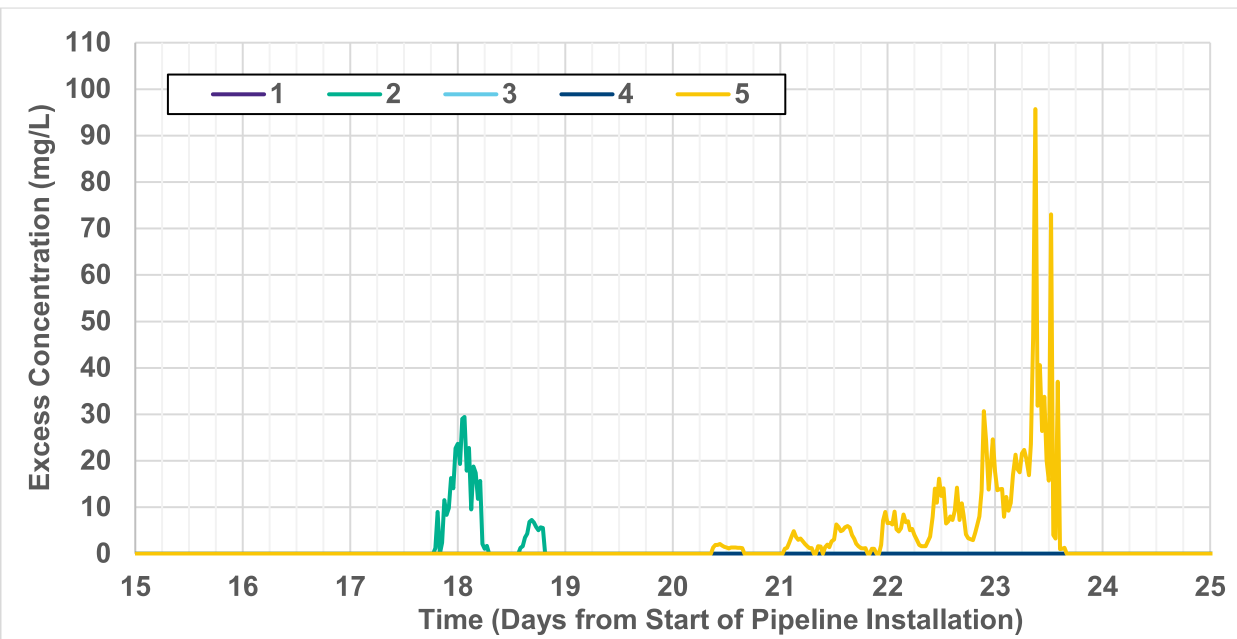


Figure 16. Time histories of excess concentrations associated with pipeline installation at select points zoomed in to days 15 - 25. The scenario modeled was an active moving source, installing pipeline over ~ 37 days.

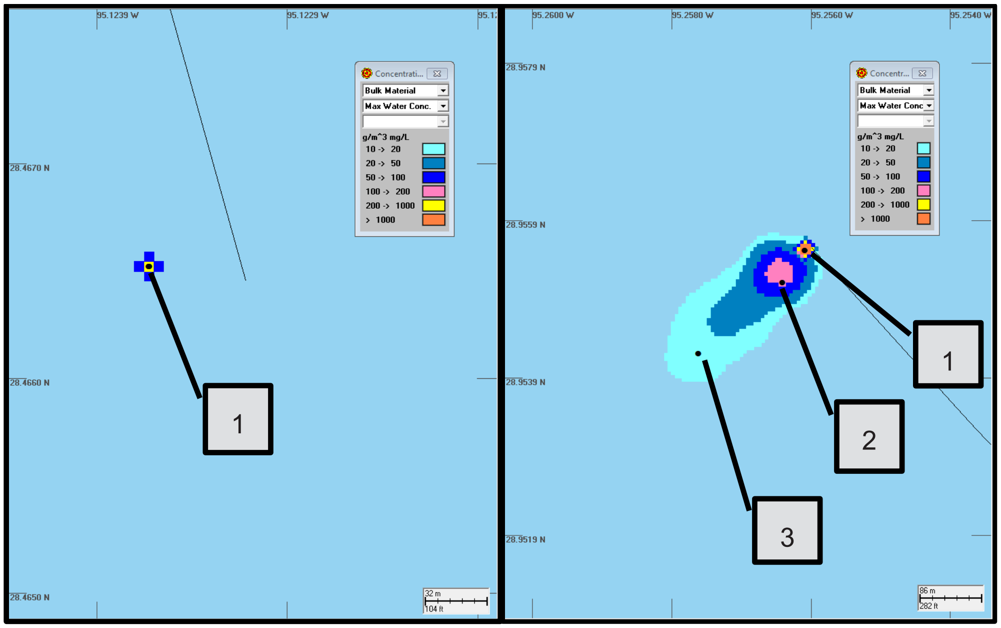


Figure 17. Map showing locations where time histories of excess concentrations were queried, associated with the representative pile installation (left) and HDD scenario (right).

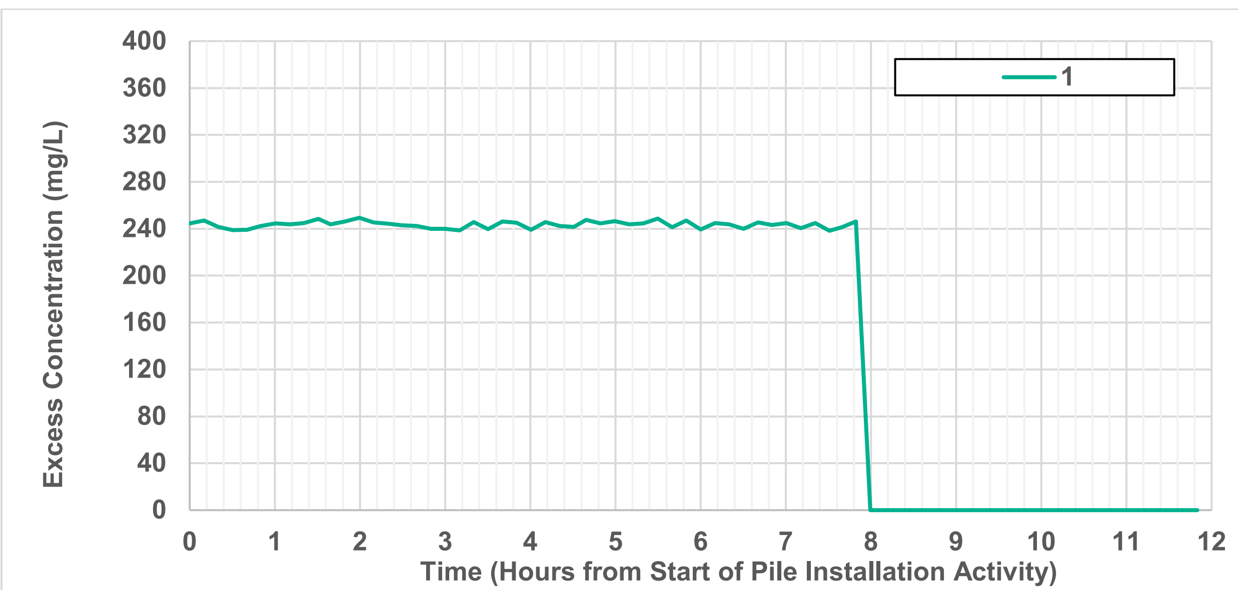


Figure 18. Time histories of excess concentrations associated with the pile installation scenario at point 1 from Figure 17 (left). The scenario modeled was an active continuous point source of ~8 hours.

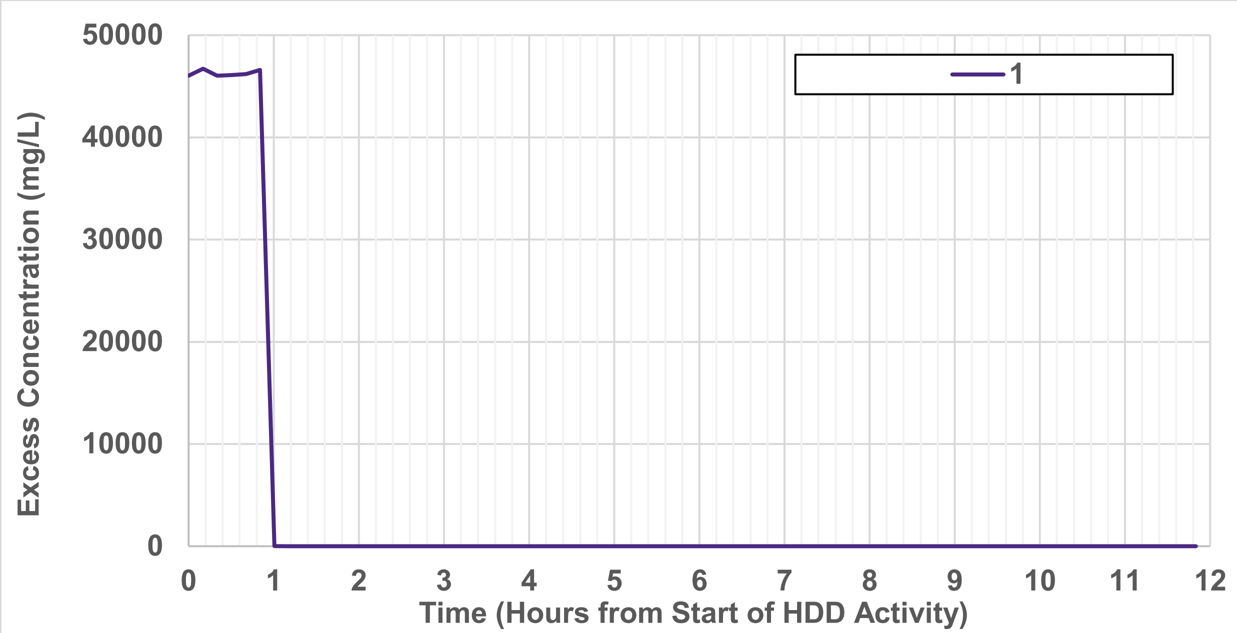


Figure 19. Time histories of excess concentrations associated the HDD scenario at point 1 from Figure 17 (right). The scenario modeled was an active point source for ~1 hour.

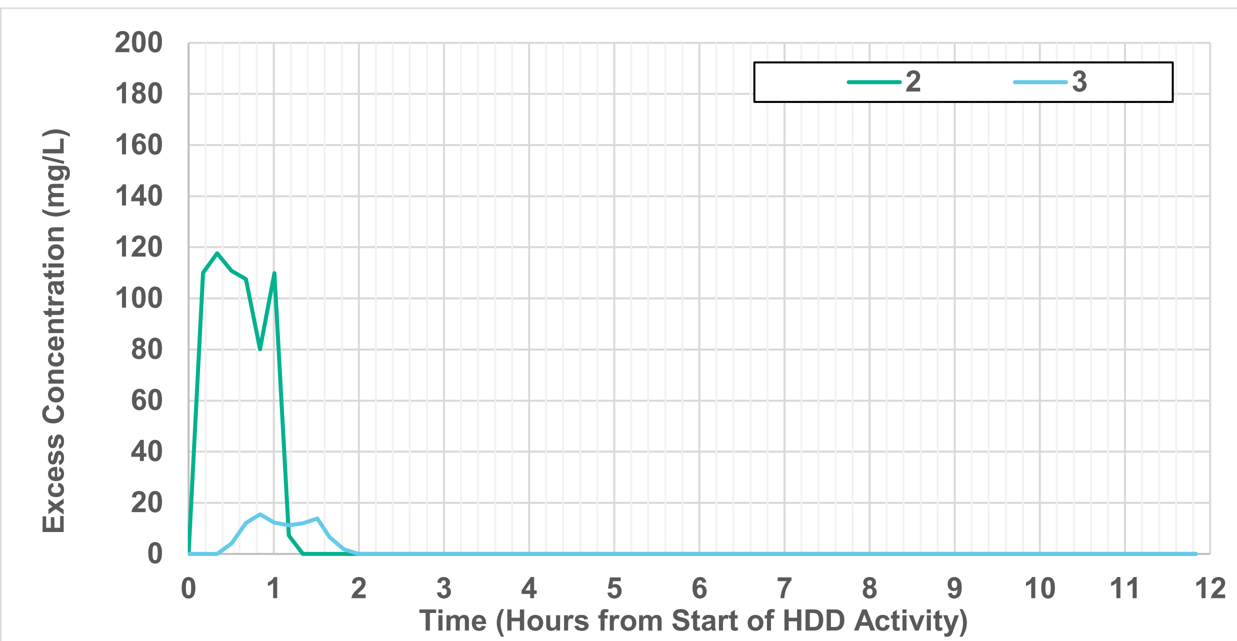


Figure 20. Time histories of excess concentrations associated the HDD scenario at points 2 & 3 from Figure 17 (right). The scenario modeled was an active point source for ~1 hour.

3 REFERENCES

Caux, P-Y, D.R.J. Moore, and D. MacDonald. 1997. Ambient water quality guidelines (criteria) for turbidity, suspended and benthic sediments. Technical Appendix. Prepared for the BC Ministry of Environment, Land and Parks, pp 146.

Crowley, D., N. Vinhateiro and D. French-McCay, 2019. TEXAS SPOT TERMINAL, Response to Data Gap #48 -Sediment Transport Modeling. Project Report issued July 15, 2019. RPS Project 18-P-200643.

Fleming, S. W., E. J. Quilty, T. Farahmand, and P. Hudson. 2005. Magnitude-duration based ecological risk assessment for turbidity and chronic temperature impacts: method development and application to millionaire creek. Prepared for the environmental quality section, environmental protection branch, British Columbia Ministry of Environment, Surrey. Prepared by Aquatic Informatics Inc., Vancouver, pp 56.

Kjelland, M. E. 2015. A review of the potential effects of suspended sediment on fishes: potential dredging-related physiological, behavioral, and transgenerational implication. Environ. Syst. Decis. 35:334-350.

Newcombe, C. P. 2003. Impact assessment model for clear water fishes exposed to excessively cloudy water. J. Am. Water Resour. Assoc. 39:529-544.

ATTACHMENT E

Sea Turtle and Smalltooth Sawfish Construction Conditions

-Page Intentionally Left Blank-

ATTACHMENT #14
SPGP IV

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
O:\forms\Sea Turtle and Smalltooth Sawfish Construction Conditions.doc

ATTACHMENT F

USFWS Standard Manatee Conditions for In-Water Work

-Page Intentionally Left Blank-

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK
2019

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 waterwhenever 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 Texas Marine Mammal Stranding Network (TMMSN) Hotline at 1-888-9-MAMMAL. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Houston (1-281-286-8282).

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..

-Page Intentionally Left Blank-

ATTACHMENT G

NOAA Fisheries' Vessel Strike Avoidance Measures and Reporting for Mariners

-Page Intentionally Left Blank-

Vessel Strike Avoidance Measures and Reporting for Mariners
NOAA Fisheries Service, Southeast Region

Background

The National Marine Fisheries Service (NMFS) has determined that collisions with vessels can injure or kill protected species (e.g., endangered and threatened species, and marine mammals). The following standard measures should be implemented to reduce the risk associated with vessel strikes or disturbance of these protected species to discountable levels. NMFS should be contacted to identify any additional conservation and recovery issues of concern, and to assist in the development of measures that may be necessary.

Protected Species Identification Training

Vessel crews should use an Atlantic and Gulf of Mexico reference guide that helps identify protected species that might be encountered in U.S. waters of the Atlantic Ocean, including the Caribbean Sea, and Gulf of Mexico. Additional training should be provided regarding information and resources available regarding federal laws and regulations for protected species, ship strike information, critical habitat, migratory routes and seasonal abundance, and recent sightings of protected species.

Vessel Strike Avoidance

In order to avoid causing injury or death to marine mammals and sea turtles the following measures should be taken when consistent with safe navigation:

1. Vessel operators and crews shall maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.

2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.

3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.

4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 knots or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity; therefore, prudent precautionary measures should always be exercised. The vessel shall attempt to route around the animals, maintaining a minimum distance of 100 yards whenever possible.

6. Whales may surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel and when safety permits, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Additional Requirements for the North Atlantic Right Whale

1. If a sighted whale is believed to be a North Atlantic right whale, federal regulation requires a minimum distance of 500 yards be maintained from the animal (50 CFR 224.103 (c)).

2. Vessels entering North Atlantic right whale critical habitat are required to report into the Mandatory Ship Reporting System.

3. Mariners shall check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners. Commercial mariners calling on United States ports should view the most recent version of the NOAA/USCG produced training CD entitled "A Prudent Mariner's Guide to Right Whale Protection" (contact the NMFS Southeast Region, Protected Resources Division for more information regarding the CD).

4. Injured, dead, or entangled right whales should be immediately reported to the U.S. Coast Guard via VHF Channel 16.

Injured or Dead Protected Species Reporting

Vessel crews shall report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by your vessel.

Report marine mammals to the Southeast U.S. Stranding Hotline: 877-433-8299
Report sea turtles to the NMFS Southeast Regional Office: 727-824-5312

If the injury or death of a marine mammal was caused by a collision with your vessel, responsible parties shall remain available to assist the respective salvage and stranding network as needed. NMFS' Southeast Regional Office shall be immediately notified of the strike by email (takereport.nmfsser@noaa.gov) using the attached vessel strike reporting form.

For additional information, please contact the Protected Resources Division at:

NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
Tel: (727) 824-5312
Visit us on the web at http://sero.nmfs.noaa.gov

ATTACHMENT H

Worst-case Scenario Spill Plots

-Page Intentionally Left Blank-

List of Figures

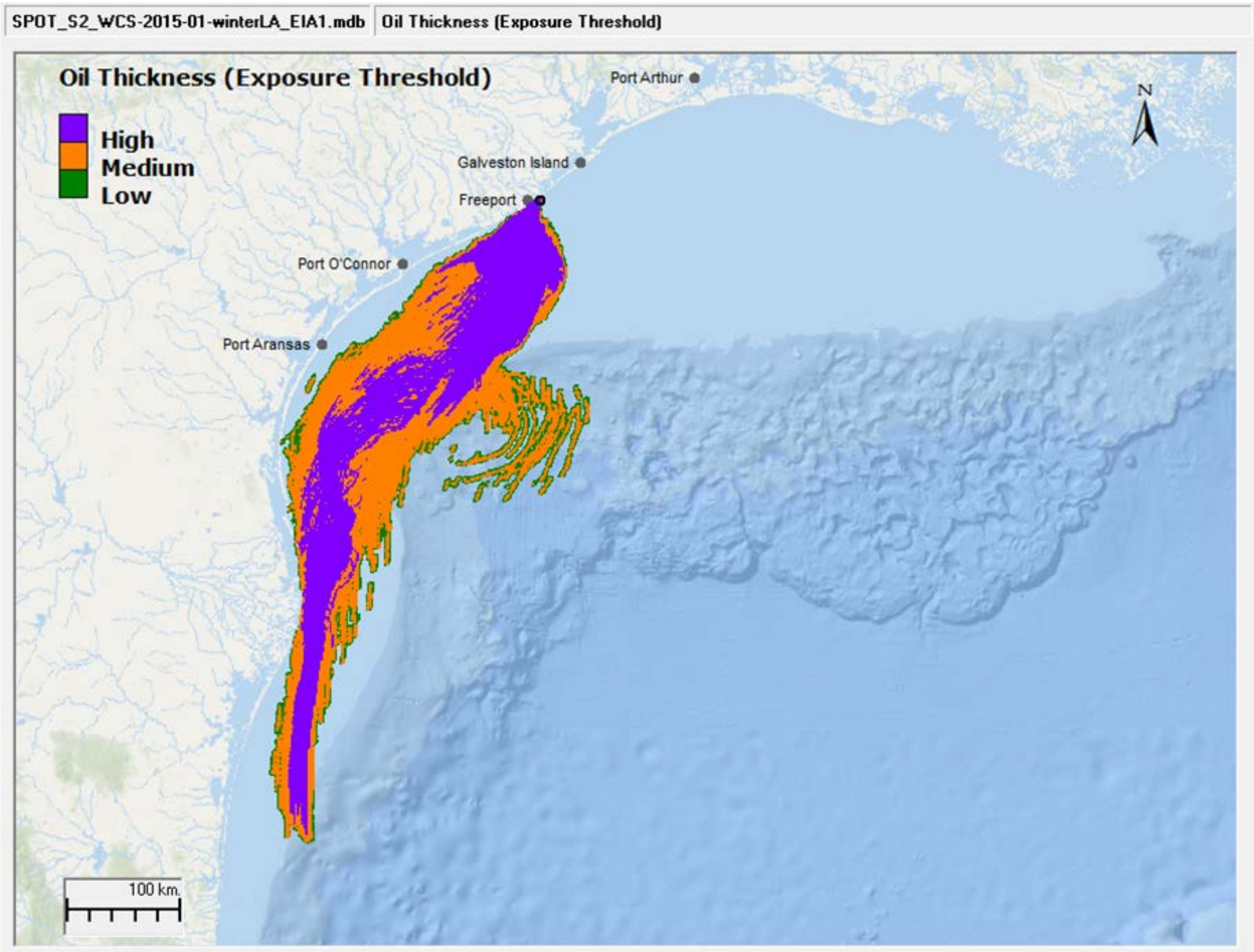


Figure 1: 15.5 day Simulation, Nearshore Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Winter

Note: High is > 10 micrometers (µm); Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

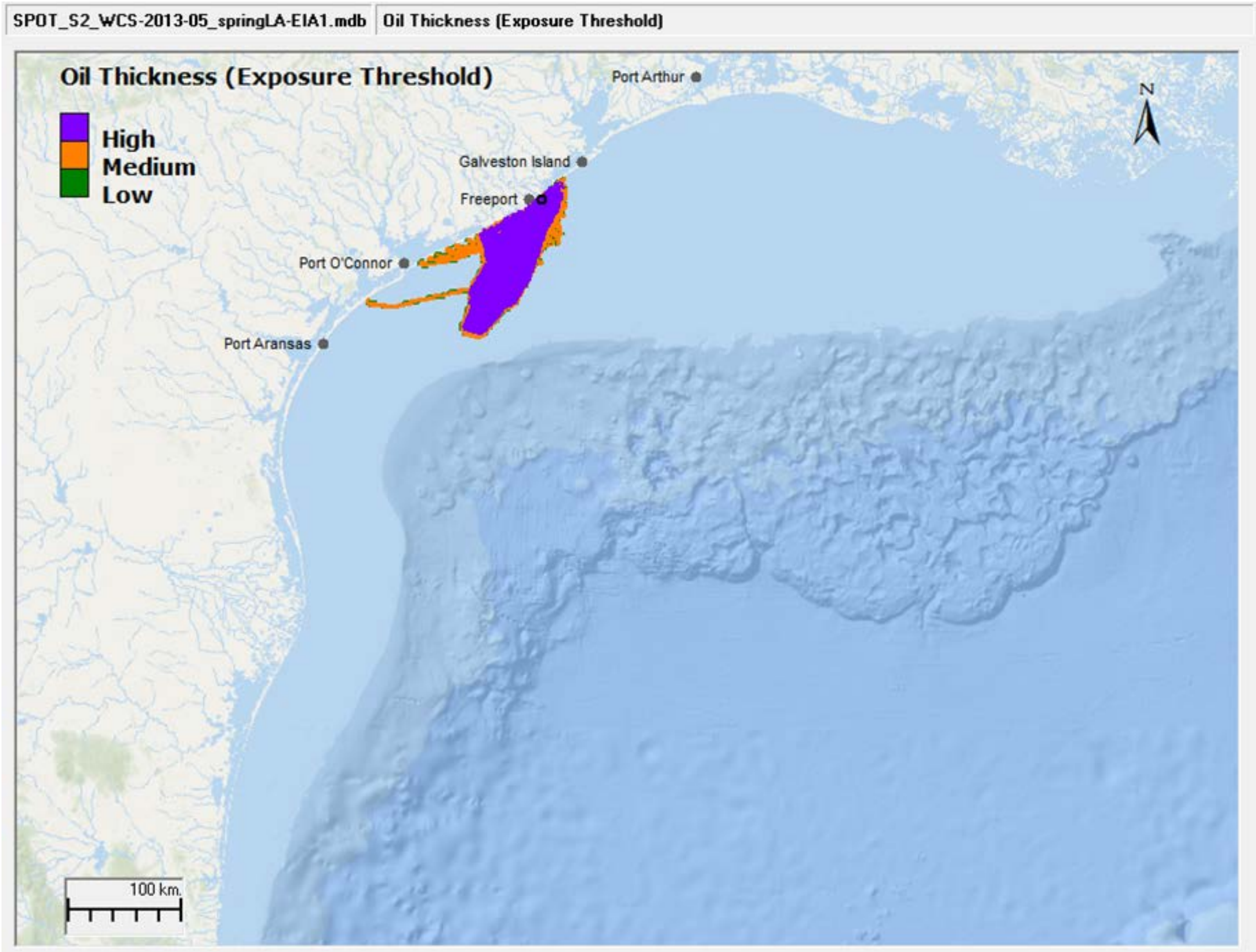


Figure 2: 15.5 day Simulation, Nearshore Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Spring

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

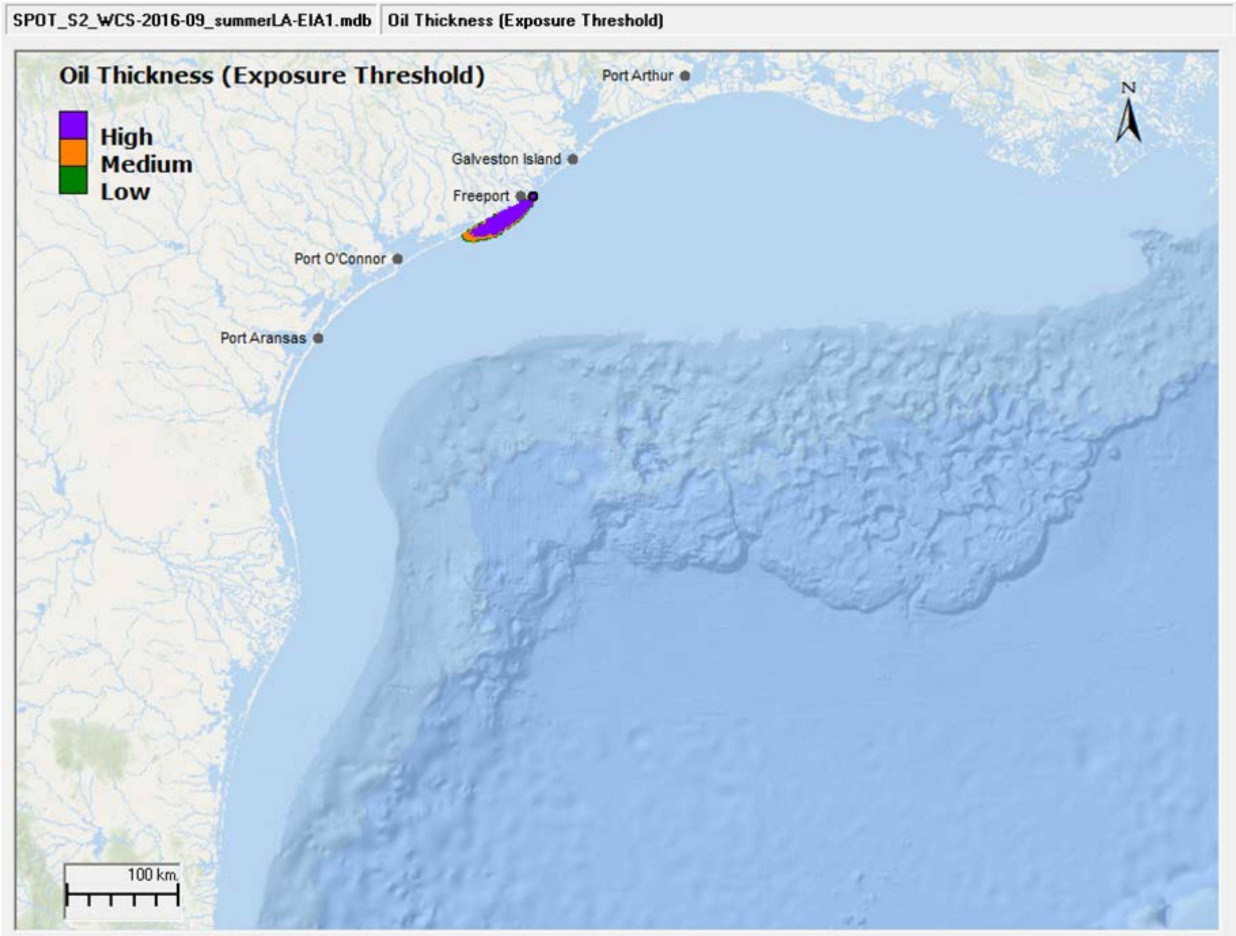


Figure 3: 15.5 day Simulation, Nearshore Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Summer

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

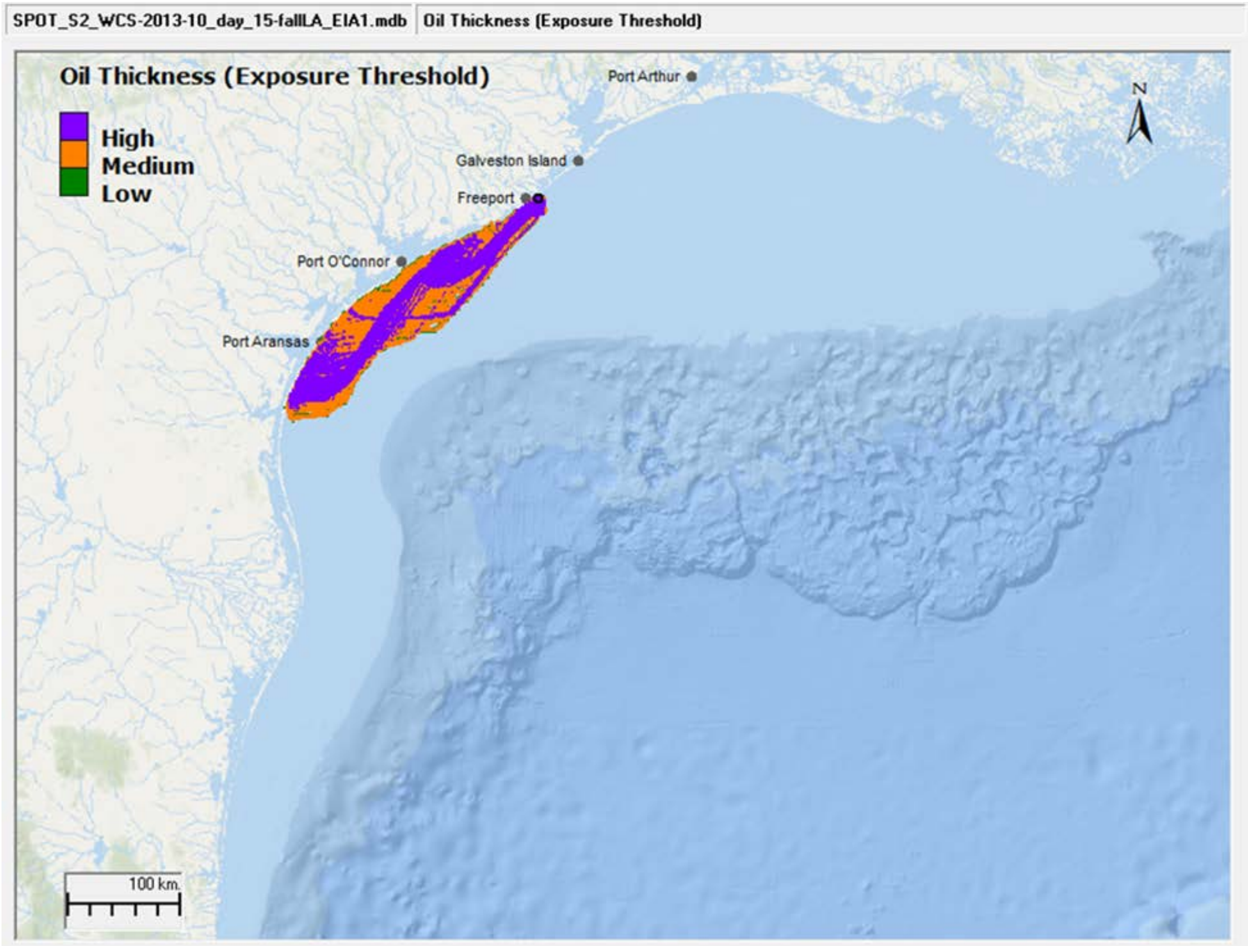


Figure 4: 15.5 day Simulation, Nearshore Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Fall

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

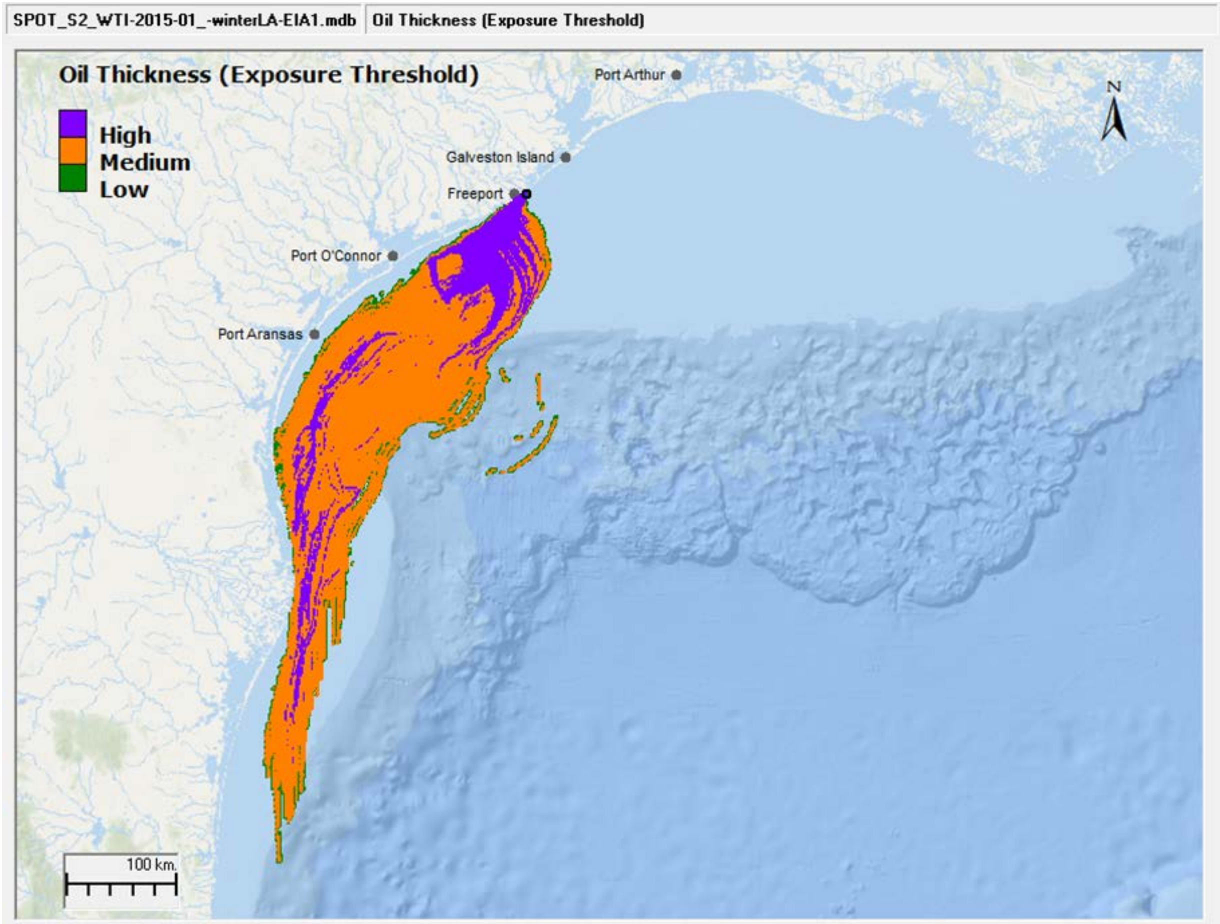


Figure 5: 15.5 day Simulation, Nearshore Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Winter

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

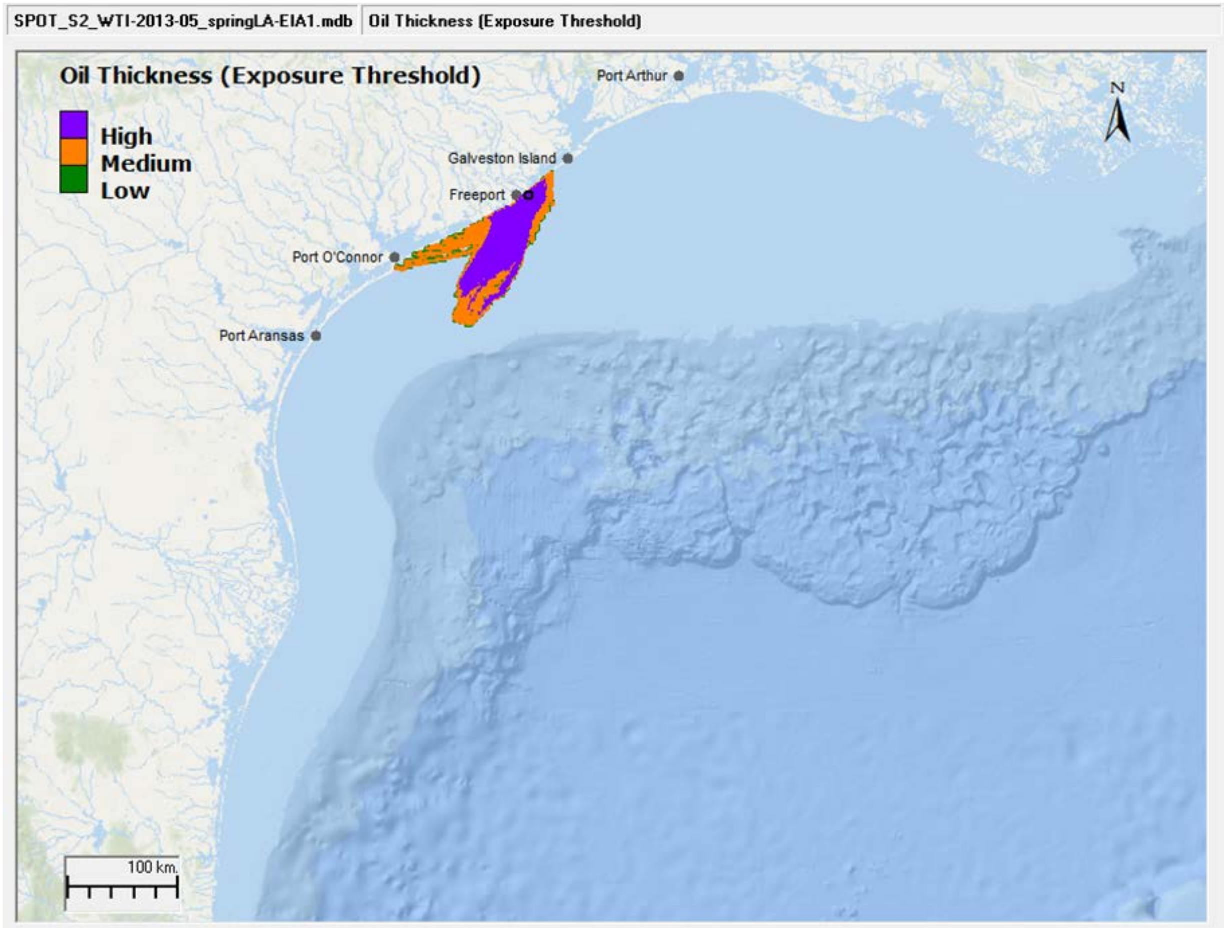


Figure 6: 15.5 day Simulation, Nearshore Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Spring

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

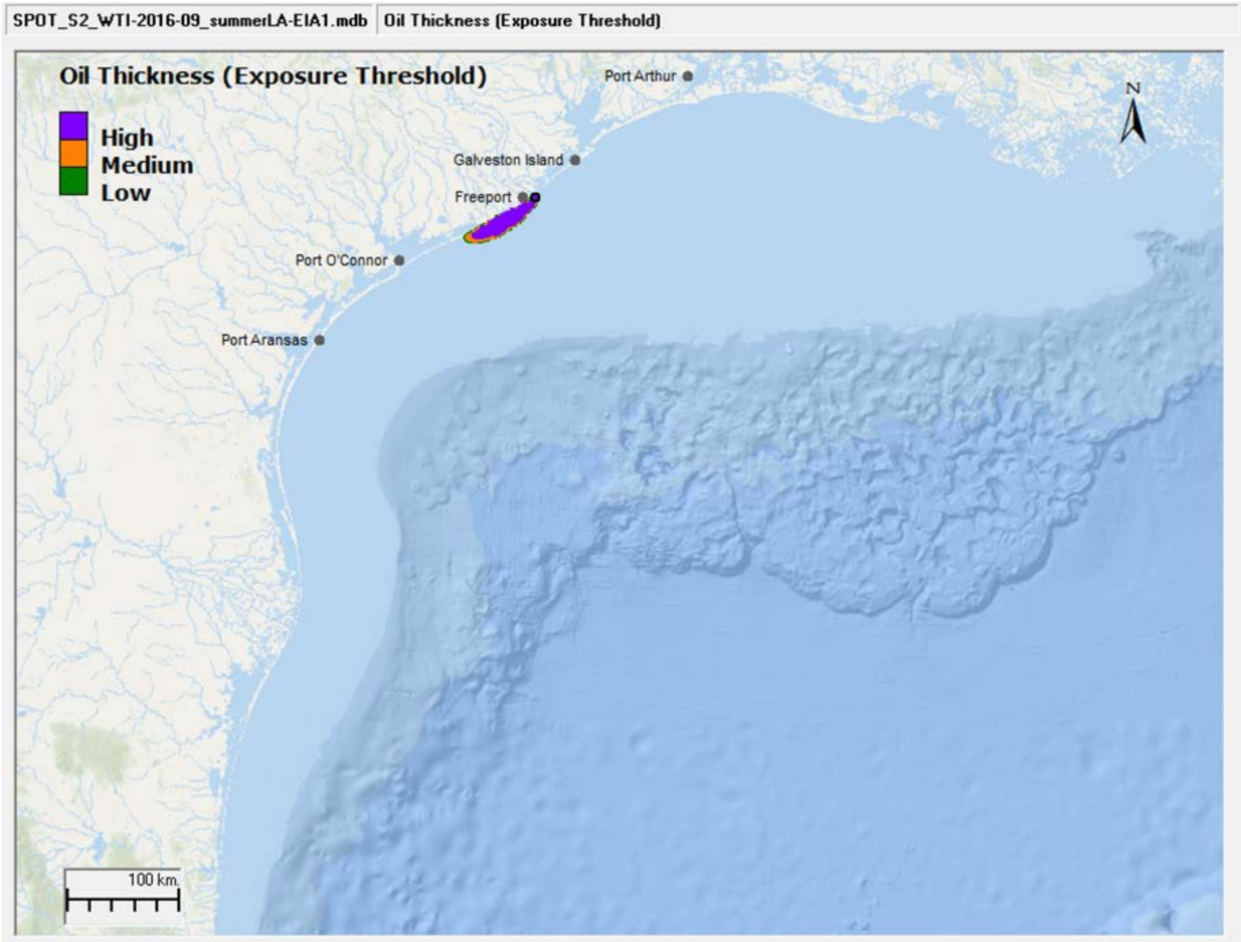


Figure 7: 15.5 day Simulation, Nearshore Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Summer

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

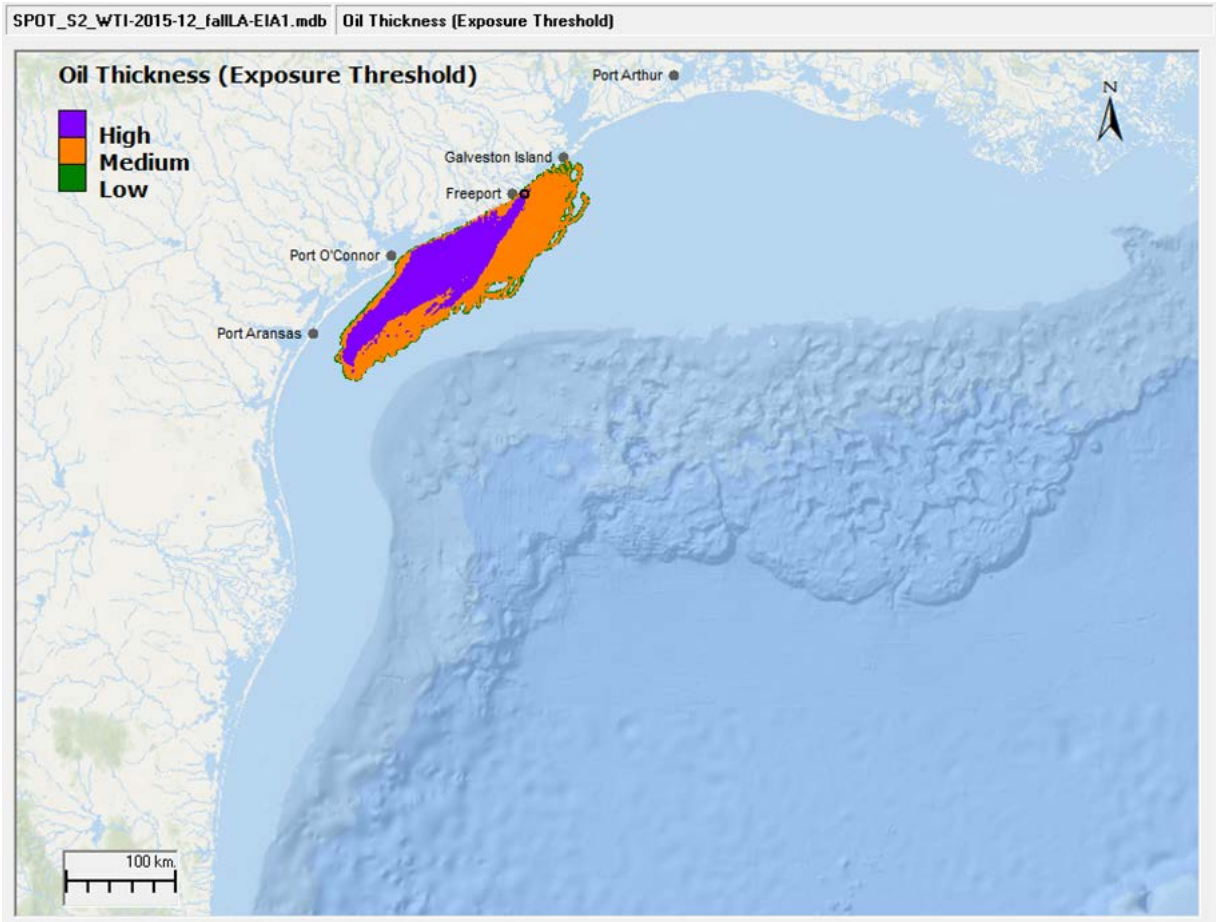


Figure 8: 15.5 day Simulation, Nearshore Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Fall

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

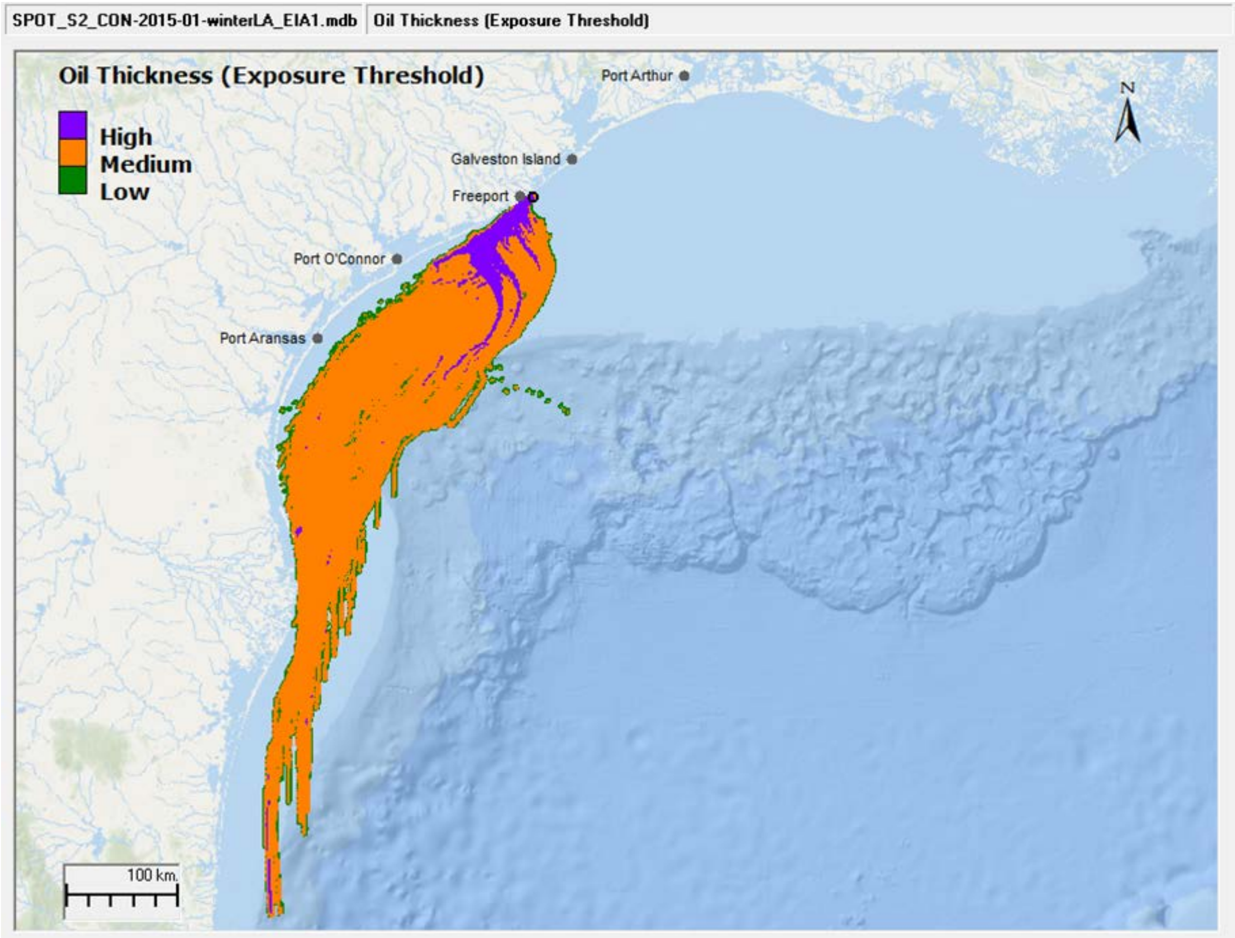


Figure 9: 15.5 day Simulation, Nearshore Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Winter

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

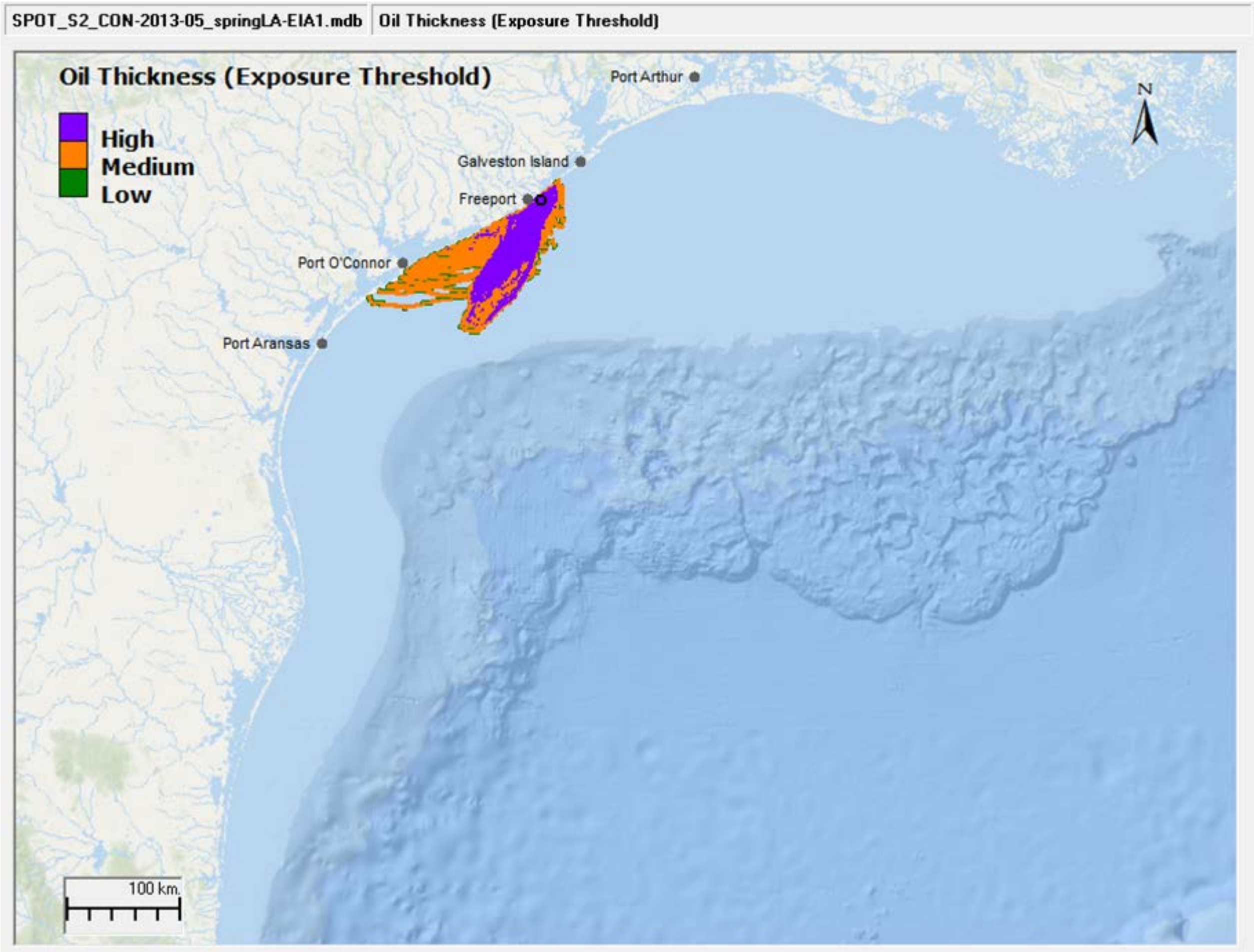


Figure 10: 15.5 day Simulation, Nearshore Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Spring

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

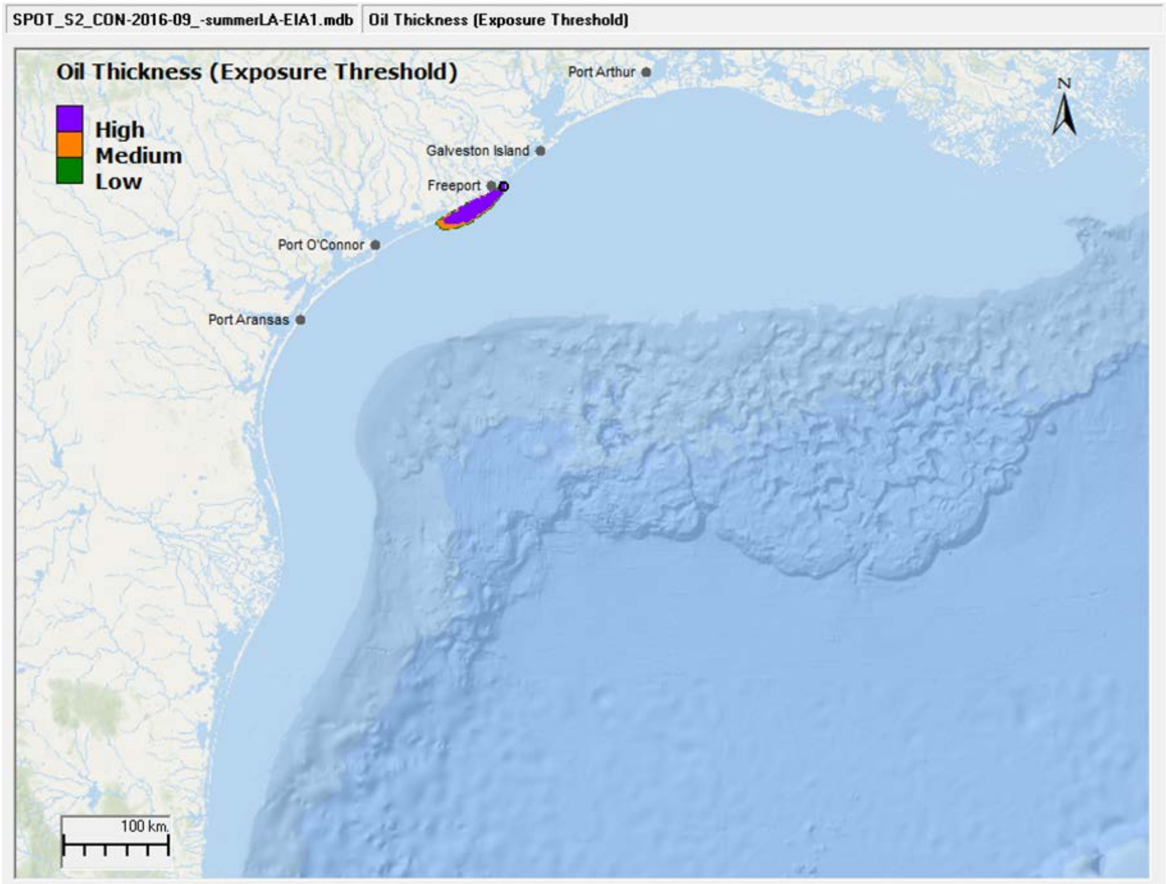


Figure 11: 15.5 day Simulation, Nearshore Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Summer

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

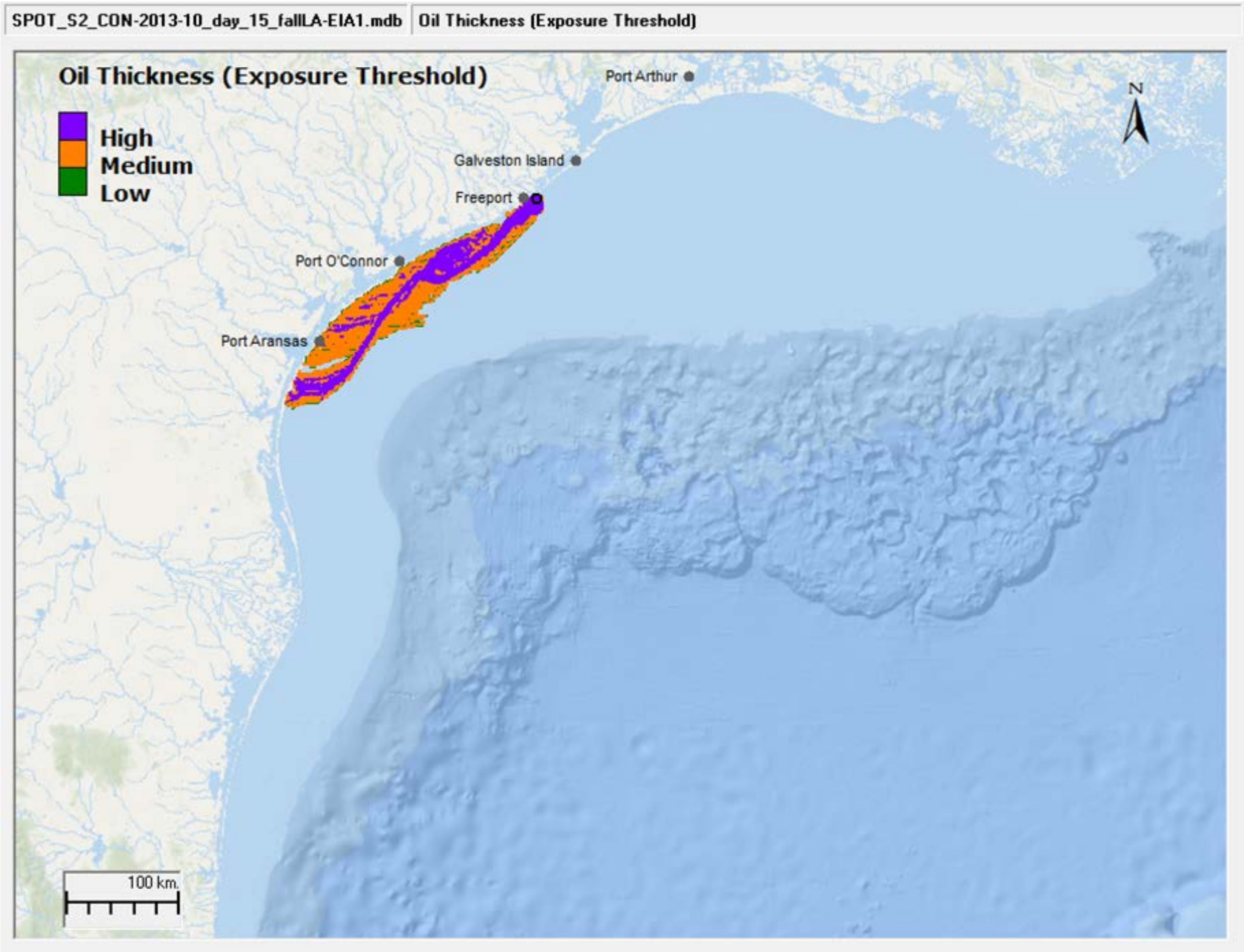


Figure 12: 15.5 day Simulation, Nearshore Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Fall

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

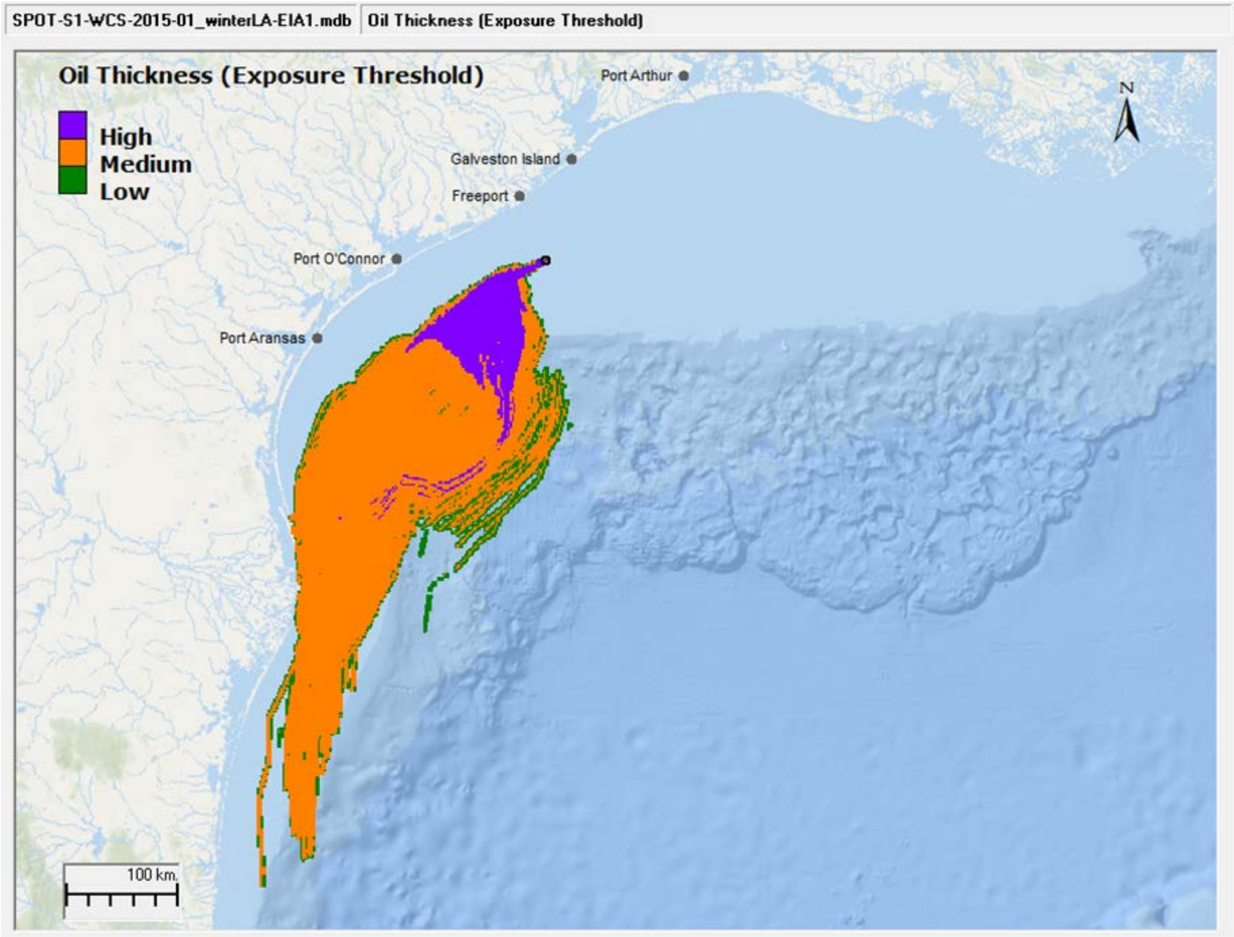


Figure 13: 15.5 day Simulation, Offshore Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Winter

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

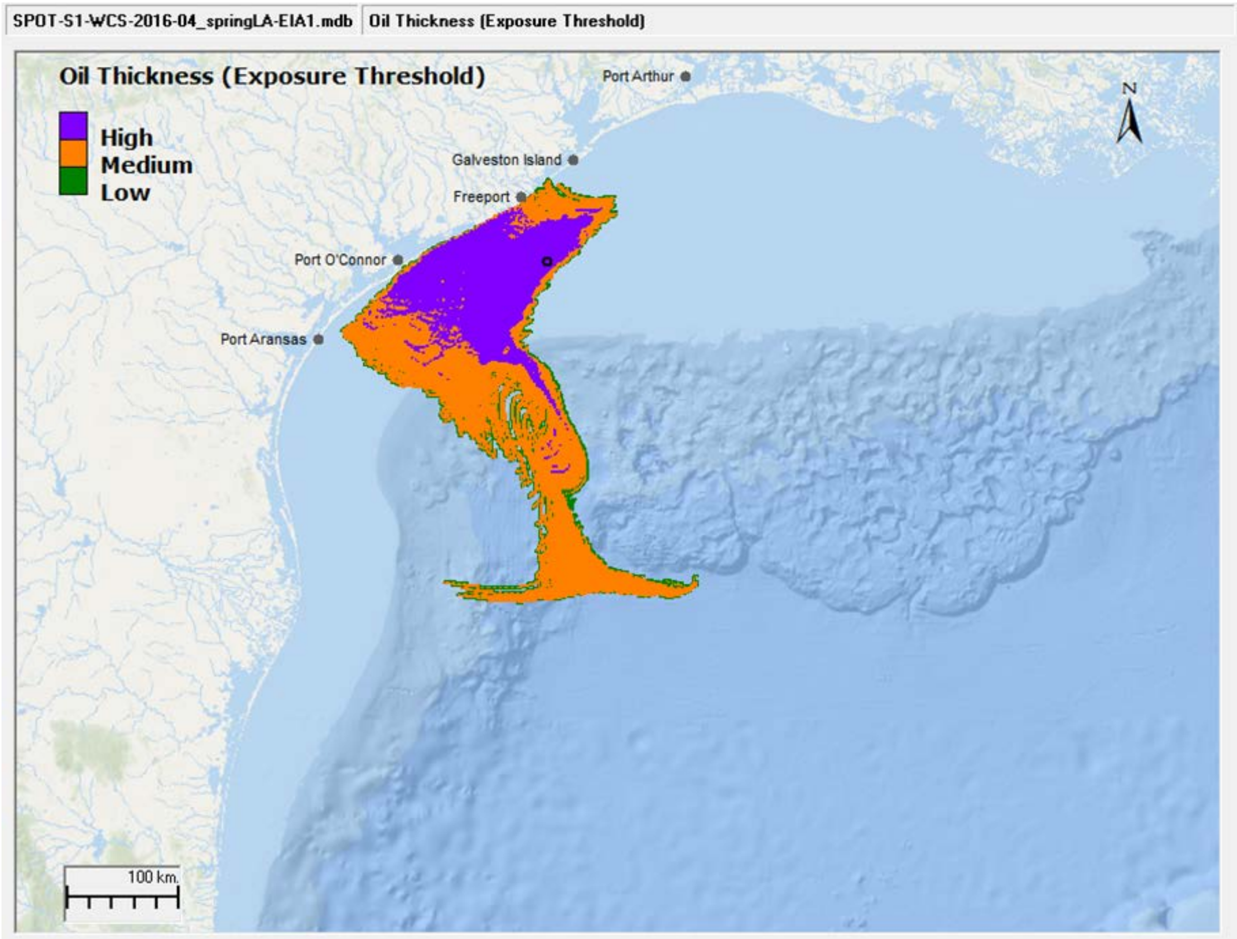


Figure 14: 15.5 day Simulation, Offshore Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Spring

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

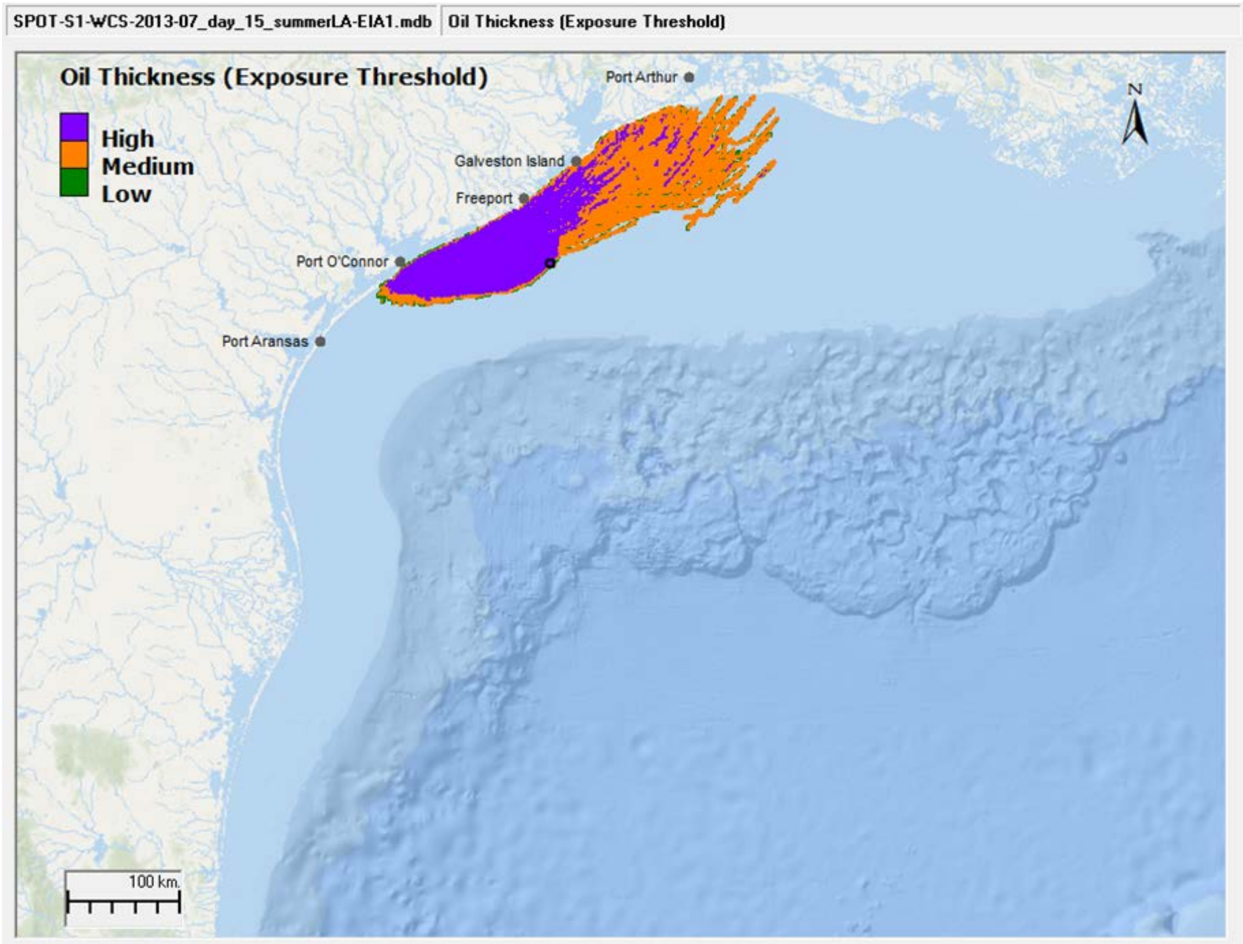


Figure 15: 15.5 day Simulation, Offshore Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Summer

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

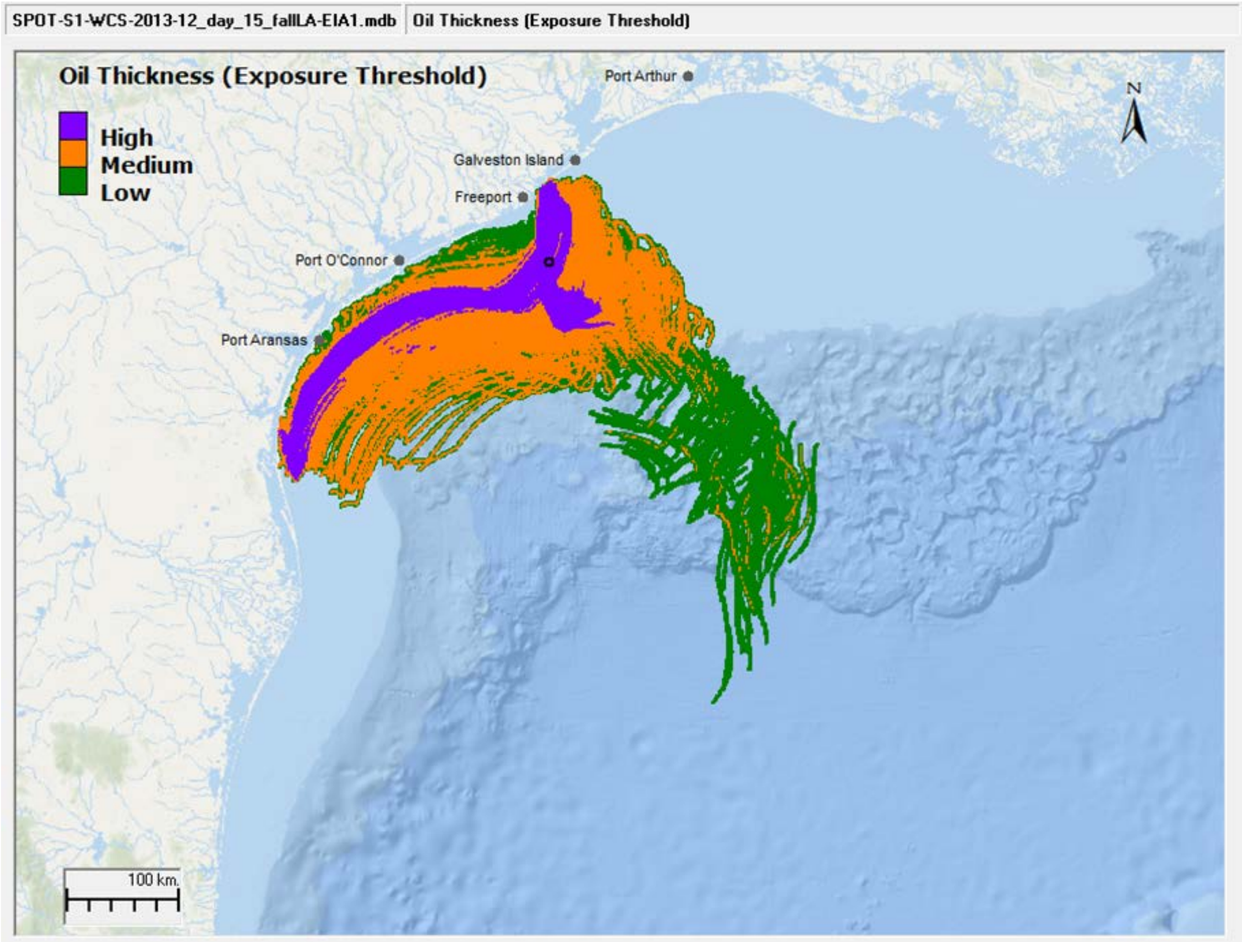


Figure 16: 15.5 day Simulation, Offshore Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Fall

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

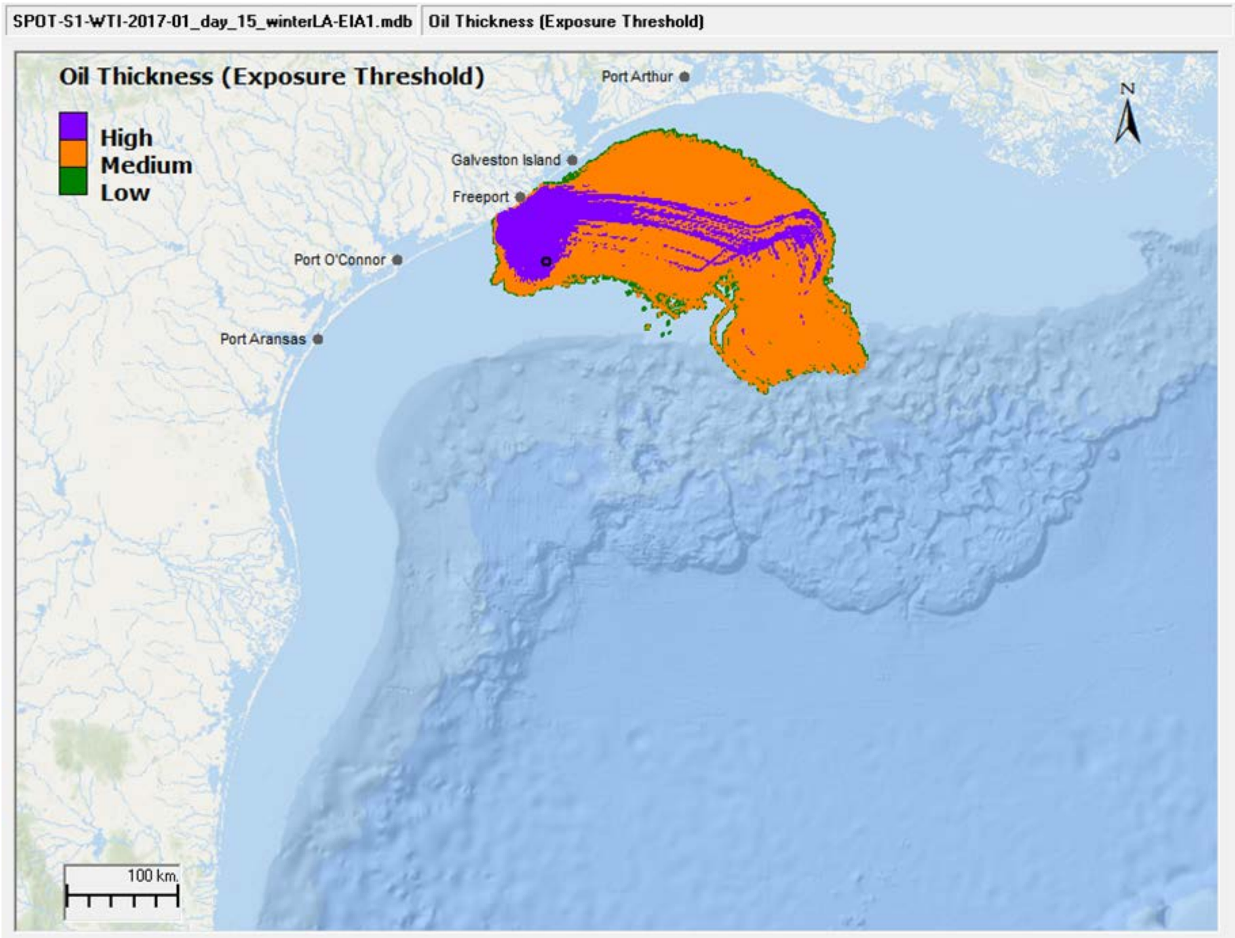


Figure 17: 15.5 day Simulation, Offshore Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Winter

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

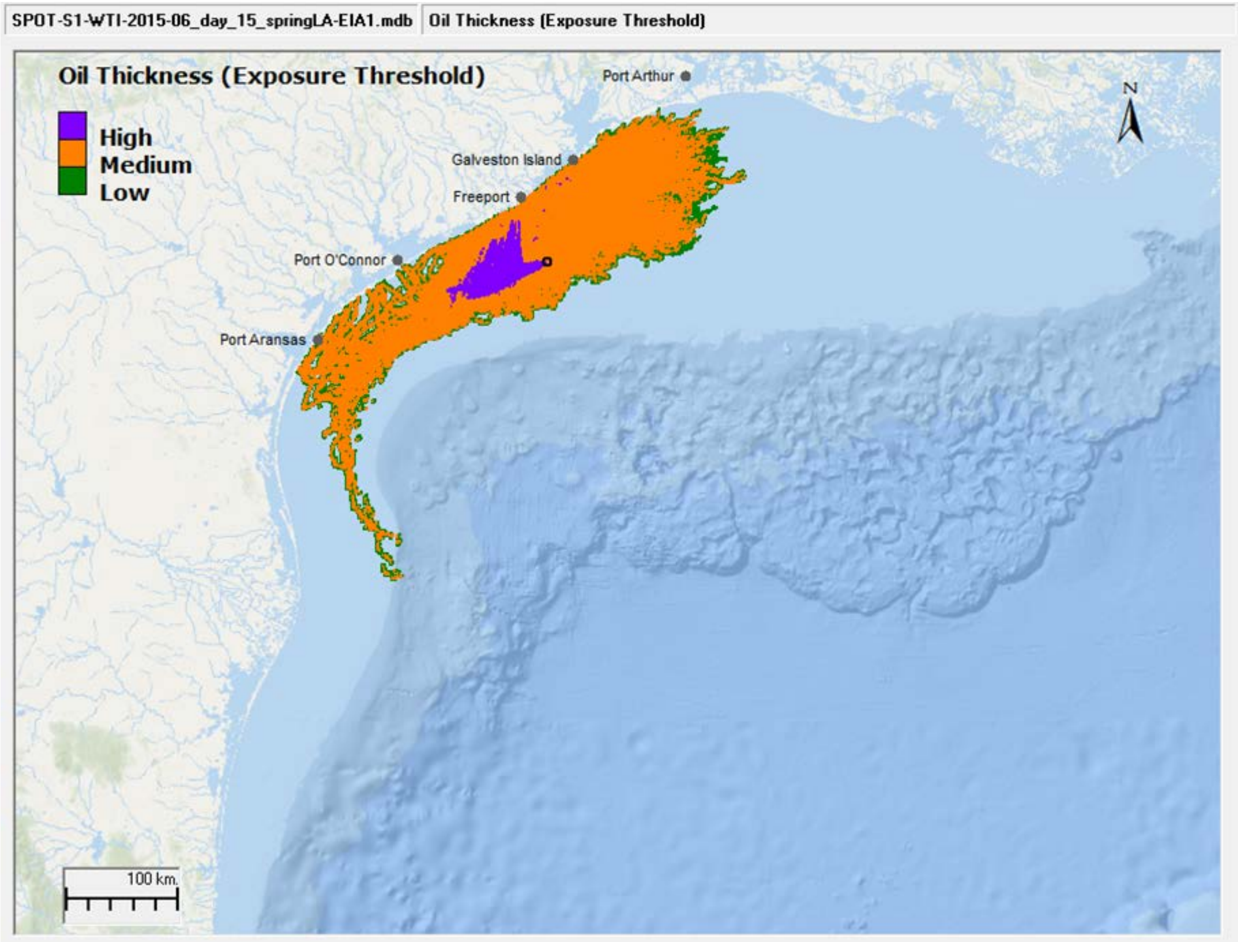


Figure 18: 15.5 day Simulation, Offshore Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Spring

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

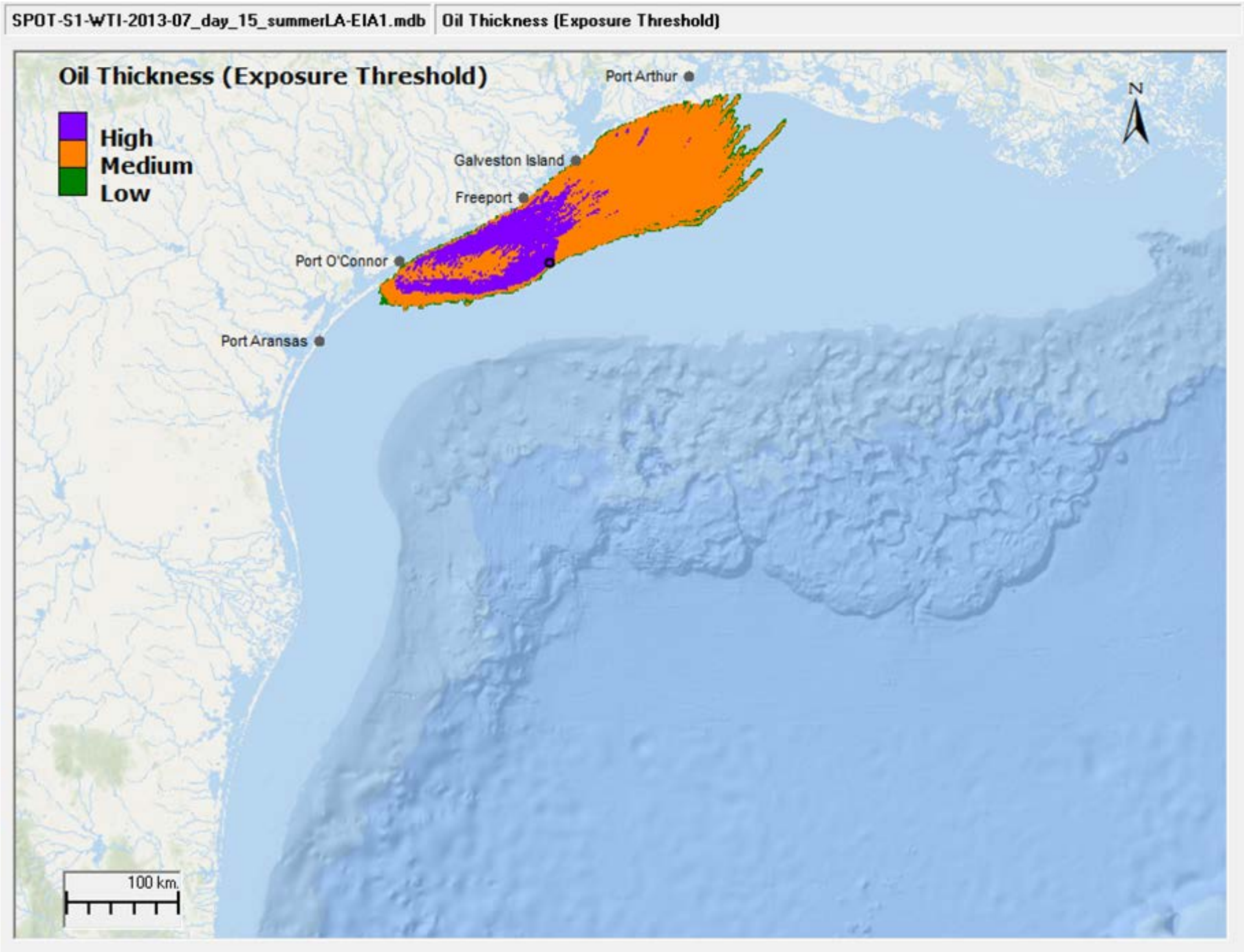


Figure 19: 15.5 day Simulation, Offshore Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Summer

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

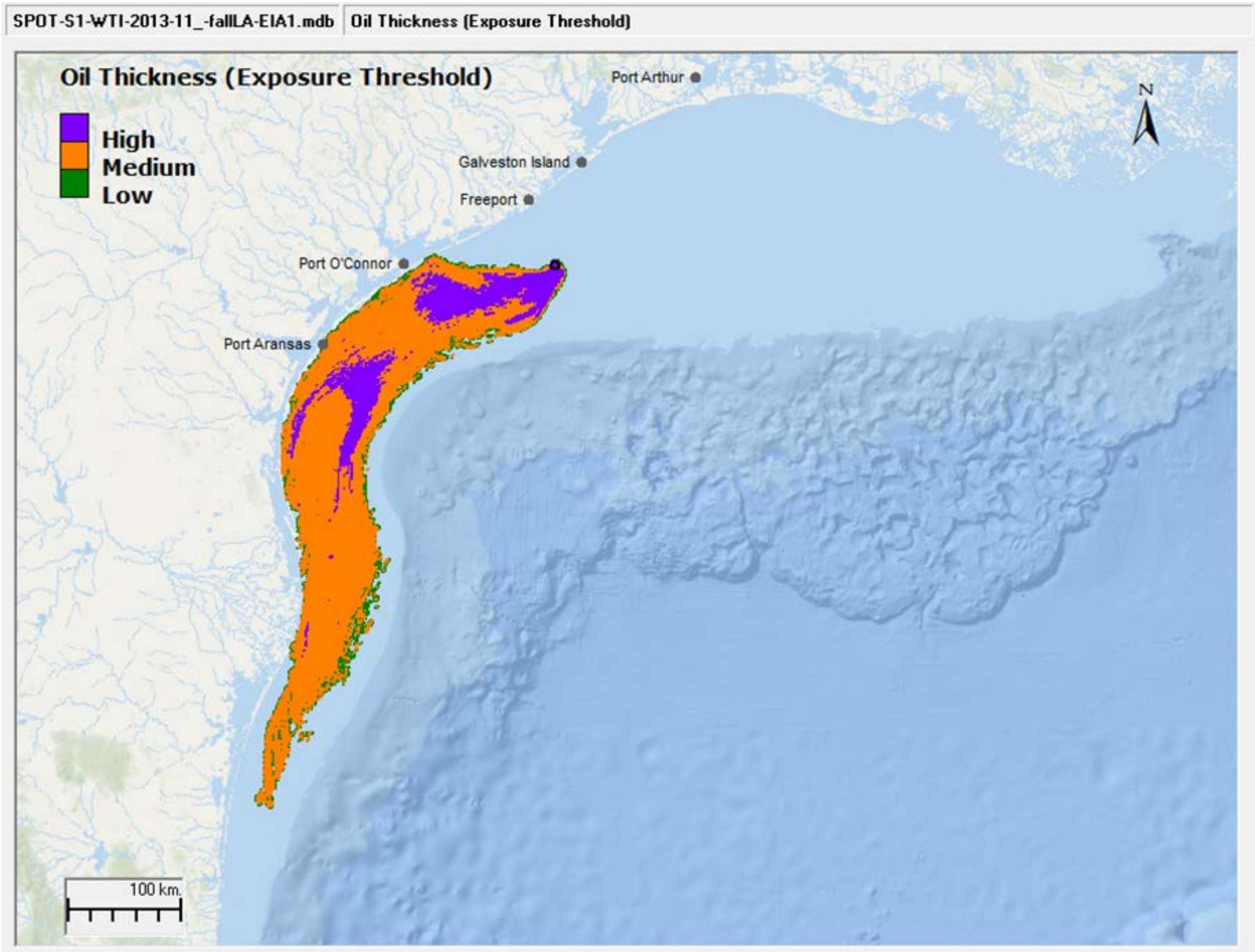


Figure 20: 15.5 day Simulation, Offshore Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Fall

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

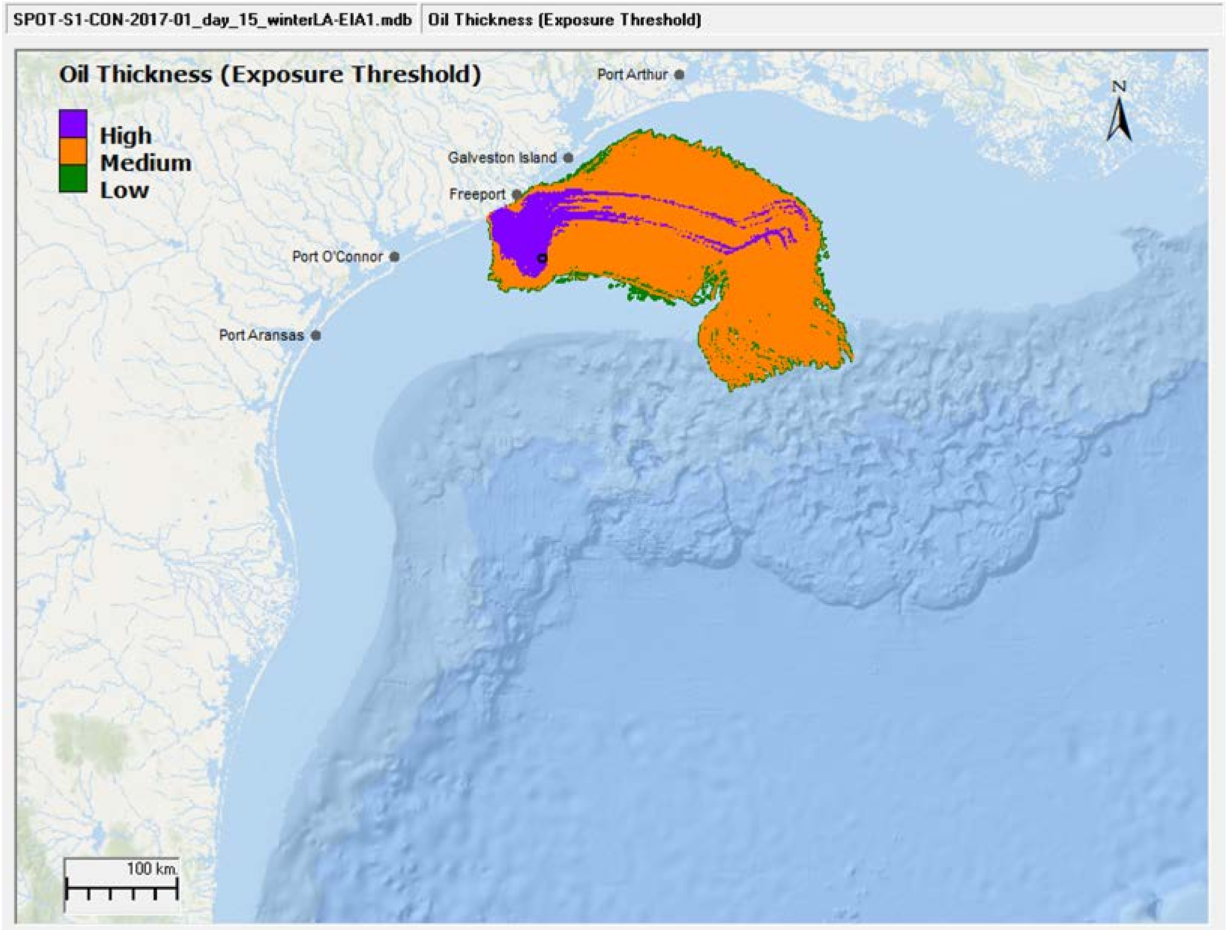


Figure 21: 15.5 day Simulation, Offshore Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Winter

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

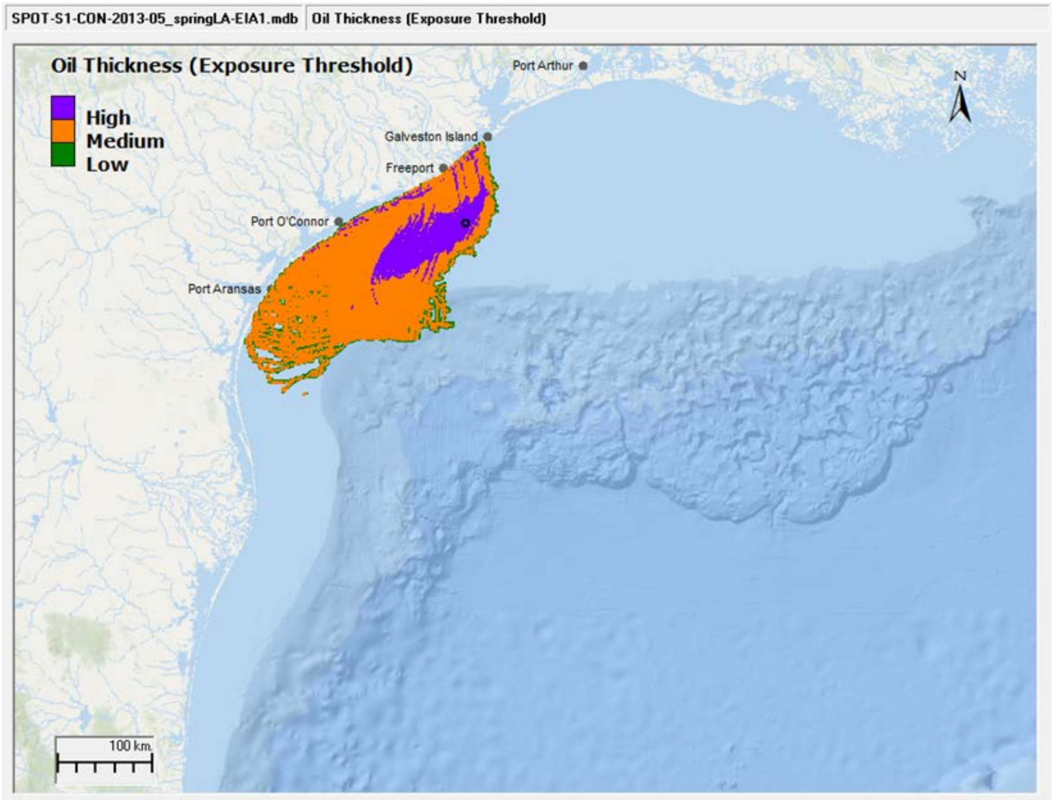


Figure 22: 15.5 day Simulation, Offshore Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Spring

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

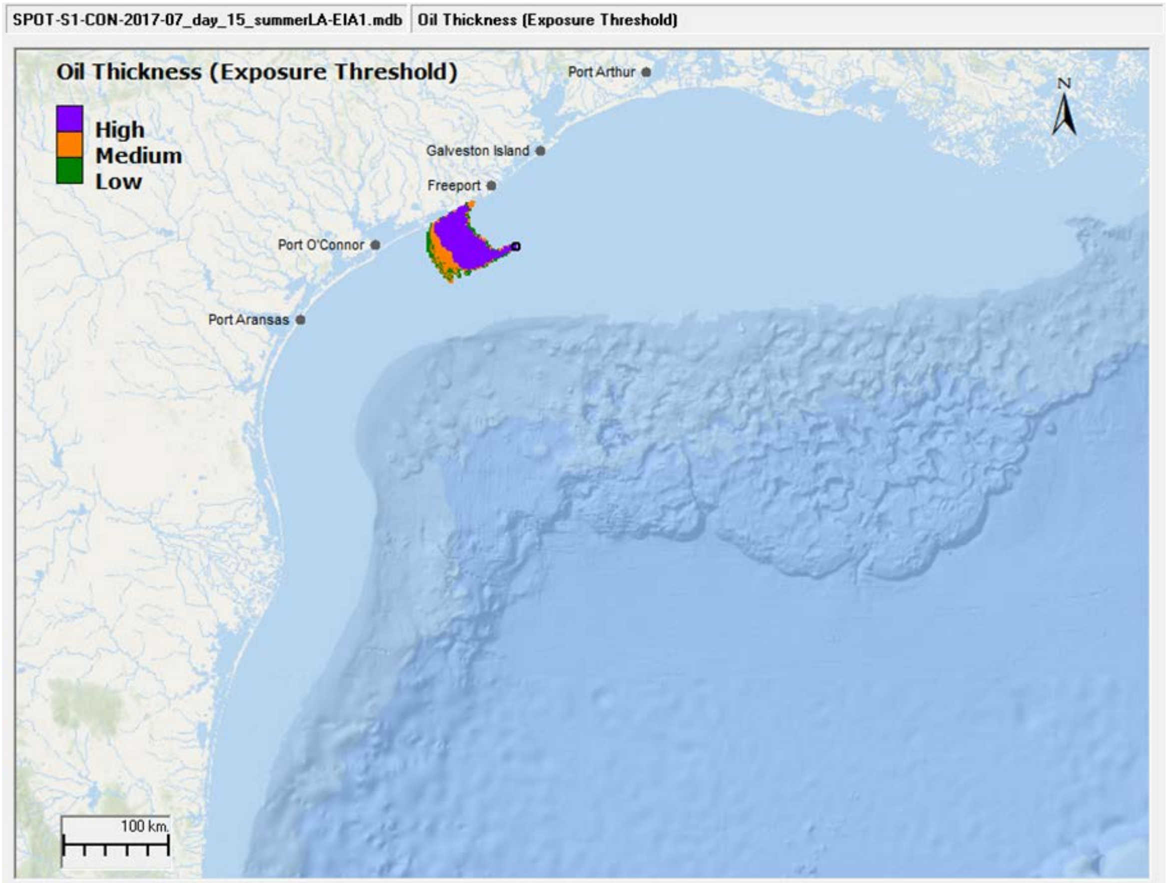


Figure 23: 15.5 day Simulation, Offshore Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Summer

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

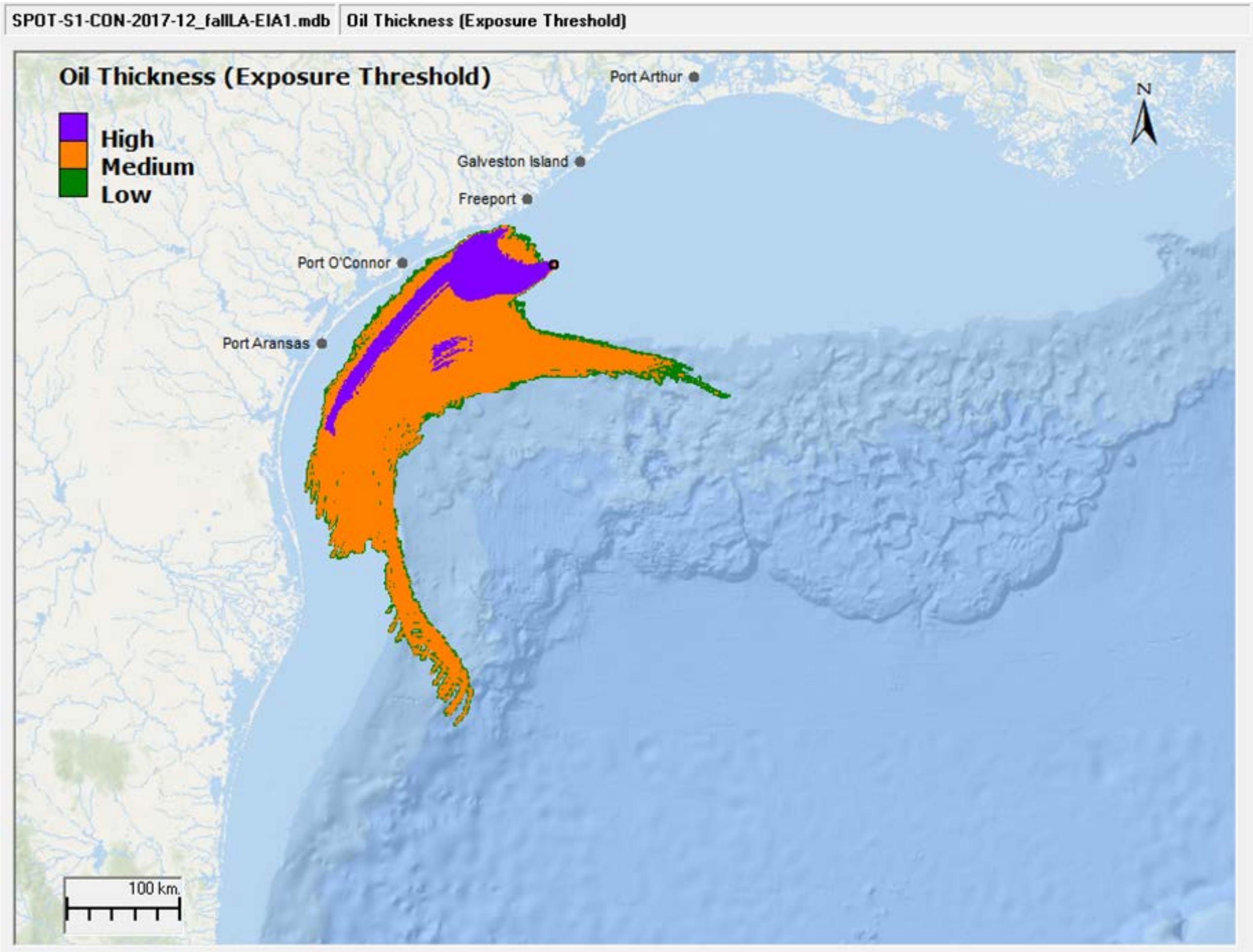


Figure 24: 15.5 day Simulation, Offshore Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Fall

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

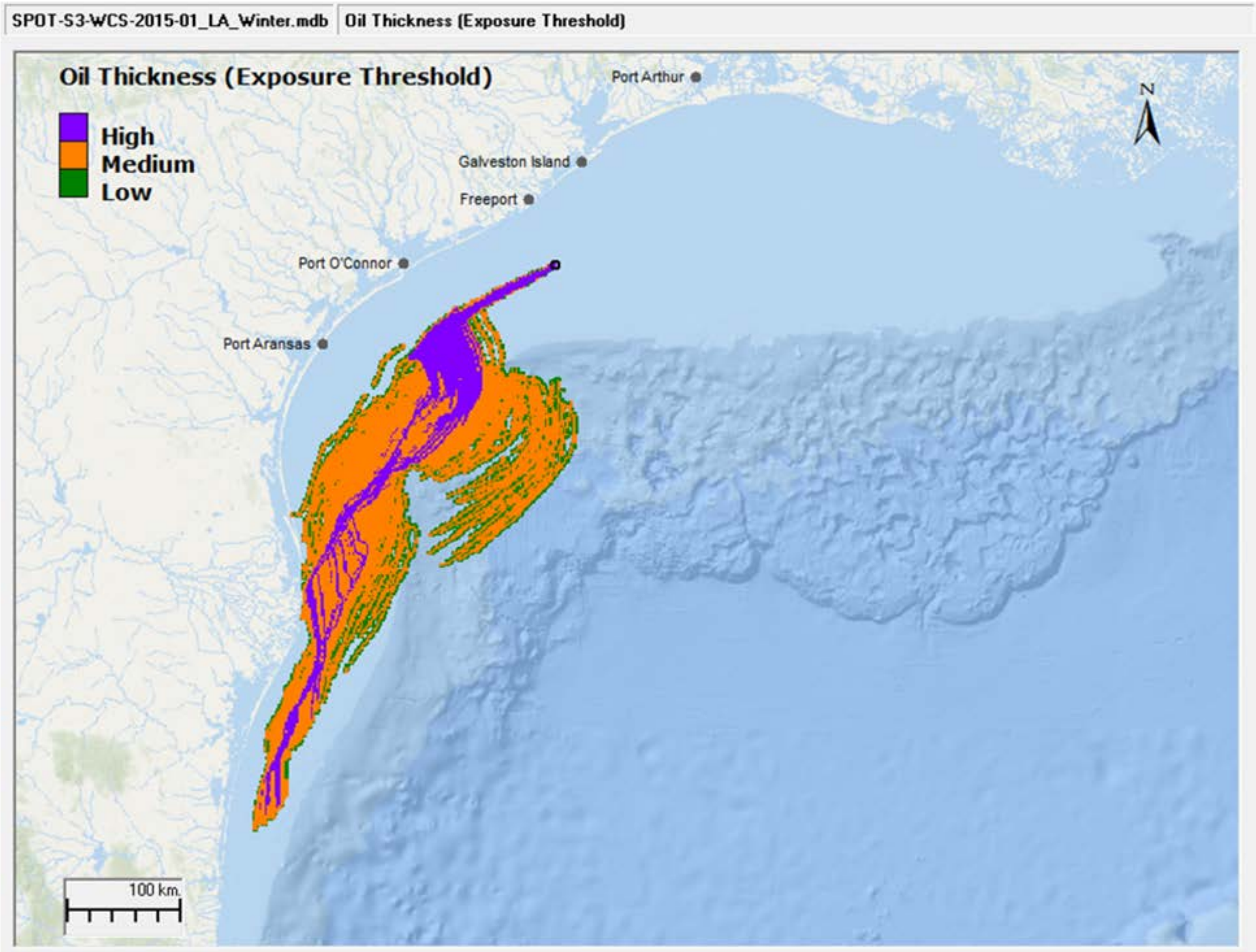


Figure 25: 14 day Simulation, Vessel Collision Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Winter

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

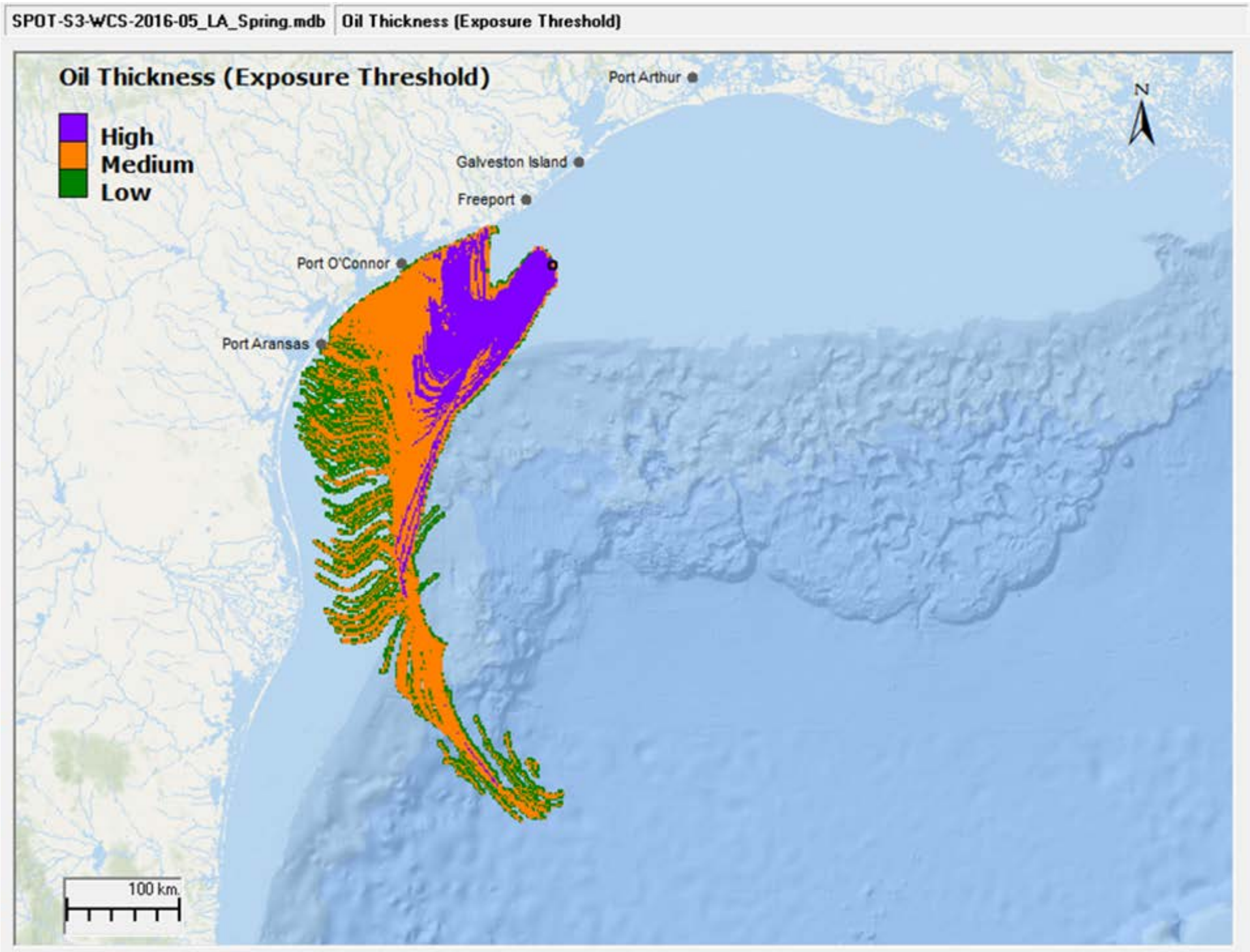


Figure 26: 14 day Simulation, Vessel Collision Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Spring

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

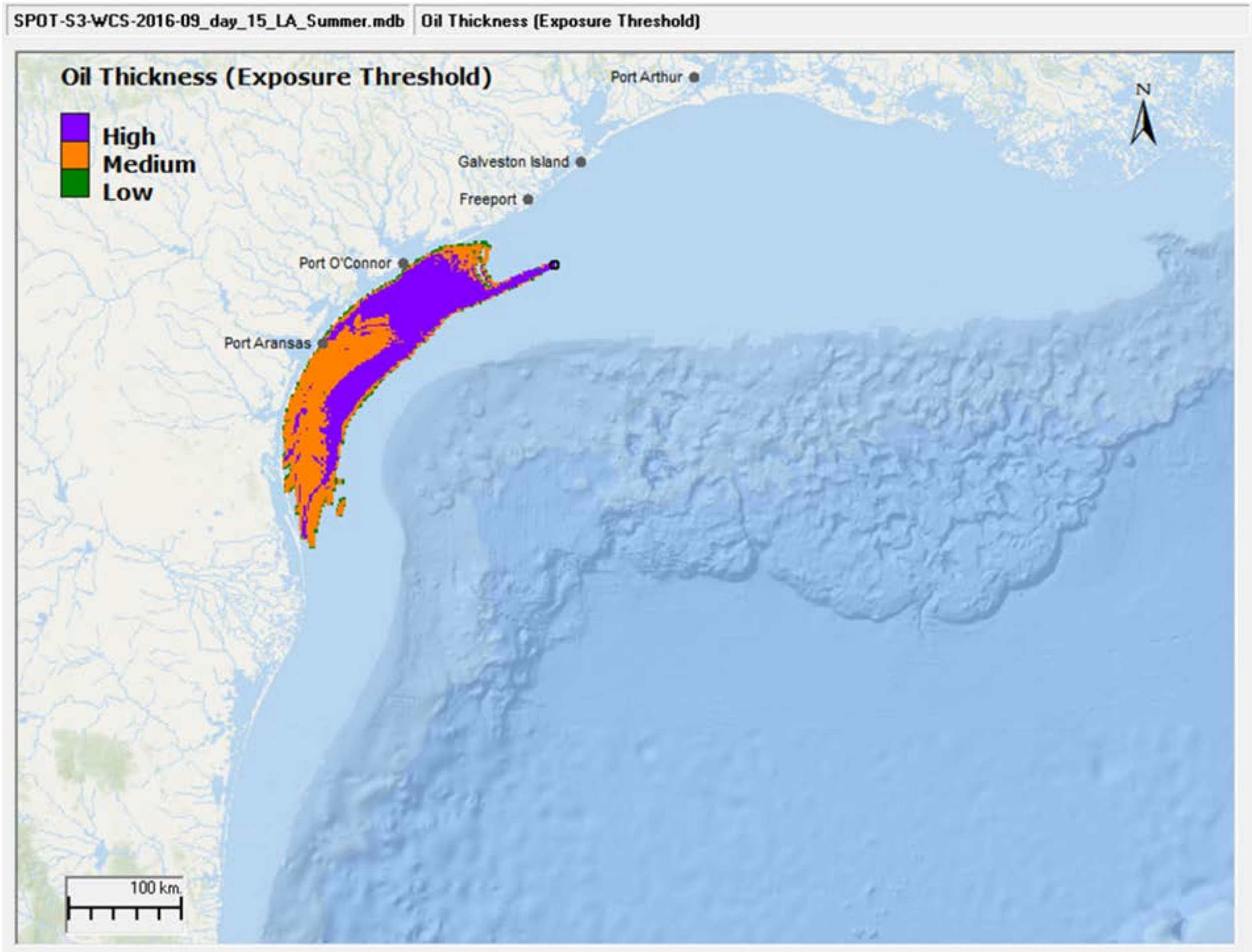


Figure 27: 14 day Simulation, Vessel Collision Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Summer

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

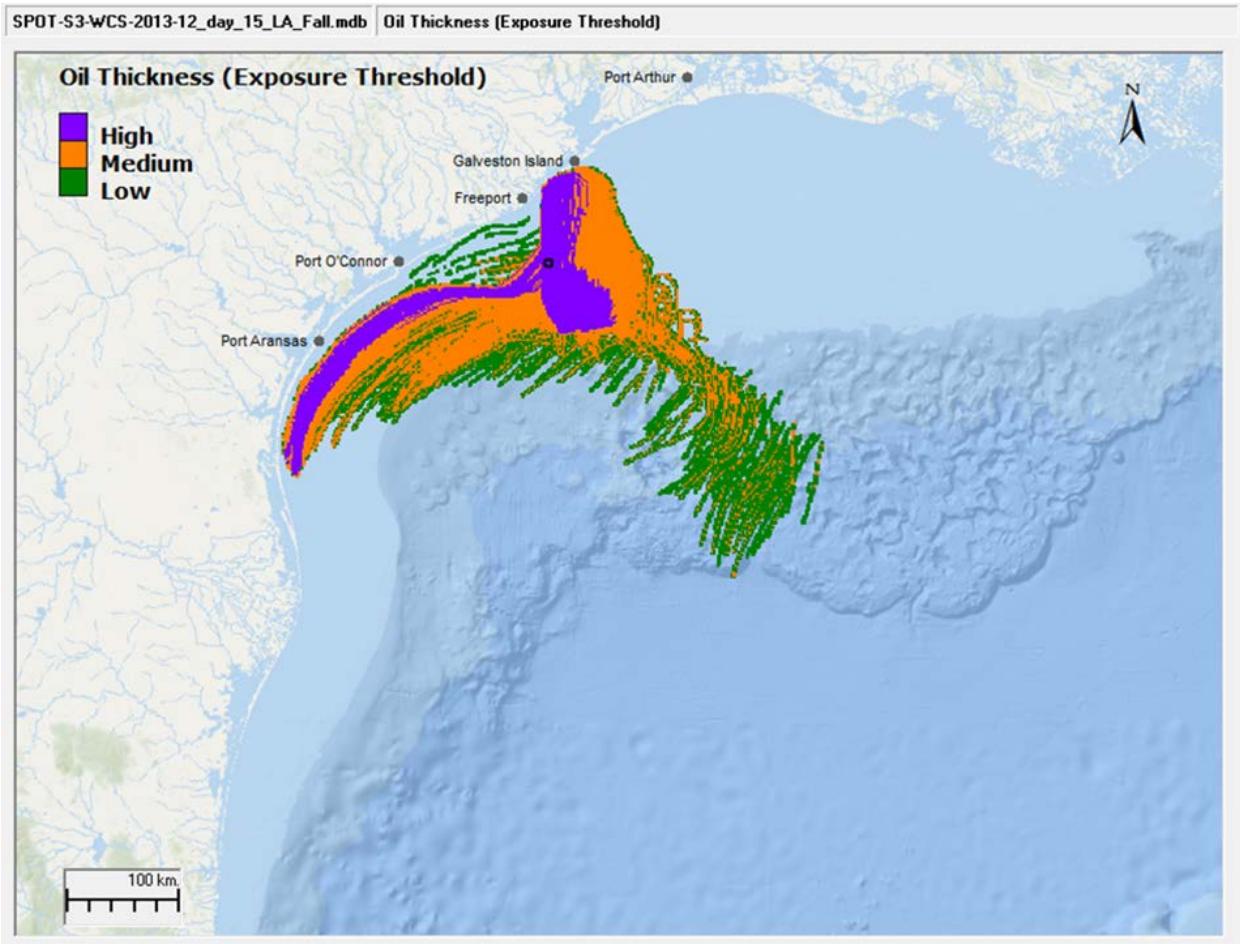


Figure 28: 14 day Simulation, Vessel Collision Release of Western Canadian Select (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Fall

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

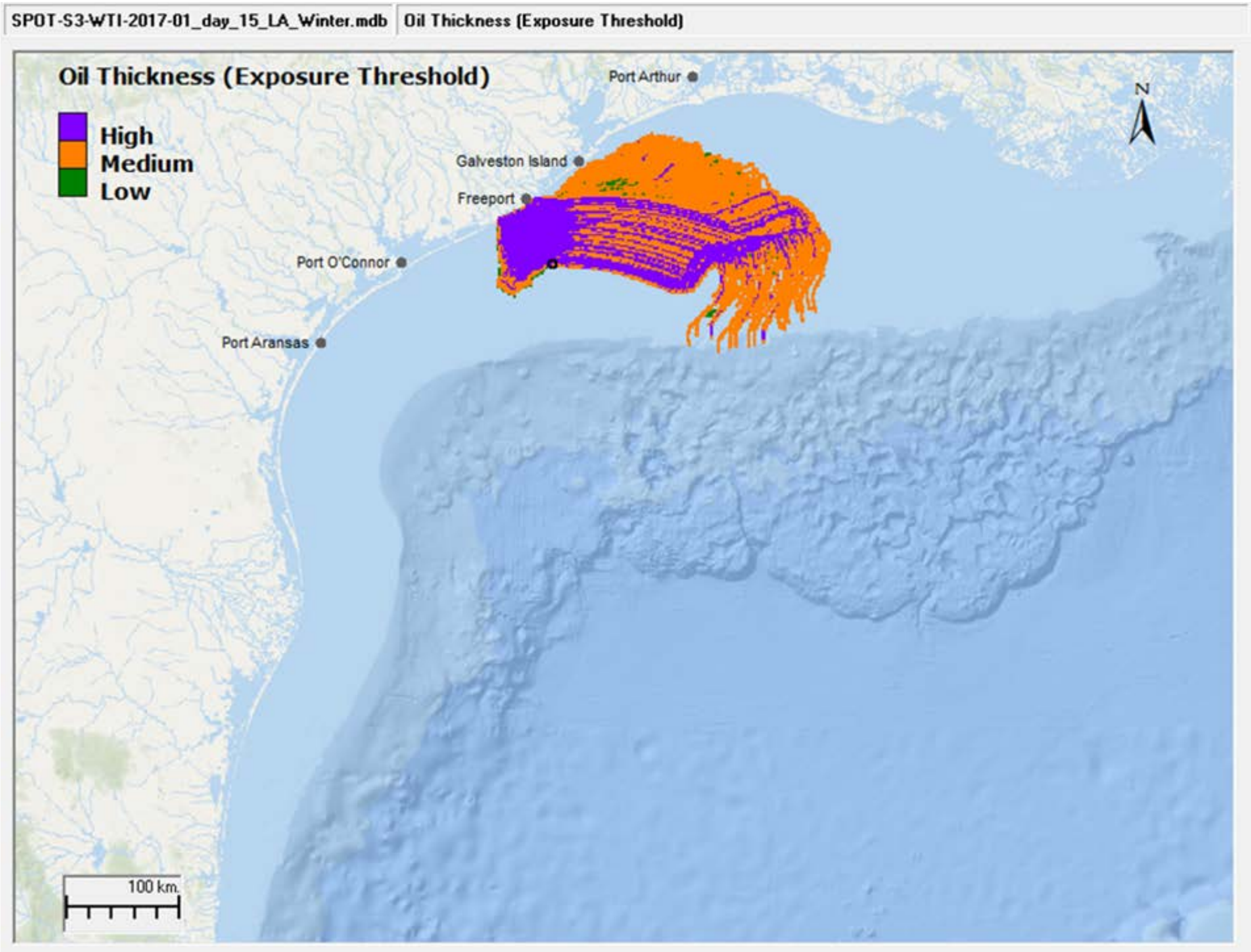


Figure 29: 14 day Simulation, Vessel Collision Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Winter

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

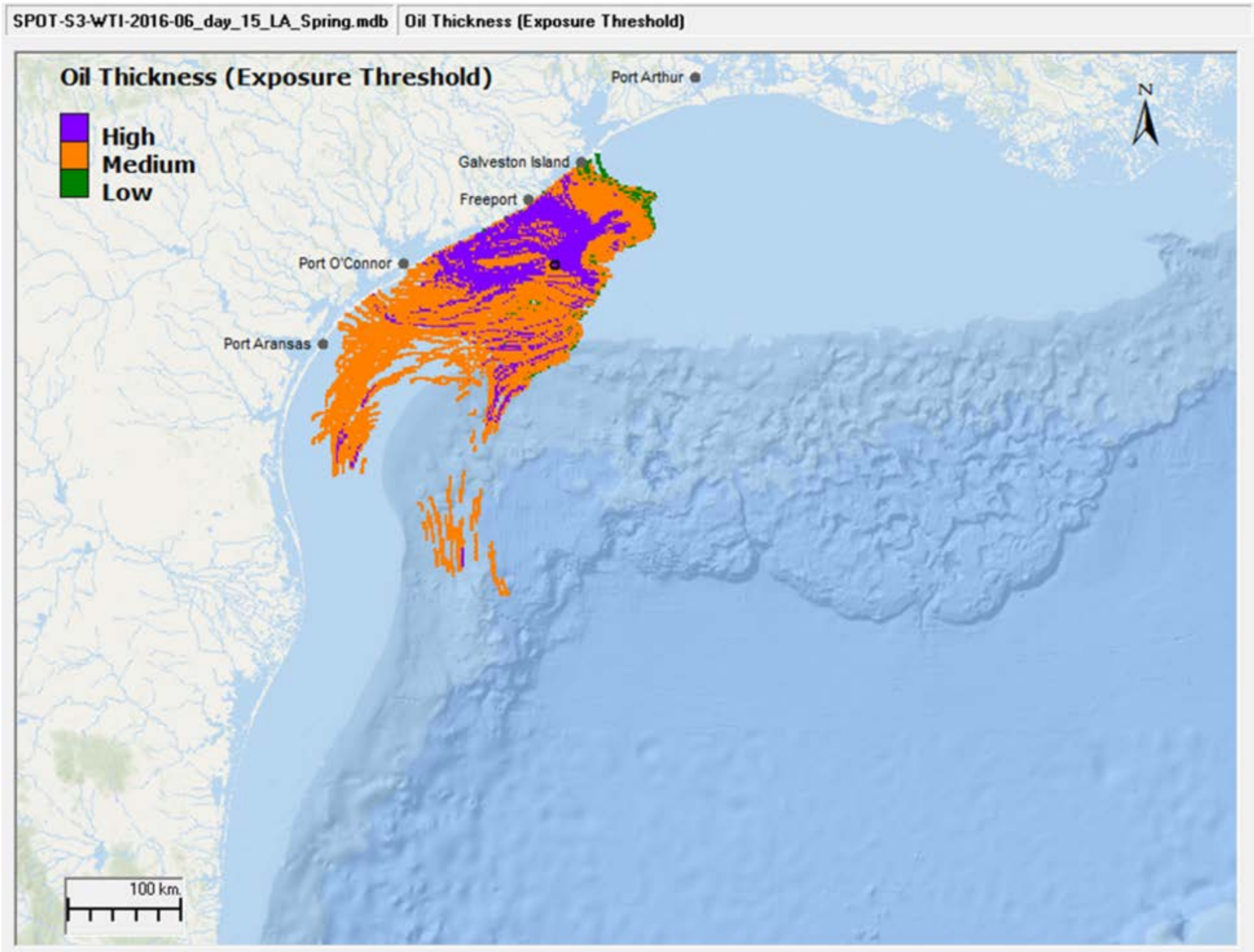


Figure 30: 14 day Simulation, Vessel Collision Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Spring

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

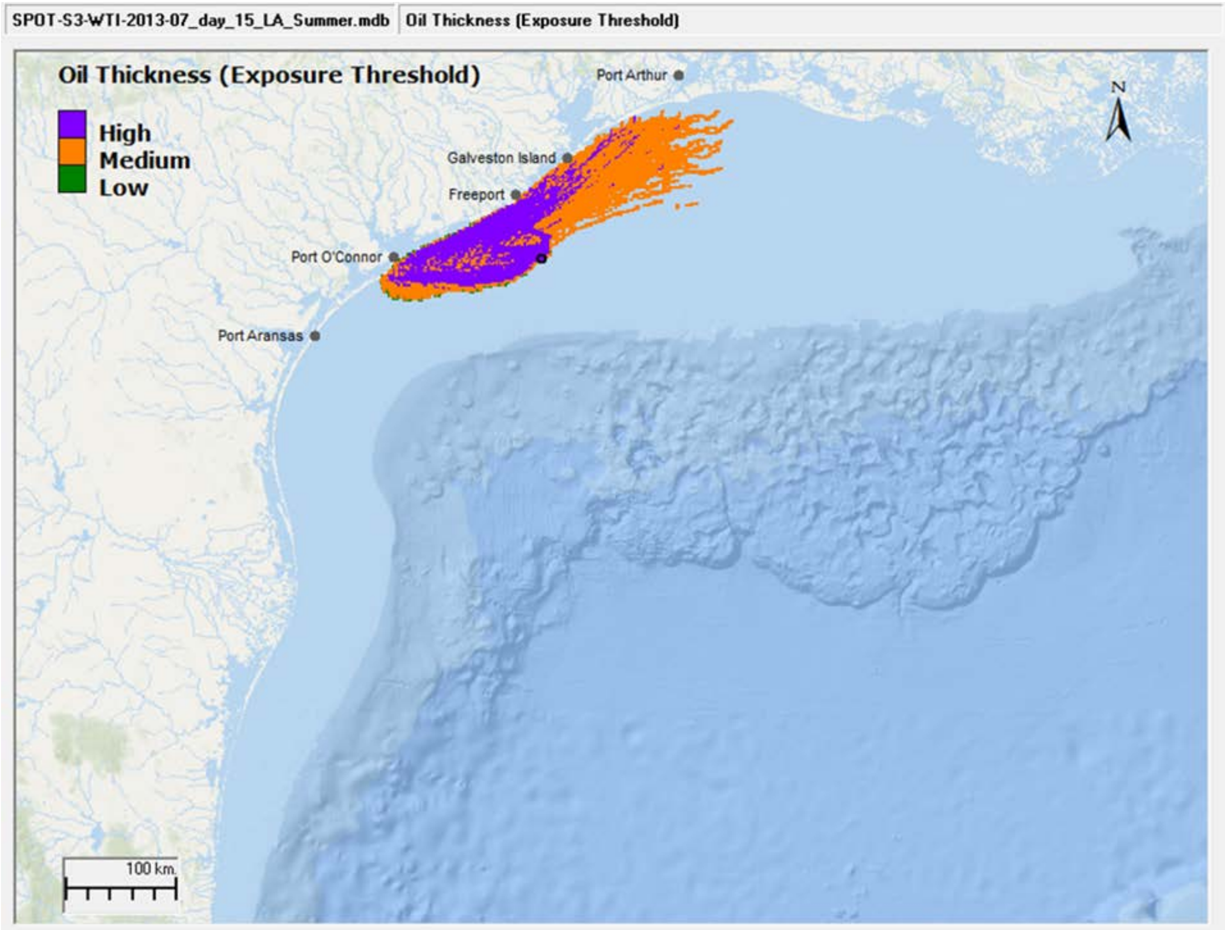


Figure 31: 14 day Simulation, Vessel Collision Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Summer

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

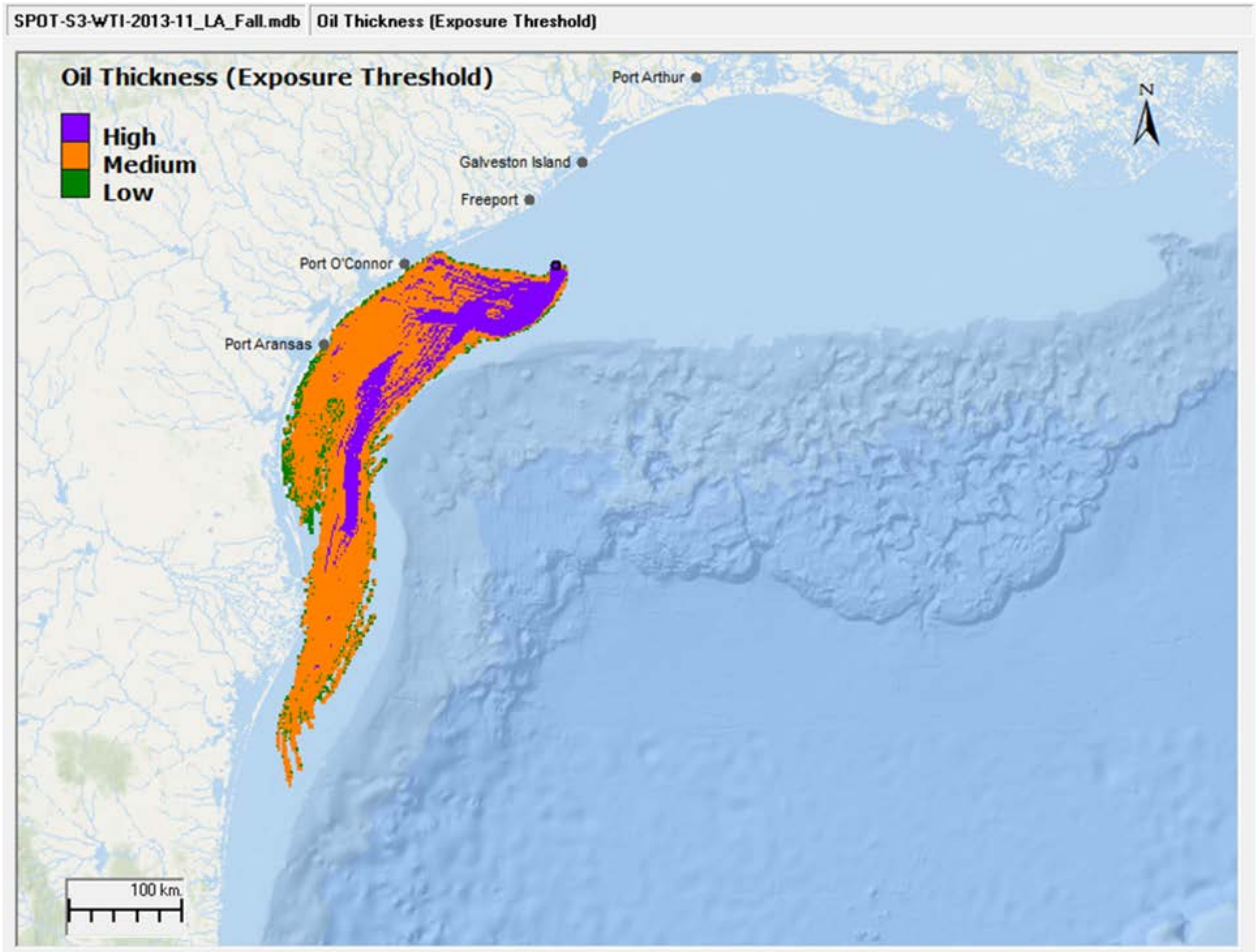


Figure 32: 14 day Simulation, Vessel Collision Release of West Texas Intermediate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Fall

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

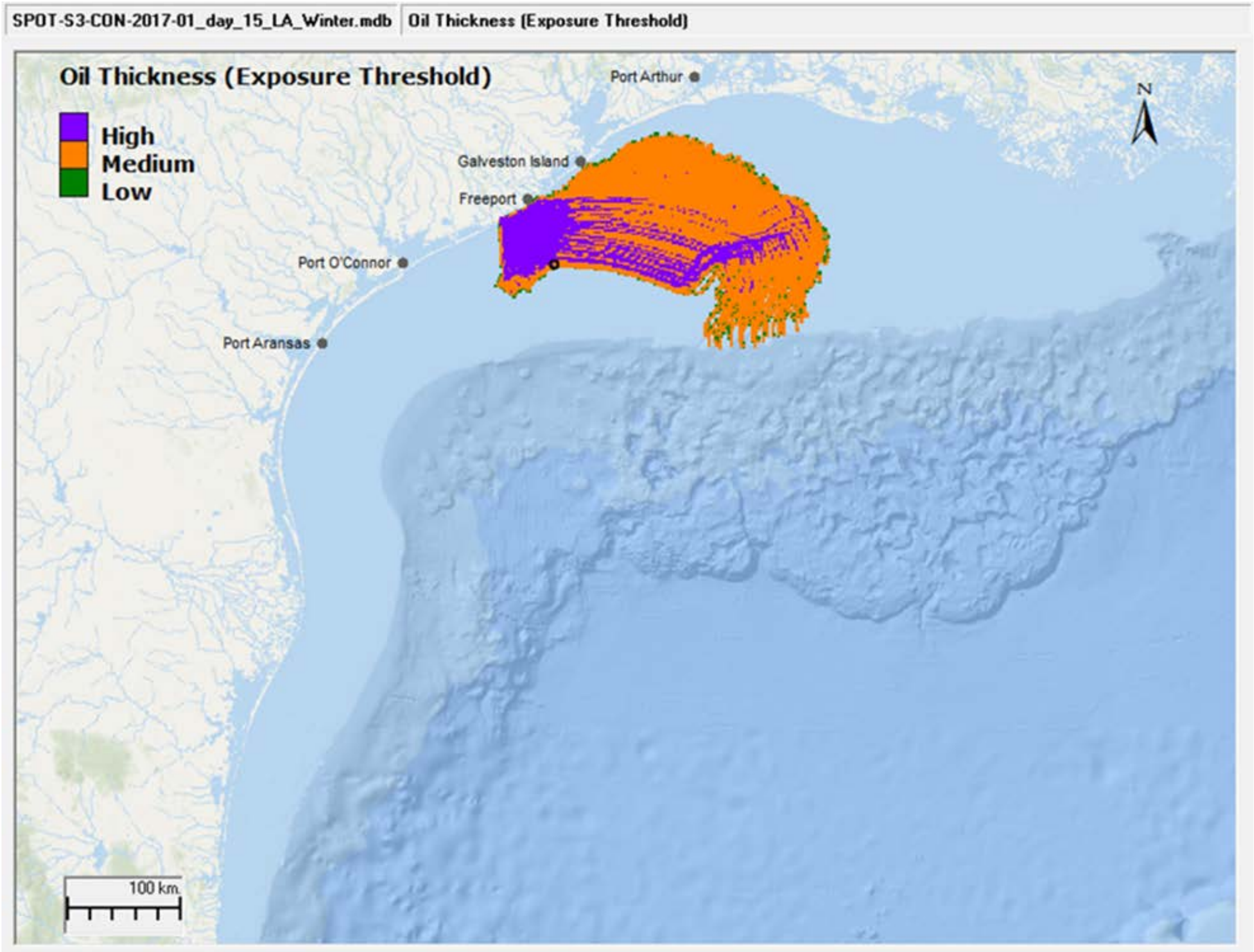


Figure 33: 14 day Simulation, Vessel Collision Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Winter

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

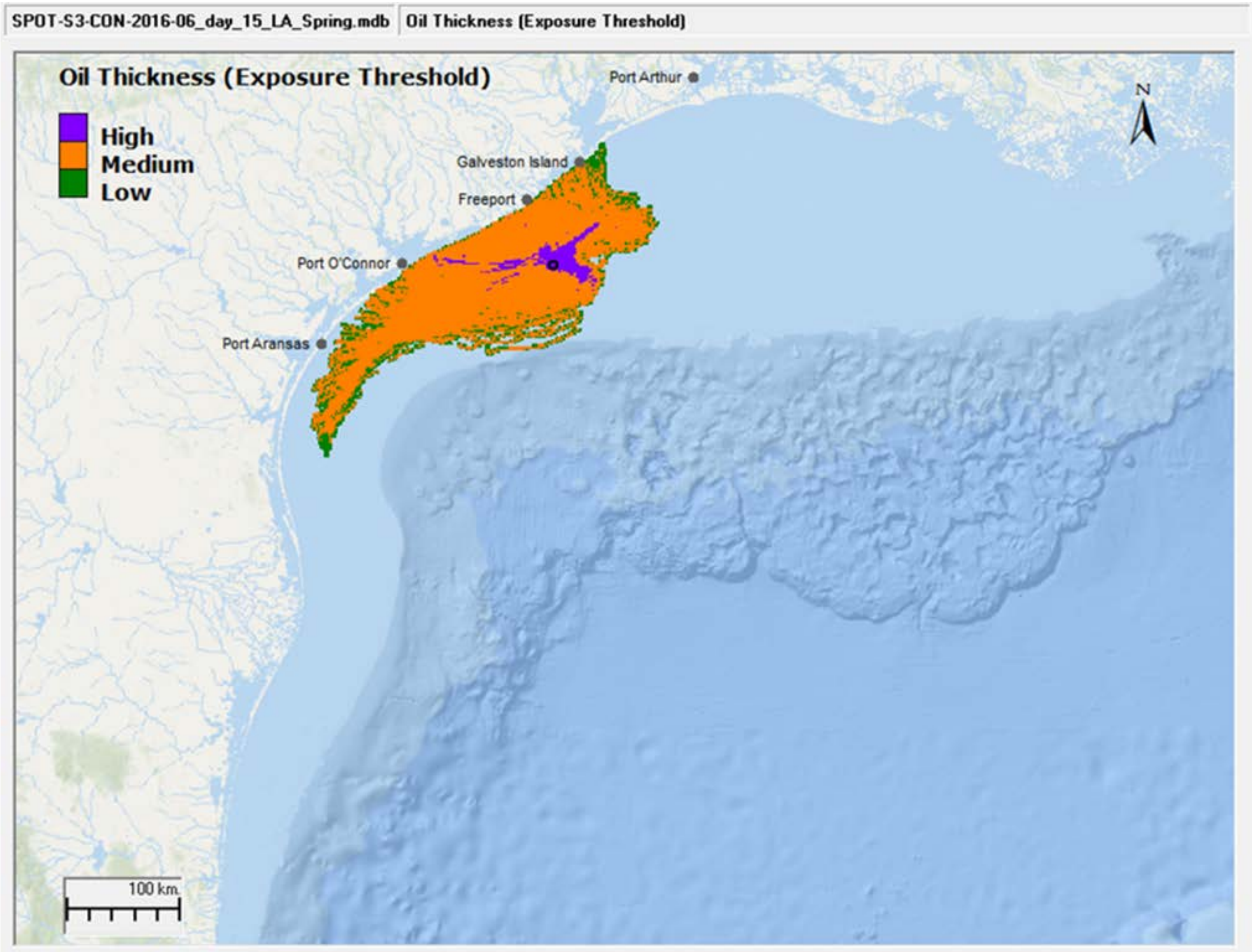


Figure 34: 14 day Simulation, Vessel Collision Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Spring

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

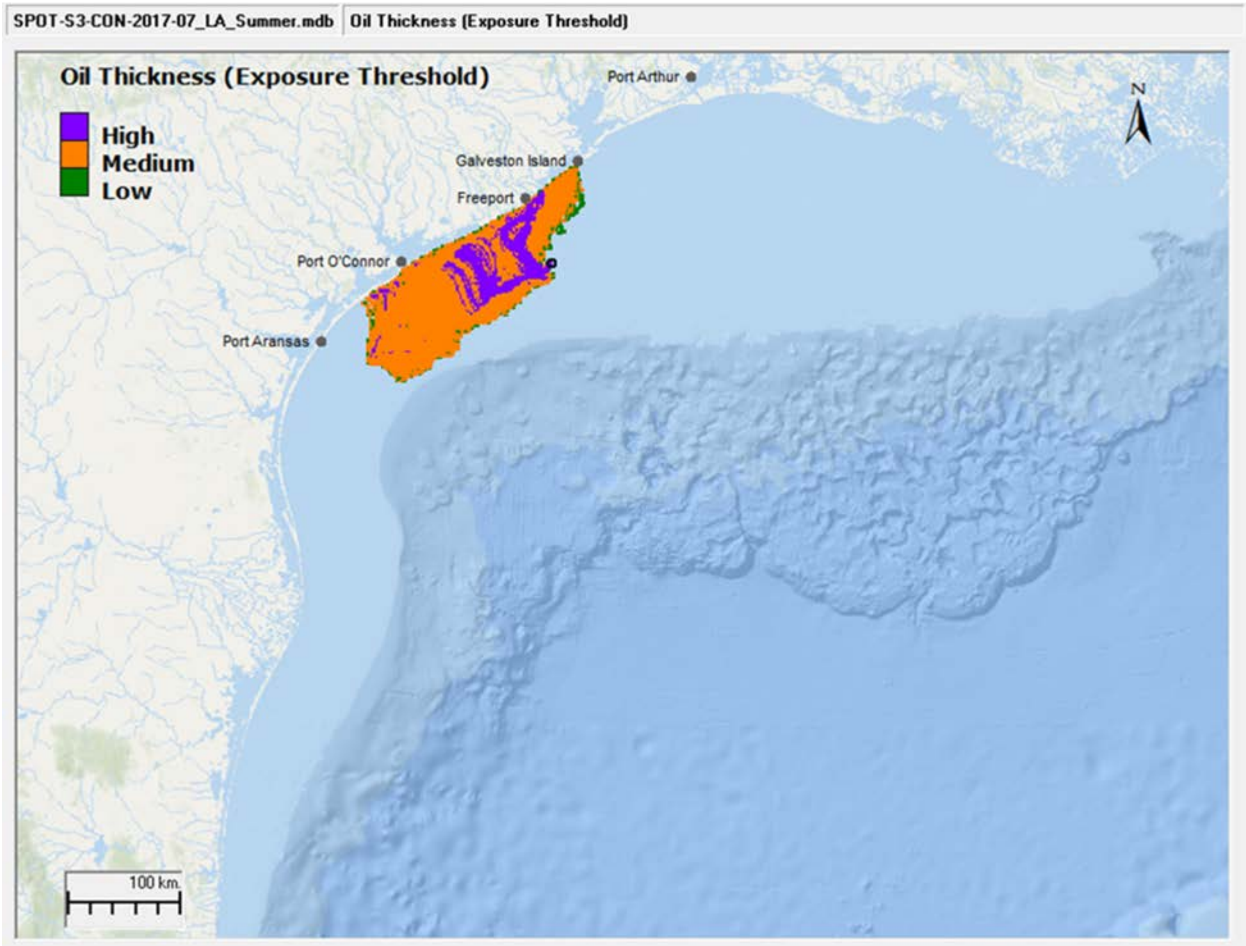


Figure 35: 14 day Simulation, Vessel Collision Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Summer

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

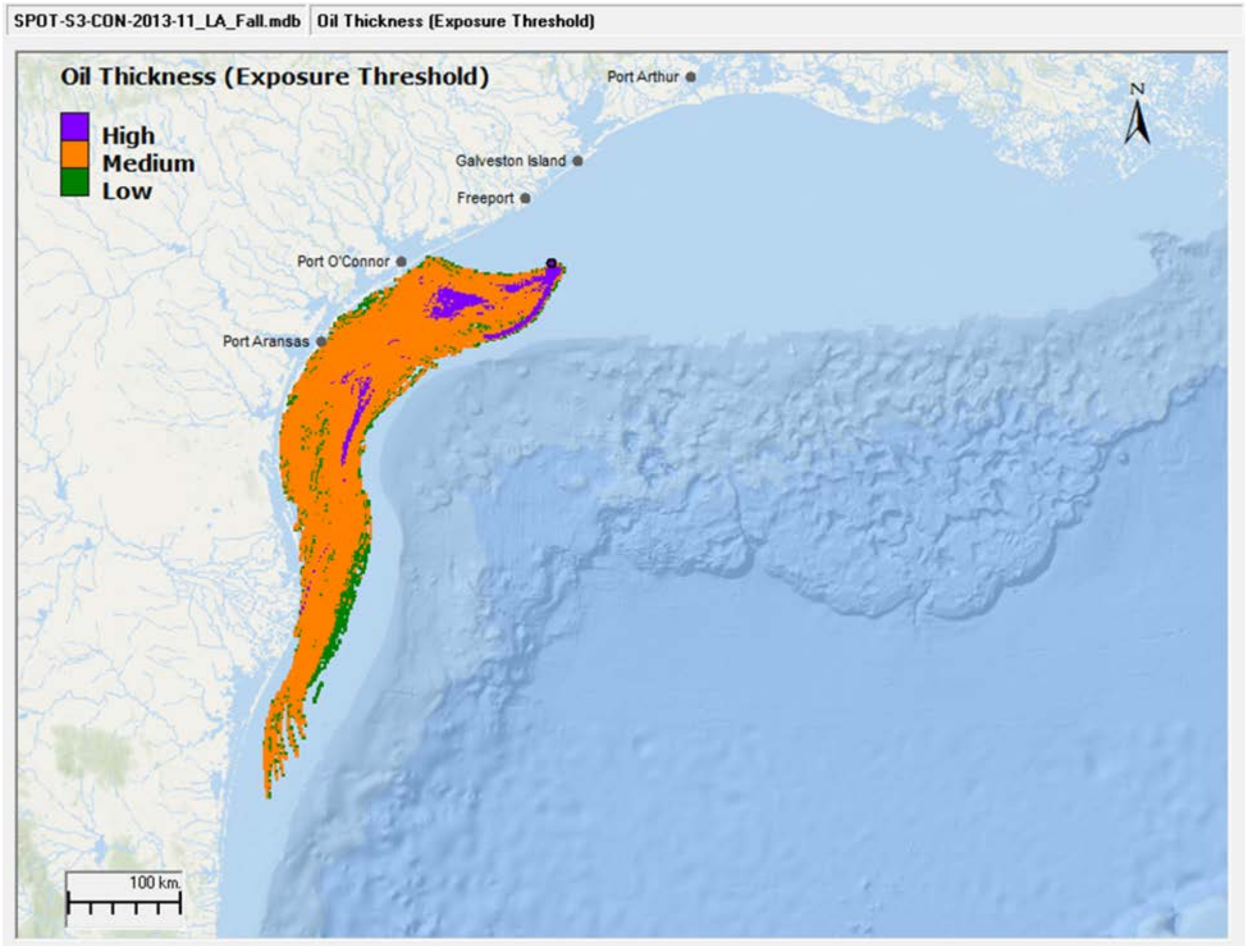


Figure 36: 14 day Simulation, Vessel Collision Release of Condensate (Worst-Case Largest Surface Oiling Area) Oil Thickness above Visible Threshold in Fall

Note: High is > 10 µm; Medium is 1 µm to 10 µm; Low is 0.1 µm to <1.0 µm

ATTACHMENT I

Applicant's Onshore Construction Spill Response Plan

(SPOT Application, Vol IIb, Appendix M)

-Page Intentionally Left Blank-

Sea Port Oil Terminal Project
Offshore Brazoria County, Texas

VOLUME IIb

APPENDIX M

CONSTRUCTION SPILL RESPONSE PLAN FOR OIL AND HAZARDOUS SUBSTANCES

M CONSTRUCTION SPILL RESPONSE PLAN FOR OIL AND HAZARDOUS SUBSTANCES

1 INTRODUCTION

The intent of the Construction Spill Response Plan for Oil and Hazardous Substances (Spill Plan) is to provide SPOT Terminal Services LLC (the Applicant) guidance to avoid, minimize, and mitigate environmental impacts as they relate to the inadvertent spills of oils and hazardous substances during the construction of the onshore components of the Sea Port Oil Terminal (SPOT) Project. Once the SPOT Project is authorized, the Applicant may deviate from the Spill Plan in certain situations if:

- A different measure provides equal or better environmental protection; or
- It is necessary because a portion of this Spill Plan is infeasible or unworkable based on Project-specific conditions.

At this time, the Spill Plan is considered DRAFT, as modifications or amendments may be necessary as agency consultation is completed and permit conditions are issued for the SPOT Project.

1.1 DEFINITIONS

Oil is defined in the Spill Prevention, Control, and Countermeasure (SPCC) regulations as oil of any kind or in any form including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil and oily mixtures.

Hazardous Material is defined by the U.S. Department of Transportation to include hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49 Code of Federal Regulations [CFR] 172.101), and materials that meet the defining criteria for hazard classes and divisions in Part 173 of Subchapter C of this chapter. Hazardous materials typically found on construction projects include, but are not limited to, petroleum oils, hydraulic fluids, engine coolants (ethylene glycol), x-ray film developer, chemical additives, pipe coatings, used abrasive blasting media, etc.

2 SPILL PREVENTION MEASURES

2.1 DRAINAGE PATTERNS

1. The general drainage patterns can be determined by the contour drawings shown in the topographic maps. In addition, wetland, waterbodies, and water wells shall be signed within workspaces.
2. Construction supervisory personnel shall be familiar with drainage patterns, wetlands, and waterbodies within the project workspaces and be prepared to implement measures to control any inadvertent spill.

2.2 SPILL PREVENTION MEASURES

Containers

1. All containers shall be stored on level ground at least 100 feet (30.5 meters) from any wetland or waterbody, and at least 200 feet (61 meters) from water wells. All containers should be located within temporary containment.

2. Temporary containment areas shall be capable of containing 110 percent of the volume of hazardous materials being stored.

3. All temporary containment areas and containers shall be routinely inspected for integrity.

4. Leaking and/or deteriorated containers shall be replaced as soon as the condition is detected and clean-up measures shall be immediately enacted.

5. No incompatible hazardous materials shall be stored in the same temporary containment area.

6. No temporary containment areas shall be left unsecured during non-work hours. All hoses and oil-containing equipment is required to be secured prior to concluding each work day. This includes parking and securing equipment, as identified in condition Container-1, and fueling equipment must have hoses placed into temporary containment areas and secured.

7. Spill response kits shall accompany all temporary containment areas.

8. Collected rainwater in temporary containment areas must be inspected prior to release; it must be free of sheens or other hazardous materials.

Tanks

1. The Contractor shall operate only those tanks that meet the requirements and specifications of applicable regulations and that are surrounded with temporary containment, as described in the *Containers* section, above.

2. Self-supporting tanks shall be constructed of materials compatible with their contents.

3. All tanks shall be routinely inspected for integrity.

4. Leaking and/or deteriorated tanks shall be replaced as soon as the condition is detected and clean-up measures shall be immediately enacted.

5. Vehicle-mounted tanks shall be equipped with flame/spark arrestors on vents to ensure that self-ignition does not occur.

6. Tanks will not be used to store differing products in sequence unless first thoroughly decontaminated prior to filling.

Unloading/Loading Areas

1. Re-fueling and transferring of liquids shall only occur in pre-designated locations that are on level ground and at least 100 feet (30.5 meters) from any waterway and 200 feet (61 meters)

from water wells. Where conditions require construction equipment be re-fueled within 100 feet (30.5 meters) of any wetland or waterbody, this activity must be continuously manned to ensure that overfilling, leaks, or spills do not occur. In addition, all this equipment must be surrounded by temporary containment, as described above, and inspected on a regular basis to ensure that any hoses or parts containing oil or hazardous materials are in good working order.

2. All service vehicles used to transport fuel must be equipped with an appropriate number of fire extinguishers and a spill response kit. At a minimum, this kit must include:

    a. Ten (10) 48”x 3” oil socks
    b. Five (5) 18” x 18” oil pillows
    c. One (1) 10’x 3” oil boom
    d. Twenty-five (25) 24” x 24”oil mats/pads
    e. One (1) box garden-size, 6-mil, disposable polyethylene bags (w/ties)
    f. Four (4) pairs of oil-proof gloves
    g. One (1) 55-gallon polyethylene open-head drum
    h. Blank drum labels
    i. Two (2) shovels

3. Contractors will be trained in proper handling, refueling, and maintenance practices.

3 SPILL RESPONSE RESPONSIBILITIES

3.1 CONTRACTOR RESPONSIBILITIES

1. The Contractor must designate both an Emergency Coordinator (EC) and an Alternate EC for the Project.

2. The Contractor is responsible for appropriately addressing all inadvertent spills that occur directly as a result of construction-related activities.

3. For minor spills (spills that take less than a shovel-full of dirt to clean up), no internal notification requirements of this Spill Plan need to be followed. However, this does not relieve the Contractor from appropriately remediating the area and reporting the spill in the daily report.

4. The Contractor shall supply the necessary manpower, personnel protective equipment (PPE), and spill response equipment to appropriately address all spills that directly occur as a result of construction-related activities.

5. The Contractor shall ensure that all emergency spill response equipment and PPE is well-stocked and in good condition, and that used spill response equipment and PPE is replaced, when necessary.

6. If the situation warrants it, the Contractor shall immediately notify any local emergency spill response contractors for assistance.

7. The Contractor shall be responsible for hiring an emergency spill response contractor if the nature of the incident requires it.

8. The Contractor is responsible for immediately notifying the Environmental Inspector (EI) of any reportable spills.

3.2 APPLICANT RESPONSIBILITIES

1. The Applicant shall be responsible for ensuring that the Contractor adequately follows the procedures outlined in this Spill Plan at all times.

2. Applicant shall be responsible for all verbal and written external notifications made to any regulatory agency or any local emergency responders.

3.3 EMERGENCY CONTACTS

Table 3-1 provides a list of Company and Contractor emergency contacts.

[*Note: Names and Contact Information will be updated just prior to construction to ensure most current information is included for emergency contacts*]

Table 3-1
Emergency Contacts

Name(s)	Job Description	Phone Number
SPOT Terminal Services, LLC		
TBD	Project Manager / Chief Inspector	TBD
TBD	Environmental Inspector	TBD
TBD	Environmental Compliance Department	TBD
TBD	Project Safety Representative	TBD
Contractor		
TBD	Superintendent	TBD
TBD	Emergency Coordinator	TBD
TBD	Alternate Emergency Coordinator	TBD
TBD	Project Safety Representative	TBD
Regulatory Agencies		
National Response Center		(800) 424-8802
Emergency Management Council of Texas		(800) 832-8224
Local Emergency Responders		
	Emergency Medical Services	TBD
	Hospital	TBD
	Fire	TBD
	Police	TBD

3.4 ENVIRONMENTAL INSPECTOR RESPONSIBILITIES

The EI will have authority to stop activities (i.e., stop work) that violate the environmental conditions of any applicable environmental permit applications and to order appropriate corrective action. In addition, the duties of the EI for non-de minimis spills (reportable spills) include the following:

1. Determine the source, character, amount, and extent of the spill.
2. Assess the potential hazards to the workspace, environment, and surrounding community and contact the Project Safety Representative if any hazards are detected.
3. Evacuate the area, if necessary.
4. Report the spill in accordance with the internal and external notification procedures outlined in Section 5.1, "Internal Notifications," and Section 5.2, "External Notifications," below.
5. Ensure the Contractor commits manpower and equipment for inadvertent spills that can be reasonably remediated by the Contractor.
6. Oversee the Contractor's spill response efforts to contain and control all inadvertent spills to ensure they adequately follow the procedures outlined in this Spill Plan.
7. Document the Contractor's response effort, including taking photographs, wherever possible.
8. Generate an Emergency Incident Report.

4 EMERGENCY SPILL RESPONSE EQUIPMENT AND PPE

Table 4-1 provides a list of the minimal required emergency spill response equipment and PPE for the SPOT Project at temporary containment areas.

Table 4-1
Minimally Required Emergency Spill Response Equipment and PPE

Chemical Spill Kit	
One (1) bag loose chemical pulp	Three (3) chemical pillows (18" x 18")
Three (3) chemical socks (48" x 3")	Ten (10) chemical mats/pads (24" x 24")
Blank drum labels	One (1) 30-gallon polyethylene open-head drum
One (1) box garden-sized, 6-mil, disposable polyethylene bags (w/ties)	Two (2) shovels
Oil Spill Kit	
One (1) oil boom (100' x 3")	Ten (10) oil pillows (18" x 18")
Ten (10) oil socks (48" x 3")	Twenty-five (25) oil mats/pads (24" x 24")
Blank drum labels	Three (3), 55-gallon PE open-head drums
One (1) box garden-sized, 6-mil, disposable polyethylene bags (w/ties)	Four (4) shovels
PPE	
Splash goggles	Half-face respirators (w/cartridges for benzene)

Table 4-1
Minimally Required Emergency Spill Response Equipment and PPE

Tyvek suits	Nitrile gloves
Waterproof/chemical resistant hip-waders	

5 SPILL NOTIFICATION PROCEDURES

5.1 INTERNAL NOTIFICATIONS

1. All spills are to be immediately reported to the EI, who will then contact the Environmental Compliance Department. Table 3-1 (see Section 3.1, "Emergency Contacts," above) includes a list of emergency contacts.

2. An Emergency Incident Report must be forwarded to the Environmental Compliance Department by the EI as soon as technically feasible.

5.2 EXTERNAL NOTIFICATIONS

1. The Environmental Compliance Department will determine if the spill constitutes the following:

    a. Reportable Quantity under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA);
    b. Reportable release under the Clean Water Act or Resource Conservation and Recovery Act (RCRA);
    c. Reportable Threshold Quantity under Superfund Amendments and Reauthorization Act (SARA) Title III;
    d. State Reportable Incident; or
    e. Immediately Reportable Incident – any sheen observed on water.

2. If any reporting is necessary, the Environmental Compliance Department shall be responsible for immediately contacting the appropriate federal and state regulatory authorities and following-up in writing, if required. Any spills requiring reporting to state or federal agencies shall also be reported to the impacted landowner.

5.3 EMERGENCY SPILL RESPONSE CONTRACTORS

The Contractor shall have arrangements with emergency spill response contractors to address emergency responses beyond the capabilities of the Contractor. The contacts for the emergency spill response contractors are provided in Table 5-1.

[*Note: Names and Contact Information will be updated just prior to construction to ensure most current information is included for emergency spill response contractors*]

Table 5-1
Emergency Spill Response Contractors

Company	TBD
Contact Name	TBD
Location	TBD
Phone Number	TBD
Company	TBD
Contact Name	TBD
Location	TBD
Phone Number	TBD
Company	TBD
Contact Name	TBD
Location	TBD
Phone Number	TBD

5.4 LOCAL EMERGENCY RESPONDERS

Supervisory Applicant or Contractor personnel (see Table 3-1, Section 3.1, “Emergency Contacts,” above) may call the local emergency responders should their assistance be required. The local emergency responders’ contact information is provided in Table 3-1.

6 CLEAN-UP PROCEDURES

6.1 SPILLS

1. Minor spills and leaks must be remediated as soon as feasible, with the use of adsorbent pads, wherever possible.

2. Spills shall be restricted to temporary containment areas, if possible, by stopping or diverting flow.

3. If the spill exceeds the temporary containment area’s capacity, additional containment shall be immediately constructed using sandbags or fill material. Every effort must be made to prevent the spills from entering a drainage pattern, wetland, or waterbody.

4. If a spill reaches a drainage pattern, wetland, or waterbody, oil booms shall be immediately placed downstream in order to contain the material. As soon as possible, the floating layer with absorbent pads shall be removed.

5. After all recoverable oil or hazardous material has been collected and drummed, all contaminated PPE, spill clean-up equipment, and any impacted soil shall be placed in appropriate containers.

6. For significant quantities of impacted soils, temporary waste piles shall be constructed using plastic sheets. This material shall subsequently be transferred into lined roll-off boxes as soon as feasible.

7. The Environmental Compliance Department will coordinate all waste characterization, profiling, and disposal activities.

6.2 EMERGENCY SPILL RESPONSE EQUIPMENT AND PPE CLEANING/STORAGE

1. Upon completion of spill clean-up activities, the Contractor shall be responsible for decontaminating the used emergency response equipment as well as the PPE.

2. The Contractor shall be responsible for replacing any spent emergency response equipment and PPE prior to resuming construction-related activities.

3. Decontamination rinse fluids shall be collected and containerized. The Environmental Compliance Department will coordinate waste characterization and disposal activities.

4. Reusable PPE shall be tested and inventoried prior to being placed back into service.

6.3 WASTE DISPOSAL

1. The Contractor is responsible for waste management and waste disposal; however, the Environmental Compliance Department will coordinate all waste characterization, profiling, and disposal activities.

2. The Contractor shall manage routine garbage and construction debris without oversight of the Environmental Compliance Department.

ATTACHMENT J

Summary of Hypothetical Oil Spill Response Actions

(SPOT Application, Vol IIa, Appendix R)

-Page Intentionally Left Blank-

Sea Port Oil Terminal Project
Offshore Brazoria County, Texas

VOLUME IIa

APPENDIX R

SUMMARY OF HYPOTHETICAL OIL SPILL RESPONSE ACTIONS

R SUMMARY OF HYPOTHETICAL OIL SPILL RESPONSE ACTIONS

1 INTRODUCTION

SPOT Terminal Services LLC (the Applicant), a subsidiary of Enterprise Products Operating LLC, a Texas limited liability company, is proposing to develop the Sea Port Oil Terminal (SPOT) Project in the Gulf of Mexico to provide U.S. crude oil loading services on very large crude carriers (VLCCs) and other crude oil carriers for export to the global market (Figure 1). The SPOT deepwater port (DWP) would be located in federal waters within the Outer Continental Shelf (OCS) in Galveston Area Lease Blocks 463 and A-59, approximately between 27.2 and 30.8 nautical miles (31.3 and 35.4 statute miles, or 50.4 and 57.0 kilometers), respectively, off the coast of Brazoria County, Texas, in water depths of approximately 115 feet (35.1 meters) (Figure 2).

The Applicant is filing this application for a license to construct, own, and operate the SPOT DWP pursuant to the Deepwater Port Act (DWPA) of 1974, as amended, and in accordance with United States Coast Guard (USCG) and U.S. Maritime Administration (MARAD) implementing regulations. The primary purpose of the SPOT Project would be to provide a safe and reliable long-term supply of crude oil for export to the global market. The Applicant has access, through its affiliates, to several crude oil pipelines from multiple sources that lead to numerous crude oil nearshore terminals owned and operated by the Applicant's affiliates along the Texas Gulf Coast.

Based on its current design, the SPOT Project would have the capability of loading VLCCs and other crude oil carriers at a rate of up to 85,000 barrels per hour (bbl/h). The SPOT DWP would allow for up to two (2) VLCCs or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with the DWP by floating connecting crude oil hoses and a floating vapor recovery hose. The maximum frequency of loading VLCCs or other crude oil carriers would be 2 million barrels per day, 365 days per year. The crude oils to be exported by the SPOT Project range from ultralight crude, such as processed condensate, to light crude, such as the West Texas Intermediate, to heavy grade crude oil, such as Western Canadian Select. The Applicant has integrated three (3) vapor combustor units at the DWP to minimize air emissions during loading.

The SPOT Project would consist of: (a) offshore/marine components; and (b) onshore storage/supply components, as described below. The "Project Fast Facts" table, presented previously, provides common measurements or metrics for the proposed Project.

OFFSHORE/MARINE COMPONENTS

The SPOT Project's offshore/marine components would consist of the SPOT DWP and subsea pipelines, as described below. Figure 3 provides an illustration of the offshore/marine components, and Section 1.3, "Description of Project Components," Volume IIa, provides a detailed description of the offshore marine components.

M:\Miami\Enterprise_Oil_DWP\Maps\Mxds\Report\ALL_First3Figures\Figure 1 Proposed DWP Port Project.mxd

Figure 1
Proposed Deepwater Port Project

SPOT Sea Port Oil Terminal

SPOT Terminal Services LLC

Source - ESRI

Document Path: M:\Miami\Enterprise_Oil_DWP\Maps\Mxds\Report\ALL_First3Figures\Figure 2 Offshore and Onshore Components.mxd

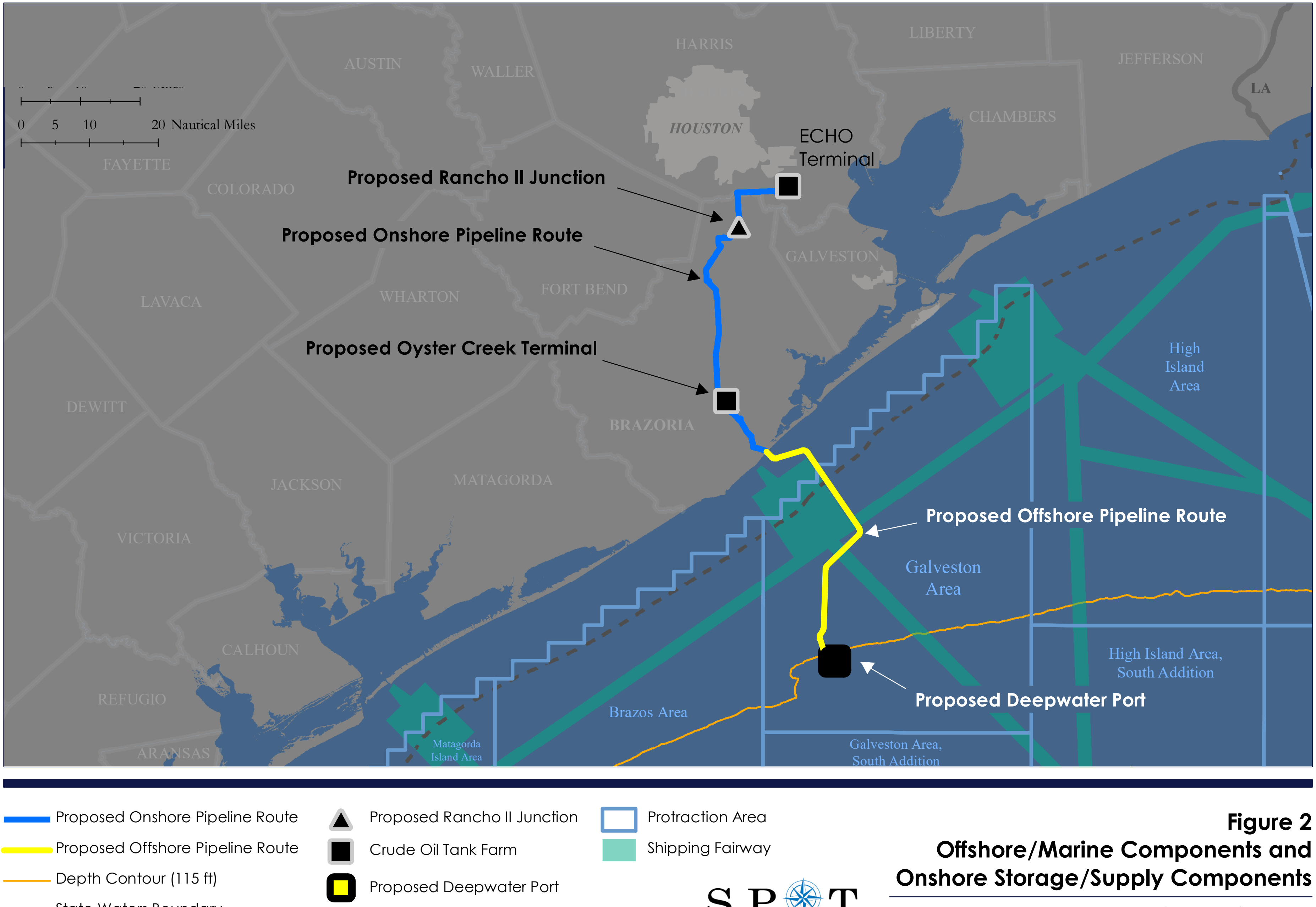
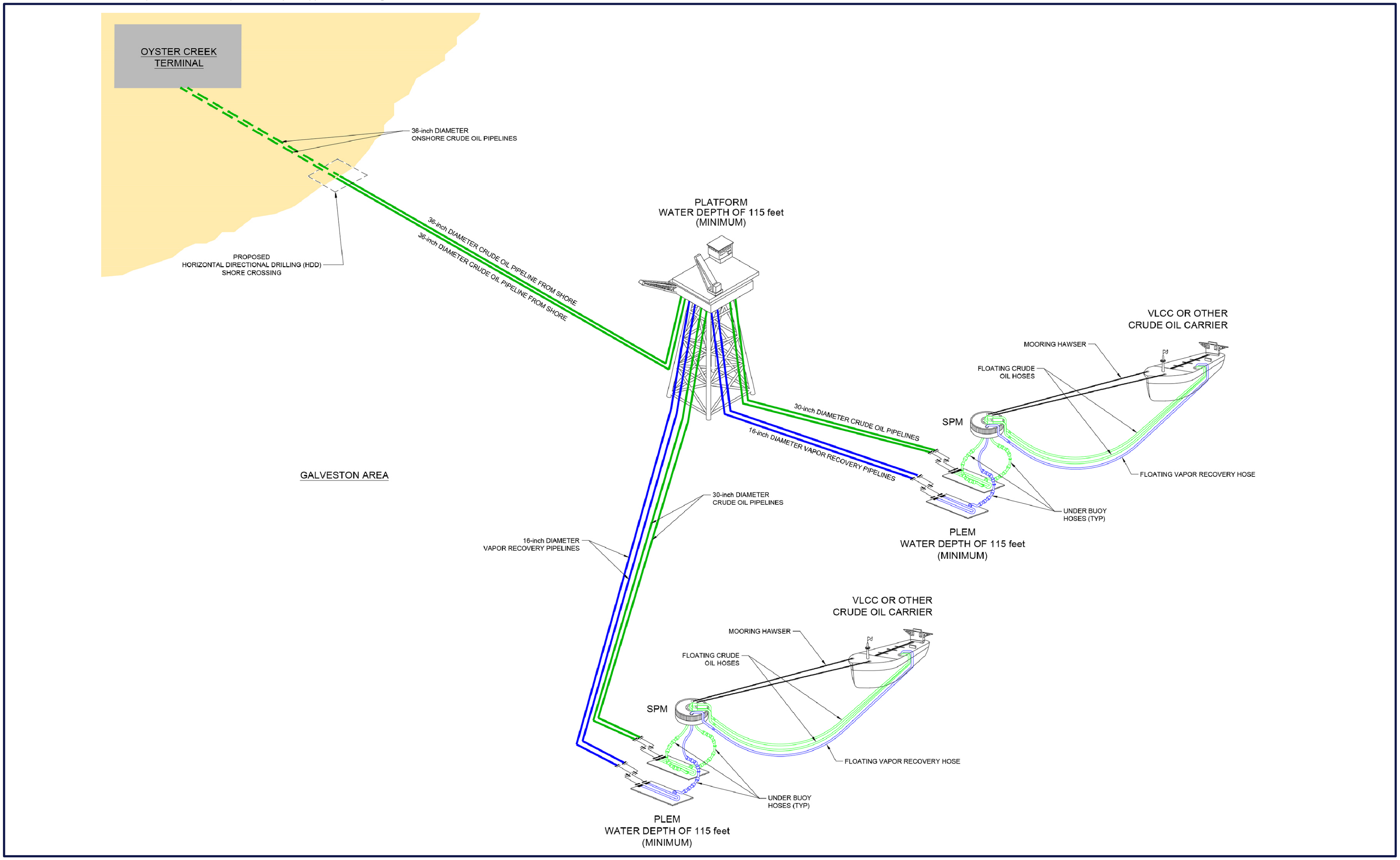


Figure 2
Offshore/Marine Components and Onshore Storage/Supply Components

SPOT Sea Port Oil Terminal

SPOT Terminal Services LLC

Source - ESRI, EP, ENE, BOEM, NOAA, TNRIS, NPMS



SPOT Sea Port Oil Terminal

Figure 3
Proposed Deepwater Port Schematic

SPOT Terminal Services LLC

- One (1) fixed offshore platform with eight (8) piles. The fixed offshore platform would be comprised of four (4) decks:
    - A sump deck with boarding shut-down valves and open drain sump;
    - A cellar deck with departing pig launchers/receivers, generators, and the vapor combustion units;
    - A main deck with a lease automatic custody transfer (LACT) unit, prover loop, living quarters, electrical and instrument building, and other ancillary equipment; and
    - A laydown deck with a crane laydown area.
- Two (2) SPM buoys, each having underbuoy hoses for crude oil and VOC vapor recovery interconnecting with the crude oil and vapor recovery pipeline end manifolds (PLEMs) and floating crude oil and vapor recovery hoses, would connect to the moored VLCCs or other crude oil carriers for loading.
- Four (4) PLEMs (two per SPM buoy) would provide the interconnection between the pipelines and the SPM buoys. There would be two (2) PLEMs for crude oil and two (2) PLEMs for vapor recovery.
- Four (4) 30-inch (76.2-centimeter) outside diameter pipelines (two per PLEM) to deliver crude oil from the platform to the PLEMs.
- Four (4) 16-inch (40.6-centimeter) outside diameter vapor recovery pipelines (two per PLEM) to transfer recovered VOC vapors from the VLCC or other crude oil carrier to the three (3) vapor combustion units on the platform.
- Two (2) colocated 36-inch (91.4-centimeter) outside diameter crude oil pipelines from the shoreline crossing in Brazoria County, Texas, to the SPOT DWP for crude oil delivery. These pipelines would connect the onshore crude oil storage facility and pumping station for the SPOT Project (the Oyster Creek Terminal) to the SPOT DWP. The crude oil would be metered at the offshore platform. Pipelines would be bi-directional for the purposes of maintenance pigging and changing crude oil grades.

ONSHORE STORAGE/SUPPLY COMPONENTS

The onshore storage/supply components would provide the crude oil supply and interconnection for the proposed Project and would consist of the following components, as described below. Figure 2 provides the location of these components, and Section 1.3, “Description of Onshore Storage/Supply Components,” Volume IIb, provides a detailed description of the onshore components.

- Modifications to the existing Enterprise Crude Houston (ECHO) Terminal, to include measurement skids and electric-driven pumps to supply crude oil to the proposed Oyster Creek Terminal.
- One (1) 36-inch (91.4-centimeter) outside diameter pipeline from the existing ECHO Terminal to the proposed Oyster Creek Terminal.

- One (1) connection from the existing Rancho II 36-inch (91.4-centimeter) outside diameter pipeline to the ECHO to Oyster Creek 36-inch (91.4-centimeter) outside diameter pipeline, to include measurement skid (collectively referred to as the "Rancho II Junction").

- Seven (7) aboveground storage tanks at the proposed Oyster Creek Terminal, each with a total storage capacity of 685,000 barrels (600,000 barrels working storage capacity), for a total onshore storage capacity of approximately 4.8 million barrels (4.2 million barrels working storage) of crude oil. Measurement skids, pumps, and other appurtenant equipment would also be present to supply crude oil to the SPOT DWP.

- Two (2) colocated 36-inch (91.4-centimeter) diameter crude oil pipelines from the Oyster Creek Terminal to the shore crossing where these become the subsea pipelines supplying the SPOT DWP.

- Ten (10) mainline valves (MLVs)—six (6) MLVs within the permanent right-of-way (ROW) of the ECHO to Oyster Creek pipeline and four (4) MLVs within the permanent ROW of the Oyster Creek to Shore Crossing pipeline.

APPENDIX CONTENT

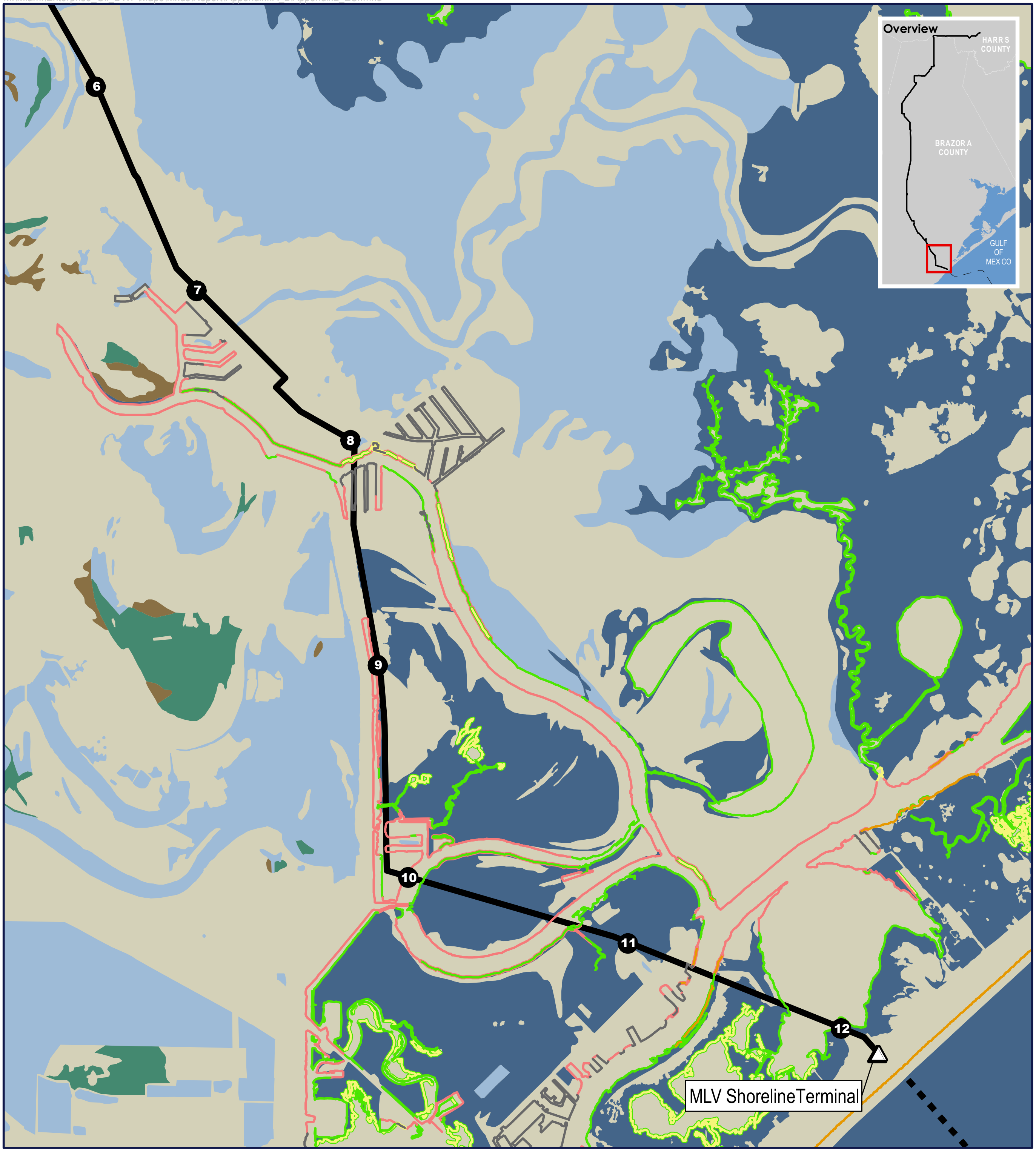
This report provides a summary of expected response actions that may be included as part of the tactical response to the hypothetical spills modeled in Appendix L, "Oil Spill Trajectory and Fate Modeling Report," Volume IIa.

2 METHODS

Appendix L , "Oil Spill Trajectory and Fate Modeling Report," Volume IIa, provides a modeling approach for assessing the potential oiling of coastal environments resulting from the unmitigated, hypothetical releases of three oil types: Western Canadian Select (WCS); West Texas Intermediate (WTI); and Ultralight crude oil (Condensate [C]), from the proposed SPOT DWP location. The spill volume for all modeled scenarios at the SPOT DWP platform was 2,200 bbl. The oil spill model uses a definition of the shoreline type in its calculations of oil-shore interactions. The digital shoreline used to create the habitat grid used in the spill risk assessment was developed using the most current National Oceanic and Atmospheric Administration (NOAA) Environmental Sensitivity Index (ESI) hydrography data layers for applicable states (NOAA Office of Response and Restoration 2012). Figure 4 provides an example of habitats identified using NOAA's ESI database for an area within the spill model boundaries.

Response actions for the various habitats addressed by this report are based on information provided in the NOAA National Ocean Service's 2010 document, *Characteristic Coastal Habitats – Choosing Spill Response Alternatives* (Reprinted in March 2017). The *Characteristic Coastal Habitats* collection was originally designed as a companion to *Environmental Considerations for Marine Oil Spill Response*, published in 2001 by the American Petroleum Institute, the National Oceanic and Atmospheric Administration, the U.S. Coast Guard, and the U.S. Environmental Protection Agency. The response method table for each habitat was based on information contained in the *NOAA Shoreline Assessment Manual* (NOAA 2013a) and the job aid entitled *Characteristics of Response Strategies – A Guide for Spill Response Planning in Marine Environments* (NOAA 2013b).

M:\Miami\Enterprise_Oil_DWP\Maps\Mxds\Report\AppendixIIA_L\AppendixL_ESI.mxd



- Milepost
- Mainline Valve Site
- Proposed Onshore Pipeline Route
- Proposed Offshore Pipeline Route
- Armored
- Beaches (sand or gravel)
- Flats (mud or sand)
- Rocky and steep shorelines (rock, sand or clay)
- Vegetated (grass/marsh/mangroves/scrub-shrub)
- Salt- and brackish-water marshes
- Freshwater marshes
- Swamps
- Scrub-shrub wetlands

0 0.25 0.5 Miles

Figure 4
ESI Shoreline Types

SPOT Terminal Services LLC

SPOT
Sea Port Oil Terminal

Source - ESRI, TX ESI

NOAA (2010) summarizes the technical rationale for selecting response methods for four categories of oil in specific habitats, including: I – gasoline products; II – diesel-like products and light crudes; III – medium grade crudes and intermediate products; and IV – heavy crudes and residual products. For the analysis developed in this document, WCS is considered a category IV oil, WTI is considered a category III oil, and C is considered as a category II oil.

3 RESPONSE ASSESSMENT

To develop a basis for response to the various oil types, it was first important to understand the habitat types that would be at risk from a 2,200 bbl potential spill originating from the proposed SPOT DWP. Appendix L, "Oil Spill Trajectory and Fate Modeling Report," Volume IIa, provides this information in Tables 3-3 and 3-4 for WTI and WCS, respectively, and in text (see Appendix L, Section 3) where a worst-case condensate spill would "affect 6.6 miles (11 km) of gravel or cobble beach immediately to the west-northwest of the spill site (no wetland would be affected)." Next, the modeled affected habitats were considered in relation to specific response methods for various habitats as provided in NOAA 2010. Therefore, for example, if 20 miles (33 kilometers) of sand beach was potentially impacted per the model, then response methods such as natural recovery, berms, manual cleaning or other techniques, were noted and their likelihood for 'adverse impact,' considering the cleanup method, was determined. This process was repeated for all of the coastal habitats identified by the 'worst-case' model run for each of the three crude oil types considered. The outcome of this process revealed the most applicable response method(s) that should be considered, which would result in the least damage to the habitat under consideration. Tables 1 and 2 provide a summary of the preceding approach for shoreline habitats. Table 3 provides a similar analysis for methods that are applicable to the offshore environment.

For condensate, per the model, since only one coastal habitat would be affected (e.g., gravel or cobble beach), it was determined that the least adverse habitat affect would be associated with methods including natural recovery, sorbents, debris removal, flooding and low-pressure, ambient water flushing and nutrient enrichment. The greatest adverse effect would be associated with methods including barriers/berms, manual oil removal/cleaning, mechanical oil removal and vegetative cutting/removal.

Table 1
Evaluation of Response Methods for Shoreline Habitats Potentially Affected by a 2,200 bbl Spill of West Texas Intermediate Crude Oil from the SPOT Deepwater Port

	Habitat Type					
Response Method [1]	Rocky Shoreline (1 statute mile [1.6 kilometers (km)] long)	Gravel/Cobble Beach (43 statute miles [70 km] long)	Sand Beach (61 statute miles [98 km] long)	Mudflat (7 statute miles [12 km] long)	Wetland (13 statute miles [21 km] long)	Artificial/ Manmade Shoreline (20 statute miles [33 km] long)
Natural Recovery	A	B	B	B	B	A
Barriers/Berms		C	B	C	B	
Manual Oil Removal/Cleanup	B	B	A	C	C	B
Mechanical Oil Removal		B	B		D	
Sorbents	A	A	A	A	A	A
Vacuum	A	B	B	B	B	
Debris Removal	A	A	A	B	B	
Sediment Reworking/Tilling			B		D	
Vegetation Cutting/Removal	C	C	C	D	C	B
Flooding			A	B	B	
Low-pressure, Ambient Water Flushing	A	A	B	C	B	A
High-pressure, Ambient Water Flushing	B	C				B
Low-pressure, Hot Water Flushing	C	C	C			C
High-pressure, Hot Water Flushing	CB	D				C
Steam Cleaning	D	D				D
Sand Blasting	DB					D
Solidifiers		B	B	C	C	
Shoreline Cleaning Agents	C	C	C		B	B
Nutrient Enrichment		A	A	I	B	
Natural Microbe Seeding		I	I	I	I	
In-situ Burning		C	C		B	

Notes:
[1] Categories are used to compare the relative environmental impact of each method in the specific environment and habitat: A = Least adverse impact; B = some adverse impact; C = Significant adverse impact; D = The most adverse impact; I = Insufficient information for evaluation; Blank means the method was not applicable.

Table 2
Evaluation of Response Methods for Shoreline Habitats Potentially Affected by a 2,200 bbl Spill of Western Canadian Select Crude Oil from the SPOT Deepwater Port

	Habitat Type					
Response Method[1]	Rocky Shoreline (1 statute mile [1.6 kilometers (km)] long)	Gravel/Cobble Beach (71 statute miles [114 km] long)	Sand Beach (153 statute miles [246 km] long)	Mudflat (2 statute miles [4 km] long)	Wetland (8 statute miles [14 km] long)	Artificial/ Manmade Shoreline (7 statute miles [11.3 km] long)
Natural Recovery	A	C	C	B	B	A
Barriers/Berms		B	B	C	B	
Manual Oil Removal/Cleanup	B	B	A	C	C	B
Mechanical Oil Removal		B	B		D	
Sorbents	A	B	A	B	A	A
Vacuum	A	B	A	B	B	
Debris Removal	A	A	A	B	B	
Sediment Reworking/Tilling			B		D	
Vegetation Cutting/Removal	C	C	C	D	C	B
Flooding		C	B	B	B	
Low-pressure, Ambient Water Flushing	B	B	B	D	B	B
High-pressure, Ambient Water Flushing	B	D				B
Low-pressure, Hot Water Flushing	C	C	C			C
High-pressure, Hot Water Flushing	C B	D				C
Steam Cleaning	D	D				
Sand Blasting	D					D
Solidifiers						
Shoreline Cleaning Agents	C	C	C		B	B
Nutrient Enrichment		B	A	I	B	
Natural Microbe Seeding		I	I	I	I	
In-situ Burning		C	C		B D	

Notes:
[1] Categories are used to compare the relative environmental impact of each method in the specific environment and habitat: A = Least adverse impact; B = some adverse impact; C = Significant adverse impact; D = The most adverse impact; I = Insufficient information for evaluation; Blank means the method was not applicable.

Table 3
Evaluation of Response Methods for Offshore Habitat Potentially Affected by a 2,200 bbl Spill of Three Types of Crude Oil from the SPOT Deepwater Port

	Offshore Environment		
Response Method[1]	West Texas Intermediate	Western Canadian Select	Condensate
Natural Recovery	B	B	A
Booming-Containment	A	A	A
Booming-Deflection/Exclusion	A	A	A
Skimming	A	A	A
Physical Herding	B	B	B
Manual Oil Removal/Cleaning			
Sorbents	B	B	B
Debris Removal	A	A	A
Dispersants	A	A	A
Emulsion-treating Agents	B	B	B
Elasticity Modifiers	B		B
Herding Agents	B		B
Solidifiers	B		B
In-situ Burning	A	A	A

Notes:
[1] Categories are used to compare the relative environmental impact of each method in the specific environment and habitat: A = Least adverse impact; B = some adverse impact; C = Significant adverse impact; D = The most adverse impact; I = Insufficient information for evaluation; Blank means the method was not applicable.

4 SUMMARY

As previously noted, Appendix L, "Oil Spill Trajectory and Fate Modeling Report," Volume IIa, contains the methods, scenarios, and results of the oil spill modeling contracted by the Applicant. Both oil transport and fate modelling and probabilistic modeling were conducted for the three crude oils noted. This analysis provides an overview of the methods that should be considered for the various habitats present and susceptible to potential crude oil spills from the proposed Project. Each habitat is unique and requires careful planning prior to developing the specific methods needed for cleaning up an oil spill and restoring the habitat. Generally, the results of this analysis indicate that natural recovery, the use of sorbents, and the removal of debris can result in the least adverse impact to most shoreline resources for the range of crude oil grades considered. Although not specifically considered by this response analysis, oil spills can also affect socioeconomic factors that rely on the various ecological habitats identified, including use of offshore artificial reefs, commercial and recreational fishing opportunities, marine traffic, and beach and natural areas use. The application of the various response techniques provided in this analysis can be used to mitigate impacts to both ecological and human use services provided by coastal/marine habitats. In the event of a crude oil spill, the SPOT DWP Emergency Spill Response Plan will be implemented to ensure minimal potential impact in accordance with the Operation and Maintenance Philosophy (Attachment 18, "Offshore Operations and Maintenance Philosophy," Volume III [*Confidential*]).

5 REFERENCES

National Oceanic and Atmospheric Administration (NOAA). 2010. Characteristic Coastal Habitats: Choosing Spill Response Alternatives. U.S. Dept. of Commerce. Seattle, WA: Emergency Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 73 pp + appendices.

_________. 2013a. Shoreline Assessment Manual. 4th Edition. U.S. Dept. of Commerce. Seattle, WA: Emergency Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 65 pp + appendices.

_________. 2103b. Characteristics of Response Strategies: A Guide for Spill Response Planning in Marine Environments. U.S. Dept. of Commerce. Seattle, WA: Emergency Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 75 pp.

National Oceanic and Atmospheric Administration (NOAA) Office of Response and Restoration. 2012. Environmental Sensitivity Index (ESI) Maps. Available at: http://response.restoration.noaa.gov/esi.

ATTACHMENT K

Ichthyoplankton Impact Assessment

(Annex #26 - Revised Response to Information Request #26)

-Page Intentionally Left Blank-

Sea Port Oil Terminal Project
Offshore Brazoria County, Texas

ICHTHYOPLANKTON IMPACT ASSESSMENT

TABLE OF CONTENTS

 21:1009836.0002

LIST OF TABLES

LIST OF ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

Applicant	SPOT Terminal Services LLC
DWP	deepwater port
EAM	equivalent adult model
kg	kilograms
lbs	pounds
LCL	lower confidence limit
m^3	cubic meters
MARAD	U.S. Maritime Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
Project	Sea Port Oil Terminal Deepwater Port and Oyster Creek Terminal and associated pipelines
SEAMAP	Southeast Area Monitoring and Assessment Program
SPM	single point mooring
SPOT	Sea Port Oil Terminal
UCL	upper confidence limit
USCG	U.S. Coast Guard
VLCC	very large crude carrier

ICHTHYOPLANKTON IMPACT ASSESSMENT

1. PROJECT DESIGN AND PLANNED ACTIVITIES

SPOT Terminal Services LLC (the Applicant), a subsidiary of Enterprise Products Operating LLC, a Texas limited liability company, is proposing to develop the Sea Port Oil Terminal (SPOT) Project in the Gulf of Mexico to provide U.S. crude oil loading services on very large crude carriers (VLCCs) and other crude oil carriers for export to the global market.

Based on the current design, operation of the SPOT deepwater port (DWP) would consist of seawater use for the following systems/purposes: jockey water pumps, firewater pumps, potable water system, sewage treatment, and water hoses. Table 1 outlines the seawater demand for each system and the rate and period at which each system is expected to require seawater.

Table 1
Deepwater Port Operational Seawater Usage

Equipment	System	Rate	Period
Jockey Water Pump	Water Main	20 gpm each (0.001 m^3/sec)	Maximum flowrate, run continuously to feed water users on platform. Excess water flows overboard.
Firewater Pump	Water Main	4,000 gpm each (0.25 m^3/sec)	Maximum flowrate, run only for testing and emergencies.
Water Maker	Potable Water System	9,624 gpd (36.4 m^3/day)	Continuous, includes water maker reject water.
Sewage Treatment Unit	Utility Water	1,980 gpd (7.5 m^3/day)	Continuous, to maintain sanitary waste system operation.
Utility Water Hoses	Utility Water	1,440 gpd (5.5 m^3/day)	Intermittent, deck and equipment washdown.

Key:
gpd = gallons per day
gpm = gallons per minute
m^3 = cubic meters
sec = second

The SPOT Project would also be associated with the use of VLCCs. The VLCCs and other crude oil carriers that would call on the SPOT DWP would not be part of the SPOT Project. The Applicant intends to use the worldwide fleet of available VLCCs and other crude oil carriers. VLCCs and other crude oil carriers would maneuver to the single point mooring (SPM) buoys and moor via hawser lines to the SPM buoy. Flexible hoses would be used to load crude oil from the SPOT DWP to the VLCCs or other crude oil carriers. Once the crude oil cargo is loaded, the flexible hoses would be disconnected and the VLCC or other crude oil carrier would depart the SPOT DWP to transport the cargo to various global export markets. For the purpose of this analysis, one (1) VLCC is considered to account for its annual water intake and its potential impacts to ichthyoplankton. Table 2 outlines the seawater demand for ballast water exchange and

 21:1009836.0002

cooling water for a single VLCC, and the rate and period at which these seawater intakes are expected to occur.

Table 2
VLCC (1) Seawater Usage

System	Rate	Period
Ballast Water Exchange	1.6 million gph (6,057 m^3/hour)	Continuous, to maintain acceptable stability conditions.
Cooling Water	528,344 gph (2,000 m^3/hour)	Continuous, to prevent overheating.

Key:
gph = gallons per hour
m^3 = cubic meters
sec = second

Annual operation of the SPOT DWP would require about 46,032,000 gallons (174,250 cubic meters [m^3]). The ballast water exchange and cooling water volumes for a single VLCC would use about 14,016,000,000 gallons (53,056,332 m^3) per year and 4,628,294,093 gallons (17,519,999 m^3) per year, respectively. The combined water intake for all three intake requirements is expected to amount to 18,690,326,093 gallons (70,750,581 m^3) annually.

The following equation represents an example of the annual seawater intake volume calculation for a single system:

Example of Seawater Usage Calculation for Single SPOT DWP System

	Flow Rate (gal/hr)		***Operating Period (hr/day)***		***# of Operating Days in 1 Year***			***Annual Seawater Use (gal/yr)***
(	1.6 million	x	24	x	365	)	=	14,160,000,000

where:
hr = hour
gal = gallon
yr = year

Note: This example demonstrates the calculation of annual seawater use required for the ballast water exchange of a VLCC.

This Ichthyoplankton Impact Assessment analyzes potential impacts on ichthyoplankton as a result of the offshore portion of the SPOT DWP. This analysis describes the National Oceanic and Atmospheric Administration National Marine Fisheries Services' (NOAA Fisheries) Southeast Area Monitoring and Assessment Program (SEAMAP) ichthyoplankton sampling, the descriptions of the source waterbody used to delineate the study area for the Project's DWP (see Attachment A, "Source Waterbody"), and the specific approaches used to analyze the SEAMAP data for fish egg and larval densities. These densities are used in conjunction with the estimated total average annual seawater intake volumes associated with the Project in order to estimate potential levels of annual impingement and entrainment losses from the SPOT DWP. These losses are calculated for four target species:

- Red drum (*Sciaenops ocellatus*);
- Red snapper (*Lutjanus campechanus*);
- Bay anchovy (*Anchoa mitchilli*); and
- Gulf menhaden (*Brevoortia patronus*).

The base-case scenario uses the average annual intake flow from each seawater-using system, the mean density estimates based on larval data from the NOAA Fisheries' SEAMAP, and the estimated life-history parameters (e.g., mortality, stage duration) based on available literature.

2. DATA PROCUREMENT AND MANAGEMENT

A description of the SEAMAP ichthyoplankton studies, the SPOT DWP study area, and the procedures used to calculate fish egg and larval densities from the SEAMAP samples taken from the defined source waterbody are provided below.

2.1 SEAMAP Program

Ichthyoplankton sampling has been conducted in the Gulf of Mexico as part of SEAMAP (Rester et al. 2000) since 1982. The sampling is conducted at standard stations, which are located at 30-statute-mile (48-kilometer), or 0.5° intervals forming a fixed, systematic grid across the Gulf of Mexico. Occasionally, samples are taken at non-standard locations, or stations are moved to avoid navigational hazards. Samples are taken upon arrival at a station, regardless of time of day. Sampling cruises are routinely conducted during the summer and fall (June through November). July and September are typically the focal months of these surveys. The SEAMAP data represent fish eggs and larvae only; the data do not include other taxa (e.g., shrimp or crab species).

Lyczkowski-Shultz et al. (2004) reported that the sampling gear and methodology used for SEAMAP ichthyoplankton surveys follow Kramer et al. (1972), Smith and Richardson (1977), and Posgay and Marck (1980). A 24-inch (61-centimeter) bongo net fitted with 0.013-inch (0.333-millimeter) mesh is fished in an oblique tow path to a maximum depth of 656 feet (200 meters) or to 6.56 to 16.4 feet (2 to 5 meters) off the bottom at depths less than 656 feet (200 meters). A mechanical flow meter is mounted off-center in the mouth of each bongo net to record the volume of water filtered. The volume of water filtered varies from approximately 5,283 to 158,503 gallons (20 to 600 m^3), but is typically 7,925 to 10,567 gallons (30 to 40 m^3) at the shallowest stations and 79,252 to 105,669 gallons (300 to 400 m^3) at the deepest stations. These data provide density estimates (i.e., the number of larvae or eggs per gallon or m^3). In addition to the bongo net sampling, a single or double 6.7- by 3.3-foot (2- by 1-meter) pipe-frame neuston net fitted with 0.04-inch (0.947-millimeter) mesh is towed at the surface with the frame half submerged for 10 minutes. These data yield catch-per-unit effort rather than density indices.

Catches from bongo nets are standardized to account for sampling effort (i.e., volume filtered) and then expressed as the number of larvae under 10 square meters of sea surface (Lyczkowski-Shultz et al. 2004). This is accomplished by dividing the number of larvae of each taxon caught in a sample by the volume of water filtered during the tow, and then multiplying the result by the maximum depth of the tow in meters and a factor of 10. For the purposes of this ichthyoplankton assessment, the density estimate (number/m^3) is the value of interest. Initial processing of SEAMAP plankton samples is carried out at the Sea Fisheries Institute, Plankton Sorting and Identification Center in Szczecin, Poland, and the Louisiana Department of Wildlife and Fisheries (Lyczkowski-Shultz et al. 2004). Vials of eggs and identified larvae, plankton displacement volumes, total egg counts, and counts and length measurements of identified larvae are sent to the SEAMAP archive at the Florida Marine Research Institute in St. Petersburg, Florida. These data are entered into the SEAMAP database, and specimens are preserved and loaned to interested scientists. Data files containing specimen identifications and lengths are sent to NOAA Fisheries Mississippi Laboratories, where these data are combined with field collection data and edited according to established SEAMAP editing routines. SEAMAP survey data are currently maintained in dBase file structures, but conversion to an Oracle-based system is underway.

2.2 Study Area – Source Waterbody

Selection of the size and configuration of a study area within which SEAMAP data are considered representative of a proposed site requires careful consideration of the SEAMAP sampling station grid; the strong cross-shelf distribution of ichthyoplankton (e.g., Ditty et al. 1988; Hernandez et al. 2002; Shaw et al. 2002); and environmental factors such as proximity to shore and depth of the study area.

The boundary polygon defining the SPOT DWP study area was developed and further refined based on comments received during the Deepwater Port License Application process. The final area selected is a block defined by the following corner coordinates, as depicted in Attachment A, "Source Waterbody": 28° 41' 50.363" N, 95° 23' 11.433" W; 28° 42' 22.189" N, 94° 49' 3.715" W; 28° 12' 16.376" N, 94° 48' 32.890" W; 28° 11' 45.205" N, 95° 22' 30.982" W.

2.3 SEAMAP Data Analyses

Detailed methods used to analyze the SEAMAP ichthyoplankton data are provided in Attachment B, "SEAMAP Analysis Methods." Generally, these descriptions identify the three SEAMAP data files (STAREC, ISTRWK, ISARWK) that are used together to estimate fish larvae and egg densities, and the relevant fields within each data file. The STAREC file describes when and where sampling operations took place. The ISTRWK file contains gear code information, volumes filtered, and all egg data, whereas the ISARWK file provides data about individual taxa. STAREC and ISTRWK can be merged based on three common fields (cruise number, vessel, and station number). The sample number field is required in order to merge these data with the ISARWK data file.

2.4 Ichthyoplankton Densities and Taxa Composition

A description of the fish egg and larvae density calculations was obtained for the SPOT DWP site (see Section 2.1, "SEAMAP Program," above). These densities are based on samples taken in the years of 1982 through 2016.

A total of 82 samples of larval fish and eggs were analyzed from sampling stations within the SPOT DWP area. Just over 150 categories of taxon, including unidentified specimens, were identified from these stations. Overall, the density of fish larvae averaged 0.22/m^3, whereas the density of fish eggs averaged 2.97 eggs/m^3.

2.5 Species of Concern

Species of concern considered in the ichthyoplankton assessment model include those that are of ecological and/or economic importance and managed species. For the SPOT DWP area, the species of concern include red drum, red snapper, Gulf menhaden, and bay anchovy. Bay anchovy have ecological value as a prey species, while Gulf menhaden have commercial as well as prey value. Red drum and red snapper are managed, high-value, recreational and/or commercial species.

Importantly, and from a very conservative perspective, data used for each species of concern included all relevant taxonomic categories for each of the four selected species. Because SEAMAP samples cannot always be identified to species level, data are also reported at genus and/or family levels and, therefore, may or may not actually represent the specific species of concern. For example, 82 records of the red snapper were observed within the 82 samples. Of the 82 reported records from the three taxonomic categories, Lutjanidae, *Lutjanus* spp., and *L. campechanus*, only 24 percent (20) of the records were for "true" red snapper; 76 percent (62) were for the other two taxonomic groups identified, which could include any of the six other *Lutjanus* species: lane (*L. synagris*), mutton (*L. analis*), gray (*L. griseus*), dog (*L. jocu*), schoolmaster (*L. apodus*), or Cubera *(L. cyanopterus*) snapper. Therefore, it can be assumed that the data query approach (per USCG and MARAD 2004) will likely result in a subsequent loss of red snapper age-1 equivalents that is overly conservative.

Additionally, species distribution complications in the analysis are associated with Sciaenidae. Sciaenids include red drum, sand drum, Atlantic croaker, whiting, black drum, spotted seatrout, silver seatrout, and several other ubiquitous species. Generally, red drum eggs and larvae are found near mouths and inlets of bays and develop to post-larvae within estuarine marshes for the first several weeks after hatching. Several studies report that red drum larvae are abundant within tidal inlets during late fall periods (Holt et al. 1989). Similar complications exist for the bay anchovy sampling data due to higher ichthyoplankton densities in the shallow and less saline waters of estuaries and river mouths (Sable et al. 2016). This information suggests that entrainment, and subsequently determined loss of age-1 equivalents for these species, is likely overly conservative to unreliable, at best.

Temporal issues are evident as well. SEAMAP data for Gulf menhaden ichthyoplankton may be largely unrepresentative of their average density over the course of an entire year. Hernandez et al. (2010) sampled ichthyoplankton off the coast of Alabama from 2004 to 2006 and reported occurrences of larval menhaden similar to those summarized by Ditty et al. (1988). However, the seasonality of Gulf menhaden spawning in the north-central Gulf of Mexico appears to be slightly shorter in duration, with the majority of larvae collected from October through March (GSMFC 2015). Due to the time of the SEAMAP sampling (June through November), it can be reasoned that these Gulf menhaden ichthyoplankton density data are not a reliable representation of yearly ichthyoplankton density.

3. CALCULATION OF POTENTIAL ENTRAINMENT ESTIMATES

The potential entrainment estimates for larvae and eggs were obtained by multiplying the observed densities by the annual average intake volume for each seawater-using system. Net extrusion effects were accounted for by multiplying the observed densities by a factor of 3. These estimates include the following three conservative assumptions, in addition to the net extrusion adjustment factor:

1. The depth-integrated samples reflect the densities that would be encountered at the depth of the intake location;

2. The season-specific densities are considered representative of the average density over the whole year; and

3. Exposure would occur intermittently over the entire year.

However, assumption (2) concerning densities is likely not true (see Section 2.5, "Species of Concern," above) and assumption (1) likely results in an over-estimate of the actual ichthyoplankton densities found at the intake location, because the depth-integrated sample accounts for the density across the entire water column.

3.1 Annual Estimates

The annual estimates of impingement and entrainment of fish eggs and larvae for the SPOT DWP area are provided in Table 3.

Table 3
Projected Annual Estimates of Impingement and Entrainment

	Lower 95% Confidence Limit (LCL)	Annual Mean	Upper 95% Confidence Limit (UCL)
DWP Operation			
Fish Eggs	173,789	278,628	383,467
Fish Larvae	405,817	740,559	1,075,301
VLCC Ballast Water			
Fish Eggs	52,915,850	84,837,699	116,759,549
Fish Larvae	123,564,813	225,488,272	327,411,730
VLCC Cooling Water			
Fish Eggs	17,473,610	28,014,685	38,555,760
Fish Larvae	40,802,961	74,459,620	108,116,280
Totals			
Fish Eggs	70,563,248	113,131,012	155,698,776
Fish Larvae	164,773,591	300,688,451	436,603,310

Key:
DWP = deepwater port
LCL = lower confidence limit
UCL = upper confidence limit
VLCC = very large crude carriers

Expected average larval densities for the four species of concern, along with upper and lower confidence intervals, are provided in Table 4 for DWP operation, VLCC ballast and cooling water.

Table 4
Projected Annual Larval Entrainment Values

Species	Associated Taxa In SEAMAP Data	Annual LCL	Annual Mean	Annual UCL
DWP Operation				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	343,511	526,195	708,880
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	48,200	134,684	221,168
Red Snapper	*L. campechanus* and F. Lutjanidae	16,883	22,344	27,805
Red Drum	*S. ocellatus* and Sciaenids	-2,777	57,335	117,448
VLCC Ballast Water				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	104,593,515	160,218,023	215,842,531
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	14,676,147	41,009,114	67,342,081
Red Snapper	*L. campechanus* and F. Lutjanidae	5,140,690	6,803,440	8,466,191
Red Drum	*S. ocellatus* and Sciaenids	-845,539	17,457,694	35,760,928
VLCC Cooling Water				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	34,538,353	52,906,402	71,274,451
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	4,846,285	13,541,826	22,237,368
Red Snapper	*L. campechanus* and F. Lutjanidae	1,697,533	2,246,598	2,795,663
Red Drum	*S. ocellatus* and Sciaenids	-279,210	5,764,793	11,808,796
Totals				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	139,475,379	213,650,621	287,825,862
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	19,570,632	54,685,624	89,800,617
Red Snapper	*L. campechanus* and F. Lutjanidae	6,855,107	9,072,383	11,289,659
Red Drum	*S. ocellatus* and Sciaenids	-1,127,526	23,279,823	47,687,172

Key:
DWP = deepwater port
LCL = lower confidence limit
SEAMAP = Southeast Area Monitoring and Assessment Program
UCL = upper confidence limit
VLCC = very large crude carriers

Because eggs were not identified to species, species-specific egg entrainment was determined by first calculating the ratio of total eggs to total larvae for the SEAMAP database. Respective densities were adjusted by a multiple of 3 for net extrusion. This yielded estimates of larvae and egg entrainment for the average, upper confidence limit (UCL), and lower confidence limit (LCL) cases, from which egg/larvae ratios were determined. Egg/larvae ratios were multiplied by annual larval entrainment for each species and each entrainment scenario (LCL, average, and UCL) to yield the projected egg entrainment for each representative species, as presented in Table 5.

Table 5
Projected Annual Egg Entrainment Values

Species	Associated Taxa in SEAMAP Data	Annual		
		LCL[1]	Mean	UCL[1]
DWP Operation				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	162,429	248,811	335,193
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	3,599	10,056	16,512
Red Snapper	*L. campechanus* and F. Lutjanidae	8,193	10,843	13,494
Red Drum	*S. ocellatus* and Sciaenids	-432	8,918	18,268
VLCC Ballast Water				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	49,456,905	75,758,880	102,060,855
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	1,095,726	3,061,753	5,027,781
Red Snapper	*L. campechanus* and F. Lutjanidae	2,494,736	3,301,656	4,108,575
Red Drum	*S. ocellatus* and Sciaenids	-131,517	2,715,410	5,562,338
VLCC Cooling Water				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	16,331,414	25,016,722	33,702,030
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	361,825	1,011,037	1,660,249
Red Snapper	*L. campechanus* and F. Lutjanidae	823,799	1,090,256	1,356,713
Red Drum	*S. ocellatus* and Sciaenids	-43,429	896,669	1,836,768
Totals				
Bay Anchovy	F. Engraulidae, *Anchoa* spp.	65,950,748	101,024,413	136,098,078
Gulf Menhaden	F. Clupeidae, *Brevoortia patronus*	1,461,150	4,082,846	6,704,543
Red Snapper	*L. campechanus* and F. Lutjanidae	3,326,729	4,402,755	5,478,782
Red Drum	*S. ocellatus* and Sciaenids	-175,378	3,620,998	7,417,374

Notes:
Values are derived by multiplying larval entrainment by species from Table 4 by the egg-to-larvae ratio for each entrainment scenario.
[1] Confidence limits for the mean are an interval estimate for the mean. Interval estimates are often desirable because the estimate of the mean varies from sample to sample. Instead of a single estimate for the mean, a confidence interval generates a lower and upper limit for the mean. The interval estimate gives an indication of how much uncertainty there is in our estimate of the true mean. The narrower the interval, the more precise is our estimate. For this study, there was, generally, high variability between entrainment numbers compared to the mean, thus the large variances for both LCL and UCL for all four species. See Snedecor and Cochran (1989) for more detail on confidence limits.
Key:
DWP = deepwater port
LCL = lower confidence limit
SEAMAP = Southeast Area Monitoring and Assessment Program
UCL = upper confidence limit
VLCC = very large crude carriers

4. ICHTHYOPLANKTON ASSESSMENT MODEL METHODS

E^2M, a consultant to the U.S. Coast Guard (USCG), developed an Ichthyoplankton Assessment Model for specific taxa in association with the formerly proposed Gulf Landing LNG facility (USCG and MARAD 2004). The USCG has instructed that this model be used without change in the assessment process for new LNG and crude oil so that impact assessments across projects will be comparable. In this section, we apply the USCG and U.S. Maritime Administration (MARAD) (2004) model as amended by USCG and MARAD (2005) to the same taxa treated in the Gulf Landing Final Environmental Impact Statement. The model involves calculating age-1 equivalents and equivalent yield (for the taxa based on the entrainment estimates and life-history characteristics of the taxa).

The equivalent yield analysis begins with the larval impacts associated with the proposed SPOT DWP expressed as the number of age-1 fish eggs and larvae that would have become adults if they had not been entrained and killed. The yield that these fish would have contributed over time is estimated and expressed as an equivalent increase in fishing pressure; i.e., an equivalent yield estimate that represents 2 percent fishing pressure on the population when compared to that harvest, not a 2 percent loss of that harvest (USCG and MARAD 2004).

4.1 Life-History Tables

Calculations of both age-1 equivalents and equivalent yield use stage-specific mortality rates to project the number of entrained eggs and larvae that otherwise would have been expected to survive to age 1 or would have been caught in a commercial or recreational fishery. The two critical life-history values of importance for both estimates are daily, instantaneous mortality rates for identified stages and duration in days for each stage (e.g., USCG and MARAD 2004, Table G-13, as amended). Total mortality per stage is the product of daily instantaneous mortality and stage duration. Calculating total natural mortality is a prerequisite for estimating both age-1 equivalents and equivalent yield.

To address variability in recruitment, the critical life histories are determined for three separate scenarios:

1. A base-mortality case;
2. A low-mortality case; and
3. A high-mortality case.

The base-mortality case provides estimates of daily mortality and stage duration based on average values provided in the scientific literature (e.g., USCG and MARAD 2004, Table G-13, as amended). In the low-mortality case, critical values are based on low or lower-end estimates of mortality provided in the scientific literature (e.g., USCG and MARAD 2004 Table G-13 as amended), whereas high-mortality critical values are determined from high or higher end estimates (e.g., USCG and MARAD 2004, Table G-13, as amended).

Three additional critical life-history values are required for calculating the equivalent yield of taxa that are commercially or recreationally fished:

1. Natural mortality rate per stage for individuals age-1 and older;

2. Fishing mortality rate per stage for individuals age-1 and older; and
3. Weight at median age of death per stage for individuals age-1 and older (e.g., USCG and MARAD 2004, Table G-16, as amended).

Within individual taxa, these critical values remain constant regardless of whether they represent the base-, low-, or high-mortality case for stages younger than age-1. This analysis assumes that fish age-1 and older are not subject to entrainment; therefore, parameter values are independent of the entrainment process.

Critical life-history values used in this ichthyoplankton impact analysis for the proposed SPOT DWP were taken directly from tables provided in USCG and MARAD (2004), as amended.

Red Drum

Instantaneous daily mortality and stage duration values for five initial stages of red drum are provided in USCG and MARAD (2004), Table G-13, as amended, along with the references used to determine those estimates. These data are for the base-case mortality, low-mortality, and high-mortality scenario; they use average values of instantaneous daily mortality and stage duration. Additional critical values for individuals age-1 and older that are needed to calculate equivalent yield are provided in USCG and MARAD (2004), Table G-16, as amended.

Red Snapper

Critical life-history values for four initial stages of red snapper are provided in USCG and MARAD (2004), Table G-58, as amended for the base, low, and high-mortality cases. Additional critical values (natural mortality, fishing mortality, weight at median age of death) for individuals age-1 and older needed to calculate equivalent yield are provided in USCG and MARAD (2004), Table G-59, as amended.

Bay Anchovy

Critical life-history values for three initial stages of bay anchovy are provided in USCG and MARAD (2004), Table G-34, as amended, for the base, low, and high-mortality cases.

Gulf Menhaden

Critical life-history values for three initial stages of Gulf menhaden are provided in USCG and MARAD (2004), Table G-42, as amended, for the base, low, and high-mortality cases. Additional critical values for individuals age-1 and older that are needed to calculate equivalent yield are provided in USCG and MARAD (2004), Table G-43, as amended.

4.2 Age-1 Equivalent Analysis

Age-1 equivalents represent the number of individuals of each taxon that would have been expected to survive to age 1 had they not been entrained (see Attachment C, "Age-1 Equivalent Calculations"). The variables and parameters used to calculate the number of age-1 equivalents are detailed in USCG and MARAD (2004), Section 3.1. To describe the analysis, the age-1 equivalent table for the red drum base-mortality case (USCG and MARAD [2004], Table A3.1 in Attachment 3) was used as an example.

As discussed above, critical values for instantaneous daily mortality and stage duration (days) were taken from the appropriate table in USCG and MARAD (2005). For the red drum base mortality case, this is Table G-13 in USCG and MARAD (2005).

The product of instantaneous daily mortality and stage duration yields total natural mortality per stage. Total Mortality is defined as the sum of natural mortality and fishing mortality. Since fishing mortality for fish under the age of 1 is always zero, total mortality per stage is the natural mortality per stage. The fraction of individuals surviving a stage (Fraction Surviving) is defined by Equation 6 in USCG and MARAD (2004):

Fraction Surviving = EXP (-Total Mortality) (1)

"Correction" is an adjustment factor used to account for underestimation of mortality based on the model assumption that all larvae are at the beginning of a life-history stage when entrained. In fact, this may not be the actual case. The Correction represents a revised Fraction Surviving and is defined by Equation 4 in USCG and MARAD (2004):

Correction = 2 * Fraction Surviving * EXP (-log(1 + Fraction Surviving)) (2)

The Number Potentially Entrained is the estimated number of entrained red drum, expressed as the mean, 95 percent LCL, and 95 percent UCL (see Tables 1 and 2).

Fraction Surviving to Age 1 is the product of all values of Fraction Surviving for all stages remaining in the table beyond and including the stage of interest. Note that for the stage of interest, the Correction value is used, but for all the remaining stages the Fraction Surviving values are used. In Table A3.1 in Attachment 3 of USCG and MARAD (2004), the Fraction Surviving to Age 1 for Larvae is calculated as the Larvae Correction multiplied by the Juvenile 1 Fraction Surviving multiplied by the Juvenile 2 Fraction Surviving multiplied by the Juvenile 3 Fraction Surviving. The Number Surviving for each stage is the product of the Number Potentially Entrained and the Fraction Surviving to Age 1. These values are calculated for both the egg and larvae stages and are summed to yield the total number of age-1 equivalents.

4.3 Equivalent Yield Analysis

Equivalent yield takes the estimated larval impacts associated with the intake of seawater and adjusts those impacts forward in time to resemble a fishery yield or harvest. The equivalent yield estimate is used as a base for reasonable comparison to other fisheries to help assess potential stress or pressure on the population. Equivalent yield is in no way intended for, or capable of, predicting direct losses to fish landings or harvest.

The analysis begins with an age-1 equivalent analysis. The variables and parameters used to calculate the number of age-1 equivalents are detailed in Section 3.2 of USCG and MARAD (2004), as amended, and as summarized above. For this report, a tabular equivalent yield model is provided as Attachment D, "Equivalent Yield Analysis."

4.4 Sensitivity Analyses

To address variability in recruitment, low and high ranges of mortality and entrainment were compared to assess differences in extreme ranges in entrainment loss relative to the base scenario. These analyses are presented in summary tables, along with summaries of age-1 equivalent and equivalent yield analysis. The upper extreme estimate is for UCL entrainment and low mortality. Such a case, in which there would be maximum entrainment and minimum natural mortality, would result in the highest proportionate loss of fish due to entrainment, or the highest losses in terms of age-1 equivalents and equivalent yield. The converse case is that in which there would be low (LCL) entrainment and high natural mortality.

Under high natural mortality, most of the entrained fish would have been lost, thereby minimizing the loss attributed to entrainment. Total entrainment, age-1 equivalents, and equivalent yield under either the UCL entrainment/low mortality or LCL entrainment/high mortality cases provide the sensitivity contrast. The results of four likely scenarios also are provided for each species:

- Low larval mortality/average entrainment;
- High larval mortality/average entrainment;
- Base larval mortality/UCL entrainment; and
- Base larval mortality/LCL entrainment.

5. MODEL RESULTS

Detailed results of the age-1 equivalent and equivalent yield analyses for the four primary species of concern are provided in Attachment C, “Age-1 Equivalent Calculations,” and Attachment D, “Equivalent Yield Analysis,” respectively. This section summarizes the results by species represented as the total loss of individuals considered for operation of the DWP and the use of a VLCC.

5.1 Red Drum

Using the average entrainment estimates and base-case life-history values, it is estimated that 23,279,823 red drum (and F. Sciaenidae) larvae and 3,620,998 eggs would be entrained. In this case, 19,416 age-1 equivalents are represented and would have had an equivalent yield of 97,105 pounds (lbs) (44,046.09 kilograms [kg]). It should be noted that this estimate assumes that all larvae identified in the family Sciaenidae are in fact red drum, which is highly unlikely given the abundance of other sciaenids (including Atlantic croaker - *Micropogonias undulatus*, and spot croaker - *Leiostomus xanthurus*) found in the shallow continental shelf waters of the northern Gulf of Mexico. If we only consider the operation of the DWP, the numbers are dramatically lower. Using the average entrainment estimates and base-case life-history values for the DWP alone, it is estimated that 48 red drum age-1 equivalents are lost and would have an equivalent yield of 239 lbs (108.4 kg).

5.2 Red Snapper

Using the average entrainment estimates and base-case life-history values, it is estimated that 9,072,383 red snapper larvae and 4,402,755 eggs would be entrained. In this case, 3,787 age-1 equivalents are represented and would have had an equivalent yield of 6,603 lbs (2,995.07 kg). Using the average entrainment estimates and base-case life-history values for the DWP alone, it is estimated that nine red snapper age-1 equivalents are lost and would have an equivalent yield of 16 lbs (7.3 kg). As previously detailed in Section 2.5, "Species of Concern," this estimation of the loss of red snapper age-1 equivalents could be overly conservative due to the potential inclusion of other Lutjanus species such as lane, mutton, gray, dog, schoolmaster, or Cubera snapper.

5.3 Gulf Menhaden

Using the average entrainment estimates and base-case life-history values, it is estimated that 54,685,624 Gulf menhaden larvae and 4,082,846 eggs would be entrained. In this case, 48,363 age-1 equivalents are represented and would have had an equivalent yield of 9,608 lbs (4,358.12 kg). Using the average entrainment estimates and base-case life-history values for the DWP alone, it is estimated that 119 Gulf menhaden age-1 equivalents are lost and would have an equivalent yield of 24 lbs (10.9 kg).

5.4 Bay Anchovy

As anchovies are not fished, we provide age-1 equivalent values but do not calculate equivalent yield losses. For the average entrainment and base-mortality case, total entrainment was estimated at 213,650,621 anchovy larvae and 101,024,413 eggs. In terms of age-1 equivalents, the expected loss to the system would be 118,681 anchovies in the average likelihood scenario. Using the average entrainment estimates and base-case life-history values for the DWP alone, it is estimated that 292 bay anchovies age-1 equivalents are lost.

5.5 Summary

The operations associated with the SPOT DWP could have adverse impacts on the representative species. The potential commercial and recreational fishing impacts of most concern are caused by the population decreases from impingement and entrainment from water intakes associated with the VLCC. Water use (cooling and ballast) by VLCCs is a process that occurs with or without the presence of the DWP and should be taken in context with other large vessels that regularly transit the Gulf of Mexico and use similar water volumes.

A summary of the proposed DWP's economic impacts on commercial and recreational fishing, including potential impacts to red snapper, red drum, Gulf menhaden, and bay anchovy, is provided in Table 6 and described below. Overall, the economic impacts on commercial and recreational fishing from the entrainment and impingement of the representative species from the operation of the proposed DWP would not be significant for the duration of the DWP; however, the inclusion of a VLCC in this analysis as considered a part of the SPOT DWP Project could result in significant impacts to ichthyoplankton.

Table 6
Summary of Annual Economic Impacts on Fishery from the SPOT DWP Project

Species	Age-1 Equivalents Lost (average entrainment/base-case mortality)	Pounds of Fish Lost	Estimated Economic Impact
DWP Operation			
Red Drum	48	239	$0 - $621.40
Red Snapper	9	16	$0 – $71.52

Table 6
Summary of Annual Economic Impacts on Fishery from the SPOT DWP Project

Species	Age-1 Equivalents Lost (average entrainment/base-case mortality)	Pounds of Fish Lost	Estimated Economic Impact
Gulf Menhaden	119	24	$0 - $2.16
Bay Anchovy	292	1.26	N/A
VLCC Ballast Water			
Red Drum	14,560	72,820	$0 - $189,332.00
Red Snapper	2,840	4,952	$0 – $22,135.44
Gulf Menhaden	36,268	7,205	$0 - $648.45
Bay Anchovy	89,000	384.07	N/A
VLCC Cooling Water			
Red Drum	4,808	24,046	$0 - $62,519.60
Red Snapper	938	1,635	$0 – $7,308.45
Gulf Menhaden	11,976	2,379	$0 - $214.11
Bay Anchovy	29,389	126.83	N/A
Totals			
Red Drum	19,416	97,105	$0 - $252,473.00
Red Snapper	3,787	6,603	$0 – $29,515.41
Gulf Menhaden	48,363	9,608	$0 - $864.72
Bay Anchovy	118,681	512.16	N/A

Key:
DWP = deepwater port
N/A = not applicable
VLCC = very large crude carriers

Red Drum

Commercial and recreational fishing of red drum in Gulf of Mexico federal waters is illegal (GMFMC 2004). Under base-case parameters, the SPOT DWP would reduce the number of red drum age-1 equivalents by a total of 19,416 individuals during each year of operation and VLCC use. The loss of 19,416 of age-1 red drum is expected to result in the decrease of red drum population by about 97,105 lbs (44,046.09 kg). The latest NOAA Fisheries report available indicates that the price of commercially landed red drum was $2.60/lb in 2017 (NOAA Fisheries 2019a). Based on only this information, the Project's economic impact from red drum entrainment and impingement from the estimated annual population reduction would range from $0.00 to no more than $252,473.00 (see Table 6, above). Based on these values, impacts on the red drum recreational fishery could be significant.

Red Snapper

The SPOT DWP would cause an estimated total annual loss of 3,787 age-1 equivalents for red snapper (6,603 lbs [2,995.07 kg]) due to entrainment and impingement. According to the 2017 annual landings by species database (NOAA Fisheries 2019b), the price of a Texas red snapper is $4.47/lb. Therefore, the estimated annual economic impact from the entrainment and impingement of red snapper would range from $0.00 to no more than $29,515.41 (see Table 4, above). Based on this amount, the operation of the DWP, when combined with the use of a VLCC, could significantly impact the red snapper commercial and recreational fisheries.

Gulf Menhaden

The Gulf menhaden fishery is primarily harvested commercially, with no significant recreational harvesting in the Gulf of Mexico. Federal and state regulations are focused on area and seasonal closures with few restrictions, if any, on size or total trip limits; therefore, the fishery is similar to an open access fishery (GSMFC 2002, 2015).

The SPOT DWP is expected to impact the Gulf menhaden population by approximately 48,363 individuals or 9,608 lbs (4,358.12 kg). When considering the use of a VLCC, this total population reduction is not considered a significant percentage of the total population in the Gulf of Mexico. In 2017, the price per pound of Gulf menhaden was $0.09 (NOAA Fisheries 2019a). The economic impact from Gulf menhaden entrainment and impingement from the annual reduction in population would range from $0.00 to no more than $864.72. Therefore, the impact on the Gulf menhaden commercial fishery from the operation of the SPOT DWP and VLCC use would not be significant.

Bay Anchovy

The bay anchovy is not commercially or recreationally fished; however, it is an important food source for a number of commercially and recreationally harvested species. Therefore, the SPOT Project could impact commercial and recreational fisheries by the loss of 118,681 bay anchovy, or approximately 512.16 lbs (232.31 kg). The loss of bay anchovy, itself, would not cause an economic loss as it is not commercially or recreationally fished. Based on its economic status, impacts on bay anchovy from the SPOT DWP would not be significant.

6. PROPOSED MITIGATION PLAN

Based on the information provided in this analysis, biological resources, such as ichthyoplankton, could be impacted by SPOT Project activities. As necessary, the Applicant will institute impact minimization and mitigation measures throughout the duration of the SPOT Project in order to reduce inadvertent impacts on fish eggs and larvae. Additional mitigation measures may be required through agency (e.g., NOAA Fisheries) consultation and permitting of the proposed Project. Currently the Applicant proposes the following mitigation measures concerning ichthyoplankton:

6.1 Accidental Spill Prevention

All in-water construction activities would comply with federal regulations to control the discharge of operational waste, such as bilge and ballast waters, trash and debris, and sanitary and domestic waste, that could be generated from all vessels associated with the SPOT Project. In addition, as per USCG and

U.S. Environmental Protection Agency regulations, an Oil Spill Contingency Plan and an HDD Contingency Plan would be implemented during all phases of the SPOT Project.

7. CONCLUSIONS

This report concludes that impacts on ichthyoplankton and fisheries resources resulting from entrainment within water intakes for the operation alone of SPOT DWP would be insignificant; however, the overall annual water use expected for operation of the DWP and the water-using requirements for a VLCC would be approximately 18,690,326,093 gallons (70,750,581 m^3) and would be considered significant. Compared to other water intakes for various industries and vessels along the Gulf Coast, these numbers for operation of the DWP are low, but the inclusion of a VLCC as considered part of this analysis results in sizable numbers of entrainment of ichthyoplankton and loss of economic value to recreational and commercial fisheries.

The various assumptions used in the Ichthyoplankton Assessment Model, including the cumulative use of related taxonomic categories (e.g., inclusion of all taxa identified to Lutjanidae as red snapper; see Section 2.5, "Species of Concern," above), the use of a net extrusion factor of 3 for baseline entrainment values, and the use of depth-integrated SEAMAP data for surface-oriented intakes likely results in over-estimates of entrainment, which lead to overly conservative results for subsequent lost age-1 individuals and equivalent yield values. Importantly, the current forward-projecting equivalent adult model (EAM) used by the USCG has been critically evaluated, and its inadequacy has been demonstrated within peer-reviewed technical papers (see Gallaway et al. 2007). Gallaway et al. (2007) noted that forward-projecting EAMs are likely inappropriate and lead to gross over-estimates of predicted losses. For example, Gallaway et al. (2007) note that, based on review of seven proposed offshore terminals, forward-projecting EAMs were 387 times greater than if a fecundity hindcast model had been used. The primary issue noted by Gallaway et al. (2007) is that the EAMs do not include any density-dependent compensation; the models are strictly linear or density independent. Gallaway et al. (2007) state that this approach over-estimates impacts on population.

The Applicant has applied the USCG's forward-projecting EAM model based on its historical application during previous Deepwater Port Act application proceedings, but believes that the model skews the understanding of "real world" impacts toward a much more conservative direction than is warranted by the data. This belief is supported by recent peer-reviewed scientific studies considering this topic (see Gallaway et al. 2007). However, even using the highly conservative forward-projecting EAM model, the predicted fisheries impacts from the SPOT DWP were evaluated as insignificant for operation alone, but significant when considering VLCC water use. Considering the high degree of uncertainty associated with the historically used USCG/MARAD model, and issues brought to bear concerning its use for estimating fisheries' population impacts, the impacts expected from entrainment and impingement associated with the annual operation of the SPOT DWP for the four species of concern are considered inconsequential.

8. REFERENCES

Ditty, J.G., G.G. Zieske, and R.F. Shaw. 1988. Seasonality and Depth Distribution of Larval Fishes in the Northern Gulf of Mexico above 26"00'N. Fishery Bulletin 86:811-823.

Gallaway, B.J., W.J. Gazey, J.G Cole, and R.G Fechhelm. 2007. Estimation of Potential Impacts from Offshore Liquefied Natural Gas Terminals on Red Snapper and Red Drum Fisheries in the Gulf of Mexico: An Alternative Approach. Transaction of the American Fisheries Society 136:655-677.

Gulf of Mexico Fishery Management Council (GMFMC). 2004. Final Environmental Impact Statement of Generic Amendment for Addressing Essential Fish Habitat Requirements in the Following Fishery Management Plans of the Gulf of Mexico: Shrimp Fishery of the Gulf of Mexico, Red Drum Fishery of the Gulf of Mexico, Reef Fish Fishery of the Gulf of Mexico, Stone Crab Fishery in the Gulf of Mexico, Coral and Coral Reef Fishery of the Gulf of Mexico, Spiny Lobster Fishery of the Gulf of Mexico and South Atlantic, and Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic. Tampa, Florida.

Gulf States Marine Fisheries Commission (GSMFC). 2002. The Menhaden Fishery of the Gulf of Mexico, United States: A Regional Management Plan. March 2002. Number 99.

__________. 2015. The Gulf Menhaden Fishery of the Gulf of Mexico, A Regional Management Plan. GSMFC 2015 Revision. March 2015. Number 240.

Hernandez, F.J., S.P. Powers, and W.M. Graham. 2010. Seasonal Variability in Ichthyoplankton Abundance and Assemblage Composition in the Northern Gulf of Mexico off Alabama. Fish. Bull. 108:193–207 (2010).

Hernandez, F.J., R.F. Shaw, J.S. Cope, J.G. Ditty, M.C. Benfield, and T. Farooqi. 2002. Across-Shelf Larval, Postlarval, and Juveniles Fishes Collected at Offshore Oil and Gas Platforms and Coastal Rock Jetty West of the Mississippi River Delta. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. OCS Study MMS 2001-007.

Holt, S.A, G.J. Holt, and C.R. Arnold. 1989. Tidal stream transport of larval fishes into non-stratified estuaries. Rapports et Proces-verbaux des Réunions. Conseil International pour l'Éxploration de la Mer, 191:100-104.

Kramer, D., M.J. Kalin, E.G. Stevens, J.R. Thraikill, and J.R. Zweifel. 1972. Collecting and Processing Data on Fish Eggs and Larvae in the California Current Region. NOAA Technical Report. NMFS Circular 370. 38pp.

Lyczkowski-Shultz, J., D.S. Hanisko, and G.W. Ingram, Jr. 2004. The Potential for Incorporating a Larval Index of Abundance for Stock Assessment of Red Snapper, Lutjanus campechanus.

National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries). 2019a. Annual Landings by Species for Unites States as of 19-JUN-19. https://www.st.nmfs.noaa.gov/pls/webpls/mf_lndngs_grp.data_in. Accessed June 19, 2019.

__________. 2019b. Annual Landings by Species for Texas as of 19-JUN-19. https://www.st.nmfs.noaa.gov/pls/webpls/mf_lndngs_grp.data_in. Accessed June 19, 2019.

Posgay, J.A., and R.R. Marak. 1980. The MARMAP Bongo Zooplankton Samplers. Journal of Northwestern Atlantic Fisheries Science. 1:9-99.

Rester, J.K., N. Sanders, Jr., D.S. Hanisko, and B. Pellegrin (eds.). 2000. Seamap Environmental and Biological Atlas of the Gulf of Mexico, 1998. No. 75. Gulf States Marine Fisheries Commission. Ocean Springs, Mississippi.

Sable, S. E., A. C. Hijuelos, A. M. O'Connell, and J. P. Geaghan. 2016. 2017 Coastal Master Plan: C3-17 – Bay Anchovy, Anchoa mitchilli, Habitat Suitability Index Model. Version II. (pp. 1-31). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Shaw, R.F., D.C. Lindquist, M.C. Benfield, T. Farooqi, and J.T. Plunket. 2002. Offshore Petroleum Platforms: Functional Significance for Larval Fish across Longitudinal and Latitudinal Gradients. Prepared by the Coastal Fisheries Institute, Louisiana State University, Baton Rouge. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region. OCS Study MMS 2002-077. 107 pp. New Orleans, LA.

Smith, P.E, and S.L. Richardson, eds. 1977. Standard Techniques for Pelagic Fish Egg and Larvae Surveys. FAO Fisheries Technical Paper 175.

Snedecor, G.W. and W.G. Cochran. 1989. *Statistical Methods*, Eighth Edition, Iowa State University Press.

U.S. Coast Guard and Maritime Administration (USCG and MARAD). 2004. Final Environmental Impact Statement for the Gulf Landing LLC Deepwater Port License Application; Appendix G (prepared by e2M): Ichthyoplankton Assessment Model Methodology and Results for the Gulf Landing LLC Deepwater Port License Application Environmental Impact Statement. U.S. Department of Transportation Docket # USCG-2004-16860-67. November 2004. Washington, D.C.

__________. 2005. Final Environmental Impact Statement for the Gulf Landing LLC Deepwater Port License Application; Revised Appendix G: Ichthyoplankton Assessment Model Methodology and Results for the Gulf Landing LLC Deepwater Port License Application Environmental Impact Statement. USCG-2004-16860-89. February 2005.

ATTACHMENT A

SOURCE WATERBODY

ATTACHMENT B

SEAMAP ANALYSIS METHODS

DATA SOURCES

The databases used for the Ichthyoplankton Impact Analysis were obtained from NOAA Fisheries, Pascagoula, dated 9/2/04. They were obtained from the following file transfer protocol site: ftp://ftp.mslabs.noaa.gov/pub/seamap.

The file obtained from this location is: Ichthyoplankton_9_2_04ascii.zip. This file includes three datasets containing different parameters of SEAMAP data. Structural relationships from these datasets were set-up in order to analyze the fish egg and larvae data. These three datasets include the following:

- STAREC: This dataset contains data regarding when and where sampling operations take place. The following queried fields were necessary to complete the analysis:
    1. VESSEL
    2. CRUISE_NO
    3. P_STA_NO
    4. S_LATD
    5. S_LATM
    6. S_LOND
    7. S_LONM
    8. S_STA_NO
    9. MO_DAY_YR

- ISTRWK: This dataset contains information on the plankton samples taken at each station and the results of all egg data collected. The following queried fields were necessary to complete the analysis:
    1. VESSEL
    2. CRUISE_NO
    3. P_STA_NO
    4. VOL_FILT
    5. NO_EGGS
    6. EGGS_ALIQU

- ISARWK: This is the individual taxa dataset which contains information on each individual fish larvae taxa collected in each sample. The following queried fields were necessary to complete the analysis:
    1. VESSEL
    2. CRUISE_NO
    3. P_STA_NO
    4. TAXONOMIC
    5. TAXON
    6. MEAS
    7. NOT_MEAS
    8. ALIQUOT

MERGING DATASETS

Information in STAREC and ISTRWK can be linked (merged) by setting a relationship between the unique combination of the VESSEL, CRUISE_NO and P_STA_NO variables or the V_C_P variable. Information in ISTRWK and ISARWK can be linked (merged) by setting a relationship between the unique combination of VESSEL, CRUISE_NO, P_STA_NO and SAMPLE_NO variables or the V_C_P_S variable.

DATA ANALYSIS

The STAREC dataset, with its station time and place information is the core dataset for these analyses. The dataset contains latitude and longitude values, which are converted to decimal degrees, and the sample dates are used to create the variable for sample month and sample year which are then transferred to a database file. Then the STAREC, ISTRWK, and ISARWK files are merged using the variables listed above to create a datasheet containing: VCP, MO-DAY_YR, VOL_FILT_, DEPTH_MA_, NUM_EGGS, EGGS_ALIQUOT, TAXONOMIC, TAON, MEAS, NOT_MEAS, and ALIQUOT. After the merger, the VOL_FILT is also converted from a negative value to NA, to adjust for differences in the handling of missing data.

The SEAMAP station data used in the analysis are restricted to the samples found within the Project area/source waterbody. All stations falling on or inside the boundaries of the Project area were included.

In order to use the egg data in the analysis, the number of eggs per cubic meter of water filtered was calculated for each sample in the combined STAREC-ISTRWK dataset where the VOL_FLT variable is greater than zero. The mean egg catch per unit effort (cpue) and two standard errors are then calculated to produce the mean value with upper and lower confidence intervals. Where the NO_EGGS variable is equal to zero and the EGG_ALIQU variable is not a valid value, the result is changed to NA.

In order to use the fish larvae data in the analysis, the ISARWK data in the database are restricted to only those entries containing a value for VOL_FILT, so that the values can be used in a quantitative analysis. The variable MEAS and NOT.MEAS are adjusted to zero values where the value in the record is -9, then they are added together to create the total count variable, which is then adjusted by the ALIQUOT variable factor to represent a whole sample.

Fish larvae catch for each sample is aggregated, then divided by the sample VOL FILT parameter to create the sample catch per cubic meter of water filter, fish cpue. From that, the mean fish cpue is calculated to produce the mean value with upper and lower confidence intervals, by month of sampling and the sampling period. Once that calculation is complete, catch rates for fish larvae for each individual taxa are calculated as catch per cubic meter of water filtered. Then the catch rate per cubic meter of water filtered is calculated for each taxa at each station. These were summarized to produce the mean cpue for each taxon along with standard errors, so that upper and lower confidence intervals can be calculated.

ATTACHMENT C

AGE-1 EQUIVALENT CALCULATIONS

LIST OF TABLES

ATTACHMENT D

EQUIVALENT YIELD ANALYSIS

LIST OF TABLES

